Think **Harvey Tool** First

Unique Selection

We offer a comprehensive selection of more than 30,000 miniature and specialty cutting tools that are all fully stocked. The breadth and depth of our products help solve the industry's toughest machining challenges.

Quality Products

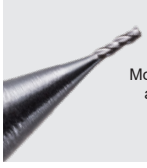
We are committed to designing unique geometries that optimize cutting performance for a variety of materials and applications. We introduce hundreds of new tools into the market every 6 months, offering our customers the solutions they need most.

Same-Day Shipping

Our fully stocked inventory is ready to ship day of purchase. We offer second day delivery at ground pricing, and any overnight orders ship until 7:00 p.m. EST. For additional shipping information and stock availability, please visit **HarveyTool.com**.

HARVEY PERFORMANCE COMPANY

HARVEY TOOL



Think Harvey Tool First

More than 30,000 miniature and specialty end mills. Ship today, in your machine tomorrow.

Helical

Let Helical Impress You

Material-optimized high performance carbide end mills. Run faster, push harder, machine smarter.

MICRO 100

Make More with Micro 100

Exceptional quality turning tools designed for durability and performance in a range of difficult-to-machine materials.

TITAN USA

MADE IN THE U.S.A.

Trust in Titan USA

Broad assortment of quality, fully stocked cutting tools at exceptional value.

COREHOG

Innovative Tools for Innovative Materials

The industry's most innovative and advanced composite and honeycomb core cutting tools.

VALOR HOLEMAKING

Victory Starts with Valor Holemaking

High performance drills & complementary tooling solutions that revolutionize CNC holemaking.

What We Offer

Miniature End Mills pg 9

Select from over **9,500** miniature end mills down to .001” cutter diameter, available in a variety of styles and profiles.

Material Specific End Mills pg 105

Achieve the best results in high temp alloys, medium alloys, free machining steels, aluminum alloys, graphite, plastics, composites, wood, and more with over **6,200** high performance end mills.

Undercutting End Mills pg 279

Over **1,100** options, with 3 different wrap angles: 300°, 270°, and 220°.

Drill/End Mills pg 294

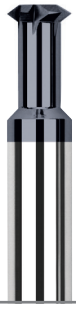
Over **600** options, with cutter diameters from 1/64" to 1".

Chamfer Cutters pg 306

Over **1,200** options, with diameters from 1/32” to 1” and 21 different angles per side.

Engraving Cutters pg 335

Over **1,000** options, available with 17 included angles and a variety of styles.



Double Angle Shank Cutters pg 358

Over **700** options in multiple styles and reach lengths and 14 included angles.

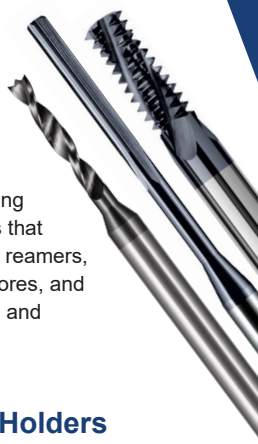
Keyseat Cutters pg 369

Over **2,200** options, with cutter diameters from 1/16” to 1-1/2”.

Slitting Saws pg 400

Over **190** coated and uncoated options, with thicknesses from .0100” to .2500”.

Holemaking & Threading pg 435



Solve a variety of holemaking challenges from spotting to threading with over **4,800** options that include miniature drills, reamers, countersinks, counterbores, and single-form, multi-form, and tri-form thread mills.

Corner Rounding End Mills pg 405

Over **900** options, with over 100 radii from .003” to 5/8”.

Dovetail Cutters pg 421

Over **600** options, with 17 included angles.

Tool Holders pg 535

Pair our exceptional tooling with different styles and reaches of tool holders. Choices range from Extended Reach Tool Holders, Solid ER Integrated Tool Holders, Saw Arbors, ER Collets, and ER Performance Collets.

30,000+ Tools

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Think **Harvey Tool** First

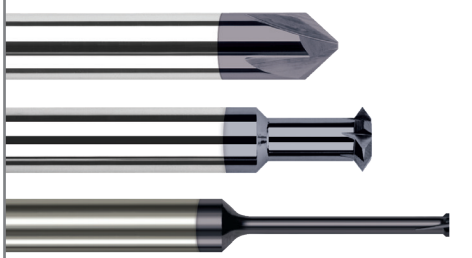
FEATURED SOLUTIONS

Mold Tool & Die

Building complex cavities requires **high performance tooling** that can mill **precise contours** while leaving **superior part finish.** Harvey Tool offers a selection of **tapered end mills** with unique geometries that are perfect for tackling the tough machining requirements of the **die and mold making** industries.

Corner Conditioning

Whether prepping a corner for functional or aesthetic reasons, Harvey Tool has a variety of unique and **hard-to-find profiles** for machining **corner requirements** and features. With multiple **angle options, reaches, and styles,** we are confident that our tools can solve any corner conditioning challenge.



Finishing

Achieving **optimal surface finish** is a critical goal for any machinist, but not all tools are designed with finish requirements in mind. Harvey Tool has a wide selection of finishing tools with **material-specific geometries** designed to ensure **tight part tolerances and reduce witness marks.**

Double Ended

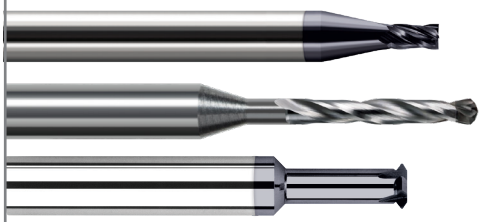
While all tools experience normal wear over time, Harvey Tool's double-ended tooling offering allows you to experience **twice your tool's longevity.** Simply flip your tool over to its second cutting side and continue your machining.

Deburring

Deburring parts can be tiresome, expensive, and time-consuming, especially if done by hand. Harvey Tool's engineers have created a variety of **CNC-toleranced** deburring tools that allow you to deburr **in your CNC machine,** providing better finish, **reduced part and labor costs,** and increased capacity.

Metric Tooling

Our metric product offering includes high performance end mills and drills each with specialized geometry that will enhance tool results in a **variety of materials**. Featuring **tight tolerances** for ultra-precision micromachining and larger shank diameters for **increased rigidity,** these products will improve performance, decrease cycle times, and save you money.



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While ALL of our stocked products can be found in our full product catalog, our Featured Solutions series presents strategically grouped tools from across our catalog for easy reference.

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Machining Advisor Pro generates customized running parameters for your specific setup and material to take your Harvey Tool products further at the spindle.

Optimized for More Than 41,000 Products
Increase material removal rates and boost shop productivity with customized running parameters, specifically tailored for Harvey Tool, Helical Solutions and Valor Holemaking products.

Customizable Speeds & Feeds
Generate specialized machining parameters by pairing your tool with your exact path, material, and machine setup.

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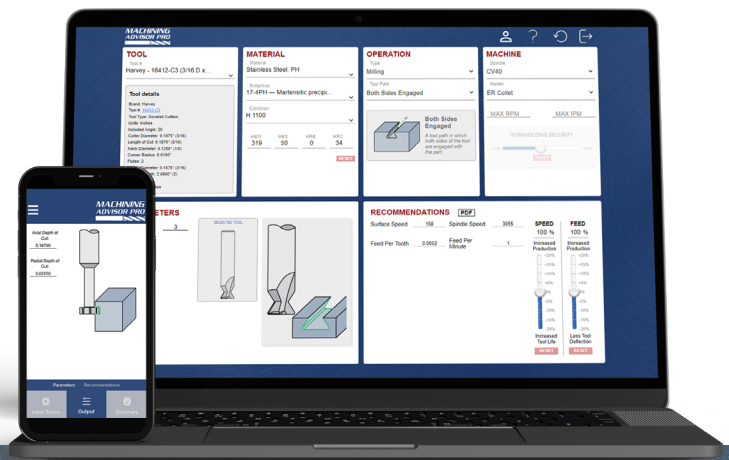


A Machinist Favorite

With Machining Advisor Pro I've become much more efficient at programming. The software takes the guess work and the headache out of feed, speed, step over, and step down to ensure it's going to work the first time.

Ryan S.
Shop Owner, Avella, PA

MINIATURE END MILLS

SQUARE

BALL

CORNER RADIUS

CORNER CHAMFER

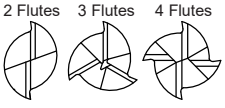
TAPERED

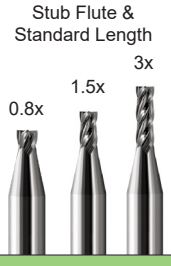
NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard

- **Cutter diameter down to .001**
- Center cutting
- Solid carbide
- CNC ground in the USA





SQUARE

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND				
D_1 +.0005" −.0005"	L_2 +.010" −.000"	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	
.001	**.001** (1.5x)	1/8	1-1/2	13901			60.20									
.001	**.003** (3x)	1/8	1-1/2	72001			60.20									
.002	**.003** (1.5x)	1/8	1-1/2	13902			52.40									
.002	**.006** (3x)	1/8	1-1/2	72002			52.40									
.003	**.004** (1.5x)	1/8	1-1/2	13903			45.20									
.003	**.009** (3x)	1/8	1-1/2	72003			45.20									
.004 (.1 mm)	**.006** (1.5x)	1/8	1-1/2	13904			38.80									
.004 (.1 mm)	**.012** (3x)	1/8	1-1/2	72004			38.80									
.005	**.007** (1.5x)	1/8	1-1/2	13905	823005	14005*	35.10	13905-C3	823005-C3	14005-C3*	40.60					
.005	**.015** (3x)	1/8	1-1/2	72005	836305	73005*	35.10	72005-C3	836305-C3	73005-C3*	40.60	72005-C4		73005-C4*	48.90	
.006	**.009** (1.5x)	1/8	1-1/2	13906		14006*	35.90	13906-C3		14006-C3*	41.40					
.006	**.018** (3x)	1/8	1-1/2	72006	836306	73006*	35.90	72006-C3	836306-C3	73006-C3*	41.40	72006-C4		73006-C4*	49.70	
.007	**.010** (1.5x)	1/8	1-1/2	13907		14007*	35.20	13907-C3		14007-C3*	40.70					
.007	**.021** (3x)	1/8	1-1/2	72007	836307	73007*	35.90	72007-C3	836307-C3	73007-C3*	41.40	72007-C4		73007-C4*	49.70	
.008 (.2 mm)	**.012** (1.5x)	1/8	1-1/2	13908		14008*	35.20	13908-C3		14008-C3*	40.70					
.008 (.2 mm)	**.024** (3x)	1/8	1-1/2	72008	836308	73008*	35.90	72008-C3	836308-C3	73008-C3*	41.40	72008-C4		73008-C4*	49.70	
.009	**.013** (1.5x)	1/8	1-1/2	13909		14009*	35.20	13909-C3		14009-C3*	40.70			14009-C4*	49.00	
.009	**.027** (3x)	1/8	1-1/2	72009	836309	73009*	35.20	72009-C3	836309-C3	73009-C3*	40.70					
.010	**.015** (1.5x)	1/8	1-1/2	13910	823010	14010	27.80	13910-C3	823010-C3	14010-C3	33.30	13910-C4		14010-C4	41.60	
.010	**.030** (3x)	1/8	1-1/2	72010	836310	73010	27.80	72010-C3	836310-C3	73010-C3	33.30	72010-C4		73010-C4	41.60	
.011	**.016** (1.5x)	1/8	1-1/2	13911		14011	28.30	13911-C3		14011-C3	33.80					
.011	**.033** (3x)	1/8	1-1/2	72011	836311	73011	28.90	72011-C3	836311-C3	73011-C3	34.40			73011-C4	42.70	
.012 (.3 mm)	**.018** (1.5x)	1/8	1-1/2	13912	823012	14012	28.30	13912-C3	823012-C3	14012-C3	33.80	13912-C4		14012-C4	42.10	
.012 (.3 mm)	**.036** (3x)	1/8	1-1/2	72012	836312	73012	28.90	72012-C3	836312-C3	73012-C3	34.40	72012-C4		73012-C4	42.70	
.013	**.019** (1.5x)	1/8	1-1/2	13913		14013	28.30	13913-C3		14013-C3	33.80					
.013	**.039** (3x)	1/8	1-1/2	72013	836313	73013	28.30	72013-C3	836313-C3	73013-C3	33.80			73013-C4	42.10	
.014	**.021** (1.5x)	1/8	1-1/2	13914		14014	28.30	13914-C3		14014-C3	33.80					
.014	**.042** (3x)	1/8	1-1/2	72014	836314	73014	28.30	72014-C3	836314-C3	73014-C3	33.80			73014-C4	42.10	
.015 (1/64)	**.012** (0.8x)	1/8	1-1/2			771315	24.70			771315-C3	30.20					
.015 (1/64)	**.022** (1.5x)	1/8	1-1/2	13915	823015	14015	23.30	13915-C3	823015-C3	14015-C3	28.80	13915-C4		14015-C4	37.10	
.015 (1/64)	**.045** (3x)	1/8	1-1/2	72015	836315	73015	23.30	72015-C3	836315-C3	73015-C3	28.80	72015-C4	836315-C4	73015-C4	37.10	NEW
.016 (.4 mm)	**.024** (1.5x)	1/8	1-1/2	13916	823016	14016	25.50	13916-C3	823016-C3	14016-C3	31.00	13916-C4			39.30	
.016 (.4 mm)	**.048** (3x)	1/8	1-1/2	72016	836316	73016	25.50	72016-C3	836316-C3	73016-C3	31.00			73016-C4	39.30	
.017	**.026** (1.5x)	1/8	1-1/2	13917		14017	25.50	13917-C3		14017-C3	31.00					
.017	**.051** (3x)	1/8	1-1/2	72017	836317	73017	25.50	72017-C3	836317-C3	73017-C3	31.00			73017-C4	39.30	
.018	**.027** (1.5x)	1/8	1-1/2	13918		14018	25.50	13918-C3		14018-C3	31.00					
.018	**.054** (3x)	1/8	1-1/2	72018	836318	73018	25.50	72018-C3	836318-C3	73018-C3	31.00	72018-C4		73018-C4	39.30	
.019	**.029** (1.5x)	1/8	1-1/2	13919		14019	25.50	13919-C3		14019-C3	31.00					
.019	**.057** (3x)	1/8	1-1/2	72019	836319	73019	25.50	72019-C3	836319-C3	73019-C3	31.00			73019-C4	39.30	

Coated sizes down to .005"!

*End cutting (not center cutting)

continued on next page

MINIATURE END MILLS

Square – Stub & Standard (cont.)

continued from previous page

	CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				ALTiN COATED				AMORPHOUS DIAMOND			
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE
NEW	.020 (.5 mm)	**.016** (0.8x)	1/8	1-1/2	733420		771320	23.60	733420-C3		771320-C3	29.10				
	.020 (.5 mm)	**.030** (1.5x)	1/8	1-1/2	13920	823020	14020	22.30	13920-C3	823020-C3	14020-C3	27.80	13920-C4		14020-C4	36.10
	.020 (.5 mm)	**.060** (3x)	1/8	1-1/2	72020	836320	73020	22.30	72020-C3	836320-C3	73020-C3	27.80	72020-C4		73020-C4	36.10
	.021	**.031** (1.5x)	1/8	1-1/2	13921		14021	24.20	13921-C3		14021-C3	29.70				
	.021	**.063** (3x)	1/8	1-1/2	72021	836321	73021	24.20	72021-C3	836321-C3	73021-C3	29.70			73021-C4	38.00
	.022	**.033** (1.5x)	1/8	1-1/2	13922		14022	24.20	13922-C3		14022-C3	29.70				
	.022	**.066** (3x)	1/8	1-1/2	72022	836322	73022	24.20	72022-C3	836322-C3	73022-C3	29.70			73022-C4	38.00
NEW	.023	**.035** (1.5x)	1/8	1-1/2	13923	823023	14023	24.20	13923-C3	823023-C3	14023-C3	29.70	13923-C4			38.00
	.023	**.069** (3x)	1/8	1-1/2	72023	836323	73023	24.20	72023-C3	836323-C3	73023-C3	29.70			73023-C4	38.00
	.024 (.6 mm)	**.036** (1.5x)	1/8	1-1/2	13924		14024	24.20	13924-C3		14024-C3	29.70				
	.024 (.6 mm)	**.072** (3x)	1/8	1-1/2	72024	836324	73024	24.20	72024-C3	836324-C3	73024-C3	29.70	72024-C4		73024-C4	38.00
	.025	**.037** (1.5x)	1/8	1-1/2	13925	823025	14025	20.50	13925-C3	823025-C3	14025-C3	26.00	13925-C4		14025-C4	34.30
	.025	**.075** (3x)	1/8	1-1/2	72025	836325	73025	20.50	72025-C3	836325-C3	73025-C3	26.00	72025-C4		73025-C4	34.30
	.026	**.039** (1.5x)	1/8	1-1/2	13926		14026	22.50	13926-C3		14026-C3	28.00				
	.026	**.078** (3x)	1/8	1-1/2	72026	836326	73026	22.50	72026-C3	836326-C3	73026-C3	28.00			73026-C4	36.30
	.027	**.041** (1.5x)	1/8	1-1/2	13927		14027	22.50	13927-C3		14027-C3	28.00				
	.027	**.081** (3x)	1/8	1-1/2	72027	836327	73027	22.50	72027-C3	836327-C3	73027-C3	28.00			73027-C4	36.30
	.028 (.7 mm)	**.042** (1.5x)	1/8	1-1/2	13928		14028	22.50	13928-C3		14028-C3	28.00				
	.028 (.7 mm)	**.084** (3x)	1/8	1-1/2	72028	836328	73028	22.50	72028-C3	836328-C3	73028-C3	28.00			73028-C4	36.30
	.029	**.043** (1.5x)	1/8	1-1/2	13929		14029	22.50	13929-C3		14029-C3	28.00				
	.029	**.087** (3x)	1/8	1-1/2	72029	836329	73029	22.50	72029-C3	836329-C3	73029-C3	28.00			73029-C4	36.30
	.030	**.045** (1.5x)	1/8	1-1/2	13930	823030	14030	20.50	13930-C3	823030-C3	14030-C3	26.00	13930-C4		14030-C4	34.30
	.030	**.090** (3x)	1/8	1-1/2	72030	836330	73030	20.50	72030-C3	836330-C3	73030-C3	26.00	72030-C4		73030-C4	34.30
	.031 (1/32)	**.025** (0.8x)	1/8	1-1/2	733431	736531	771331	22.00	733431-C3	736531-C3	771331-C3	27.50				
	.031 (1/32)	**.046** (1.5x)	1/8	1-1/2	13931	823031	14031	20.50	13931-C3	823031-C3	14031-C3	26.00	13931-C4		14031-C4	34.30
	.031 (1/32)	**.093** (3x)	1/8	1-1/2	72031	836331	73031	20.50	72031-C3	836331-C3	73031-C3	26.00	72031-C4	836331-C4	73031-C4	34.30
	.032	**.048** (1.5x)	1/8	1-1/2	13932		14032	22.50	13932-C3		14032-C3	28.00				
	.032	**.096** (3x)	1/8	1-1/2	72032		73032	22.50	72032-C3		73032-C3	28.00				
	.033	**.049** (1.5x)	1/8	1-1/2	13933		14033	22.50	13933-C3		14033-C3	28.00				
	.033	**.099** (3x)	1/8	1-1/2	72033		73033	22.50	72033-C3		73033-C3	28.00				
	.034	**.051** (1.5x)	1/8	1-1/2	13934		14034	22.50	13934-C3		14034-C3	28.00				
	.034	**.102** (3x)	1/8	1-1/2	72034		73034	22.50	72034-C3		73034-C3	28.00				
	.035 (.9 mm)	**.052** (1.5x)	1/8	1-1/2	13935	823035	14035	17.90	13935-C3	823035-C3	14035-C3	23.40			14035-C4	31.70
	.035 (.9 mm)	**.105** (3x)	1/8	1-1/2	72035	836335	73035	17.90	72035-C3	836335-C3	73035-C3	23.40	72035-C4		73035-C4	31.70
	.036	**.054** (1.5x)	1/8	1-1/2	13936		14036	19.40	13936-C3		14036-C3	24.90				
	.036	**.108** (3x)	1/8	1-1/2	72036		73036	19.40	72036-C3		73036-C3	24.90				
	.037	**.055** (1.5x)	1/8	1-1/2	13937		14037	19.40	13937-C3		14037-C3	24.90				
	.037	**.111** (3x)	1/8	1-1/2	72037		73037	19.40	72037-C3		73037-C3	24.90				
	.038	**.057** (1.5x)	1/8	1-1/2	13938		14038	19.40	13938-C3		14038-C3	24.90				
	.038	**.114** (3x)	1/8	1-1/2	72038	836338	73038	19.40	72038-C3	836338-C3	73038-C3	24.90			73038-C4	33.20
	.039 (1 mm)	**.058** (1.5x)	1/8	1-1/2	13939	823039	14039	19.20	13939-C3	823039-C3	14039-C3	24.70				
	.039 (1 mm)	**.117** (3x)	1/8	1-1/2	72039	836339	73039	19.20	72039-C3	836339-C3	73039-C3	24.70	72039-C4		73039-C4	33.00
	.040	**.032** (0.8x)	1/8	1-1/2			771340	19.40			771340-C3	24.90				
	.040	**.060** (1.5x)	1/8	1-1/2	13940	823040	14040	17.90	13940-C3	823040-C3	14040-C3	23.40	13940-C4		14040-C4	31.70
	.040	**.120** (3x)	1/8	1-1/2	72040	836340	73040	17.90	72040-C3	836340-C3	73040-C3	23.40	72040-C4		73040-C4	31.70
	.041	**.062** (1.5x)	1/8	1-1/2	13941		14041	19.40	13941-C3		14041-C3	24.90				
	.041	**.123** (3x)	1/8	1-1/2	72041		73041	19.40	72041-C3		73041-C3	24.90				

*End cutting (not center cutting)

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NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

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SQUARE

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				ALTiN COATED				AMORPHOUS DIAMOND				
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	
.042	**.063** (1.5x)	1/8	1-1/2	13942		14042	19.40	13942-C3		14042-C3	24.90					
.042	**.126** (3x)	1/8	1-1/2	72042		73042	19.40	72042-C3		73042-C3	24.90					
.043 (1.1 mm)	**.065** (1.5x)	1/8	1-1/2	13943		14043	19.40	13943-C3		14043-C3	24.90					
.043 (1.1 mm)	**.129** (3x)	1/8	1-1/2	72043	836343	73043	19.40	72043-C3	836343-C3	73043-C3	24.90					
.044	**.066** (1.5x)	1/8	1-1/2	13944		14044	19.40	13944-C3		14044-C3	24.90					
.044	**.132** (3x)	1/8	1-1/2	72044	836344	73044	19.40	72044-C3	836344-C3	73044-C3	24.90			73044-C4	33.20	
.045	**.067** (1.5x)	1/8	1-1/2	13945	823045	14045	18.00	13945-C3	823045-C3	14045-C3	23.50			14045-C4	31.80	
.045	**.135** (3x)	1/8	1-1/2	72045	836345	73045	17.90	72045-C3	836345-C3	73045-C3	23.40	72045-C4		73045-C4	31.70	
.046	**.069** (1.5x)	1/8	1-1/2			14046	19.40			14046-C3	24.90					
.046	**.138** (3x)	1/8	1-1/2	72046	836346	73046	19.40	72046-C3	836346-C3	73046-C3	24.90					
.047 (3/64)	**.038** (0.8x)	1/8	1-1/2			771347	19.40			771347-C3	24.90					
.047 (3/64)	**.070** (1.5x)	1/8	1-1/2	13947	823047	14047	17.90	13947-C3	823047-C3	14047-C3	23.40	13947-C4		14047-C4	31.70	
.047 (3/64)	**.141** (3x)	1/8	1-1/2	72047	836347	73047	17.90	72047-C3	836347-C3	73047-C3	23.40	72047-C4		73047-C4	31.70	
.048	**.144** (3x)	1/8	1-1/2	72048		73048	19.40	72048-C3		73048-C3	24.90					
.049	**.147** (3x)	1/8	1-1/2	72049		73049	19.40	72049-C3		73049-C3	24.90					
.050	**.040** (0.8x)	1/8	1-1/2			771350	19.40			771350-C3	24.90					
.050	**.075** (1.5x)	1/8	1-1/2	13950	823050	14050	17.90	13950-C3	823050-C3	14050-C3	23.40	13950-C4		14050-C4	31.70	
.050	**.150** (3x)	1/8	1-1/2	72050	836350	73050	17.90	72050-C3	836350-C3	73050-C3	23.40	72050-C4		73050-C4	31.70	
.051 (1.3 mm)	**.077** (1.5x)	1/8	1-1/2			14051	19.70			14051-C3	25.20					
.051 (1.3 mm)	**.153** (3x)	1/8	1-1/2	72051		73051	19.40	72051-C3		73051-C3	24.90					
.052	**.078** (1.5x)	1/8	1-1/2	13952		14052	19.40	13952-C3		14052-C3	24.90					
.052	**.156** (3x)	1/8	1-1/2	72052	836352	73052	19.40	72052-C3	836352-C3	73052-C3	24.90	72052-C4			33.20	
.053	**.080** (1.5x)	1/8	1-1/2			14053	19.40			14053-C3	24.90					
.053	**.159** (3x)	1/8	1-1/2	72053	836353	73053	19.40	72053-C3	836353-C3	73053-C3	24.90			73053-C4	33.20	
.054	**.162** (3x)	1/8	1-1/2	72054		73054	19.40	72054-C3		73054-C3	24.90					
.055 (1.4 mm)	**.044** (0.8x)	1/8	1-1/2			771355	19.40			771355-C3	24.90					NEW
.055 (1.4 mm)	**.082** (1.5x)	1/8	1-1/2	13955	823055	14055	17.90	13955-C3	823055-C3	14055-C3	23.40	13955-C4		14055-C4	31.70	
.055 (1.4 mm)	**.165** (3x)	1/8	1-1/2	72055	836355	73055	17.90	72055-C3	836355-C3	73055-C3	23.40	72055-C4		73055-C4	31.70	
.056	**.168** (3x)	1/8	1-1/2	72056		73056	19.40	72056-C3		73056-C3	24.90					
.057	**.086** (1.5x)	1/8	1-1/2			14057	19.40			14057-C3	24.90					
.057	**.171** (3x)	1/8	1-1/2	72057	836357	73057	19.40	72057-C3	836357-C3	73057-C3	24.90	72057-C4		73057-C4	33.20	
.058	**.087** (1.5x)	1/8	1-1/2			14058	19.40			14058-C3	24.90					
.058	**.174** (3x)	1/8	1-1/2	72058		73058	19.40	72058-C3		73058-C3	24.90			73058-C4	33.20	
.059 (1.5 mm)	**.089** (1.5x)	1/8	1-1/2	13959	823059	14059	19.40	13959-C3	823059-C3	14059-C3	24.90					
.059 (1.5 mm)	**.177** (3x)	1/8	1-1/2	72059	836359	73059	19.40	72059-C3	836359-C3	73059-C3	24.90			73059-C4	33.20	
.060	**.048** (0.8x)	1/8	1-1/2			771360	19.40			771360-C3	24.90					
.060	**.090** (1.5x)	1/8	1-1/2	13960	823060	14060	17.90	13960-C3	823060-C3	14060-C3	23.40			14060-C4	31.70	
.060	**.180** (3x)	1/8	1-1/2	72060	836360	73060	17.90	72060-C3	836360-C3	73060-C3	23.40	72060-C4		73060-C4	31.70	
.061	**.183** (3x)	1/8	1-1/2			73061	19.50			73061-C3	25.00					
.062 (1/16)	**.050** (0.8x)	1/8	1-1/2	733462	736562	771362	20.10	733462-C3	736562-C3	771362-C3	25.60					
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	13962	823062	14062	16.10	13962-C3	823062-C3	14062-C3	21.60	13962-C4	823062-C4	14062-C4	29.90	NEW
.062 (1/16)	**.186** (3x)	1/8	1-1/2	72062	836362	73062	16.10	72062-C3	836362-C3	73062-C3	21.60	72062-C4	836362-C4	73062-C4	29.90	
.063 (1.6 mm)	**.095** (1.5x)	1/8	1-1/2			14063	19.50			14063-C3	25.00					NEW
.063 (1.6 mm)	**.189** (3x)	1/8	1-1/2			73063	19.50			73063-C3	25.00					
.064	**.096** (1.5x)	1/8	1-1/2			14064	16.70			14064-C3	22.20					
.064	**.192** (3x)	1/8	1-1/2	72064		73064	19.50	72064-C3		73064-C3	25.00					

*End cutting (not center cutting)

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MINIATURE END MILLS

Square – Stub & Standard (cont.)

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	CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″		D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE
	.065	**.097**	(1.5x)	1/8	1-1/2	13965	823065	14065	16.40	13965-C3	823065-C3	14065-C3	21.90			14065-C4	30.20
	.065	**.195**	(3x)	1/8	1-1/2	72065	836365	73065	16.40	72065-C3	836365-C3	73065-C3	21.90	72065-C4		73065-C4	30.20
	.066	**.198**	(3x)	1/8	1-1/2			73066	19.50			73066-C3	25.00				
	.067 (1.7 mm)	**.201**	(3x)	1/8	1-1/2			73067	19.50			73067-C3	25.00				
	.068	**.204**	(3x)	1/8	1-1/2			73068	19.50			73068-C3	25.00				
	.069	**.207**	(3x)	1/8	1-1/2			73069	19.50			73069-C3	25.00				
	.070	**.105**	(1.5x)	1/8	1-1/2	13970	823070	14070	16.40	13970-C3	823070-C3	14070-C3	21.90			14070-C4	30.20
	.070	**.210**	(3x)	1/8	1-1/2	72070	836370	73070	16.40	72070-C3	836370-C3	73070-C3	21.90	72070-C4		73070-C4	30.20
	.071 (1.8 mm)	**.107**	(1.5x)	1/8	1-1/2			14071	19.50			14071-C3	25.00				
	.071 (1.8 mm)	**.213**	(3x)	1/8	1-1/2	72071		73071	19.50	72071-C3		73071-C3	25.00				
NEW	.072	**.216**	(3x)	1/8	1-1/2	72072		73072	19.50	72072-C3		73072-C3	25.00				
	.073	**.219**	(3x)	1/8	1-1/2			73073	19.50			73073-C3	25.00				
	.074	**.222**	(3x)	1/8	1-1/2			73074	19.50			73074-C3	25.00				
	.075 (1.9 mm)	**.112**	(1.5x)	1/8	1-1/2	13975	823075	14075	16.40	13975-C3	823075-C3	14075-C3	21.90				
	.075 (1.9 mm)	**.225**	(3x)	1/8	1-1/2	72075	836375	73075	16.40	72075-C3	836375-C3	73075-C3	21.90			73075-C4	30.20
	.076	**.228**	(3x)	1/8	1-1/2			73076	19.50			73076-C3	25.00				
	.077	**.231**	(3x)	1/8	1-1/2			73077	19.50			73077-C3	25.00				
	.078 (5/64)	**.062**	(0.8x)	1/8	1-1/2			771378	17.50			771378-C3	23.00				
	.078 (5/64)	**.117**	(1.5x)	1/8	1-1/2	13978	823078	14078	16.10	13978-C3	823078-C3	14078-C3	21.60	13978-C4		14078-C4	29.90
	.078 (5/64)	**.234**	(3x)	1/8	1-1/2	72078	836378	73078	16.10	72078-C3	836378-C3	73078-C3	21.60	72078-C4	836378-C4	73078-C4	29.90
	.079	**.237**	(3x)	1/8	1-1/2			73079	19.50			73079-C3	25.00				
	.080	**.120**	(1.5x)	1/8	1-1/2	13980	823080	14080	16.40	13980-C3	823080-C3	14080-C3	21.90				
	.080	**.240**	(3x)	1/8	1-1/2	72080	836380	73080	16.10	72080-C3	836380-C3	73080-C3	21.60	72080-C4		73080-C4	29.90
	.081	**.243**	(3x)	1/8	1-1/2			73081	19.50			73081-C3	25.00				
	.082	**.246**	(3x)	1/8	1-1/2			73082	19.50			73082-C3	25.00				
	.083 (2.1 mm)	**.249**	(3x)	1/8	1-1/2			73083	19.50			73083-C3	25.00				
	.084	**.252**	(3x)	1/8	1-1/2			73084	19.50			73084-C3	25.00				
	.085	**.127**	(1.5x)	1/8	1-1/2	13985	823085	14085	16.40	13985-C3	823085-C3	14085-C3	21.90				
	.085	**.255**	(3x)	1/8	1-1/2	72085	836385	73085	16.40	72085-C3	836385-C3	73085-C3	21.90			73085-C4	30.20
	.086	**.258**	(3x)	1/8	1-1/2			73086	19.50			73086-C3	25.00				
	.087 (2.2 mm)	**.261**	(3x)	1/8	1-1/2			73087	19.50			73087-C3	25.00				
	.088	**.132**	(1.5x)	1/8	1-1/2			14088	16.70			14088-C3	22.20				
	.088	**.264**	(3x)	1/8	1-1/2			73088	19.50			73088-C3	25.00				
	.089	**.267**	(3x)	1/8	1-1/2			73089	19.50			73089-C3	25.00				
	.090	**.135**	(1.5x)	1/8	1-1/2	13990	823090	14090	16.10	13990-C3	823090-C3	14090-C3	21.60			14090-C4	29.90
	.090	**.270**	(3x)	1/8	1-1/2	72090	836390	73090	16.10	72090-C3	836390-C3	73090-C3	21.60	72090-C4		73090-C4	29.90
	.091 (2.3 mm)	**.273**	(3x)	1/8	1-1/2			73091	19.50			73091-C3	25.00				
	.092	**.276**	(3x)	1/8	1-1/2			73092	19.50			73092-C3	25.00			73092-C4	33.30
	.093 (3/32)	**.074**	(0.8x)	1/8	1-1/2	733493	736593	771393	17.70	733493-C3	736593-C3	771393-C3	23.20				
	.093 (3/32)	**.139**	(1.5x)	1/8	1-1/2	13993	823093	14093	16.10	13993-C3	823093-C3	14093-C3	21.60	13993-C4		14093-C4	29.90
	.093 (3/32)	**.279**	(3x)	1/8	1-1/2	72093	836393	73093	16.10	72093-C3	836393-C3	73093-C3	21.60	72093-C4	836393-C4	73093-C4	29.90
	.094 (2.4 mm)	**.141**	(1.5x)	1/8	1-1/2			14094	19.80			14094-C3	25.30				
	.094 (2.4 mm)	**.282**	(3x)	1/8	1-1/2	72094		73094	19.50	72094-C3		73094-C3	25.00				
	.095	**.142**	(1.5x)	1/8	1-1/2	13995	823095	14095	16.40	13995-C3	823095-C3	14095-C3	21.90				
	.095	**.285**	(3x)	1/8	1-1/2	72095	836395	73095	16.40	72095-C3	836395-C3	73095-C3	21.90			73095-C4	30.20
	.096	**.288**	(3x)	1/8	1-1/2			73096	19.50			73096-C3	25.00				
	.097	**.291**	(3x)	1/8	1-1/2			73097	19.50			73097-C3	25.00				

*End cutting (not center cutting)

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NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

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SQUARE

CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND				
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″		D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	
.098 (2.5 mm)	**.147**	(1.5x)	1/8	1-1/2			14098	19.50			14098-C3	25.00					
.098 (2.5 mm)	**.294**	(3x)	1/8	1-1/2	72098		73098	19.50	72098-C3		73098-C3	25.00					
.099	**.297**	(3x)	1/8	1-1/2			73099	19.50			73099-C3	25.00					
.100	**.150**	(1.5x)	1/8	1-1/2	13999	823100	14099	16.40	13999-C3	823100-C3	14099-C3	21.90	13999-C4		14099-C4	30.20	
.100	**.300**	(3x)	1/8	1-1/2	72100	836400	73100	16.10	72100-C3	836400-C3	73100-C3	21.60	72100-C4		73100-C4	29.90	
.101	**.303**	(3x)	1/8	1-1/2			73101	19.50			73101-C3	25.00					
.102 (2.6 mm)	**.306**	(3x)	1/8	1-1/2			73102	19.50			73102-C3	25.00					
.103	**.155**	(1.5x)	1/8	1-1/2			14103	19.50			14103-C3	25.00					NEW
.103	**.309**	(3x)	1/8	1-1/2			73103	19.50			73103-C3	25.00					
.104	**.312**	(3x)	1/8	1-1/2			73104	19.50			73104-C3	25.00					
.105	**.158**	(1.5x)	1/8	1-1/2	50200		50300	16.40	50200-C3		50300-C3	21.90					
.105	**.315**	(3x)	1/8	1-1/2	72105		73105	16.10	72105-C3		73105-C3	21.60			73105-C4	29.90	
.106 (2.7 mm)	**.318**	(3x)	1/8	1-1/2			73106	19.50			73106-C3	25.00					
.107	**.321**	(3x)	1/8	1-1/2			73107	19.50			73107-C3	25.00					
.108	**.324**	(3x)	1/8	1-1/2			73108	19.50			73108-C3	25.00					
.109 (7/64)	**.164**	(1.5x)	1/8	1-1/2	50201	823102	50301	16.10	50201-C3	823102-C3	50301-C3	21.60					
.109 (7/64)	**.327**	(3x)	1/8	1-1/2	72109	836402	73109	16.10	72109-C3	836402-C3	73109-C3	21.60			73109-C4	29.90	
.110	**.165**	(1.5x)	1/8	1-1/2	50202		50302	16.10	50202-C3		50302-C3	21.60					
.110	**.330**	(3x)	1/8	1-1/2	72110		73110	16.10	72110-C3		73110-C3	21.60			73110-C4	29.90	
.111 (2.8 mm)	**.333**	(3x)	1/8	1-1/2			73111	19.50			73111-C3	25.00					
.112	**.336**	(3x)	1/8	1-1/2			73112	19.50			73112-C3	25.00					
.113	**.339**	(3x)	1/8	1-1/2			73113	19.50			73113-C3	25.00					
.114 (2.9 mm)	**.341**	(3x)	1/8	1-1/2			73114	19.50			73114-C3	25.00					
.115	**.173**	(1.5x)	1/8	1-1/2	50203		50303	16.10	50203-C3		50303-C3	21.60					
.115	**.345**	(3x)	1/8	1-1/2	72115		73115	16.10	72115-C3		73115-C3	21.60			73115-C4	29.90	
.116	**.348**	(3x)	1/8	1-1/2			73116	19.50			73116-C3	25.00					
.117	**.351**	(3x)	1/8	1-1/2			73117	19.50			73117-C3	25.00					
.118 (3 mm)	**.177**	(1.5x)	1/8	1-1/2	50204	823105	50304	16.70	50204-C3	823105-C3	50304-C3	22.20			50304-C4	30.50	
.118 (3 mm)	**.354**	(3x)	1/8	1-1/2	72118	836405	73118	16.50	72118-C3	836405-C3	73118-C3	22.00	72118-C4		73118-C4	30.30	
.119	**.357**	(3x)	1/8	1-1/2			73119	19.50			73119-C3	25.00					
.120	**.180**	(1.5x)	1/8	1-1/2	50205		50305	16.10	50205-C3		50305-C3	21.60					
.120	**.360**	(3x)	1/8	1-1/2	72120	836406	73120	16.10	72120-C3	836406-C3	73120-C3	21.60			73120-C4	29.90	
.121	**.363**	(3x)	1/8	1-1/2			73121	19.50			73121-C3	25.00					
.122	**.366**	(3x)	1/8	1-1/2			73189	19.50			73189-C3	25.00					
.123	**.369**	(3x)	1/8	1-1/2			73123	19.50			73123-C3	25.00					
.124	**.372**	(3x)	1/8	1-1/2			73124	19.50			73124-C3	25.00					

D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE
.125 (1/8)	**.100**	(0.8x)	1/8	1-1/2	733508	736608	771408	17.10	733508-C3	736608-C3	771408-C3	22.60				
.125 (1/8)	**.187**	(1.5x)	1/8	1-1/2	50208	823108	50308	15.60	50208-C3	823108-C3	50308-C3	21.10	50208-C4		50308-C4	29.40
.125 (1/8)	**.375**	(3x)	1/8	1-1/2	72125	836408	73125	15.60	72125-C3	836408-C3	73125-C3	21.10	72125-C4	836408-C4	73125-C4	29.40
.140 (9/64)	**.220**	(1.5x)	3/16	2	50209	823109	50309	17.00	50209-C3	823109-C3	50309-C3	22.90				
.140 (9/64)	**.562**	(4x)	3/16	2	72140	836409	73140	17.00	72140-C3	836409-C3	73140-C3	22.90			73140-C4	34.40
.156 (5/32)	**.281**	(1.5x)	3/16	2	50210	823110	50310	17.00	50210-C3	823110-C3	50310-C3	22.90			50310-C4	34.40
.156 (5/32)	**.562**	(3x)	3/16	2	72156	836410	73156	17.00	72156-C3	836410-C3	73156-C3	22.90	72156-C4		73156-C4	34.40
.172 (11/64)	**.312**	(1.5x)	3/16	2	50211		50311	17.20	50211-C3		50311-C3	23.00				
.172 (11/64)	**.625**	(3x)	3/16	2	72172	836411	73172	17.00	72172-C3	836411-C3	73172-C3	22.90				

*End cutting (not center cutting)

continued on next page

MINIATURE END MILLS

Square – Stub & Standard (cont.)

continued from previous page

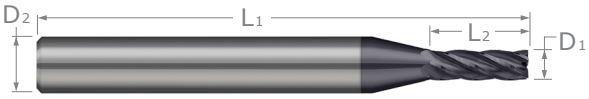
CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE
.187 (3/16)	**.150**	(0.8x)	3/16	2			771412	18.30			771412-C3	24.30				
.187 (3/16)	**.312**	(1.5x)	3/16	2	50212	823112	50312	17.00	50212-C3	823112-C3	50312-C3	22.90	50212-C4		50312-C4	34.40
.187 (3/16)	**.625**	(3x)	3/16	2	72187	836412	73187	17.00	72187-C3	836412-C3	73187-C3	22.90	72187-C4		73187-C4	34.40
.203 (13/64)	**.312**	(1.5x)	1/4	2-1/2			50313	18.70			50313-C3	26.20				
.203 (13/64)	**.625**	(3x)	1/4	2-1/2	72190	836413	73190	18.70	72190-C3	836413-C3	73190-C3	26.20				
.218 (7/32)	**.330**	(1.5x)	1/4	2-1/2	50214	823114	50314	18.70	50214-C3	823114-C3	50314-C3	26.60				
.218 (7/32)	**.625**	(3x)	1/4	2-1/2	72193	836414	73193	18.70	72193-C3	836414-C3	73193-C3	26.20				
.234 (15/64)	**.750**	(3x)	1/4	2-1/2	72195		73195	18.70	72195-C3		73195-C3	26.20				
.250 (1/4)	**.200**	(0.8x)	1/4	2-1/2			771416	20.00			771416-C3	28.10				
.250 (1/4)	**.375**	(1.5x)	1/4	2-1/2	50216	823116	50316	18.70	50216-C3	823116-C3	50316-C3	26.60	50216-C4		50316-C4	40.20
.250 (1/4)	**.750**	(3x)	1/4	2-1/2	72199	836416	73199	18.70	72199-C3	836416-C3	73199-C3	26.20	72199-C4		73199-C4	38.50
.281 (9/32)	**.750**	(3x)	5/16	2-1/2			73122	25.40			73122-C3	34.80				
.312 (5/16)	**.470**	(1.5x)	5/16	2-1/2	50220		50320	25.70	50220-C3		50320-C3	35.00				
.312 (5/16)	**.812**	(3x)	5/16	2-1/2	15120		15220	25.40	15120-C3		15220-C3	34.80			15220-C4	49.20
.343 (11/32)	**1.000**	(3x)	3/8	2-1/2			15222	36.40			15222-C3	47.00				
.375 (3/8)	**.570**	(1.5x)	3/8	2-1/2	50224	823124	50324	34.20	50224-C3	823124-C3	50324-C3	44.80	50224-C4		50324-C4	61.50
.375 (3/8)	**1.000**	(3x)	3/8	2-1/2	15124	836424	15224	33.90	15124-C3	836424-C3	15224-C3	44.50			15224-C4	61.10
.437 (7/16)	**1.000**	(3x)	7/16	2-3/4			15228	54.10			15228-C3	66.60				
.500 (1/2)	**.500**	(1x)	1/2	3			50332	55.80			50332-C3	71.60				
.500 (1/2)	**1.000**	(2x)	1/2	3	15132	836432	15232	59.00	15132-C3	836432-C3	15232-C3	74.80	15132-C4		15232-C4	92.20

*End cutting (not center cutting)

NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard – 5 Flute



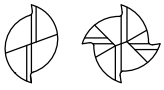
SQUARE

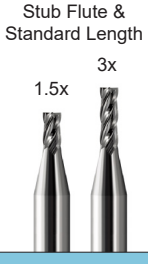
- Cutter diameter down to .020"
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
D_1 $^{+.0005''}_{-.0005''}$	L_4 $^{+.010''}_{-.000''}$	D_2	L_1	5 FL	PRICE	5 FL	PRICE	
.020 (.5 mm)	.030 (1.5x)	1/8	1-1/2	739420	25.60	739420-C3	31.10	
.020 (.5 mm)	.060 (3x)	1/8	1-1/2	742020	27.20	742020-C3	32.70	
.031 (1/32)	.047 (1.5x)	1/8	1-1/2	739431	23.80	739431-C3	29.30	
.031 (1/32)	.093 (3x)	1/8	1-1/2	742031	25.90	742031-C3	31.40	
.040	.060 (1.5x)	1/8	1-1/2	739440	23.80	739440-C3	29.30	NEW
.040	.120 (3x)	1/8	1-1/2	742040	25.10	742040-C3	30.60	NEW
.047 (3/64)	.071 (1.5x)	1/8	1-1/2	739447	23.80	739447-C3	29.30	
.047 (3/64)	.141 (3x)	1/8	1-1/2	742047	25.10	742047-C3	30.60	
.050	.075 (1.5x)	1/8	1-1/2	739450	23.80	739450-C3	29.30	NEW
.050	.150 (3x)	1/8	1-1/2	742050	25.10	742050-C3	30.60	NEW
.060	.090 (1.5x)	1/8	1-1/2	739460	23.80	739460-C3	29.30	NEW
.060	.180 (3x)	1/8	1-1/2	742060	25.10	742060-C3	30.60	NEW
.062 (1/16)	.093 (1.5x)	1/8	1-1/2	739462	23.80	739462-C3	29.30	
.062 (1/16)	.186 (3x)	1/8	1-1/2	742062	25.10	742062-C3	30.60	
.078 (5/64)	.117 (1.5x)	1/8	1-1/2	739478	23.80	739478-C3	29.30	
.078 (5/64)	.234 (3x)	1/8	1-1/2	742078	25.10	742078-C3	30.60	
.093 (3/32)	.140 (1.5x)	1/8	1-1/2	739493	23.80	739493-C3	29.30	
.093 (3/32)	.279 (3x)	1/8	1-1/2	742093	25.10	742093-C3	30.60	
.118 (3 mm)	.177 (1.5x)	1/8	1-1/2	739505	23.80	739505-C3	29.30	NEW
.118 (3 mm)	.354 (3x)	1/8	1-1/2	742105	25.10	742105-C3	30.60	NEW
D_1 $^{+.000''}_{-.002''}$	L_4 $^{+.030''}_{-.000''}$	D_2	L_1	5 FL	PRICE	5 FL	PRICE	
.125 (1/8)	.187 (1.5x)	1/8	1-1/2	739508	22.20	739508-C3	27.70	
.125 (1/8)	.375 (3x)	1/8	1-1/2	742108	23.40	742108-C3	28.90	
.156 (5/32)	.281 (1.5x)	3/16	2	739510	25.70	739510-C3	31.50	NEW
.156 (5/32)	.562 (3x)	3/16	2	742110	27.00	742110-C3	32.80	NEW
.187 (3/16)	.312 (1.5x)	3/16	2	739512	25.70	739512-C3	31.60	
.187 (3/16)	.625 (3x)	3/16	2	742112	27.00	742112-C3	32.90	
.250 (1/4)	.375 (1.5x)	1/4	2-1/2	739516	30.40	739516-C3	38.50	
.250 (1/4)	.750 (3x)	1/4	2-1/2	742116	31.90	742116-C3	40.00	

MINIATURE END MILLS

Square – Stub & Standard – Metric





- All dimensions and tolerances in metric values
- Cutter diameter down to 0.5mm
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		
D_1 +.00mm −.02mm	L_2 +.25mm −.00mm	D_2	L_1	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.500 mm	.75 (1.5x)	3 mm	38 mm	740811	740711	23.30	740811-C3	740711-C3	28.80
.500 mm	1.50 (3x)	3 mm	38 mm	741411	743411	23.30	741411-C3	743411-C3	28.80
1.00 mm	1.50 (1.5x)	3 mm	38 mm	740822	740722	19.60	740822-C3	740722-C3	25.10
1.00 mm	3.00 (3x)	3 mm	38 mm	741422	743422	19.60	741422-C3	743422-C3	25.10
1.50 mm	2.20 (1.5x)	3 mm	38 mm	740833	740733	19.80	740833-C3	740733-C3	25.30
1.50 mm	4.50 (3x)	3 mm	38 mm	741433	743433	19.80	741433-C3	743433-C3	25.30
2.00 mm	3.00 (1.5x)	3 mm	38 mm	740845	740745	19.60	740845-C3	740745-C3	25.10
2.00 mm	6.00 (3x)	3 mm	38 mm	741445	743445	19.60	741445-C3	743445-C3	25.10
3.00 mm	4.50 (1.5x)	3 mm	38 mm	740857	740757	18.40	740857-C3	740757-C3	23.90
3.00 mm	9.00 (3x)	3 mm	38 mm	741457	743457	18.40	741457-C3	743457-C3	23.90

	D_1 +.00mm −.04mm	L_2 +.750mm −.000mm	D_2	L_1	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
NEW	3.50 mm	5.00 (1.5x)	4 mm	50 mm	740859	740759	20.40	740859-C3	740759-C3	26.20
NEW	3.50 mm	10.00 (3x)	4 mm	50 mm	741459	743459	20.40	741459-C3	743459-C3	26.20
	4.00 mm	6.00 (1.5x)	4 mm	50 mm	740861	740761	20.40	740861-C3	740761-C3	26.20
	4.00 mm	12.00 (3x)	4 mm	50 mm	741461	743461	20.40	741461-C3	743461-C3	26.20
	5.00 mm	7.50 (1.5x)	5 mm	50 mm	740864	740764	25.10	740864-C3	740764-C3	32.00
	5.00 mm	15.00 (3x)	5 mm	50 mm	741464	743464	25.10	741464-C3	743464-C3	32.00
	6.00 mm	9.00 (1.5x)	6 mm	50 mm	740866	740766	26.20	740866-C3	740766-C3	33.10
	6.00 mm	18.00 (3x)	6 mm	50 mm	741466	743466	26.20	741466-C3	743466-C3	33.10
	8.00 mm	12.00 (1.5x)	8 mm	63 mm	740870	740770	32.10	740870-C3	740770-C3	42.70
	8.00 mm	24.00 (3x)	8 mm	63 mm	741470	743470	32.10	741470-C3	743470-C3	42.70
	10.0 mm	15.00 (1.5x)	10 mm	75 mm	740873	740773	54.90	740873-C3	740773-C3	67.20
	10.0 mm	30.00 (3x)	10 mm	75 mm	741473	743473	54.90	741473-C3	743473-C3	67.20
	12.0 mm	18.00 (1.5x)	12 mm	75 mm	740876	740776	62.80	740876-C3	740776-C3	77.20
	12.0 mm	36.00 (3x)	12 mm	75 mm	741476	743476	62.80	741476-C3	743476-C3	77.20

NEW SIZES!

MINIATURE END MILLS

Square – Long Flute

Stocked in 9 Lengths of Cut!

SQUARE

- **Long flute and long shank design for deep cavities**
- Mills deep pockets • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.004	**.020** (5x)	3	1/8	2-1/2	31804	51.00				
.005	**.025** (5x)	3	1/8	2-1/2	31805	50.10				
.005	**.040** (8x)	3	1/8	2-1/2	33605	53.20				
.006	**.030** (5x)	3	1/8	2-1/2	31806	50.10				
.006	**.048** (8x)	3	1/8	2-1/2	33606	53.20				
.008	**.040** (5x)	3	1/8	2-1/2	31808	50.10				
.008	**.064** (8x)	3	1/8	2-1/2	33608	53.20				
.010	**.040** (4x)	3	1/8	2-1/2	888410	42.40	888410-C3	47.90		
.010	**.050** (5x)	3	1/8	2-1/2	12710	42.60	12710-C3	48.10	12710-C4	56.40
.010	**.050** (5x)	4	1/8	2-1/2	834110	44.50	834110-C3	50.00		
.010	**.060** (6x)	3	1/8	2-1/2	894210	51.10	894210-C3	56.60		
.010	**.070** (7x)	3	1/8	2-1/2	897910	59.60	897910-C3	65.10		
.010	**.080** (8x)	3	1/8	2-1/2	33610	76.00	33610-C3	81.50		
.010	**.100** (10x)	3	1/8	2-1/2	951310	80.20	951310-C3	85.70		
.012	**.060** (5x)	3	1/8	2-1/2	31812	43.20	31812-C3	48.70		
.012	**.096** (8x)	3	1/8	2-1/2	33612	76.00	33612-C3	81.50		
.015 (1/64)	**.062** (4x)	3	1/8	2-1/2	888415	39.10	888415-C3	44.60		
.015 (1/64)	**.062** (4x)	4	1/8	2-1/2	836915	40.80	836915-C3	46.30		
.015 (1/64)	**.078** (5x)	3	1/8	2-1/2	31815	39.10	31815-C3	44.60	31815-C4	53.00
.015 (1/64)	**.078** (5x)	4	1/8	2-1/2	834115	40.80	834115-C3	46.30		
.015 (1/64)	**.093** (6x)	3	1/8	2-1/2	894215	46.70	894215-C3	52.20		
.015 (1/64)	**.109** (7x)	3	1/8	2-1/2	897915	54.40	897915-C3	59.90		
.015 (1/64)	**.125** (8x)	3	1/8	2-1/2	33615	68.50	33615-C3	74.00	33615-C4	82.40
.015 (1/64)	**.125** (8x)	4	1/8	2-1/2	826815	70.00	826815-C3	75.50		
.015 (1/64)	**.156** (10x)	3	1/8	2-1/2	951315	76.50	951315-C3	82.00		
.015 (1/64)	**.187** (12x)	3	1/8	2-1/2	34915	84.40	34915-C3	89.90		
.017	**.085** (5x)	3	1/8	2-1/2	31817	43.20	31817-C3	48.70		
.017	**.136** (8x)	3	1/8	2-1/2	33617	75.20	33617-C3	80.70		
.020 (.5 mm)	**.080** (4x)	3	1/8	2-1/2	888420	33.40	888420-C3	38.90		
.020 (.5 mm)	**.080** (4x)	4	1/8	2-1/2	836920	35.60	836920-C3	41.10		
.020 (.5 mm)	**.100** (5x)	3	1/8	2-1/2	12720	33.40	12720-C3	38.90	12720-C4	47.80
.020 (.5 mm)	**.100** (5x)	4	1/8	2-1/2	834120	35.60	834120-C3	41.10		
.020 (.5 mm)	**.120** (6x)	3	1/8	2-1/2	894220	40.10	894220-C3	45.60		
.020 (.5 mm)	**.120** (6x)	4	1/8	2-1/2	758020	43.20	758020-C3	48.70		
.020 (.5 mm)	**.140** (7x)	3	1/8	2-1/2	897920	46.70	897920-C3	52.20		
.020 (.5 mm)	**.160** (8x)	3	1/8	2-1/2	33620	65.50	33620-C3	71.00	33620-C4	79.30
.020 (.5 mm)	**.160** (8x)	4	1/8	2-1/2	826820	69.10	826820-C3	74.60		
.020 (.5 mm)	**.200** (10x)	3	1/8	2-1/2	951320	73.40	951320-C3	78.90		
.020 (.5 mm)	**.250** (12x)	3	1/8	2-1/2	34920	81.20	34920-C3	86.70		
.020 (.5 mm)	**.300** (15x)	3	1/8	2-1/2	35820	98.70	35820-C3	104.20		

continued on next page

MINIATURE END MILLS

Square – Long Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.024	**.120** (5x)	3	1/8	2-1/2	31824	31.80	31824-C3	37.30		
.024	**.192** (8x)	3	1/8	2-1/2	33624	64.90	33624-C3	70.40		
.025	**.100** (4x)	3	1/8	2-1/2	888425	31.80	888425-C3	37.30		
.025	**.125** (5x)	3	1/8	2-1/2	12725	31.80	12725-C3	37.30	12725-C4	46.20
.025	**.125** (5x)	4	1/8	2-1/2	834125	33.70	834125-C3	39.20		
.025	**.150** (6x)	3	1/8	2-1/2	894225	38.40	894225-C3	43.90		
.025	**.175** (7x)	3	1/8	2-1/2	897925	44.70	897925-C3	50.20		
.025	**.203** (8x)	3	1/8	2-1/2	33625	63.80	33625-C3	69.30	33625-C4	77.60
.025	**.203** (8x)	4	1/8	2-1/2	826825	65.60	826825-C3	71.10		
.025	**.250** (10x)	3	1/8	2-1/2	951325	67.80	951325-C3	73.30		
.025	**.312** (12x)	3	1/8	2-1/2	34925	72.00	34925-C3	77.50		
.030	**.125** (4x)	3	1/8	2-1/2	888430	30.80	888430-C3	36.30		
.030	**.150** (5x)	3	1/8	2-1/2	12730	30.80	12730-C3	36.30	12730-C4	45.10
.030	**.156** (5x)	4	1/8	2-1/2	834130	32.50	834130-C3	38.00		
.030	**.187** (6x)	3	1/8	2-1/2	894230	36.80	894230-C3	42.30		
.030	**.218** (7x)	3	1/8	2-1/2	897930	42.90	897930-C3	48.40		
.030	**.250** (8x)	3	1/8	2-1/2	33630	60.50	33630-C3	66.00	33630-C4	74.40
.030	**.312** (10x)	3	1/8	2-1/2	951330	64.80	951330-C3	70.30		
.030	**.375** (12x)	3	1/8	2-1/2	34930	68.10	34930-C3	73.60		
.031 (1/32)	**.125** (4x)	3	1/8	2-1/2	888431	30.80	888431-C3	36.30	888431-C4	45.10
.031 (1/32)	**.125** (4x)	4	1/8	2-1/2	836931	32.50	836931-C3	38.00		
.031 (1/32)	**.156** (5x)	3	1/8	2-1/2	31831	30.80	31831-C3	36.30	31831-C4	45.10
.031 (1/32)	**.156** (5x)	4	1/8	2-1/2	834131	32.20	834131-C3	37.70	834131-C4	46.60
.031 (1/32)	**.187** (6x)	3	1/8	2-1/2	894231	36.80	894231-C3	42.30	894231-C4	51.20
.031 (1/32)	**.187** (6x)	4	1/8	2-1/2	12531	38.60	12531-C3	44.10		
.031 (1/32)	**.218** (7x)	3	1/8	2-1/2	897931	42.90	897931-C3	48.40		
.031 (1/32)	**.218** (7x)	4	1/8	2-1/2	810331	44.70	810331-C3	50.20		
.031 (1/32)	**.250** (8x)	3	1/8	2-1/2	33631	60.50	33631-C3	66.00	33631-C4	74.40
.031 (1/32)	**.250** (8x)	4	1/8	2-1/2	826831	62.30	826831-C3	67.80		
.031 (1/32)	**.281** (9x)	3	1/8	2-1/2	837831	63.50	837831-C3	69.00		
.031 (1/32)	**.312** (10x)	3	1/8	2-1/2	951331	64.20	951331-C3	69.70	951331-C4	78.10
.031 (1/32)	**.312** (10x)	4	1/8	2-1/2	802631	67.20	802631-C3	72.70		
.031 (1/32)	**.375** (12x)	3	1/8	2-1/2	34931	68.10	34931-C3	73.60	34931-C4	82.00
.031 (1/32)	**.375** (12x)	4	1/8	2-1/2	818031	70.30	818031-C3	75.80		
.031 (1/32)	**.470** (15x)	3	1/8	2-1/2	35831	92.20	35831-C3	97.70		
.035 (.9 mm)	**.140** (4x)	3	1/8	2-1/2	888435	30.80	888435-C3	36.30		
.035 (.9 mm)	**.175** (5x)	3	1/8	2-1/2	12735	30.80	12735-C3	36.30	12735-C4	45.10
.035 (.9 mm)	**.187** (5x)	4	1/8	2-1/2	834135	33.00	834135-C3	38.50		
.035 (.9 mm)	**.218** (6x)	3	1/8	2-1/2	894235	36.80	894235-C3	42.30		
.035 (.9 mm)	**.250** (7x)	3	1/8	2-1/2	897935	42.90	897935-C3	48.40		
.035 (.9 mm)	**.280** (8x)	3	1/8	2-1/2	33635	60.50	33635-C3	66.00	33635-C4	74.40
.035 (.9 mm)	**.350** (10x)	3	1/8	2-1/2	951335	64.20	951335-C3	69.70		
.035 (.9 mm)	**.425** (12x)	3	1/8	2-1/2	34935	69.20	34935-C3	74.70		

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NEW SIZES!

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Square – Long Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.039 (1 mm)	**.156** (4x)	3	1/8	2-1/2	888439	31.20	888439-C3	36.70			
.039 (1 mm)	**.156** (4x)	4	1/8	2-1/2	836939	33.40	836939-C3	38.90			
.039 (1 mm)	**.203** (5x)	3	1/8	2-1/2	31839	31.20	31839-C3	36.70	31839-C4	45.60	
.039 (1 mm)	**.203** (5x)	4	1/8	2-1/2	834139	33.40	834139-C3	38.90			
.039 (1 mm)	**.240** (6x)	3	1/8	2-1/2	894239	49.10	894239-C3	54.60			
.039 (1 mm)	**.281** (7x)	3	1/8	2-1/2	897939	55.40	897939-C3	60.90			
.039 (1 mm)	**.325** (8x)	3	1/8	2-1/2	33639	61.00	33639-C3	66.50			
.039 (1 mm)	**.325** (8x)	4	1/8	2-1/2	826839	62.50	826839-C3	68.00			
.039 (1 mm)	**.400** (10x)	3	1/8	2-1/2	951339	64.80	951339-C3	70.30			
.039 (1 mm)	**.480** (12x)	3	1/8	2-1/2	34939	69.50	34939-C3	75.00			
.040	**.160** (4x)	3	1/8	2-1/2	888440	30.80	888440-C3	36.30			
.040	**.160** (4x)	4	1/8	2-1/2	836940	33.60	836940-C3	39.10			
.040	**.200** (5x)	3	1/8	2-1/2	12740	30.80	12740-C3	36.30	12740-C4	45.10	
.040	**.203** (5x)	4	1/8	2-1/2	834140	32.50	834140-C3	38.00			
.040	**.240** (6x)	3	1/8	2-1/2	894240	36.80	894240-C3	42.30			
.040	**.281** (7x)	3	1/8	2-1/2	897940	42.90	897940-C3	48.40			
.040	**.281** (7x)	4	1/8	2-1/2	810340	44.60	810340-C3	50.10			NEW
.040	**.325** (8x)	3	1/8	2-1/2	33640	60.50	33640-C3	66.00	33640-C4	74.40	
.040	**.325** (8x)	4	1/8	2-1/2	826840	62.30	826840-C3	67.80			
.040	**.400** (10x)	3	1/8	2-1/2	951340	64.20	951340-C3	69.70			
.040	**.480** (12x)	3	1/8	2-1/2	34940	69.20	34940-C3	74.70			
.045	**.187** (4x)	3	1/8	2-1/2	888445	30.80	888445-C3	36.30			
.045	**.225** (5x)	3	1/8	2-1/2	12745	30.80	12745-C3	36.30	12745-C4	45.10	
.045	**.225** (5x)	4	1/8	2-1/2	834145	32.50	834145-C3	38.00			
.045	**.281** (6x)	3	1/8	2-1/2	894245	36.80	894245-C3	42.30			
.045	**.325** (7x)	3	1/8	2-1/2	897945	42.90	897945-C3	48.40			
.045	**.375** (8x)	3	1/8	2-1/2	33645	60.50	33645-C3	66.00			
.045	**.450** (10x)	3	1/8	2-1/2	951345	64.20	951345-C3	69.70			
.045	**.550** (12x)	3	1/8	2-1/2	34945	69.20	34945-C3	74.70			
.047 (3/64)	**.187** (4x)	3	1/8	2-1/2	888447	30.80	888447-C3	36.30	888447-C4	45.10	
.047 (3/64)	**.187** (4x)	4	1/8	2-1/2	836947	32.50	836947-C3	38.00			
.047 (3/64)	**.250** (5x)	3	1/8	2-1/2	31847	30.80	31847-C3	36.30	31847-C4	45.10	
.047 (3/64)	**.250** (5x)	4	1/8	2-1/2	834147	32.20	834147-C3	37.70	834147-C4	46.60	
.047 (3/64)	**.281** (6x)	3	1/8	2-1/2	894247	36.80	894247-C3	42.30			
.047 (3/64)	**.328** (7x)	3	1/8	2-1/2	897947	42.90	897947-C3	48.40			
.047 (3/64)	**.375** (8x)	3	1/8	2-1/2	33647	59.30	33647-C3	64.80	33647-C4	73.20	
.047 (3/64)	**.375** (8x)	4	1/8	2-1/2	826847	61.00	826847-C3	66.50			
.047 (3/64)	**.480** (10x)	3	1/8	2-1/2	951347	64.20	951347-C3	69.70			
.047 (3/64)	**.570** (12x)	3	1/8	2-1/2	34947	68.10	34947-C3	73.60	34947-C4	82.00	
.047 (3/64)	**.710** (15x)	3	1/8	2-1/2	35847	86.80	35847-C3	92.30			
.050	**.203** (4x)	3	1/8	2-1/2	888450	30.80	888450-C3	36.30			
.050	**.203** (4x)	4	1/8	2-1/2	836950	33.00	836950-C3	38.50			
.050	**.250** (5x)	3	1/8	2-1/2	31850	30.80	31850-C3	36.30			
.050	**.250** (5x)	4	1/8	2-1/2	834150	32.50	834150-C3	38.00			
.050	**.300** (6x)	3	1/8	2-1/2	12750	30.80	12750-C3	36.30	12750-C4	45.10	
.050	**.300** (6x)	4	1/8	2-1/2	12550	32.50	12550-C3	38.00			

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Square – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.050	**.350** (7x)	3	1/8	2-1/2	897950	42.90	897950-C3	48.40		
.050	**.400** (8x)	3	1/8	2-1/2	33650	60.50	33650-C3	66.00	33650-C4	74.40
.050	**.500** (10x)	3	1/8	2-1/2	951350	64.80	951350-C3	70.30		
.050	**.600** (12x)	3	1/8	2-1/2	34950	68.10	34950-C3	73.60		
.055 (1.4 mm)	**.220** (4x)	3	1/8	2-1/2	888455	27.40	888455-C3	32.90		
.055 (1.4 mm)	**.275** (5x)	3	1/8	2-1/2	31855	27.40	31855-C3	32.90	31855-C4	42.00
.055 (1.4 mm)	**.275** (5x)	4	1/8	2-1/2	834155	29.50	834155-C3	35.00		
.055 (1.4 mm)	**.330** (6x)	3	1/8	2-1/2	894255	29.80	894255-C3	35.30		
.055 (1.4 mm)	**.385** (7x)	3	1/8	2-1/2	12755	30.80	12755-C3	36.30	12755-C4	45.10
.055 (1.4 mm)	**.385** (7x)	4	1/8	2-1/2	810355	32.50	810355-C3	38.00		
NEW .055 (1.4 mm)	**.450** (8x)	3	1/8	2-1/2	33655	43.50	33655-C3	49.00		
.055 (1.4 mm)	**.560** (10x)	3	1/8	2-1/2	951355	47.80	951355-C3	53.30		
.055 (1.4 mm)	**.660** (12x)	3	1/8	2-1/2	34955	69.20	34955-C3	74.70		
.059 (1.5 mm)	**.295** (5x)	3	1/8	2-1/2	31859	28.60	31859-C3	34.10		
.059 (1.5 mm)	**.472** (8x)	3	1/8	2-1/2	12759	28.60	12759-C3	34.10		
.060	**.250** (4x)	3	1/8	2-1/2	888460	27.40	888460-C3	32.90		
.060	**.250** (4x)	4	1/8	2-1/2	836960	30.10	836960-C3	35.60		
.060	**.312** (5x)	3	1/8	2-1/2	31860	27.40	31860-C3	32.90		
.060	**.312** (5x)	4	1/8	2-1/2	834160	29.00	834160-C3	34.50		
.060	**.375** (6x)	3	1/8	2-1/2	894260	28.50	894260-C3	34.00		
.060	**.375** (6x)	4	1/8	2-1/2	12560	29.30	12560-C3	34.80		
.060	**.437** (7x)	3	1/8	2-1/2	897960	29.80	897960-C3	35.30		
.060	**.500** (8x)	3	1/8	2-1/2	12760	31.20	12760-C3	36.70	12760-C4	45.60
.060	**.500** (8x)	4	1/8	2-1/2	826860	33.40	826860-C3	38.90		
.060	**.625** (10x)	3	1/8	2-1/2	951360	54.20	951360-C3	59.70		
.060	**.720** (12x)	3	1/8	2-1/2	34960	69.20	34960-C3	74.70		
.062 (1/16)	**.250** (4x)	3	1/8	2-1/2	888462	27.40	888462-C3	32.90	888462-C4	41.70
.062 (1/16)	**.250** (4x)	4	1/8	2-1/2	836962	29.50	836962-C3	35.00	836962-C4	43.90
.062 (1/16)	**.312** (5x)	3	1/8	2-1/2	31862	27.40	31862-C3	32.90	31862-C4	41.70
.062 (1/16)	**.312** (5x)	4	1/8	2-1/2	834162	29.50	834162-C3	35.00	834162-C4	43.90
.062 (1/16)	**.375** (6x)	3	1/8	2-1/2	894262	28.50	894262-C3	34.00	894262-C4	42.90
.062 (1/16)	**.375** (6x)	4	1/8	2-1/2	12562	29.30	12562-C3	34.80	12562-C4	43.60
.062 (1/16)	**.437** (7x)	3	1/8	2-1/2	897962	29.80	897962-C3	35.30	897962-C4	44.20
.062 (1/16)	**.437** (7x)	4	1/8	2-1/2	810362	30.90	810362-C3	36.40		
.062 (1/16)	**.500** (8x)	3	1/8	2-1/2	33662	31.20	33662-C3	36.70	33662-C4	45.60
.062 (1/16)	**.500** (8x)	4	1/8	2-1/2	826862	32.90	826862-C3	38.40	826862-C4	47.30
.062 (1/16)	**.562** (9x)	3	1/8	2-1/2	837862	36.10	837862-C3	41.60		
.062 (1/16)	**.562** (9x)	4	1/8	2-1/2	770862	37.70	770862-C3	43.20		
.062 (1/16)	**.625** (10x)	3	1/8	2-1/2	951362	39.30	951362-C3	44.80	951362-C4	53.20
.062 (1/16)	**.625** (10x)	4	1/8	2-1/2	802662	42.30	802662-C3	47.80		
.062 (1/16)	**.750** (12x)	3	1/8	2-1/2	34962	53.30	34962-C3	58.80	34962-C4	67.20
.062 (1/16)	**.750** (12x)	4	1/8	2-1/2	818062	55.50	818062-C3	61.00		
.062 (1/16)	**.950** (15x)	3	1/8	2-1/2	35862	76.50	35862-C3	82.00	35862-C4	90.40
.062 (1/16)	**.950** (15x)	4	1/8	2-1/2	740362	78.70	740362-C3	84.20		
.065	**.325** (5x)	3	1/8	2-1/2	31865	27.40	31865-C3	32.90		
.065	**.500** (8x)	3	1/8	2-1/2	12765	30.80	12765-C3	36.30	12765-C4	45.40
.065	**.650** (10x)	3	1/8	2-1/2	951365	47.80	951365-C3	53.30		

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NEW SIZES!

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Square – Long Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.070	**.281** (4x)	3	1/8	2-1/2	888470	29.50	888470-C3	35.00			
.070	**.375** (5x)	3	1/8	2-1/2	31870	27.40	31870-C3	32.90	31870-C4	42.00	
.070	**.375** (5x)	4	1/8	2-1/2	834170	30.10	834170-C3	35.60			
.070	**.500** (7x)	3	1/8	2-1/2	12770	30.80	12770-C3	36.30	12770-C4	45.10	
.070	**.700** (10x)	3	1/8	2-1/2	951370	47.80	951370-C3	53.30			
.070	**.850** (12x)	3	1/8	2-1/2	34970	54.00	34970-C3	59.50			
.075	**.300** (4x)	3	1/8	2-1/2	888475	30.10	888475-C3	35.60			
.075	**.375** (5x)	3	1/8	2-1/2	31875	27.40	31875-C3	32.90			
.075	**.450** (6x)	3	1/8	2-1/2	894275	29.80	894275-C3	35.30			NEW
.075	**.500** (7x)	3	1/8	2-1/2	12775	30.80	12775-C3	36.30	12775-C4	45.10	
.075	**.531** (7x)	4	1/8	2-1/2	810375	32.60	810375-C3	38.10			NEW
.075	**.750** (10x)	3	1/8	2-1/2	951375	47.80	951375-C3	53.30			
.075	**.900** (12x)	3	1/8	2-1/2	34975	54.00	34975-C3	59.50			
.078 (5/64)	**.312** (4x)	3	1/8	2-1/2	888478	27.40	888478-C3	32.90	888478-C4	42.00	
.078 (5/64)	**.312** (4x)	4	1/8	2-1/2	836978	29.50	836978-C3	35.00			
.078 (5/64)	**.406** (5x)	3	1/8	2-1/2	31878	27.40	31878-C3	32.90	31878-C4	41.70	
.078 (5/64)	**.406** (5x)	4	1/8	2-1/2	834178	29.50	834178-C3	35.00	834178-C4	43.90	
.078 (5/64)	**.475** (6x)	3	1/8	2-1/2	894278	28.50	894278-C3	34.00			
.078 (5/64)	**.475** (6x)	4	1/8	2-1/2	12578	30.80	12578-C3	36.30			
.078 (5/64)	**.550** (7x)	3	1/8	2-1/2	897978	29.80	897978-C3	35.30	897978-C4	44.40	
.078 (5/64)	**.550** (7x)	4	1/8	2-1/2	810378	31.60	810378-C3	37.10			
.078 (5/64)	**.625** (8x)	3	1/8	2-1/2	33678	31.20	33678-C3	36.70	33678-C4	45.60	
.078 (5/64)	**.625** (8x)	4	1/8	2-1/2	826878	34.00	826878-C3	39.50			
.078 (5/64)	**.800** (10x)	3	1/8	2-1/2	951378	38.60	951378-C3	44.10			
.078 (5/64)	**.940** (12x)	3	1/8	2-1/2	34978	53.30	34978-C3	58.80	34978-C4	67.20	
.078 (5/64)	**1.187** (15x)	3	1/8	2-1/2	35878	76.50	35878-C3	82.00	35878-C4	90.40	
.080	**.320** (4x)	3	1/8	2-1/2	888480	27.90	888480-C3	33.40			
.080	**.406** (5x)	3	1/8	2-1/2	31880	27.40	31880-C3	32.90			
.080	**.406** (5x)	4	1/8	2-1/2	834180	30.10	834180-C3	35.60			
.080	**.750** (9x)	3	1/8	2-1/2	12780	31.30	12780-C3	36.80	12780-C4	45.70	
.080	**.960** (12x)	3	1/8	2-1/2	34980	54.00	34980-C3	59.50			
.085	**.425** (5x)	3	1/8	2-1/2	31885	27.40	31885-C3	32.90			
.085	**.750** (9x)	3	1/8	2-1/2	12785	31.30	12785-C3	36.80	12785-C4	45.90	
.090	**.450** (5x)	3	1/8	2-1/2	31890	27.40	31890-C3	32.90			
.090	**.450** (5x)	4	1/8	2-1/2	834190	30.10	834190-C3	35.60			
.090	**.750** (8x)	3	1/8	2-1/2	12790	31.20	12790-C3	36.70	12790-C4	45.60	
.090	**.900** (10x)	3	1/8	2-1/2	951390	47.80	951390-C3	53.30			
.090	**1.080** (12x)	3	1/8	2-1/2	34990	55.00	34990-C3	60.50			
.093 (3/32)	**.375** (4x)	3	1/8	2-1/2	888493	27.40	888493-C3	32.90	888493-C4	41.70	
.093 (3/32)	**.375** (4x)	4	1/8	2-1/2	836993	29.50	836993-C3	35.00			
.093 (3/32)	**.500** (5x)	3	1/8	2-1/2	31893	27.40	31893-C3	32.90	31893-C4	41.70	
.093 (3/32)	**.500** (5x)	4	1/8	2-1/2	834193	29.50	834193-C3	35.00	834193-C4	43.90	
.093 (3/32)	**.585** (6x)	3	1/8	2-1/2	894293	28.50	894293-C3	34.00	894293-C4	42.90	
.093 (3/32)	**.585** (6x)	4	1/8	2-1/2	12593	29.10	12593-C3	34.60			
.093 (3/32)	**.670** (7x)	3	1/8	2-1/2	897993	29.80	897993-C3	35.30	897993-C4	44.20	
.093 (3/32)	**.670** (7x)	4	1/8	2-1/2	810393	31.40	810393-C3	36.90			
.093 (3/32)	**.750** (8x)	3	1/8	2-1/2	33693	31.20	33693-C3	36.70	33693-C4	45.60	
.093 (3/32)	**.750** (8x)	4	1/8	2-1/2	826893	34.00	826893-C3	39.50			

continued on next page

MINIATURE END MILLS

Square – Long Flute (cont.)

continued from previous page

	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.093 (3/32)	**.850** (9x)	3	1/8	2-1/2	837893	36.50	837893-C3	42.00		
	.093 (3/32)	**.950** (10x)	3	1/8	2-1/2	951393	38.60	951393-C3	44.10		
	.093 (3/32)	**1.125** (12x)	3	1/8	2-1/2	34993	53.30	34993-C3	58.80	34993-C4	67.20
	.093 (3/32)	**1.400** (15x)	3	1/8	3	35893	79.50	35893-C3	85.00	35893-C4	93.40
	.095	**.500** (5x)	3	1/8	2-1/2	31895	27.40	31895-C3	32.90		
	.095	**.750** (8x)	3	1/8	2-1/2	12795	30.80	12795-C3	36.30	12795-C4	45.40
	.095	**.950** (10x)	3	1/8	2-1/2	951395	47.80	951395-C3	53.30		
	.100	**.400** (4x)	3	1/8	2-1/2	888500	27.40	888500-C3	32.90		
	.100	**.500** (5x)	3	1/8	2-1/2	31899	27.40	31899-C3	32.90	31899-C4	41.70
	.100	**.500** (5x)	4	1/8	2-1/2	834200	29.50	834200-C3	35.00		
	.100	**.600** (6x)	3	1/8	2-1/2	894300	28.50	894300-C3	34.00		
	.100	**.700** (7x)	4	1/8	2-1/2	810400	31.10	810400-C3	36.60		
	.100	**.750** (7.5x)	3	1/8	2-1/2	12799	30.80	12799-C3	36.30	12799-C4	45.10
NEW	.100	**.800** (8x)	4	1/8	2-1/2	826900	33.70	826900-C3	39.20		
	.100	**1.000** (10x)	3	1/8	2-1/2	951600	47.80	951600-C3	53.30		
	.100	**1.200** (12x)	3	1/8	2-1/2	34999	54.00	34999-C3	59.50		
	.105	**.530** (5x)	3	1/8	2-1/2	31901	28.30	31901-C3	33.80		
	.109 (7/64)	**.437** (4x)	3	1/8	2-1/2	888502	27.40	888502-C3	32.90		
	.109 (7/64)	**.570** (5x)	3	1/8	2-1/2	31902	27.40	31902-C3	32.90	31902-C4	42.00
	.109 (7/64)	**.570** (5x)	4	1/8	2-1/2	834202	29.50	834202-C3	35.00		
	.109 (7/64)	**.680** (6x)	3	1/8	2-1/2	894302	28.50	894302-C3	34.00		
	.109 (7/64)	**.790** (7x)	3	1/8	2-1/2	898002	31.10	898002-C3	36.60		
	.109 (7/64)	**.900** (8x)	3	1/8	2-1/2	33702	31.10	33702-C3	36.60		
NEW	.109 (7/64)	**.900** (8x)	4	1/8	2-1/2	826902	33.90	826902-C3	39.40		
	.109 (7/64)	**1.125** (10x)	3	1/8	2-1/2	951602	54.20	951602-C3	59.70		
	.110	**.570** (5x)	3	1/8	2-1/2	31903	28.30	31903-C3	33.80		
	.115	**.600** (5x)	3	1/8	2-1/2	31904	28.30	31904-C3	33.80		
	.118 (3 mm)	**.475** (4x)	3	1/8	2-1/2	888505	27.80	888505-C3	33.30		
	.118 (3 mm)	**.625** (5x)	3	1/8	2-1/2	31905	27.80	31905-C3	33.30	31905-C4	42.10
	.118 (3 mm)	**.625** (5x)	4	1/8	2-1/2	834205	29.40	834205-C3	34.90		
	.118 (3 mm)	**.735** (6x)	3	1/8	2-1/2	894305	28.50	894305-C3	34.00		
	.118 (3 mm)	**.840** (7x)	3	1/8	2-1/2	898005	31.10	898005-C3	36.60		
	.118 (3 mm)	**.950** (8x)	3	1/8	2-1/2	33705	31.40	33705-C3	36.90		
	.118 (3 mm)	**.950** (8x)	4	1/8	2-1/2	826905	33.20	826905-C3	38.70		
	.118 (3 mm)	**1.187** (10x)	3	1/8	2-1/2	951605	54.50	951605-C3	60.00		
	.120	**.625** (5x)	3	1/8	2-1/2	31906	28.60	31906-C3	34.10		
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.125 (1/8)	**.500** (4x)	3	1/8	2-1/2	888508	26.90	888508-C3	32.40	888508-C4	41.20
	.125 (1/8)	**.500** (4x)	4	1/8	2-1/2	837008	29.60	837008-C3	35.10		
	.125 (1/8)	**.625** (5x)	3	1/8	2-1/2	31908	26.90	31908-C3	32.40	31908-C4	41.20
	.125 (1/8)	**.625** (5x)	4	1/8	2-1/2	834208	29.60	834208-C3	35.10	834208-C4	44.00
	.125 (1/8)	**.750** (6x)	3	1/8	2-1/2	894308	27.90	894308-C3	33.40	894308-C4	42.30
	.125 (1/8)	**.750** (6x)	4	1/8	2-1/2	12508	29.60	12508-C3	35.10		
	.125 (1/8)	**.875** (7x)	3	1/8	2-1/2	898008	28.40	898008-C3	33.90		
	.125 (1/8)	**.875** (7x)	4	1/8	2-1/2	810408	31.40	810408-C3	36.90		
	.125 (1/8)	**1.000** (8x)	3	1/8	2-1/2	33708	29.00	33708-C3	34.50	33708-C4	43.30
	.125 (1/8)	**1.000** (8x)	4	1/8	2-1/2	826908	31.90	826908-C3	37.40		
	.125 (1/8)	**1.125** (9x)	3	1/8	2-1/2	837908	40.80	837908-C3	46.30		
	.125 (1/8)	**1.250** (10x)	3	1/8	2-1/2	951608	49.50	951608-C3	55.00	951608-C4	64.10

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NEW SIZES!

MINIATURE END MILLS

Square – Long Flute (cont.)

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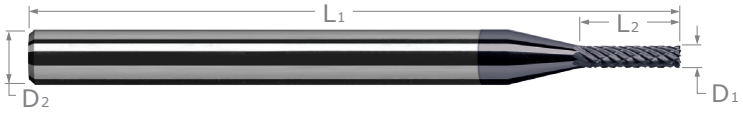
CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**1.250** (10x)	4	1/8	2-1/2	802708	51.60	802708-C3	57.10		
.125 (1/8)	**1.500** (12x)	3	1/8	3	35008	56.70	35008-C3	62.20	35008-C4	70.60
.125 (1/8)	**1.500** (12x)	4	1/8	3	818108	58.90	818108-C3	64.40		
.125 (1/8)	**1.875** (15x)	3	1/8	3	35908	79.50	35908-C3	85.00	35908-C4	93.40
.140 (9/64)	**.562** (4x)	4	3/16	3	837009	29.60	837009-C3	35.60		
.140 (9/64)	**.750** (5x)	4	3/16	3	31909	29.60	31909-C3	35.60		
.140 (9/64)	**.875** (6x)	4	3/16	3	12509	31.90	12509-C3	38.10		
.140 (9/64)	**1.125** (8x)	4	3/16	3	33709	52.50	33709-C3	58.40		
.140 (9/64)	**1.450** (10x)	4	3/16	3	951609	62.10	951609-C3	68.00		
.156 (5/32)	**.625** (4x)	4	3/16	3	888510	27.60	888510-C3	33.50		
.156 (5/32)	**.750** (5x)	4	3/16	3	834210	27.60	834210-C3	33.50	834210-C4	44.10
.156 (5/32)	**.937** (6x)	3	3/16	3	894310	28.30	894310-C3	34.30		
.156 (5/32)	**1.000** (6x)	4	3/16	3	12510	29.90	12510-C3	35.90	12510-C4	46.50
.156 (5/32)	**1.093** (7x)	4	3/16	3	898010	35.40	898010-C3	41.40		
.156 (5/32)	**1.250** (8x)	4	3/16	3	33710	52.50	33710-C3	58.40		
.156 (5/32)	**1.570** (10x)	4	3/16	3	951610	62.10	951610-C3	68.00		
.156 (5/32)	**1.875** (12x)	4	3/16	4	35010	73.70	35010-C3	81.80	35010-C4	94.10
.172 (11/64)	**.875** (5x)	4	3/16	3	834211	30.20	834211-C3	36.20		
.172 (11/64)	**1.375** (8x)	4	3/16	3	33711	56.10	33711-C3	62.30		
.187 (3/16)	**.750** (4x)	4	3/16	3	888512	27.60	888512-C3	33.50	888512-C4	44.30
.187 (3/16)	**1.000** (5x)	4	3/16	3	834212	27.60	834212-C3	33.50	834212-C4	44.10
.187 (3/16)	**1.156** (6x)	3	3/16	3	894312	28.30	894312-C3	34.30		
.187 (3/16)	**1.125** (6x)	4	3/16	3	12512	29.90	12512-C3	35.90	77012	46.50
.187 (3/16)	**1.312** (7x)	4	3/16	3	898012	35.40	898012-C3	41.40		
.187 (3/16)	**1.500** (8x)	3	3/16	3	733612	50.30	733612-C3	56.50		
.187 (3/16)	**1.500** (8x)	4	3/16	3	33712	52.50	33712-C3	58.40	33712-C4	69.00
.187 (3/16)	**1.875** (10x)	4	3/16	4	951612	62.30	951612-C3	70.40		
.187 (3/16)	**2.250** (12x)	4	3/16	4	35012	73.70	35012-C3	81.80		
.218 (7/32)	**.875** (4x)	4	1/4	4	888514	32.10	888514-C3	40.10		
.218 (7/32)	**1.125** (5x)	4	1/4	4	834214	32.10	834214-C3	41.60		
.218 (7/32)	**1.750** (8x)	4	1/4	4	33714	40.40	33714-C3	49.80		
.218 (7/32)	**2.187** (10x)	4	1/4	4	951614	42.00	951614-C3	50.00		
.250 (1/4)	**1.000** (4x)	4	1/4	4	888516	31.50	888516-C3	40.90		
.250 (1/4)	**1.250** (5x)	4	1/4	4	834216	31.50	834216-C3	40.90	834216-C4	53.30
.250 (1/4)	**1.500** (6x)	3	1/4	4	894316	32.30	894316-C3	41.80		
.250 (1/4)	**1.500** (6x)	4	1/4	4	12516	33.90	12516-C3	43.40	77016	55.70
.250 (1/4)	**1.750** (7x)	4	1/4	4	898016	40.40	898016-C3	49.80		
.250 (1/4)	**2.000** (8x)	4	1/4	4	33716	56.20	33716-C3	65.60	33716-C4	78.00
.250 (1/4)	**2.500** (10x)	4	1/4	4	951616	67.50	951616-C3	76.90		
.250 (1/4)	**3.000** (12x)	4	1/4	6	35016	80.90	35016-C3	91.60		
.312 (5/16)	**1.625** (5x)	4	5/16	4	12520	48.80	12520-C3	60.10		
.375 (3/8)	**1.750** (5x)	4	3/8	4	12524	51.90	12524-C3	66.50	12524-C4	79.00
.375 (3/8)	**3.000** (8x)	4	3/8	6	33724	103.70	33724-C3	120.20		
.500 (1/2)	**2.000** (4x)	4	1/2	4	12532	73.10	12532-C3	89.00	12532-C4	105.70
.500 (1/2)	**3.000** (6x)	4	1/2	6	888532	141.70	888532-C3	159.70		

MINIATURE END MILLS

Square – Deburring End Mill



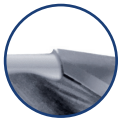
End Mill Tolerances with Bur-Style Geometry!

- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.015 (1/64)	**.045** (3x)	6	3	1/8	2-1/2	60715	37.40	60715-C3	42.90
.031 (1/32)	**.093** (3x)	6	3	1/8	2-1/2	60731	28.60	60731-C3	34.10
.047 (3/64)	**.141** (3x)	8	4	1/8	2-1/2	60747	27.70	60747-C3	33.20
.062 (1/16)	**.186** (3x)	8	4	1/8	2-1/2	60762	27.70	60762-C3	33.20
.078 (5/64)	**.234** (3x)	10	5	1/8	2-1/2	60778	28.20	60778-C3	33.70
.093 (3/32)	**.279** (3x)	12	6	1/8	2-1/2	60793	28.20	60793-C3	33.70
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.375** (3x)	14	7	1/8	2-1/2	60808	26.10	60808-C3	31.60
.187 (3/16)	**.562** (3x)	16	8	3/16	2-1/2	60812	47.60	60812-C3	53.80
.250 (1/4)	**.750** (3x)	18	9	1/4	2-1/2	60816	55.50	60816-C3	63.00

MINIATURE END MILLS

Square – Long Reach, Standard Flute



Reduced Neck Diameter to Avoid Heeling

SQUARE

• Length of cut = 3x diameter • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED			AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1		2 FL	4FL	PRICE	2FL	4FL	PRICE	4 FL	PRICE
.005	.015	**.025** (5x)	1/8	1-1/2		944505	956805	54.90					
.005	.015	**.040** (8x)	1/8	1-1/2		76205	76405	54.90					
.008	.024	**.040** (5x)	1/8	1-1/2		944508	956808	54.90					
.008	.024	**.065** (8x)	1/8	1-1/2		76208	76408	54.90					
.010	.030	**.050** (5x)	1/8	1-1/2		944510	956810	52.50	944510-C3	956810-C3	58.00		
.010	.030	**.080** (8x)	1/8	1-1/2		76210	76410	52.50	76210-C3	76410-C3	58.00		
.010	.030	**.100** (10x)	1/8	1-1/2			846110	55.50		846110-C3	61.00		
.010	.030	**.125** (12x)	1/8	1-1/2		952010	992510	55.50	952010-C3	992510-C3	61.00		
.015 (1/64)	.045	**.078** (5x)	1/8	1-1/2		944515	956815	42.40	944515-C3	956815-C3	47.90		
.015 (1/64)	.045	**.093** (6x)	1/8	1-1/2			802415	42.40		802415-C3	47.90		
.015 (1/64)	.045	**.109** (7x)	1/8	1-1/2			896815	42.40		896815-C3	47.90		
.015 (1/64)	.045	**.128** (8x)	1/8	1-1/2		76215	76415	42.40	76215-C3	76415-C3	47.90		
.015 (1/64)	.045	**.156** (10x)	1/8	1-1/2		849615	846115	44.20		846115-C3	49.70		
.015 (1/64)	.045	**.187** (12x)	1/8	1-1/2		952015	992515	44.20	952015-C3	992515-C3	49.70		
.020 (.5 mm)	.060	**.100** (5x)	1/8	1-1/2		944520	956820	40.50	944520-C3	956820-C3	46.00	956820-C4	54.30
.020 (.5 mm)	.060	**.100** (5x)	1/8	2-1/2	**LONG!**		736120	45.20		736120-C3	50.70		
.020 (.5 mm)	.060	**.120** (6x)	1/8	1-1/2			802420	40.50		802420-C3	46.00		
.020 (.5 mm)	.060	**.140** (7x)	1/8	1-1/2			896820	40.50		896820-C3	46.00		
.020 (.5 mm)	.060	**.170** (8x)	1/8	1-1/2		76220	76420	40.50	76220-C3	76420-C3	46.00	76420-C4	54.30
.020 (.5 mm)	.060	**.160** (8x)	1/8	2-1/2	**LONG!**		735520	45.20		735520-C3	50.70		
.020 (.5 mm)	.060	**.200** (10x)	1/8	1-1/2		849620	846120	42.60		846120-C3	48.10		
.020 (.5 mm)	.060	**.250** (12x)	1/8	1-1/2		952020	992520	42.60	952020-C3	992520-C3	48.10		
.025	.075	**.125** (5x)	1/8	1-1/2		944525	956825	39.10	944525-C3	956825-C3	44.60		
.025	.075	**.150** (6x)	1/8	1-1/2			802425	39.10		802425-C3	44.60		
.025	.075	**.213** (8x)	1/8	1-1/2		76225	76425	39.10	76225-C3	76425-C3	44.60		
.025	.075	**.312** (12x)	1/8	1-1/2		952025	992525	40.40	952025-C3	992525-C3	45.90		
.030	.090	**.156** (5x)	1/8	1-1/2		944530	956830	39.10	944530-C3	956830-C3	44.60		
.030	.090	**.270** (9x)	1/8	1-1/2		76230	76430	39.10	76230-C3	76430-C3	44.60		
.030	.090	**.375** (12x)	1/8	1-1/2		952030	992530	40.40	952030-C3	992530-C3	45.90		
.031 (1/32)	.093	**.156** (5x)	1/8	1-1/2		944531	956831	39.10	944531-C3	956831-C3	44.60	956831-C4	52.90
.031 (1/32)	.093	**.156** (5x)	1/8	2-1/2	**LONG!**		736131	43.80		736131-C3	49.30		
.031 (1/32)	.093	**.187** (6x)	1/8	1-1/2		757931	802431	39.10		802431-C3	44.60		
.031 (1/32)	.093	**.218** (7x)	1/8	1-1/2			896831	39.10		896831-C3	44.60		
.031 (1/32)	.093	**.250** (8x)	1/8	1-1/2		960831	972231	39.10		972231-C3	44.60		
.031 (1/32)	.093	**.279** (9x)	1/8	1-1/2		76231	76431	39.10	76231-C3	76431-C3	44.60	76431-C4	52.90
.031 (1/32)	.093	**.281** (9x)	1/8	2-1/2	**LONG!**		735331	43.80		735331-C3	49.30		
.031 (1/32)	.093	**.312** (10x)	1/8	1-1/2			846131	40.40		846131-C3	45.90		
.031 (1/32)	.093	**.375** (12x)	1/8	1-1/2		952031	992531	40.40	952031-C3	992531-C3	45.90		
.031 (1/32)	.093	**.470** (15x)	1/8	1-1/2		829131	838631	42.70	829131-C3	838631-C3	48.20		
.035 (.9 mm)	.105	**.187** (5x)	1/8	1-1/2		944535	956835	39.10	944535-C3	956835-C3	44.60		
.035 (.9 mm)	.105	**.315** (9x)	1/8	1-1/2		76235	76435	39.10	76235-C3	76435-C3	44.60	76435-C4	52.90
.035 (.9 mm)	.105	**.425** (12x)	1/8	1-1/2		952035	992535	40.40	952035-C3	992535-C3	45.90		

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MINIATURE END MILLS

Square – Long Reach, Standard Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED			AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1		2 FL	4FL	PRICE	2FL	4FL	PRICE	4 FL	PRICE
.039 (1 mm)	.117	**.203** (5x)	1/8	1-1/2		944539	956839	39.10	944539-C3	956839-C3	44.60		
.039 (1 mm)	.117	**.240** (6x)	1/8	1-1/2			802439	39.10		802439-C3	44.60		
.039 (1 mm)	.117	**.325** (8x)	1/8	1-1/2		960839	972239	39.10	960839-C3	972239-C3	44.60		
.039 (1 mm)	.117	**.400** (10x)	1/8	1-1/2			846139	40.40		846139-C3	45.90		
.039 (1 mm)	.117	**.480** (12x)	1/8	1-1/2		952039	992539	40.40		992539-C3	45.90		
.040	.120	**.203** (5x)	1/8	1-1/2		944540	956840	39.10	944540-C3	956840-C3	44.60		
.040	.120	**.281** (7x)	1/8	1-1/2			896840	39.10		896840-C3	44.60		
.040	.120	**.360** (9x)	1/8	1-1/2		76240	76440	39.10	76240-C3	76440-C3	44.60	76440-C4	52.90
.040	.120	**.400** (10x)	1/8	1-1/2			846140	40.40		846140-C3	45.90		
.040	.120	**.480** (12x)	1/8	1-1/2		952040	992540	40.40	952040-C3	992540-C3	45.90		
.045	.135	**.225** (5x)	1/8	1-1/2		944545	956845	38.40	944545-C3	956845-C3	43.90		
.045	.135	**.405** (9x)	1/8	1-1/2		76245	76445	38.40	76245-C3	76445-C3	43.90		
.047 (3/64)	.141	**.250** (5x)	1/8	1-1/2		944547	956847	38.40	944547-C3	956847-C3	43.90		
.047 (3/64)	.141	**.281** (6x)	1/8	1-1/2			802447	39.10		802447-C3	44.60		
.047 (3/64)	.141	**.328** (7x)	1/8	1-1/2		898747	896847	38.40		896847-C3	43.90		
.047 (3/64)	.141	**.375** (8x)	1/8	1-1/2			972247	38.40		972247-C3	43.90		
.047 (3/64)	.141	**.423** (9x)	1/8	1-1/2		76247	76447	38.40	76247-C3	76447-C3	43.90		
.047 (3/64)	.141	**.480** (10x)	1/8	1-1/2			846147	39.50		846147-C3	45.00		
.047 (3/64)	.141	**.570** (12x)	1/8	1-1/2		952047	992547	39.50	952047-C3	992547-C3	45.00		
.047 (3/64)	.141	**.710** (15x)	1/8	2-1/2			838647	42.90		838647-C3	48.40		
.050	.150	**.250** (5x)	1/8	1-1/2		944550	956850	38.40	944550-C3	956850-C3	43.90		
.050	.150	**.400** (8x)	1/8	1-1/2		960850	972250	38.40	960850-C3	972250-C3	43.90		
.050	.150	**.500** (10x)	1/8	1-1/2		76250	76450	39.50	76250-C3	76450-C3	45.00	76450-C4	53.30
.050	.150	**.600** (12x)	1/8	2		952050	992550	42.00	952050-C3	992550-C3	47.50		
.055 (1.4 mm)	.165	**.275** (5x)	1/8	1-1/2		944555	956855	39.30	944555-C3	956855-C3	44.80		
.055 (1.4 mm)	.165	**.500** (9x)	1/8	1-1/2		76255	76455	39.30	76255-C3	76455-C3	44.80		
.055 (1.4 mm)	.165	**.660** (12x)	1/8	2		952055	992555	41.80		992555-C3	47.30		
.060	.180	**.312** (5x)	1/8	1-1/2		944560	956860	38.40	944560-C3	956860-C3	43.90		
.060	.180	**.375** (6x)	1/8	1-1/2			802460	38.40		802460-C3	43.90		
.060	.180	**.500** (8x)	1/8	1-1/2		76260	76460	38.40	76260-C3	76460-C3	43.90		
.060	.180	**.625** (10x)	1/8	2			846160	39.50		846160-C3	45.00		
.060	.180	**.720** (12x)	1/8	2		952060	992560	39.50	952060-C3	992560-C3	45.00		
.062 (1/16)	.186	**.312** (5x)	1/8	1-1/2		944562	956862	38.40	944562-C3	956862-C3	43.90	956862-C4	52.20
.062 (1/16)	.186	**.312** (5x)	1/8	2-1/2	**LONG!**		736162	43.10		736162-C3	48.60		
.062 (1/16)	.186	**.375** (6x)	1/8	1-1/2		736662	802462	38.40		802462-C3	43.90		
.062 (1/16)	.186	**.437** (7x)	1/8	1-1/2			896862	38.40		896862-C3	43.90		
.062 (1/16)	.186	**.500** (8x)	1/8	1-1/2		76262	76462	38.40	76262-C3	76462-C3	43.90	76462-C4	52.20
.062 (1/16)	.186	**.500** (8x)	1/8	2-1/2	**LONG!**		735562	43.10		735562-C3	48.60		
.062 (1/16)	.186	**.625** (10x)	1/8	2		849662	846162	39.50	849662-C3	846162-C3	45.00		
.062 (1/16)	.186	**.750** (12x)	1/8	2		952062	992562	39.50	952062-C3	992562-C3	45.00		
.062 (1/16)	.186	**.950** (15x)	1/8	2		829162	838662	42.00	829162-C3	838662-C3	47.50		
.065	.195	**.500** (8x)	1/8	1-1/2		76265	76465	38.40	76265-C3	76465-C3	43.90		
.070	.210	**.375** (5x)	1/8	1-1/2			956770	38.40		956770-C3	43.90		
.070	.210	**.500** (7x)	1/8	1-1/2		76270	76470	38.40	76270-C3	76470-C3	43.90		
.070	.210	**.850** (12x)	1/8	2		952070	992570	39.50	952070-C3	992570-C3	45.00		
.075	.225	**.500** (7x)	1/8	1-1/2		76275	76475	38.40	76275-C3	76475-C3	43.90		
.075	.225	**.750** (10x)	1/8	2			846175	40.30		846175-C3	45.80		

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MINIATURE END MILLS

Square – Long Reach, Standard Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED			AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1		2 FL	4FL	PRICE	2FL	4FL	PRICE	4 FL	PRICE
.078 (5/64)	.234	**.406** (5x)	1/8	1-1/2			956878	38.40		956878-C3	43.90		
.078 (5/64)	.234	**.475** (6x)	1/8	2-1/2	**LONG!**		735978	43.10		735978-C3	48.60		
.078 (5/64)	.234	**.500** (6x)	1/8	1-1/2		76278	76478	38.40	76278-C3	76478-C3	43.90	76478-C4	52.20
.078 (5/64)	.234	**.550** (7x)	1/8	1-1/2			896878	38.40		896878-C3	43.90		
.078 (5/64)	.234	**.625** (8x)	1/8	2		960878	972278	38.50		972278-C3	44.00		
.078 (5/64)	.234	**.800** (10x)	1/8	2		849678	846178	39.50		846178-C3	45.00		
.078 (5/64)	.234	**.940** (12x)	1/8	2		952078	992578	39.50	952078-C3	992578-C3	45.00		
.078 (5/64)	.234	**1.187** (15x)	1/8	2-1/2			838678	42.90		838678-C3	48.40		
.080	.240	**.500** (6x)	1/8	1-1/2		76280	76480	38.40	76280-C3	76480-C3	43.90		
.080	.240	**.960** (12x)	1/8	2		952080	992580	39.50	952080-C3	992580-C3	45.00		
.085	.255	**.500** (6x)	1/8	1-1/2		76285	76485	38.40	76285-C3	76485-C3	43.90		
.085	.255	**.875** (10x)	1/8	2			846185	39.50		846185-C3	45.00		
.090	.270	**.625** (7x)	1/8	1-1/2		76290	76490	38.40	76290-C3	76490-C3	43.90		
.090	.270	**1.080** (12x)	1/8	2		952090	992590	39.50	952090-C3	992590-C3	45.00		
.093 (3/32)	.279	**.500** (5x)	1/8	1-1/2		944593	956893	38.40	944593-C3	956893-C3	43.90	956893-C4	52.20
.093 (3/32)	.279	**.500** (5x)	1/8	2-1/2	**LONG!**		736193	43.10		736193-C3	48.60		
.093 (3/32)	.279	**.585** (6x)	1/8	1-1/2		757993	802493	38.40		802493-C3	43.90		
.093 (3/32)	.279	**.625** (7x)	1/8	1-1/2		76293	76493	38.40	76293-C3	76493-C3	43.90	76493-C4	52.20
.093 (3/32)	.279	**.670** (7x)	1/8	3	**LONG!**		735793	43.10		735793-C3	48.60		
.093 (3/32)	.279	**.750** (8x)	1/8	2		972293	960893	39.50		960893-C3	45.00		
.093 (3/32)	.279	**.950** (10x)	1/8	2		849693	846193	39.50	849693-C3	846193-C3	45.00		
.093 (3/32)	.279	**1.125** (12x)	1/8	2		952093	992593	39.50	952093-C3	992593-C3	45.00		
.093 (3/32)	.279	**1.400** (15x)	1/8	2-1/2		829193	838693	42.00	829193-C3	838693-C3	47.50		
.095	.285	**.625** (6x)	1/8	1-1/2		76295	76495	38.40	76295-C3	76495-C3	43.90		
.100	.300	**.625** (6x)	1/8	1-1/2		76300	76500	38.40	76300-C3	76500-C3	43.90		
.100	.300	**.800** (8x)	1/8	2			972300	39.50		972300-C3	45.00		
.100	.300	**1.200** (12x)	1/8	2-1/2		952100	992600	39.50	952100-C3	992600-C3	45.00		
.109 (7/64)	.327	**.570** (5x)	1/8	1-1/2		944602	956902	38.40		956902-C3	43.90		
.109 (7/64)	.327	**.900** (8x)	1/8	2		960902	972302	38.40		972302-C3	43.90		
.109 (7/64)	.327	**1.125** (10x)	1/8	2			846202	39.50		846202-C3	45.00		
.118 (3 mm)	.354	**.625** (5x)	1/8	1-1/2		944605	956905	38.40	944605-C3	956905-C3	43.90		
.118 (3 mm)	.354	**.950** (8x)	1/8	2		960905	972305	38.40	960905-C3	972305-C3	43.90		
.118 (3 mm)	.354	**1.187** (10x)	1/8	2-1/2			846205	40.30		846205-C3	45.80		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	4FL	PRICE	2FL	4FL	PRICE	4 FL	PRICE
.125 (1/8)	.375	**.625** (5x)	1/8	1-1/2	944608	956908	38.40	944608-C3	956908-C3	43.90	956908-C4	52.20
.125 (1/8)	.375	**.750** (6x)	1/8	2	76308	802508	38.40		802508-C3	43.90		
.125 (1/8)	.375	**.875** (7x)	1/8	2-1/2		802308	41.60		802308-C3	47.10		
.125 (1/8)	.375	**1.000** (8x)	1/8	2	960908	972308	38.40	960908-C3	972308-C3	43.90	972308-C4	55.70
.125 (1/8)	.375	**1.250** (10x)	1/8	2-1/2	849708	846208	41.60	849708-C3	846208-C3	47.10		
.125 (1/8)	.375	**1.500** (12x)	1/8	2-1/2	952108	992608	41.60	952108-C3	992608-C3	47.10		
.125 (1/8)	.375	**1.875** (15x)	1/8	3	829208	838708	44.40	829208-C3	838708-C3	49.90		

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MINIATURE END MILLS

Square – Long Reach, Standard Flute (cont.)

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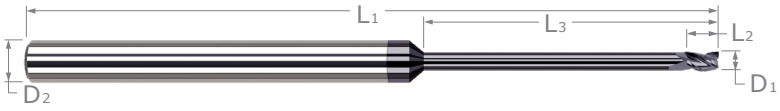
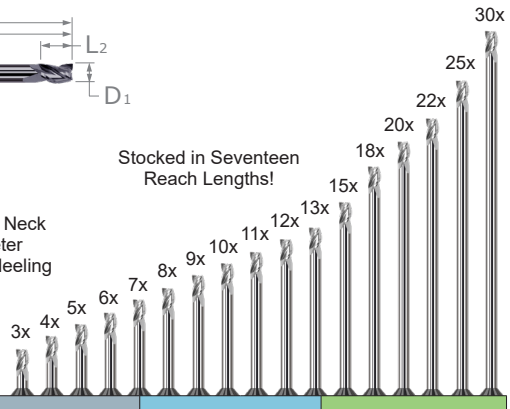
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH		SHANK DIA.	OAL	UNCOATED			AlTiN COATED			AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	2 FL	4FL	PRICE	2FL	4FL	PRICE	4 FL	PRICE
.140 (9/64)	.422	**.750**	(5x)	3/16	2	944609	956909	45.30		956909-C3	51.30		
.140 (9/64)	.425	**.875**	(6x)	3/16	2		802509	45.30		802509-C3	51.10		
.140 (9/64)	.425	**1.000**	(7x)	3/16	2-1/2		802309	45.30		802309-C3	51.50		
.140 (9/64)	.422	**1.125**	(8x)	3/16	2-1/2	960909	972309	45.30		972309-C3	51.30		
.140 (9/64)	.425	**1.450**	(10x)	3/16	3		846209	47.40		846209-C3	53.40		
.156 (5/32)	.469	**.750**	(5x)	3/16	2	944610	956910	45.30		956910-C3	51.30		
.156 (5/32)	.470	**.937**	(6x)	3/16	2		802510	45.30		802510-C3	51.10		
.156 (5/32)	.470	**1.093**	(7x)	3/16	2-1/2		802310	45.30		802310-C3	51.50		
.156 (5/32)	.469	**1.250**	(8x)	3/16	2-1/2	960910	972310	45.30		972310-C3	51.30		
.156 (5/32)	.470	**1.570**	(10x)	3/16	3		846210	47.40		846210-C3	53.40		
.187 (3/16)	.562	**1.000**	(5x)	3/16	2	944612	956912	45.30	944612-C3	956912-C3	51.30		
.187 (3/16)	.562	**1.500**	(8x)	3/16	2-1/2	960912	972312	45.30	960912-C3	972312-C3	51.30		
.187 (3/16)	.562	**1.875**	(10x)	3/16	3	849712	846212	47.40	849712-C3	846212-C3	53.40		
.250 (1/4)	.750	**1.250**	(5x)	1/4	2-1/2	944616	956916	50.70	944616-C3	956916-C3	58.80		
.250 (1/4)	.750	**2.000**	(8x)	1/4	4	960916	972316	50.70	960916-C3	972316-C3	60.10		
.250 (1/4)	.750	**3.000**	(12x)	1/4	6	952116	992616	58.70		992616-C3	69.40		
.375 (3/8)	1.125	**2.000**	(5x)	3/8	4		956924	53.10		956924-C3	64.40		
.375 (3/8)	1.125	**3.000**	(8x)	3/8	4		972324	53.10		972324-C3	67.70		

NEW SIZES!

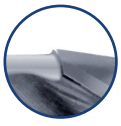
MINIATURE END MILLS

Square – Long Reach, Stub Flute





- **Long length design for deep cavities**
- Stub flutes for maximum rigidity
- Length of cut = 1½x diameter
- Center cutting
- Solid carbide • CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.005	.007	**.025** (5x)	3	1/8	2-1/2	33205	53.40					
.005	.007	**.040** (8x)	3	1/8	2-1/2	34605	53.40					
.008	.012	**.040** (5x)	3	1/8	2-1/2	33208	53.40					
.008	.012	**.065** (8x)	3	1/8	2-1/2	34608	53.40					
.010	.015	**.030** (3x)	3	1/8	2-1/2	47810	51.30	47810-C3	56.80			
.010	.015	**.050** (5x)	3	1/8	2-1/2	33210	51.30	33210-C3	56.80	33210-C4	65.20	
.010	.015	**.050** (5x)	4	1/8	2-1/2	861610	51.30	861610-C3	56.80			NEW
.010	.015	**.060** (6x)	3	1/8	2-1/2	937010	52.40	937010-C3	57.90			
.010	.015	**.070** (7x)	3	1/8	2-1/2	934810	52.40	934810-C3	57.90			
.010	.015	**.080** (8x)	3	1/8	2-1/2	34610	54.20	34610-C3	59.70	34610-C4	68.20	
.010	.015	**.080** (8x)	4	1/8	2-1/2	874110	54.20	874110-C3	59.70			NEW
.010	.015	**.100** (10x)	3	1/8	2-1/2	982110	57.00	982110-C3	62.50			
.010	.015	**.125** (12x)	3	1/8	2-1/2	35410	57.50	35410-C3	63.00	35410-C4	71.40	
.010	.015	**.150** (15x)	3	1/8	2-1/2	48910	66.20	48910-C3	71.70			
.010	.015	**.180** (18x)	3	1/8	2-1/2	977310	73.70	977310-C3	79.20			
.011	.016	**.055** (5x)	3	1/8	2-1/2	33211	51.30	33211-C3	56.80			
.011	.016	**.088** (8x)	3	1/8	2-1/2	34611	54.20	34611-C3	59.70			
.012 (.3 mm)	.018	**.060** (5x)	3	1/8	2-1/2	33212	51.30	33212-C3	56.80			
.012 (.3 mm)	.018	**.096** (8x)	3	1/8	2-1/2	34612	54.20	34612-C3	59.70			
.013	.019	**.065** (5x)	3	1/8	2-1/2	33213	51.30	33213-C3	56.80	33213-C4	65.90	NEW
.013	.019	**.104** (8x)	3	1/8	2-1/2	34613	54.20	34613-C3	59.70			
.014	.021	**.070** (5x)	3	1/8	2-1/2	33214	51.30	33214-C3	56.80			
.014	.021	**.112** (8x)	3	1/8	2-1/2	34614	54.20	34614-C3	59.70			
.015 (1/64)	.022	**.045** (3x)	3	1/8	2-1/2	47815	42.40	47815-C3	47.90	47815-C4	56.20	
.015 (1/64)	.022	**.062** (4x)	3	1/8	2-1/2	945515	42.40	945515-C3	47.90			
.015 (1/64)	.022	**.078** (5x)	3	1/8	2-1/2	33215	42.40	33215-C3	47.90	33215-C4	56.20	
.015 (1/64)	.022	**.078** (5x)	4	1/8	2-1/2	861615	42.40	861615-C3	47.90			
.015 (1/64)	.022	**.093** (6x)	3	1/8	2-1/2	937015	42.60	937015-C3	48.10			
.015 (1/64)	.022	**.109** (7x)	3	1/8	2-1/2	934815	42.60	934815-C3	48.10			
.015 (1/64)	.022	**.125** (8x)	3	1/8	2-1/2	34615	42.60	34615-C3	48.10	34615-C4	56.40	
.015 (1/64)	.022	**.125** (8x)	4	1/8	2-1/2	874115	42.60	874115-C3	48.10			
.015 (1/64)	.022	**.156** (10x)	3	1/8	2-1/2	982115	44.20	982115-C3	49.70	982115-C4	58.00	
.015 (1/64)	.022	**.187** (12x)	3	1/8	2-1/2	35415	44.20	35415-C3	49.70	35415-C4	58.00	
.015 (1/64)	.022	**.225** (15x)	3	1/8	2-1/2	48915	50.00	48915-C3	55.50	48915-C4	63.80	
.015 (1/64)	.022	**.270** (18x)	3	1/8	2-1/2	977315	59.50	977315-C3	65.00			
.015 (1/64)	.022	**.300** (20x)	3	1/8	2-1/2	58315	63.20	58315-C3	68.70			
.015 (1/64)	.022	**.375** (25x)	3	1/8	2-1/2	38015	80.80	38015-C3	86.30	38015-C4	94.80	

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MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.016 (.4 mm)	.024	**.080** (5x)	3	1/8	2-1/2	33216	43.60	33216-C3	49.10		
	.016 (.4 mm)	.024	**.128** (8x)	3	1/8	2-1/2	34616	43.90	34616-C3	49.40		
	.017	.026	**.085** (5x)	3	1/8	2-1/2	33217	43.60	33217-C3	49.10		
	.017	.026	**.136** (8x)	3	1/8	2-1/2	34617	43.90	34617-C3	49.40		
	.018	.027	**.090** (5x)	3	1/8	2-1/2	33218	43.60	33218-C3	49.10		
	.018	.027	**.144** (8x)	3	1/8	2-1/2	34618	43.90	34618-C3	49.40		
	.019	.029	**.095** (5x)	3	1/8	2-1/2	33219	43.60	33219-C3	49.10		
	.019	.029	**.152** (8x)	3	1/8	2-1/2	34619	43.90	34619-C3	49.40		
	.020 (.5 mm)	.030	**.060** (3x)	3	1/8	2-1/2	47820	40.50	47820-C3	46.00		
	.020 (.5 mm)	.030	**.080** (4x)	3	1/8	2-1/2	945520	40.50	945520-C3	46.00	945520-C4	55.10
	.020 (.5 mm)	.030	**.080** (4x)	4	1/8	2-1/2	752020	40.50	752020-C3	46.40		
	.020 (.5 mm)	.030	**.100** (5x)	3	1/8	2-1/2	33220	40.50	33220-C3	46.00	33220-C4	54.30
	.020 (.5 mm)	.030	**.100** (5x)	4	1/8	2-1/2	861620	42.70	861620-C3	48.20		
	.020 (.5 mm)	.030	**.120** (6x)	3	1/8	2-1/2	937020	40.50	937020-C3	46.00	937020-C4	55.10
	.020 (.5 mm)	.030	**.140** (7x)	3	1/8	2-1/2	934820	40.70	934820-C3	46.20		
	.020 (.5 mm)	.030	**.160** (8x)	3	1/8	2-1/2	34620	40.70	34620-C3	46.20	34620-C4	54.50
	.020 (.5 mm)	.030	**.160** (8x)	4	1/8	2-1/2	874120	41.50	874120-C3	47.00		
	.020 (.5 mm)	.030	**.180** (9x)	3	1/8	2-1/2	846820	42.60	846820-C3	48.10		
	.020 (.5 mm)	.030	**.200** (10x)	3	1/8	2-1/2	982120	42.60	982120-C3	48.10	982120-C4	57.20
NEW	.020 (.5 mm)	.030	**.200** (10x)	4	1/8	2-1/2	789120	42.60	789120-C3	48.10		
	.020 (.5 mm)	.030	**.250** (12x)	3	1/8	2-1/2	35420	42.60	35420-C3	48.10	35420-C4	56.40
NEW	.020 (.5 mm)	.030	**.250** (12x)	4	1/8	2-1/2	801720	42.60	801720-C3	48.10		
	.020 (.5 mm)	.030	**.300** (15x)	3	1/8	2-1/2	48920	48.10	48920-C3	53.60	48920-C4	61.90
	.020 (.5 mm)	.030	**.360** (18x)	3	1/8	2-1/2	977320	55.60	977320-C3	61.10		
	.020 (.5 mm)	.030	**.400** (20x)	3	1/8	2-1/2	58320	60.40	58320-C3	65.90	58320-C4	74.30
	.020 (.5 mm)	.030	**.440** (22x)	3	1/8	2-1/2	969620	66.80	969620-C3	72.30		
	.020 (.5 mm)	.030	**.500** (25x)	3	1/8	2-1/2	38020	78.00	38020-C3	83.50	**25x Diameter!**	
	.020 (.5 mm)	.030	**.600** (30x)	3	1/8	2-1/2	972020	83.40	972020-C3	88.90	**30x Diameter!**	
	.021	.031	**.105** (5x)	3	1/8	2-1/2	33221	43.20	33221-C3	48.70		
	.021	.031	**.168** (8x)	3	1/8	2-1/2	34621	43.40	34621-C3	48.90		
	.022	.033	**.110** (5x)	3	1/8	2-1/2	33222	42.40	33222-C3	47.90		
	.022	.033	**.176** (8x)	3	1/8	2-1/2	34622	42.60	34622-C3	48.10		
	.023	.035	**.115** (5x)	3	1/8	2-1/2	33223	42.40	33223-C3	47.90		
	.023	.035	**.187** (8x)	3	1/8	2-1/2	34623	42.60	34623-C3	48.10		
	.024 (.6 mm)	.036	**.120** (5x)	3	1/8	2-1/2	33224	42.40	33224-C3	47.90		
	.024 (.6 mm)	.036	**.192** (8x)	3	1/8	2-1/2	34624	42.60	34624-C3	48.10		
	.025	.037	**.075** (3x)	3	1/8	2-1/2	47825	39.10	47825-C3	44.60		
	.025	.037	**.100** (4x)	3	1/8	2-1/2	945525	39.10	945525-C3	44.60		
	.025	.037	**.125** (5x)	3	1/8	2-1/2	33225	39.10	33225-C3	44.60	33225-C4	53.00
	.025	.037	**.125** (5x)	4	1/8	2-1/2	861625	39.10	861625-C3	44.60		
	.025	.037	**.150** (6x)	3	1/8	2-1/2	937025	39.10	937025-C3	44.60		
	.025	.037	**.175** (7x)	3	1/8	2-1/2	934825	39.10	934825-C3	44.60		
	.025	.037	**.203** (8x)	3	1/8	2-1/2	34625	39.30	34625-C3	44.80	34625-C4	53.20
NEW	.025	.037	**.203** (8x)	4	1/8	2-1/2	874125	39.30	874125-C3	44.80		
	.025	.037	**.250** (10x)	3	1/8	2-1/2	982125	40.40	982125-C3	45.90		
	.025	.037	**.312** (12x)	3	1/8	2-1/2	35425	40.40	35425-C3	45.90	35425-C4	54.20
	.025	.037	**.375** (15x)	3	1/8	2-1/2	48925	47.20	48925-C3	52.70	48925-C4	61.10
	.025	.037	**.450** (18x)	3	1/8	2-1/2	977325	55.40	977325-C3	60.90		
	.025	.037	**.500** (20x)	3	1/8	2-1/2	58325	59.50	58325-C3	65.00		
	.025	.037	**.625** (25x)	3	1/8	2-1/2	38025	77.20	38025-C3	82.70	**25x Diameter!**	

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.026	.039	**.130** (5x)	3	1/8	2-1/2	33226	39.90	33226-C3	45.40			
.026	.039	**.208** (8x)	3	1/8	2-1/2	34626	40.10	34626-C3	45.60			
.027	.041	**.135** (5x)	3	1/8	2-1/2	33227	39.90	33227-C3	45.40			
.027	.041	**.216** (8x)	3	1/8	2-1/2	34627	40.10	34627-C3	45.60			
.028 (.7 mm)	.042	**.140** (5x)	3	1/8	2-1/2	33228	39.90	33228-C3	45.40			
.028 (.7 mm)	.042	**.224** (8x)	3	1/8	2-1/2	34628	40.10	34628-C3	45.60			
.029	.043	**.145** (5x)	3	1/8	2-1/2	33229	39.90	33229-C3	45.40			
.029	.043	**.232** (8x)	3	1/8	2-1/2	34629	40.10	34629-C3	45.60			
.030	.045	**.090** (3x)	3	1/8	2-1/2	47830	39.10	47830-C3	44.60			
.030	.045	**.125** (4x)	3	1/8	2-1/2	945530	39.10	945530-C3	44.60			
.030	.045	**.156** (5x)	3	1/8	2-1/2	33230	39.10	33230-C3	44.60	33230-C4	53.00	
.030	.045	**.156** (5x)	4	1/8	2-1/2	861630	41.40	861630-C3	46.90			
.030	.045	**.187** (6x)	3	1/8	2-1/2	937030	39.30	937030-C3	44.80			
.030	.045	**.218** (7x)	3	1/8	2-1/2	934830	39.30	934830-C3	44.80			
.030	.045	**.250** (8x)	3	1/8	2-1/2	34630	39.30	34630-C3	44.80	34630-C4	53.20	
.030	.045	**.250** (8x)	4	1/8	2-1/2	874130	39.30	874130-C3	44.80			NEW
.030	.045	**.270** (9x)	3	1/8	2-1/2	846830	40.40	846830-C3	45.90			
.030	.045	**.312** (10x)	3	1/8	2-1/2	982130	40.40	982130-C3	45.90			
.030	.045	**.375** (12x)	3	1/8	2-1/2	35430	40.40	35430-C3	45.90	35430-C4	54.20	
.030	.045	**.450** (15x)	3	1/8	2-1/2	48930	47.20	48930-C3	52.70			
.030	.045	**.540** (18x)	3	1/8	2-1/2	977330	54.90	977330-C3	60.40			
.030	.045	**.600** (20x)	3	1/8	2-1/2	58330	59.50	58330-C3	65.00			
.031 (1/32)	.046	**.093** (3x)	3	1/8	2-1/2	47831	39.10	47831-C3	44.60	47831-C4	53.00	
.031 (1/32)	.046	**.093** (3x)	4	1/8	2-1/2	739931	39.10	739931-C3	44.60			NEW
.031 (1/32)	.046	**.125** (4x)	3	1/8	2-1/2	945531	39.10	945531-C3	44.60	945531-C4	53.70	
.031 (1/32)	.046	**.125** (4x)	4	1/8	2-1/2	752031	39.10	752031-C3	44.60			
.031 (1/32)	.046	**.156** (5x)	3	1/8	2-1/2	33231	39.10	33231-C3	44.60	33231-C4	53.00	
.031 (1/32)	.046	**.156** (5x)	4	1/8	2-1/2	861631	41.40	861631-C3	46.90			
.031 (1/32)	.046	**.187** (6x)	3	1/8	2-1/2	937031	39.10	937031-C3	44.60	937031-C4	53.00	
.031 (1/32)	.046	**.218** (7x)	3	1/8	2-1/2	934831	39.30	934831-C3	44.80			
.031 (1/32)	.046	**.250** (8x)	3	1/8	2-1/2	34631	39.30	34631-C3	44.80	34631-C4	53.20	
.031 (1/32)	.046	**.250** (8x)	4	1/8	2-1/2	874131	41.50	874131-C3	47.00			
.031 (1/32)	.046	**.281** (9x)	3	1/8	2-1/2	846831	40.40	846831-C3	45.90			
.031 (1/32)	.046	**.312** (10x)	3	1/8	2-1/2	982131	40.40	982131-C3	45.90	982131-C4	54.20	
.031 (1/32)	.046	**.312** (10x)	4	1/8	2-1/2	789131	40.40	789131-C3	45.90			
.031 (1/32)	.046	**.343** (11x)	3	1/8	2-1/2	850231	41.20	850231-C3	46.70			
.031 (1/32)	.046	**.375** (12x)	3	1/8	2-1/2	35431	40.40	35431-C3	45.90	35431-C4	54.20	
.031 (1/32)	.046	**.375** (12x)	4	1/8	2-1/2	801731	40.40	801731-C3	45.90			
.031 (1/32)	.046	**.470** (15x)	3	1/8	2-1/2	48931	47.20	48931-C3	52.70	48931-C4	61.10	
.031 (1/32)	.046	**.565** (18x)	3	1/8	2-1/2	977331	59.50	977331-C3	65.00	977331-C4	74.10	
.031 (1/32)	.046	**.625** (20x)	3	1/8	2-1/2	58331	59.50	58331-C3	65.00			
.031 (1/32)	.046	**.687** (22x)	3	1/8	2-1/2	969631	65.80	969631-C3	71.30			
.031 (1/32)	.046	**.775** (25x)	3	1/8	2-1/2	38031	77.20	38031-C3	82.70	**25x Diameter!**		
.031 (1/32)	.046	**.937** (30x)	3	1/8	2-1/2	972031	92.00	972031-C3	97.50	**30x Diameter!**		

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MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.035 (.9 mm)	.052	**.105** (3x)	3	1/8	2-1/2	47835	39.10	47835-C3	44.60		
.035 (.9 mm)	.052	**.187** (5x)	3	1/8	2-1/2	33235	39.10	33235-C3	44.60	33235-C4	53.00
.035 (.9 mm)	.052	**.187** (5x)	4	1/8	2-1/2	861635	39.80	861635-C3	45.30		
.035 (.9 mm)	.052	**.218** (6x)	3	1/8	2-1/2	937035	39.30	937035-C3	44.80		
.035 (.9 mm)	.052	**.250** (7x)	3	1/8	2-1/2	934835	39.30	934835-C3	44.80		
.035 (.9 mm)	.052	**.281** (8x)	3	1/8	2-1/2	34635	39.30	34635-C3	44.80	34635-C4	53.20
.035 (.9 mm)	.052	**.350** (10x)	3	1/8	2-1/2	982135	40.40	982135-C3	45.90		
.035 (.9 mm)	.052	**.425** (12x)	3	1/8	2-1/2	35435	40.40	35435-C3	45.90	35435-C4	54.20
.035 (.9 mm)	.052	**.525** (15x)	3	1/8	2-1/2	48935	47.20	48935-C3	52.70		
.035 (.9 mm)	.052	**.700** (20x)	3	1/8	2-1/2	58335	59.50	58335-C3	65.00		
.039 (1 mm)	.059	**.117** (3x)	3	1/8	2-1/2	47839	39.10	47839-C3	44.60		
.039 (1 mm)	.059	**.203** (5x)	3	1/8	2-1/2	33239	39.10	33239-C3	44.60	33239-C4	53.00
.039 (1 mm)	.059	**.203** (5x)	4	1/8	2-1/2	861639	39.10	861639-C3	44.60		
.039 (1 mm)	.059	**.240** (6x)	3	1/8	2-1/2	937039	39.30	937039-C3	44.80		
.039 (1 mm)	.059	**.281** (7x)	3	1/8	2-1/2	934839	39.30	934839-C3	44.80		
.039 (1 mm)	.059	**.325** (8x)	3	1/8	2-1/2	34639	39.30	34639-C3	44.80	34639-C4	53.20
.039 (1 mm)	.059	**.325** (8x)	4	1/8	2-1/2	874139	39.30	874139-C3	44.80		
.039 (1 mm)	.059	**.400** (10x)	3	1/8	2-1/2	982139	40.40	982139-C3	45.90		
.039 (1 mm)	.059	**.480** (12x)	3	1/8	2-1/2	35439	40.40	35439-C3	45.90		
.039 (1 mm)	.059	**.600** (15x)	3	1/8	2-1/2	48939	47.20	48939-C3	52.70		
.039 (1 mm)	.059	**.700** (18x)	3	1/8	2-1/2	977339	51.40	977339-C3	56.60		
.040	.060	**.120** (3x)	3	1/8	2-1/2	47840	39.10	47840-C3	44.60		
.040	.060	**.160** (4x)	3	1/8	2-1/2	945540	39.10	945540-C3	44.60	945540-C4	53.70
.040	.060	**.203** (5x)	3	1/8	2-1/2	33240	39.10	33240-C3	44.60	33240-C4	53.00
.040	.060	**.203** (5x)	4	1/8	2-1/2	861640	41.40	861640-C3	46.90		
.040	.060	**.240** (6x)	3	1/8	2-1/2	937040	39.30	937040-C3	44.80		
.040	.060	**.281** (7x)	3	1/8	2-1/2	934840	39.30	934840-C3	44.80		
.040	.060	**.325** (8x)	3	1/8	2-1/2	34640	39.30	34640-C3	44.80	34640-C4	53.20
.040	.060	**.325** (8x)	4	1/8	2-1/2	874140	39.30	874140-C3	44.80		
.040	.060	**.400** (10x)	3	1/8	2-1/2	982140	40.40	982140-C3	45.90	982140-C4	55.00
.040	.060	**.400** (10x)	4	1/8	2-1/2	789140	41.20	789140-C3	46.70		
.040	.060	**.480** (12x)	3	1/8	2-1/2	35440	40.40	35440-C3	45.90	35440-C4	54.20
.040	.060	**.600** (15x)	3	1/8	2-1/2	48940	47.20	48940-C3	52.70	48940-C4	61.10
.040	.060	**.720** (18x)	3	1/8	2-1/2	977340	59.50	977340-C3	65.00		
.040	.060	**.800** (20x)	3	1/8	2-1/2	58340	59.50	58340-C3	65.00		
.040	.060	**1.000** (25x)	3	1/8	2-1/2	38040	77.20	38040-C3	82.70	**25x Diameter!**	
.045	.067	**.135** (3x)	3	1/8	2-1/2	47845	38.40	47845-C3	43.90		
.045	.067	**.225** (5x)	3	1/8	2-1/2	33245	38.40	33245-C3	43.90	33245-C4	52.80
.045	.067	**.375** (8x)	3	1/8	2-1/2	34645	38.50	34645-C3	44.00	34645-C4	52.90
.045	.067	**.450** (10x)	3	1/8	2-1/2	982145	39.80	982145-C3	45.30		
.045	.067	**.550** (12x)	3	1/8	2-1/2	35445	39.80	35445-C3	45.30	35445-C4	53.70
.045	.067	**.680** (15x)	3	1/8	2-1/2	48945	44.90	48945-C3	50.40		
.045	.067	**.900** (20x)	3	1/8	2-1/2	58345	56.10	58345-C3	61.60		

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.047 (3/64)	.070	**.141** (3x)	3	1/8	2-1/2	47847	38.40	47847-C3	43.90		
.047 (3/64)	.070	**.187** (4x)	3	1/8	2-1/2	945547	38.40	945547-C3	43.90		
.047 (3/64)	.070	**.250** (5x)	3	1/8	2-1/2	33247	38.40	33247-C3	43.90	33247-C4	52.80
.047 (3/64)	.070	**.250** (5x)	4	1/8	2-1/2	861647	40.70	861647-C3	46.20		
.047 (3/64)	.070	**.281** (6x)	3	1/8	2-1/2	937047	38.40	937047-C3	43.90		
.047 (3/64)	.070	**.328** (7x)	3	1/8	2-1/2	934847	38.50	934847-C3	44.00		
.047 (3/64)	.070	**.375** (8x)	3	1/8	2-1/2	34647	38.50	34647-C3	44.00	34647-C4	52.90
.047 (3/64)	.070	**.375** (8x)	4	1/8	2-1/2	874147	40.80	874147-C3	46.30		
.047 (3/64)	.070	**.425** (9x)	3	1/8	2-1/2	846847	39.80	846847-C3	45.30		
.047 (3/64)	.070	**.480** (10x)	3	1/8	2-1/2	982147	39.80	982147-C3	45.30	982147-C4	53.70
.047 (3/64)	.070	**.570** (12x)	3	1/8	2-1/2	35447	39.80	35447-C3	45.30	35447-C4	53.70
.047 (3/64)	.070	**.570** (12x)	4	1/8	2-1/2	801747	42.30	801747-C3	47.80		
.047 (3/64)	.070	**.710** (15x)	3	1/8	2-1/2	48947	44.90	48947-C3	50.40	48947-C4	58.80
.047 (3/64)	.070	**.850** (18x)	3	1/8	2-1/2	977347	56.10	977347-C3	61.60		
.047 (3/64)	.070	**.950** (20x)	3	1/8	2-1/2	58347	56.10	58347-C3	61.60		
.047 (3/64)	.070	**1.187** (25x)	3	1/8	2-1/2	38047	68.10	38047-C3	73.60	**25x Diameter!**	
.047 (3/64)	.070	**1.406** (30x)	3	1/8	2-1/2	972047	90.20	972047-C3	95.70	**30x Diameter!**	
.050	.075	**.150** (3x)	3	1/8	2-1/2	47850	38.40	47850-C3	43.90		
.050	.075	**.203** (4x)	3	1/8	2-1/2	945550	38.40	945550-C3	43.90		
.050	.075	**.250** (5x)	3	1/8	2-1/2	33250	38.40	33250-C3	43.90	33250-C4	52.80
.050	.075	**.250** (5x)	4	1/8	2-1/2	861650	40.80	861650-C3	46.30		
.050	.075	**.300** (6x)	3	1/8	2-1/2	937050	38.50	937050-C3	44.00		
.050	.075	**.350** (7x)	3	1/8	2-1/2	934850	38.50	934850-C3	44.00		
.050	.075	**.400** (8x)	3	1/8	2-1/2	34650	38.50	34650-C3	44.00	34650-C4	52.90
.050	.075	**.450** (9x)	3	1/8	2-1/2	846850	39.80	846850-C3	45.30		
.050	.075	**.500** (10x)	3	1/8	2-1/2	982150	39.80	982150-C3	45.30		
.050	.075	**.600** (12x)	3	1/8	2-1/2	35450	39.80	35450-C3	45.30	35450-C4	53.70
.050	.075	**.750** (15x)	3	1/8	2-1/2	48950	44.90	48950-C3	50.40		
.050	.075	**.900** (18x)	3	1/8	2-1/2	977350	56.10	977350-C3	61.60		
.055 (1.4 mm)	.082	**.165** (3x)	3	1/8	2-1/2	47855	38.40	47855-C3	43.90		
.055 (1.4 mm)	.082	**.275** (5x)	3	1/8	2-1/2	33255	38.40	33255-C3	43.90	33255-C4	52.80
.055 (1.4 mm)	.082	**.275** (5x)	4	1/8	2-1/2	861655	39.10	861655-C3	44.60		
.055 (1.4 mm)	.082	**.330** (6x)	3	1/8	2-1/2	937055	38.50	937055-C3	44.00		
.055 (1.4 mm)	.082	**.385** (7x)	3	1/8	2-1/2	934855	38.50	934855-C3	44.00		
.055 (1.4 mm)	.082	**.450** (8x)	3	1/8	2-1/2	34655	38.50	34655-C3	44.00	34655-C4	52.90
.055 (1.4 mm)	.082	**.560** (10x)	3	1/8	2-1/2	982155	39.80	982155-C3	45.30		
.055 (1.4 mm)	.082	**.660** (12x)	3	1/8	2-1/2	35455	40.60	35455-C3	46.10	35455-C4	54.40
.055 (1.4 mm)	.082	**.825** (15x)	3	1/8	2-1/2	48955	44.90	48955-C3	50.40		
.055 (1.4 mm)	.082	**1.000** (18x)	3	1/8	2-1/2	977355	56.10	977355-C3	61.60		
.060	.090	**.180** (3x)	3	1/8	2-1/2	47860	38.40	47860-C3	43.90		
.060	.090	**.250** (4x)	3	1/8	2-1/2	945560	38.40	945560-C3	43.90		
.060	.090	**.312** (5x)	3	1/8	2-1/2	33260	38.40	33260-C3	43.90	33260-C4	52.80
.060	.090	**.312** (5x)	4	1/8	2-1/2	861660	40.60	861660-C3	46.10		
.060	.090	**.375** (6x)	3	1/8	2-1/2	937060	38.50	937060-C3	44.00		
.060	.090	**.437** (7x)	3	1/8	2-1/2	934860	38.50	934860-C3	44.00		
.060	.090	**.500** (8x)	3	1/8	2-1/2	34660	38.50	34660-C3	44.00	34660-C4	52.90
.060	.090	**.500** (8x)	4	1/8	2-1/2	874160	39.20	874160-C3	44.70		
.060	.090	**.562** (9x)	3	1/8	2-1/2	846860	39.80	846860-C3	45.30		

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MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.060	.090	**.625** (10x)	3	1/8	2-1/2	982160	39.80	982160-C3	45.30		
	.060	.090	**.720** (12x)	3	1/8	2-1/2	35460	39.80	35460-C3	45.30	35460-C4	53.70
	.060	.090	**.900** (15x)	3	1/8	2-1/2	48960	44.90	48960-C3	50.40		
	.060	.090	**1.062** (18x)	3	1/8	2-1/2	977360	56.10	977360-C3	61.60		
	.060	.090	**1.200** (20x)	3	1/8	2-1/2	58360	56.10	58360-C3	61.60		
	.062 (1/16)	.093	**.186** (3x)	3	1/8	2-1/2	47862	38.40	47862-C3	43.90	47862-C4	52.80
	.062 (1/16)	.093	**.186** (3x)	4	1/8	2-1/2	739962	38.40	739962-C3	43.90		
	.062 (1/16)	.093	**.250** (4x)	3	1/8	2-1/2	945562	38.40	945562-C3	43.90	945562-C4	52.80
	.062 (1/16)	.093	**.250** (4x)	4	1/8	2-1/2	752062	38.40	752062-C3	43.90		
	.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	33262	38.40	33262-C3	43.90	33262-C4	52.80
	.062 (1/16)	.093	**.312** (5x)	4	1/8	2-1/2	861662	40.70	861662-C3	46.20		
	.062 (1/16)	.093	**.375** (6x)	3	1/8	2-1/2	937062	38.40	937062-C3	43.90	937062-C4	52.80
	.062 (1/16)	.093	**.375** (6x)	4	1/8	2-1/2	753662	38.40	753662-C3	43.90		
	.062 (1/16)	.093	**.437** (7x)	3	1/8	2-1/2	934862	38.50	934862-C3	44.00	934862-C4	52.90
NEW	.062 (1/16)	.093	**.437** (7x)	4	1/8	2-1/2	753262	38.50	753262-C3	44.00		
	.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	34662	38.50	34662-C3	44.00	34662-C4	52.90
	.062 (1/16)	.093	**.500** (8x)	4	1/8	2-1/2	874162	41.60	874162-C3	47.10	874162-C4	55.50
	.062 (1/16)	.093	**.562** (9x)	3	1/8	2-1/2	846862	39.80	846862-C3	45.30		
	.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	982162	39.80	982162-C3	45.30	982162-C4	53.70
	.062 (1/16)	.093	**.625** (10x)	4	1/8	2-1/2	789162	40.60	789162-C3	46.10		
	.062 (1/16)	.093	**.687** (11x)	3	1/8	2-1/2	850262	39.80	850262-C3	45.30		
	.062 (1/16)	.093	**.750** (12x)	3	1/8	2-1/2	35462	39.80	35462-C3	45.30	35462-C4	53.70
	.062 (1/16)	.093	**.750** (12x)	4	1/8	2-1/2	801762	42.20	801762-C3	47.70		
	.062 (1/16)	.093	**.800** (13x)	3	1/8	2-1/2	839362	42.40	839362-C3	47.90		
	.062 (1/16)	.093	**.950** (15x)	3	1/8	2-1/2	48962	44.90	48962-C3	50.40	48962-C4	58.80
	.062 (1/16)	.093	**.950** (15x)	4	1/8	2-1/2	735162	44.90	735162-C3	50.40		
	.062 (1/16)	.093	**1.125** (18x)	3	1/8	2-1/2	977362	56.10	977362-C3	61.60	977362-C4	70.10
	.062 (1/16)	.093	**1.250** (20x)	3	1/8	2-1/2	58362	56.10	58362-C3	61.60	58362-C4	70.10
	.062 (1/16)	.093	**1.375** (22x)	3	1/8	3	969662	63.20	969662-C3	68.70		
	.062 (1/16)	.093	**1.550** (25x)	3	1/8	3	38062	68.10	38062-C3	73.60	**25x Diameter!**	
	.062 (1/16)	.093	**1.875** (30x)	3	1/8	3	972062	90.20	972062-C3	95.70	**30x Diameter!**	
	.065	.097	**.195** (3x)	3	1/8	2-1/2	47865	38.40	47865-C3	43.90		
	.065	.097	**.325** (5x)	3	1/8	2-1/2	33265	38.40	33265-C3	43.90		
	.065	.097	**.530** (8x)	3	1/8	2-1/2	34665	38.50	34665-C3	44.00	34665-C4	53.10
	.065	.097	**.650** (10x)	3	1/8	2-1/2	982165	39.80	982165-C3	45.30		
	.065	.097	**.800** (12x)	3	1/8	2-1/2	35465	39.80	35465-C3	45.30		
	.070	.105	**.210** (3x)	3	1/8	2-1/2	47870	38.40	47870-C3	43.90		
	.070	.105	**.375** (5x)	3	1/8	2-1/2	33270	38.40	33270-C3	43.90	33270-C4	52.80
	.070	.105	**.375** (5x)	4	1/8	2-1/2	861670	40.60	861670-C3	46.10		
	.070	.105	**.570** (8x)	3	1/8	2-1/2	34670	38.50	34670-C3	44.00	34670-C4	52.90
	.070	.105	**.700** (10x)	3	1/8	2-1/2	982170	39.80	982170-C3	45.30		
	.070	.105	**.850** (12x)	3	1/8	2-1/2	35470	39.80	35470-C3	45.30		
	.070	.105	**1.062** (15x)	3	1/8	2-1/2	48970	44.90	48970-C3	50.40		
	.075	.112	**.225** (3x)	3	1/8	2-1/2	47875	38.40	47875-C3	43.90		
	.075	.112	**.375** (5x)	3	1/8	2-1/2	33275	38.40	33275-C3	43.90		
	.075	.112	**.625** (8x)	3	1/8	2-1/2	34675	38.50	34675-C3	44.00	34675-C4	52.90
	.075	.112	**.750** (10x)	3	1/8	2-1/2	982175	39.80	982175-C3	45.30		
	.075	.112	**.900** (12x)	3	1/8	2-1/2	35475	39.80	35475-C3	45.30		

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.078 (5/64)	.117	**.234** (3x)	3	1/8	2-1/2	47878	38.40	47878-C3	43.90			
.078 (5/64)	.117	**.312** (4x)	3	1/8	2-1/2	945578	38.40	945578-C3	43.90			
.078 (5/64)	.117	**.406** (5x)	3	1/8	2-1/2	33278	38.40	33278-C3	43.90	33278-C4	52.80	
.078 (5/64)	.117	**.406** (5x)	4	1/8	2-1/2	861678	40.70	861678-C3	46.20			
.078 (5/64)	.117	**.475** (6x)	3	1/8	2-1/2	937078	38.40	937078-C3	43.90			
.078 (5/64)	.117	**.550** (7x)	3	1/8	2-1/2	934878	38.50	934878-C3	44.00			
.078 (5/64)	.117	**.625** (8x)	3	1/8	2-1/2	34678	38.50	34678-C3	44.00	34678-C4	52.90	
.078 (5/64)	.117	**.625** (8x)	4	1/8	2-1/2	874178	40.80	874178-C3	46.30			
.078 (5/64)	.117	**.700** (9x)	3	1/8	2-1/2	846878	39.80	846878-C3	45.30			
.078 (5/64)	.117	**.800** (10x)	3	1/8	2-1/2	982178	39.80	982178-C3	45.30			
.078 (5/64)	.117	**.940** (12x)	3	1/8	2-1/2	35478	39.80	35478-C3	45.30	35478-C4	53.70	
.078 (5/64)	.117	**1.187** (15x)	3	1/8	2-1/2	48978	44.90	48978-C3	50.40			
.078 (5/64)	.117	**1.400** (18x)	3	1/8	3	977378	56.10	977378-C3	61.60			
.078 (5/64)	.117	**1.562** (20x)	3	1/8	3	58378	56.10	58378-C3	61.60			
.078 (5/64)	.117	**1.950** (25x)	3	1/8	3	38078	68.10	38078-C3	73.60	**25x Diameter!**		
.078 (5/64)	.117	**2.343** (30x)	3	1/8	4	972078	90.20	972078-C3	96.10	**30x Diameter!**		
.080	.120	**.240** (3x)	3	1/8	2-1/2	47880	38.40	47880-C3	43.90			
.080	.120	**.406** (5x)	3	1/8	2-1/2	33280	38.40	33280-C3	43.90			
.080	.120	**.650** (8x)	3	1/8	2-1/2	34680	38.50	34680-C3	44.00	34680-C4	52.90	
.080	.120	**.960** (12x)	3	1/8	2-1/2	35480	39.80	35480-C3	45.30			
.085	.127	**.425** (5x)	3	1/8	2-1/2	33285	38.40	33285-C3	43.90			
.085	.127	**.700** (8x)	3	1/8	2-1/2	34685	38.50	34685-C3	44.00	34685-C4	52.90	
.085	.127	**1.020** (12x)	3	1/8	2-1/2	35485	39.80	35485-C3	45.30			
.090	.135	**.270** (3x)	3	1/8	2-1/2	47890	38.40	47890-C3	43.90			
.090	.135	**.450** (5x)	3	1/8	2-1/2	33290	38.40	33290-C3	43.90			
.090	.135	**.750** (8x)	3	1/8	2-1/2	34690	38.50	34690-C3	44.00	34690-C4	52.90	
.090	.135	**1.080** (12x)	3	1/8	2-1/2	35490	39.80	35490-C3	45.30			
.093 (3/32)	.139	**.279** (3x)	3	1/8	2-1/2	47893	38.40	47893-C3	43.90	47893-C4	52.80	
.093 (3/32)	.139	**.279** (3x)	4	1/8	2-1/2	739993	40.70	739993-C3	46.20			
.093 (3/32)	.139	**.375** (4x)	3	1/8	2-1/2	945593	38.40	945593-C3	43.90	945593-C4	52.80	
.093 (3/32)	.139	**.375** (4x)	4	1/8	2-1/2	752093	38.40	752093-C3	43.90			
.093 (3/32)	.139	**.500** (5x)	3	1/8	2-1/2	33293	38.40	33293-C3	43.90	33293-C4	52.80	
.093 (3/32)	.139	**.500** (5x)	4	1/8	2-1/2	861693	40.70	861693-C3	46.20			
.093 (3/32)	.139	**.585** (6x)	3	1/8	2-1/2	937093	38.40	937093-C3	43.90	937093-C4	53.00	
.093 (3/32)	.139	**.585** (6x)	4	1/8	2-1/2	753693	38.40	753693-C3	43.90			NEW
.093 (3/32)	.139	**.670** (7x)	3	1/8	2-1/2	934893	38.50	934893-C3	44.00	934893-C4	52.90	
.093 (3/32)	.139	**.670** (7x)	4	1/8	2-1/2	753293	38.50	753293-C3	44.00			NEW
.093 (3/32)	.139	**.750** (8x)	3	1/8	2-1/2	34693	38.50	34693-C3	44.00	34693-C4	52.90	
.093 (3/32)	.139	**.750** (8x)	4	1/8	2-1/2	874193	40.80	874193-C3	46.30			
.093 (3/32)	.139	**.850** (9x)	3	1/8	2-1/2	846893	39.80	846893-C3	45.30			
.093 (3/32)	.139	**.950** (10x)	3	1/8	2-1/2	982193	39.80	982193-C3	45.30	982193-C4	54.40	NEW
.093 (3/32)	.139	**.950** (10x)	4	1/8	2-1/2	789193	39.80	789193-C3	45.30			
.093 (3/32)	.139	**1.030** (11x)	3	1/8	2-1/2	850293	39.80	850293-C3	45.30			
.093 (3/32)	.139	**1.125** (12x)	3	1/8	2-1/2	35493	39.80	35493-C3	45.30	35493-C4	53.70	
.093 (3/32)	.139	**1.125** (12x)	4	1/8	2-1/2	801793	39.80	801793-C3	45.30			
.093 (3/32)	.139	**1.250** (13x)	3	1/8	2-1/2	839393	42.80	839393-C3	48.30			
.093 (3/32)	.139	**1.400** (15x)	3	1/8	3	48993	46.70	48993-C3	52.20	48993-C4	60.60	

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Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.093 (3/32)	.139	**1.675** (18x)	3	1/8	3	977393	56.80	977393-C3	61.70		
.093 (3/32)	.139	**1.875** (20x)	3	1/8	4	58393	61.90	58393-C3	67.80		
.093 (3/32)	.139	**2.062** (22x)	3	1/8	4	969693	65.00	969693-C3	70.90		
.093 (3/32)	.139	**2.312** (25x)	3	1/8	4	38093	70.90	38093-C3	76.80	**25x Diameter!**	
.093 (3/32)	.139	**2.812** (30x)	3	1/8	4	972093	100.00	972093-C3	105.90	**30x Diameter!**	
.095	.142	**.500** (5x)	3	1/8	2-1/2	33295	38.40	33295-C3	43.90		
.095	.142	**.750** (8x)	3	1/8	2-1/2	34695	38.50	34695-C3	44.00	34695-C4	53.10
.095	.142	**1.150** (12x)	3	1/8	2-1/2	35495	39.80	35495-C3	45.30		
.100	.150	**.300** (3x)	3	1/8	2-1/2	978400	38.40	978400-C3	43.90		
.100	.150	**.400** (4x)	3	1/8	2-1/2	945600	38.40	945600-C3	43.90		
.100	.150	**.500** (5x)	3	1/8	2-1/2	33300	38.40	33300-C3	43.90		
.100	.150	**.600** (6x)	3	1/8	2-1/2	937100	38.40	937100-C3	43.90		
.100	.150	**.700** (7x)	3	1/8	2-1/2	934900	38.40	934900-C3	43.90		
.100	.150	**.800** (8x)	3	1/8	2-1/2	34700	38.50	34700-C3	44.00	34700-C4	52.90
.100	.150	**1.000** (10x)	3	1/8	2-1/2	982200	39.80	982200-C3	45.30		
.100	.150	**1.200** (12x)	3	1/8	2-1/2	35499	39.80	35499-C3	45.30		
.100	.150	**1.500** (15x)	3	1/8	3	49000	47.50	49000-C3	53.00		
.100	.150	**1.812** (18x)	3	1/8	4	977400	59.50	977400-C3	65.40		
.105	.158	**.530** (5x)	3	1/8	2-1/2	33301	38.40	33301-C3	43.90		
.105	.158	**.850** (8x)	3	1/8	2-1/2	34701	38.50	34701-C3	44.00		
.109 (7/64)	.163	**.570** (5x)	3	1/8	2-1/2	33302	38.40	33302-C3	43.90	33302-C4	52.80
.109 (7/64)	.163	**.570** (5x)	4	1/8	2-1/2	861702	39.10	861702-C3	44.60		
.109 (7/64)	.163	**.680** (6x)	3	1/8	2-1/2	937102	38.50	937102-C3	44.00		
.109 (7/64)	.163	**.790** (7x)	3	1/8	2-1/2	934902	38.50	934902-C3	44.00		
.109 (7/64)	.163	**.900** (8x)	3	1/8	2-1/2	34702	38.50	34702-C3	44.00		
.109 (7/64)	.163	**1.125** (10x)	3	1/8	2-1/2	982202	39.80	982202-C3	45.30		
.109 (7/64)	.163	**1.312** (12x)	3	1/8	3	35502	40.40	35502-C3	45.90		
.110	.165	**.570** (5x)	3	1/8	2-1/2	33303	38.40	33303-C3	43.90		
.110	.165	**.900** (8x)	3	1/8	2-1/2	34703	39.20	34703-C3	44.70		
.115	.173	**.600** (5x)	3	1/8	2-1/2	33304	38.40	33304-C3	43.90		
.115	.173	**.950** (8x)	3	1/8	2-1/2	34704	38.50	34704-C3	44.00		
.118 (3 mm)	.177	**.475** (4x)	3	1/8	2-1/2	945605	38.40	945605-C3	43.90		
.118 (3 mm)	.177	**.625** (5x)	3	1/8	2-1/2	33305	38.40	33305-C3	43.90		
.118 (3 mm)	.177	**.625** (5x)	4	1/8	2-1/2	861705	38.40	861705-C3	43.90		
.118 (3 mm)	.177	**.735** (6x)	3	1/8	2-1/2	937105	38.50	937105-C3	44.00		
.118 (3 mm)	.177	**.840** (7x)	3	1/8	2-1/2	934905	38.50	934905-C3	44.00		
.118 (3 mm)	.177	**.950** (8x)	3	1/8	2-1/2	34705	38.50	34705-C3	44.00		
.118 (3 mm)	.177	**.950** (8x)	4	1/8	2-1/2	874205	39.20	874205-C3	44.70		
.118 (3 mm)	.177	**1.187** (10x)	3	1/8	2-1/2	982205	39.80	982205-C3	45.30		
.118 (3 mm)	.177	**1.420** (12x)	3	1/8	3	35505	40.40	35505-C3	45.90		
.118 (3 mm)	.177	**1.770** (15x)	3	1/8	3	49005	48.50	49005-C3	54.00		
.118 (3 mm)	.177	**2.125** (18x)	3	1/8	4	977405	60.30	977405-C3	66.20		
.120	.180	**.625** (5x)	3	1/8	2-1/2	33306	38.40	33306-C3	43.90		
.120	.180	**1.000** (8x)	3	1/8	2-1/2	34706	38.50	34706-C3	44.00		

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NEW SIZES!

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Square – Long Reach, Stub Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.187	.375 (3x)	3	1/8	2-1/2	978408	38.40	978408-C3	43.90		
.125 (1/8)	.187	.500 (4x)	3	1/8	2-1/2	945608	38.40	945608-C3	43.90	945608-C4	52.80
.125 (1/8)	.187	.625 (5x)	3	1/8	2-1/2	33308	38.40	33308-C3	43.90	33308-C4	52.80
.125 (1/8)	.187	.625 (5x)	4	1/8	2-1/2	861708	40.70	861708-C3	46.20		
.125 (1/8)	.187	.750 (6x)	3	1/8	2-1/2	937108	38.40	937108-C3	43.90	937108-C4	52.80
.125 (1/8)	.187	.750 (6x)	4	1/8	2-1/2	753708	39.10	753708-C3	44.60		
.125 (1/8)	.187	.875 (7x)	3	1/8	2-1/2	934908	38.40	934908-C3	43.90	934908-C4	52.80
.125 (1/8)	.187	.875 (7x)	4	1/8	2-1/2	753308	39.10	753308-C3	44.60		
.125 (1/8)	.187	1.000 (8x)	3	1/8	2-1/2	34708	38.40	34708-C3	43.90	34708-C4	52.80
.125 (1/8)	.187	1.000 (8x)	4	1/8	2-1/2	874208	40.70	874208-C3	46.20		
.125 (1/8)	.187	1.125 (9x)	3	1/8	2-1/2	846908	41.50	846908-C3	47.00		
.125 (1/8)	.187	1.250 (10x)	3	1/8	2-1/2	982208	41.50	982208-C3	47.00	982208-C4	55.40
.125 (1/8)	.187	1.250 (10x)	4	1/8	2-1/2	789208	41.50	789208-C3	47.00		
.125 (1/8)	.187	1.375 (11x)	3	1/8	2-1/2	850308	41.60	850308-C3	47.10		
.125 (1/8)	.187	1.500 (12x)	3	1/8	3	35508	41.60	35508-C3	47.10	35508-C4	55.50
.125 (1/8)	.187	1.500 (12x)	4	1/8	3	801808	41.60	801808-C3	47.10		
.125 (1/8)	.187	1.625 (13x)	3	1/8	3	839408	44.60	839408-C3	50.10		
.125 (1/8)	.187	1.875 (15x)	3	1/8	3	49008	47.50	49008-C3	53.00	49008-C4	61.40
.125 (1/8)	.187	2.250 (18x)	3	1/8	4	977408	57.00	977408-C3	62.90		
.125 (1/8)	.187	2.500 (20x)	3	1/8	4	58408	59.00	58408-C3	64.90		
.125 (1/8)	.187	2.750 (22x)	3	1/8	4	969708	62.30	969708-C3	68.20		
.125 (1/8)	.187	3.125 (25x)	3	1/8	4	38108	68.50	38108-C3	74.40	**25x Diameter!**	
.125 (1/8)	.187	3.750 (30x)	3	1/8	6	973608	83.30	973608-C3	90.70	**30x Diameter!**	
.140 (9/64)	.220	.425 (3x)	3	3/16	3	978409	45.30	978409-C3	51.30		
.140 (9/64)	.220	.750 (5x)	3	3/16	3	33309	45.30	33309-C3	51.30	33309-C4	61.80
.140 (9/64)	.220	.750 (5x)	4	3/16	3	861709	45.30	861709-C3	51.30		
.140 (9/64)	.220	1.125 (8x)	3	3/16	3	34709	45.30	34709-C3	51.30		
.140 (9/64)	.220	1.450 (10x)	3	3/16	3	982209	48.60	982209-C3	54.50		
.140 (9/64)	.220	1.680 (12x)	3	3/16	4	35509	52.20	35509-C3	60.20		
.156 (5/32)	.234	.470 (3x)	3	3/16	3	978410	45.30	978410-C3	51.30		
.156 (5/32)	.234	.625 (4x)	3	3/16	3	945610	45.30	945610-C3	51.30		
.156 (5/32)	.234	.750 (5x)	3	3/16	3	33310	45.30	33310-C3	51.30	33310-C4	61.80
.156 (5/32)	.234	.750 (5x)	4	3/16	3	861710	45.30	861710-C3	51.30		
.156 (5/32)	.234	.937 (6x)	3	3/16	3	937110	45.30	937110-C3	51.30		
.156 (5/32)	.234	1.093 (7x)	3	3/16	3	934910	45.30	934910-C3	51.30		
.156 (5/32)	.234	1.250 (8x)	3	3/16	3	34710	45.30	34710-C3	51.30	34710-C4	64.50
.156 (5/32)	.234	1.250 (8x)	4	3/16	3	874210	45.30	874210-C3	51.30		
.156 (5/32)	.234	1.375 (9x)	3	3/16	3	846910	48.60	846910-C3	54.50		
.156 (5/32)	.234	1.570 (10x)	3	3/16	3	982210	48.60	982210-C3	54.50		
.156 (5/32)	.234	1.875 (12x)	3	3/16	4	35510	48.80	35510-C3	56.90		
.156 (5/32)	.234	2.375 (15x)	3	3/16	4	49010	52.20	49010-C3	60.20		
.156 (5/32)	.234	2.812 (18x)	3	3/16	6	977410	72.00	977410-C3	82.70		
.172 (11/64)	.258	.875 (5x)	3	3/16	3	33311	45.30	33311-C3	51.30		
.172 (11/64)	.258	1.375 (8x)	3	3/16	3	34711	45.30	34711-C3	51.30		

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Square – Long Reach, Stub Flute (cont.)

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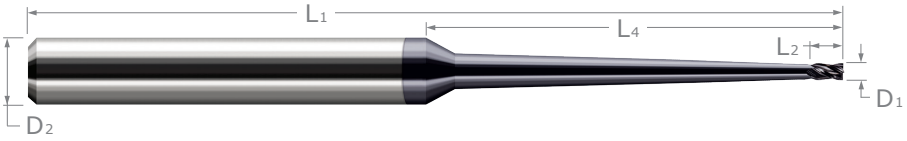
	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.187 (3/16)	.281	.570 (3x)	3	3/16	3	978412	45.30	978412-C3	51.30		
	.187 (3/16)	.281	.750 (4x)	3	3/16	3	945612	45.30	945612-C3	51.30		
	.187 (3/16)	.281	1.000 (5x)	3	3/16	3	33312	45.30	33312-C3	51.30	33312-C4	64.50
	.187 (3/16)	.281	1.000 (5x)	4	3/16	3	861712	45.30	861712-C3	51.30		
	.187 (3/16)	.281	1.156 (6x)	3	3/16	3	937112	45.30	937112-C3	51.30		
	.187 (3/16)	.281	1.312 (7x)	3	3/16	3	934912	45.30	934912-C3	51.30		
	.187 (3/16)	.281	1.500 (8x)	3	3/16	3	34712	45.30	34712-C3	51.30	34712-C4	64.50
	.187 (3/16)	.281	1.500 (8x)	4	3/16	3	874212	47.40	874212-C3	53.40		
	.187 (3/16)	.281	1.680 (9x)	3	3/16	3	846912	48.60	846912-C3	54.50		
	.187 (3/16)	.281	1.875 (10x)	3	3/16	4	982212	48.60	982212-C3	56.70		
	.187 (3/16)	.281	2.250 (12x)	3	3/16	4	35512	48.80	35512-C3	56.90	35512-C4	69.20
	.187 (3/16)	.281	2.812 (15x)	3	3/16	4	49012	52.20	49012-C3	60.20		
	.187 (3/16)	.281	3.375 (18x)	3	3/16	6	977412	74.30	977412-C3	85.00		
	.187 (3/16)	.281	3.750 (20x)	3	3/16	6	58412	74.30	58412-C3	85.00		
	.187 (3/16)	.281	4.125 (22x)	3	3/16	6	969712	73.40	969712-C3	84.10		
	.203 (13/64)	.312	1.015 (5x)	3	1/4	4	33313	57.00	33313-C3	66.50		
	.203 (13/64)	.312	1.625 (8x)	3	1/4	4	34713	57.00	34713-C3	66.50		
	.218 (7/32)	.330	1.125 (5x)	3	1/4	4	33314	56.70	33314-C3	66.10		
	.218 (7/32)	.330	1.750 (8x)	3	1/4	4	34714	56.70	34714-C3	6		
	.218 (7/32)	.330	2.187 (10x)	3	1/4	4	982214	58.40	982214-C3	67.80		
	.250 (1/4)	.375	.750 (3x)	3	1/4	4	978416	50.70	978416-C3	60.10		
	.250 (1/4)	.375	1.000 (4x)	3	1/4	4	945616	50.70	945616-C3	60.10		
	.250 (1/4)	.375	1.250 (5x)	3	1/4	4	33316	50.70	33316-C3	60.10	33316-C4	72.50
	.250 (1/4)	.375	1.250 (5x)	4	1/4	4	861716	50.70	861716-C3	60.10		
	.250 (1/4)	.375	1.500 (6x)	3	1/4	4	937116	50.70	937116-C3	60.10		
	.250 (1/4)	.375	1.750 (7x)	3	1/4	4	934916	50.70	934916-C3	60.10		
	.250 (1/4)	.375	2.000 (8x)	3	1/4	4	34716	50.70	34716-C3	60.10	34716-C4	72.50
	.250 (1/4)	.375	2.000 (8x)	4	1/4	4	874216	52.90	874216-C3	62.40		
	.250 (1/4)	.375	2.250 (9x)	3	1/4	4	846916	57.20	846916-C3	66.70		
	.250 (1/4)	.375	2.500 (10x)	3	1/4	4	982216	57.20	982216-C3	66.70		
	.250 (1/4)	.375	3.000 (12x)	3	1/4	6	35516	62.70	35516-C3	73.40	35516-C4	89.30
	.250 (1/4)	.375	3.750 (15x)	3	1/4	6	49016	63.90	49016-C3	74.60		
	.250 (1/4)	.375	5.000 (20x)	3	1/4	8	58416	133.10	58416-C3	149.10		
	.312 (5/16)	.470	1.625 (5x)	3	5/16	4	33320	84.40	33320-C3	95.70		
	.312 (5/16)	.470	2.500 (8x)	3	5/16	4	34720	84.40	34720-C3	95.70		
	.375 (3/8)	.570	2.000 (5x)	3	3/8	4	33324	84.40	33324-C3	99.00		
	.375 (3/8)	.570	3.000 (8x)	3	3/8	6	34724	116.10	34724-C3	132.60		
NEW	.375 (3/8)	.570	3.750 (10x)	3	3/8	6	982224	116.10	982224-C3	129.40		
	.500 (1/2)	.750	2.625 (5x)	3	1/2	4	33332	99.80	33332-C3	115.20		

MINIATURE END MILLS

Square – Tapered Reach (Clearance Cutters)



Maximum Reach & Maximum Rigidity!

SQUARE

- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½x diameter
- Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

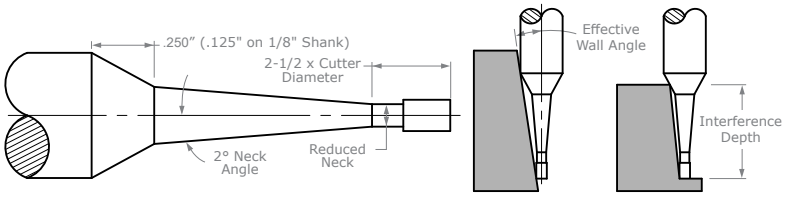
CUTTER DIA.	LOC	OVERALL REACH	EFF. WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*						UNCOATED			AlTiN NANO COATED		
D_1 +.000″ −.001″	L_2 +.020″ −.000″	L_4 +.020″ −.000″		D_2 (h6)	L_1	0°	.5°	1°	2°	3°	4°	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.015	.023	**1/2**	6.4°	1/8	2-1/2	.060	.080	.125	.375	.395	.420		990215	81.50		990215-C6	88.20
.031	.047	**1/2**	5.4°	1/8	2-1/2	.115	.155	.235	.385	.410	.440		990231	62.80		990231-C6	69.50
.031	.047	**1**	6.3°	1/4	4	.115	.155	.235	.755	.800	.850	26631	30831	75.60	26631-C6	30831-C6	85.30
.031	.047	**1-1/2**	4.2°	1/4	4	.115	.155	.235	1.260	1.355	1.470	28331	31231	81.70	28331-C6	31231-C6	91.40
.031	.047	**2**	3.1°	1/4	4	.115	.155	.235	1.765	1.965	-	17431	913131	87.60	17431-C6	913131-C6	97.30
.047	.071	**1/2**	4.5°	1/8	2-1/2	.180	.245	.370	.395	.430	.470		990247	63.30		990247-C6	70.00
.047	.071	**1**	5.9°	1/4	4	.180	.245	.370	.765	.815	.870	26647	30847	75.60	26647-C6	30847-C6	85.30
.047	.071	**1-1/2**	3.9°	1/4	4	.180	.245	.370	1.275	1.380	-	28347	31247	81.70	28347-C6	31247-C6	91.40
.062	.093	**1/2**	3.7°	1/8	2-1/2	.220	.295	.375	.410	.460	-		990262	61.00		990262-C6	67.70
.062	.093	**1**	5.4°	1/4	4	.220	.295	.445	.775	.825	.890	26662	30862	73.50	26662-C6	30862-C6	83.20
.062	.093	**1-1/2**	3.7°	1/4	4	.220	.295	.445	1.285	1.410	-	28362	31262	79.50	28362-C6	31262-C6	89.20
.062	.093	**2**	2.6°	1/4	4	.220	.295	.445	1.805	-	-	17462	913162	85.50	17462-C6	913162-C6	95.20
.078	.118	**1**	5.0°	1/4	4	.305	.405	.610	.785	.845	.915	26678	30878	73.50	26678-C6	30878-C6	83.20
.078	.118	**1-1/2**	3.4°	1/4	4	.305	.405	.610	1.305	1.445	-	28378	31278	79.50	28378-C6	31278-C6	89.20
.093	.140	**1**	4.6°	1/4	4	.340	.455	.685	.795	.865	.945	26693	30893	74.40	26693-C6	30893-C6	84.10
.093	.140	**1-1/2**	3.1°	1/4	4	.340	.455	.685	1.320	-	-	28393	31293	78.80	28393-C6	31293-C6	88.50
.093	.140	**2**	2.2°	1/4	4	.340	.455	.685	1.890	-	-	17493	913193	83.30	17493-C6	913193-C6	93.00
.125	.188	**1**	3.7°	1/4	4	.450	.600	.760	.835	.930	-	26708	30908	74.40	26708-C6	30908-C6	84.10
.125	.188	**1-1/2**	2.5°	1/4	4	.450	.600	.905	1.395	-	-	28408	31308	78.80	28408-C6	31308-C6	88.50
.125	.188	**2**	1.7°	1/4	4	.450	.600	.905	-	-	-	17508	913208	83.30	17508-C6	913208-C6	93.00
.156	.234	**1**	2.8°	1/4	4	.525	.705	.780	.895	-	-	26710	30910	74.40	26710-C6	30910-C6	84.10
.156	.234	**1-1/2**	1.9°	1/4	4	.525	.705	1.060	-	-	-	28410	31310	78.80	28410-C6	31310-C6	88.50
.187	.281	**1-1/2**	1.3°	1/4	4	.605	.805	1.215	-	-	-	28412	31312	78.80	28412-C6	31312-C6	88.50
.250	.375	**1-1/2**	2.5°	3/8	4	.760	1.015	1.275	1.425	-	-	28416	31316	101.70	28416-C6	31316-C6	115.60

*Values are approximate and may vary due to tolerancing.

For detailed interference charts with more angles, scan the QR code or visit **harveytool.com/resources**

Effective Wall Angle:
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

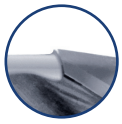
Interference Depth:
At a given angle, the depth at which the cutter interferes with the workpiece.



MINIATURE END MILLS

Square – Long Reach, Long Flute

- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut is > 5x diameter
- 3 and 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.010	.050	.080 (8x)	3	1/8	2-1/2	876610	54.30	876610-C3	59.80		
.010	.050	.100 (10x)	3	1/8	2-1/2	13610	55.80	13610-C3	61.30	10010	69.70
.010	.050	.150 (15x)	3	1/8	2-1/2	948210	70.80	948210-C3	76.30		
.012	.060	.120 (10x)	3	1/8	2-1/2	13612	55.80	13612-C3	61.30		
.015 (1/64)	.075	.125 (8x)	3	1/8	2-1/2	876615	43.10	876615-C3	48.60		
.015 (1/64)	.075	.150 (10x)	3	1/8	2-1/2	13615	44.40	13615-C3	49.90	10015	58.20
.015 (1/64)	.075	.225 (15x)	3	1/8	2-1/2	948215	60.80	948215-C3	66.30		
.020 (.5 mm)	.100	.160 (8x)	3	1/8	2-1/2	876620	41.30	876620-C3	46.80		
.020 (.5 mm)	.100	.200 (10x)	3	1/8	2-1/2	13620	42.60	13620-C3	48.10	10020	56.40
.020 (.5 mm)	.100	.300 (15x)	3	1/8	2-1/2	948220	58.70	948220-C3	64.20		
.025	.125	.250 (10x)	3	1/8	2-1/2	13625	40.90	13625-C3	46.40	10025	54.80
.025	.125	.312 (12x)	3	1/8	2-1/2	867025	53.60	867025-C3	59.10		
.030	.150	.300 (10x)	3	1/8	2-1/2	13630	40.90	13630-C3	46.40	10030	54.80
.030	.150	.450 (15x)	3	1/8	2-1/2	948230	56.80	948230-C3	62.30		
.031 (1/32)	.155	.250 (8x)	3	1/8	2-1/2	876631	39.70	876631-C3	45.20		
.031 (1/32)	.155	.310 (10x)	3	1/8	2-1/2	13631	40.90	13631-C3	46.40	10031	54.80
.031 (1/32)	.155	.312 (10x)	4	1/8	2-1/2	776031	40.90	776031-C3	46.40		
.031 (1/32)	.155	.375 (12x)	3	1/8	2-1/2	867031	53.10	867031-C3	58.60		
.031 (1/32)	.155	.470 (15x)	3	1/8	2-1/2	948231	56.80	948231-C3	62.30		
.035 (.9 mm)	.175	.350 (10x)	3	1/8	2-1/2	13635	40.90	13635-C3	46.40	10035	55.50
.040	.200	.325 (8x)	3	1/8	2-1/2	876640	39.60	876640-C3	45.10		
.040	.200	.400 (10x)	3	1/8	2-1/2	13640	40.90	13640-C3	46.40	10040	54.80
.040	.200	.600 (15x)	3	1/8	2-1/2	948240	56.80	948240-C3	62.30		
.045	.225	.450 (10x)	3	1/8	2-1/2	13645	40.10	13645-C3	45.60	10045	54.00
.047 (3/64)	.250	.375 (8x)	3	1/8	2-1/2	876647	38.90	876647-C3	44.40		
.047 (3/64)	.250	.500 (10x)	3	1/8	2-1/2	13647	40.10	13647-C3	45.60	10047	54.00
.047 (3/64)	.250	.500 (10x)	4	1/8	2-1/2	776047	40.10	776047-C3	45.60		
.047 (3/64)	.250	.570 (12x)	3	1/8	2-1/2	867047	50.20	867047-C3	55.70		
.047 (3/64)	.250	.710 (15x)	3	1/8	2-1/2	948247	53.90	948247-C3	59.40		
.050	.300	.500 (10x)	3	1/8	2-1/2	956350	40.10	956350-C3	45.60		
.050	.300	.600 (12x)	3	1/8	2-1/2	13650	40.10	13650-C3	45.60	10050	54.70
.050	.300	.750 (15x)	3	1/8	2-1/2	948250	53.90	948250-C3	59.40		
.055 (1.4 mm)	.385	.770 (14x)	3	1/8	2-1/2	13655	42.60	13655-C3	48.10	10055	56.70
.060	.312	.625 (10x)	3	1/8	2-1/2	956360	40.10	956360-C3	45.60		
.060	.312	.720 (12x)	3	1/8	2-1/2	867060	40.10	867060-C3	45.60		
.060	.500	1.000 (16x)	3	1/8	2-1/2	13660	42.80	13660-C3	48.30	10060	56.90

continued on next page

NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Long Flute (cont.)

continued from previous page

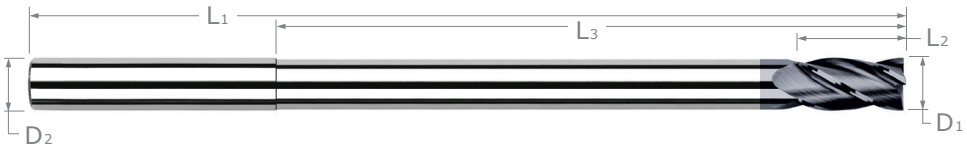
SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.062 (1/16)	.312	.500 (8x)	3	1/8	2-1/2	876662	38.80	876662-C3	44.30			
.062 (1/16)	.312	.625 (10x)	3	1/8	2-1/2	956362	40.10	956362-C3	45.60			
.062 (1/16)	.312	.750 (12x)	3	1/8	2-1/2	867062	39.40	867062-C3	44.90			
.062 (1/16)	.500	1.000 (16x)	3	1/8	2-1/2	13662	42.80	13662-C3	48.30	10062	56.90	
.062 (1/16)	.312	1.000 (16x)	4	1/8	2-1/2	776062	42.80	776062-C3	48.30			
.062 (1/16)	.312	1.125 (18x)	3	1/8	2-1/2	720762	43.40	720762-C3	48.90			NEW
.065	.500	1.000 (15x)	3	1/8	2-1/2	13665	42.60	13665-C3	48.10	10065	56.70	
.070	.375	.700 (10x)	3	1/8	2-1/2	956370	40.10	956370-C3	45.60			
.070	.500	1.000 (14x)	3	1/8	2-1/2	13670	42.60	13670-C3	48.10	10070	57.20	
.075	.500	1.000 (13x)	3	1/8	2-1/2	13675	40.10	13675-C3	45.60	10075	54.70	
.078 (5/64)	.406	.800 (10x)	3	1/8	2-1/2	956378	40.10	956378-C3	45.60			
.078 (5/64)	.500	1.000 (12x)	3	1/8	2-1/2	13678	40.10	13678-C3	45.60	10078	54.00	
.078 (5/64)	.406	1.000 (12x)	4	1/8	2-1/2	776078	40.10	776078-C3	45.60			
.078 (5/64)	.406	1.187 (15x)	3	1/8	2-1/2	948278	53.90	948278-C3	59.40			
.080	.750	1.250 (15x)	3	1/8	2-1/2	13680	42.80	13680-C3	48.30	10080	56.90	
.085	.750	1.250 (14x)	3	1/8	2-1/2	13685	42.80	13685-C3	48.30	10085	57.40	
.090	.750	1.250 (13x)	3	1/8	2-1/2	13690	40.40	13690-C3	45.90	10090	55.00	
.093 (3/32)	.500	.750 (8x)	3	1/8	2-1/2	876693	38.80	876693-C3	44.30			
.093 (3/32)	.500	.950 (10x)	3	1/8	2-1/2	956393	40.10	956393-C3	45.60			
.093 (3/32)	.750	.950 (10x)	3	1/8	2-1/2	755693	41.20	755693-C3	46.70			
.093 (3/32)	.750	1.250 (13x)	3	1/8	2-1/2	13693	40.40	13693-C3	45.90	10093	54.20	
.093 (3/32)	.500	1.250 (13x)	4	1/8	2-1/2	776093	40.40	776093-C3	45.90			
.093 (3/32)	.500	1.400 (15x)	3	1/8	3	948293	53.90	948293-C3	59.40			
.093 (3/32)	.750	1.400 (15x)	3	1/8	3	720593	55.00	720593-C3	60.50			NEW
.093 (3/32)	.500	1.675 (18x)	3	1/8	3	720793	55.60	720793-C3	61.10			NEW
.095	.750	1.250 (13x)	3	1/8	2-1/2	13695	40.10	13695-C3	45.60	10095	54.00	
.100	.750	1.250 (12x)	3	1/8	2-1/2	13700	40.10	13700-C3	45.60	10100	54.70	

D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.125 (1/8)	.625	1.000 (8x)	3	1/8	2-1/2	876708	38.80	876708-C3	44.30			
.125 (1/8)	.625	1.250 (10x)	3	1/8	2-1/2	956408	41.40	956408-C3	46.90			
.125 (1/8)	1.000	1.250 (10x)	3	1/8	2-1/2	755708	42.00	755708-C3	47.50			
.125 (1/8)	1.000	1.500 (12x)	3	1/8	2-1/2	13708	41.60	13708-C3	47.10	10108	55.70	
.125 (1/8)	.625	1.500 (12x)	4	1/8	2-1/2	776108	41.60	776108-C3	47.10			
.125 (1/8)	.625	1.875 (15x)	3	1/8	3	948308	57.20	948308-C3	62.70			
.125 (1/8)	1.000	1.875 (15x)	3	1/8	3	720608	58.30	720608-C3	63.80			NEW
.140 (9/64)	.750	1.125 (8x)	3	3/16	3	876709	50.40	876709-C3	56.60			
.140 (9/64)	.750	1.450 (10x)	3	3/16	3	956409	52.80	956409-C3	59.00			
.156 (5/32)	.750	1.250 (8x)	3	3/16	3	876710	50.40	876710-C3	56.30			
.156 (5/32)	.750	1.570 (10x)	3	3/16	3	956410	52.80	956410-C3	58.80			
.187 (3/16)	1.125	1.625 (8x)	3	3/16	3	13712	47.50	13712-C3	53.50	10112	66.70	
.187 (3/16)	1.000	1.875 (10x)	3	3/16	4	956412	50.30	956412-C3	58.50			
.250 (1/4)	1.500	2.000 (8x)	3	1/4	4	13716	53.00	13716-C3	59.50	10116	74.80	
.250 (1/4)	1.250	2.500 (10x)	3	1/4	4	956416	57.90	956416-C3	67.40			
.375 (3/8)	2.000	3.000 (8x)	3	3/8	6	876724	139.00	876724-C3	155.70			

MINIATURE END MILLS

Square – Extra Long Length

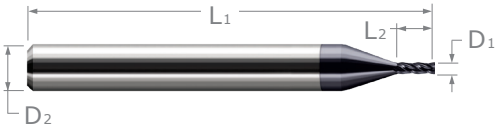


- **Up to 10" overall length**
- Longest overall length carbide end mill available in stock
- Extended reach • 4 flutes • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000" −.002"	L_2 +.030" −.000"	L_3 +.030" −.000"	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.250 (1/4)	.375	4.375 (17.5x)	1/4	6	991916	95.40	991916-C3	106.10
.250 (1/4)	.375	4.375 (17.5x)	1/4	8	960516	131.80	960516-C3	147.90
.312 (5/16)	.470	4.343 (14x)	5/16	6	991920	113.90	991920-C3	129.90
.375 (3/8)	.562	4.312 (11.5x)	3/8	6	991924	128.40	991924-C3	145.00
.375 (3/8)	.562	4.312 (11.5x)	3/8	8	960524	158.00	960524-C3	180.40
.437 (7/16)	.656	5.875 (13.5x)	7/16	8	991928	223.80	991928-C3	243.30
.500 (1/2)	.750	5.750 (11.5x)	1/2	8	991932	235.10	991932-C3	268.10
.500 (1/2)	.750	5.750 (11.5x)	1/2	10	960532	341.70	960532-C3	374.70
.625 (5/8)	.937	5.687 (9x)	5/8	8	991940	395.50	991940-C3	424.50
.750 (3/4)	1.125	5.625 (7.5x)	3/4	8	991948	491.40	991948-C3	525.10

MINIATURE END MILLS

Square – Router Style



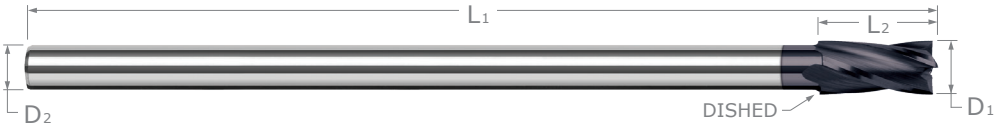
- Router style shank and tight overall length for quick and consistent tool changes
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		
D_1 +.0005" −.0005"	L_2 +.010" −.000"	D_2	L_1 +.010" −.000"	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.015 (1/64)	**.045** (3x)	1/4	2	760615	761715	36.40	760615-C3	761715-C3	43.30
.031 (1/32)	**.093** (3x)	1/4	2	760631	761731	36.40	760631-C3	761731-C3	43.30
.047 (3/64)	**.141** (3x)	1/4	2	760647	761747	36.40	760647-C3	761747-C3	43.30
.062 (1/16)	**.186** (3x)	1/4	2	760662	761762	36.40	760662-C3	761762-C3	43.30
.078 (5/64)	**.234** (3x)	1/4	2	760678	761778	36.40	760678-C3	761778-C3	43.30
.093 (3/32)	**.279** (3x)	1/4	2	760693	761793	36.40	760693-C3	761793-C3	43.30

D_1 +.0005" −.0005"	L_2 +.030" −.000"	D_2	L_1 +.010" −.000"	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.125 (1/8)	**.375** (3x)	1/4	2	760708	761808	36.40	760708-C3	761808-C3	43.30
.187 (3/16)	**.625** (3x)	1/4	2	760712	761812	36.40	760712-C3	761812-C3	43.30

END MILLS

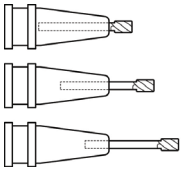
Square – Reduced Shank



SQUARE

- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Center cutting
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!

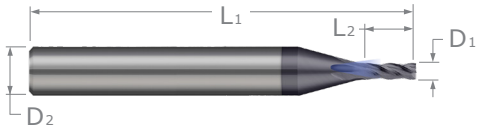


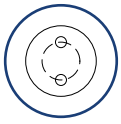
CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/8	3/16 (1.5x)	2	**3 mm**	2-1/2	907808	94.70	907808-C3	100.20	907808-C4	108.60
1/8	3/16 (1.5x)	4	**3 mm**	2-1/2	943208	97.40	943208-C3	102.90	943208-C4	111.30
1/8	3/8 (3x)	4	**3 mm**	2-1/2	789308	99.90	789308-C3	105.40		
5/32	15/64 (1.5x)	2	**1/8**	2-1/2	907810	94.70	907810-C3	100.90		
5/32	15/64 (1.5x)	4	**1/8**	2-1/2	943210	97.40	943210-C3	103.40		
5/32	15/64 (1.5x)	4	**1/8**	4	920610	106.60	920610-C3	114.70		
3/16	9/32 (1.5x)	2	**1/8**	2-1/2	907812	94.70	907812-C3	100.60		
3/16	9/32 (1.5x)	4	**1/8**	2-1/2	943212	97.40	943212-C3	103.40		
3/16	9/32 (1.5x)	4	**5/32**	4	920613	106.60	920613-C3	114.70	920613-C4	127.10
3/16	.570 (3x)	4	**1/8**	2-1/2	789312	99.90	789312-C3	105.80		
1/4	3/8 (1.5x)	2	**3/16**	3	907816	104.70	907816-C3	112.80		
1/4	3/8 (1.5x)	4	**3/16**	3	943216	105.60	943216-C3	113.60	943216-C4	127.30
1/4	3/8 (1.5x)	4	**3/16**	4	920616	143.30	920616-C3	152.70		
1/4	3/4 (3x)	4	**3/16**	3	789316	110.40	789316-C3	118.50		
5/16	15/32 (1.5x)	4	**1/4**	4	943220	129.60	943220-C3	140.90		
5/16	15/32 (1.5x)	4	**1/4**	6	920620	171.40	920620-C3	187.40		
3/8	9/16 (1.5x)	4	**5/16**	4	943224	153.00	943224-C3	167.60	943224-C4	181.30
3/8	9/16 (1.5x)	4	**5/16**	6	920624	186.60	920624-C3	203.20		
7/16	21/32 (1.5x)	4	**3/8**	6	943228	212.00	943228-C3	229.90		
1/2	3/4 (1.5x)	4	**7/16**	6	943232	239.90	943232-C3	255.80		
5/8	15/16 (1.5x)	4	**1/2**	6	943240	311.60	943240-C3	335.40		
3/4	1-1/8 (1.5x)	4	**5/8**	6	943248	384.60	943248-C3	409.40		

For Ball Reduced Shank, please see page 71.
For Corner Radius Reduced Shank, please see page 95.

MINIATURE END MILLS

Square – Coolant Through





Cross sectional view of dual coolant channels

- Coolant-through design for improved chip removal and heat reduction
- Dual coolant channels through shank transition
- AlTiN coating for improved lubricity and heat resistance
- Center cutting
- Solid carbide
- CNC ground in the USA

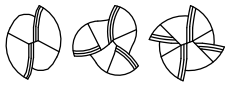
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			ALTiN COATED		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.031	**.093** (3x)	1/4	2	741531	742931	43.90	741531-C3	742931-C3	50.80
.047	**.141** (3x)	1/4	2	741547	742947	44.50	741547-C3	742947-C3	51.40
.062	**.186** (3x)	1/4	2	741562	742962	44.90	741562-C3	742962-C3	51.80
.078	**.234** (3x)	1/4	2	741578	742978	45.90	741578-C3	742978-C3	52.80
.093	**.279** (3x)	3/8	2	741593	742993	66.80	741593-C3	742993-C3	76.80
.125	**.375** (3x)	3/8	2	741608	743008	67.30	741608-C3	743008-C3	77.30

NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard

- **Cutter diameter down to .002"**
- Center cutting • Solid carbide
- CNC ground in the USA



BALL

CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005" −.0005"	L_2 +.010" −.000"		D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE
.002	.003	(1.5x)	1/8	1-1/2	24502			73.50								
.002	.006	(3x)	1/8	1-1/2	74002			73.50								
.003	.004	(1.5x)	1/8	1-1/2	24503			65.00								
.003	.009	(3x)	1/8	1-1/2	74003			65.70								
.004 (.1 mm)	.006	(1.5x)	1/8	1-1/2	24504			58.50								
.004 (.1 mm)	.012	(3x)	1/8	1-1/2	74004			58.50								
.005	.007	(1.5x)	1/8	1-1/2	24505		24605	52.70	24505-C3		24605-C3	58.20			24605-C4	66.50
.005	.015	(3x)	1/8	1-1/2	74005		74305	52.70	74005-C3		74305-C3	58.20	74005-C4		74305-C4	66.50
.006	.009	(1.5x)	1/8	1-1/2	24506		24606	54.20			24606-C3	59.70				
.006	.018	(3x)	1/8	1-1/2	74006		74306	54.20	74006-C3		74306-C3	59.70				
.007	.010	(1.5x)	1/8	1-1/2	24507		24607	54.20			24607-C3	59.70				
.007	.021	(3x)	1/8	1-1/2	74007		74307	54.20	74007-C3		74307-C3	59.70				
.008 (.2 mm)	.012	(1.5x)	1/8	1-1/2	24508		24608	54.20	24508-C3		24608-C3	59.70				
.008 (.2 mm)	.024	(3x)	1/8	1-1/2	74008	835908	74308	54.20	74008-C3	835908-C3	74308-C3	59.70	74008-C4			68.00
.009	.013	(1.5x)	1/8	1-1/2	24509		24609	54.20			24609-C3	59.70				
.009	.027	(3x)	1/8	1-1/2	74009		74309	54.20			74309-C3	59.70				
.010	.015	(1.5x)	1/8	1-1/2	24510	823410	24610	42.00	24510-C3	823410-C3	24610-C3	47.50			24610-C4	55.80
.010	.030	(3x)	1/8	1-1/2	74010	835910	74310	42.00	74010-C3	835910-C3	74310-C3	47.50	74010-C4		74310-C4	55.80
.011	.016	(1.5x)	1/8	1-1/2	24511		24611	43.90			24611-C3	49.40				
.011	.033	(3x)	1/8	1-1/2	74011		74311	43.90			74311-C3	49.40				
.012 (.3 mm)	.018	(1.5x)	1/8	1-1/2	24512		24612	43.90	24512-C3		24612-C3	49.40				
.012 (.3 mm)	.036	(3x)	1/8	1-1/2	74012	835912	74312	43.90	74012-C3	835912-C3	74312-C3	49.40	74012-C4			57.70
.013	.019	(1.5x)	1/8	1-1/2	24513		24613	43.90			24613-C3	49.40				
.013	.039	(3x)	1/8	1-1/2	74013		74313	43.90			74313-C3	49.40				
.014	.021	(1.5x)	1/8	1-1/2	24514		24614	43.90			24614-C3	49.40				
.014	.042	(3x)	1/8	1-1/2	74014		74314	43.90			74314-C3	49.40				
.015 (1/64)	.022	(1.5x)	1/8	1-1/2	24515	823415	24615	32.50	24515-C3	823415-C3	24615-C3	38.00	24515-C4		24615-C4	46.30
.015 (1/64)	.045	(3x)	1/8	1-1/2	74015	835915	74315	32.50	74015-C3	835915-C3	74315-C3	38.00	74015-C4		74315-C4	46.30
.016 (.4 mm)	.024	(1.5x)	1/8	1-1/2	24516		24616	34.10			24616-C3	39.60				
.016 (.4 mm)	.048	(3x)	1/8	1-1/2	74016		74316	34.10			74316-C3	39.60				
.017	.026	(1.5x)	1/8	1-1/2	24517		24617	34.10			24617-C3	39.60				
.017	.051	(3x)	1/8	1-1/2	74017		74317	34.10			74317-C3	39.60				
.018	.027	(1.5x)	1/8	1-1/2	24518		24618	34.10			24618-C3	39.60				
.018	.054	(3x)	1/8	1-1/2	74018		74318	34.10	74018-C3		74318-C3	39.60				
.019	.029	(1.5x)	1/8	1-1/2	24519		24619	34.10			24619-C3	39.60				
.019	.057	(3x)	1/8	1-1/2	74019		74319	34.10			74319-C3	39.60	74019-C4			47.90
.020 (.5 mm)	.030	(1.5x)	1/8	1-1/2	24520	823420	24620	31.40	24520-C3	823420-C3	24620-C3	36.90	24520-C4		24620-C4	45.20
.020 (.5 mm)	.060	(3x)	1/8	1-1/2	74020	835920	74320	31.40	74020-C3	835920-C3	74320-C3	36.90	74020-C4		74320-C4	45.20

Down to .002"!

continued on next page

NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard (cont.)

continued from previous page

	CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
	D_1 +.0005" −.0005"	L_2 +.010" −.000"	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE
	.021	.031 (1.5x)	1/8	1-1/2	24521		24621	32.90			24621-C3	38.40				
	.021	.063 (3x)	1/8	1-1/2	74021		74321	32.90	74021-C3		74321-C3	38.40				
	.022	.033 (1.5x)	1/8	1-1/2	24522		24622	32.90			24622-C3	38.40				
	.022	.066 (3x)	1/8	1-1/2	74022		74322	32.90			74322-C3	38.40				
	.023	.035 (1.5x)	1/8	1-1/2	24523		24623	32.90			24623-C3	38.40				
	.023	.069 (3x)	1/8	1-1/2	74023		74323	32.90	74023-C3		74323-C3	38.40				
	.024 (.6 mm)	.036 (1.5x)	1/8	1-1/2	24524		24624	32.90			24624-C3	38.40				
	.024 (.6 mm)	.072 (3x)	1/8	1-1/2	74024		74324	32.90			74324-C3	38.40				
	.025	.037 (1.5x)	1/8	1-1/2	24525	823425	24625	28.30	24525-C3	823425-C3	24625-C3	33.80			24625-C4	42.10
	.025	.075 (3x)	1/8	1-1/2	74025	835925	74325	28.30	74025-C3	835925-C3	74325-C3	33.80	74025-C4		74325-C4	42.10
	.026	.039 (1.5x)	1/8	1-1/2	24526		24626	29.50			24626-C3	35.00				
	.026	.078 (3x)	1/8	1-1/2	74026		74326	29.50			74326-C3	35.00				
	.027	.041 (1.5x)	1/8	1-1/2	24527		24627	29.50			24627-C3	35.00				
	.027	.081 (3x)	1/8	1-1/2	74027		74327	29.50			74327-C3	35.00				
	.028 (.7 mm)	.042 (1.5x)	1/8	1-1/2	24528		24628	29.50			24628-C3	35.00				
	.028 (.7 mm)	.084 (3x)	1/8	1-1/2	74028		74328	29.50			74328-C3	35.00				
	.029	.043 (1.5x)	1/8	1-1/2	24529		24629	29.50			24629-C3	35.00				
	.029	.087 (3x)	1/8	1-1/2	74029		74329	29.50			74329-C3	35.00				
	.030	.045 (1.5x)	1/8	1-1/2	24530	823430	24630	25.80	24530-C3	823430-C3	24630-C3	31.30			24630-C4	39.60
	.030	.090 (3x)	1/8	1-1/2	74030	835930	74330	25.80	74030-C3	835930-C3	74330-C3	31.30	74030-C4		74330-C4	39.60
	.031 (1/32)	.025 (0.8x)	1/8	1-1/2			758231	25.80			758231-C3	31.30				
	.031 (1/32)	.046 (1.5x)	1/8	1-1/2	24531	823431	24631	25.80	24531-C3	823431-C3	24631-C3	31.30	24531-C4		24631-C4	39.60
NEW	.031 (1/32)	.093 (3x)	1/8	1-1/2	74031	835931	74331	25.80	74031-C3	835931-C3	74331-C3	31.30	74031-C4	835931-C4	74331-C4	39.60
	.032	.048 (1.5x)	1/8	1-1/2	24532		24632	27.10			24632-C3	32.60				
	.032	.096 (3x)	1/8	1-1/2	74032		74332	27.10	74032-C3		74332-C3	32.60				
	.033	.049 (1.5x)	1/8	1-1/2	24533		24633	27.10			24633-C3	32.60				
	.033	.099 (3x)	1/8	1-1/2	74033		74333	27.10	74033-C3		74333-C3	32.60				
	.034	.051 (1.5x)	1/8	1-1/2	24534		24634	27.10			24634-C3	32.60				
	.034	.102 (3x)	1/8	1-1/2	74034		74334	27.10			74334-C3	32.60				
	.035 (.9 mm)	.052 (1.5x)	1/8	1-1/2	24535	823435	24635	24.40	24535-C3	823435-C3	24635-C3	29.90			24635-C4	38.20
	.035 (.9 mm)	.105 (3x)	1/8	1-1/2	74035	835935	74335	24.40	74035-C3	835935-C3	74335-C3	29.90	74035-C4		74335-C4	38.20
	.036	.054 (1.5x)	1/8	1-1/2	24536		24636	25.60			24636-C3	31.10				
	.036	.108 (3x)	1/8	1-1/2	74036		74336	25.60			74336-C3	31.10				
	.037	.055 (1.5x)	1/8	1-1/2	24537		24637	25.60			24637-C3	31.10				
	.037	.111 (3x)	1/8	1-1/2	74037		74337	25.60			74337-C3	31.10				
	.038	.057 (1.5x)	1/8	1-1/2	24538		24638	25.60			24638-C3	31.10				
	.038	.114 (3x)	1/8	1-1/2	74038		74338	25.60			74338-C3	31.10				
	.039 (1 mm)	.058 (1.5x)	1/8	1-1/2	24539	823439	24639	25.10	24539-C3	823439-C3	24639-C3	30.60				
	.039 (1 mm)	.117 (3x)	1/8	1-1/2	74039	835939	74339	25.10	74039-C3	835939-C3	74339-C3	30.60	74039-C4		74339-C4	38.90
	.040	.060 (1.5x)	1/8	1-1/2	24540	823440	24640	24.40	24540-C3	823440-C3	24640-C3	29.90	24540-C4		24640-C4	38.20
	.040	.120 (3x)	1/8	1-1/2	74040	835940	74340	24.40	74040-C3	835940-C3	74340-C3	29.90	74040-C4		74340-C4	38.20
	.041	.123 (3x)	1/8	1-1/2	74041		74341	25.60			74341-C3	31.10				
	.042	.126 (3x)	1/8	1-1/2	74042		74342	25.60			74342-C3	31.10				
	.043 (1.1 mm)	.129 (3x)	1/8	1-1/2	74043		74343	25.60			74343-C3	31.10				
	.044	.132 (3x)	1/8	1-1/2	74044		74344	25.60			74344-C3	31.10				
	.045	.067 (1.5x)	1/8	1-1/2	24545	823445	24645	24.40		823445-C3	24645-C3	29.90			24645-C4	38.20
	.045	.135 (3x)	1/8	1-1/2	74045	835945	74345	24.40	74045-C3	835945-C3	74345-C3	29.90	74045-C4		74345-C4	38.20

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NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard (cont.)

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BALL

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND				
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	
.046	.138 (3x)	1/8	1-1/2	74046		74346	25.60			74346-C3	31.10					
.047 (3/64)	.070 (1.5x)	1/8	1-1/2	24547	823447	24647	24.40	24547-C3	823447-C3	24647-C3	29.90	24547-C4		24647-C4	38.20	
.047 (3/64)	.141 (3x)	1/8	1-1/2	74047	835947	74347	24.40	74047-C3	835947-C3	74347-C3	29.90	74047-C4		74347-C4	38.20	
.048	.144 (3x)	1/8	1-1/2	74048		74348	25.60			74348-C3	31.10					
.049	.147 (3x)	1/8	1-1/2	74049		74349	25.60			74349-C3	31.10					
.050	.075 (1.5x)	1/8	1-1/2	24550	823450	24650	24.40	24550-C3	823450-C3	24650-C3	29.90			24650-C4	38.20	
.050	.150 (3x)	1/8	1-1/2	74050	835950	74350	24.40	74050-C3	835950-C3	74350-C3	29.90	74050-C4		74350-C4	38.20	
.051 (1.3 mm)	.153 (3x)	1/8	1-1/2	74051		74351	25.60			74351-C3	31.10					
.052	.156 (3x)	1/8	1-1/2	74052		74352	25.60			74352-C3	31.10					
.053	.159 (3x)	1/8	1-1/2	74053		74353	25.60			74353-C3	31.10					
.054	.162 (3x)	1/8	1-1/2	74054		74354	25.60			74354-C3	31.10					
.055 (1.4 mm)	.082 (1.5x)	1/8	1-1/2	24555	823455	24655	24.40	24555-C3	823455-C3	24655-C3	29.90			24655-C4	38.20	
.055 (1.4 mm)	.165 (3x)	1/8	1-1/2	74055	835955	74355	24.40	74055-C3	835955-C3	74355-C3	29.90	74055-C4		74355-C4	38.20	
.056	.168 (3x)	1/8	1-1/2	74056		74356	25.60			74356-C3	31.10					
.057	.171 (3x)	1/8	1-1/2	74057		74357	25.60			74357-C3	31.10					
.058	.174 (3x)	1/8	1-1/2	74058		74358	25.60			74358-C3	31.10					
.059 (1.5 mm)	.089 (1.5x)	1/8	1-1/2	24559		24659	25.60			24659-C3	31.10					
.059 (1.5 mm)	.177 (3x)	1/8	1-1/2	74059		74359	25.60			74359-C3	31.10					
.060	.090 (1.5x)	1/8	1-1/2	24560	823460	24660	24.40	24560-C3	823460-C3	24660-C3	29.90			24660-C4	38.20	
.060	.180 (3x)	1/8	1-1/2	74060	835960	74360	24.40	74060-C3	835960-C3	74360-C3	29.90	74060-C4		74360-C4	38.20	
.061	.183 (3x)	1/8	1-1/2			74361	24.40			74361-C3	29.90					
.062 (1/16)	.050 (0.8x)	1/8	1-1/2			758262	24.00			758262-C3	29.50					
.062 (1/16)	.093 (1.5x)	1/8	1-1/2	24562	823462	24662	24.00	24562-C3	823462-C3	24662-C3	29.50	24562-C4		24662-C4	37.80	
.062 (1/16)	.186 (3x)	1/8	1-1/2	74062	835962	74362	24.00	74062-C3	835962-C3	74362-C3	29.50	74062-C4	835931-C4	74362-C4	37.80	NEW
.063	.189 (3x)	1/8	1-1/2			74363	24.40			74363-C3	29.90					
.064	.192 (3x)	1/8	1-1/2			74364	24.40			74364-C3	29.90					
.065	.097 (1.5x)	1/8	1-1/2	24565	823465	24665	24.00		823465-C3	24665-C3	29.50					
.065	.195 (3x)	1/8	1-1/2	74065	835965	74365	24.00	74065-C3	835965-C3	74365-C3	29.50	74065-C4		74365-C4	37.80	
.066	.198 (3x)	1/8	1-1/2			74366	24.40			74366-C3	29.90					
.067	.201 (3x)	1/8	1-1/2			74367	24.40			74367-C3	29.90					
.068	.204 (3x)	1/8	1-1/2			74368	24.40			74368-C3	29.90					
.069	.207 (3x)	1/8	1-1/2			74369	24.40			74369-C3	29.90					
.070	.105 (1.5x)	1/8	1-1/2	24570	823470	24670	24.00	24570-C3	823470-C3	24670-C3	29.50					
.070	.210 (3x)	1/8	1-1/2	74070	835970	74370	24.00	74070-C3	835970-C3	74370-C3	29.50	74070-C4		74370-C4	37.80	
.071	.213 (3x)	1/8	1-1/2			74371	24.00			74371-C3	29.50					
.075	.112 (1.5x)	1/8	1-1/2	24575		24675	24.00			24675-C3	29.50					
.075	.225 (3x)	1/8	1-1/2	74075	835975	74375	24.00	74075-C3	835975-C3	74375-C3	29.50	74075-C4			37.80	
.078 (5/64)	.117 (1.5x)	1/8	1-1/2	24578	823478	24678	24.00	24578-C3	823478-C3	24678-C3	29.50			24678-C4	37.80	
.078 (5/64)	.234 (3x)	1/8	1-1/2	74078	835978	74378	24.00	74078-C3	835978-C3	74378-C3	29.50	74078-C4		74378-C4	37.80	
.080	.120 (1.5x)	1/8	1-1/2	24580	823480	24680	24.00		823480-C3	24680-C3	29.50					
.080	.240 (3x)	1/8	1-1/2	74080	835980	74380	24.00	74080-C3	835980-C3	74380-C3	29.50	74080-C4		74380-C4	37.80	
.085	.127 (1.5x)	1/8	1-1/2	24585		24685	24.00			24685-C3	29.50					
.085	.255 (3x)	1/8	1-1/2	74085		74385	24.00			74385-C3	29.50					
.090	.135 (1.5x)	1/8	1-1/2	24590	823490	24690	24.00		823490-C3	24690-C3	29.50					
.090	.270 (3x)	1/8	1-1/2	74090	835990	74390	24.00	74090-C3	835990-C3	74390-C3	29.50	74090-C4		74390-C4	37.80	

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NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard (cont.)

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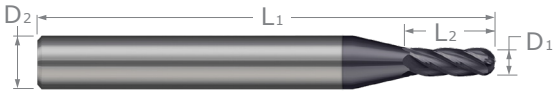
CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″		D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE
.093 (3/32)	.074	(0.8x)	1/8	1-1/2			758293	24.00			758293-C3	29.50				
.093 (3/32)	.139	(1.5x)	1/8	1-1/2	24593	823493	24693	24.00	24593-C3	823493-C3	24693-C3	29.50	24593-C4		24693-C4	37.80
.093 (3/32)	.279	(3x)	1/8	1-1/2	74093	835993	74393	24.00	74093-C3	835993-C3	74393-C3	29.50	74093-C4		74393-C4	37.80
.095	.142	(1.5x)	1/8	1-1/2	24595		24695	24.00			24695-C3	29.50				
.095	.285	(3x)	1/8	1-1/2	74095		74395	24.00			74395-C3	29.50				
.098	.294	(3x)	1/8	1-1/2			74398	26.90			74398-C3	32.40				
.100	.150	(1.5x)	1/8	1-1/2	24599	823500	24699	24.00	24599-C3	823500-C3	24699-C3	29.50				
.100	.300	(3x)	1/8	1-1/2	74100	836000	74400	24.00	74100-C3	836000-C3	74400-C3	29.50	74100-C4		74400-C4	37.80
.103	.309	(3x)	1/8	1-1/2			74403	24.00			74403-C3	29.50				
.105	.158	(1.5x)	1/8	1-1/2	50900		51000	24.00			51000-C3	29.50				
.105	.315	(3x)	1/8	1-1/2	74105		74405	24.00			74405-C3	29.50				
.109 (7/64)	.164	(1.5x)	1/8	1-1/2	50901	823502	51001	24.00	50901-C3	823502-C3	51001-C3	29.50				
.109 (7/64)	.375	(3x)	1/8	1-1/2	74109	836002	74409	24.00	74109-C3	836002-C3	74409-C3	29.50				
.110	.165	(1.5x)	1/8	1-1/2	50902		51002	24.00			51002-C3	29.50				
.110	.330	(3x)	1/8	1-1/2	74110		74410	24.00			74410-C3	29.50				
.115	.173	(1.5x)	1/8	1-1/2	50903		51003	24.00			51003-C3	29.50				
.115	.345	(3x)	1/8	1-1/2	74115		74415	24.00			74415-C3	29.50				
.118 (3 mm)	.177	(1.5x)	1/8	1-1/2	50904	823505	51004	24.60		823505-C3	51004-C3	30.10				
.118 (3 mm)	.354	(3x)	1/8	1-1/2	74118	836005	74418	24.60	74118-C3	836005-C3	74418-C3	30.10				
.120	.180	(1.5x)	1/8	1-1/2	50905		51005	24.00			51005-C3	29.50				
.120	.360	(3x)	1/8	1-1/2	74120		74420	24.00			74420-C3	29.50				

	D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	2 FL	3 FL	4 FL	PRICE	2 FL	3 FL	4 FL	PRICE	2 FL		4 FL	PRICE
	.125 (1/8)	.100	(0.8x)	1/8	1-1/2			758308	22.30			758308-C3	27.80				
	.125 (1/8)	.187	(1.5x)	1/8	1-1/2	50908	823508	51008	22.30	50908-C3	823508-C3	51008-C3	27.80	50908-C4		51008-C4	36.10
NEW	.125 (1/8)	.375	(3x)	1/8	1-1/2	74125	836008	74425	22.30	74125-C3	836008-C3	74425-C3	27.80	74125-C4	836008-C4	74425-C4	36.10
	.140 (9/64)	.220	(1.5x)	3/16	2	50909		51009	22.80	50909-C3		51009-C3	28.70				
	.140 (9/64)	.562	(3x)	3/16	2	74140	836009	74440	22.80	74140-C3	836009-C3	74440-C3	28.60				
	.156 (5/32)	.281	(1.5x)	3/16	2	50910	823510	51010	23.70		823510-C3	51010-C3	29.60			51010-C4	40.80
	.156 (5/32)	.562	(3x)	3/16	2	74156	836010	74456	23.70	74156-C3	836010-C3	74456-C3	29.50			74456-C4	39.20
	.172 (11/64)	.312	(1.5x)	3/16	2			51011	26.50			51011-C3	32.40				
	.172 (11/64)	.625	(3x)	3/16	2			74472	26.50			74472-C3	32.40				
	.187 (3/16)	.312	(1.5x)	3/16	2	50912	823512	51012	23.70	50912-C3	823512-C3	51012-C3	29.60			51012-C4	40.80
	.187 (3/16)	.625	(3x)	3/16	2	74187	836012	74487	23.70	74187-C3	836012-C3	74487-C3	29.60	74187-C4		74487-C4	40.80
	.203 (13/64)	.312	(1.5x)	1/4	2-1/2			51013	29.10			51013-C3	37.10				
	.203 (13/64)	.625	(3x)	1/4	2-1/2			74490	29.10			74490-C3	37.10				
	.218 (7/32)	.330	(1.5x)	1/4	2-1/2	50914	823514	51014	26.20		823514-C3	51014-C3	34.20				
	.218 (7/32)	.625	(3x)	1/4	2-1/2	74193	836014	74493	26.20	74193-C3	836014-C3	74493-C3	33.70				
	.234 (15/64)	.750	(3x)	1/4	2-1/2			74495	29.10			74495-C3	36.60				
	.250 (1/4)	.375	(1.5x)	1/4	2-1/2	50916	823516	51016	26.20	50916-C3	823516-C3	51016-C3	34.20	50916-C4		51016-C4	47.80
	.250 (1/4)	.750	(3x)	1/4	2-1/2	74199	836016	74499	26.20	74199-C3	836016-C3	74499-C3	33.70	74199-C4		74499-C4	46.00
	.312 (5/16)	.470	(1.5x)	5/16	2-1/2			51020	33.90			51020-C3	43.30				
	.312 (5/16)	.812	(3x)	5/16	2-1/2			74620	33.90			74620-C3	43.30				
	.375 (3/8)	.570	(1.5x)	3/8	2-1/2			51024	42.30			51024-C3	52.90				
	.375 (3/8)	1.000	(3x)	3/8	2-1/2	74124		74624	42.30			74624-C3	52.90			74624-C4	69.70
	.500 (1/2)	1.000	(2x)	1/2	3	74132		74632	67.00			74632-C3	82.90			74632-C4	100.40

NEW!

MINIATURE END MILLS

Ball – Stub & Standard – 5 Flute

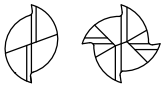


- **Cutter diameter down to .020"**
- Center cutting • Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	5 FL	PRICE	5 FL	PRICE	
.020 (.5 mm)	**.030** (1.5x)	1/8	1-1/2	714820	34.70	714820-C3	40.20	NEW
.020 (.5 mm)	**.060** (3x)	1/8	1-1/2	715020	36.30	715020-C3	41.80	NEW
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	714831	29.10	714831-C3	34.60	NEW
.031 (1/32)	**.093** (3x)	1/8	1-1/2	715031	31.20	715031-C3	36.70	NEW
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2	714847	30.30	714847-C3	35.80	NEW
.047 (3/64)	**.141** (3x)	1/8	1-1/2	715047	31.60	715047-C3	37.10	NEW
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	714862	31.70	714862-C3	37.20	NEW
.062 (1/16)	**.186** (3x)	1/8	1-1/2	715062	33.00	715062-C3	38.50	NEW
.078 (5/64)	**.117** (1.5x)	1/8	1-1/2	714878	31.70	714878-C3	37.20	NEW
.078 (5/64)	**.234** (3x)	1/8	1-1/2	715078	33.00	715078-C3	38.50	NEW
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	714893	31.70	714893-C3	37.20	NEW
.093 (3/32)	**.279** (3x)	1/8	1-1/2	715093	33.00	715093-C3	38.50	NEW
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	5 FL	PRICE	5 FL	PRICE	
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	714908	28.90	714908-C3	34.40	NEW
.125 (1/8)	**.375** (3x)	1/8	1-1/2	715108	30.10	715108-C3	35.60	NEW
.187 (3/16)	**.312** (1.5x)	3/16	2	714912	32.40	714912-C3	38.20	NEW
.187 (3/16)	**.625** (3x)	3/16	2	715112	33.70	715112-C3	39.50	NEW
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	714916	37.90	714916-C3	45.40	NEW
.250 (1/4)	**.750** (3x)	1/4	2-1/2	715116	39.40	715116-C3	46.90	NEW

MINIATURE END MILLS

Ball – Stub & Standard – Metric



- All dimensions and tolerances in metric values
- Cutter diameter down to 0.5mm
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		
D_1 +.00mm −.02mm	L_2 +.25mm −.00mm	D_2	L_1	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.500 mm	.75 (1.5x)	3 mm	38 mm	741311	741211	26.70	741311-C3	741211-C3	32.20
.500 mm	1.50 (3x)	3 mm	38 mm	739611	741011	26.70	739611-C3	741011-C3	32.20
1.00 mm	1.50 (1.5x)	3 mm	38 mm	741322	741222	22.40	741322-C3	741222-C3	27.90
1.00 mm	3.00 (3x)	3 mm	38 mm	739622	741022	22.40	739622-C3	741022-C3	27.90
1.50 mm	2.20 (1.5x)	3 mm	38 mm	741333	741233	22.70	741333-C3	741233-C3	28.20
1.50 mm	4.50 (3x)	3 mm	38 mm	739633	741033	22.70	739633-C3	741033-C3	28.20
2.00 mm	3.00 (1.5x)	3 mm	38 mm	741345	741245	22.40	741345-C3	741245-C3	27.90
2.00 mm	6.00 (3x)	3 mm	38 mm	739645	741045	22.40	739645-C3	741045-C3	27.90
3.00 mm	4.50 (1.5x)	3 mm	38 mm	741357	741257	21.20	741357-C3	741257-C3	26.70
3.00 mm	9.00 (3x)	3 mm	38 mm	739657	741057	21.20	739657-C3	741057-C3	26.70
D_1 +.00mm −.04mm	L_2 +.750mm −.000mm	D_2	L_1	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE
4.00 mm	6.00 (1.5x)	4 mm	50 mm	741361	741261	25.00	741361-C3	741261-C3	30.80
4.00 mm	12.00 (3x)	4 mm	50 mm	739661	741061	25.00	739661-C3	741061-C3	30.80
5.00 mm	7.50 (1.5x)	5 mm	50 mm	741364	741264	30.50	741364-C3	741264-C3	37.20
5.00 mm	15.00 (3x)	5 mm	50 mm	739664	741064	30.50	739664-C3	741064-C3	37.40
6.00 mm	9.00 (1.5x)	6 mm	50 mm	741366	741266	36.80	741366-C3	741266-C3	43.70
6.00 mm	18.00 (3x)	6 mm	50 mm	739666	741066	36.80	739666-C3	741066-C3	43.70
8.00 mm	12.00 (1.5x)	8 mm	63 mm	741370	741270	45.10	741370-C3	741270-C3	55.70
8.00 mm	24.00 (3x)	8 mm	63 mm	739670	741070	46.70	739670-C3	741070-C3	57.30
10.0 mm	15.00 (1.5x)	10 mm	75 mm	741373	741273	76.90	741373-C3	741273-C3	89.20
10.0 mm	30.00 (3x)	10 mm	75 mm	739673	741073	76.90	739673-C3	741073-C3	89.20
12.0 mm	18.00 (1.5x)	12 mm	75 mm	741376	741276	94.40	741376-C3	741276-C3	108.80
12.0 mm	36.00 (3x)	12 mm	75 mm	739676	741076	94.40	739676-C3	741076-C3	108.80

MINIATURE END MILLS

Ball – Long Flute

Stocked in 10 Lengths of Cut!

- **Long flute and long shank design for deep cavities**
- Mills deep pockets • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.005	**.025** (5x)	3	1/8	2-1/2	32205	53.30				
.008	**.040** (5x)	3	1/8	2-1/2	32208	52.10				
.010	**.050** (5x)	3	1/8	2-1/2	12810	49.10	12810-C3	54.60	12810-C4	63.00
.010	**.050** (5x)	4	1/8	2-1/2	841010	51.10	841010-C3	56.60		
.010	**.080** (8x)	3	1/8	2-1/2	34010	82.70	34010-C3	88.20		
.015 (1/64)	**.062** (4x)	3	1/8	2-1/2	895715	45.30	895715-C3	50.80		
.015 (1/64)	**.078** (5x)	3	1/8	2-1/2	32215	45.30	32215-C3	50.80	32215-C4	59.20
.015 (1/64)	**.078** (5x)	4	1/8	2-1/2	841015	47.30	841015-C3	52.80		
.015 (1/64)	**.093** (6x)	3	1/8	2-1/2	877115	52.50	877115-C3	58.00		
.015 (1/64)	**.109** (7x)	3	1/8	2-1/2	861415	60.50	861415-C3	66.00		
.015 (1/64)	**.125** (8x)	3	1/8	2-1/2	34015	79.20	34015-C3	84.70	34015-C4	93.10
.015 (1/64)	**.125** (8x)	4	1/8	2-1/2	845515	81.20	845515-C3	86.70		
.015 (1/64)	**.187** (12x)	3	1/8	2-1/2	35115	101.70	35115-C3	107.20		
.020 (.5 mm)	**.080** (4x)	3	1/8	2-1/2	895720	39.10	895720-C3	44.60		
.020 (.5 mm)	**.100** (5x)	3	1/8	2-1/2	12820	39.10	12820-C3	44.60	12820-C4	53.00
.020 (.5 mm)	**.100** (5x)	4	1/8	2-1/2	841020	43.30	841020-C3	48.80		
.020 (.5 mm)	**.120** (6x)	3	1/8	2-1/2	877120	45.40	877120-C3	50.90		
.020 (.5 mm)	**.160** (8x)	3	1/8	2-1/2	34020	73.60	34020-C3	79.10	34020-C4	87.50
.020 (.5 mm)	**.200** (10x)	3	1/8	2-1/2	957220	88.40	957220-C3	93.90		
.020 (.5 mm)	**.250** (12x)	3	1/8	2-1/2	35120	95.90	35120-C3	101.40		
.025	**.125** (5x)	3	1/8	2-1/2	12825	36.90	12825-C3	42.40	12825-C4	51.30
.025	**.203** (8x)	3	1/8	2-1/2	34025	72.00	34025-C3	77.50		
.030	**.125** (4x)	3	1/8	2-1/2	895730	35.90	895730-C3	41.40		
.030	**.150** (5x)	3	1/8	2-1/2	12830	35.90	12830-C3	41.40	12830-C4	49.80
.030	**.156** (5x)	4	1/8	2-1/2	841030	39.70	841030-C3	45.20		
.030	**.250** (8x)	3	1/8	2-1/2	34030	69.90	34030-C3	75.40		
.031 (1/32)	**.125** (4x)	3	1/8	2-1/2	895731	35.90	895731-C3	41.40	895731-C4	50.50
.031 (1/32)	**.125** (4x)	4	1/8	2-1/2	801531	39.70	801531-C3	45.20		
.031 (1/32)	**.156** (5x)	3	1/8	2-1/2	32231	35.90	32231-C3	41.40	32231-C4	49.80
.031 (1/32)	**.156** (5x)	4	1/8	2-1/2	841031	39.50	841031-C3	45.00		
.031 (1/32)	**.187** (6x)	3	1/8	2-1/2	877131	40.40	877131-C3	45.90	877131-C4	54.20
.031 (1/32)	**.218** (7x)	3	1/8	2-1/2	861431	45.30	861431-C3	50.80		
.031 (1/32)	**.250** (8x)	3	1/8	2-1/2	34031	69.90	34031-C3	75.40	34031-C4	83.80
.031 (1/32)	**.250** (8x)	4	1/8	2-1/2	845531	71.80	845531-C3	77.30		
.031 (1/32)	**.312** (10x)	3	1/8	2-1/2	957231	74.70	957231-C3	80.20		
.031 (1/32)	**.375** (12x)	3	1/8	2-1/2	35131	81.70	35131-C3	87.20	35131-C4	95.60
.031 (1/32)	**.470** (15x)	3	1/8	2-1/2	36031	102.00	36031-C3	107.50		

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MINIATURE END MILLS

Ball – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.035 (.9 mm)	**.175** (5x)	3	1/8	2-1/2	12835	35.90	12835-C3	41.40	12835-C4	49.80
.035 (.9 mm)	**.281** (8x)	3	1/8	2-1/2	34035	69.90	34035-C3	75.40		
.039 (1 mm)	**.156** (4x)	3	1/8	2-1/2	895739	35.90	895739-C3	41.40		
.039 (1 mm)	**.203** (5x)	3	1/8	2-1/2	32239	35.90	32239-C3	41.40		
.039 (1 mm)	**.325** (8x)	3	1/8	2-1/2	34039	69.90	34039-C3	75.40		
.039 (1 mm)	**.480** (12x)	3	1/8	2-1/2	35139	82.50	35139-C3	88.00		
.040	**.160** (4x)	3	1/8	2-1/2	895740	35.90	895740-C3	41.40		
.040	**.200** (5x)	3	1/8	2-1/2	12840	35.90	12840-C3	41.40	12840-C4	49.80
.040	**.200** (5x)	4	1/8	2-1/2	841040	39.70	841040-C3	45.20		
.040	**.240** (6x)	3	1/8	2-1/2	877140	40.40	877140-C3	45.90		
.040	**.281** (7x)	3	1/8	2-1/2	861440	45.30	861440-C3	50.80		
.040	**.325** (8x)	3	1/8	2-1/2	34040	69.90	34040-C3	75.40	34040-C4	83.80
.040	**.325** (8x)	4	1/8	2-1/2	845540	71.90	845540-C3	77.40		
.040	**.480** (12x)	3	1/8	2-1/2	35140	81.70	35140-C3	87.20		
.045	**.225** (5x)	3	1/8	2-1/2	12845	35.90	12845-C3	41.40	12845-C4	49.80
.045	**.375** (8x)	3	1/8	2-1/2	34045	69.90	34045-C3	75.40		
.047 (3/64)	**.187** (4x)	3	1/8	2-1/2	895747	35.90	895747-C3	41.40		
.047 (3/64)	**.250** (5x)	3	1/8	2-1/2	32247	35.90	32247-C3	41.40	32247-C4	49.80
.047 (3/64)	**.250** (5x)	4	1/8	2-1/2	841047	39.50	841047-C3	45.00		
.047 (3/64)	**.375** (8x)	3	1/8	2-1/2	34047	66.00	34047-C3	71.50	34047-C4	79.90
.047 (3/64)	**.375** (8x)	4	1/8	2-1/2	845547	69.30	845547-C3	74.80		
.047 (3/64)	**.570** (12x)	3	1/8	2-1/2	35147	81.70	35147-C3	87.20	35147-C4	95.60
.050	**.203** (4x)	3	1/8	2-1/2	895750	35.90	895750-C3	41.40		
.050	**.300** (6x)	3	1/8	2-1/2	12850	35.90	12850-C3	41.40	12850-C4	49.80
.050	**.400** (8x)	3	1/8	2-1/2	34050	69.90	34050-C3	75.40		
.055 (1.4 mm)	**.275** (5x)	3	1/8	2-1/2	32255	31.80	32255-C3	37.30		
.055 (1.4 mm)	**.385** (7x)	3	1/8	2-1/2	12855	35.90	12855-C3	41.40	12855-C4	50.50
.060	**.250** (4x)	3	1/8	2-1/2	895760	31.80	895760-C3	37.30		
.060	**.312** (5x)	3	1/8	2-1/2	32260	31.80	32260-C3	37.30	32260-C4	46.20
.060	**.312** (5x)	4	1/8	2-1/2	841060	35.10	841060-C3	40.60		
.060	**.375** (6x)	3	1/8	2-1/2	877160	33.20	877160-C3	38.70		
.060	**.500** (8x)	3	1/8	2-1/2	12860	36.50	12860-C3	42.00	12860-C4	50.90
.060	**.720** (12x)	3	1/8	2-1/2	35160	63.60	35160-C3	69.10		
.062 (1/16)	**.250** (4x)	3	1/8	2-1/2	895762	31.80	895762-C3	37.30	895762-C4	46.20
.062 (1/16)	**.250** (4x)	4	1/8	2-1/2	801562	34.00	801562-C3	39.50		
.062 (1/16)	**.312** (5x)	3	1/8	2-1/2	32262	31.80	32262-C3	37.30	32262-C4	46.20
.062 (1/16)	**.312** (5x)	4	1/8	2-1/2	841062	35.10	841062-C3	40.60	841062-C4	49.50
.062 (1/16)	**.375** (6x)	3	1/8	2-1/2	877162	33.20	877162-C3	38.70	877162-C4	47.60
.062 (1/16)	**.375** (6x)	4	1/8	2-1/2	754162	36.50	754162-C3	42.00		
.062 (1/16)	**.437** (7x)	3	1/8	2-1/2	861462	34.60	861462-C3	40.10		
.062 (1/16)	**.500** (8x)	3	1/8	2-1/2	34062	35.90	34062-C3	41.40	34062-C4	49.80
.062 (1/16)	**.500** (8x)	4	1/8	2-1/2	845562	39.10	845562-C3	44.60	845562-C4	53.00
.062 (1/16)	**.558** (9x)	3	1/8	2-1/2	757662	44.00	757662-C3	49.50		
.062 (1/16)	**.625** (10x)	3	1/8	2-1/2	957262	49.00	957262-C3	54.50	957262-C4	63.60
.062 (1/16)	**.625** (10x)	4	1/8	2-1/2	751262	53.30	751262-C3	58.80		
.062 (1/16)	**.750** (12x)	3	1/8	2-1/2	35162	64.10	35162-C3	69.60	35162-C4	78.00
.062 (1/16)	**.950** (15x)	3	1/8	2-1/2	36062	87.40	36062-C3	92.90	36062-C4	102.00

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MINIATURE END MILLS

Ball – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.065	**.500** (8x)	3	1/8	2-1/2	12865	35.80	12865-C3	41.30	12865-C4	49.70
.070	**.500** (7x)	3	1/8	2-1/2	12870	35.80	12870-C3	41.30	12870-C4	49.70
.075	**.500** (7x)	3	1/8	2-1/2	12875	35.80	12875-C3	41.30	12875-C4	49.70
.078 (5/64)	**.312** (4x)	3	1/8	2-1/2	895778	31.80	895778-C3	37.30		
.078 (5/64)	**.406** (5x)	3	1/8	2-1/2	32278	31.80	32278-C3	37.30	32278-C4	46.20
.078 (5/64)	**.406** (5x)	4	1/8	2-1/2	841078	35.10	841078-C3	40.60		
.078 (5/64)	**.475** (6x)	3	1/8	2-1/2	877178	33.20	877178-C3	38.70		
.078 (5/64)	**.550** (7x)	3	1/8	2-1/2	861478	34.60	861478-C3	40.10		
.078 (5/64)	**.625** (8x)	3	1/8	2-1/2	34078	35.90	34078-C3	41.40	34078-C4	49.80
.078 (5/64)	**.625** (8x)	4	1/8	2-1/2	845578	39.10	845578-C3	44.60		
.078 (5/64)	**.940** (12x)	3	1/8	2-1/2	35178	64.10	35178-C3	69.60	35178-C4	78.70
.078 (5/64)	**1.187** (15x)	3	1/8	2-1/2	36078	87.40	36078-C3	92.90	36078-C4	101.30
.080	**.750** (9x)	3	1/8	2-1/2	12880	36.10	12880-C3	41.60	12880-C4	50.00
.085	**.750** (9x)	3	1/8	2-1/2	12885	36.10	12885-C3	41.60	12885-C4	50.70
.090	**.750** (8x)	3	1/8	2-1/2	12890	36.10	12890-C3	41.60	12890-C4	50.00
.093 (3/32)	**.375** (4x)	3	1/8	2-1/2	895793	31.80	895793-C3	37.30	895793-C4	46.40
.093 (3/32)	**.375** (4x)	4	1/8	2-1/2	801593	31.80	801593-C3	37.30		
.093 (3/32)	**.500** (5x)	3	1/8	2-1/2	32293	31.80	32293-C3	37.30	32293-C4	46.20
.093 (3/32)	**.500** (5x)	4	1/8	2-1/2	841093	35.10	841093-C3	40.60		
.093 (3/32)	**.585** (6x)	3	1/8	2-1/2	877193	33.20	877193-C3	38.70		
.093 (3/32)	**.670** (7x)	3	1/8	2-1/2	861493	34.60	861493-C3	40.10		
.093 (3/32)	**.750** (8x)	3	1/8	2-1/2	34093	35.90	34093-C3	41.40	34093-C4	49.80
.093 (3/32)	**.750** (8x)	4	1/8	2-1/2	845593	39.10	845593-C3	44.60		
.093 (3/32)	**.950** (10x)	3	1/8	2-1/2	957293	49.00	957293-C3	54.50		
.093 (3/32)	**1.125** (12x)	3	1/8	2-1/2	35193	64.10	35193-C3	69.60	35193-C4	78.70
.093 (3/32)	**1.400** (15x)	3	1/8	3	36093	89.60	36093-C3	95.10	36093-C4	104.20
.095	**.750** (8x)	3	1/8	2-1/2	12895	36.50	12895-C3	42.00	12895-C4	51.10
.100	**.500** (5x)	3	1/8	2-1/2	32299	31.90	32299-C3	37.40		
.100	**.750** (7.5x)	3	1/8	2-1/2	12899	36.10	12899-C3	41.60	12899-C4	50.00
.109 (7/64)	**.570** (5x)	3	1/8	2-1/2	32302	31.80	32302-C3	37.30		
.109 (7/64)	**.900** (8x)	3	1/8	2-1/2	34102	35.90	34102-C3	41.40		
.118 (3 mm)	**.475** (4x)	3	1/8	2-1/2	895705	31.80	895705-C3	37.30		
.118 (3 mm)	**.625** (5x)	3	1/8	2-1/2	32305	31.80	32305-C3	37.30	32305-C4	46.40
.118 (3 mm)	**.950** (8x)	3	1/8	2-1/2	34105	35.90	34105-C3	41.40	34105-C4	50.50
.118 (3 mm)	**.950** (8x)	4	1/8	2-1/2	845605	39.90	845605-C3	45.40		
.118 (3 mm)	**1.420** (12x)	3	1/8	3	35205	89.60	35205-C3	95.10		

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Ball – Long Flute (cont.)

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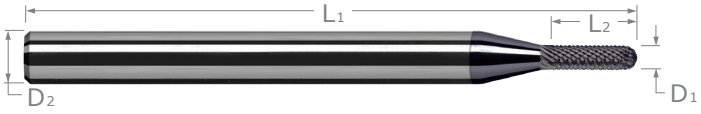
CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.500** (4x)	3	1/8	2-1/2	895808	29.40	895808-C3	34.90	895808-C4	43.70
.125 (1/8)	**.500** (4x)	4	1/8	2-1/2	801608	32.40	801608-C3	37.90		
.125 (1/8)	**.625** (5x)	3	1/8	2-1/2	32308	29.40	32308-C3	34.90	32308-C4	43.70
.125 (1/8)	**.625** (5x)	4	1/8	2-1/2	12608	32.40	12608-C3	37.90		
.125 (1/8)	**.750** (6x)	3	1/8	2-1/2	877208	31.20	877208-C3	36.70	877208-C4	45.60
.125 (1/8)	**.750** (6x)	4	1/8	2-1/2	750308	35.10	750308-C3	40.60		
.125 (1/8)	**.875** (7x)	3	1/8	2-1/2	861508	32.50	861508-C3	38.00		
.125 (1/8)	**1.000** (8x)	3	1/8	2-1/2	34108	32.50	34108-C3	38.00	34108-C4	46.40
.125 (1/8)	**1.000** (8x)	4	1/8	2-1/2	845608	35.90	845608-C3	41.40		
.125 (1/8)	**1.250** (10x)	3	1/8	2-1/2	957308	48.50	957308-C3	54.00		
.125 (1/8)	**1.500** (12x)	3	1/8	3	35208	67.40	35208-C3	72.90	35208-C4	81.30
.125 (1/8)	**1.875** (15x)	3	1/8	3	36108	89.60	36108-C3	95.10	36108-C4	103.60
.140 (9/64)	**.750** (5x)	4	3/16	3	12609	34.80	12609-C3	40.70		
.140 (9/64)	**1.125** (8x)	4	3/16	3	34109	38.80	34109-C3	44.70		
.156 (5/32)	**.750** (5x)	4	3/16	3	841110	31.70	841110-C3	37.70		
.156 (5/32)	**1.000** (6x)	4	3/16	3	12610	34.80	12610-C3	40.70	12610-C4	53.90
.156 (5/32)	**1.093** (7x)	4	3/16	3	856310	41.10	856310-C3	47.10		
.156 (5/32)	**1.250** (8x)	4	3/16	3	34110	38.80	34110-C3	44.70		
.187 (3/16)	**.750** (4x)	4	3/16	3	837012	31.70	837012-C3	37.70		
.187 (3/16)	**1.000** (5x)	4	3/16	3	841112	31.70	841112-C3	37.70		
.187 (3/16)	**1.125** (6x)	4	3/16	3	12612	34.80	12612-C3	40.70	77112	53.90
.187 (3/16)	**1.312** (7x)	4	3/16	3	856312	36.80	856312-C3	42.70		
.187 (3/16)	**1.500** (8x)	4	3/16	3	34112	38.80	34112-C3	44.70		
.187 (3/16)	**1.875** (10x)	4	3/16	3	957312	54.50	957312-C3	60.50		
.250 (1/4)	**1.000** (4x)	4	1/4	4	837016	37.00	837016-C3	46.40		
.250 (1/4)	**1.250** (5x)	4	1/4	4	841116	37.00	841116-C3	46.40		
.250 (1/4)	**1.500** (6x)	4	1/4	4	12616	39.10	12616-C3	48.50	77116	60.90
.250 (1/4)	**1.750** (7x)	4	1/4	4	856316	41.10	856316-C3	50.50		
.250 (1/4)	**2.000** (8x)	4	1/4	4	34116	43.20	34116-C3	52.60	34116-C4	64.40
.250 (1/4)	**2.500** (10x)	4	1/4	4	957316	57.40	957316-C3	66.90		
.312 (5/16)	**1.625** (5x)	4	5/16	4	12620	53.40	12620-C3	64.80		
.375 (3/8)	**1.750** (5x)	4	3/8	4	12624	67.20	12624-C3	81.80		
.375 (3/8)	**3.000** (8x)	4	3/8	6	845624	75.40	845624-C3	91.90		
.500 (1/2)	**2.000** (4x)	4	1/2	4	12632	81.70	12632-C3	97.70		

MINIATURE END MILLS

Ball – Deburring End Mill



End Mill Tolerances with Bur-Style Geometry!

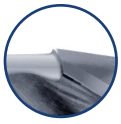
- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern • Center cutting (2 flutes to center)
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.015 (1/64)	**.045** (3x)	12	10	1/8	2-1/2	892115	32.90	892115-C3	38.40
.020	**.060** (3x)	12	10	1/8	2-1/2	892120	32.90	892120-C3	38.40
.031 (1/32)	**.093** (3x)	12	10	1/8	2-1/2	892131	32.60	892131-C3	38.10
.047 (3/64)	**.141** (3x)	12	10	1/8	2-1/2	892147	32.90	892147-C3	38.40
.062 (1/16)	**.186** (3x)	14	12	1/8	2-1/2	892162	31.40	892162-C3	36.90
.078 (5/64)	**.234** (3x)	14	12	1/8	2-1/2	892178	32.90	892178-C3	38.40
.093 (3/32)	**.279** (3x)	14	12	1/8	2-1/2	892193	31.40	892193-C3	36.90

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.375** (3x)	16	13	1/8	2-1/2	892208	30.10	892208-C3	35.60
.187 (3/16)	**.561** (3x)	16	13	3/16	2-1/2	892212	41.80	892212-C3	47.80
.250 (1/4)	**.750** (3x)	16	13	1/4	2-1/2	892216	53.10	892216-C3	61.20

MINIATURE END MILLS

Ball – Long Reach, Standard Flute



Reduced Neck Diameter to Avoid Heeling

- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1		2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
.010	.030	.050 (5x)	1/8	1-1/2		948610	982810	71.70	982810-C3	77.20		
.010	.030	.080 (8x)	1/8	1-1/2		76610	76810	72.00	76810-C3	77.50		
.010	.030	.125 (12x)	1/8	1-1/2		950210	991110	73.10	991110-C3	78.60		
.015 (1/64)	.045	.078 (5x)	1/8	1-1/2		948615	982815	55.70	982815-C3	61.20		
.015 (1/64)	.045	.128 (8x)	1/8	1-1/2		76615	76815	56.80	76815-C3	62.30		
.015 (1/64)	.045	.156 (10x)	1/8	1-1/2			851015	58.80	851015-C3	64.30		
.015 (1/64)	.045	.187 (12x)	1/8	1-1/2		950215	991115	60.00	991115-C3	65.50		
.015 (1/64)	.045	.225 (15x)	1/8	1-1/2			861215	62.80	861215-C3	68.30		
.020 (.5 mm)	.060	.100 (5x)	1/8	1-1/2		948620	982820	54.40	982820-C3	59.90	982820-C4	68.20
.020 (.5 mm)	.060	.120 (6x)	1/8	1-1/2			805720	55.70	805720-C3	61.20		
.020 (.5 mm)	.060	.140 (7x)	1/8	1-1/2			805520	55.70	805520-C3	61.20		
.020 (.5 mm)	.060	.170 (8x)	1/8	1-1/2		76620	76820	54.60	76820-C3	60.10	76820-C4	68.40
.020 (.5 mm)	.060	.200 (10x)	1/8	1-1/2			851020	56.40	851020-C3	61.90		
.020 (.5 mm)	.060	.250 (12x)	1/8	1-1/2		950220	991120	56.40	991120-C3	61.90		
.020 (.5 mm)	.060	.300 (15x)	1/8	1-1/2			861220	60.40	861220-C3	65.90		
.025	.075	.125 (5x)	1/8	1-1/2		948625	982825	49.70	982825-C3	55.20		
.025	.075	.213 (8x)	1/8	1-1/2		76625	76825	50.00	76825-C3	55.50		
.025	.075	.312 (12x)	1/8	1-1/2		950225	991125	51.80	991125-C3	57.30		
.030	.090	.156 (5x)	1/8	1-1/2		948630	982830	49.70	982830-C3	55.20		
.030	.090	.270 (9x)	1/8	1-1/2		76630	76830	50.00	76830-C3	55.50		
.030	.090	.375 (12x)	1/8	1-1/2		950230	991130	51.80	991130-C3	57.30		
.031 (1/32)	.093	.156 (5x)	1/8	1-1/2		948631	982831	48.80	982831-C3	54.30	982831-C4	62.60
.031 (1/32)	.093	.187 (6x)	1/8	1-1/2			805731	50.90	805731-C3	56.40		
.031 (1/32)	.093	.218 (7x)	1/8	1-1/2			805531	50.90	805531-C3	56.40		
.031 (1/32)	.093	.250 (8x)	1/8	1-1/2		903831	904431	50.00	904431-C3	55.50		
.031 (1/32)	.093	.250 (8x)	1/8	2-1/2	**LONG!**		734931	54.70	734931-C3	60.20		
.031 (1/32)	.093	.279 (9x)	1/8	1-1/2		76631	76831	50.00	76831-C3	55.50	76831-C4	63.80
.031 (1/32)	.093	.312 (10x)	1/8	1-1/2		811031	851031	51.80	851031-C3	57.30		
.031 (1/32)	.093	.375 (12x)	1/8	1-1/2		950231	991131	51.80	991131-C3	57.30		
.031 (1/32)	.093	.470 (15x)	1/8	1-1/2			861231	55.60	861231-C3	61.10		
.035 (.9 mm)	.105	.187 (5x)	1/8	1-1/2		948635	982835	48.80	982835-C3	54.30		
.035 (.9 mm)	.105	.315 (9x)	1/8	1-1/2		76635	76835	50.00	76835-C3	55.50		
.039 (1 mm)	.117	.203 (5x)	1/8	1-1/2		948639	982839	48.80	982839-C3	54.30		
.039 (1 mm)	.117	.325 (8x)	1/8	1-1/2		903839	904439	50.00	904439-C3	55.50		
.040	.120	.203 (5x)	1/8	1-1/2		948640	982840	48.80	982840-C3	54.30		
.040	.120	.325 (8x)	1/8	1-1/2			904440	50.00	904440-C3	55.50		
.040	.120	.360 (9x)	1/8	1-1/2		76640	76840	50.00	76840-C3	55.50		
.040	.120	.480 (12x)	1/8	1-1/2		950240	991140	51.80	991140-C3	57.30		

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MINIATURE END MILLS

Ball – Long Reach, Standard Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1		2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
.045	.135	.405 (9x)	1/8	1-1/2		76645	76845	48.50	76845-C3	54.00		
.047 (3/64)	.141	.250 (5x)	1/8	1-1/2		948647	982847	47.30	982847-C3	52.80		
.047 (3/64)	.141	.375 (8x)	1/8	1-1/2			904447	48.50	904447-C3	54.00		
.047 (3/64)	.141	.423 (9x)	1/8	1-1/2		76647	76847	48.50	76847-C3	54.00		
.047 (3/64)	.141	.480 (10x)	1/8	1-1/2			851047	50.00	851047-C3	55.50		
.047 (3/64)	.141	.570 (12x)	1/8	1-1/2		950247	991147	50.00	991147-C3	55.50		
.047 (3/64)	.141	.710 (15x)	1/8	2			861247	53.90	861247-C3	59.40		
.050	.150	.250 (5x)	1/8	1-1/2		948650	982850	47.30	982850-C3	52.80		
.050	.150	.500 (10x)	1/8	1-1/2		76650	76850	48.50	76850-C3	54.00		
.055 (1.4 mm)	.165	.500 (9x)	1/8	1-1/2		76655	76855	48.50	76855-C3	54.00		
.060	.180	.312 (5x)	1/8	1-1/2			982860	47.30	982860-C3	52.80		
.060	.180	.500 (8x)	1/8	1-1/2		76660	76860	48.50	76860-C3	54.00		
.060	.180	.720 (12x)	1/8	2		950260	991160	50.00	991160-C3	55.50		
.062 (1/16)	.186	.312 (5x)	1/8	1-1/2		948662	982862	47.30	982862-C3	52.80	982862-C4	61.10
.062 (1/16)	.186	.375 (6x)	1/8	1-1/2		755062	805762	48.50	805762-C3	54.00		
.062 (1/16)	.186	.437 (7x)	1/8	1-1/2		753862	805562	48.50	805562-C3	54.00		
.062 (1/16)	.186	.500 (8x)	1/8	1-1/2		76662	76862	48.50	76862-C3	54.00	76862-C4	62.30
.062 (1/16)	.186	.500 (8x)	1/8	2-1/2	**LONG!**		734962	53.20	734962-C3	58.70		
.062 (1/16)	.186	.625 (10x)	1/8	2		811062	851062	50.00	851062-C3	55.50		
.062 (1/16)	.186	.750 (12x)	1/8	2		950262	991162	50.00	991162-C3	55.50		
.062 (1/16)	.186	.950 (15x)	1/8	2		753462	861262	53.90	861262-C3	59.40		
.065	.195	.500 (8x)	1/8	1-1/2		76665	76865	48.50	76865-C3	54.00		
.070	.210	.500 (7x)	1/8	1-1/2		76670	76870	48.50	76870-C3	54.00		
.075	.225	.500 (7x)	1/8	1-1/2		76675	76875	48.50	76875-C3	54.00		
.078 (5/64)	.234	.406 (5x)	1/8	1-1/2			982878	48.20	982878-C3	53.70		
.078 (5/64)	.234	.500 (6x)	1/8	1-1/2		76678	76878	48.50	76878-C3	54.00		
.078 (5/64)	.234	.475 (6x)	1/8	2-1/2	**LONG!**		734778	53.20	734778-C3	58.70		
.078 (5/64)	.234	.625 (8x)	1/8	2			904478	48.50	904478-C3	54.00		
.078 (5/64)	.234	.800 (10x)	1/8	2			851078	50.00	851078-C3	55.50		
.078 (5/64)	.234	.940 (12x)	1/8	2		950278	991178	50.00	991178-C3	55.50		
.078 (5/64)	.234	1.187 (15x)	1/8	2-1/2			861278	53.90	861278-C3	59.40		
.080	.240	.500 (6x)	1/8	1-1/2		76680	76880	48.50	76880-C3	54.00		
.085	.255	.500 (6x)	1/8	1-1/2		76685	76885	47.50	76885-C3	53.00		
.090	.270	.625 (7x)	1/8	1-1/2		76690	76890	48.50	76890-C3	54.00		
.093 (3/32)	.279	.500 (5x)	1/8	1-1/2		948693	982893	48.30	982893-C3	53.80	982893-C4	62.10
.093 (3/32)	.279	.585 (6x)	1/8	1-1/2			805793	49.40	805793-C3	54.90		
.093 (3/32)	.279	.625 (7x)	1/8	1-1/2		76693	76893	48.50	76893-C3	54.00	76893-C4	62.30
.093 (3/32)	.279	.670 (7x)	1/8	3	**LONG!**		734593	53.20	734593-C3	58.70		
.093 (3/32)	.279	.750 (8x)	1/8	2			904493	49.40	904493-C3	54.90		
.093 (3/32)	.279	.950 (10x)	1/8	2			851093	50.00	851093-C3	55.50		
.093 (3/32)	.279	1.125 (12x)	1/8	2		950293	991193	50.00	991193-C3	55.50		
.093 (3/32)	.279	1.400 (15x)	1/8	2-1/2			861293	53.90	861293-C3	59.40		
.095	.285	.625 (6x)	1/8	1-1/2		76695	76895	49.40	76895-C3	54.90		
.100	.300	.625 (6x)	1/8	1-1/2		76700	76900	48.50	76900-C3	54.00		
.109 (7/64)	.327	.570 (5x)	1/8	1-1/2		948602	982902	48.30	982902-C3	53.80		
.109 (7/64)	.327	.900 (8x)	1/8	2		903802	904402	50.00	904402-C3	55.50		
.118 (3 mm)	.354	.625 (5x)	1/8	1-1/2		948705	982905	48.30	982905-C3	53.80		
.118 (3 mm)	.354	.950 (8x)	1/8	2		903805	904405	50.00	904405-C3	55.50		

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MINIATURE END MILLS

Ball – Long Reach, Standard Flute (cont.)

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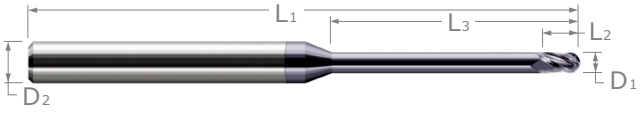
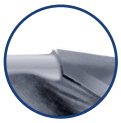
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	.375	.625 (5x)	1/8	1-1/2	948708	982908	48.30	982908-C3	53.80	982908-C4	62.10
.125 (1/8)	.375	.750 (6x)	1/8	2		805808	48.50	805808-C3	54.00		
.125 (1/8)	.375	.875 (7x)	1/8	2		805608	48.50	805608-C3	54.00		
.125 (1/8)	.375	1.000 (8x)	1/8	2	76708	76908	48.50	76908-C3	54.00	76908-C4	62.30
.125 (1/8)	.375	1.250 (10x)	1/8	2-1/2		851108	51.50	851108-C3	57.00		
.125 (1/8)	.375	1.500 (12x)	1/8	2-1/2	950308	991208	51.50	991208-C3	57.00		
.125 (1/8)	.375	1.875 (15x)	1/8	3		861308	56.80	861308-C3	62.30		
.140 (9/64)	.425	.750 (5x)	3/16	2		982909	57.90	982909-C3	63.70		
.140 (9/64)	.425	1.125 (8x)	3/16	2-1/2		76909	58.40	76909-C3	64.40		
.156 (5/32)	.470	.750 (5x)	3/16	2		982910	55.70	982910-C3	61.60		
.156 (5/32)	.470	1.250 (8x)	3/16	2-1/2		76910	55.90	76910-C3	61.80		
.187 (3/16)	.570	1.000 (5x)	3/16	2	948712	982912	55.70	982912-C3	61.60		
.187 (3/16)	.570	1.500 (8x)	3/16	2-1/2	76712	76912	55.90	76912-C3	61.80		
.250 (1/4)	.750	1.250 (5x)	1/4	2-1/2	948716	982916	60.80	982916-C3	68.90		
.250 (1/4)	.750	2.000 (8x)	1/4	4	76716	76916	61.10	76916-C3	70.60		

MINIATURE END MILLS

Ball – Long Reach, Stub Flute





Reduced Neck Diameter to Avoid Heeling

- **Long length design for deep cavities**
- Stub flutes for maximum rigidity
- Length of cut = 1½x diameter
- Center cutting • Solid carbide • CNC ground in the USA

BALL

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.005	.007	.025 (5x)	3	1/8	2-1/2	33405	67.20				
.005	.007	.040 (8x)	3	1/8	2-1/2	34205	67.80				
.008	.012	.040 (5x)	3	1/8	2-1/2	33408	65.90				
.008	.012	.064 (8x)	3	1/8	2-1/2	34208	66.50				
.010	.015	.030 (3x)	3	1/8	2-1/2	47910	65.90	47910-C3	71.40		
.010	.015	.050 (5x)	3	1/8	2-1/2	33410	65.90	33410-C3	71.40	33410-C4	79.80
.010	.015	.050 (5x)	4	1/8	2-1/2	803110	65.90	803110-C3	71.40		
.010	.015	.080 (8x)	3	1/8	2-1/2	34210	66.50	34210-C3	72.00	34210-C4	80.40
.010	.015	.080 (8x)	4	1/8	2-1/2	801310	66.50	801310-C3	72.00		
.010	.015	.100 (10x)	3	1/8	2-1/2	966010	69.50	966010-C3	75.00	966010-C4	83.30
.010	.015	.125 (12x)	3	1/8	2-1/2	35610	69.50	35610-C3	75.00	35610-C4	83.30
.010	.015	.150 (15x)	3	1/8	2-1/2	49210	78.20	49210-C3	83.70	49210-C4	92.10
.010	.015	.180 (18x)	3	1/8	2-1/2	970710	89.90	970710-C3	95.40		
.011	.016	.055 (5x)	3	1/8	2-1/2	33411	67.20	33411-C3	72.70		
.011	.016	.088 (8x)	3	1/8	2-1/2	34211	67.80	34211-C3	73.30		
.012 (.3 mm)	.018	.060 (5x)	3	1/8	2-1/2	33412	65.90	33412-C3	71.40		
.012 (.3 mm)	.018	.096 (8x)	3	1/8	2-1/2	34212	66.50	34212-C3	72.00		
.013	.019	.065 (5x)	3	1/8	2-1/2	33413	67.20	33413-C3	72.70		
.013	.019	.104 (8x)	3	1/8	2-1/2	34213	67.80	34213-C3	73.30		
.014	.021	.070 (5x)	3	1/8	2-1/2	33414	65.90	33414-C3	71.40		
.014	.021	.112 (8x)	3	1/8	2-1/2	34214	66.50	34214-C3	72.00		
.015 (1/64)	.022	.045 (3x)	3	1/8	2-1/2	47915	54.90	47915-C3	60.40		
.015 (1/64)	.022	.062 (4x)	3	1/8	2-1/2	844415	54.90	844415-C3	60.40		
.015 (1/64)	.022	.078 (5x)	3	1/8	2-1/2	33415	54.90	33415-C3	60.40	33415-C4	68.80
.015 (1/64)	.022	.078 (5x)	4	1/8	2-1/2	803115	56.00	803115-C3	61.50		
.015 (1/64)	.022	.093 (6x)	3	1/8	2-1/2	860615	54.90	860615-C3	60.40		
.015 (1/64)	.022	.109 (7x)	3	1/8	2-1/2	868215	54.90	868215-C3	60.40		
.015 (1/64)	.022	.125 (8x)	3	1/8	2-1/2	34215	56.20	34215-C3	61.70	34215-C4	70.10
.015 (1/64)	.022	.125 (8x)	4	1/8	2-1/2	801315	57.20	801315-C3	62.70		
.015 (1/64)	.022	.156 (10x)	3	1/8	2-1/2	966015	57.80	966015-C3	63.30	966015-C4	71.60
.015 (1/64)	.022	.187 (12x)	3	1/8	2-1/2	35615	57.80	35615-C3	63.30	35615-C4	71.60
.015 (1/64)	.022	.225 (15x)	3	1/8	2-1/2	49215	63.90	49215-C3	69.40	49215-C4	77.80
.015 (1/64)	.022	.270 (18x)	3	1/8	2-1/2	970715	75.20	970715-C3	80.70		
.015 (1/64)	.022	.300 (20x)	3	1/8	2-1/2	59415	75.20	59415-C3	80.70	59415-C4	89.10
.015 (1/64)	.022	.375 (25x)	3	1/8	2-1/2	40115	95.20	40115-C3	100.70		
.016 (.4 mm)	.024	.080 (5x)	3	1/8	2-1/2	33416	58.80	33416-C3	64.30		
.016 (.4 mm)	.024	.128 (8x)	3	1/8	2-1/2	34216	58.80	34216-C3	64.30		

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.017	.026	.085 (5x)	3	1/8	2-1/2	33417	58.80	33417-C3	64.30		
.017	.026	.136 (8x)	3	1/8	2-1/2	34217	60.00	34217-C3	65.50		
.018	.027	.090 (5x)	3	1/8	2-1/2	33418	57.80	33418-C3	63.30		
.018	.027	.144 (8x)	3	1/8	2-1/2	34218	60.00	34218-C3	65.50		
.019	.029	.095 (5x)	3	1/8	2-1/2	33419	57.80	33419-C3	63.30		
.019	.029	.152 (8x)	3	1/8	2-1/2	34219	58.80	34219-C3	64.30		
.020 (.5 mm)	.030	.060 (3x)	3	1/8	2-1/2	47920	53.10	47920-C3	58.60	47920-C4	67.00
.020 (.5 mm)	.030	.080 (4x)	3	1/8	2-1/2	844420	53.10	844420-C3	58.60		
.020 (.5 mm)	.030	.100 (5x)	3	1/8	2-1/2	33420	53.10	33420-C3	58.60	33420-C4	67.00
.020 (.5 mm)	.030	.100 (5x)	4	1/8	2-1/2	803120	53.10	803120-C3	58.60		
.020 (.5 mm)	.030	.120 (6x)	3	1/8	2-1/2	860620	53.10	860620-C3	58.60	860620-C4	67.70
.020 (.5 mm)	.030	.120 (6x)	4	1/8	2-1/2	753020	53.10	753020-C3	58.60		
.020 (.5 mm)	.030	.140 (7x)	3	1/8	2-1/2	868220	53.10	868220-C3	58.60		
.020 (.5 mm)	.030	.160 (8x)	3	1/8	2-1/2	34220	54.50	34220-C3	60.00	34220-C4	68.40
.020 (.5 mm)	.030	.160 (8x)	4	1/8	2-1/2	801320	54.50	801320-C3	60.00		
.020 (.5 mm)	.030	.200 (10x)	3	1/8	2-1/2	966020	56.00	966020-C3	61.50	966020-C4	69.80
.020 (.5 mm)	.030	.250 (12x)	3	1/8	2-1/2	35620	56.00	35620-C3	61.50	35620-C4	69.80
.020 (.5 mm)	.030	.300 (15x)	3	1/8	2-1/2	49220	61.90	49220-C3	67.40	49220-C4	75.70
.020 (.5 mm)	.030	.360 (18x)	3	1/8	2-1/2	970720	74.70	970720-C3	80.20		
.020 (.5 mm)	.030	.400 (20x)	3	1/8	2-1/2	59420	74.70	59420-C3	80.20	59420-C4	88.60
.020 (.5 mm)	.030	.500 (25x)	3	1/8	2-1/2	40120	93.00	40120-C3	98.50	40120-C4	107.00
.020 (.5 mm)	.030	.600 (30x)	3	1/8	2-1/2	922720	105.00	922720-C3	110.50	**30x Diameter!**	
.021	.031	.105 (5x)	3	1/8	2-1/2	33421	58.80	33421-C3	64.30		
.021	.031	.168 (8x)	3	1/8	2-1/2	34221	60.00	34221-C3	65.50		
.022	.033	.110 (5x)	3	1/8	2-1/2	33422	58.80	33422-C3	64.30		
.022	.033	.176 (8x)	3	1/8	2-1/2	34222	58.80	34222-C3	64.30		
.023	.035	.115 (5x)	3	1/8	2-1/2	33423	58.80	33423-C3	64.30		
.023	.035	.187 (8x)	3	1/8	2-1/2	34223	58.80	34223-C3	64.30		
.024 (.6 mm)	.036	.120 (5x)	3	1/8	2-1/2	33424	57.80	33424-C3	63.30		
.024 (.6 mm)	.036	.192 (8x)	3	1/8	2-1/2	34224	58.80	34224-C3	64.30		
.025	.037	.075 (3x)	3	1/8	2-1/2	47925	46.10	47925-C3	51.60		
.025	.037	.125 (5x)	3	1/8	2-1/2	33425	46.10	33425-C3	51.60	33425-C4	59.90
.025	.037	.125 (5x)	4	1/8	2-1/2	803125	46.10	803125-C3	51.60		
.025	.037	.150 (6x)	3	1/8	2-1/2	860625	46.90	860625-C3	52.40		
.025	.037	.175 (7x)	3	1/8	2-1/2	868225	47.70	868225-C3	53.20		
.025	.037	.203 (8x)	3	1/8	2-1/2	34225	46.90	34225-C3	52.40	34225-C4	60.80
.025	.037	.250 (10x)	3	1/8	2-1/2	966025	48.50	966025-C3	54.00		
.025	.037	.312 (12x)	3	1/8	2-1/2	35625	48.50	35625-C3	54.00	35625-C4	62.40
.025	.037	.312 (12x)	4	1/8	2-1/2	768025	48.50	768025-C3	54.00		
.025	.037	.375 (15x)	3	1/8	2-1/2	49225	55.50	49225-C3	61.00	49225-C4	69.40
.026	.039	.130 (5x)	3	1/8	2-1/2	33426	58.80	33426-C3	64.30		
.026	.039	.208 (8x)	3	1/8	2-1/2	34226	60.00	34226-C3	65.50		
.027	.041	.135 (5x)	3	1/8	2-1/2	33427	58.80	33427-C3	64.30		
.027	.041	.216 (8x)	3	1/8	2-1/2	34227	60.00	34227-C3	65.50		
.028 (.7 mm)	.042	.140 (5x)	3	1/8	2-1/2	33428	57.80	33428-C3	63.30		
.028 (.7 mm)	.042	.224 (8x)	3	1/8	2-1/2	34228	58.80	34228-C3	64.30		

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.029	.043	.145 (5x)	3	1/8	2-1/2	33429	58.80	33429-C3	64.30		
.029	.043	.232 (8x)	3	1/8	2-1/2	34229	60.00	34229-C3	65.50		
.030	.045	.090 (3x)	3	1/8	2-1/2	47930	46.10	47930-C3	51.60		
.030	.045	.156 (5x)	3	1/8	2-1/2	33430	46.10	33430-C3	51.60	33430-C4	59.90
.030	.045	.250 (8x)	3	1/8	2-1/2	34230	46.90	34230-C3	52.40	34230-C4	60.80
.030	.045	.312 (10x)	3	1/8	2-1/2	966030	48.50	966030-C3	54.00	966030-C4	63.10
.030	.045	.375 (12x)	3	1/8	2-1/2	35630	48.50	35630-C3	54.00	35630-C4	62.40
.030	.045	.450 (15x)	3	1/8	2-1/2	49230	55.50	49230-C3	61.00	49230-C4	69.40
.030	.045	.540 (18x)	3	1/8	2-1/2	970730	67.80	970730-C3	73.30		
.031 (1/32)	.046	.093 (3x)	3	1/8	2-1/2	47931	46.10	47931-C3	51.60	47931-C4	59.90
.031 (1/32)	.046	.125 (4x)	3	1/8	2-1/2	844431	46.10	844431-C3	51.60	844431-C4	59.90
.031 (1/32)	.046	.156 (5x)	3	1/8	2-1/2	33431	46.10	33431-C3	51.60	33431-C4	59.90
.031 (1/32)	.046	.156 (5x)	4	1/8	2-1/2	803131	46.10	803131-C3	51.60		
.031 (1/32)	.046	.187 (6x)	3	1/8	2-1/2	860631	46.10	860631-C3	51.60	860631-C4	59.90
.031 (1/32)	.046	.218 (7x)	3	1/8	2-1/2	868231	46.10	868231-C3	51.60		
.031 (1/32)	.046	.250 (8x)	3	1/8	2-1/2	34231	46.90	34231-C3	52.40	34231-C4	60.80
.031 (1/32)	.046	.250 (8x)	4	1/8	2-1/2	801331	46.90	801331-C3	52.40		
.031 (1/32)	.046	.312 (10x)	3	1/8	2-1/2	966031	48.50	966031-C3	54.00	966031-C4	62.40
.031 (1/32)	.046	.312 (10x)	4	1/8	2-1/2	769231	48.50	769231-C3	54.00		
.031 (1/32)	.046	.375 (12x)	3	1/8	2-1/2	35631	48.50	35631-C3	54.00	35631-C4	62.40
.031 (1/32)	.046	.375 (12x)	4	1/8	2-1/2	768031	49.40	768031-C3	54.90		
.031 (1/32)	.046	.470 (15x)	3	1/8	2-1/2	49231	55.50	49231-C3	61.00	49231-C4	69.40
.031 (1/32)	.046	.565 (18x)	3	1/8	2-1/2	970731	67.80	970731-C3	73.30	970731-C4	81.70
.031 (1/32)	.046	.625 (20x)	3	1/8	2-1/2	59431	67.80	59431-C3	73.30	59431-C4	81.70
.031 (1/32)	.046	.775 (25x)	3	1/8	2-1/2	40131	81.00	40131-C3	86.50	40131-C4	95.00
.031 (1/32)	.046	.937 (30x)	3	1/8	2-1/2	922731	97.30	922731-C3	102.80	**30x Diameter!**	
.035 (.9 mm)	.052	.187 (5x)	3	1/8	2-1/2	33435	46.10	33435-C3	51.60	33435-C4	60.70
.035 (.9 mm)	.052	.281 (8x)	3	1/8	2-1/2	34235	46.90	34235-C3	52.40	34235-C4	61.50
.035 (.9 mm)	.052	.425 (12x)	3	1/8	2-1/2	35635	49.00	35635-C3	54.50	35635-C4	63.60
.035 (.9 mm)	.052	.525 (15x)	3	1/8	2-1/2	49235	55.50	49235-C3	61.00		
.039 (1 mm)	.059	.203 (5x)	3	1/8	2-1/2	33439	46.30	33439-C3	51.80		
.039 (1 mm)	.059	.203 (5x)	4	1/8	2-1/2	803139	46.30	803139-C3	51.80		
.039 (1 mm)	.059	.240 (6x)	3	1/8	2-1/2	860639	46.30	860639-C3	51.80		
.039 (1 mm)	.059	.281 (7x)	3	1/8	2-1/2	868239	47.20	868239-C3	52.70		
.039 (1 mm)	.059	.325 (8x)	3	1/8	2-1/2	34239	46.90	34239-C3	52.40		
.039 (1 mm)	.059	.400 (10x)	3	1/8	2-1/2	966039	49.00	966039-C3	54.50		
.040	.060	.120 (3x)	3	1/8	2-1/2	47940	46.10	47940-C3	51.60	47940-C4	60.70
.040	.060	.160 (4x)	3	1/8	2-1/2	844440	47.00	844440-C3	52.50		
.040	.060	.203 (5x)	3	1/8	2-1/2	33440	46.10	33440-C3	51.60	33440-C4	59.90
.040	.060	.203 (5x)	4	1/8	2-1/2	803140	46.10	803140-C3	51.60		
.040	.060	.240 (6x)	3	1/8	2-1/2	860640	46.10	860640-C3	51.60		
.040	.060	.281 (7x)	3	1/8	2-1/2	868240	46.10	868240-C3	51.60		
.040	.060	.325 (8x)	3	1/8	2-1/2	34240	46.90	34240-C3	52.40	34240-C4	60.80
.040	.060	.325 (8x)	4	1/8	2-1/2	801340	46.90	801340-C3	52.40		
.040	.060	.400 (10x)	3	1/8	2-1/2	966040	49.00	966040-C3	54.50	966040-C4	62.90
.040	.060	.480 (12x)	3	1/8	2-1/2	35640	49.00	35640-C3	54.50	35640-C4	62.90

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.040	.060	.600 (15x)	3	1/8	2-1/2	49240	55.50	49240-C3	61.00	49240-C4	69.40
.040	.060	.720 (18x)	3	1/8	2-1/2	970740	67.80	970740-C3	73.30		
.040	.060	.800 (20x)	3	1/8	2-1/2	59440	67.80	59440-C3	73.30	59440-C4	81.70
.040	.060	1.000 (25x)	3	1/8	2-1/2	40140	81.00	40140-C3	86.50	**25x Diameter!**	
.045	.067	.225 (5x)	3	1/8	2-1/2	33445	44.90	33445-C3	50.40	33445-C4	59.50
.045	.067	.375 (8x)	3	1/8	2-1/2	34245	45.90	34245-C3	51.40	34245-C4	60.50
.045	.067	.550 (12x)	3	1/8	2-1/2	35645	47.20	35645-C3	52.70	35645-C4	61.10
.045	.067	.680 (15x)	3	1/8	2-1/2	49245	53.40	49245-C3	58.90		
.047 (3/64)	.070	.141 (3x)	3	1/8	2-1/2	47947	44.90	47947-C3	50.40		
.047 (3/64)	.070	.187 (4x)	3	1/8	2-1/2	844447	44.90	844447-C3	50.40		
.047 (3/64)	.070	.250 (5x)	3	1/8	2-1/2	33447	44.90	33447-C3	50.40	33447-C4	58.80
.047 (3/64)	.070	.250 (5x)	4	1/8	2-1/2	803147	44.90	803147-C3	50.40		
.047 (3/64)	.070	.281 (6x)	3	1/8	2-1/2	860647	44.90	860647-C3	50.40		
.047 (3/64)	.070	.328 (7x)	3	1/8	2-1/2	868247	44.90	868247-C3	50.40		
.047 (3/64)	.070	.375 (8x)	3	1/8	2-1/2	34247	45.90	34247-C3	51.40	34247-C4	59.80
.047 (3/64)	.070	.375 (8x)	4	1/8	2-1/2	801347	45.90	801347-C3	51.40		
.047 (3/64)	.070	.480 (10x)	3	1/8	2-1/2	966047	47.20	966047-C3	52.70	966047-C4	61.10
.047 (3/64)	.070	.480 (10x)	4	1/8	2-1/2	769247	47.20	769247-C3	52.70		
.047 (3/64)	.070	.570 (12x)	3	1/8	2-1/2	35647	47.20	35647-C3	52.70	35647-C4	61.10
.047 (3/64)	.070	.710 (15x)	3	1/8	2-1/2	49247	52.50	49247-C3	58.00	49247-C4	66.40
.047 (3/64)	.070	.850 (18x)	3	1/8	2-1/2	970747	63.80	970747-C3	69.30		
.047 (3/64)	.070	.950 (20x)	3	1/8	2-1/2	59447	63.80	59447-C3	69.30	59447-C4	77.70
.047 (3/64)	.070	1.187 (25x)	3	1/8	2-1/2	40147	78.20	40147-C3	83.70	**25x Diameter!**	
.050	.075	.150 (3x)	3	1/8	2-1/2	47950	44.90	47950-C3	50.40		
.050	.075	.250 (5x)	3	1/8	2-1/2	33450	44.90	33450-C3	50.40	33450-C4	58.80
.050	.075	.400 (8x)	3	1/8	2-1/2	34250	45.90	34250-C3	51.40	34250-C4	60.50
.050	.075	.500 (10x)	3	1/8	2-1/2	966050	47.20	966050-C3	52.70		
.050	.075	.600 (12x)	3	1/8	2-1/2	35650	47.20	35650-C3	52.70	35650-C4	61.10
.050	.075	.750 (15x)	3	1/8	2-1/2	49250	52.50	49250-C3	58.00		
.055 (1.4 mm)	.082	.165 (3x)	3	1/8	2-1/2	47955	44.90	47955-C3	50.40		
.055 (1.4 mm)	.082	.275 (5x)	3	1/8	2-1/2	33455	44.90	33455-C3	50.40	33455-C4	59.50
.055 (1.4 mm)	.082	.330 (6x)	3	1/8	2-1/2	860655	44.90	860655-C3	50.40		
.055 (1.4 mm)	.082	.450 (8x)	3	1/8	2-1/2	34255	45.90	34255-C3	51.40	34255-C4	59.80
.055 (1.4 mm)	.082	.560 (10x)	3	1/8	2-1/2	966055	48.10	966055-C3	53.60		
.055 (1.4 mm)	.082	.660 (12x)	3	1/8	2-1/2	35655	47.20	35655-C3	52.70	35655-C4	61.10
.060	.090	.180 (3x)	3	1/8	2-1/2	47960	44.90	47960-C3	50.40		
.060	.090	.312 (5x)	3	1/8	2-1/2	33460	44.90	33460-C3	50.40	33460-C4	58.80
.060	.090	.375 (6x)	3	1/8	2-1/2	860660	45.90	860660-C3	51.40		
.060	.090	.437 (7x)	3	1/8	2-1/2	868260	45.90	868260-C3	51.40		
.060	.090	.500 (8x)	3	1/8	2-1/2	34260	45.90	34260-C3	51.40	34260-C4	59.80
.060	.090	.625 (10x)	3	1/8	2-1/2	966060	47.20	966060-C3	52.70		
.060	.090	.720 (12x)	3	1/8	2-1/2	35660	47.20	35660-C3	52.70	35660-C4	61.10
.060	.090	.900 (15x)	3	1/8	2-1/2	49260	52.50	49260-C3	58.00		
.060	.090	1.062 (18x)	3	1/8	2-1/2	970760	63.80	970760-C3	69.30		
.060	.090	1.200 (20x)	3	1/8	2-1/2	59460	63.80	59460-C3	69.30		

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.062 (1/16)	.093	.186 (3x)	3	1/8	2-1/2	47962	44.90	47962-C3	50.40	47962-C4	58.80
.062 (1/16)	.093	.250 (4x)	3	1/8	2-1/2	844462	44.90	844462-C3	50.40	844462-C4	59.50
.062 (1/16)	.093	.250 (4x)	4	1/8	2-1/2	754362	44.90	754362-C3	50.40		
.062 (1/16)	.093	.312 (5x)	3	1/8	2-1/2	33462	44.90	33462-C3	50.40	33462-C4	58.80
.062 (1/16)	.093	.312 (5x)	4	1/8	2-1/2	803162	44.90	803162-C3	50.40		
.062 (1/16)	.093	.375 (6x)	3	1/8	2-1/2	860662	44.90	860662-C3	50.40	860662-C4	58.80
.062 (1/16)	.093	.375 (6x)	4	1/8	2-1/2	753062	44.90	753062-C3	50.40		
.062 (1/16)	.093	.437 (7x)	3	1/8	2-1/2	868262	44.90	868262-C3	50.40	868262-C4	58.80
.062 (1/16)	.093	.500 (8x)	3	1/8	2-1/2	34262	45.90	34262-C3	51.40	34262-C4	59.80
.062 (1/16)	.093	.500 (8x)	4	1/8	2-1/2	801362	45.90	801362-C3	51.40		
.062 (1/16)	.093	.558 (9x)	3	1/8	2-1/2	805362	47.20	805362-C3	52.70		
.062 (1/16)	.093	.625 (10x)	3	1/8	2-1/2	966062	47.20	966062-C3	52.70	966062-C4	61.10
.062 (1/16)	.093	.625 (10x)	4	1/8	2-1/2	769262	47.20	769262-C3	52.70		
.062 (1/16)	.093	.750 (12x)	3	1/8	2-1/2	35662	47.20	35662-C3	52.70	35662-C4	61.10
.062 (1/16)	.093	.750 (12x)	4	1/8	2-1/2	768062	47.20	768062-C3	52.70		
.062 (1/16)	.093	.950 (15x)	3	1/8	2-1/2	49262	52.50	49262-C3	58.00	49262-C4	66.40
.062 (1/16)	.093	.950 (15x)	4	1/8	2-1/2	752262	53.40	752262-C3	58.90		
.062 (1/16)	.093	1.125 (18x)	3	1/8	2-1/2	970762	63.80	970762-C3	69.30	970762-C4	77.70
.062 (1/16)	.093	1.250 (20x)	3	1/8	2-1/2	59462	63.80	59462-C3	69.30	59462-C4	77.70
.062 (1/16)	.093	1.550 (25x)	3	1/8	3	40162	78.20	40162-C3	83.70	40162-C4	92.10
.062 (1/16)	.093	1.875 (30x)	3	1/8	3	922762	102.10	922762-C3	107.60	**30x Diameter!**	
.065	.097	.325 (5x)	3	1/8	2-1/2	33465	44.90	33465-C3	50.40		
.065	.097	.530 (8x)	3	1/8	2-1/2	34265	45.90	34265-C3	51.40	34265-C4	60.50
.070	.105	.375 (5x)	3	1/8	2-1/2	33470	44.90	33470-C3	50.40		
.070	.105	.570 (8x)	3	1/8	2-1/2	34270	45.90	34270-C3	51.40	34270-C4	59.80
.075	.112	.375 (5x)	3	1/8	2-1/2	33475	44.90	33475-C3	50.40		
.075	.112	.625 (8x)	3	1/8	2-1/2	34275	45.90	34275-C3	51.40	34275-C4	60.50
.078 (5/64)	.117	.234 (3x)	3	1/8	2-1/2	47978	44.90	47978-C3	50.40		
.078 (5/64)	.117	.312 (4x)	3	1/8	2-1/2	844478	44.90	844478-C3	50.40		
.078 (5/64)	.117	.406 (5x)	3	1/8	2-1/2	33478	44.90	33478-C3	50.40	33478-C4	58.80
.078 (5/64)	.117	.406 (5x)	4	1/8	2-1/2	803178	44.90	803178-C3	50.40		
.078 (5/64)	.117	.475 (6x)	3	1/8	2-1/2	860678	44.90	860678-C3	50.40		
.078 (5/64)	.117	.550 (7x)	3	1/8	2-1/2	868278	44.90	868278-C3	50.40		
.078 (5/64)	.117	.625 (8x)	3	1/8	2-1/2	34278	45.90	34278-C3	51.40	34278-C4	59.80
.078 (5/64)	.117	.625 (8x)	4	1/8	2-1/2	801378	45.90	801378-C3	51.40		
.078 (5/64)	.117	.800 (10x)	3	1/8	2-1/2	966078	47.20	966078-C3	52.70		
.078 (5/64)	.117	.940 (12x)	3	1/8	2-1/2	35678	47.20	35678-C3	52.70	35678-C4	61.10
.078 (5/64)	.117	1.187 (15x)	3	1/8	2-1/2	49278	52.50	49278-C3	58.00	49278-C4	66.40
.078 (5/64)	.117	1.400 (18x)	3	1/8	3	970778	63.80	970778-C3	69.30		
.078 (5/64)	.117	1.562 (20x)	3	1/8	3	59478	63.80	59478-C3	69.30		
.078 (5/64)	.117	1.950 (25x)	3	1/8	3	40178	78.20	40178-C3	83.70	**25x Diameter!**	
.080	.120	.406 (5x)	3	1/8	2-1/2	33480	44.90	33480-C3	50.40		
.080	.120	.650 (8x)	3	1/8	2-1/2	34280	45.90	34280-C3	51.40	34280-C4	60.50
.085	.127	.425 (5x)	3	1/8	2-1/2	33485	44.90	33485-C3	50.40		
.085	.127	.700 (8x)	3	1/8	2-1/2	34285	45.90	34285-C3	51.40	34285-C4	60.50
.090	.135	.450 (5x)	3	1/8	2-1/2	33490	45.70	33490-C3	51.20		
.090	.135	.750 (8x)	3	1/8	2-1/2	34290	45.90	34290-C3	51.40	34290-C4	60.50

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.093 (3/32)	.139	.279 (3x)	3	1/8	2-1/2	47993	44.90	47993-C3	50.40		
.093 (3/32)	.139	.375 (4x)	3	1/8	2-1/2	844493	44.90	844493-C3	50.40		
.093 (3/32)	.139	.500 (5x)	3	1/8	2-1/2	33493	44.90	33493-C3	50.40	33493-C4	58.80
.093 (3/32)	.139	.500 (5x)	4	1/8	2-1/2	803193	44.90	803193-C3	50.40		
.093 (3/32)	.139	.585 (6x)	3	1/8	2-1/2	860693	44.90	860693-C3	50.40		
.093 (3/32)	.139	.670 (7x)	3	1/8	2-1/2	868293	44.90	868293-C3	50.40		
.093 (3/32)	.139	.750 (8x)	3	1/8	2-1/2	34293	45.90	34293-C3	51.40	34293-C4	59.80
.093 (3/32)	.139	.750 (8x)	4	1/8	2-1/2	801393	45.90	801393-C3	51.40		
.093 (3/32)	.139	.950 (10x)	3	1/8	2-1/2	966093	47.20	966093-C3	52.70	966093-C4	61.10
.093 (3/32)	.139	1.125 (12x)	3	1/8	2-1/2	35693	47.20	35693-C3	52.70	35693-C4	61.10
.093 (3/32)	.139	1.400 (15x)	3	1/8	3	49293	55.20	49293-C3	60.70	49293-C4	69.10
.093 (3/32)	.139	1.675 (18x)	3	1/8	3	970793	67.70	970793-C3	73.20		
.093 (3/32)	.139	1.875 (20x)	3	1/8	4	59493	70.50	59493-C3	76.40		
.093 (3/32)	.139	2.312 (25x)	3	1/8	4	40193	80.80	40193-C3	86.70	**25x Diameter!**	
.093 (3/32)	.139	2.812 (30x)	3	1/8	4	922793	111.20	922793-C3	117.10	**30x Diameter!**	
.095	.142	.500 (5x)	3	1/8	2-1/2	33495	44.90	33495-C3	50.40		
.095	.142	.750 (8x)	3	1/8	2-1/2	34295	45.90	34295-C3	51.40	34295-C4	60.50
.100	.150	.300 (3x)	3	1/8	2-1/2	978500	44.90	978500-C3	50.40		
.100	.150	.500 (5x)	3	1/8	2-1/2	33500	44.90	33500-C3	50.40		
.100	.150	.800 (8x)	3	1/8	2-1/2	34300	45.90	34300-C3	51.40	34300-C4	59.80
.100	.150	1.000 (10x)	3	1/8	2-1/2	966100	47.20	966100-C3	52.70		
.100	.150	1.200 (12x)	3	1/8	2-1/2	35700	47.20	35700-C3	52.70		
.109 (7/64)	.163	.570 (5x)	3	1/8	2-1/2	33502	44.90	33502-C3	50.40		
.109 (7/64)	.163	.900 (8x)	3	1/8	2-1/2	34302	45.90	34302-C3	51.40		
.118 (3 mm)	.177	.475 (4x)	3	1/8	2-1/2	844505	44.90	844505-C3	50.40		
.118 (3 mm)	.177	.625 (5x)	3	1/8	2-1/2	33505	44.90	33505-C3	50.40		
.118 (3 mm)	.177	.625 (5x)	4	1/8	2-1/2	803105	44.90	803105-C3	50.40		
.118 (3 mm)	.177	.950 (8x)	3	1/8	2-1/2	34305	45.90	34305-C3	51.40		
.118 (3 mm)	.177	1.187 (10x)	3	1/8	2-1/2	966105	47.20	966105-C3	52.70		
.118 (3 mm)	.177	1.420 (12x)	3	1/8	3	35605	48.40	35605-C3	53.90		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.187	.375 (3x)	3	1/8	2-1/2	978508	44.90	978508-C3	50.40	978508-C4	58.80
.125 (1/8)	.187	.375 (3x)	4	1/8	2-1/2	751908	45.70	751908-C3	51.20		
.125 (1/8)	.187	.500 (4x)	3	1/8	2-1/2	844508	44.90	844508-C3	50.40		
.125 (1/8)	.187	.625 (5x)	3	1/8	2-1/2	33508	44.90	33508-C3	50.40	33508-C4	58.80
.125 (1/8)	.187	.625 (5x)	4	1/8	2-1/2	803208	44.90	803208-C3	50.40		
.125 (1/8)	.187	.750 (6x)	3	1/8	2-1/2	860708	44.90	860708-C3	50.40	860708-C4	58.80
.125 (1/8)	.187	.875 (7x)	3	1/8	2-1/2	868308	44.90	868308-C3	50.40		
.125 (1/8)	.187	1.000 (8x)	3	1/8	2-1/2	34308	45.90	34308-C3	51.40	34308-C4	59.80
.125 (1/8)	.187	1.000 (8x)	4	1/8	2-1/2	801408	45.90	801408-C3	51.40		
.125 (1/8)	.187	1.125 (9x)	3	1/8	2-1/2	805408	49.30	805408-C3	54.80		
.125 (1/8)	.187	1.250 (10x)	3	1/8	2-1/2	966108	49.30	966108-C3	54.80	966108-C4	63.20
.125 (1/8)	.187	1.250 (10x)	4	1/8	2-1/2	769308	49.30	769308-C3	54.80		

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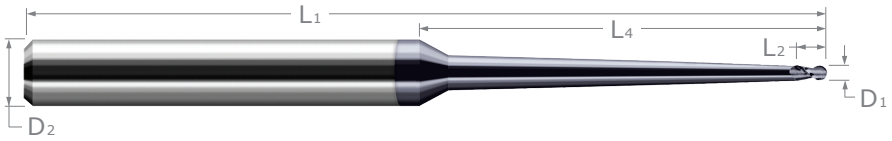
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.187	1.500 (12x)	3	1/8	3	35708	49.30	35708-C3	54.80	35708-C4	63.20
.125 (1/8)	.187	1.500 (12x)	4	1/8	3	768108	49.30	768108-C3	54.80		
.125 (1/8)	.187	1.875 (15x)	3	1/8	3	49308	55.20	49308-C3	60.70	49308-C4	69.10
.125 (1/8)	.187	2.250 (18x)	3	1/8	4	970808	67.70	970808-C3	73.60	970808-C4	82.20
.125 (1/8)	.187	2.500 (20x)	3	1/8	4	59508	67.70	59508-C3	73.60	59508-C4	88.00
.125 (1/8)	.187	3.125 (25x)	3	1/8	4	959108	86.50	959108-C3	92.40	**25x Diameter!**	
.125 (1/8)	.187	3.750 (30x)	3	1/8	6	922808	103.70	922808-C3	111.10	**30x Diameter!**	
.140 (9/64)	.220	.750 (5x)	3	3/16	3	33509	49.50	33509-C3	55.50		
.140 (9/64)	.220	1.125 (8x)	3	3/16	3	34309	50.60	34309-C3	56.50		
.140 (9/64)	.220	1.450 (10x)	3	3/16	3	966109	54.00	966109-C3	60.20		
.156 (5/32)	.234	.470 (3x)	3	3/16	3	978510	49.50	978510-C3	55.50		
.156 (5/32)	.234	.750 (5x)	3	3/16	3	33510	49.50	33510-C3	55.50		
.156 (5/32)	.234	1.250 (8x)	3	3/16	3	34310	50.60	34310-C3	56.50	34310-C4	69.70
.156 (5/32)	.234	1.570 (10x)	3	3/16	3	966110	54.00	966110-C3	59.90		
.156 (5/32)	.234	1.875 (12x)	3	3/16	4	35710	54.00	35710-C3	62.00		
.156 (5/32)	.234	2.375 (15x)	3	3/16	4	49310	58.20	49310-C3	66.30		
.187 (3/16)	.281	.570 (3x)	3	3/16	3	978512	49.50	978512-C3	55.50		
.187 (3/16)	.281	1.000 (5x)	3	3/16	3	33512	49.50	33512-C3	55.50	33512-C4	68.70
.187 (3/16)	.281	1.000 (5x)	4	3/16	3	803212	49.50	803212-C3	55.50		
.187 (3/16)	.281	1.156 (6x)	3	3/16	3	860712	50.60	860712-C3	56.50		
.187 (3/16)	.281	1.312 (7x)	3	3/16	3	868312	50.60	868312-C3	56.50		
.187 (3/16)	.281	1.500 (8x)	3	3/16	3	34312	50.60	34312-C3	56.50	34312-C4	69.70
.187 (3/16)	.281	1.500 (8x)	4	3/16	3	801412	50.60	801412-C3	56.50		
.187 (3/16)	.281	1.875 (10x)	3	3/16	4	966112	54.00	966112-C3	62.00	966112-C4	74.40
.187 (3/16)	.281	2.250 (12x)	3	3/16	4	35712	54.00	35712-C3	62.00	35712-C4	71.70
.187 (3/16)	.281	2.812 (15x)	3	3/16	4	49312	57.00	49312-C3	65.10	49312-C4	74.70
.187 (3/16)	.281	3.375 (18x)	3	3/16	6	970812	79.00	970812-C3	89.80		
.187 (3/16)	.281	3.750 (20x)	3	3/16	6	59512	82.10	59512-C3	89.90		
.218 (7/32)	.330	1.125 (5x)	3	1/4	4	33514	57.60	33514-C3	67.00		
.218 (7/32)	.330	1.750 (8x)	3	1/4	4	34314	58.20	34314-C3	67.60		
.250 (1/4)	.375	.750 (3x)	3	1/4	4	978516	54.60	978516-C3	64.00		
.250 (1/4)	.375	1.250 (5x)	3	1/4	4	33516	54.60	33516-C3	64.00	33516-C4	76.40
.250 (1/4)	.375	1.250 (5x)	4	1/4	4	803216	55.70	803216-C3	65.10		
.250 (1/4)	.375	2.000 (8x)	3	1/4	4	34316	56.00	34316-C3	65.40	34316-C4	77.80
.250 (1/4)	.375	2.000 (8x)	4	1/4	4	801416	56.00	801416-C3	65.40		
.250 (1/4)	.375	2.500 (10x)	3	1/4	4	966116	62.50	966116-C3	72.00	966116-C4	83.70
.250 (1/4)	.375	3.000 (12x)	3	1/4	6	35716	67.20	35716-C3	77.90	35716-C4	91.90
.250 (1/4)	.375	3.750 (15x)	3	1/4	6	49316	68.80	49316-C3	79.50		
.250 (1/4)	.375	5.000 (20x)	3	1/4	8	59516	139.10	59516-C3	155.20		
.312 (5/16)	.470	1.625 (5x)	3	5/16	4	33520	72.20	33520-C3	81.80		
.312 (5/16)	.470	2.500 (8x)	3	5/16	4	34320	89.10	34320-C3	98.70		
.375 (3/8)	.570	2.000 (5x)	3	3/8	4	33524	95.40	33524-C3	110.00		
.375 (3/8)	.570	3.000 (8x)	3	3/8	6	34324	128.60	34324-C3	145.10		

MINIATURE END MILLS

Ball – Tapered Reach (Clearance Cutters)



Maximum Reach & Maximum Rigidity!

- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½ x diameter • Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

CUTTER DIA.	LOC	EFFECTIVE OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*			UNCOATED			AlTiN NANO COATED			AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.020″ −.000″	L_4 +.020″ −.000″		D_2 (h6)	L_1	0°	.5°	1°	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE	2 FL	PRICE
.010	.015	1/2	6.6°	1/8	2-1/2	.054	.070	.102	29810		78.50	29810-C6		86.60		
.015	.023	1/2	6.4°	1/8	2-1/2	.060	.080	.120	29815	778115	77.40	29815-C6	778115-C6	85.50	29815-C4	91.30
.015	.023	1	6.7°	1/4	4	.060	.080	.120	17715		92.20	17715-C6		104.10		
.020	.030	1/2	6.1°	1/8	2-1/2	.070	.095	.140	29820		78.50	29820-C6		86.60		
.020	.030	1	6.6°	1/4	4	.070	.095	.140	17720		92.20	17720-C6		101.90		
.031	.047	1/2	5.5°	1/8	2-1/2	.115	.150	.220	29831	778131	60.50	29831-C6	778131-C6	68.60	29831-C4	74.40
.031	.047	1	6.3°	1/4	4	.115	.150	.220	17731	777231	75.80	17731-C6	777231-C6	87.80	17731-C4	97.70
.031	.047	1-1/2	4.2°	1/4	4	.115	.150	.220	24831	776231	81.70	24831-C6	776231-C6	93.60	24831-C4	103.60
.031	.047	2	3.2°	1/4	4	.115	.150	.220	18831		93.30	18831-C6		105.30	18831-C4	115.30
.039	.059	1/2	5.1°	1/8	2-1/2	.150	.195	.285	29839		61.30	29839-C6		69.40		
.039	.059	1	6.1°	1/4	4	.150	.195	.285	17739		75.80	17739-C6		87.80		
.047	.071	1/2	4.7°	1/8	2-1/2	.180	.235	.350	29847	778147	60.50	29847-C6	778147-C6	68.60	29847-C4	74.40
.047	.071	1	5.9°	1/4	4	.180	.235	.350	17747	777247	75.80	17747-C6	777247-C6	87.80	17747-C4	97.00
.047	.071	1-1/2	3.9°	1/4	4	.180	.235	.350	24847		81.70	24847-C6		93.60	24847-C4	102.90
.047	.071	2	2.9°	1/4	4	.180	.235	.350	18847		93.30	18847-C6		105.30	18847-C4	114.50
.062	.093	1/2	3.8°	1/8	2-1/2	.220	.285	.370	29862	778162	58.60	29862-C6	778162-C6	66.70	29862-C4	72.50
.062	.093	1	5.5°	1/4	4	.220	.285	.415	17762	777262	73.50	17762-C6	777262-C6	85.40	17762-C4	95.40
.062	.093	1-1/2	3.7°	1/4	4	.220	.285	.415	24862	776262	78.80	24862-C6	776262-C6	90.70	24862-C4	100.70
.062	.093	2	2.7°	1/4	4	.220	.285	.415	18862	775262	91.00	18862-C6	775262-C6	103.00	18862-C4	113.00
.062	.093	2-1/2	2.2°	1/4	4	.220	.285	.415	21362		93.20	21362-C6		102.90		
.078	.118	1	5.1°	1/4	4	.305	.395	.575	17778		73.50	17778-C6		85.40	17778-C4	94.70
.078	.118	1-1/2	3.4°	1/4	4	.305	.395	.575	24878		78.80	24878-C6		90.70	24878-C4	100.70
.078	.118	2	2.5°	1/4	4	.305	.395	.575	18878		91.00	18878-C6		103.00	18878-C4	112.20
.093	.140	1	4.7°	1/4	4	.340	.440	.640	17793	777293	74.40	17793-C6	777293-C6	86.30	17793-C4	96.20
.093	.140	1-1/2	3.1°	1/4	4	.340	.440	.640	24893	776293	78.80	24893-C6	776293-C6	90.70	24893-C4	100.70
.093	.140	2	2.3°	1/4	4	.340	.440	.640	18893		88.60	18893-C6		100.60	18893-C4	109.80
.118	.177	1	4.0°	1/4	4	.438	.565	.756	17805		75.10	17805-C6		87.00		
.118	.177	1-1/2	2.6°	1/4	4	.438	.565	.818	24905		79.60	24905-C6		91.50		
.125	.188	1	3.8°	1/4	4	.450	.580	.750	17808	777308	74.40	17808-C6	777308-C6	86.30	17808-C4	96.20
.125	.188	1-1/2	2.5°	1/4	4	.450	.580	.840	24908	776308	78.80	24908-C6	776308-C6	90.70	24908-C4	100.70
.125	.188	2	1.8°	1/4	4	.450	.580	.840	18908	775308	88.60	18908-C6	775308-C6	100.60	18908-C4	110.60
.125	.188	2-1/2	2.2°	5/16	4	.450	.580	.840	21408	734408	93.00	21408-C6	734408-C6	106.50		

*Values are approximate and may vary due to tolerancing. †Tapered neck angle is 1.85°.

continued on next page

For detailed interference charts with more angles, scan the QR code or visit www.harveytool.com/resources

MINIATURE END MILLS

Ball – Tapered Reach (Clearance Cutters) (cont.)

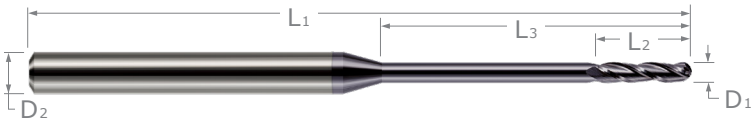
continued from previous page

CUTTER DIA.	LOC	EFFECTIVE OVERALL REACH	WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*			UNCOATED			AlTiN NANO COATED			AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.020″ −.000″	L_4 +.020″ −.000″		D_2 (h6)	L_1	0°	.5°	1°	2 FL	4 FL	PRICE	2 FL	4 FL	PRICE	2 FL	PRICE
.140	.211	1-1/2	2.2°	1/4	4	.495	.636	.919	24909		79.30	24909-C6		89.00		
.140	.211	2	1.6°	1/4	4	.495	.636	.919	18909		88.60	18909-C6		98.30		
.156	.234	1	2.9°	1/4	4	.525	.680	.775	17810		74.40	17810-C6		86.30	17810-C4	95.60
.156	.234	1-1/2	1.9°	1/4	4	.525	.680	.980	24910		78.80	24910-C6		90.70	24910-C4	100.00
.156	.234	2	1.4°	1/4	4	.540	.710	1.085	18910†	775310†	88.60	18910-C6†	775310-C6†	100.60	18910-C4†	109.80
.187	.281	1-1/2	1.3°	1/4	4	.605	.775	1.120	24912	776312	80.80	24912-C6	776312-C6	92.80	24912-C4	102.00
.187	.281	2	2.7°	3/8	4	.605	.775	1.120	18912	775312	119.00	18912-C6	775312-C6	132.50	18912-C4	145.50
.187	.281	2-1/2	2.2°	3/8	4	.605	.775	1.120	21412		122.90	21412-C6		136.40		
.250	.375	1-1/2	2.6°	3/8	4	.760	.975	1.260	24916	776316	103.70	24916-C6	776316-C6	117.10	24916-C4	130.90
.250	.375	2	1.8°	3/8	4	.760	.975	1.405	18916	775316	119.00	18916-C6	775316-C6	132.50	18916-C4	145.50
.250	.375	2-1/2	1.5°	3/8	4	.760	.975	1.405	21416		122.90	21416-C6		136.40		
.312	.468	2	2.7°	1/2	4	.915	1.170	1.685	18920		161.30	18920-C6		179.90	18920-C4	202.50
.375	.563	2	1.8°	1/2	4	1.075	1.370	1.770	18924		161.30	18924-C6		179.90	18924-C4	193.10

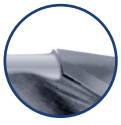
*Values are approximate and may vary due to tolerancing. †Tapered neck angle is 1.85°.

MINIATURE END MILLS

Ball – Long Reach, Long Flute



- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut > 5x diameter
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



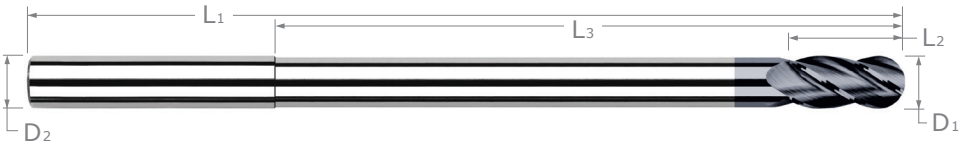
Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.010	.050	.100 (10x)	1/8	2-1/2	13810	69.80	13810-C3	75.30	10210	83.70
.012	.060	.120 (10x)	1/8	2-1/2	13812	67.40	13812-C3	72.90		
.015 (1/64)	.075	.150 (10x)	1/8	2-1/2	13815	59.50	13815-C3	65.00	10215	73.50
.020 (.5 mm)	.100	.200 (10x)	1/8	2-1/2	13820	57.80	13820-C3	63.30	10220	71.80
.025	.125	.250 (10x)	1/8	2-1/2	13825	49.90	13825-C3	55.40	10225	64.20
.030	.150	.300 (10x)	1/8	2-1/2	13830	49.90	13830-C3	55.40	10230	64.50
.031 (1/32)	.155	.250 (8x)	1/8	2-1/2	750431	48.70	750431-C3	54.20		
.031 (1/32)	.155	.310 (10x)	1/8	2-1/2	13831	49.90	13831-C3	55.40	10231	64.20
.031 (1/32)	.155	.470 (15x)	1/8	2-1/2	724031	49.90	724031-C3	55.40		
.035 (.9 mm)	.175	.350 (10x)	1/8	2-1/2	13835	50.30	13835-C3	55.80	10235	64.90
.040	.200	.400 (10x)	1/8	2-1/2	13840	49.90	13840-C3	55.40	10240	64.20
.045	.225	.450 (10x)	1/8	2-1/2	13845	48.70	13845-C3	54.20	10245	63.10
.047 (3/64)	.250	.500 (10x)	1/8	2-1/2	13847	48.70	13847-C3	54.20	10247	63.10
.050	.300	.600 (12x)	1/8	2-1/2	13850	48.70	13850-C3	54.20	10250	63.30
.055 (1.4 mm)	.385	.770 (14x)	1/8	2-1/2	13855	48.70	13855-C3	54.20	10255	63.30
.060	.500	1.000 (16x)	1/8	2-1/2	13860	49.80	13860-C3	55.30	10260	64.40
.062 (1/16)	.312	.500 (8x)	1/8	2-1/2	750462	47.50	750462-C3	53.00		
.062 (1/16)	.500	.625 (10x)	1/8	2-1/2	803562	48.70	803562-C3	54.20	803362	63.10
.062 (1/16)	.500	1.000 (16x)	1/8	2-1/2	13862	49.80	13862-C3	55.30	10262	64.10
.065	.500	1.000 (15x)	1/8	2-1/2	13865	49.20	13865-C3	54.70	10265	63.80
.070	.500	1.000 (14x)	1/8	2-1/2	13870	48.70	13870-C3	54.20	10270	63.30
.075	.500	1.000 (13x)	1/8	2-1/2	13875	48.70	13875-C3	54.20	10275	63.10
.078 (5/64)	.500	1.000 (12x)	1/8	2-1/2	13878	48.70	13878-C3	54.20	10278	63.30
.080	.750	1.250 (15x)	1/8	2-1/2	13880	48.70	13880-C3	54.20	10280	63.30
.085	.750	1.250 (14x)	1/8	2-1/2	13885	48.70	13885-C3	54.20	10285	63.30
.090	.750	1.250 (13x)	1/8	2-1/2	13890	49.20	13890-C3	54.70	10290	63.80
.093 (3/32)	.500	.750 (8x)	1/8	2-1/2	750493	47.50	750493-C3	53.00		
.093 (3/32)	.750	1.250 (13x)	1/8	2-1/2	13893	48.70	13893-C3	54.20	10293	63.30
.095	.750	1.250 (13x)	1/8	2-1/2	13895	48.70	13895-C3	54.20	10295	63.30
.100	.750	1.250 (12x)	1/8	2-1/2	14800	48.70	14800-C3	54.20	10300	63.10

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	1.000	1.500 (12x)	1/8	2-1/2	14808	48.70	14808-C3	54.20	10308	63.10
.187 (3/16)	1.125	1.625 (8x)	3/16	3	14812	52.70	14812-C3	58.90	10312	72.00
.250 (1/4)	1.500	2.000 (8x)	1/4	4	14816	59.10	14816-C3	65.50	10316	81.00

MINIATURE END MILLS

Ball – Extra Long Length

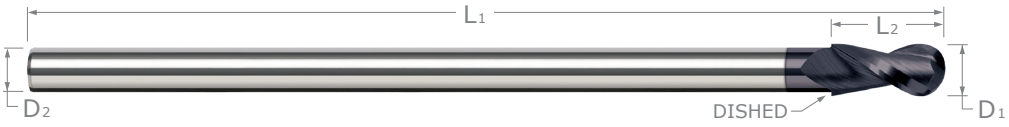


- **Up to 8" overall length**
- Longest overall length carbide end mill available in stock
- Extended reach
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.250 (1/4)	.375	**4.375** (17.5x)	1/4	6	14916	106.60	14916-C3	117.30
.312 (5/16)	.470	**4.343** (14x)	5/16	6	14920	128.80	14920-C3	144.90
.375 (3/8)	.562	**4.312** (11.5x)	3/8	6	14924	146.10	14924-C3	162.70
.500 (1/2)	.750	**5.750** (11.5x)	1/2	8	14932	254.40	14932-C3	287.40
.625 (5/8)	.937	**5.687** (9x)	5/8	8	14940	430.00		
.750 (3/4)	1.125	**5.625** (7.5x)	3/4	8	14948	516.90		

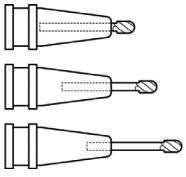
MINIATURE END MILLS

Ball – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Length of cut = 1½x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!



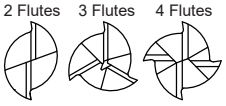
CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	3/16	2	**3 mm**	2-1/2	24708	106.60	24708-C3	112.10
1/8	3/16	4	**3 mm**	2-1/2	804208	110.40	804208-C3	115.90
5/32	15/64	2	**1/8**	2-1/2	24710	106.60	24710-C3	112.60
3/16	9/32	2	**1/8**	2-1/2	24712	107.60	24712-C3	113.80
3/16	9/32	2	**5/32**	2-1/2	24713	110.10	24713-C3	116.10
3/16	9/32	4	**5/32**	2-1/2	804212	115.00	804212-C3	120.90
1/4	3/8	2	**3/16**	3	24716	115.50	24716-C3	123.60
1/4	3/8	4	**3/16**	3	804216	119.60	804216-C3	127.70
5/16	15/32	2	**1/4**	4	24720	141.90	24720-C3	151.50
3/8	9/16	2	**5/16**	4	24724	167.60	24724-C3	182.30
7/16	21/32	2	**3/8**	6	24728	249.40	24728-C3	264.70
1/2	3/4	2	**7/16**	6	24732	260.60	24732-C3	278.60
5/8	15/16	2	**1/2**	6	24740	337.90	24740-C3	358.70
3/4	1-1/8	2	**5/8**	6	24748	417.60	24748-C3	442.40

For Square Reduced Shank, please see page 44.
For Corner Radius Reduced Shank, please see page 95.

NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard



- Corner radius for improved strength
- Center cutting
- Solid carbide
- CNC ground in the USA

CORNER RADIUS

CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND			
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.008	.002	.012 (1.5x)	1/8	1-1/2			856008	55.20		856008-C3	60.70				
.008	.002	.024 (3x)	1/8	1-1/2			854208	55.20		854208-C3	60.70				
.010	.003	.015 (1.5x)	1/8	1-1/2			987510	49.70		987510-C3	55.20				
.010	.003	.030 (3x)	1/8	1-1/2			47210	49.70		47210-C3	55.20				
.012	.003	.018 (1.5x)	1/8	1-1/2			987512	50.70		987512-C3	56.20				
.012	.003	.036 (3x)	1/8	1-1/2			47212	50.70		47212-C3	56.20				
.015 (1/64)	.003	.023 (1.5x)	1/8	1-1/2			987515	49.70		987515-C3	55.20				
.015 (1/64)	.003	.045 (3x)	1/8	1-1/2	45415		47215	49.70		47215-C3	55.20		47215-C4	63.50	
.015 (1/64)	.005	.023 (1.5x)	1/8	1-1/2			993815	49.70		993815-C3	55.20				
.015 (1/64)	.005	.045 (3x)	1/8	1-1/2	44715		26315	49.70		26315-C3	55.20				
.018	.005	.027 (1.5x)	1/8	1-1/2			993818	49.70		993818-C3	55.20				
.018	.005	.054 (3x)	1/8	1-1/2			26318	49.70		26318-C3	55.20				
.020 (.5 mm)	.003	.030 (1.5x)	1/8	1-1/2			987520	47.60		987520-C3	53.10				
.020 (.5 mm)	.003	.060 (3x)	1/8	1-1/2			47220	47.60		47220-C3	53.10				
.020 (.5 mm)	.005	.030 (1.5x)	1/8	1-1/2			993820	47.60		993820-C3	53.10				
.020 (.5 mm)	.005	.060 (3x)	1/8	1-1/2	44720	848320	26320	47.60	848320-C3	26320-C3	53.10		26320-C4	61.40	
.022	.005	.066 (3x)	1/8	1-1/2			26322	43.30		26322-C3	48.80				
.024 (.6 mm)	.005	.072 (3x)	1/8	1-1/2			26324	43.30		26324-C3	48.80				
.025	.003	.038 (1.5x)	1/8	1-1/2			987525	43.30		987525-C3	48.80				
.025	.003	.075 (3x)	1/8	1-1/2			47225	43.30		47225-C3	48.80				
.025	.005	.038 (1.5x)	1/8	1-1/2			993825	43.30		993825-C3	48.80				
.025	.005	.075 (3x)	1/8	1-1/2	44725		26325	43.30		26325-C3	48.80		26325-C4	57.10	
.025	.008	.038 (1.5x)	1/8	1-1/2			994525	43.30		994525-C3	48.80				
.025	.008	.075 (3x)	1/8	1-1/2			953025	43.30		953025-C3	48.80				
.028 (.7mm)	.005	.084 (3x)	1/8	1-1/2			26328	40.10		26328-C3	45.60				
.030	.003	.090 (3x)	1/8	1-1/2			47230	40.10		47230-C3	45.60				
.030	.005	.045 (1.5x)	1/8	1-1/2			993830	40.10		993830-C3	45.60				
.030	.005	.090 (3x)	1/8	1-1/2	44730		26330	40.10		26330-C3	45.60		26330-C4	53.90	
.030	.008	.090 (3x)	1/8	1-1/2			953030	40.10		953030-C3	45.60				
.030	.010	.045 (1.5x)	1/8	1-1/2			994530	40.10		994530-C3	45.60				
.030	.010	.090 (3x)	1/8	1-1/2	45230		27230	40.10		27230-C3	45.60		27230-C4	53.90	
.031 (1/32)	.003	.047 (1.5x)	1/8	1-1/2			987531	40.10		987531-C3	45.60				
.031 (1/32)	.003	.093 (3x)	1/8	1-1/2			47231	40.10		47231-C3	45.60		47231-C4	53.90	
.031 (1/32)	.005	.025 (0.8x)	1/8	1-1/2			720431	41.60		720431-C3	47.10				NEW
.031 (1/32)	.005	.047 (1.5x)	1/8	1-1/2			993831	40.10		993831-C3	45.60				
.031 (1/32)	.005	.093 (3x)	1/8	1-1/2	44731	848331	26331	40.10	848331-C3	26331-C3	45.60	44731-C4	26331-C4	53.90	
.031 (1/32)	.008	.047 (1.5x)	1/8	1-1/2			913731	40.10		913731-C3	45.60				
.031 (1/32)	.008	.093 (3x)	1/8	1-1/2			953031	40.10		953031-C3	45.60				
.031 (1/32)	.010	.025 (0.8x)	1/8	1-1/2			720331	41.60		720331-C3	47.10				NEW
.031 (1/32)	.010	.047 (1.5x)	1/8	1-1/2			994531	40.10		994531-C3	45.60				
.031 (1/32)	.010	.093 (3x)	1/8	1-1/2	45231	854131	27231	40.10	854131-C3	27231-C3	45.60		27231-C4	53.90	

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Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.034	.005	.102 (3x)	1/8	1-1/2			26334	33.70		26334-C3	39.20			
.035 (.9 mm)	.005	.053 (1.5x)	1/8	1-1/2			993835	33.70		993835-C3	39.20			
.035 (.9 mm)	.005	.105 (3x)	1/8	1-1/2	44735		26335	33.70		26335-C3	39.20		26335-C4	47.50
.035 (.9 mm)	.010	.053 (1.5x)	1/8	1-1/2			994535	33.70		994535-C3	39.20			
.035 (.9 mm)	.010	.105 (3x)	1/8	1-1/2	45235		27235	33.70		27235-C3	39.20		27235-C4	47.50
.037	.005	.111 (3x)	1/8	1-1/2			26337	33.70		26337-C3	39.20			
.039 (1 mm)	.003	.059 (1.5x)	1/8	1-1/2			987539	26.10		987539-C3	31.60			
.039 (1 mm)	.003	.117 (3x)	1/8	1-1/2			47239	26.10		47239-C3	31.60			
.039 (1 mm)	.005	.059 (1.5x)	1/8	1-1/2	804539		993839	26.10		993839-C3	31.60			
.039 (1 mm)	.005	.117 (3x)	1/8	1-1/2	44739		26339	26.10		26339-C3	31.60			
.039 (1 mm)	.008	.059 (1.5x)	1/8	1-1/2			913739	26.10		913739-C3	31.60			
.039 (1 mm)	.008	.117 (3x)	1/8	1-1/2			953039	26.10		953039-C3	31.60			
.039 (1 mm)	.010	.059 (1.5x)	1/8	1-1/2			994539	26.10		994539-C3	31.60			
.039 (1 mm)	.010	.117 (3x)	1/8	1-1/2			27239	26.10		27239-C3	31.60			
.040	.003	.120 (3x)	1/8	1-1/2			47240	25.70		47240-C3	31.20			
.040	.005	.060 (1.5x)	1/8	1-1/2	804540	865140	993840	25.70	865140-C3	993840-C3	31.20			
.040	.005	.120 (3x)	1/8	1-1/2	44740	848340	26340	25.70	848340-C3	26340-C3	31.20		26340-C4	39.50
.040	.008	.120 (3x)	1/8	1-1/2			953040	25.70		953040-C3	31.20			
.040	.010	.060 (1.5x)	1/8	1-1/2			994540	25.70		994540-C3	31.20			
.040	.010	.120 (3x)	1/8	1-1/2	45240		27240	25.70		27240-C3	31.20		27240-C4	39.50
.045	.005	.068 (1.5x)	1/8	1-1/2			993845	25.70		993845-C3	31.20			
.045	.005	.135 (3x)	1/8	1-1/2	44745		26345	25.70		26345-C3	31.20		26345-C4	39.50
.045	.010	.068 (1.5x)	1/8	1-1/2			994545	25.70		994545-C3	31.20			
.045	.010	.135 (3x)	1/8	1-1/2	45245		27245	25.70		27245-C3	31.20		27245-C4	39.50
.045	.015	.068 (1.5x)	1/8	1-1/2			997945	25.70		997945-C3	31.20			
.045	.015	.135 (3x)	1/8	1-1/2	45545		28145	25.70		28145-C3	31.20		28145-C4	39.50
.046	.005	.138 (3x)	1/8	1-1/2			26346	25.70		26346-C3	31.20			
.047 (3/64)	.003	.071 (1.5x)	1/8	1-1/2			987547	25.70		987547-C3	31.20			
.047 (3/64)	.003	.141 (3x)	1/8	1-1/2			47247	25.70		47247-C3	31.20			
.047 (3/64)	.005	.071 (1.5x)	1/8	1-1/2	804547	865147	993847	25.70	865147-C3	993847-C3	31.20			
.047 (3/64)	.005	.141 (3x)	1/8	1-1/2	44747	848347	26347	25.70	848347-C3	26347-C3	31.20		26347-C4	39.50
.047 (3/64)	.008	.071 (1.5x)	1/8	1-1/2			913747	25.70		913747-C3	31.20			
.047 (3/64)	.008	.141 (3x)	1/8	1-1/2			953047	25.70		953047-C3	31.20			
.047 (3/64)	.010	.071 (1.5x)	1/8	1-1/2			994547	25.70		994547-C3	31.20			
.047 (3/64)	.010	.141 (3x)	1/8	1-1/2	45247		27247	25.70		27247-C3	31.20		27247-C4	39.50
.047 (3/64)	.012	.141 (3x)	1/8	1-1/2			966947	25.70		966947-C3	31.20			
.047 (3/64)	.015	.071 (1.5x)	1/8	1-1/2	830147	860847	997947	25.70	860847-C3	997947-C3	31.20			
.047 (3/64)	.015	.141 (3x)	1/8	1-1/2	45547	867247	28147	25.70	867247-C3	28147-C3	31.20		28147-C4	39.50
.050	.003	.150 (3x)	1/8	1-1/2			47250	25.70		47250-C3	31.20			
.050	.005	.075 (1.5x)	1/8	1-1/2			993850	25.70		993850-C3	31.20			
.050	.005	.150 (3x)	1/8	1-1/2	44750	848350	26350	25.70	848350-C3	26350-C3	31.20		26350-C4	39.50
.050	.008	.075 (1.5x)	1/8	1-1/2			913750	26.20		913750-C3	31.70			
.050	.008	.150 (3x)	1/8	1-1/2			953050	25.70		953050-C3	31.20			
.050	.010	.075 (1.5x)	1/8	1-1/2			994550	25.70		994550-C3	31.20			
.050	.010	.150 (3x)	1/8	1-1/2	45250		27250	25.70		27250-C3	31.20		27250-C4	39.50
.050	.012	.150 (3x)	1/8	1-1/2			966950	26.20		966950-C3	31.70			
.050	.015	.075 (1.5x)	1/8	1-1/2			997950	25.70		997950-C3	31.20			
.050	.015	.150 (3x)	1/8	1-1/2	45550		28150	25.70		28150-C3	31.20		28150-C4	39.50

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND			
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.055 (1.4 mm)	.003	.165 (3x)	1/8	1-1/2			47255	25.70		47255-C3	31.20				
.055 (1.4 mm)	.005	.083 (1.5x)	1/8	1-1/2			993855	25.70		993855-C3	31.20				
.055 (1.4 mm)	.005	.165 (3x)	1/8	1-1/2	44755		26355	25.70		26355-C3	31.20		26355-C4	39.50	
.055 (1.4 mm)	.008	.165 (3x)	1/8	1-1/2			953055	25.70		953055-C3	31.20				
.055 (1.4 mm)	.010	.083 (1.5x)	1/8	1-1/2			994555	25.70		994555-C3	31.20				
.055 (1.4 mm)	.010	.165 (3x)	1/8	1-1/2	45255		27255	25.70		27255-C3	31.20		27255-C4	39.50	
.055 (1.4 mm)	.015	.083 (1.5x)	1/8	1-1/2			997955	25.70		997955-C3	31.20				
.055 (1.4 mm)	.015	.165 (3x)	1/8	1-1/2	45555		28155	25.70		28155-C3	31.20		28155-C4	39.50	
.059	.005	.177 (3x)	1/8	1-1/2			26359	25.70		26359-C3	31.20				
.060	.003	.180 (3x)	1/8	1-1/2			47260	25.70		47260-C3	31.20				
.060	.005	.090 (1.5x)	1/8	1-1/2			993860	25.70		993860-C3	31.20				
.060	.005	.180 (3x)	1/8	1-1/2	44760	848360	26360	25.70	848360-C3	26360-C3	31.20		26360-C4	39.50	
.060	.008	.180 (3x)	1/8	1-1/2			953060	25.70		953060-C3	31.20				
.060	.010	.090 (1.5x)	1/8	1-1/2			994560	25.70		994560-C3	31.20				
.060	.010	.180 (3x)	1/8	1-1/2	45260		27260	25.70		27260-C3	31.20		27260-C4	39.50	
.060	.015	.090 (1.5x)	1/8	1-1/2			997960	25.70		997960-C3	31.20				
.060	.015	.180 (3x)	1/8	1-1/2	45560		28160	25.70		28160-C3	31.20		28160-C4	39.50	
.060	.020	.090 (1.5x)	1/8	1-1/2			966460	25.70		966460-C3	31.20				
.060	.020	.180 (3x)	1/8	1-1/2			51660	25.70		51660-C3	31.20				
.062 (1/16)	.003	.093 (1.5x)	1/8	1-1/2			987562	25.70		987562-C3	31.20				
.062 (1/16)	.003	.186 (3x)	1/8	1-1/2	45462		47262	25.70		47262-C3	31.20				
.062 (1/16)	.005	.050 (0.8x)	1/8	1-1/2			720462	27.20		720462-C3	32.70				NEW
.062 (1/16)	.005	.093 (1.5x)	1/8	1-1/2	804562	865162	993862	25.70	865162-C3	993862-C3	31.20		993862-C4	39.50	
.062 (1/16)	.005	.186 (3x)	1/8	1-1/2	44762	848362	26362	25.70	848362-C3	26362-C3	31.20	44762-C4	26362-C4	39.50	
.062 (1/16)	.008	.093 (1.5x)	1/8	1-1/2			913762	25.70		913762-C3	31.20				
.062 (1/16)	.008	.186 (3x)	1/8	1-1/2	843962		953062	25.70		953062-C3	31.20				
.062 (1/16)	.010	.050 (0.8x)	1/8	1-1/2			720362	27.20		720362-C3	32.70				NEW
.062 (1/16)	.010	.093 (1.5x)	1/8	1-1/2	830362	864662	994562	25.70	864662-C3	994562-C3	31.20		994562-C4	39.50	
.062 (1/16)	.010	.186 (3x)	1/8	1-1/2	45262	854162	27262	25.70	854162-C3	27262-C3	31.20	45262-C4	27262-C4	39.50	
.062 (1/16)	.012	.093 (1.5x)	1/8	1-1/2			904862	25.70		904862-C3	31.20				
.062 (1/16)	.012	.186 (3x)	1/8	1-1/2			966962	25.70		966962-C3	31.20				
.062 (1/16)	.015	.093 (1.5x)	1/8	1-1/2	830162	860862	997962	25.70	860862-C3	997962-C3	31.20				
.062 (1/16)	.015	.186 (3x)	1/8	1-1/2	45562	867262	28162	25.70	867262-C3	28162-C3	31.20	45562-C4	28162-C4	39.50	NEW
.062 (1/16)	.020	.093 (1.5x)	1/8	1-1/2	810662	858762	966462	25.70	858762-C3	966462-C3	31.20				
.062 (1/16)	.020	.186 (3x)	1/8	1-1/2	51362	857762	51662	25.70	857762-C3	51662-C3	31.20	51362-C4	51662-C4	39.50	
.065	.005	.098 (1.5x)	1/8	1-1/2			993865	25.70		993865-C3	31.20				
.065	.005	.195 (3x)	1/8	1-1/2	44765		26365	25.70		26365-C3	31.20		26365-C4	39.50	
.065	.010	.098 (1.5x)	1/8	1-1/2			994565	25.70		994565-C3	31.20				
.065	.010	.195 (3x)	1/8	1-1/2	45265		27265	25.70		27265-C3	31.20		27265-C4	39.50	
.065	.015	.195 (3x)	1/8	1-1/2	45565		28165	25.70		28165-C3	31.20		28165-C4	39.50	
.065	.020	.195 (3x)	1/8	1-1/2			51665	26.20		51665-C3	31.70				
.070	.003	.210 (3x)	1/8	1-1/2			47270	25.70		47270-C3	31.20				
.070	.005	.105 (1.5x)	1/8	1-1/2			993870	25.70		993870-C3	31.20				
.070	.005	.210 (3x)	1/8	1-1/2	44770		26370	25.70		26370-C3	31.20		26370-C4	39.50	
.070	.008	.210 (3x)	1/8	1-1/2			953070	25.70		953070-C3	31.20				
.070	.010	.105 (1.5x)	1/8	1-1/2			994570	25.70		994570-C3	31.20				
.070	.010	.210 (3x)	1/8	1-1/2	45270		27270	25.70		27270-C3	31.20		27270-C4	39.50	
.070	.015	.210 (3x)	1/8	1-1/2	45570		28170	25.70		28170-C3	31.20		28170-C4	39.50	

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	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
	.070	.020	.105 (1.5x)	1/8	1-1/2			966470	26.20		966470-C3	31.70			
	.070	.020	.210 (3x)	1/8	1-1/2			51670	25.70		51670-C3	31.20			
	.075	.005	.113 (1.5x)	1/8	1-1/2			993875	25.70		993875-C3	31.20			
	.075	.005	.225 (3x)	1/8	1-1/2	44775		26375	25.70		26375-C3	31.20		26375-C4	39.50
	.075	.010	.113 (1.5x)	1/8	1-1/2			994575	25.70		994575-C3	31.20			
	.075	.010	.225 (3x)	1/8	1-1/2	45275		27275	25.70		27275-C3	31.20		27275-C4	39.50
	.075	.015	.225 (3x)	1/8	1-1/2	45575		28175	25.70		28175-C3	31.20		28175-C4	39.50
	.078 (5/64)	.003	.117 (1.5x)	1/8	1-1/2			987578	25.70		987578-C3	31.20			
	.078 (5/64)	.003	.234 (3x)	1/8	1-1/2			47278	25.70		47278-C3	31.20			
	.078 (5/64)	.005	.117 (1.5x)	1/8	1-1/2	804578		993878	25.70		993878-C3	31.20			
	.078 (5/64)	.005	.234 (3x)	1/8	1-1/2	44778	848378	26378	25.70	848378-C3	26378-C3	31.20		26378-C4	39.50
	.078 (5/64)	.008	.117 (1.5x)	1/8	1-1/2			913778	25.70		913778-C3	31.20			
	.078 (5/64)	.008	.234 (3x)	1/8	1-1/2			953078	25.70		953078-C3	31.20			
	.078 (5/64)	.010	.117 (1.5x)	1/8	1-1/2	830378	864678	994578	25.70	864678-C3	994578-C3	31.20		994578-C4	39.50
NEW	.078 (5/64)	.010	.234 (3x)	1/8	1-1/2	45278	854178	27278	25.70	854178-C3	27278-C3	31.20	45278-C4	27278-C4	39.50
	.078 (5/64)	.012	.234 (3x)	1/8	1-1/2			966978	25.70		966978-C3	31.20			
	.078 (5/64)	.015	.117 (1.5x)	1/8	1-1/2	830178	860878	997978	25.70	860878-C3	997978-C3	31.20			
	.078 (5/64)	.015	.234 (3x)	1/8	1-1/2	45578	867278	28178	25.70	867278-C3	28178-C3	31.20		28178-C4	39.50
	.078 (5/64)	.020	.117 (1.5x)	1/8	1-1/2	810678		966478	25.70		966478-C3	31.20			
NEW	.078 (5/64)	.020	.234 (3x)	1/8	1-1/2	51378	857778	51678	25.70	857778-C3	51678-C3	31.20	51378-C4	51678-C4	39.50
	.078 (5/64)	.025	.117 (1.5x)	1/8	1-1/2			964078	25.70		964078-C3	31.20			
	.078 (5/64)	.025	.234 (3x)	1/8	1-1/2		842678	957178	25.70	842678-C3	957178-C3	31.20			
	.080	.003	.240 (3x)	1/8	1-1/2			47280	25.70		47280-C3	31.20			
	.080	.005	.120 (1.5x)	1/8	1-1/2			993880	25.70		993880-C3	31.20			
	.080	.005	.240 (3x)	1/8	1-1/2	44780		26380	25.70		26380-C3	31.20		26380-C4	39.50
	.080	.008	.240 (3x)	1/8	1-1/2			953080	26.20		953080-C3	31.70			
	.080	.010	.120 (1.5x)	1/8	1-1/2			994580	25.70		994580-C3	31.20			
	.080	.010	.240 (3x)	1/8	1-1/2	45280		27280	25.70		27280-C3	31.20		27280-C4	39.50
	.080	.015	.240 (3x)	1/8	1-1/2	45580		28180	25.70		28180-C3	31.20		28180-C4	39.50
	.080	.020	.240 (3x)	1/8	1-1/2			51680	25.70		51680-C3	31.20			
	.085	.005	.128 (1.5x)	1/8	1-1/2			993885	25.70		993885-C3	31.20			
	.085	.005	.255 (3x)	1/8	1-1/2	44785		26385	25.70		26385-C3	31.20		26385-C4	39.50
	.085	.010	.128 (1.5x)	1/8	1-1/2			994585	25.70		994585-C3	31.20			
	.085	.010	.255 (3x)	1/8	1-1/2	45285		27285	25.70		27285-C3	31.20		27285-C4	39.50
	.085	.015	.128 (1.5x)	1/8	1-1/2			997985	25.70		997985-C3	31.20			
	.085	.015	.255 (3x)	1/8	1-1/2	45585		28185	25.70		28185-C3	31.20		28185-C4	39.50
	.085	.020	.255 (3x)	1/8	1-1/2			51685	25.70		51685-C3	31.20			
	.090	.003	.270 (3x)	1/8	1-1/2			47290	26.20		47290-C3	31.70			
	.090	.005	.135 (1.5x)	1/8	1-1/2			993890	25.70		993890-C3	31.20			
	.090	.005	.270 (3x)	1/8	1-1/2	44790		26390	25.70		26390-C3	31.20		26390-C4	39.50
	.090	.008	.135 (1.5x)	1/8	1-1/2			913790	25.70		913790-C3	31.20			
	.090	.008	.270 (3x)	1/8	1-1/2			953090	25.70		953090-C3	31.20			
	.090	.010	.135 (1.5x)	1/8	1-1/2			994590	25.70		994590-C3	31.20			
	.090	.010	.270 (3x)	1/8	1-1/2	45290		27290	25.70		27290-C3	31.20		27290-C4	39.50
	.090	.015	.135 (1.5x)	1/8	1-1/2			997990	25.70		997990-C3	31.20			
	.090	.015	.270 (3x)	1/8	1-1/2	45590		28190	25.70		28190-C3	31.20		28190-C4	39.50
	.090	.020	.135 (1.5x)	1/8	1-1/2			966490	25.70		966490-C3	31.20			
	.090	.020	.270 (3x)	1/8	1-1/2			51690	25.70		51690-C3	31.20			

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				ALTiN COATED			AMORPHOUS DIAMOND			
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.090	.030	.135 (1.5x)	1/8	1-1/2			958890	25.70		958890-C3	31.20				
.090	.030	.270 (3x)	1/8	1-1/2			28690	25.70		28690-C3	31.20				
.093 (3/32)	.003	.140 (1.5x)	1/8	1-1/2			987593	25.70		987593-C3	31.20				
.093 (3/32)	.003	.279 (3x)	1/8	1-1/2	45493		47293	25.70		47293-C3	31.20				
.093 (3/32)	.005	.074 (0.8x)	1/8	1-1/2			720493	27.20		720493-C3	32.70				NEW
.093 (3/32)	.005	.140 (1.5x)	1/8	1-1/2	804593	865193	993893	25.70	865193-C3	993893-C3	31.20				
.093 (3/32)	.005	.279 (3x)	1/8	1-1/2	44793	848393	26393	25.70	848393-C3	26393-C3	31.20		26393-C4	39.50	
.093 (3/32)	.008	.140 (1.5x)	1/8	1-1/2			913793	25.70		913793-C3	31.20				
.093 (3/32)	.008	.279 (3x)	1/8	1-1/2	843993		953093	25.70		953093-C3	31.20				
.093 (3/32)	.010	.074 (0.8x)	1/8	1-1/2			720393	27.20		720393-C3	32.70				NEW
.093 (3/32)	.010	.140 (1.5x)	1/8	1-1/2	830393	864693	994593	25.70	864693-C3	994593-C3	31.20		994593-C4	39.50	
.093 (3/32)	.010	.279 (3x)	1/8	1-1/2	45293	854193	27293	25.70	854193-C3	27293-C3	31.20	45293-C4	27293-C4	39.50	
.093 (3/32)	.012	.140 (1.5x)	1/8	1-1/2			904893	25.70		904893-C3	31.20				
.093 (3/32)	.012	.279 (3x)	1/8	1-1/2			966993	25.70		966993-C3	31.20				
.093 (3/32)	.015	.140 (1.5x)	1/8	1-1/2	830193	860893	997993	25.70	860893-C3	997993-C3	31.20		997993-C4	39.50	
.093 (3/32)	.015	.279 (3x)	1/8	1-1/2	45593	867293	28193	25.70	867293-C3	28193-C3	31.20	45593-C4	28193-C4	39.50	NEW
.093 (3/32)	.020	.140 (1.5x)	1/8	1-1/2	810693	858793	966493	25.70	858793-C3	966493-C3	31.20				
.093 (3/32)	.020	.279 (3x)	1/8	1-1/2	51393	857793	51693	25.70	857793-C3	51693-C3	31.20	51393-C4	51693-C4	39.50	
.093 (3/32)	.025	.140 (1.5x)	1/8	1-1/2			964093	25.70		964093-C3	31.20				
.093 (3/32)	.025	.279 (3x)	1/8	1-1/2			957193	25.70		957193-C3	31.20				
.093 (3/32)	.030	.140 (1.5x)	1/8	1-1/2	759093	758693	958893	25.70	758693-C3	958893-C3	31.20				
.093 (3/32)	.030	.279 (3x)	1/8	1-1/2	73993	853493	28693	25.70	853493-C3	28693-C3	31.20	73993-C4	28693-C4	39.50	
.095	.005	.143 (1.5x)	1/8	1-1/2			993895	25.70		993895-C3	31.20				
.095	.005	.285 (3x)	1/8	1-1/2	44795		26395	25.70		26395-C3	31.20		26395-C4	39.50	
.095	.010	.143 (1.5x)	1/8	1-1/2			994595	25.70		994595-C3	31.20				
.095	.010	.285 (3x)	1/8	1-1/2	45295		27295	25.70		27295-C3	31.20		27295-C4	39.50	
.095	.015	.285 (3x)	1/8	1-1/2	45595		28195	25.70		28195-C3	31.20		28195-C4	39.50	
.095	.020	.285 (3x)	1/8	1-1/2			51695	25.70		51695-C3	31.20				
.095	.030	.285 (3x)	1/8	1-1/2			28695	25.70		28695-C3	31.20				
.100	.003	.300 (3x)	1/8	1-1/2			47300	25.70		47300-C3	31.20				
.100	.005	.150 (1.5x)	1/8	1-1/2			993899	25.70		993899-C3	31.20				
.100	.005	.300 (3x)	1/8	1-1/2	44799		26399	25.70		26399-C3	31.20		26399-C4	39.50	
.100	.008	.300 (3x)	1/8	1-1/2			953099	25.70		953099-C3	31.20				
.100	.010	.150 (1.5x)	1/8	1-1/2			994599	25.70		994599-C3	31.20				
.100	.010	.300 (3x)	1/8	1-1/2	45299		27299	25.70		27299-C3	31.20		27299-C4	39.50	
.100	.015	.150 (1.5x)	1/8	1-1/2			997999	25.70		997999-C3	31.20				
.100	.015	.300 (3x)	1/8	1-1/2	45599		28199	25.70		28199-C3	31.20		28199-C4	39.50	
.100	.020	.150 (1.5x)	1/8	1-1/2			966499	25.70		966499-C3	31.20				
.100	.020	.300 (3x)	1/8	1-1/2			51699	25.70		51699-C3	31.20				
.100	.030	.150 (1.5x)	1/8	1-1/2			958899	25.70		958899-C3	31.20				
.100	.030	.300 (3x)	1/8	1-1/2			28699	25.70		28699-C3	31.20				
.109 (7/64)	.003	.327 (3x)	1/8	1-1/2			10802	25.70		10802-C3	31.20				
.109 (7/64)	.005	.164 (1.5x)	1/8	1-1/2			941402	25.70		941402-C3	31.20				
.109 (7/64)	.005	.327 (3x)	1/8	1-1/2	44802		72902	25.70		72902-C3	31.20				
.109 (7/64)	.008	.164 (1.5x)	1/8	1-1/2			913802	25.70		913802-C3	31.20				
.109 (7/64)	.008	.327 (3x)	1/8	1-1/2			75502	25.70		75502-C3	31.20				
.109 (7/64)	.010	.164 (1.5x)	1/8	1-1/2			936902	25.70		936902-C3	31.20				
.109 (7/64)	.010	.327 (3x)	1/8	1-1/2			75802	25.70		75802-C3	31.20				
.109 (7/64)	.015	.164 (1.5x)	1/8	1-1/2			935002	25.70		935002-C3	31.20				
.109 (7/64)	.015	.327 (3x)	1/8	1-1/2			74202	25.70		74202-C3	31.20				

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.109 (7/64)	.020	.164 (1.5x)	1/8	1-1/2			872002	25.70		872002-C3	31.20			
.109 (7/64)	.020	.327 (3x)	1/8	1-1/2			986302	25.70		986302-C3	31.20			
.109 (7/64)	.025	.327 (3x)	1/8	1-1/2			957109	25.70		957109-C3	31.20			
.109 (7/64)	.030	.164 (1.5x)	1/8	1-1/2			892402	25.70		892402-C3	31.20			
.109 (7/64)	.030	.327 (3x)	1/8	1-1/2			937602	25.70		937602-C3	31.20		937602-C4	39.50
.118 (3 mm)	.003	.354 (3x)	1/8	1-1/2			47305	26.10		47305-C3	31.60			
.118 (3 mm)	.005	.177 (1.5x)	1/8	1-1/2			941405	26.10		941405-C3	31.60			
.118 (3 mm)	.005	.354 (3x)	1/8	1-1/2			72905	26.10		72905-C3	31.60			
.118 (3 mm)	.008	.177 (1.5x)	1/8	1-1/2			913805	26.10		913805-C3	31.60			
.118 (3 mm)	.008	.354 (3x)	1/8	1-1/2			916705	26.10		916705-C3	31.60			
.118 (3 mm)	.010	.177 (1.5x)	1/8	1-1/2			936905	26.10		936905-C3	31.60			
.118 (3 mm)	.010	.354 (3x)	1/8	1-1/2			75805	26.10		75805-C3	31.60			
.118 (3 mm)	.015	.177 (1.5x)	1/8	1-1/2			935005	26.10		935005-C3	31.60			
.118 (3 mm)	.015	.354 (3x)	1/8	1-1/2	45605		74205	26.10		74205-C3	31.60			
.118 (3 mm)	.020	.177 (1.5x)	1/8	1-1/2			872005	26.10		872005-C3	31.60			
.118 (3 mm)	.020	.354 (3x)	1/8	1-1/2			986305	26.10		986305-C3	31.60			
.118 (3 mm)	.030	.177 (1.5x)	1/8	1-1/2			892405	26.10		892405-C3	31.60			
.118 (3 mm)	.030	.354 (3x)	1/8	1-1/2			937605	26.10		937605-C3	31.60		937605-C4	39.90
.118 (3 mm)	.040	.177 (1.5x)	1/8	1-1/2			734105	26.10		734105-C3	31.60			
.118 (3 mm)	.040	.354 (3x)	1/8	1-1/2			874005	26.10		874005-C3	31.60			

	D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
	.125 (1/8)	.003	.187 (1.5x)	1/8	1-1/2			980203	23.90		980203-C3	29.40			
	.125 (1/8)	.003	.500 (4x)	1/8	1-1/2	46403		32403	23.90		32403-C3	29.40			
NEW	.125 (1/8)	.005	.100 (0.8x)	1/8	1-1/2			720205	25.40		720205-C3	30.90			
	.125 (1/8)	.005	.187 (1.5x)	1/8	1-1/2	832905	833405	980205	25.70	833405-C3	980205-C3	31.20			
	.125 (1/8)	.005	.500 (4x)	1/8	1-1/2	46405	870905	32405	25.70	870905-C3	32405-C3	31.20		32405-C4	39.50
	.125 (1/8)	.008	.187 (1.5x)	1/8	1-1/2			980208	25.70		980208-C3	31.20		980208-C4	39.50
	.125 (1/8)	.008	.500 (4x)	1/8	1-1/2	46408		32408	25.70		32408-C3	31.20			
NEW	.125 (1/8)	.010	.100 (0.8x)	1/8	1-1/2			720210	27.20		720210-C3	32.70			
	.125 (1/8)	.010	.187 (1.5x)	1/8	1-1/2	832910	833410	980210	23.90	833410-C3	980210-C3	29.40		980210-C4	37.70
	.125 (1/8)	.010	.500 (4x)	1/8	1-1/2	46410	870910	32410	23.90	870910-C3	32410-C3	29.40	46410-C4	32410-C4	37.70
	.125 (1/8)	.012	.187 (1.5x)	1/8	1-1/2			980212	25.70		980212-C3	31.20			
	.125 (1/8)	.012	.500 (4x)	1/8	1-1/2			32412	25.70		32412-C3	31.20			
	.125 (1/8)	.015	.187 (1.5x)	1/8	1-1/2	832915	833415	980215	23.90	833415-C3	980215-C3	29.40		980215-C4	37.70
	.125 (1/8)	.015	.500 (4x)	1/8	1-1/2	46415	870915	32415	23.90	870915-C3	32415-C3	29.40		32415-C4	37.70
	.125 (1/8)	.020	.187 (1.5x)	1/8	1-1/2	832920	833420	980220	23.90	833420-C3	980220-C3	29.40		980220-C4	37.70
	.125 (1/8)	.020	.500 (4x)	1/8	1-1/2	46420	870920	32420	23.90	870920-C3	32420-C3	29.40	46420-C4	32420-C4	37.70
	.125 (1/8)	.025	.187 (1.5x)	1/8	1-1/2			980225	25.70		980225-C3	31.20			
	.125 (1/8)	.025	.500 (4x)	1/8	1-1/2	46425		32425	25.70		32425-C3	31.20		32425-C4	39.50
	.125 (1/8)	.030	.187 (1.5x)	1/8	1-1/2	832930	833430	980230	23.90	833430-C3	980230-C3	29.40		980230-C4	37.70
	.125 (1/8)	.030	.500 (4x)	1/8	1-1/2	46430	870930	32430	23.90	870930-C3	32430-C3	29.40	46430-C4	32430-C4	37.70
NEW	.125 (1/8)	.035	.500 (4x)	1/8	1-1/2			32435	25.70		32435-C3	31.20			
	.125 (1/8)	.040	.187 (1.5x)	1/8	1-1/2	832940	833440	980240	25.70	833440-C3	980240-C3	31.20			
	.125 (1/8)	.040	.500 (4x)	1/8	1-1/2	46440	870940	32440	25.70	870940-C3	32440-C3	31.20			
	.125 (1/8)	.045	.187 (1.5x)	1/8	1-1/2			980245	23.90		980245-C3	29.40			
	.125 (1/8)	.045	.500 (4x)	1/8	1-1/2			32445	23.90		32445-C3	29.40			

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
.140 (9/64)	.005	.220 (1.5x)	3/16	2			857105	31.20		857105-C3	37.10			
.140 (9/64)	.005	.425 (3x)	3/16	2			966705	31.20		966705-C3	37.10			
.140 (9/64)	.008	.425 (3x)	3/16	2			966708	31.20		966708-C3	37.00			
.140 (9/64)	.010	.220 (1.5x)	3/16	2			857110	29.00		857110-C3	34.90			
.140 (9/64)	.010	.425 (3x)	3/16	2	810910		966710	29.00		966710-C3	34.90			
.140 (9/64)	.012	.425 (3x)	3/16	2			966712	29.80		966712-C3	35.70			
.140 (9/64)	.015	.220 (1.5x)	3/16	2		833315	857115	29.00	833315-C3	857115-C3	34.90			
.140 (9/64)	.015	.425 (3x)	3/16	2	810915	832115	966715	29.00	832115-C3	966715-C3	34.90			
.140 (9/64)	.020	.220 (1.5x)	3/16	2			857120	29.00		857120-C3	34.90			
.140 (9/64)	.020	.425 (3x)	3/16	2			966720	29.00		966720-C3	34.90			
.140 (9/64)	.030	.220 (1.5x)	3/16	2			857130	29.00		857130-C3	34.90			
.140 (9/64)	.030	.425 (3x)	3/16	2			966730	29.00		966730-C3	34.90			
.140 (9/64)	.040	.220 (1.5x)	3/16	2			857140	31.20		857140-C3	37.10			
.140 (9/64)	.040	.425 (3x)	3/16	2			966740	31.20		966740-C3	37.10			
.140 (9/64)	.045	.220 (1.5x)	3/16	2			857145	29.00		857145-C3	34.90			
.140 (9/64)	.045	.425 (3x)	3/16	2			966745	29.00		966745-C3	34.90			
.156 (5/32)	.005	.235 (1.5x)	3/16	2			954805	28.50		954805-C3	34.50			
.156 (5/32)	.005	.562 (3x)	3/16	2			75205	28.50		75205-C3	34.50			
.156 (5/32)	.008	.562 (3x)	3/16	2			75208	28.50		75208-C3	34.50			
.156 (5/32)	.010	.235 (1.5x)	3/16	2			954810	26.50		954810-C3	32.40			
.156 (5/32)	.010	.562 (3x)	3/16	2	71910		75210	26.50		75210-C3	32.40			
.156 (5/32)	.015	.235 (1.5x)	3/16	2			954815	26.50		954815-C3	32.40			
.156 (5/32)	.015	.562 (3x)	3/16	2	71915		75215	26.50		75215-C3	32.40			
.156 (5/32)	.020	.235 (1.5x)	3/16	2			954820	26.50		954820-C3	32.40			
.156 (5/32)	.020	.562 (3x)	3/16	2	71920		75220	26.50		75220-C3	32.40		75220-C4	43.50
.156 (5/32)	.025	.562 (3x)	3/16	2			75225	26.50		75225-C3	32.40			
.156 (5/32)	.030	.235 (1.5x)	3/16	2	734030		954830	26.50		954830-C3	32.40			
.156 (5/32)	.030	.562 (3x)	3/16	2	71930	832030	75230	26.50	832030-C3	75230-C3	32.40		75230-C4	43.50
.156 (5/32)	.040	.235 (1.5x)	3/16	2			954840	28.50		954840-C3	34.50			
.156 (5/32)	.040	.562 (3x)	3/16	2			75240	28.50		75240-C3	34.50			
.156 (5/32)	.045	.235 (1.5x)	3/16	2			954845	26.50		954845-C3	32.40			
.156 (5/32)	.045	.562 (3x)	3/16	2			75245	26.50		75245-C3	32.40			
.172 (11/64)	.005	.515 (3x)	3/16	2			855305	28.50		855305-C3	34.50			
.172 (11/64)	.010	.260 (1.5x)	3/16	2			758710	28.50		758710-C3	34.50			
.172 (11/64)	.010	.515 (3x)	3/16	2			855310	26.50		855310-C3	32.40			
.172 (11/64)	.020	.515 (3x)	3/16	2			855320	28.50		855320-C3	34.50			
.172 (11/64)	.030	.260 (1.5x)	3/16	2			758730	28.50		758730-C3	34.30			
.172 (11/64)	.030	.515 (3x)	3/16	2			855330	26.50		855330-C3	32.40			
.187 (3/16)	.003	.625 (3x)	3/16	2			34803	28.50		34803-C3	34.50			
.187 (3/16)	.005	.285 (1.5x)	3/16	2			937905	28.50		937905-C3	34.50		937905-C4	45.20
.187 (3/16)	.005	.625 (3x)	3/16	2	46705		34805	28.50		34805-C3	34.50		34805-C4	45.20
.187 (3/16)	.008	.285 (1.5x)	3/16	2			937908	28.50		937908-C3	34.50			
.187 (3/16)	.008	.625 (3x)	3/16	2		831908	34808	28.50	831908-C3	34808-C3	34.50			
.187 (3/16)	.010	.285 (1.5x)	3/16	2		833210	937910	26.50	833210-C3	937910-C3	32.40		937910-C4	43.50
.187 (3/16)	.010	.625 (3x)	3/16	2	46710	831910	34810	26.50	831910-C3	34810-C3	32.40	46710-C4	34810-C4	43.50
.187 (3/16)	.012	.285 (1.5x)	3/16	2			937912	28.50		937912-C3	34.50			
.187 (3/16)	.012	.625 (3x)	3/16	2			34812	28.50		34812-C3	34.50			
.187 (3/16)	.015	.285 (1.5x)	3/16	2			937915	26.50		937915-C3	32.40			

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
	D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE
	.187 (3/16)	.015	.625 (3x)	3/16	2	46715		34815	26.50		34815-C3	32.40	46715-C4	34815-C4	43.50
	.187 (3/16)	.020	.285 (1.5x)	3/16	2	810520		937920	26.70		937920-C3	32.60			
	.187 (3/16)	.020	.625 (3x)	3/16	2	46720		34820	26.50		34820-C3	32.40			
	.187 (3/16)	.025	.285 (1.5x)	3/16	2			937925	28.50		937925-C3	34.50			
	.187 (3/16)	.025	.625 (3x)	3/16	2	46725		34825	28.50		34825-C3	34.50			
	.187 (3/16)	.030	.285 (1.5x)	3/16	2	810530		937930	26.70		937930-C3	32.60		937930-C4	43.70
NEW	.187 (3/16)	.030	.625 (3x)	3/16	2	46730	831930	34830	26.50	831930-C3	34830-C3	32.40	46730-C4	34830-C4	42.00
NEW	.187 (3/16)	.035	.625 (3x)	3/16	2			34835	28.50		34835-C3	34.30			
	.187 (3/16)	.040	.285 (1.5x)	3/16	2			937940	28.50		937940-C3	34.50			
	.187 (3/16)	.040	.625 (3x)	3/16	2	46740		34840	28.50		34840-C3	34.50		34840-C4	45.20
	.187 (3/16)	.045	.285 (1.5x)	3/16	2			937945	26.50		937945-C3	32.40			
	.187 (3/16)	.045	.625 (3x)	3/16	2	46745		34845	26.50		34845-C3	32.40		34845-C4	42.00
	.187 (3/16)	.050	.285 (1.5x)	3/16	2			937950	28.50		937950-C3	34.50			
	.187 (3/16)	.050	.625 (3x)	3/16	2			34850	28.50		34850-C3	34.50		34850-C4	44.00
	.187 (3/16)	.060	.285 (1.5x)	3/16	2	810560	833260	937960	26.50	833260-C3	937960-C3	32.40			
	.187 (3/16)	.060	.625 (3x)	3/16	2	46760	831960	34860	26.50	831960-C3	34860-C3	32.40		34860-C4	43.50
	.203 (13/64)	.010	.610 (3x)	1/4	2-1/2			865610	33.00		865610-C3	41.00			
	.203 (13/64)	.030	.610 (3x)	1/4	2-1/2			865630	33.00		865630-C3	41.00			
	.203 (13/64)	.040	.610 (3x)	1/4	2-1/2			865640	33.60		865640-C3	41.10			
	.218 (7/32)	.010	.660 (3x)	1/4	2-1/2			863910	32.70		863910-C3	40.70			
	.218 (7/32)	.020	.660 (3x)	1/4	2-1/2			863920	33.00		863920-C3	40.50			
	.218 (7/32)	.030	.660 (3x)	1/4	2-1/2			863930	32.70		863930-C3	40.70			
	.218 (7/32)	.040	.660 (3x)	1/4	2-1/2			863940	32.70		863940-C3	40.70			
	.234 (15/64)	.010	.355 (1.5x)	1/4	2-1/2			734210	33.00		734210-C3	40.50			
	.234 (15/64)	.010	.705 (3x)	1/4	2-1/2			863510	32.70		863510-C3	40.70			
	.234 (15/64)	.030	.705 (3x)	1/4	2-1/2			863530	32.70		863530-C3	40.70			
	.234 (15/64)	.040	.705 (3x)	1/4	2-1/2			863540	33.60		863540-C3	41.60			
	.250 (1/4)	.003	.750 (3x)	1/4	2-1/2			36203	35.10		36203-C3	43.10			
	.250 (1/4)	.005	.375 (1.5x)	1/4	2-1/2	810805	833005	941105	35.10	833005-C3	941105-C3	43.10			
	.250 (1/4)	.005	.750 (3x)	1/4	2-1/2	47405	831805	36205	35.10	831805-C3	36205-C3	43.10		36205-C4	56.90
	.250 (1/4)	.008	.375 (1.5x)	1/4	2-1/2			941108	35.10		941108-C3	43.10			
	.250 (1/4)	.008	.750 (3x)	1/4	2-1/2			36208	35.10		36208-C3	43.10			
	.250 (1/4)	.010	.375 (1.5x)	1/4	2-1/2	810810	833010	941110	32.70	833010-C3	941110-C3	40.70			
	.250 (1/4)	.010	.750 (3x)	1/4	2-1/2	47410	831810	36210	32.70	831810-C3	36210-C3	40.70	47410-C4	36210-C4	52.50
	.250 (1/4)	.012	.750 (3x)	1/4	2-1/2			36212	35.10		36212-C3	43.10			
	.250 (1/4)	.015	.375 (1.5x)	1/4	2-1/2		833015	941115	32.70	833015-C3	941115-C3	40.70			
	.250 (1/4)	.015	.750 (3x)	1/4	2-1/2	47415	831815	36215	32.70	831815-C3	36215-C3	40.70		36215-C4	54.20
	.250 (1/4)	.020	.375 (1.5x)	1/4	2-1/2			941120	32.70		941120-C3	40.70		941120-C4	54.20
	.250 (1/4)	.020	.750 (3x)	1/4	2-1/2	47420		36220	32.70		36220-C3	40.70		36220-C4	52.50
	.250 (1/4)	.025	.375 (1.5x)	1/4	2-1/2		833025	941125	35.10	833025-C3	941125-C3	43.10			
	.250 (1/4)	.025	.750 (3x)	1/4	2-1/2		831825	36225	35.10	831825-C3	36225-C3	42.60			
	.250 (1/4)	.030	.375 (1.5x)	1/4	2-1/2	810830		941130	32.70		941130-C3	40.70		941130-C4	54.20
	.250 (1/4)	.030	.750 (3x)	1/4	2-1/2	47430	831830	36230	32.70	831830-C3	36230-C3	40.70	47430-C4	36230-C4	54.20
NEW	.250 (1/4)	.035	.750 (3x)	1/4	2-1/2			36235	35.10		36235-C3	42.60			
	.250 (1/4)	.040	.375 (1.5x)	1/4	2-1/2	810840	833040	941140	35.10	833040-C3	941140-C3	43.10			
	.250 (1/4)	.040	.750 (3x)	1/4	2-1/2	47440	831840	36240	35.10	831840-C3	36240-C3	43.10			
	.250 (1/4)	.045	.375 (1.5x)	1/4	2-1/2			941145	32.70		941145-C3	40.70			

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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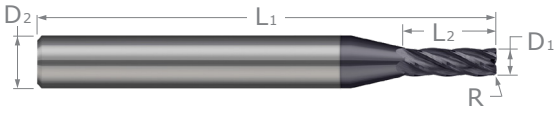
CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				ALTiN COATED			AMORPHOUS DIAMOND			
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	PRICE	3 FL	4 FL	PRICE	2 FL	4 FL	PRICE	
.250 (1/4)	.045	.750 (3x)	1/4	2-1/2	47445		36245	32.70		36245-C3	40.70		36245-C4	54.20	
.250 (1/4)	.050	.375 (1.5x)	1/4	2-1/2			941150	35.10		941150-C3	43.10				
.250 (1/4)	.050	.750 (3x)	1/4	2-1/2	47450		36250	35.10		36250-C3	43.10		36250-C4	56.90	
.250 (1/4)	.060	.375 (1.5x)	1/4	2-1/2			941160	32.70		941160-C3	40.70				
.250 (1/4)	.060	.750 (3x)	1/4	2-1/2	47460	831860	36260	32.70	831860-C3	36260-C3	40.70	47460-C4	36260-C4	54.20	
.250 (1/4)	.075	.375 (1.5x)	1/4	2-1/2			941175	35.10		941175-C3	43.10				
.250 (1/4)	.075	.750 (3x)	1/4	2-1/2	47475		36275	35.10		36275-C3	43.10				
.312 (5/16)	.005	1.000 (3x)	5/16	2-1/2			945105	39.30		945105-C3	48.70				
.312 (5/16)	.010	1.000 (3x)	5/16	2-1/2			945110	36.50		945110-C3	45.90				
.312 (5/16)	.030	1.000 (3x)	5/16	2-1/2			945130	36.50		945130-C3	45.90				
.312 (5/16)	.040	1.000 (3x)	5/16	2-1/2			945140	36.50		945140-C3	45.90				
.312 (5/16)	.060	1.000 (3x)	5/16	2-1/2			945160	36.50		945160-C3	45.90				
.375 (3/8)	.005	.570 (1.5x)	3/8	2-1/2			915205	53.40		915205-C3	64.00				
.375 (3/8)	.005	1.000 (3x)	3/8	2-1/2	804305		72805	53.40		72805-C3	64.00		72805-C4	81.60	
.375 (3/8)	.008	1.000 (3x)	3/8	2-1/2			72808	53.40		72808-C3	64.00				
.375 (3/8)	.010	.570 (1.5x)	3/8	2-1/2			915210	49.60		915210-C3	60.20				
.375 (3/8)	.010	1.000 (3x)	3/8	2-1/2			72810	49.60		72810-C3	60.20				
.375 (3/8)	.015	.570 (1.5x)	3/8	2-1/2			915215	50.10		915215-C3	60.70				
.375 (3/8)	.015	1.000 (3x)	3/8	2-1/2			72815	49.60		72815-C3	60.20				
.375 (3/8)	.020	.570 (1.5x)	3/8	2-1/2			915220	50.10		915220-C3	60.70				
.375 (3/8)	.020	1.000 (3x)	3/8	2-1/2	804320		72820	49.60		72820-C3	60.20		72820-C4	77.10	
.375 (3/8)	.025	.570 (1.5x)	3/8	2-1/2			915225	49.60		915225-C3	60.20				NEW
.375 (3/8)	.025	1.000 (3x)	3/8	2-1/2			72825	49.60		72825-C3	60.20				
.375 (3/8)	.030	.570 (1.5x)	3/8	2-1/2			915230	49.60		915230-C3	60.20		915230-C4	77.10	
.375 (3/8)	.030	1.000 (3x)	3/8	2-1/2			72830	49.60		72830-C3	60.20		72830-C4	77.10	
.375 (3/8)	.040	.570 (1.5x)	3/8	2-1/2			915240	53.40		915240-C3	64.00				
.375 (3/8)	.040	1.000 (3x)	3/8	2-1/2	804340	831740	72840	53.40	831740-C3	72840-C3	64.00		72840-C4	80.60	
.375 (3/8)	.045	.570 (1.5x)	3/8	2-1/2			915245	49.60		915245-C3	60.20				NEW
.375 (3/8)	.045	1.000 (3x)	3/8	2-1/2			72845	49.60		72845-C3	60.20				
.375 (3/8)	.050	.570 (1.5x)	3/8	2-1/2			915250	49.60		915250-C3	60.20				
.375 (3/8)	.050	1.000 (3x)	3/8	2-1/2			72850	49.60		72850-C3	60.20				
.375 (3/8)	.060	.570 (1.5x)	3/8	2-1/2			915260	50.10		915260-C3	60.70				
.375 (3/8)	.060	1.000 (3x)	3/8	2-1/2			72860	49.60		72860-C3	60.20				
.375 (3/8)	.075	.570 (1.5x)	3/8	2-1/2			915275	50.10		915275-C3	60.70				
.375 (3/8)	.075	1.000 (3x)	3/8	2-1/2			72875	49.60		72875-C3	60.20				
.375 (3/8)	.090	1.000 (3x)	3/8	2-1/2			72890	49.60		72890-C3	60.20				
.500 (1/2)	.010	1.000 (2x)	1/2	3			74510	76.80		74510-C3	92.60				
.500 (1/2)	.015	1.000 (2x)	1/2	3			74515	76.80		74515-C3	92.60				
.500 (1/2)	.020	1.000 (2x)	1/2	3			74520	76.80		74520-C3	92.60		74520-C4	115.20	
.500 (1/2)	.030	1.000 (2x)	1/2	3	733930		74530	76.80		74530-C3	92.60		74530-C4	110.30	
.500 (1/2)	.040	1.000 (2x)	1/2	3			74540	76.80		74540-C3	92.60				
.500 (1/2)	.045	1.000 (2x)	1/2	3			74545	77.50		74545-C3	93.30				
.500 (1/2)	.050	1.000 (2x)	1/2	3	733950		74550	76.80		74550-C3	92.60		74550-C4	115.20	
.500 (1/2)	.060	1.000 (2x)	1/2	3			74560	76.80		74560-C3	92.60		74560-C4	110.30	
.500 (1/2)	.090	1.000 (2x)	1/2	3			74590	76.80		74590-C3	92.60				

MINIATURE END MILLS

Corner Radius – Stub & Standard – 5 Flute



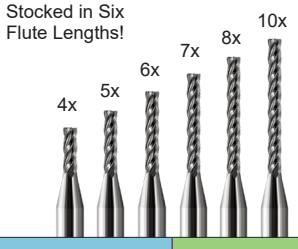
- Corner radius for improved strength
- Center cutting
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	5 FL	PRICE	5 FL	PRICE
NEW	.020 (.5 mm)	**.005**	.030 (1.5x)	1/8	1-1/2	720020	31.40	720020-C3	36.90
NEW	.020 (.5 mm)	**.005**	.060 (3x)	1/8	1-1/2	720120	33.00	720120-C3	38.50
NEW	.031 (1/32)	**.005**	.047 (1.5x)	1/8	1-1/2	720031	27.50	720031-C3	33.00
NEW	.031 (1/32)	**.005**	.093 (3x)	1/8	1-1/2	720131	29.70	720131-C3	35.20
NEW	.047 (3/64)	**.005**	.071 (1.5x)	1/8	1-1/2	720047	28.10	720047-C3	33.60
NEW	.047 (3/64)	**.005**	.141 (3x)	1/8	1-1/2	720147	29.50	720147-C3	35.00
NEW	.062 (1/16)	**.005**	.093 (1.5x)	1/8	1-1/2	720062	28.90	720062-C3	34.40
NEW	.062 (1/16)	**.005**	.186 (3x)	1/8	1-1/2	720162	30.20	720162-C3	35.70
NEW	.078 (5/64)	**.005**	.118 (1.5x)	1/8	1-1/2	720078	28.90	720078-C3	34.40
NEW	.078 (5/64)	**.005**	.234 (3x)	1/8	1-1/2	720178	30.20	720178-C3	35.70
NEW	.093 (3/32)	**.005**	.143 (1.5x)	1/8	1-1/2	720093	28.90	720093-C3	34.40
NEW	.093 (3/32)	**.005**	.285 (3x)	1/8	1-1/2	720193	30.20	720193-C3	35.70
	D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	5 FL	PRICE	5 FL	PRICE
NEW	.125 (1/8)	**.010**	.187 (1.5x)	1/8	1-1/2	719610	26.60	719610-C3	32.10
NEW	.125 (1/8)	**.010**	.375 (3x)	1/8	1-1/2	719910	27.80	719910-C3	33.30
NEW	.187 (3/16)	**.010**	.285 (1.5x)	3/16	2	719510	30.20	719510-C3	36.00
NEW	.187 (3/16)	**.010**	.570 (3x)	3/16	2	719810	31.60	719810-C3	37.40
NEW	.250 (1/4)	**.010**	.375 (1.5x)	1/4	2-1/2	719410	35.50	719410-C3	43.00
NEW	.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	719710	37.10	719710-C3	44.60

NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Flute



- **Long flute and long shank design for deep cavities**
- Mills deep pockets • 4 flutes
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
.015 (1/64)	.003	.078 (5x)	4	1/8	2-1/2	981415	76.80	981415-C3	82.30		
.015 (1/64)	.003	.125 (8x)	4	1/8	2-1/2	933615	88.00	933615-C3	93.50		
.020 (.5 mm)	.003	.100 (5x)	4	1/8	2-1/2	981420	67.50	981420-C3	73.00		
.020 (.5 mm)	.003	.160 (8x)	4	1/8	2-1/2	933620	78.40	933620-C3	83.90		
.020 (.5 mm)	.005	.100 (5x)	4	1/8	2-1/2	959620	67.50	959620-C3	73.00		
.020 (.5 mm)	.005	.160 (8x)	4	1/8	2-1/2	949820	78.40	949820-C3	83.90		
.025	.005	.125 (5x)	4	1/8	2-1/2	959625	64.20	959625-C3	69.70		
.025	.005	.203 (8x)	4	1/8	2-1/2	949825	75.20	949825-C3	80.70		
.031 (1/32)	.005	.125 (4x)	4	1/8	2-1/2	787531	61.00	787531-C3	66.50		
.031 (1/32)	.005	.156 (5x)	4	1/8	2-1/2	959631	62.30	959631-C3	67.80		
.031 (1/32)	.005	.187 (6x)	4	1/8	2-1/2	801131	65.80	801131-C3	71.30		
.031 (1/32)	.005	.218 (7x)	4	1/8	2-1/2	800931	68.30	800931-C3	73.80		
.031 (1/32)	.005	.250 (8x)	4	1/8	2-1/2	949831	73.10	949831-C3	78.60		
.031 (1/32)	.008	.156 (5x)	4	1/8	2-1/2	884231	62.50	884231-C3	68.00		
.031 (1/32)	.008	.250 (8x)	4	1/8	2-1/2	887431	73.10	887431-C3	78.60		
.031 (1/32)	.010	.156 (5x)	4	1/8	2-1/2	964331	62.30	964331-C3	67.80		
.031 (1/32)	.010	.187 (6x)	4	1/8	2-1/2	739831	65.80	739831-C3	71.30		
.031 (1/32)	.010	.250 (8x)	4	1/8	2-1/2	938031	73.10	938031-C3	78.60		
.039 (1 mm)	.005	.203 (5x)	4	1/8	2-1/2	959639	59.20	959639-C3	64.70		
.039 (1 mm)	.005	.325 (8x)	4	1/8	2-1/2	949839	66.10	949839-C3	71.60		
.039 (1 mm)	.010	.203 (5x)	4	1/8	2-1/2	964339	59.20	964339-C3	64.70		
.039 (1 mm)	.010	.325 (8x)	4	1/8	2-1/2	938039	66.10	938039-C3	71.60		
.040	.005	.203 (5x)	4	1/8	2-1/2	959640	59.20	959640-C3	64.70		
.040	.005	.325 (8x)	4	1/8	2-1/2	949840	66.10	949840-C3	71.60		
.040	.010	.203 (5x)	4	1/8	2-1/2	964340	59.20	964340-C3	64.70		
.040	.010	.325 (8x)	4	1/8	2-1/2	938040	66.10	938040-C3	71.60		
.047 (3/64)	.005	.250 (5x)	4	1/8	2-1/2	959647	32.50	959647-C3	38.00		
.047 (3/64)	.005	.375 (8x)	4	1/8	2-1/2	949847	37.00	949847-C3	42.50		
.047 (3/64)	.010	.187 (4x)	4	1/8	2-1/2	787347	31.30	787347-C3	36.80		
.047 (3/64)	.010	.250 (5x)	4	1/8	2-1/2	964347	32.50	964347-C3	38.00		
.047 (3/64)	.010	.375 (8x)	4	1/8	2-1/2	938047	37.00	938047-C3	42.50		
.047 (3/64)	.015	.250 (5x)	4	1/8	2-1/2	885047	32.50	885047-C3	38.00		
.047 (3/64)	.015	.375 (8x)	4	1/8	2-1/2	888247	37.00	888247-C3	42.50		
.050	.005	.250 (5x)	4	1/8	2-1/2	959650	32.50	959650-C3	38.00		
.050	.005	.400 (8x)	4	1/8	2-1/2	949850	37.70	949850-C3	43.20		
.060	.005	.312 (5x)	4	1/8	2-1/2	959660	32.50	959660-C3	38.00		
.060	.005	.500 (8x)	4	1/8	2-1/2	949860	37.70	949860-C3	43.20		

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MINIATURE END MILLS

Corner Radius – Long Flute (cont.)

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	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
	.062 (1/16)	.005	.250 (4x)	4	1/8	2-1/2	787562	31.30	787562-C3	36.80		
	.062 (1/16)	.005	.312 (5x)	4	1/8	2-1/2	959662	32.50	959662-C3	38.00		
	.062 (1/16)	.005	.375 (6x)	4	1/8	2-1/2	801162	34.60	801162-C3	40.10		
	.062 (1/16)	.005	.437 (7x)	4	1/8	2-1/2	800962	35.00	800962-C3	40.50		
	.062 (1/16)	.005	.500 (8x)	4	1/8	2-1/2	949862	37.00	949862-C3	42.50		
	.062 (1/16)	.005	.625 (10x)	4	1/8	2-1/2	870562	43.10	870562-C3	48.60		
	.062 (1/16)	.008	.312 (5x)	4	1/8	2-1/2	884262	32.90	884262-C3	38.40		
	.062 (1/16)	.008	.500 (8x)	4	1/8	2-1/2	887462	37.70	887462-C3	43.20		
	.062 (1/16)	.010	.250 (4x)	4	1/8	2-1/2	787362	31.30	787362-C3	36.80		
	.062 (1/16)	.010	.312 (5x)	4	1/8	2-1/2	964362	32.50	964362-C3	38.00	964362-C4	46.40
	.062 (1/16)	.010	.375 (6x)	4	1/8	2-1/2	739862	34.60	739862-C3	40.10		
	.062 (1/16)	.010	.500 (8x)	4	1/8	2-1/2	938062	37.00	938062-C3	42.50	938062-C4	51.60
	.062 (1/16)	.010	.625 (10x)	4	1/8	2-1/2	849262	43.10	849262-C3	48.60		
	.062 (1/16)	.015	.312 (5x)	4	1/8	2-1/2	885062	32.50	885062-C3	38.00		
	.062 (1/16)	.015	.500 (8x)	4	1/8	2-1/2	888262	37.00	888262-C3	42.50		
	.062 (1/16)	.020	.312 (5x)	4	1/8	2-1/2	885862	32.50	885862-C3	38.00	885862-C4	46.40
	.062 (1/16)	.020	.375 (6x)	4	1/8	2-1/2	733762	34.60	733762-C3	40.10		
	.062 (1/16)	.020	.500 (8x)	4	1/8	2-1/2	889062	37.00	889062-C3	42.50		
	.062 (1/16)	.020	.625 (10x)	4	1/8	2-1/2	762662	43.10	762662-C3	48.60		
	.078 (5/64)	.005	.406 (5x)	4	1/8	2-1/2	959678	32.50	959678-C3	38.00		
	.078 (5/64)	.005	.625 (8x)	4	1/8	2-1/2	949878	37.00	949878-C3	42.50		
	.078 (5/64)	.010	.312 (4x)	4	1/8	2-1/2	787378	31.30	787378-C3	36.80		
	.078 (5/64)	.010	.406 (5x)	4	1/8	2-1/2	964378	32.50	964378-C3	38.00	964378-C4	46.40
	.078 (5/64)	.010	.625 (8x)	4	1/8	2-1/2	938078	37.00	938078-C3	42.50		
	.078 (5/64)	.015	.406 (5x)	4	1/8	2-1/2	885078	32.50	885078-C3	38.00		
	.078 (5/64)	.015	.625 (8x)	4	1/8	2-1/2	888278	37.00	888278-C3	42.50		
	.078 (5/64)	.020	.406 (5x)	4	1/8	2-1/2	885878	32.50	885878-C3	38.00		
	.078 (5/64)	.020	.625 (8x)	4	1/8	2-1/2	889078	37.00	889078-C3	42.50		
NEW	.078 (5/64)	.025	.406 (5x)	4	1/8	2-1/2	719378	32.50	719378-C3	38.00		
	.093 (3/32)	.005	.375 (4x)	4	1/8	2-1/2	787593	31.30	787593-C3	36.80		
	.093 (3/32)	.005	.500 (5x)	4	1/8	2-1/2	959693	32.50	959693-C3	38.00		
	.093 (3/32)	.005	.585 (6x)	4	1/8	2-1/2	801193	34.60	801193-C3	40.10		
	.093 (3/32)	.005	.670 (7x)	4	1/8	2-1/2	800993	35.00	800993-C3	40.50		
	.093 (3/32)	.005	.750 (8x)	4	1/8	2-1/2	949893	37.00	949893-C3	42.50		
	.093 (3/32)	.005	.950 (10x)	4	1/8	2-1/2	870593	43.90	870593-C3	49.40		
	.093 (3/32)	.008	.500 (5x)	4	1/8	2-1/2	884293	32.90	884293-C3	38.40		
	.093 (3/32)	.008	.750 (8x)	4	1/8	2-1/2	887493	37.70	887493-C3	43.20		
	.093 (3/32)	.010	.375 (4x)	4	1/8	2-1/2	787393	31.30	787393-C3	36.80		
	.093 (3/32)	.010	.500 (5x)	4	1/8	2-1/2	964393	32.50	964393-C3	38.00	964393-C4	47.10
	.093 (3/32)	.010	.750 (8x)	4	1/8	2-1/2	938093	37.00	938093-C3	42.50		
	.093 (3/32)	.010	.950 (10x)	4	1/8	2-1/2	849293	43.10	849293-C3	48.60		
	.093 (3/32)	.015	.500 (5x)	4	1/8	2-1/2	885093	32.50	885093-C3	38.00		
	.093 (3/32)	.015	.750 (8x)	4	1/8	2-1/2	888293	37.00	888293-C3	42.50		
	.093 (3/32)	.020	.500 (5x)	4	1/8	2-1/2	885893	32.50	885893-C3	38.00		
	.093 (3/32)	.020	.750 (8x)	4	1/8	2-1/2	889093	37.00	889093-C3	42.50		

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Flute (cont.)

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″		D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE	
.093 (3/32)	.020	.950 (10x)	4	1/8	2-1/2	762693	43.90	762693-C3	49.40			
.093 (3/32)	.025	.500 (5x)	4	1/8	2-1/2	719393	32.50	719393-C3	38.00			NEW
.093 (3/32)	.030	.375 (4x)	4	1/8	2-1/2	719293	31.30	719293-C3	36.80			NEW
.093 (3/32)	.030	.500 (5x)	4	1/8	2-1/2	886693	32.50	886693-C3	38.00			
.093 (3/32)	.030	.750 (8x)	4	1/8	2-1/2	889893	37.00	889893-C3	42.50			
.100	.005	.500 (5x)	4	1/8	2-1/2	959700	32.50	959700-C3	38.00			
.100	.010	.500 (5x)	4	1/8	2-1/2	964400	32.50	964400-C3	38.00			
.100	.010	.800 (8x)	4	1/8	2-1/2	938100	37.00	938100-C3	42.50			
.109 (7/64)	.005	.570 (5x)	4	1/8	2-1/2	912502	32.50	912502-C3	38.00			
.118 (3 mm)	.005	.625 (5x)	4	1/8	2-1/2	912505	32.50	912505-C3	38.00			
.118 (3 mm)	.005	.950 (8x)	4	1/8	2-1/2	905305	37.00	905305-C3	42.50			
.118 (3 mm)	.010	.625 (5x)	4	1/8	2-1/2	912605	32.50	912605-C3	38.00			
.118 (3 mm)	.010	.950 (8x)	4	1/8	2-1/2	905405	37.00	905405-C3	42.50			
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″		D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE	
.125 (1/8)	.005	.625 (5x)	4	1/8	2-1/2	950905	30.80	950905-C3	36.30			
.125 (1/8)	.005	1.000 (8x)	4	1/8	2-1/2	981905	33.70	981905-C3	39.20			
.125 (1/8)	.010	.625 (5x)	4	1/8	2-1/2	950910	30.80	950910-C3	36.30	950910-C4	45.10	
.125 (1/8)	.010	.750 (6x)	4	1/8	2-1/2	733810	32.20	733810-C3	37.70			
.125 (1/8)	.010	1.000 (8x)	4	1/8	2-1/2	981910	33.70	981910-C3	39.20			
.125 (1/8)	.010	1.250 (10x)	4	1/8	3	762210	39.50	762210-C3	45.00			
.125 (1/8)	.015	.625 (5x)	4	1/8	2-1/2	950915	30.80	950915-C3	36.30			
.125 (1/8)	.015	1.000 (8x)	4	1/8	2-1/2	981915	33.70	981915-C3	39.20			
.125 (1/8)	.020	.625 (5x)	4	1/8	2-1/2	950920	30.80	950920-C3	36.30			
.125 (1/8)	.020	1.000 (8x)	4	1/8	2-1/2	981920	33.70	981920-C3	39.20			
.125 (1/8)	.020	1.250 (10x)	4	1/8	3	762220	39.50	762220-C3	45.00			
.125 (1/8)	.025	.625 (5x)	4	1/8	2-1/2	950925	30.80	950925-C3	36.30			NEW
.125 (1/8)	.030	.625 (5x)	4	1/8	2-1/2	950930	30.80	950930-C3	36.30	950930-C4	45.40	
.125 (1/8)	.030	1.000 (8x)	4	1/8	2-1/2	981930	33.70	981930-C3	39.20			
.125 (1/8)	.030	1.250 (10x)	4	1/8	3	762230	39.50	762230-C3	45.00			
.125 (1/8)	.040	.625 (5x)	4	1/8	2-1/2	950940	30.80	950940-C3	36.30			
.125 (1/8)	.040	1.000 (8x)	4	1/8	2-1/2	981940	33.70	981940-C3	39.20			
.140 (9/64)	.010	.750 (5x)	4	3/16	3	793610	38.00	793610-C3	44.00			
.140 (9/64)	.015	.750 (5x)	4	3/16	3	793615	38.80	793615-C3	44.70			
.140 (9/64)	.030	.750 (5x)	4	3/16	3	793630	38.80	793630-C3	45.00			
.156 (5/32)	.010	.750 (5x)	4	3/16	3	830910	38.00	830910-C3	44.00			
.156 (5/32)	.010	1.250 (8x)	4	3/16	3	739710	39.10	739710-C3	45.00			
.156 (5/32)	.030	.750 (5x)	4	3/16	3	830930	38.00	830930-C3	44.00			
.156 (5/32)	.030	1.250 (8x)	4	3/16	3	738330	39.10	738330-C3	45.30			
.187 (3/16)	.005	1.000 (5x)	4	3/16	3	932405	36.20	932405-C3	42.20			
.187 (3/16)	.010	1.000 (5x)	4	3/16	3	932410	36.20	932410-C3	42.20			
.187 (3/16)	.010	1.500 (8x)	4	3/16	3	830810	37.20	830810-C3	43.10			
.187 (3/16)	.020	1.000 (5x)	4	3/16	3	932420	36.20	932420-C3	42.20			
.187 (3/16)	.020	1.500 (8x)	4	3/16	3	830820	37.20	830820-C3	43.10			
.187 (3/16)	.025	1.000 (5x)	4	3/16	3	932425	36.20	932425-C3	42.40			NEW
.187 (3/16)	.030	1.000 (5x)	4	3/16	3	932430	36.20	932430-C3	42.20	932430-C4	55.40	
.187 (3/16)	.030	1.500 (8x)	4	3/16	3	830830	37.20	830830-C3	43.10			
.187 (3/16)	.040	1.000 (5x)	4	3/16	3	932450	36.20	932450-C3	42.20			

continued on next page

MINIATURE END MILLS

Corner Radius – Long Flute (cont.)

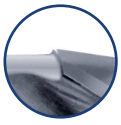
continued from previous page

	CUTTER DIAMETER D_1 +.0005″ −.0005″	CORNER RADIUS R +.001″ −.001″	LENGTH OF CUT L_2 +.010″ −.000″	FLUTES	SHANK DIA. D_2	OAL L_1	UNCOATED 4 FL	UNCOATED PRICE	AlTiN COATED 4 FL	AlTiN COATED PRICE	AMORPHOUS DIAMOND 4 FL	AMORPHOUS DIAMOND PRICE
	.250 (1/4)	.005	1.250 (5x)	4	1/4	4	917105	40.50	917105-C3	48.50		
	.250 (1/4)	.010	1.250 (5x)	4	1/4	4	917110	40.50	917110-C3	49.90		
	.250 (1/4)	.020	1.250 (5x)	4	1/4	4	917120	40.50	917120-C3	49.90		
	.250 (1/4)	.020	2.000 (8x)	4	1/4	4	763020	41.90	763020-C3	51.40		
NEW	.250 (1/4)	.025	1.250 (5x)	4	1/4	4	917125	40.50	917125-C3	48.50		
	.250 (1/4)	.030	1.250 (5x)	4	1/4	4	917130	40.50	917130-C3	49.90	917130-C4	62.20
	.250 (1/4)	.030	2.000 (8x)	4	1/4	4	763030	41.90	763030-C3	51.40		
	.250 (1/4)	.040	1.250 (5x)	4	1/4	4	917140	40.50	917140-C3	49.90		
	.375 (3/8)	.005	2.000 (5x)	4	3/8	4	800805	54.90	800805-C3	69.50		
	.375 (3/8)	.010	2.000 (5x)	4	3/8	4	800810	54.90	800810-C3	69.50		
	.375 (3/8)	.030	2.000 (5x)	4	3/8	4	800830	54.90	800830-C3	66.20		
	.375 (3/8)	.040	2.000 (5x)	4	3/8	4	800840	54.90	800840-C3	69.50		

NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Standard Flute



Reduced Neck Diameter to Avoid Heeling

- Corner radius for improved strength
- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE	
.020	.005	.060	.100 (5x)	1/8	1-1/2		864120	50.30	864120-C3	55.80	
.020	.005	.060	.160 (8x)	1/8	1-1/2		865720	52.30	865720-C3	57.80	
.031 (1/32)	.005	.093	.156 (5x)	1/8	1-1/2	864131	875231	49.00	875231-C3	54.50	
.031 (1/32)	.005	.093	.250 (8x)	1/8	1-1/2	865731	876831	50.00	876831-C3	55.50	
.031 (1/32)	.010	.093	.156 (5x)	1/8	1-1/2	864931	876031	49.00	876031-C3	54.50	
.031 (1/32)	.010	.093	.250 (8x)	1/8	1-1/2	866531	877631	50.00	877631-C3	55.50	
.039 (1 mm)	.005	.117	.203 (5x)	1/8	1-1/2		875239	50.00	875239-C3	55.50	
.039 (1 mm)	.005	.117	.325 (8x)	1/8	1-1/2		865739	50.00	865739-C3	55.50	
.039 (1 mm)	.010	.117	.325 (8x)	1/8	1-1/2		876039	50.00	876039-C3	55.50	
.040	.005	.120	.203 (5x)	1/8	1-1/2		875240	50.00	875240-C3	55.50	
.040	.005	.120	.325 (8x)	1/8	1-1/2		865740	50.00	865740-C3	55.50	
.047 (3/64)	.005	.141	.250 (5x)	1/8	1-1/2	864147	875247	47.50	875247-C3	53.00	
.047 (3/64)	.005	.141	.375 (8x)	1/8	1-1/2	865747	876847	48.50	876847-C3	54.00	
.047 (3/64)	.010	.141	.250 (5x)	1/8	1-1/2	864947	876047	47.50	876047-C3	53.00	
.047 (3/64)	.010	.141	.375 (8x)	1/8	1-1/2	866547	877647	48.50	877647-C3	54.00	
.062 (1/16)	.005	.186	.312 (5x)	1/8	1-1/2	864162	875262	47.50	875262-C3	53.00	
.062 (1/16)	.005	.186	.500 (8x)	1/8	1-1/2	865762	876862	48.50	876862-C3	54.00	
.062 (1/16)	.010	.186	.312 (5x)	1/8	1-1/2	864962	876062	47.50	876062-C3	53.00	
.062 (1/16)	.010	.186	.375 (6x)	1/8	1-1/2		730662	47.50	730662-C3	53.00	NEW
.062 (1/16)	.010	.186	.500 (8x)	1/8	1-1/2	866562	877662	48.50	877662-C3	54.00	
.062 (1/16)	.010	.186	.625 (10x)	1/8	2		730462	49.00	730462-C3	54.50	
.062 (1/16)	.020	.186	.312 (5x)	1/8	1-1/2		764362	47.50	764362-C3	53.00	
.062 (1/16)	.020	.186	.500 (8x)	1/8	1-1/2		759362	48.50	759362-C3	54.00	
.078 (5/64)	.005	.234	.406 (5x)	1/8	1-1/2	864178	875278	47.50	875278-C3	53.00	
.078 (5/64)	.005	.234	.625 (8x)	1/8	2	865778	876878	49.00	876878-C3	54.50	
.078 (5/64)	.010	.234	.406 (5x)	1/8	1-1/2	864978	876078	47.50	876078-C3	53.00	
.078 (5/64)	.010	.234	.625 (8x)	1/8	2	866578	877678	49.00	877678-C3	54.50	
.078 (5/64)	.020	.234	.406 (5x)	1/8	1-1/2		764378	49.00	764378-C3	54.50	
.078 (5/64)	.020	.234	.625 (8x)	1/8	2		759378	49.00	759378-C3	54.50	
.093 (3/32)	.005	.279	.500 (5x)	1/8	1-1/2	864193	875293	48.50	875293-C3	54.00	
.093 (3/32)	.005	.279	.750 (8x)	1/8	2	865793	876893	49.00	876893-C3	54.50	
.093 (3/32)	.010	.279	.500 (5x)	1/8	1-1/2	864993	876093	48.50	876093-C3	54.00	
.093 (3/32)	.010	.279	.585 (6x)	1/8	1-1/2		730693	48.50	730693-C3	54.00	NEW
.093 (3/32)	.010	.279	.750 (8x)	1/8	2	866593	877693	49.00	877693-C3	54.50	
.093 (3/32)	.010	.279	.950 (10x)	1/8	2		730493	49.00	730493-C3	54.50	
.093 (3/32)	.020	.279	.500 (5x)	1/8	1-1/2		764393	48.50	764393-C3	54.00	
.093 (3/32)	.020	.279	.750 (8x)	1/8	2		759393	49.00	759393-C3	54.50	
.093 (3/32)	.030	.279	.500 (5x)	1/8	1-1/2		762793	48.50	762793-C3	54.00	
.093 (3/32)	.030	.279	.750 (8x)	1/8	2		762093	49.00	762093-C3	54.50	

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MINIATURE END MILLS

Corner Radius – Long Reach, Standard Flute (cont.)

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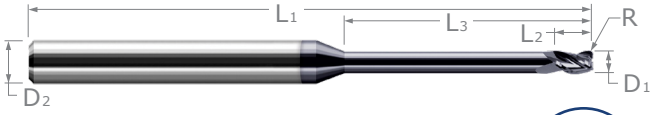
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	4 FL	PRICE	4 FL	PRICE
.118 (3 mm)	.010	.354	.950 (8x)	1/8	2		866605	49.60	866605-C3	55.10
.125 (1/8)	.005	.375	.625 (5x)	1/8	1-1/2	864208	875308	48.50	875308-C3	54.00
.125 (1/8)	.005	.375	1.000 (8x)	1/8	2	865808	876908	48.50	876908-C3	54.00
.125 (1/8)	.010	.375	.625 (5x)	1/8	1-1/2	865008	876108	48.50	876108-C3	54.00
.125 (1/8)	.010	.375	.750 (6x)	1/8	2		730708	48.50	730708-C3	54.00
.125 (1/8)	.010	.375	1.000 (8x)	1/8	2	866608	877708	48.50	877708-C3	54.00
.125 (1/8)	.010	.375	1.250 (10x)	1/8	2-1/2		730508	49.40	730508-C3	54.90
.125 (1/8)	.020	.375	.625 (5x)	1/8	1-1/2		764408	49.40	764408-C3	54.90
.125 (1/8)	.020	.375	1.000 (8x)	1/8	2-1/2		759408	49.40	759408-C3	54.90
.125 (1/8)	.030	.375	.625 (5x)	1/8	1-1/2		762808	48.50	762808-C3	54.00
.125 (1/8)	.030	.375	1.000 (8x)	1/8	2-1/2		762108	48.50	762108-C3	54.00
.140 (9/64)	.010	.422	.750 (5x)	3/16	2		876109	56.60	876109-C3	62.40
.140 (9/64)	.010	.422	1.125 (8x)	3/16	2-1/2		877709	57.30	877709-C3	63.50
.156 (5/32)	.010	.469	.750 (5x)	3/16	2		876110	56.60	876110-C3	62.40
.156 (5/32)	.010	.469	1.250 (8x)	3/16	2-1/2		877710	57.30	877710-C3	63.50
.187 (3/16)	.010	.563	1.000 (5x)	3/16	2		876112	56.60	876112-C3	62.60
.187 (3/16)	.010	.563	1.500 (8x)	3/16	2-1/2		877712	56.60	877712-C3	62.60
.187 (3/16)	.030	.563	1.000 (5x)	3/16	2		762812	56.60	762812-C3	62.40
.250 (1/4)	.010	.750	1.250 (5x)	1/4	2-1/2		876116	63.70	876116-C3	71.70
.250 (1/4)	.010	.750	2.000 (8x)	1/4	4		877716	64.80	877716-C3	74.30
.250 (1/4)	.030	.750	1.250 (5x)	1/4	2-1/2		762816	63.70	762816-C3	71.20

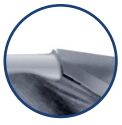
NEW SIZES!

MINIATURE END MILLS

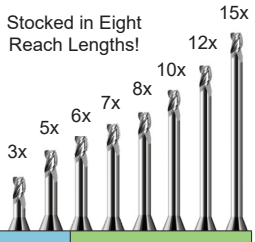
Corner Radius – Long Reach, Stub Flute



- **Long length design for deep cavities**
- Corner radius for improved strength
- Length of cut = 1½ x diameter
- Solid carbide • CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling



CORNER RADIUS

CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005" −.0005"	R +.001" −.001"	L_2 +.010" −.000"	L_3 +.010" −.000"		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.010	.003	.015	.050 (5x)	3	1/8	2-1/2	968210	60.90	968210-C3	66.40			
.010	.003	.015	.080 (8x)	3	1/8	2-1/2	972710	61.90	972710-C3	67.40			
.015 (1/64)	.003	.022	.078 (5x)	3	1/8	2-1/2	968215	54.40	968215-C3	59.90			
.015 (1/64)	.003	.022	.125 (8x)	3	1/8	2-1/2	972715	55.90	972715-C3	61.40			
.015 (1/64)	.003	.022	.125 (8x)	4	1/8	2-1/2	729615	55.90	729615-C3	61.40			
.015 (1/64)	.003	.022	.156 (10x)	3	1/8	2-1/2	719115	59.20	719115-C3	64.70			NEW
.015 (1/64)	.005	.022	.078 (5x)	3	1/8	2-1/2	37115	54.60	37115-C3	60.10			
.015 (1/64)	.005	.022	.125 (8x)	3	1/8	2-1/2	38315	55.90	38315-C3	61.40			
.020 (.5 mm)	.003	.030	.100 (5x)	3	1/8	2-1/2	968220	52.70	968220-C3	58.20			
.020 (.5 mm)	.005	.030	.100 (5x)	3	1/8	2-1/2	37120	52.70	37120-C3	58.20			
.020 (.5 mm)	.005	.030	.160 (8x)	3	1/8	2-1/2	38320	54.20	38320-C3	59.70			
.020 (.5 mm)	.005	.030	.160 (8x)	4	1/8	2-1/2	729420	54.20	729420-C3	59.70			
.020 (.5 mm)	.005	.030	.200 (10x)	3	1/8	2-1/2	917820	57.50	917820-C3	63.00			
.025	.005	.037	.125 (5x)	3	1/8	2-1/2	37125	52.70	37125-C3	58.20			
.025	.005	.037	.203 (8x)	3	1/8	2-1/2	38325	54.20	38325-C3	59.70	38325-C4	68.00	
.025	.005	.037	.250 (10x)	3	1/8	2-1/2	917825	57.50	917825-C3	63.00			
.030	.005	.045	.156 (5x)	3	1/8	2-1/2	37130	45.30	37130-C3	50.80			
.030	.005	.045	.250 (8x)	3	1/8	2-1/2	38330	46.60	38330-C3	52.10			
.031 (1/32)	.003	.046	.156 (5x)	3	1/8	2-1/2	968231	45.30	968231-C3	50.80			
.031 (1/32)	.003	.046	.250 (8x)	3	1/8	2-1/2	972731	46.60	972731-C3	52.10			
.031 (1/32)	.005	.046	.156 (5x)	3	1/8	2-1/2	37131	45.30	37131-C3	50.80	37131-C4	59.20	
.031 (1/32)	.005	.046	.156 (5x)	4	1/8	2-1/2	800531	48.60	800531-C3	54.10			
.031 (1/32)	.005	.046	.250 (8x)	3	1/8	2-1/2	38331	46.60	38331-C3	52.10	38331-C4	60.50	
.031 (1/32)	.005	.046	.250 (8x)	4	1/8	2-1/2	800331	49.70	800331-C3	55.20			
.031 (1/32)	.005	.046	.312 (10x)	3	1/8	2-1/2	917831	49.90	917831-C3	55.40			
.031 (1/32)	.005	.046	.375 (12x)	3	1/8	2-1/2	39431	49.90	39431-C3	55.40	39431-C4	64.20	
.031 (1/32)	.008	.046	.156 (5x)	3	1/8	2-1/2	912731	45.30	912731-C3	50.80			
.031 (1/32)	.008	.046	.250 (8x)	3	1/8	2-1/2	909331	46.60	909331-C3	52.10			
.031 (1/32)	.010	.046	.093 (3x)	3	1/8	2-1/2	925631	45.30	925631-C3	50.80			
.031 (1/32)	.010	.046	.156 (5x)	3	1/8	2-1/2	41531	45.30	41531-C3	50.80			
.031 (1/32)	.010	.046	.156 (5x)	4	1/8	2-1/2	730231	45.30	730231-C3	50.80			
.031 (1/32)	.010	.046	.250 (8x)	3	1/8	2-1/2	41731	46.60	41731-C3	52.10			
.031 (1/32)	.010	.046	.312 (10x)	3	1/8	2-1/2	953731	49.90	953731-C3	55.40			
.031 (1/32)	.010	.046	.375 (12x)	3	1/8	2-1/2	41931	49.90	41931-C3	55.40			
.031 (1/32)	.010	.046	.470 (15x)	3	1/8	2-1/2	947831	57.30	947831-C3	62.80			
.039 (1 mm)	.005	.059	.203 (5x)	3	1/8	2-1/2	37139	45.30	37139-C3	50.80			
.039 (1 mm)	.005	.059	.325 (8x)	3	1/8	2-1/2	38339	46.60	38339-C3	52.10			
.039 (1 mm)	.005	.059	.400 (10x)	3	1/8	2-1/2	917839	49.90	917839-C3	55.40			NEW
.039 (1 mm)	.010	.059	.325 (8x)	3	1/8	2-1/2	41739	46.60	41739-C3	52.10			

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MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.040	.005	.060	.203 (5x)	3	1/8	2-1/2	37140	45.30	37140-C3	50.80		
.040	.005	.060	.325 (8x)	3	1/8	2-1/2	38340	46.60	38340-C3	52.10		
.040	.010	.060	.203 (5x)	3	1/8	2-1/2	41540	45.30	41540-C3	50.80		
.040	.010	.060	.325 (8x)	3	1/8	2-1/2	41740	46.60	41740-C3	52.10		
.047 (3/64)	.005	.070	.250 (5x)	3	1/8	2-1/2	37147	44.60	37147-C3	50.10	37147-C4	59.20
.047 (3/64)	.005	.070	.375 (8x)	3	1/8	2-1/2	38347	45.50	38347-C3	51.00	38347-C4	59.40
.047 (3/64)	.005	.070	.375 (8x)	4	1/8	2-1/2	729447	45.50	729447-C3	51.00		
.047 (3/64)	.005	.070	.480 (10x)	3	1/8	2-1/2	917847	48.70	917847-C3	54.20		
.047 (3/64)	.005	.070	.570 (12x)	3	1/8	2-1/2	39447	48.70	39447-C3	54.20	39447-C4	63.10
.047 (3/64)	.010	.070	.141 (3x)	3	1/8	2-1/2	925647	44.60	925647-C3	50.10		
.047 (3/64)	.010	.070	.250 (5x)	3	1/8	2-1/2	41547	44.60	41547-C3	50.10	41547-C4	58.40
.047 (3/64)	.010	.070	.375 (8x)	3	1/8	2-1/2	41747	45.50	41747-C3	51.00		
.047 (3/64)	.010	.070	.480 (10x)	3	1/8	2-1/2	953747	48.70	953747-C3	54.20		
.047 (3/64)	.010	.070	.570 (12x)	3	1/8	2-1/2	41947	48.10	41947-C3	53.60		
.047 (3/64)	.010	.070	.710 (15x)	3	1/8	2-1/2	947847	54.90	947847-C3	60.40		
.047 (3/64)	.015	.070	.250 (5x)	3	1/8	2-1/2	42747	44.60	42747-C3	50.10		
.047 (3/64)	.015	.070	.375 (8x)	3	1/8	2-1/2	42947	45.50	42947-C3	51.00		
.050	.005	.075	.250 (5x)	3	1/8	2-1/2	37150	44.60	37150-C3	50.10		
.050	.005	.075	.400 (8x)	3	1/8	2-1/2	38350	45.50	38350-C3	51.00		
.050	.010	.075	.250 (5x)	3	1/8	2-1/2	41550	44.60	41550-C3	50.10		
.050	.010	.075	.400 (8x)	3	1/8	2-1/2	41750	45.50	41750-C3	51.00		
.060	.005	.090	.312 (5x)	3	1/8	2-1/2	37160	44.60	37160-C3	50.10		
.060	.005	.090	.500 (8x)	3	1/8	2-1/2	38360	45.50	38360-C3	51.00		
.060	.010	.090	.312 (5x)	3	1/8	2-1/2	41560	44.60	41560-C3	50.10		
.060	.010	.090	.500 (8x)	3	1/8	2-1/2	41760	45.50	41760-C3	51.00		
.060	.015	.090	.500 (8x)	3	1/8	2-1/2	42960	45.50	42960-C3	51.00		
.060	.020	.090	.500 (8x)	3	1/8	2-1/2	970160	45.50	970160-C3	51.00		
.062 (1/16)	.003	.093	.312 (5x)	3	1/8	2-1/2	968262	44.60	968262-C3	50.10		
.062 (1/16)	.003	.093	.500 (8x)	3	1/8	2-1/2	972762	45.50	972762-C3	51.00		
.062 (1/16)	.005	.093	.312 (5x)	3	1/8	2-1/2	37162	44.60	37162-C3	50.10	37162-C4	59.20
.062 (1/16)	.005	.093	.312 (5x)	4	1/8	2-1/2	800562	47.70	800562-C3	53.20		
.062 (1/16)	.005	.093	.500 (8x)	3	1/8	2-1/2	38362	45.50	38362-C3	51.00	38362-C4	59.40
.062 (1/16)	.005	.093	.500 (8x)	4	1/8	2-1/2	800362	48.80	800362-C3	54.30		
.062 (1/16)	.005	.093	.625 (10x)	3	1/8	2-1/2	917862	48.70	917862-C3	54.20		
.062 (1/16)	.005	.093	.750 (12x)	3	1/8	2-1/2	39462	48.70	39462-C3	54.20		
.062 (1/16)	.005	.093	.950 (15x)	3	1/8	2-1/2	727662	54.90	727662-C3	60.40		
.062 (1/16)	.008	.093	.312 (5x)	3	1/8	2-1/2	912762	44.60	912762-C3	50.10		
.062 (1/16)	.008	.093	.500 (8x)	3	1/8	2-1/2	909362	45.50	909362-C3	51.00		
.062 (1/16)	.010	.093	.187 (3x)	3	1/8	2-1/2	925662	44.60	925662-C3	50.10		
.062 (1/16)	.010	.093	.312 (5x)	3	1/8	2-1/2	41562	44.60	41562-C3	50.10	41562-C4	58.40
.062 (1/16)	.010	.093	.312 (5x)	4	1/8	2-1/2	730262	44.60	730262-C3	50.10		
.062 (1/16)	.010	.093	.375 (6x)	3	1/8	2-1/2	768462	44.60	768462-C3	50.10		
.062 (1/16)	.010	.093	.437 (7x)	3	1/8	2-1/2	766862	45.50	766862-C3	51.00		
.062 (1/16)	.010	.093	.500 (8x)	3	1/8	2-1/2	41762	45.50	41762-C3	51.00	41762-C4	59.40
.062 (1/16)	.010	.093	.500 (8x)	4	1/8	2-1/2	729862	45.50	729862-C3	51.00		
.062 (1/16)	.010	.093	.625 (10x)	3	1/8	2-1/2	953762	48.70	953762-C3	54.20		
.062 (1/16)	.010	.093	.750 (12x)	3	1/8	2-1/2	41962	48.70	41962-C3	54.20	41962-C4	63.10
.062 (1/16)	.010	.093	.950 (15x)	3	1/8	2-1/2	947862	54.90	947862-C3	60.40		

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.062 (1/16)	.012	.093	.312 (5x)	3	1/8	2-1/2	901962	44.60	901962-C3	50.10		
.062 (1/16)	.012	.093	.500 (8x)	3	1/8	2-1/2	913562	45.50	913562-C3	51.00		
.062 (1/16)	.015	.093	.312 (5x)	3	1/8	2-1/2	42762	44.60	42762-C3	50.10	42762-C4	59.20
.062 (1/16)	.015	.093	.500 (8x)	3	1/8	2-1/2	42962	45.50	42962-C3	51.00	42962-C4	60.10
.062 (1/16)	.015	.093	.625 (10x)	3	1/8	2-1/2	965662	48.70	965662-C3	54.20		
.062 (1/16)	.015	.093	.750 (12x)	3	1/8	2-1/2	43162	48.70	43162-C3	54.20		
.062 (1/16)	.020	.093	.312 (5x)	3	1/8	2-1/2	953562	44.60	953562-C3	50.10	953562-C4	59.20
.062 (1/16)	.020	.093	.312 (5x)	4	1/8	2-1/2	730062	44.60	730062-C3	50.10		
.062 (1/16)	.020	.093	.500 (8x)	3	1/8	2-1/2	970162	45.50	970162-C3	51.00	970162-C4	59.40
.062 (1/16)	.020	.093	.625 (10x)	3	1/8	2-1/2	923262	48.70	923262-C3	54.20		
.062 (1/16)	.020	.093	.750 (12x)	3	1/8	2-1/2	872662	48.70	872662-C3	54.20		
.070	.005	.105	.375 (5x)	3	1/8	2-1/2	37170	44.60	37170-C3	50.10		
.070	.005	.105	.570 (8x)	3	1/8	2-1/2	38370	45.50	38370-C3	51.00		
.070	.010	.105	.375 (5x)	3	1/8	2-1/2	41570	44.60	41570-C3	50.10		
.070	.010	.105	.570 (8x)	3	1/8	2-1/2	41770	45.50	41770-C3	51.00		
.078 (5/64)	.005	.117	.406 (5x)	3	1/8	2-1/2	37178	44.60	37178-C3	50.10		
.078 (5/64)	.005	.117	.406 (5x)	4	1/8	2-1/2	800578	44.60	800578-C3	50.10		
.078 (5/64)	.005	.117	.475 (6x)	3	1/8	2-1/2	729278	44.60	729278-C3	50.10		
.078 (5/64)	.005	.117	.550 (7x)	3	1/8	2-1/2	729078	45.50	729078-C3	51.00		
.078 (5/64)	.005	.117	.625 (8x)	3	1/8	2-1/2	38378	45.50	38378-C3	51.00		
.078 (5/64)	.005	.117	.800 (10x)	3	1/8	2-1/2	917878	48.70	917878-C3	54.20		
.078 (5/64)	.005	.117	.940 (12x)	3	1/8	2-1/2	39478	48.70	39478-C3	54.20		
.078 (5/64)	.010	.117	.406 (5x)	3	1/8	2-1/2	41578	44.60	41578-C3	50.10	41578-C4	58.40
.078 (5/64)	.010	.117	.406 (5x)	4	1/8	2-1/2	730278	44.60	730278-C3	50.10		
.078 (5/64)	.010	.117	.475 (6x)	3	1/8	2-1/2	768478	44.60	768478-C3	50.10		
.078 (5/64)	.010	.117	.550 (7x)	3	1/8	2-1/2	766878	45.50	766878-C3	51.00		
.078 (5/64)	.010	.117	.625 (8x)	3	1/8	2-1/2	41778	45.50	41778-C3	51.00	41778-C4	59.40
.078 (5/64)	.010	.117	.800 (10x)	3	1/8	2-1/2	953778	48.70	953778-C3	54.20		
.078 (5/64)	.010	.117	.940 (12x)	3	1/8	2-1/2	41978	48.70	41978-C3	54.20	41978-C4	63.10
.078 (5/64)	.015	.117	.234 (3x)	3	1/8	2-1/2	944978	44.60	944978-C3	50.10		
.078 (5/64)	.015	.117	.406 (5x)	3	1/8	2-1/2	42778	44.60	42778-C3	50.10		
.078 (5/64)	.015	.117	.625 (8x)	3	1/8	2-1/2	42978	45.50	42978-C3	51.00		
.078 (5/64)	.015	.117	.800 (10x)	3	1/8	2-1/2	965678	48.70	965678-C3	54.20		
.078 (5/64)	.015	.117	.940 (12x)	3	1/8	2-1/2	43178	49.20	43178-C3	54.70		
.078 (5/64)	.015	.117	1.187 (15x)	3	1/8	2-1/2	939378	54.90	939378-C3	60.40		
.078 (5/64)	.020	.117	.406 (5x)	3	1/8	2-1/2	953578	44.60	953578-C3	50.10		
.078 (5/64)	.020	.117	.625 (8x)	3	1/8	2-1/2	970178	45.50	970178-C3	51.00		
.078 (5/64)	.020	.117	.800 (10x)	3	1/8	2-1/2	923278	48.70	923278-C3	54.20		
.080	.005	.120	.406 (5x)	3	1/8	2-1/2	37180	44.60	37180-C3	50.10		
.080	.005	.120	.650 (8x)	3	1/8	2-1/2	38380	45.50	38380-C3	51.00		
.080	.010	.120	.406 (5x)	3	1/8	2-1/2	41580	44.60	41580-C3	50.10		
.080	.010	.120	.650 (8x)	3	1/8	2-1/2	41780	45.50	41780-C3	51.00		
.090	.005	.135	.450 (5x)	3	1/8	2-1/2	37190	44.60	37190-C3	50.10		
.090	.005	.135	.750 (8x)	3	1/8	2-1/2	38390	45.50	38390-C3	51.00		
.090	.010	.135	.450 (5x)	3	1/8	2-1/2	41590	44.60	41590-C3	50.10		
.090	.010	.135	.750 (8x)	3	1/8	2-1/2	41790	45.50	41790-C3	51.00		

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MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.093 (3/32)	.003	.139	.500 (5x)	3	1/8	2-1/2	968293	44.60	968293-C3	50.10		
.093 (3/32)	.003	.139	.750 (8x)	3	1/8	2-1/2	972793	46.40	972793-C3	51.90		
.093 (3/32)	.005	.139	.500 (5x)	3	1/8	2-1/2	37193	44.60	37193-C3	50.10	37193-C4	58.40
.093 (3/32)	.005	.139	.500 (5x)	4	1/8	2-1/2	800593	47.70	800593-C3	53.20		
.093 (3/32)	.005	.139	.750 (8x)	3	1/8	2-1/2	38393	45.50	38393-C3	51.00		
.093 (3/32)	.005	.139	.750 (8x)	4	1/8	2-1/2	800393	48.80	800393-C3	54.30		
.093 (3/32)	.005	.139	.950 (10x)	3	1/8	2-1/2	917893	48.70	917893-C3	54.20		
.093 (3/32)	.005	.139	1.125 (12x)	3	1/8	2-1/2	39493	48.70	39493-C3	54.20		
.093 (3/32)	.008	.139	.500 (5x)	3	1/8	2-1/2	912793	44.60	912793-C3	50.10		
.093 (3/32)	.008	.139	.750 (8x)	3	1/8	2-1/2	909393	45.30	909393-C3	50.80		
.093 (3/32)	.010	.139	.500 (5x)	3	1/8	2-1/2	41593	44.60	41593-C3	50.10	41593-C4	58.40
.093 (3/32)	.010	.139	.750 (8x)	3	1/8	2-1/2	41793	45.50	41793-C3	51.00		
.093 (3/32)	.010	.139	.950 (10x)	3	1/8	2-1/2	953793	48.70	953793-C3	54.20		
.093 (3/32)	.010	.139	1.125 (12x)	3	1/8	2-1/2	41993	48.70	41993-C3	54.20		
.093 (3/32)	.012	.139	.500 (5x)	3	1/8	2-1/2	901993	45.40	901993-C3	50.90		
.093 (3/32)	.012	.139	.750 (8x)	3	1/8	2-1/2	913593	46.40	913593-C3	51.90		
.093 (3/32)	.015	.139	.279 (3x)	3	1/8	2-1/2	944993	44.60	944993-C3	50.10		
.093 (3/32)	.015	.139	.500 (5x)	3	1/8	2-1/2	42793	44.60	42793-C3	50.10	42793-C4	58.40
.093 (3/32)	.015	.139	.500 (5x)	4	1/8	2-1/2	728893	44.60	728893-C3	50.10		
.093 (3/32)	.015	.139	.585 (6x)	3	1/8	2-1/2	765893	44.60	765893-C3	50.10		
.093 (3/32)	.015	.139	.670 (7x)	3	1/8	2-1/2	766093	45.50	766093-C3	51.00		
.093 (3/32)	.015	.139	.750 (8x)	3	1/8	2-1/2	42993	45.50	42993-C3	51.00	42993-C4	59.40
.093 (3/32)	.015	.139	.950 (10x)	3	1/8	2-1/2	965693	48.70	965693-C3	54.20		
.093 (3/32)	.015	.139	1.125 (12x)	3	1/8	2-1/2	43193	48.70	43193-C3	54.20	43193-C4	63.10
.093 (3/32)	.015	.139	1.400 (15x)	3	1/8	3	939393	54.90	939393-C3	60.40		
.093 (3/32)	.020	.139	.500 (5x)	3	1/8	2-1/2	953593	44.60	953593-C3	50.10		
.093 (3/32)	.020	.139	.500 (5x)	4	1/8	2-1/2	730093	44.60	730093-C3	50.10		
.093 (3/32)	.020	.139	.585 (6x)	3	1/8	2-1/2	728493	44.60	728493-C3	50.10		
.093 (3/32)	.020	.139	.670 (7x)	3	1/8	2-1/2	728293	45.50	728293-C3	51.00		
.093 (3/32)	.020	.139	.750 (8x)	3	1/8	2-1/2	970193	45.50	970193-C3	51.00		
.093 (3/32)	.020	.139	.950 (10x)	3	1/8	2-1/2	923293	48.70	923293-C3	54.20		
.093 (3/32)	.030	.139	.500 (5x)	3	1/8	2-1/2	42193	44.60	42193-C3	50.10	42193-C4	58.40
.093 (3/32)	.030	.139	.750 (8x)	3	1/8	2-1/2	42393	45.50	42393-C3	51.00		
.093 (3/32)	.030	.139	.950 (10x)	3	1/8	2-1/2	921493	48.70	921493-C3	54.20		
.100	.005	.150	.500 (5x)	3	1/8	2-1/2	37200	44.60	37200-C3	50.10		
.100	.005	.150	.800 (8x)	3	1/8	2-1/2	38400	45.50	38400-C3	51.00		
.100	.010	.150	.500 (5x)	3	1/8	2-1/2	41600	44.60	41600-C3	50.10		
.100	.010	.150	.800 (8x)	3	1/8	2-1/2	41800	45.50	41800-C3	51.00		
.109 (7/64)	.005	.163	.570 (5x)	3	1/8	2-1/2	37202	44.60	37202-C3	50.10		
.109 (7/64)	.005	.163	.900 (8x)	3	1/8	2-1/2	38402	45.50	38402-C3	51.00		
.109 (7/64)	.010	.163	.570 (5x)	3	1/8	2-1/2	41602	44.60	41602-C3	50.10		
.109 (7/64)	.010	.163	.900 (8x)	3	1/8	2-1/2	41802	45.50	41802-C3	51.00		
.118 (3 mm)	.005	.177	.950 (8x)	3	1/8	2-1/2	38405	45.50	38405-C3	51.00		
.118 (3 mm)	.010	.177	.950 (8x)	3	1/8	2-1/2	41805	45.50	41805-C3	51.00		
.118 (3 mm)	.030	.177	.950 (8x)	3	1/8	2-1/2	42405	45.50	42405-C3	51.00		

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.125 (1/8)	.005	.187	.625 (5x)	3	1/8	2-1/2	37208	44.60	37208-C3	50.10	37208-C4	58.40	
.125 (1/8)	.005	.187	1.000 (8x)	3	1/8	2-1/2	38408	45.50	38408-C3	51.00			
.125 (1/8)	.005	.187	1.250 (10x)	3	1/8	2-1/2	917908	50.60	917908-C3	56.10			
.125 (1/8)	.005	.187	1.500 (12x)	3	1/8	3	39508	49.00	39508-C3	54.50			
.125 (1/8)	.008	.187	.625 (5x)	3	1/8	2-1/2	912808	44.60	912808-C3	50.10			
.125 (1/8)	.008	.187	1.000 (8x)	3	1/8	2-1/2	909408	45.30	909408-C3	50.80			
.125 (1/8)	.010	.187	.375 (3x)	3	1/8	2-1/2	925708	44.60	925708-C3	50.10			
.125 (1/8)	.010	.187	.625 (5x)	3	1/8	2-1/2	41608	44.60	41608-C3	50.10	41608-C4	58.40	
.125 (1/8)	.010	.187	.625 (5x)	4	1/8	2-1/2	800208	49.10	800208-C3	54.60			
.125 (1/8)	.010	.187	.750 (6x)	3	1/8	2-1/2	768508	44.60	768508-C3	50.10			
.125 (1/8)	.010	.187	.875 (7x)	3	1/8	2-1/2	766908	45.50	766908-C3	51.00			
.125 (1/8)	.010	.187	1.000 (8x)	3	1/8	2-1/2	41808	45.50	41808-C3	51.00			
.125 (1/8)	.010	.187	1.000 (8x)	4	1/8	2-1/2	800008	50.20	800008-C3	55.70			
.125 (1/8)	.010	.187	1.250 (10x)	3	1/8	2-1/2	953808	48.80	953808-C3	54.30			
.125 (1/8)	.010	.187	1.500 (12x)	3	1/8	3	42008	49.00	42008-C3	54.50			
.125 (1/8)	.010	.187	1.875 (15x)	3	1/8	3	947908	55.50	947908-C3	61.00			
.125 (1/8)	.015	.187	.625 (5x)	3	1/8	2-1/2	42808	44.60	42808-C3	50.10	42808-C4	58.40	
.125 (1/8)	.015	.187	1.000 (8x)	3	1/8	2-1/2	43008	45.50	43008-C3	51.00	43008-C4	59.40	
.125 (1/8)	.015	.187	1.250 (10x)	3	1/8	2-1/2	965708	48.80	965708-C3	54.30			
.125 (1/8)	.015	.187	1.500 (12x)	3	1/8	3	43208	49.00	43208-C3	54.50	43208-C4	62.90	
.125 (1/8)	.015	.187	1.875 (15x)	3	1/8	3	939408	55.30	939408-C3	60.80			
.125 (1/8)	.020	.187	.625 (5x)	3	1/8	2-1/2	953608	44.60	953608-C3	50.10	953608-C4	59.20	
.125 (1/8)	.020	.187	1.000 (8x)	3	1/8	2-1/2	970208	45.50	970208-C3	51.00			
.125 (1/8)	.020	.187	1.250 (10x)	3	1/8	2-1/2	923308	48.80	923308-C3	54.30			
.125 (1/8)	.025	.187	.625 (5x)	3	1/8	2-1/2	839908	44.60	839908-C3	50.10			
.125 (1/8)	.025	.187	1.000 (8x)	3	1/8	2-1/2	840208	45.30	840208-C3	50.80			
.125 (1/8)	.030	.187	.375 (3x)	3	1/8	2-1/2	827108	44.60	827108-C3	50.10			
.125 (1/8)	.030	.187	.625 (5x)	3	1/8	2-1/2	42208	44.60	42208-C3	50.10	42208-C4	59.20	
.125 (1/8)	.030	.187	.625 (5x)	4	1/8	2-1/2	728108	44.60	728108-C3	50.10			
.125 (1/8)	.030	.187	1.000 (8x)	3	1/8	2-1/2	42408	45.50	42408-C3	51.00	42408-C4	60.10	NEW
.125 (1/8)	.030	.187	1.250 (10x)	3	1/8	2-1/2	921508	49.00	921508-C3	54.50			
.125 (1/8)	.030	.187	1.500 (12x)	3	1/8	3	42608	49.00	42608-C3	54.50			
.125 (1/8)	.030	.187	1.875 (15x)	3	1/8	3	919708	55.30	919708-C3	60.80			
.125 (1/8)	.040	.187	.625 (5x)	3	1/8	2-1/2	930208	44.60	930208-C3	50.10			
.125 (1/8)	.040	.187	1.000 (8x)	3	1/8	2-1/2	924308	45.30	924308-C3	50.80			
.140 (9/64)	.010	.220	.750 (5x)	3	3/16	3	41609	44.60	41609-C3	50.50			
.140 (9/64)	.010	.220	1.125 (8x)	3	3/16	3	41809	45.50	41809-C3	51.50			
.140 (9/64)	.015	.220	.750 (5x)	3	3/16	3	42809	44.60	42809-C3	50.50			
.140 (9/64)	.015	.220	1.125 (8x)	3	3/16	3	43009	46.40	43009-C3	52.30			
.140 (9/64)	.030	.220	.750 (5x)	3	3/16	3	42209	44.60	42209-C3	50.80			
.140 (9/64)	.030	.220	1.125 (8x)	3	3/16	3	42409	46.40	42409-C3	52.60			
.156 (5/32)	.010	.234	.750 (5x)	3	3/16	3	41610	49.00	41610-C3	55.00			
.156 (5/32)	.010	.234	.750 (5x)	4	3/16	3	800210	49.00	800210-C3	55.20			NEW
.156 (5/32)	.010	.234	1.250 (8x)	3	3/16	3	41810	50.00	41810-C3	55.90			
.156 (5/32)	.010	.234	1.570 (10x)	3	3/16	3	953810	53.10	953810-C3	59.10			
.156 (5/32)	.015	.234	.750 (5x)	3	3/16	3	42810	49.00	42810-C3	55.00			
.156 (5/32)	.015	.234	1.250 (8x)	3	3/16	3	43010	50.00	43010-C3	55.90			
.156 (5/32)	.015	.234	1.570 (10x)	3	3/16	3	965710	53.10	965710-C3	59.10			
.156 (5/32)	.020	.234	.750 (5x)	3	3/16	3	953610	49.00	953610-C3	55.00			

continued on next page

MINIATURE END MILLS

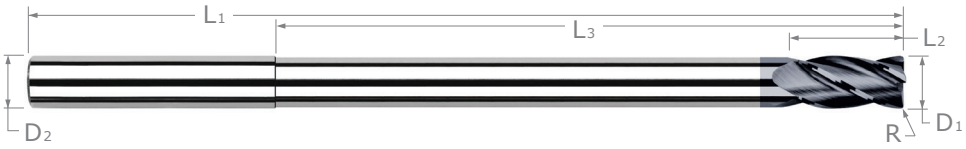
Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

	CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.156 (5/32)	.020	.234	1.250 (8x)	3	3/16	3	970210	50.00	970210-C3	55.90		
	.156 (5/32)	.030	.234	.750 (5x)	3	3/16	3	42210	49.00	42210-C3	55.00		
	.156 (5/32)	.030	.234	1.250 (8x)	3	3/16	3	42410	50.00	42410-C3	55.90		
	.156 (5/32)	.030	.234	1.570 (10x)	3	3/16	3	921510	53.10	921510-C3	59.30		
	.187 (3/16)	.005	.281	1.000 (5x)	3	3/16	3	37212	49.00	37212-C3	55.00		
	.187 (3/16)	.010	.281	1.000 (5x)	3	3/16	3	41612	49.00	41612-C3	55.00		
	.187 (3/16)	.010	.281	1.500 (8x)	3	3/16	3	41812	50.00	41812-C3	55.90		
	.187 (3/16)	.015	.281	1.000 (5x)	3	3/16	3	42812	49.00	42812-C3	55.00	42812-C4	68.20
NEW	.187 (3/16)	.015	.281	1.000 (5x)	4	3/16	3	728912	49.00	728912-C3	55.20		
	.187 (3/16)	.015	.281	1.500 (8x)	3	3/16	3	43012	50.00	43012-C3	55.90	43012-C4	69.10
	.187 (3/16)	.015	.281	1.875 (10x)	3	3/16	4	965712	53.10	965712-C3	61.20		
	.187 (3/16)	.015	.281	2.250 (12x)	3	3/16	4	43212	53.30	43212-C3	61.40	43212-C4	73.70
	.187 (3/16)	.020	.281	1.000 (5x)	3	3/16	3	953612	49.00	953612-C3	55.00		
	.187 (3/16)	.020	.281	1.500 (8x)	3	3/16	3	970212	50.00	970212-C3	55.90		
	.187 (3/16)	.030	.281	1.000 (5x)	3	3/16	3	42212	49.00	42212-C3	55.00	42212-C4	65.50
	.187 (3/16)	.030	.281	1.156 (6x)	3	3/16	3	766512	50.00	766512-C3	56.20		
	.187 (3/16)	.030	.281	1.312 (7x)	3	3/16	3	765712	50.00	765712-C3	55.90		
	.187 (3/16)	.030	.281	1.500 (8x)	3	3/16	3	42412	50.00	42412-C3	55.90	42412-C4	66.50
	.187 (3/16)	.030	.281	1.875 (10x)	3	3/16	4	921512	53.30	921512-C3	61.40		
	.187 (3/16)	.030	.281	2.250 (12x)	3	3/16	4	42612	53.30	42612-C3	61.40		
	.187 (3/16)	.045	.281	1.000 (5x)	3	3/16	3	978812	49.00	978812-C3	55.00		
	.187 (3/16)	.045	.281	1.500 (8x)	3	3/16	3	961812	50.00	961812-C3	56.20		
	.187 (3/16)	.060	.281	1.000 (5x)	3	3/16	3	949112	49.00	949112-C3	55.00		
	.187 (3/16)	.060	.281	1.500 (8x)	3	3/16	3	866012	49.70	866012-C3	55.70		
	.187 (3/16)	.060	.281	1.875 (10x)	3	3/16	4	727912	53.30	727912-C3	59.90		
	.250 (1/4)	.005	.375	1.250 (5x)	3	1/4	4	37216	54.20	37216-C3	60.80		
	.250 (1/4)	.005	.375	2.000 (8x)	3	1/4	4	38416	55.50	38416-C3	63.50		
	.250 (1/4)	.010	.375	1.250 (5x)	3	1/4	4	41616	54.20	41616-C3	63.60		
	.250 (1/4)	.010	.375	2.000 (8x)	3	1/4	4	41816	55.50	41816-C3	65.00		
	.250 (1/4)	.015	.375	1.250 (5x)	3	1/4	4	42816	54.20	42816-C3	63.60		
	.250 (1/4)	.015	.375	2.000 (8x)	3	1/4	4	43016	55.50	43016-C3	65.00		
	.250 (1/4)	.015	.375	3.000 (12x)	3	1/4	6	43216	63.60	43216-C3	74.30		
	.250 (1/4)	.020	.375	1.250 (5x)	3	1/4	4	953616	54.20	953616-C3	63.60		
	.250 (1/4)	.020	.375	2.000 (8x)	3	1/4	4	970216	56.60	970216-C3	66.00		
	.250 (1/4)	.030	.375	1.250 (5x)	3	1/4	4	42216	54.20	42216-C3	63.60	42216-C4	76.00
NEW	.250 (1/4)	.030	.375	1.250 (5x)	4	1/4	4	728116	54.20	728116-C3	62.20		
	.250 (1/4)	.030	.375	2.000 (8x)	3	1/4	4	42416	55.50	42416-C3	65.00	42416-C4	77.30
	.250 (1/4)	.030	.375	3.000 (12x)	3	1/4	6	42616	63.60	42616-C3	74.30	42616-C4	90.10
	.250 (1/4)	.045	.375	1.250 (5x)	3	1/4	4	978816	54.20	978816-C3	63.60		
	.250 (1/4)	.060	.375	1.250 (5x)	3	1/4	4	949116	54.20	949116-C3	63.60	949116-C4	75.40
	.250 (1/4)	.060	.375	2.000 (8x)	3	1/4	4	866016	56.60	866016-C3	66.00		
	.312 (5/16)	.015	.470	1.625 (5x)	3	5/16	4	42820	86.40	42820-C3	97.70		
	.312 (5/16)	.015	.470	2.500 (8x)	3	5/16	4	43020	87.90	43020-C3	99.30		
	.375 (3/8)	.030	.570	2.000 (5x)	3	3/8	4	42224	91.40	42224-C3	106.00		
	.375 (3/8)	.030	.570	3.000 (8x)	3	3/8	6	42424	124.00	42424-C3	140.50		
	.375 (3/8)	.060	.570	2.000 (5x)	3	3/8	4	949124	91.40	949124-C3	106.00		
	.375 (3/8)	.060	.570	3.000 (8x)	3	3/8	6	866024	126.30	866024-C3	139.60		

MINIATURE END MILLS

Corner Radius – Extra Long Length

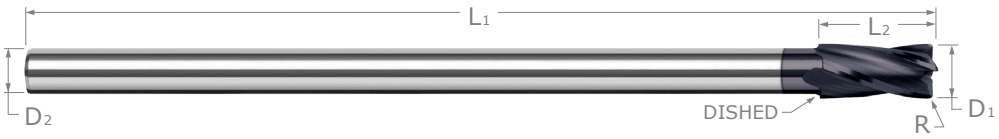


- **Up to 8" overall length**
- Extended reach
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.00''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.250 (1/4)	**.015**	.375	4.375 (17.5x)	1/4	6	24016	102.70	24016-C3	113.40
.312 (5/16)	**.015**	.470	4.343 (14x)	5/16	6	24020	121.10	24020-C3	137.20
.375 (3/8)	**.030**	.562	4.312 (11.5x)	3/8	6	24024	137.40	24024-C3	154.00
.500 (1/2)	**.030**	.750	5.750 (11.5x)	1/2	8	24032	239.30	24032-C3	272.30
.625 (5/8)	**.030**	.937	5.687 (9x)	5/8	8	24040	400.10	24040-C3	429.10
.750 (3/4)	**.030**	1.125	5.625 (7.5x)	3/4	8	24048	498.60	24048-C3	532.30

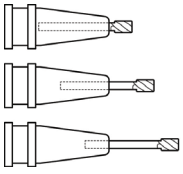
END MILLS

Corner Radius – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Corner radius for improved strength
- Length of cut = 1½x diameter
- Center cutting
- 4 flutes
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!



CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
1/8	.010	3/16	**3 mm**	2-1/2	17608	100.90	17608-C3	106.40
1/8	.015	3/16	**3 mm**	2-1/2	829008	100.90	829008-C3	106.40
5/32	.010	15/64	**1/8**	2-1/2	17610	100.90	17610-C3	106.80
5/32	.015	15/64	**1/8**	2-1/2	829010	100.90	829010-C3	106.80
3/16	.015	9/32	**1/8**	2-1/2	17612	100.90	17612-C3	106.80
3/16	.015	9/32	**5/32**	2-1/2	17613	103.80	17613-C3	109.80
3/16	.030	9/32	**1/8**	2-1/2	844912	104.90	844912-C3	110.90
1/4	.015	3/8	**3/16**	3	17616	109.20	17616-C3	117.30
1/4	.030	3/8	**3/16**	3	844916	109.20	844916-C3	116.00
5/16	.015	15/32	**1/4**	4	17620	133.10	17620-C3	144.50
5/16	.030	15/32	**1/4**	4	844920	133.10	844920-C3	144.50
3/8	.015	9/16	**5/16**	4	829024	159.80	829024-C3	174.50
3/8	.030	9/16	**5/16**	4	17624	158.30	17624-C3	173.00
3/8	.060	9/16	**5/16**	4	766324	161.20	766324-C3	175.90
7/16	.015	21/32	**3/8**	6	829028	234.80	829028-C3	250.10
7/16	.030	21/32	**3/8**	6	17628	232.60	17628-C3	250.60
1/2	.015	3/4	**7/16**	6	829032	245.80	829032-C3	256.50
1/2	.030	3/4	**7/16**	6	17632	245.80	17632-C3	261.80
1/2	.060	3/4	**7/16**	6	766332	246.90	766332-C3	264.90
5/8	.030	15/16	**1/2**	6	17640	319.20	17640-C3	343.10
3/4	.030	1-1/8	**5/8**	6	17648	394.00	17648-C3	418.80
3/4	.060	1-1/8	**5/8**	6	766348	396.50	766348-C3	421.30

For Square Reduced Shank, please see page 44.
For Ball Reduced Shank, please see page 71.

MINIATURE END MILLS

Corner Chamfer – Stub & Standard

4 Flutes

Stub Flute & Standard Length

- Chamfered corner creates consistent heat and wear along chamfer by distributing forces evenly
- 45° corner chamfer protects corners on the end mill and can create small chamfers and edge breaks
- Center cutting
- Solid carbide
- CNC ground in the USA

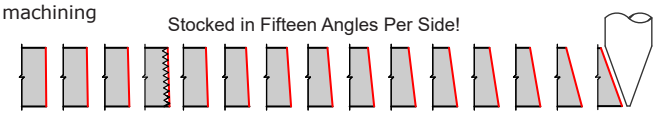
CUTTER DIAMETER	CORNER CHAMFER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_4 $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.047 (3/64)	**.005**	.141 (3x)	1/8	1-1/2	805147	25.70	805147-C3	31.20
.062 (1/16)	**.005**	.093 (1.5x)	1/8	1-1/2	727462	25.70	727462-C3	31.20
.062 (1/16)	**.005**	.187 (3x)	1/8	1-1/2	805162	25.70	805162-C3	31.20
.062 (1/16)	**.010**	.187 (3x)	1/8	1-1/2	804962	25.70	804962-C3	31.20
.078 (5/64)	**.005**	.234 (3x)	1/8	1-1/2	805178	25.70	805178-C3	31.20
.093 (3/32)	**.005**	.279 (3x)	1/8	1-1/2	805193	26.20	805193-C3	31.70
.093 (3/32)	**.010**	.140 (1.5x)	1/8	1-1/2	727293	25.70	727293-C3	31.20
.093 (3/32)	**.010**	.279 (3x)	1/8	1-1/2	804993	25.70	804993-C3	31.20
D_1 $^{+.000''}_{-.002''}$	L_4 $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	**.005**	.375 (3x)	1/8	1-1/2	805208	26.20	805208-C3	31.70
.125 (1/8)	**.010**	.375 (3x)	1/8	1-1/2	805008	25.70	805008-C3	31.20
.125 (1/8)	**.020**	.187 (1.5x)	1/8	1-1/2	727108	25.70	727108-C3	31.20
.125 (1/8)	**.020**	.375 (3x)	1/8	1-1/2	804808	25.70	804808-C3	31.20
.125 (1/8)	**.030**	.375 (3x)	1/8	1-1/2	751108	26.20	751108-C3	31.70
.187 (3/16)	**.005**	.570 (3x)	3/16	2	805212	28.50	805212-C3	34.50
.187 (3/16)	**.010**	.570 (3x)	3/16	2	805012	28.50	805012-C3	34.50
.187 (3/16)	**.020**	.285 (1.5x)	3/16	2	727112	28.50	727112-C3	34.30
.187 (3/16)	**.020**	.570 (3x)	3/16	2	804812	28.50	804812-C3	34.50
.187 (3/16)	**.030**	.570 (3x)	3/16	2	751112	28.50	751112-C3	34.50
.250 (1/4)	**.005**	.750 (3x)	1/4	2-1/2	805216	35.10	805216-C3	43.10
.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	805016	35.10	805016-C3	43.10
.250 (1/4)	**.020**	.375 (1.5x)	1/4	2-1/2	727116	35.10	727116-C3	42.60
.250 (1/4)	**.020**	.750 (3x)	1/4	2-1/2	804816	35.10	804816-C3	43.10
.250 (1/4)	**.030**	.750 (3x)	1/4	2-1/2	751116	35.10	751116-C3	43.10
.375 (3/8)	**.005**	1.125 (3x)	3/8	2-1/2	805224	51.30	805224-C3	61.90
.375 (3/8)	**.010**	1.125 (3x)	3/8	2-1/2	805024	51.30	805024-C3	61.90
.375 (3/8)	**.020**	1.125 (3x)	3/8	2-1/2	804824	51.30	804824-C3	61.90
.375 (3/8)	**.030**	1.125 (3x)	3/8	2-1/2	751124	51.30	751124-C3	61.90
.500 (1/2)	**.005**	1.500 (3x)	1/2	3	805232	79.30	805232-C3	93.70
.500 (1/2)	**.010**	1.500 (3x)	1/2	3	805032	79.30	805032-C3	93.70
.500 (1/2)	**.020**	1.500 (3x)	1/2	3	804832	79.30	804832-C3	95.30
.500 (1/2)	**.030**	1.500 (3x)	1/2	3	751132	79.30	751132-C3	95.30

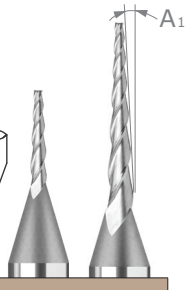
MINIATURE END MILLS

Tapered – Square

- Length of cut up to 10x end diameter
- Long length design for deep cavity machining
- 3 and 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Stocked in Fifteen Angles Per Side!





ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
0.5°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	997015	47.00	997015-C6	55.10		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20515	77.40	20515-C6	85.50		
	.030	.156 (5x)	3	1/8	1-1/2	997030	39.90	997030-C6	48.00		
	.030	.300 (10x)	3	3/16	3	20530	68.80	20530-C6	77.50		
	.045	.250 (5x)	3	1/8	1-1/2	997045	39.90	997045-C6	48.00		
	.045	.450 (10x)	3	3/16	3	20545	68.80	20545-C6	76.40		
	.060	.312 (5x)	3	1/8	1-1/2	997060	39.90	997060-C6	48.00		
	.060	.600 (10x)	3	3/16	3	20560	68.80	20560-C6	77.50		
	.075	.750 (10x)	3	3/16	3	20575	70.10	20575-C6	77.70		
	.090	.500 (5x)	3	1/8	1-1/2	997090	39.90	997090-C6	48.00		
	.090	.900 (10x)	3	1/4	4	20590	76.20	20590-C6	85.90		
	.125 (1/8)	.625 (5x)	3	3/16	2	997099	62.10	997099-C6	70.80		
	.125 (1/8)	1.250 (10x)	3	1/4	4	20599	74.90	20599-C6	86.70		
1°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	992715	47.00	992715-C6	53.30		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20615	75.90	20615-C6	84.00		
	.030	.156 (5x)	3	1/8	1-1/2	992730	39.90	992730-C6	48.00	992730-C8	48.00
	.030	.300 (10x)	3	3/16	3	20630	68.80	20630-C6	77.50	20630-C8	76.90
	.045	.250 (5x)	3	1/8	1-1/2	992745	39.90	992745-C6	48.00		
	.045	.450 (10x)	3	3/16	3	20645	68.80	20645-C6	77.50		
	.060	.312 (5x)	3	1/8	1-1/2	992760	39.90	992760-C6	48.00		
	.060	.600 (10x)	3	3/16	3	20660	68.80	20660-C6	77.50		
	.075	.750 (10x)	3	3/16	3	20675	68.80	20675-C6	76.40		
	.090	.500 (5x)	3	1/8	1-1/2	992790	39.90	992790-C6	48.00		
	.090	.900 (10x)	3	1/4	4	20690	74.90	20690-C6	86.70		
	.125 (1/8)	.625 (5x)	3	3/16	2	992799	62.10	992799-C6	70.80		
	.125 (1/8)	1.250 (10x)	3	1/4	4	20699	74.90	20699-C6	86.70		
1.5°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	991815	47.00	991815-C6	55.10		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20715	77.40	20715-C6	84.10		
	.030	.156 (5x)	3	1/8	1-1/2	991830	40.70	991830-C6	48.70		
	.030	.300 (10x)	3	3/16	3	20730	70.10	20730-C6	77.70		
	.045	.250 (5x)	3	1/8	1-1/2	991845	39.90	991845-C6	48.00		
	.045	.450 (10x)	3	3/16	3	20745	68.80	20745-C6	76.40		
	.060	.312 (5x)	3	1/8	1-1/2	991860	40.70	991860-C6	48.70		
	.060	.600 (10x)	3	3/16	3	20760	70.10	20760-C6	78.80		
	.075	.750 (10x)	3	1/4	4	20775	76.20	20775-C6	88.10		
	.090	.500 (5x)	3	1/8	1-1/2	991890	40.70	991890-C6	48.70		
	.090	.900 (10x)	3	1/4	4	20790	74.90	20790-C6	86.70		
	.125 (1/8)	1.250 (10x)	3	1/4	4	20799	74.90	20799-C6	86.70		

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ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1.8° (N.P.T.)	.200	.625 (3x)	3	1/4	2	912282	65.50	912282-C6	77.40		
	.300	.900 (3x)	3	3/8	2-1/2	912286	81.70	912286-C6	95.10		
	.400	1.250 (3x)	3	1/2	3	912292	109.90	912292-C6	127.20		
2°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	991015	46.10	991015-C6	54.10		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20815	75.90	20815-C6	84.00		
	.030	.156 (5x)	3	1/8	1-1/2	991030	39.90	991030-C6	48.00		
	.030	.300 (10x)	3	3/16	3	20830	68.80	20830-C6	77.50		
	.045	.250 (5x)	3	1/8	1-1/2	991045	39.90	991045-C6	48.00		
	.045	.450 (10x)	3	3/16	3	20845	68.80	20845-C6	77.50		
	.060	.312 (5x)	3	1/8	1-1/2	991060	39.90	991060-C6	48.00		
	.060	.600 (10x)	3	3/16	3	20860	68.80	20860-C6	77.50		
	.075	.750 (10x)	3	1/4	4	20875	76.20	20875-C6	88.10		
	.090	.500 (5x)	3	1/8	1-1/2	991090	39.90	991090-C6	48.00		
	.090	.900 (10x)	3	1/4	4	20890	74.90	20890-C6	86.70		
	.125 (1/8)	.625 (5x)	3	3/16	2	991099	62.10	991099-C6	70.80		
	.125 (1/8)	1.250 (10x)	3	1/4	4	20899	74.90	20899-C6	86.70		
3°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	990415	46.10	990415-C6	54.10		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20915	75.90	20915-C6	84.00		
	.030	.156 (5x)	3	1/8	1-1/2	990430	39.90	990430-C6	48.00	990430-C8	48.00
	.030	.300 (10x)	3	3/16	3	20930	68.80	20930-C6	77.50	20930-C8	77.40
	.045	.250 (5x)	3	1/8	1-1/2	990445	39.90	990445-C6	48.00		
	.045	.450 (10x)	3	3/16	3	20945	68.80	20945-C6	77.50		
	.060	.312 (5x)	3	1/8	1-1/2	990460	39.90	990460-C6	48.00		
	.060	.600 (10x)	3	3/16	3	20960	68.80	20960-C6	77.50		
	.075	.750 (10x)	3	1/4	4	20975	76.20	20975-C6	88.10		
	.090	.500 (5x)	3	3/16	2	990490	62.10	990490-C6	70.80		
	.090	.900 (10x)	3	1/4	4	20990	74.90	20990-C6	86.70		
	.125 (1/8)	.625 (5x)	3	1/4	2-1/2	990499	91.40	990499-C6	103.30		
	.125 (1/8)	1.192 (10x)	3	1/4	4	20999	74.90	20999-C6	86.70		
4°	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	996215	75.90	996215-C6	84.00		
	.030	.300 (10x)	3	3/16	3	996230	68.80	996230-C6	77.50		
	.045	.450 (10x)	3	3/16	3	996245	68.80	996245-C6	77.50		
	.060	.600 (10x)	3	3/16	3	996260	68.80	996260-C6	77.50		
	.075	.750 (10x)	3	1/4	4	996275	76.20	996275-C6	88.10		
	.090	.900 (10x)	3	1/4	4	996290	76.20	996290-C6	88.10		
	.125 (1/8)	1.250 (10x)	3	3/8	4	996299	103.00	996299-C6	116.40		
5°	.010	.050 (5x)	3	1/8	1-1/2	989610	54.60	989610-C6	62.70		
	.010	.100 (10x)	3	1/8	2-1/2	27110	84.20	27110-C6	90.90		
	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	989615	46.10	989615-C6	54.10		
	.015 (1/64)	.078 (5x)	4	1/8	1-1/2	723915	47.20	723915-C6	53.50		
	.015 (1/64)	.120 (8x)	3	1/8	1-1/2	761915	48.70	761915-C6	56.80		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	27115	75.90	27115-C6	84.00		
	.020	.100 (5x)	3	1/8	1-1/2	989620	45.10	989620-C6	53.20		
	.020	.200 (10x)	3	1/8	2-1/2	27120	74.50	27120-C6	82.60		
	.030	.156 (5x)	3	1/8	1-1/2	989630	39.90	989630-C6	48.00	989630-C8	48.00
	.030	.300 (10x)	3	3/16	3	27130	68.80	27130-C6	77.50	27130-C8	76.90
	.045	.250 (5x)	3	1/8	1-1/2	989645	39.90	989645-C6	48.00		
	.045	.450 (10x)	3	3/16	3	27145	68.80	27145-C6	77.50		

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Tapered – Square (cont.)

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ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
5°	.060	.312 (5x)	3	1/8	1-1/2	989660	39.90	989660-C6	48.00		
	.060	.600 (10x)	3	3/16	3	27160	68.80	27160-C6	77.50		
	.062 (1/16)	.312 (5x)	3	1/8	1-1/2	989662	39.90	989662-C6	48.00		
	.062 (1/16)	.620 (10x)	3	3/16	3	27162	68.80	27162-C6	76.40		
	.075	.375 (5x)	3	3/16	2	989675	62.10	989675-C6	70.80		
	.075	.750 (10x)	3	1/4	4	27175	76.20	27175-C6	88.10		
	.090	.500 (5x)	3	3/16	2	989690	62.10	989690-C6	70.80		
	.090	.900 (10x)	3	1/4	4	27190	74.90	27190-C6	86.70		
	.093 (3/32)	.500 (5x)	3	3/16	2	989693	62.10	989693-C6	70.80		
	.093 (3/32)	.930 (10x)	3	1/4	4	27193	74.90	27193-C6	86.70		
	.125 (1/8)	.625 (5x)	3	1/4	2-1/2	989699	91.40	989699-C6	103.30		
	.125 (1/8)	1.250 (10x)	3	3/8	4	27199	101.00	27199-C6	114.40		
	.187 (3/16)	1.000 (5x)	3	3/8	2-1/2	989681	101.00	989681-C6	114.40		
	.250 (1/4)	1.250 (5x)	3	1/2	3	989684	136.60	989684-C6	153.80		
6°	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	993315	81.00	993315-C6	89.10		
	.030	.300 (10x)	3	3/16	3	993330	75.20	993330-C6	84.00		
	.045	.250 (5x)	3	1/8	1-1/2	904345	65.90	904345-C6	72.20		
	.045	.450 (10x)	3	3/16	3	993345	75.20	993345-C6	84.00		
	.060	.312 (5x)	3	3/16	2	904360	63.60	904360-C6	72.30		
	.060	.600 (10x)	3	3/16	3	993360	75.20	993360-C6	84.00		
	.090	.500 (5x)	3	1/4	2-1/2	904390	95.00	904390-C6	107.00		
	.125 (1/8)	.625 (5x)	3	5/16	2-1/2	904399	91.40	904399-C6	104.80		
7°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	922615	47.90	922615-C6	54.20		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	28015	78.80	28015-C6	86.90		
	.030	.156 (5x)	3	1/8	1-1/2	922630	41.40	922630-C6	49.50		
	.030	.300 (10x)	3	3/16	3	28030	71.50	28030-C6	80.20		
	.045	.250 (5x)	3	1/8	1-1/2	922645	41.40	922645-C6	49.50		
	.045	.450 (10x)	3	3/16	3	28045	71.50	28045-C6	80.20		
	.060	.312 (5x)	3	3/16	2	922660	64.50	922660-C6	73.20		
	.060	.600 (10x)	3	1/4	4	28060	77.90	28060-C6	89.80		
	.075	.750 (10x)	3	3/8	4	28075	108.10	28075-C6	121.50		
	.090	.500 (5x)	3	1/4	2-1/2	922690	77.90	922690-C6	89.80		
	.090	.900 (10x)	3	3/8	4	28090	106.30	28090-C6	119.70		
	.125 (1/8)	.625 (5x)	3	5/16	2-1/2	922699	91.40	922699-C6	104.80		
8°	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	995415	81.00	995415-C6	89.10		
	.030	.300 (10x)	3	3/16	3	995430	75.20	995430-C6	84.00		
	.045	.450 (10x)	3	3/16	3	995445	75.20	995445-C6	84.00		
	.060	.600 (10x)	3	1/4	4	995460	80.40	995460-C6	92.30		
	.090	.500 (5x)	3	1/4	2-1/2	903790	77.90	903790-C6	89.80		
	.125 (1/8)	.625 (5x)	3	5/16	2-1/2	903799	91.40	903799-C6	104.80		
9°	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	992115	81.80	992115-C6	88.50		
	.030	.300 (10x)	3	3/16	3	992130	76.00	992130-C6	83.60		
	.045	.450 (10x)	3	3/16	3	992145	76.00	992145-C6	83.60		
	.060	.600 (10x)	3	1/4	4	992160	81.10	992160-C6	93.10		
	.090	.500 (5x)	3	1/4	2-1/2	902490	77.90	902490-C6	89.80		
	.125 (1/8)	.625 (5x)	3	3/8	2-1/2	902499	105.10	902499-C6	118.50		

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Tapered – Square (cont.)

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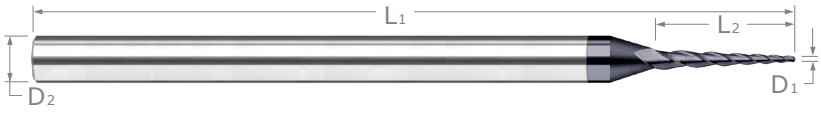
ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
10°	.010	.050 (5x)	3	1/8	1-1/2	988210	54.60	988210-C6	62.70		
	.010	.100 (10x)	3	1/8	2-1/2	29410	82.70	29410-C6	90.70		
	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	988215	46.10	988215-C6	54.10		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	29415	75.90	29415-C6	84.00		
	.020	.100 (5x)	3	1/8	1-1/2	988220	46.10	988220-C6	54.10		
	.020	.200 (10x)	3	1/8	2-1/2	29420	74.50	29420-C6	82.60		
	.030	.156 (5x)	3	1/8	1-1/2	988230	39.90	988230-C6	48.00	988230-C8	47.00
	.030	.300 (10x)	3	3/16	3	29430	68.80	29430-C6	77.50	29430-C8	76.90
	.045	.250 (5x)	3	3/16	2	988245	68.80	988245-C6	77.50		
	.045	.360 (8x)	3	3/16	3	760845	70.10	760845-C6	78.80		
	.045	.450 (10x)	3	1/4	4	29445	76.20	29445-C6	88.10		
	.060	.312 (5x)	3	3/16	2	988260	68.80	988260-C6	77.50		
	.060	.312 (5x)	4	3/16	2	723860	70.00	723860-C6	77.10		
	.060	.600 (10x)	3	3/8	4	29460	101.00	29460-C6	114.40		
	.075	.375 (5x)	3	1/4	2-1/2	988275	72.40	988275-C6	84.30		
	.075	.750 (10x)	3	3/8	4	29475	103.00	29475-C6	116.40		
	.090	.500 (5x)	3	5/16	2-1/2	988290	85.70	988290-C6	99.10		
	.090	.720 (8x)	3	3/8	4	760890	86.90	760890-C6	100.80		
	.125 (1/8)	.625 (5x)	3	3/8	2-1/2	988299	101.00	988299-C6	114.40		
	.187 (3/16)	.890 (5x)	3	1/2	3	988281	136.60	988281-C6	153.80		
	.250 (1/4)	1.065 (5x)	3	5/8	3-1/2	988284	146.80	988284-C6	166.70		
15°	.015 (1/64)	.031 (3x)	3	1/8	1-1/2	799415	44.00	799415-C6	52.10		
	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	919515	46.10	919515-C6	54.10		
	.015 (1/64)	.078 (5x)	4	1/8	1-1/2	723715	47.20	723715-C6	53.50		
	.015 (1/64)	.120 (8x)	3	1/8	1-1/2	799315	51.00	799315-C6	59.10		
	.015 (1/64)	.150 (10x)	3	1/8	1-1/2	41115	72.40	41115-C6	80.50		
	.030	.093 (3x)	3	1/8	1-1/2	799430	44.00	799430-C6	52.10		
	.030	.156 (5x)	3	1/8	1-1/2	919530	46.10	919530-C6	54.10		
	.030	.240 (8x)	3	3/16	2	799330	51.00	799330-C6	59.70		
	.030	.294 (10x)	3	3/16	2	41130	70.70	41130-C6	79.40		
	.045	.250 (5x)	3	3/16	2	919545	62.10	919545-C6	70.80		
	.045	.250 (5x)	4	3/16	2	723745	63.30	723745-C6	70.40		
	.045	.383 (8x)	3	1/4	2-1/2	41145	75.90	41145-C6	87.80		
	.060	.312 (5x)	3	1/4	2-1/2	919560	74.50	919560-C6	86.40		
	.060	.312 (5x)	4	1/4	2-1/2	723760	75.70	723760-C6	84.70		
	.060	.480 (8x)	3	3/8	2-1/2	799360	99.50	799360-C6	112.40		
	.060	.588 (10x)	3	3/8	2-1/2	41160	103.00	41160-C6	116.40		
	.075	.750 (10x)	3	1/2	3	41175	143.40	41175-C6	160.90		
	.090	.765 (8x)	3	1/2	3	41190	140.70	41190-C6	157.90		
	.125 (1/8)	.625 (5x)	4	1/2	3	723799	142.90	723799-C6	160.40		
	.125 (1/8)	.700 (5x)	3	1/2	3	41199	140.70	41199-C6	157.90		
20°	.015	.078 (5x)	3	1/8	1-1/2	832815	46.10	832815-C6	54.10		
	.015	.120 (8x)	3	1/8	1-1/2	799215	51.00	799215-C6	59.10		
	.030	.156 (5x)	3	3/16	2	832830	46.10	832830-C6	54.80		
	.030	.156 (5x)	4	3/16	2	723630	47.20	723630-C6	54.30		
	.030	.240 (8x)	3	1/4	2-1/2	799230	75.90	799230-C6	87.80		
	.045	.250 (5x)	3	1/4	2-1/2	832845	62.10	832845-C6	74.00		
	.045	.360 (8x)	3	5/16	2-1/2	799245	80.80	799245-C6	94.10		
	.060	.312 (5x)	3	5/16	2-1/2	832860	66.90	832860-C6	80.30		
	.060	.480 (8x)	3	1/2	3	799260	140.70	799260-C6	158.20		

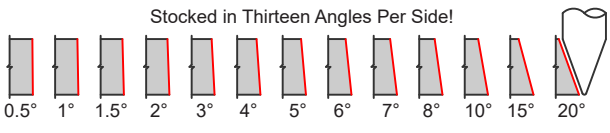
For larger angles, please see Chamfer Cutters on page 297.

MINIATURE END MILLS

Tapered – Ball



- Stocked in 0.5° to 20° tapers
- Long length design for deep cavity machining
- 3 and 4 flutes • Center cutting
- Solid carbide • CNC ground in the USA



ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
0.5°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21515	82.60	21515-C6	90.60
	.030	**.300** (10x)	3	3/16	3	21530	75.60	21530-C6	84.30
	.045	**.450** (10x)	3	3/16	3	21545	77.10	21545-C6	85.80
	.060	**.600** (10x)	3	3/16	3	21560	75.60	21560-C6	84.30
	.090	**.900** (10x)	3	1/4	4	21590	81.30	21590-C6	91.00
	.125 (1/8)	**1.250** (10x)	3	1/4	4	21599	81.30	21599-C6	91.00
1°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21615	82.60	21615-C6	90.60
	.030	**.156** (5x)	3	1/8	1-1/2	879830	44.60	879830-C6	52.60
	.030	**.300** (10x)	3	3/16	3	21630	75.60	21630-C6	84.30
	.045	**.450** (10x)	3	3/16	3	21645	77.10	21645-C6	85.80
	.060	**.312** (5x)	3	1/8	1-1/2	879860	44.60	879860-C6	52.60
	.060	**.600** (10x)	3	3/16	3	21660	75.60	21660-C6	84.30
	.090	**.900** (10x)	3	1/4	4	21690	79.80	21690-C6	91.70
	.125 (1/8)	**1.250** (10x)	3	1/4	4	21699	79.80	21699-C6	91.70
1.5°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21715	81.00	21715-C6	89.00
	.030	**.300** (10x)	3	3/16	3	21730	75.60	21730-C6	84.30
	.045	**.450** (10x)	3	3/16	3	21745	78.50	21745-C6	87.20
	.060	**.600** (10x)	3	3/16	3	21760	75.60	21760-C6	84.30
	.090	**.900** (10x)	3	1/4	4	21790	81.30	21790-C6	91.00
	.125 (1/8)	**1.250** (10x)	3	1/4	4	21799	79.80	21799-C6	89.50
2°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21815	81.00	21815-C6	89.00
	.030	**.300** (10x)	3	3/16	3	21830	75.60	21830-C6	84.30
	.045	**.450** (10x)	3	3/16	3	21845	77.10	21845-C6	85.80
	.060	**.600** (10x)	3	3/16	3	21860	75.60	21860-C6	84.30
	.090	**.900** (10x)	3	1/4	4	21890	79.80	21890-C6	89.50
	.125 (1/8)	**1.250** (10x)	3	1/4	4	21899	79.80	21899-C6	91.70
3°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21915	81.00	21915-C6	89.00
	.030	**.156** (5x)	3	1/8	1-1/2	880230	44.60	880230-C6	52.60
	.030	**.300** (10x)	3	3/16	3	21930	75.60	21930-C6	84.30
	.045	**.450** (10x)	3	3/16	3	21945	77.10	21945-C6	85.80
	.060	**.312** (5x)	3	1/8	1-1/2	880260	44.60	880260-C6	52.60
	.060	**.600** (10x)	3	3/16	3	21960	75.60	21960-C6	84.30
	.090	**.900** (10x)	3	1/4	4	21990	79.80	21990-C6	91.70
	.125 (1/8)	**1.192** (10x)	3	1/4	4	21999	79.80	21999-C6	91.70
4°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	840415	85.00	840415-C6	91.70
	.030	**.300** (10x)	3	3/16	3	840430	79.20	840430-C6	86.80
	.060	**.600** (10x)	3	3/16	3	840460	79.20	840460-C6	88.00
	.090	**.900** (10x)	3	1/4	4	840490	83.70	840490-C6	95.60

continued on next page

MINIATURE END MILLS

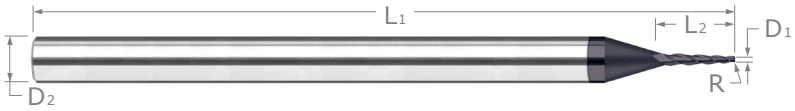
Tapered – Ball (cont.)

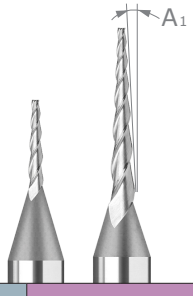
continued from previous page

ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
5°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	32615	81.00	32615-C6	89.00
	.030	**.156** (5x)	3	1/8	1-1/2	880630	44.60	880630-C6	52.60
	.030	**.300** (10x)	3	3/16	3	32630	75.60	32630-C6	84.30
	.030	**.300** (10x)	4	3/16	3	723530	78.20	723530-C6	85.80
	.045	**.250** (5x)	3	1/8	1-1/2	880645	44.60	880645-C6	50.90
	.045	**.450** (10x)	3	3/16	3	32645	77.10	32645-C6	85.80
	.060	**.312** (5x)	3	1/8	1-1/2	880660	44.60	880660-C6	52.60
	.060	**.480** (8x)	3	3/16	2	761960	69.50	761960-C6	76.60
	.060	**.600** (10x)	3	3/16	3	32660	75.60	32660-C6	84.30
	.060	**.600** (10x)	4	3/16	3	723560	78.20	723560-C6	85.80
	.090	**.900** (10x)	3	1/4	4	32690	79.80	32690-C6	91.70
	.125 (1/8)	**1.250** (10x)	3	3/8	4	32699	106.30	32699-C6	119.60
6°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	835615	85.00	835615-C6	93.10
	.030	**.300** (10x)	3	3/16	3	835630	78.50	835630-C6	87.20
	.060	**.600** (10x)	3	3/16	3	835660	82.90	835660-C6	91.70
	.090	**.900** (10x)	3	3/8	4	835690	110.40	835690-C6	123.80
7°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	34415	84.10	34415-C6	92.20
	.030	**.300** (10x)	3	3/16	3	34430	78.50	34430-C6	86.10
	.045	**.450** (10x)	3	3/16	3	34445	80.10	34445-C6	88.80
	.060	**.600** (10x)	3	1/4	4	34460	82.90	34460-C6	94.90
	.090	**.900** (10x)	3	3/8	4	34490	110.40	34490-C6	123.80
8°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	853815	85.00	853815-C6	91.70
	.030	**.300** (10x)	3	3/16	3	853830	79.20	853830-C6	88.00
	.060	**.600** (10x)	3	1/4	4	853860	82.90	853860-C6	94.90
	.090	**.900** (10x)	3	3/8	4	853890	110.40	853890-C6	123.80
10°	.015 (1/64)	**.078** (5x)	3	1/8	1-1/2	881015	46.20	881015-C6	54.30
	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	35315	84.10	35315-C6	92.20
	.015 (1/64)	**.150** (10x)	4	1/8	2-1/2	723415	86.30	723415-C6	93.00
	.030	**.156** (5x)	3	1/8	1-1/2	881030	46.20	881030-C6	54.30
	.030	**.300** (10x)	3	3/16	3	35330	78.50	35330-C6	87.20
	.045	**.250** (5x)	3	3/16	2	881045	76.10	881045-C6	84.80
	.045	**.450** (10x)	3	1/4	4	35345	84.10	35345-C6	96.00
	.060	**.312** (5x)	3	3/16	2	881060	76.10	881060-C6	84.80
	.060	**.600** (10x)	3	3/8	4	35360	110.40	35360-C6	123.80
	.090	**.500** (5x)	3	5/16	2-1/2	881090	122.80	881090-C6	136.20
	.125 (1/8)	**.625** (5x)	3	3/8	2-1/2	881099	151.00	881099-C6	164.40
	.187 (3/16)	**.937** (5x)	3	1/2	3	881081	173.00	881081-C6	190.40
	.250 (1/4)	**1.177** (5x)	3	5/8	3-1/2	881084	186.00	881084-C6	205.10
15°	.015 (1/64)	**.078** (5x)	3	1/8	1-1/2	785915	45.50	785915-C6	53.60
	.015 (1/64)	**.150** (10x)	3	1/8	1-1/2	916115	83.40	916115-C6	91.50
	.030	**.156** (5x)	3	1/8	1-1/2	785930	45.50	785930-C6	53.60
	.030	**.300** (10x)	3	3/16	2	916130	77.70	916130-C6	86.40
	.030	**.300** (10x)	4	3/16	2	723330	80.30	723330-C6	87.40
	.045	**.402** (9x)	3	1/4	2-1/2	916145	83.40	916145-C6	95.30
	.060	**.312** (5x)	3	1/4	2	785960	79.10	785960-C6	90.90
	.060	**.600** (10x)	3	3/8	2-1/2	916160	109.70	916160-C6	123.00
	.060	**.600** (10x)	4	3/8	2-1/2	723360	112.40	723360-C6	125.30
20°	.015 (1/64)	**.078** (5x)	3	1/8	1-1/2	802115	46.20	802115-C6	54.30
	.030	**.156** (5x)	3	3/16	2	802130	75.30	802130-C6	84.10
	.045	**.250** (5x)	3	1/4	2-1/2	802145	84.60	802145-C6	96.60
	.060	**.312** (5x)	3	5/16	2-1/2	802160	122.80	802160-C6	133.70

MINIATURE END MILLS

Tapered – Corner Radius





- Corner radius for improved strength
- Long length design for deep cavity machining
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

	ANGLE PER SIDE	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
NEW	5°	.015 (1/64)	.005	**.078** (5x)	1/8	1-1/2	1-1/2	714715	46.60	714715-C6	52.90
NEW		.015 (1/64)	.005	**.150** (10x)	1/8	2-1/2	2-1/2	714515	76.40	714515-C6	83.10
NEW		.030	.005	**.156** (5x)	1/8	1-1/2	1-1/2	714730	41.10	714730-C6	47.40
NEW		.030	.005	**.300** (10x)	3/16	3	3	714530	70.30	714530-C6	77.90
NEW		.045	.005	**.250** (5x)	1/8	1-1/2	1-1/2	714745	41.10	714745-C6	47.40
NEW		.045	.005	**.450** (10x)	3/16	3	3	714545	70.90	714545-C6	78.50
NEW		.060	.005	**.312** (5x)	1/8	1-1/2	1-1/2	714760	41.10	714760-C6	47.40
NEW		.060	.005	**.600** (10x)	3/16	3	3	714560	70.30	714560-C6	77.90
NEW		.125 (1/8)	.005	**.625** (5x)	1/4	2-1/2	2-1/2	714799	92.90	714799-C6	101.90
NEW		.125 (1/8)	.005	**1.250** (10x)	3/8	4	4	714599	102.50	714599-C6	116.40
NEW	10°	.015 (1/64)	.005	**.078** (5x)	1/8	1-1/2	1-1/2	714615	44.20	714615-C6	50.50
NEW		.015 (1/64)	.005	**.150** (10x)	1/8	2-1/2	2-1/2	714415	75.70	714415-C6	82.40
NEW		.030	.005	**.156** (5x)	1/8	1-1/2	1-1/2	714630	40.80	714630-C6	47.10
NEW		.030	.005	**.300** (10x)	3/16	3	3	714430	69.70	714430-C6	77.30
NEW		.045	.005	**.250** (5x)	3/16	2	2	714645	68.60	714645-C6	75.70
NEW		.045	.005	**.450** (10x)	1/4	4	4	714445	75.80	714445-C6	85.50
NEW		.060	.005	**.312** (5x)	3/16	2	2	714660	68.60	714660-C6	75.70
NEW		.060	.005	**.600** (10x)	3/8	4	4	714460	100.00	714460-C6	113.90
NEW		.125 (1/8)	.005	**.625** (5x)	3/8	2-1/2	2-1/2	714699	119.20	714699-C6	132.10
NEW		.125 (1/8)	.005	**1.250** (10x)	5/8	4	4	714499	155.90	714499-C6	177.70

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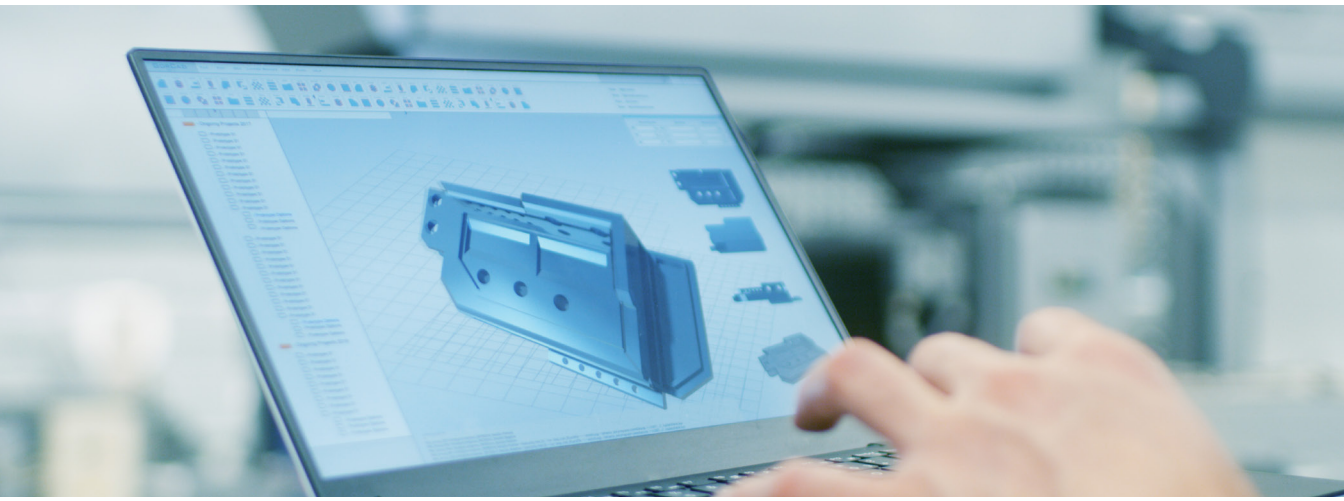
Harvey Performance Company works closely with industry-leading CAM software companies to optimize Harvey Tool and Helical Solutions product libraries for their platforms.



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- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	ALTiN NANO COATED	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
.015 (1/64)		.0150	**.023** (1.5x)	1/4	2-1/2	907415-C6	81.70
.015 (1/64)		.0150	**.045** (3x)	1/4	2-1/2	915915-C6	81.70
.015 (1/64)		.0150	**.078** (5x)	1/4	2-1/2	885215-C6	85.60
.020		.0200	**.030** (1.5x)	1/4	2-1/2	907420-C6	81.70
.020		.0200	**.060** (3x)	1/4	2-1/2	915920-C6	81.70
.020		.0200	**.100** (5x)	1/4	2-1/2	885220-C6	85.60
.025		.0250	**.038** (1.5x)	1/4	2-1/2	907425-C6	81.70
.025		.0250	**.075** (3x)	1/4	2-1/2	915925-C6	81.70
.030		.0300	**.045** (1.5x)	1/4	2-1/2	907430-C6	74.20
.030		.0300	**.090** (3x)	1/4	2-1/2	915930-C6	74.90
.031 (1/32)		.0310	**.025** (0.8x)	1/4	2-1/2	859431-C6	72.60
.031 (1/32)		.0310	**.047** (1.5x)	1/4	2-1/2	907431-C6	68.70
.031 (1/32)		.0310	**.093** (3x)	1/4	2-1/2	915931-C6	68.70
.031 (1/32)		.0310	**.125** (4x)	1/4	2-1/2	824931-C6	72.60
.031 (1/32)		.0310	**.156** (5x)	1/4	2-1/2	885231-C6	75.00
.035		.0350	**.053** (1.5x)	1/4	2-1/2	907435-C6	69.80
.035		.0350	**.105** (3x)	1/4	2-1/2	915935-C6	69.20
.039		.0390	**.059** (1.5x)	1/4	2-1/2	907439-C6	69.80
.039		.0390	**.117** (3x)	1/4	2-1/2	915939-C6	69.20
.039		.0390	**.203** (5x)	1/4	2-1/2	885239-C6	75.70
	1.0 mm	.0393	**3.00 mm** (3x)	6 mm	63 mm	897822-C6	76.10
.040		.0400	**.060** (1.5x)	1/4	2-1/2	907440-C6	68.70
.040		.0400	**.120** (3x)	1/4	2-1/2	915940-C6	68.70
.040		.0400	**.203** (5x)	1/4	2-1/2	885240-C6	75.00
.045		.0450	**.068** (1.5x)	1/4	2-1/2	907445-C6	69.20
.045		.0450	**.135** (3x)	1/4	2-1/2	915945-C6	69.20
.047 (3/64)		.0470	**.071** (1.5x)	1/4	2-1/2	907447-C6	68.70
.047 (3/64)		.0470	**.141** (3x)	1/4	2-1/2	915947-C6	68.70
.047 (3/64)		.0470	**.187** (4x)	1/4	2-1/2	824947-C6	71.90
.047 (3/64)		.0470	**.250** (5x)	1/4	2-1/2	885247-C6	75.00
.050		.0500	**.075** (1.5x)	1/4	2-1/2	907450-C6	69.50
.050		.0500	**.150** (3x)	1/4	2-1/2	915950-C6	68.70
.055		.0550	**.083** (1.5x)	1/4	2-1/2	907455-C6	69.80
.055		.0550	**.165** (3x)	1/4	2-1/2	915955-C6	69.20
.060		.0600	**.090** (1.5x)	1/4	2-1/2	907460-C6	68.70
.060		.0600	**.180** (3x)	1/4	2-1/2	915960-C6	68.70

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END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc (cont.)

continued from previous page

CUTTER DIAMETER D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ / +.25mm −.00mm	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED 5 FL	PRICE
.062 (1/16)		.0620	**.050** (0.8x)	1/4	2-1/2	859462-C6	71.90
.062 (1/16)		.0620	**.093** (1.5x)	1/4	2-1/2	907462-C6	68.70
.062 (1/16)		.0620	**.186** (3x)	1/4	2-1/2	915962-C6	68.70
.062 (1/16)		.0620	**.250** (4x)	1/4	2-1/2	824962-C6	72.60
.062 (1/16)		.0620	**.312** (5x)	1/4	2-1/2	885262-C6	75.00
.070		.0700	**.105** (1.5x)	1/4	2-1/2	907470-C6	71.90
.070		.0700	**.210** (3x)	1/4	2-1/2	915970-C6	71.90
.078 (5/64)		.0780	**.117** (1.5x)	1/4	2-1/2	907478-C6	71.90
.078 (5/64)		.0780	**.234** (3x)	1/4	2-1/2	915978-C6	71.90
.078 (5/64)		.0780	**.312** (4x)	1/4	2-1/2	824978-C6	75.80
.078 (5/64)		.0780	**.406** (5x)	1/4	2-1/2	885278-C6	78.30
	2.0 mm	.0787	**3.00 mm** (1.5x)	6 mm	63 mm	777845-C6	80.50
	2.0 mm	.0787	**6.00 mm** (3x)	6 mm	63 mm	897845-C6	79.70
.080		.0800	**.120** (1.5x)	1/4	2-1/2	907480-C6	72.60
.080		.0800	**.240** (3x)	1/4	2-1/2	915980-C6	72.60
.090		.0900	**.135** (1.5x)	1/4	2-1/2	907490-C6	72.60
.090		.0900	**.270** (3x)	1/4	2-1/2	915990-C6	71.90
.093 (3/32)		.0930	**.074** (0.8x)	1/4	2-1/2	859493-C6	76.20
.093 (3/32)		.0930	**.140** (1.5x)	1/4	2-1/2	907493-C6	73.00
.093 (3/32)		.0930	**.279** (3x)	1/4	2-1/2	915993-C6	73.00
.093 (3/32)		.0930	**.372** (4x)	1/4	2-1/2	824993-C6	76.70
.093 (3/32)		.0930	**.500** (5x)	1/4	2-1/2	885293-C6	79.10
.100		.1000	**.150** (1.5x)	1/4	2-1/2	907500-C6	73.00
.100		.1000	**.300** (3x)	1/4	2-1/2	916000-C6	73.00
.109 (7/64)		.1090	**.164** (1.5x)	1/4	2-1/2	907502-C6	73.60
.109 (7/64)		.1090	**.327** (3x)	1/4	2-1/2	916002-C6	73.60
NEW .109 (7/64)		.1090	**.570** (5x)	1/4	2-1/2	885302-C6	79.70
.118		.1180	**.177** (1.5x)	1/4	2-1/2	907505-C6	74.20
.118		.1180	**.354** (3x)	1/4	2-1/2	916005-C6	74.20
	3.0 mm	.1181	**9.00 mm** (3x)	6 mm	63 mm	897857-C6	81.30

D_1 +.000″ −.002″	D_1 +.00mm −.04mm	D_1 decimal equivalent	LENGTH OF CUT L_2 +.030″ −.000″ / +.75mm −.00mm	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	5 FL	PRICE
.125 (1/8)		.1250	**.100** (0.8x)	1/4	2-1/2	859508-C6	77.00
.125 (1/8)		.1250	**.187** (1.5x)	1/4	2-1/2	907508-C6	73.80
.125 (1/8)		.1250	**.375** (3x)	1/4	2-1/2	916008-C6	73.80
.125 (1/8)		.1250	**.500** (4x)	1/4	2-1/2	825008-C6	77.50
.125 (1/8)		.1250	**.625** (5x)	1/4	2-1/2	885308-C6	80.10
.140 (9/64)		.1406	**.220** (1.5x)	1/4	2-1/2	907509-C6	77.60
.140 (9/64)		.1406	**.425** (3x)	1/4	2-1/2	916009-C6	77.60
.140 (9/64)		.1406	**.750** (5x)	1/4	2-1/2	885309-C6	80.80
NEW .156 (5/32)		.1562	**.125** (0.8x)	1/4	2-1/2	859510-C6	77.00
.156 (5/32)		.1562	**.235** (1.5x)	1/4	2-1/2	907510-C6	73.80
.156 (5/32)		.1562	**.468** (3x)	1/4	2-1/2	916010-C6	73.80
.156 (5/32)		.1562	**.625** (4x)	1/4	2-1/2	825010-C6	77.50
.156 (5/32)		.1562	**.750** (5x)	1/4	3	885310-C6	80.80

continued on next page

NEW SIZES!

END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc (cont.)

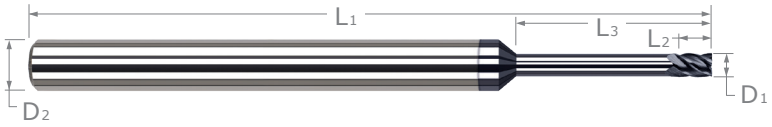
continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
.172 (11/64)		.1718	**.516** (3x)	1/4	2-1/2	916011-C6	79.90
.187 (3/16)		.1875	**.150** (0.8x)	1/4	2-1/2	859512-C6	78.70
.187 (3/16)		.1875	**.285** (1.5x)	1/4	2-1/2	907512-C6	76.70
.187 (3/16)		.1875	**.562** (3x)	1/4	2-1/2	916012-C6	76.70
.187 (3/16)		.1875	**1.000** (5x)	1/4	3	885312-C6	84.50
.218 (7/32)		.2187	**.656** (3x)	1/4	2-1/2	916014-C6	79.90
	6.0 mm	.2362	**18.00 mm** (3x)	6 mm	63 mm	897866-C6	82.00
.250 (1/4)		.2500	**.200** (0.8x)	1/4	2-1/2	859516-C6	87.50
.250 (1/4)		.2500	**.375** (1.5x)	1/4	2-1/2	907516-C6	85.50
.250 (1/4)		.2500	**.750** (3x)	1/4	2-1/2	916016-C6	85.50
.250 (1/4)		.2500	**1.250** (5x)	1/4	4	885316-C6	92.90
.312 (5/16)		.3125	**.470** (1.5x)	5/16	2-1/2	907520-C6	93.10
.312 (5/16)		.3125	**1.000** (3x)	5/16	2-1/2	916020-C6	94.10
.375 (3/8)		.3750	**.570** (1.5x)	3/8	2-1/2	907524-C6	107.60
.375 (3/8)		.3750	**1.125** (3x)	3/8	2-1/2	916024-C6	107.60
.500 (1/2)		.5000	**.750** (1.5x)	1/2	3	907532-C6	130.00
.500 (1/2)		.5000	**1.500** (3x)	1/2	3	916032-C6	131.30

Please see Speeds & Feeds on page 114

END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc – Long Reach, Stub Flute



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

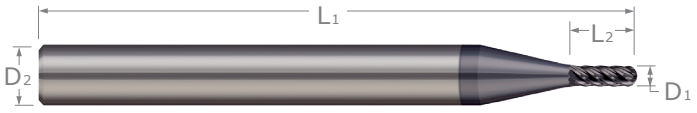
	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE
	.031 (1/32)	.047	**.156** (5x)	1/4	2-1/2	825331-C6	77.50
	.031 (1/32)	.047	**.250** (8x)	1/4	2-1/2	819031-C6	83.70
	.047 (3/64)	.071	**.250** (5x)	1/4	2-1/2	825347-C6	77.50
	.047 (3/64)	.071	**.375** (8x)	1/4	2-1/2	819047-C6	83.70
	.062 (1/16)	.093	**.312** (5x)	1/4	2-1/2	825362-C6	77.50
	.062 (1/16)	.093	**.500** (8x)	1/4	2-1/2	819062-C6	83.70
	.078 (5/64)	.117	**.406** (5x)	1/4	2-1/2	825378-C6	77.50
	.078 (5/64)	.117	**.625** (8x)	1/4	2-1/2	819078-C6	84.50
	.093 (3/32)	.140	**.500** (5x)	1/4	2-1/2	825393-C6	81.80
	.093 (3/32)	.140	**.750** (8x)	1/4	2-1/2	819093-C6	87.90
NEW	.109 (7/64)	.164	**.570** (5x)	1/4	2-1/2	825402-C6	81.80
NEW	.109 (7/64)	.164	**.900** (8x)	1/4	2-1/2	819102-C6	87.90
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE
	.125 (1/8)	.187	**.625** (5x)	1/4	2-1/2	825408-C6	82.60
	.125 (1/8)	.187	**1.000** (8x)	1/4	2-1/2	819108-C6	88.80
NEW	.156 (5/32)	.235	**.750** (5x)	1/4	3	825410-C6	87.10
NEW	.156 (5/32)	.235	**1.250** (8x)	1/4	3	819110-C6	93.10
	.187 (3/16)	.285	**1.000** (5x)	1/4	3	825412-C6	87.10
	.187 (3/16)	.285	**1.500** (8x)	1/4	3	819112-C6	93.10
	.250 (1/4)	.375	**1.250** (5x)	1/4	4	825416-C6	91.20
	.250 (1/4)	.375	**2.000** (8x)	1/4	4	819116-C6	97.60

Please see Speeds & Feeds on page 115

NEW SIZES!

END MILLS FOR HARDENED STEELS

Ball – For Steels Up to 55 Rc



6 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 6 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Ball profile for maximum strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE	
.031 (1/32)	.047 (1.5x)	1/4	2-1/2	798131-C6	50.60	
.031 (1/32)	.093 (3x)	1/4	2-1/2	843431-C6	50.60	
.031 (1/32)	.156 (5x)	1/4	2-1/2	789431-C6	54.30	
.039	.059 (1.5x)	1/4	2-1/2	798139-C6	50.60	
.039	.117 (3x)	1/4	2-1/2	843439-C6	50.60	
.040	.120 (3x)	1/4	2-1/2	843440-C6	50.60	
.047 (3/64)	.071 (1.5x)	1/4	2-1/2	798147-C6	50.60	
.047 (3/64)	.141 (3x)	1/4	2-1/2	843447-C6	50.60	
.047 (3/64)	.250 (5x)	1/4	2-1/2	789447-C6	54.30	
.062 (1/16)	.093 (1.5x)	1/4	2-1/2	798162-C6	48.00	
.062 (1/16)	.186 (3x)	1/4	2-1/2	843462-C6	48.00	
.062 (1/16)	.250 (4x)	1/4	2-1/2	718962-C6	51.20	NEW
.062 (1/16)	.312 (5x)	1/4	2-1/2	789462-C6	54.30	
.078 (5/64)	.117 (1.5x)	1/4	2-1/2	798178-C6	48.00	
.078 (5/64)	.234 (3x)	1/4	2-1/2	843478-C6	48.00	
.078 (5/64)	.406 (5x)	1/4	2-1/2	789478-C6	54.30	
.093 (3/32)	.140 (1.5x)	1/4	2-1/2	798193-C6	48.00	
.093 (3/32)	.279 (3x)	1/4	2-1/2	843493-C6	48.00	
.093 (3/32)	.375 (4x)	1/4	2-1/2	718993-C6	51.20	NEW
.093 (3/32)	.500 (5x)	1/4	2-1/2	789493-C6	54.30	
.109 (7/64)	.327 (3x)	1/4	2-1/2	843502-C6	48.00	NEW
.118	.177 (1.5x)	1/4	2-1/2	798205-C6	48.00	
.118	.354 (3x)	1/4	2-1/2	843505-C6	48.00	

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE	
.125 (1/8)	.187 (1.5x)	1/4	2-1/2	798208-C6	44.00	
.125 (1/8)	.375 (3x)	1/4	2-1/2	843508-C6	44.00	
.125 (1/8)	.500 (4x)	1/4	2-1/2	719008-C6	47.20	NEW
.125 (1/8)	.625 (5x)	1/4	2-1/2	789508-C6	50.30	
.140 (9/64)	.220 (1.5x)	1/4	2-1/2	798209-C6	48.70	
.140 (9/64)	.425 (3x)	1/4	2-1/2	843509-C6	48.70	
.156 (5/32)	.235 (1.5x)	1/4	2-1/2	798210-C6	45.40	
.156 (5/32)	.468 (3x)	1/4	2-1/2	843510-C6	45.40	
.156 (5/32)	.750 (5x)	1/4	3	789510-C6	54.50	
.187 (3/16)	.285 (1.5x)	1/4	2-1/2	798212-C6	46.80	
.187 (3/16)	.562 (3x)	1/4	2-1/2	843512-C6	46.80	
.187 (3/16)	1.000 (5x)	1/4	3	789512-C6	54.50	
.250 (1/4)	.375 (1.5x)	1/4	2-1/2	798216-C6	56.70	
.250 (1/4)	.750 (3x)	1/4	2-1/2	843516-C6	56.70	
.375 (3/8)	1.125 (3x)	3/8	2-1/2	843524-C6	89.60	

Please see Speeds & Feeds on page 111

END MILLS FOR HARDENED STEELS

Ball – For Steels Up to 55 Rc – Long Reach, Stub Flute

6 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 6 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE
.031 (1/32)	.047	**.156** (5x)	1/4	2-1/2	786231-C6	77.90
.031 (1/32)	.047	**.250** (8x)	1/4	2-1/2	786031-C6	84.10
.047 (3/64)	.071	**.250** (5x)	1/4	2-1/2	786247-C6	79.80
.047 (3/64)	.071	**.375** (8x)	1/4	2-1/2	786047-C6	86.20
.062 (1/16)	.093	**.312** (5x)	1/4	2-1/2	786262-C6	79.00
.062 (1/16)	.093	**.500** (8x)	1/4	2-1/2	786062-C6	85.40
.078 (5/64)	.117	**.406** (5x)	1/4	2-1/2	786278-C6	82.00
.078 (5/64)	.117	**.625** (8x)	1/4	2-1/2	786078-C6	88.50
.093 (3/32)	.140	**.500** (5x)	1/4	2-1/2	786293-C6	83.40
.093 (3/32)	.140	**.750** (8x)	1/4	2-1/2	786093-C6	90.60
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE
.125 (1/8)	.187	**.625** (5x)	1/4	2-1/2	786308-C6	84.20
.125 (1/8)	.187	**1.000** (8x)	1/4	2-1/2	786108-C6	90.50
.187 (3/16)	.285	**1.000** (5x)	1/4	3	786312-C6	89.60
.187 (3/16)	.285	**1.500** (8x)	1/4	3	786112-C6	96.00

Speeds & Feeds (End Mills for Hardened Steels – Ball – For Steels Up to 55Rc)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter length of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 85%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00006	.00009	.00012	.00015	.00018	.00024	.00036	.00049	.00061	.00073	.00097	1 x Dia	.30 x Dia
			Profiling	.00004	.00007	.00011	.00015	.00018	.00022	.00029	.00044	.00059	.00073	.00088	.00118	.3 x Dia	.5 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00023	.00031	.00039	.00047	.00062	1 x Dia	.15 x Dia
			Profiling	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00026	.00034	.00043	.00051	.00068	.15 x Dia	.5 x Dia

Speeds & Feeds (End Mills for Hardened Steels – Ball – For Steels Up to 55Rc – Long Reach, Stub Flute)

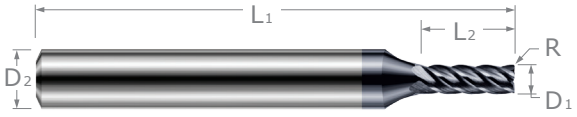
Important Note: Values in tables are in inches and are based on reached (8x Dia) end mills. For shorter reaches, tables values of IPT must be increased (for 5x, increase 125%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38 - 44 Rc	100	Slotting	.00003	.00005	.00008	.00011	.00013	.00016	.00022	.00032	.00043	.00054	.00065	.00086	1 x Dia	.28 x Dia
			Profiling	.00003	.00006	.00010	.00013	.00016	.00019	.00026	.00039	.00052	.00065	.00078	.00105	1 x Dia	.28 x Dia
	45 - 55 Rc	60	Slotting	.00002	.00003	.00005	.00007	.00009	.00010	.00014	.00021	.00028	.00035	.00041	.00055	1 x Dia	.14 x Dia
			Profiling	.00002	.00004	.00006	.00008	.00009	.00011	.00015	.00023	.00030	.00038	.00046	.00061	1 x Dia	.14 x Dia

NEW SIZES!

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Corner radius for improved strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	R +.001" −.001" +.025mm −.025mm	L_2 +.010" −.000" +.25mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE	
.015 (1/64)		.0150	**.003**	.045 (3x)	1/4	2-1/2	760415-C6	70.40	
.020		.0200	**.005**	.030 (1.5x)	1/4	2-1/2	920420-C6	69.50	
.020		.0200	**.005**	.060 (3x)	1/4	2-1/2	933220-C6	69.80	
.031 (1/32)		.0310	**.005**	.025 (0.8x)	1/4	2-1/2	718731-C6	71.90	NEW
.031 (1/32)		.0310	**.005**	.047 (1.5x)	1/4	2-1/2	920431-C6	68.70	
.031 (1/32)		.0310	**.005**	.093 (3x)	1/4	2-1/2	933231-C6	68.70	
.031 (1/32)		.0310	**.005**	.156 (5x)	1/4	2-1/2	851731-C6	75.00	
.031 (1/32)		.0310	**.010**	.093 (3x)	1/4	2-1/2	852131-C6	68.70	
.039		.0390	**.005**	.117 (3x)	1/4	2-1/2	933239-C6	69.80	
	1.0 mm	.0393	**.20 mm**	3.00 mm (3x)	6 mm	63 mm	894622-C6	76.10	
.040		.0400	**.005**	.060 (1.5x)	1/4	2-1/2	920440-C6	69.20	
.040		.0400	**.005**	.120 (3x)	1/4	2-1/2	933240-C6	69.20	
.047 (3/64)		.0470	**.005**	.071 (1.5x)	1/4	2-1/2	920447-C6	68.70	
.047 (3/64)		.0470	**.005**	.141 (3x)	1/4	2-1/2	933247-C6	68.70	
.047 (3/64)		.0470	**.005**	.250 (5x)	1/4	2-1/2	851747-C6	75.00	
.047 (3/64)		.0470	**.010**	.141 (3x)	1/4	2-1/2	852147-C6	68.70	
.047 (3/64)		.0470	**.010**	.250 (5x)	1/4	2-1/2	750047-C6	75.70	
.050		.0500	**.005**	.150 (3x)	1/4	2-1/2	933250-C6	69.20	
.060		.0600	**.005**	.090 (1.5x)	1/4	2-1/2	920460-C6	69.50	
.060		.0600	**.005**	.180 (3x)	1/4	2-1/2	933260-C6	69.20	
.062 (1/16)		.0620	**.005**	.050 (0.8x)	1/4	2-1/2	718762-C6	72.70	NEW
.062 (1/16)		.0620	**.005**	.093 (1.5x)	1/4	2-1/2	920462-C6	69.50	
.062 (1/16)		.0620	**.005**	.186 (3x)	1/4	2-1/2	933262-C6	68.70	
.062 (1/16)		.0620	**.005**	.312 (5x)	1/4	2-1/2	851762-C6	75.00	
.062 (1/16)		.0620	**.010**	.093 (1.5x)	1/4	2-1/2	872762-C6	68.70	
.062 (1/16)		.0620	**.010**	.186 (3x)	1/4	2-1/2	852162-C6	68.70	
.062 (1/16)		.0620	**.010**	.312 (5x)	1/4	2-1/2	750062-C6	75.70	
.062 (1/16)		.0620	**.020**	.186 (3x)	1/4	2-1/2	813562-C6	68.70	
.070		.0700	**.005**	.210 (3x)	1/4	2-1/2	933270-C6	72.50	
.078 (5/64)		.0780	**.005**	.117 (1.5x)	1/4	2-1/2	920478-C6	71.90	
.078 (5/64)		.0780	**.005**	.234 (3x)	1/4	2-1/2	933278-C6	71.90	
.078 (5/64)		.0780	**.005**	.406 (5x)	1/4	2-1/2	851778-C6	78.30	
.078 (5/64)		.0780	**.010**	.117 (1.5x)	1/4	2-1/2	872778-C6	71.90	
.078 (5/64)		.0780	**.010**	.234 (3x)	1/4	2-1/2	852178-C6	71.90	
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	6 mm	63 mm	894645-C6	80.50	
.080		.0800	**.005**	.240 (3x)	1/4	2-1/2	933280-C6	73.60	

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END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc (cont.)

continued from previous page

	CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
	.090		.0900	**.005**	.270 (3x)	1/4	2-1/2	933290-C6	74.30
NEW	.093 (3/32)		.0930	**.005**	.074 (0.8x)	1/4	2-1/2	718793-C6	76.20
	.093 (3/32)		.0930	**.005**	.140 (1.5x)	1/4	2-1/2	920493-C6	73.00
	.093 (3/32)		.0930	**.005**	.279 (3x)	1/4	2-1/2	933293-C6	73.00
	.093 (3/32)		.0930	**.005**	.372 (4x)	1/4	2-1/2	750893-C6	76.90
	.093 (3/32)		.0930	**.005**	.500 (5x)	1/4	2-1/2	851793-C6	79.10
	.093 (3/32)		.0930	**.010**	.140 (1.5x)	1/4	2-1/2	872793-C6	73.00
	.093 (3/32)		.0930	**.010**	.279 (3x)	1/4	2-1/2	852193-C6	73.00
	.093 (3/32)		.0930	**.010**	.500 (5x)	1/4	2-1/2	750093-C6	79.90
	.093 (3/32)		.0930	**.015**	.279 (3x)	1/4	2-1/2	852793-C6	73.00
	.093 (3/32)		.0930	**.020**	.140 (1.5x)	1/4	2-1/2	732093-C6	73.00
	.093 (3/32)		.0930	**.020**	.279 (3x)	1/4	2-1/2	813593-C6	73.00
	.093 (3/32)		.0930	**.030**	.279 (3x)	1/4	2-1/2	853293-C6	73.00
	.100		.1000	**.005**	.300 (3x)	1/4	2-1/2	933300-C6	74.30
	.109 (7/64)		.1090	**.005**	.327 (3x)	1/4	2-1/2	933302-C6	73.00
NEW	.118		.1180	**.005**	.177 (1.5x)	1/4	2-1/2	920505-C6	74.20
	.118		.1180	**.005**	.354 (3x)	1/4	2-1/2	933305-C6	74.20
NEW	.118		.1180	**.010**	.354 (3x)	1/4	2-1/2	852205-C6	74.20
		3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	6 mm	63 mm	894657-C6	81.30

	D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE
NEW	.125 (1/8)		.1250	**.005**	.100 (0.8x)	1/4	2-1/2	718808-C6	77.00
	.125 (1/8)		.1250	**.005**	.187 (1.5x)	1/4	2-1/2	920508-C6	73.80
	.125 (1/8)		.1250	**.005**	.375 (3x)	1/4	2-1/2	933308-C6	73.80
	.125 (1/8)		.1250	**.005**	.500 (4x)	1/4	2-1/2	750908-C6	77.60
	.125 (1/8)		.1250	**.005**	.625 (5x)	1/4	2-1/2	851808-C6	80.10
	.125 (1/8)		.1250	**.010**	.187 (1.5x)	1/4	2-1/2	872808-C6	74.50
	.125 (1/8)		.1250	**.010**	.375 (3x)	1/4	2-1/2	852208-C6	73.80
	.125 (1/8)		.1250	**.010**	.625 (5x)	1/4	2-1/2	781608-C6	80.10
	.125 (1/8)		.1250	**.015**	.187 (1.5x)	1/4	2-1/2	798008-C6	74.50
	.125 (1/8)		.1250	**.015**	.375 (3x)	1/4	2-1/2	852808-C6	73.80
	.125 (1/8)		.1250	**.015**	.625 (5x)	1/4	2-1/2	730808-C6	80.10
	.125 (1/8)		.1250	**.020**	.375 (3x)	1/4	2-1/2	813608-C6	73.80
	.125 (1/8)		.1250	**.030**	.187 (1.5x)	1/4	2-1/2	761308-C6	74.50
	.125 (1/8)		.1250	**.030**	.375 (3x)	1/4	2-1/2	853308-C6	73.80
	.140 (9/64)		.1406	**.005**	.220 (1.5x)	1/4	2-1/2	920509-C6	74.50
	.140 (9/64)		.1406	**.005**	.425 (3x)	1/4	2-1/2	933309-C6	73.80
	.156 (5/32)		.1562	**.005**	.235 (1.5x)	1/4	2-1/2	920510-C6	73.80
	.156 (5/32)		.1562	**.005**	.468 (3x)	1/4	2-1/2	933310-C6	73.80
	.156 (5/32)		.1562	**.005**	.625 (4x)	1/4	2-1/2	750910-C6	73.80
	.156 (5/32)		.1562	**.005**	.750 (5x)	1/4	3	851810-C6	80.10
	.156 (5/32)		.1562	**.010**	.468 (3x)	1/4	2-1/2	852210-C6	74.50
	.156 (5/32)		.1562	**.015**	.468 (3x)	1/4	2-1/2	852810-C6	73.80
	.156 (5/32)		.1562	**.020**	.468 (3x)	1/4	2-1/2	813610-C6	73.80
	.156 (5/32)		.1562	**.030**	.468 (3x)	1/4	2-1/2	853310-C6	73.80

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NEW SIZES!

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc (cont.)

continued from previous page

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	PRICE	
.187 (3/16)		.1875	**.005**	.150 (0.8x)	1/4	2-1/2	718812-C6	79.90	NEW
.187 (3/16)		.1875	**.005**	.285 (1.5x)	1/4	2-1/2	920512-C6	76.70	
.187 (3/16)		.1875	**.005**	.562 (3x)	1/4	2-1/2	933312-C6	76.70	
.187 (3/16)		.1875	**.005**	1.000 (5x)	1/4	3	851812-C6	84.50	
.187 (3/16)		.1875	**.010**	.562 (3x)	1/4	2-1/2	852212-C6	76.70	
.187 (3/16)		.1875	**.015**	.285 (1.5x)	1/4	2-1/2	798012-C6	76.70	
.187 (3/16)		.1875	**.015**	.562 (3x)	1/4	2-1/2	852812-C6	76.70	
.187 (3/16)		.1875	**.020**	.562 (3x)	1/4	2-1/2	813612-C6	76.70	
.187 (3/16)		.1875	**.030**	.285 (1.5x)	1/4	2-1/2	761312-C6	76.70	
.187 (3/16)		.1875	**.030**	.562 (3x)	1/4	2-1/2	853312-C6	76.70	
.187 (3/16)		.1875	**.060**	.562 (3x)	1/4	2-1/2	800712-C6	76.70	
	6.0 mm	.2362	**.20 mm**	18.00 mm (3x)	6 mm	63 mm	894666-C6	82.00	
.250 (1/4)		.2500	**.005**	.200 (0.8x)	1/4	2-1/2	718816-C6	88.70	NEW
.250 (1/4)		.2500	**.005**	.375 (1.5x)	1/4	2-1/2	920516-C6	85.50	
.250 (1/4)		.2500	**.005**	.750 (3x)	1/4	2-1/2	933316-C6	85.50	
.250 (1/4)		.2500	**.005**	1.250 (5x)	1/4	4	851816-C6	92.90	
.250 (1/4)		.2500	**.010**	.750 (3x)	1/4	2-1/2	852216-C6	85.50	
.250 (1/4)		.2500	**.015**	.375 (1.5x)	1/4	2-1/2	798016-C6	86.30	
.250 (1/4)		.2500	**.015**	.750 (3x)	1/4	2-1/2	852816-C6	85.50	
.250 (1/4)		.2500	**.020**	.750 (3x)	1/4	2-1/2	813616-C6	85.50	
.250 (1/4)		.2500	**.030**	.375 (1.5x)	1/4	2-1/2	761316-C6	85.50	
.250 (1/4)		.2500	**.030**	.750 (3x)	1/4	2-1/2	853316-C6	85.50	
.312 (5/16)		.3125	**.015**	1.000 (3x)	5/16	2-1/2	852720-C6	100.50	
.375 (3/8)		.3750	**.015**	1.125 (3x)	3/8	2-1/2	852824-C6	110.30	
.500 (1/2)		.5000	**.015**	1.500 (3x)	1/2	3	852832-C6	134.60	
.500 (1/2)		.5000	**.030**	1.500 (3x)	1/2	3	853332-C6	134.60	

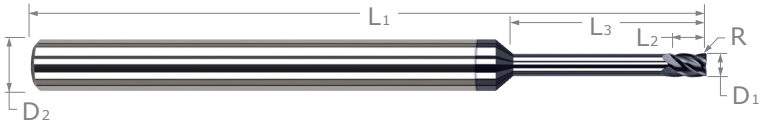
Speeds & Feeds (End Mills for Hardened Steels – Square & Corner Radius – For Steels Up to 55Rc)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 4x, reduce to 90%; for 5x, reduce to 85%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00007	.00010	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	1 x Dia	.30 x Dia
			Profiling	.00004	.00008	.00012	.00016	.00020	.00024	.00033	.00049	.00065	.00082	.00098	.00131	.3 x Dia	.5 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00009	.00011	.00013	.00017	.00026	.00035	.00043	.00052	.00069	1 x Dia	.15 x Dia
			Profiling	.00002	.00005	.00007	.00009	.00012	.00014	.00019	.00028	.00038	.00047	.00057	.00076	.15 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc – Long Reach, Stub Flute



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE
	.031 (1/32)	**.005**	.047	**.156** (5x)	1/4	2-1/2	812731-C6	78.30
	.031 (1/32)	**.005**	.047	**.250** (8x)	1/4	2-1/2	812531-C6	83.70
	.047 (3/64)	**.005**	.071	**.250** (5x)	1/4	2-1/2	812747-C6	77.50
	.047 (3/64)	**.005**	.071	**.375** (8x)	1/4	2-1/2	812547-C6	84.50
	.062 (1/16)	**.005**	.093	**.312** (5x)	1/4	2-1/2	812762-C6	77.50
	.062 (1/16)	**.005**	.093	**.500** (8x)	1/4	2-1/2	812562-C6	83.70
	.062 (1/16)	**.010**	.093	**.312** (5x)	1/4	2-1/2	761562-C6	78.30
	.062 (1/16)	**.010**	.093	**.500** (8x)	1/4	2-1/2	763762-C6	84.50
	.078 (5/64)	**.005**	.117	**.406** (5x)	1/4	2-1/2	812778-C6	78.30
	.078 (5/64)	**.005**	.117	**.625** (8x)	1/4	2-1/2	812578-C6	84.50
	.093 (3/32)	**.005**	.140	**.500** (5x)	1/4	2-1/2	812793-C6	81.80
	.093 (3/32)	**.005**	.140	**.750** (8x)	1/4	2-1/2	812593-C6	87.90
	.093 (3/32)	**.010**	.140	**.500** (5x)	1/4	2-1/2	761593-C6	82.60
	.093 (3/32)	**.010**	.140	**.750** (8x)	1/4	2-1/2	763793-C6	87.90
NEW	.109 (7/64)	**.005**	.164	**.570** (5x)	1/4	2-1/2	812702-C6	82.60
NEW	.109 (7/64)	**.005**	.164	**.900** (8x)	1/4	2-1/2	812502-C6	87.90

	D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE
	.125 (1/8)	**.005**	.187	**.625** (5x)	1/4	2-1/2	812808-C6	82.60
	.125 (1/8)	**.005**	.187	**1.000** (8x)	1/4	2-1/2	812608-C6	88.80
	.125 (1/8)	**.010**	.187	**.625** (5x)	1/4	2-1/2	761608-C6	82.60
	.125 (1/8)	**.010**	.187	**1.000** (8x)	1/4	2-1/2	763808-C6	89.60
NEW	.156 (5/32)	**.005**	.235	**.750** (5x)	1/4	3	812810-C6	87.10
NEW	.156 (5/32)	**.005**	.235	**1.250** (8x)	1/4	3	812610-C6	93.10
	.187 (3/16)	**.005**	.285	**1.000** (5x)	1/4	3	812812-C6	87.10
	.187 (3/16)	**.005**	.285	**1.500** (8x)	1/4	3	812612-C6	93.10
	.250 (1/4)	**.005**	.375	**1.250** (5x)	1/4	4	812816-C6	94.30
	.250 (1/4)	**.005**	.375	**2.000** (8x)	1/4	4	812616-C6	101.50

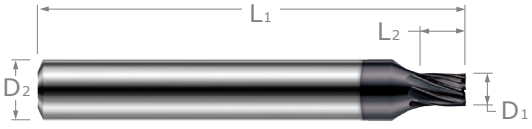
Speeds & Feeds (End Mills for Hardened Steels – Square & Corner Radius – For Steels Up to 55Rc – Long Reach, Stub Flute)

Important Note: Values in tables are in inches and are based on reached (8x Dia) end mills. For shorter reaches, tables values of IPT must be increased (for 5x, increase 125%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00006	.00009	.00012	.00015	.00018	.00024	.00036	.00048	.00060	.00072	.00096	1 x Dia	.28 x Dia
			Profiling	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	.00072	.00087	.00116	1 x Dia	.28 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00008	.00010	.00011	.00015	.00023	.00031	.00038	.00046	.00061	1 x Dia	.14 x Dia
			Profiling	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00025	.00034	.00042	.00051	.00068	1 x Dia	.14 x Dia

END MILLS FOR HARDENED STEELS

Square – For Steels 45 - 68 Rc



7 Flute, Variable Helix Design

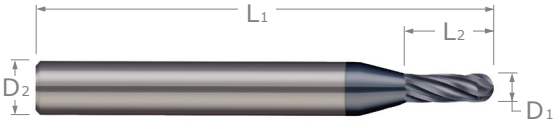
- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • End cutting (not center cutting)
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
.031 (1/32)	.047 (1.5x)	1/4	2-1/2	835131-C6	71.80
.031 (1/32)	.093 (3x)	1/4	2-1/2	854831-C6	71.80
.039	.117 (3x)	1/4	2-1/2	854839-C6	72.50
.040	.120 (3x)	1/4	2-1/2	854840-C6	71.80
.047 (3/64)	.071 (1.5x)	1/4	2-1/2	835147-C6	71.80
.047 (3/64)	.141 (3x)	1/4	2-1/2	854847-C6	71.80
.060	.180 (3x)	1/4	2-1/2	854860-C6	72.50
.062 (1/16)	.093 (1.5x)	1/4	2-1/2	835162-C6	71.80
.062 (1/16)	.186 (3x)	1/4	2-1/2	854862-C6	71.80
.062 (1/16)	.312 (5x)	1/4	2-1/2	797762-C6	71.80
.078 (5/64)	.117 (1.5x)	1/4	2-1/2	835178-C6	75.80
.078 (5/64)	.234 (3x)	1/4	2-1/2	854878-C6	75.80
.093 (3/32)	.074 (0.8x)	1/4	2-1/2	749893-C6	78.40
.093 (3/32)	.140 (1.5x)	1/4	2-1/2	835193-C6	76.60
.093 (3/32)	.279 (3x)	1/4	2-1/2	854893-C6	76.60
.093 (3/32)	.500 (5x)	1/4	2-1/2	797793-C6	78.70
.118	.177 (1.5x)	1/4	2-1/2	835205-C6	77.30
.118	.354 (3x)	1/4	2-1/2	854905-C6	77.30
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
.125 (1/8)	.100 (0.8x)	1/4	2-1/2	749908-C6	79.50
.125 (1/8)	.187 (1.5x)	1/4	2-1/2	835208-C6	77.50
.125 (1/8)	.375 (3x)	1/4	2-1/2	854808-C6	77.50
.125 (1/8)	.625 (5x)	1/4	2-1/2	797808-C6	79.70
.156 (5/32)	.235 (1.5x)	1/4	2-1/2	835210-C6	83.80
.156 (5/32)	.468 (3x)	1/4	2-1/2	854810-C6	83.80
.187 (3/16)	.150 (0.8x)	1/4	2-1/2	749912-C6	82.60
.187 (3/16)	.285 (1.5x)	1/4	2-1/2	835212-C6	80.70
.187 (3/16)	.562 (3x)	1/4	2-1/2	854812-C6	80.70
.250 (1/4)	.375 (1.5x)	1/4	2-1/2	835216-C6	89.80
.250 (1/4)	.750 (3x)	1/4	2-1/2	854816-C6	89.80
.250 (1/4)	1.250 (5x)	1/4	4	797816-C6	94.00
.375 (3/8)	.570 (1.5x)	3/8	2-1/2	835224-C6	112.10
.375 (3/8)	1.125 (3x)	3/8	2-1/2	854824-C6	112.10
.500 (1/2)	.750 (1.5x)	1/2	3	835232-C6	137.60
.500 (1/2)	1.500 (3x)	1/2	3	854832-C6	137.60

Please see Speeds & Feeds on page 119

END MILLS FOR HARDENED STEELS

Ball – For Steels 45 - 68 Rc



6 Flute, Variable Helix Design

- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 6 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE
	.031 (1/32)	.093 (3x)	1/4	2-1/2	763431-C6	51.70
	.047 (3/64)	.141 (3x)	1/4	2-1/2	763447-C6	51.70
	.062 (1/16)	.187 (3x)	1/4	2-1/2	763462-C6	49.00
	.078 (5/64)	.234 (3x)	1/4	2-1/2	763478-C6	49.00
	.093 (3/32)	.279 (3x)	1/4	2-1/2	763493-C6	49.00
NEW	.109 (7/64)	.327 (3x)	1/4	2-1/2	763502-C6	49.00
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE
	.125 (1/8)	.375 (3x)	1/4	2-1/2	763508-C6	44.90
NEW	.156 (5/32)	.469 (3x)	1/4	2-1/2	763510-C6	46.40
	.187 (3/16)	.563 (3x)	1/4	2-1/2	763512-C6	47.80
	.250 (1/4)	.750 (3x)	1/4	2-1/2	763516-C6	57.80
NEW	.375 (3/8)	1.125 (3x)	3/8	2-1/2	763524-C6	88.50
NEW	.500 (1/2)	1.500 (3x)	1/2	3	763532-C6	128.80

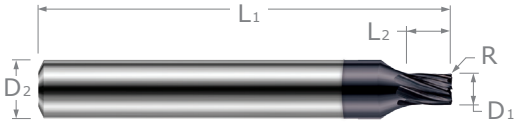
Speeds & Feeds (End Mills for Hardened Steels – Ball - For Steels 45 - 68Rc)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter length of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	45 - 55 Rc	60	Semi-Roughing	.00004	.00009	.00013	.00017	.00021	.00026	.00034	.00051	.00069	.00086	.00103	.00137	.15 x Dia	.25 x Dia
			Finishing	.00005	.00010	.00016	.00021	.00026	.00031	.00042	.00062	.00083	.00104	.00125	.00166	.08 x Dia	.5 x Dia
	56 - 68 Rc	50	Semi-Roughing	.00003	.00007	.00010	.00014	.00017	.00020	.00027	.00041	.00055	.00069	.00082	.00110	.12 x Dia	.20 x Dia
			Finishing	.00004	.00007	.00011	.00015	.00019	.00022	.00030	.00045	.00060	.00075	.00091	.00121	.08 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels 45 - 68 Rc



7 Flute, Variable Helix Design

- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Corner radius for improved strength • h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
.030	**.005**	.045 (1.5x)	1/4	2-1/2	903130-C6	79.20
.030	**.005**	.090 (3x)	1/4	2-1/2	910830-C6	79.20
.031 (1/32)	**.005**	.047 (1.5x)	1/4	2-1/2	903131-C6	76.10
.031 (1/32)	**.005**	.093 (3x)	1/4	2-1/2	910831-C6	76.80
.031 (1/32)	**.005**	.156 (5x)	1/4	2-1/2	845231-C6	82.30
.040	**.005**	.120 (3x)	1/4	2-1/2	910840-C6	79.20
.047 (3/64)	**.005**	.071 (1.5x)	1/4	2-1/2	903147-C6	76.10
.047 (3/64)	**.005**	.141 (3x)	1/4	2-1/2	910847-C6	76.10
.047 (3/64)	**.010**	.141 (3x)	1/4	2-1/2	850547-C6	76.10
.050	**.005**	.150 (3x)	1/4	2-1/2	910850-C6	79.20
.060	**.005**	.180 (3x)	1/4	2-1/2	910860-C6	79.20
.062 (1/16)	**.005**	.093 (1.5x)	1/4	2-1/2	903162-C6	76.10
.062 (1/16)	**.005**	.186 (3x)	1/4	2-1/2	910862-C6	76.10
.062 (1/16)	**.005**	.312 (5x)	1/4	2-1/2	845262-C6	82.30
.062 (1/16)	**.010**	.186 (3x)	1/4	2-1/2	850562-C6	76.10
.070	**.005**	.210 (3x)	1/4	2-1/2	910870-C6	78.50
.078 (5/64)	**.005**	.117 (1.5x)	1/4	2-1/2	903178-C6	79.80
.078 (5/64)	**.005**	.234 (3x)	1/4	2-1/2	910878-C6	79.80
.080	**.005**	.240 (3x)	1/4	2-1/2	910880-C6	82.40
.090	**.005**	.270 (3x)	1/4	2-1/2	910890-C6	83.20
.093 (3/32)	**.005**	.140 (1.5x)	1/4	2-1/2	903193-C6	80.50
.093 (3/32)	**.005**	.279 (3x)	1/4	2-1/2	910893-C6	80.50
.093 (3/32)	**.005**	.500 (5x)	1/4	2-1/2	845293-C6	86.80
.093 (3/32)	**.010**	.279 (3x)	1/4	2-1/2	850593-C6	80.50
.100	**.005**	.300 (3x)	1/4	2-1/2	910900-C6	83.20
.109 (7/64)	**.005**	.327 (3x)	1/4	2-1/2	910902-C6	82.40
.118	**.005**	.354 (3x)	1/4	2-1/2	910905-C6	82.40
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
.125 (1/8)	**.005**	.187 (1.5x)	1/4	2-1/2	903208-C6	81.70
.125 (1/8)	**.005**	.375 (3x)	1/4	2-1/2	910908-C6	81.70
.125 (1/8)	**.005**	.625 (5x)	1/4	2-1/2	845308-C6	81.70
.125 (1/8)	**.010**	.375 (3x)	1/4	2-1/2	850608-C6	82.50
.125 (1/8)	**.015**	.187 (1.5x)	1/4	2-1/2	879108-C6	81.70
.125 (1/8)	**.015**	.375 (3x)	1/4	2-1/2	882308-C6	81.70
.125 (1/8)	**.030**	.375 (3x)	1/4	2-1/2	883508-C6	81.70

continued on next page

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels 45 - 68 Rc (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	PRICE
.140 (9/64)	**.005**	.425 (3x)	1/4	2-1/2	910909-C6	84.20
.156 (5/32)	**.005**	.235 (1.5x)	1/4	2-1/2	903210-C6	81.70
.156 (5/32)	**.005**	.468 (3x)	1/4	2-1/2	910910-C6	81.70
.187 (3/16)	**.005**	.285 (1.5x)	1/4	2-1/2	903212-C6	85.10
.187 (3/16)	**.005**	.562 (3x)	1/4	2-1/2	910912-C6	85.10
.187 (3/16)	**.010**	.562 (3x)	1/4	2-1/2	850612-C6	85.10
.187 (3/16)	**.015**	.285 (1.5x)	1/4	2-1/2	879112-C6	85.10
.187 (3/16)	**.015**	.562 (3x)	1/4	2-1/2	882312-C6	85.10
.187 (3/16)	**.015**	1.000 (5x)	1/4	3	723212-C6	87.40
.187 (3/16)	**.030**	.562 (3x)	1/4	2-1/2	883512-C6	85.10
.250 (1/4)	**.005**	.375 (1.5x)	1/4	2-1/2	903216-C6	94.60
.250 (1/4)	**.005**	.750 (3x)	1/4	2-1/2	910916-C6	95.60
.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	850616-C6	94.60
.250 (1/4)	**.015**	.375 (1.5x)	1/4	2-1/2	879116-C6	94.60
.250 (1/4)	**.015**	.750 (3x)	1/4	2-1/2	882316-C6	94.60
.250 (1/4)	**.030**	.750 (3x)	1/4	2-1/2	883516-C6	94.60
.312 (5/16)	**.015**	1.000 (3x)	5/16	2-1/2	882320-C6	98.40
.312 (5/16)	**.030**	1.000 (3x)	5/16	2-1/2	883520-C6	99.40
.375 (3/8)	**.015**	.570 (1.5x)	3/8	2-1/2	879124-C6	106.40
.375 (3/8)	**.015**	1.125 (3x)	3/8	2-1/2	882324-C6	106.40
.375 (3/8)	**.030**	.570 (1.5x)	3/8	2-1/2	868024-C6	106.40
.375 (3/8)	**.030**	1.125 (3x)	3/8	2-1/2	883524-C6	107.40
.500 (1/2)	**.015**	.750 (1.5x)	1/2	3	879132-C6	119.00
.500 (1/2)	**.015**	1.500 (3x)	1/2	3	882332-C6	119.00
.500 (1/2)	**.030**	.750 (1.5x)	1/2	3	868032-C6	119.00
.500 (1/2)	**.030**	1.500 (3x)	1/2	3	883532-C6	119.00

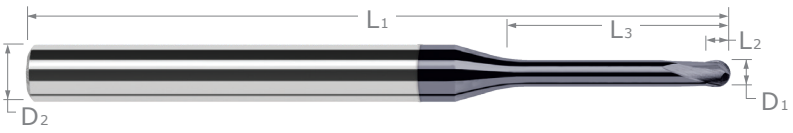
Speeds & Feeds (End Mills for Hardened Steels – Square & Corner Radius For Steels 45 - 68Rc)

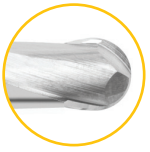
Important Note: Values intable are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 114%; for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	45 - 55 Rc	60	Semi-Roughing	.00004	.00008	.00012	.00015	.00019	.00023	.00031	.00047	.00062	.00078	.00094	.00125	.15 x Dia	.25 x Dia
			Finishing	.00005	.00009	.00014	.00019	.00024	.00028	.00038	.00056	.00076	.00094	.00113	.00151	.08 x Dia	.5 x Dia
	56 - 68 Rc	50	Semi-Roughing	.00003	.00006	.00009	.00012	.00016	.00019	.00025	.00037	.00050	.00062	.00075	.00100	.12 x Dia	.20 x Dia
			Finishing	.00003	.00007	.00010	.00014	.00017	.00020	.00027	.00041	.00055	.00069	.00082	.00110	.08 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Finishers – Ball





Stub Flute and Large Rigid Core

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Reduced neck diameter to avoid heeling
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
.008		.0080	.006	**.012** (1.5x)	1/4	2-1/2	37808-C6	113.90		
.008		.0080	.006	**.025** (3x)	1/4	2-1/2	31408-C6	113.90		
.008		.0080	.006	**.040** (5x)	1/4	2-1/2	38708-C6	119.50		
.010		.0100	.008	**.015** (1.5x)	1/4	2-1/2	37810-C6	103.30		
.010		.0100	.008	**.031** (3x)	1/4	2-1/2	31410-C6	103.30		
.010		.0100	.008	**.050** (5x)	1/4	2-1/2	38710-C6	108.30		
.015 (1/64)		.0150	.012	**-**	1/4	2-1/2	958315-C6	86.70		
.015 (1/64)		.0150	.012	**.023** (1.5x)	1/4	2-1/2	37815-C6	81.30		
.015 (1/64)		.0150	.012	**.047** (3x)	1/4	2-1/2	31415-C6	81.30	813115-C6	87.40
.015 (1/64)		.0150	.012	**.062** (4x)	1/4	2-1/2	881515-C6	84.20		
.015 (1/64)		.0150	.012	**.078** (5x)	1/4	2-1/2	38715-C6	84.20	812915-C6	90.40
.015 (1/64)		.0150	.012	**.125** (8x)	1/4	2-1/2	32015-C6	90.10		
.015 (1/64)		.0150	.012	**.187** (12x)	1/4	2-1/2	33815-C6	111.50		
.020		.0200	.016	**-**	1/4	2-1/2	958320-C6	85.80		
.020		.0200	.016	**.031** (1.5x)	1/4	2-1/2	37820-C6	81.30		
.020		.0200	.016	**.062** (3x)	1/4	2-1/2	31420-C6	81.30		
.020		.0200	.016	**.080** (4x)	1/4	2-1/2	881520-C6	84.20		
.020		.0200	.016	**.100** (5x)	1/4	2-1/2	38720-C6	84.20		
.020		.0200	.016	**.160** (8x)	1/4	2-1/2	32020-C6	85.10		
.020		.0200	.016	**.200** (10x)	1/4	2-1/2	919120-C6	99.10		
.025		.0250	.020	**.038** (1.5x)	1/4	2-1/2	37825-C6	81.30		
.025		.0250	.020	**.075** (3x)	1/4	2-1/2	31425-C6	81.30		
.025		.0250	.020	**.125** (5x)	1/4	2-1/2	38725-C6	85.10		
.031 (1/32)		.0310	.025	**-**	1/4	2-1/2	958331-C6	73.80		
.031 (1/32)		.0310	.025	**.047** (1.5x)	1/4	2-1/2	37831-C6	69.50		
.031 (1/32)		.0310	.025	**.093** (3x)	1/4	2-1/2	31431-C6	69.50	813131-C6	74.80
.031 (1/32)		.0310	.025	**.125** (4x)	1/4	2-1/2	881531-C6	73.80		
.031 (1/32)		.0310	.025	**.156** (5x)	1/4	2-1/2	38731-C6	76.10	812931-C6	82.00
.031 (1/32)		.0310	.025	**.187** (6x)	1/4	2-1/2	858031-C6	77.50		
.031 (1/32)		.0310	.025	**.218** (7x)	1/4	2-1/2	863231-C6	78.80		
.031 (1/32)		.0310	.025	**.250** (8x)	1/4	2-1/2	32031-C6	80.20		
.031 (1/32)		.0310	.025	**.312** (10x)	1/4	2-1/2	919131-C6	95.60		
.031 (1/32)		.0310	.025	**.375** (12x)	1/4	2-1/2	33831-C6	95.60		
.031 (1/32)		.0310	.025	**.470** (15x)	1/4	2-1/2	973231-C6	109.90		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
.039		.0390	.031	-	1/4	2-1/2	958339-C6	74.50		
.039		.0390	.031	**.062** (1.5x)	1/4	2-1/2	37839-C6	69.50		
.039		.0390	.031	**.117** (3x)	1/4	2-1/2	31439-C6	69.50		
.039		.0390	.031	**.156** (4x)	1/4	2-1/2	881539-C6	76.10		
.039		.0390	.031	**.203** (5x)	1/4	2-1/2	38739-C6	76.10		
.039		.0390	.031	**.312** (8x)	1/4	2-1/2	32039-C6	80.20		
.039		.0390	.031	**.468** (12x)	1/4	2-1/2	33839-C6	95.60		
	1.0 mm	.0393	.80 mm	**3.00 mm** (3x)	6 mm	63 mm	882922-C6	76.10		
	1.0 mm	.0393	.80 mm	**5.00 mm** (5x)	6 mm	63 mm	881722-C6	83.20		
.040		.0400	.032	**.062** (1.5x)	1/4	2-1/2	37840-C6	69.50		
.040		.0400	.032	**.125** (3x)	1/4	2-1/2	31440-C6	70.10		
.047 (3/64)		.0470	.038	-	1/4	2-1/2	958347-C6	73.80		
.047 (3/64)		.0470	.038	**.071** (1.5x)	1/4	2-1/2	37847-C6	69.50		
.047 (3/64)		.0470	.038	**.141** (3x)	1/4	2-1/2	31447-C6	69.50	813147-C6	75.50
.047 (3/64)		.0470	.038	**.187** (4x)	1/4	2-1/2	881547-C6	76.10		
.047 (3/64)		.0470	.038	**.250** (5x)	1/4	2-1/2	38747-C6	76.10	812947-C6	82.00
.047 (3/64)		.0470	.038	**.375** (8x)	1/4	2-1/2	32047-C6	80.20		
.047 (3/64)		.0470	.038	**.470** (10x)	1/4	2-1/2	919147-C6	95.60		
.047 (3/64)		.0470	.038	**.564** (12x)	1/4	2-1/2	33847-C6	95.60		
.047 (3/64)		.0470	.038	**.710** (15x)	1/4	2-1/2	973247-C6	109.90		
.050		.0500	.040	**.078** (1.5x)	1/4	2-1/2	37850-C6	69.50		
.050		.0500	.040	**.150** (3x)	1/4	2-1/2	31450-C6	70.10		
.060		.0600	.048	**.093** (1.5x)	1/4	2-1/2	37860-C6	69.50		
.060		.0600	.048	**.180** (3x)	1/4	2-1/2	31460-C6	70.10		
.062 (1/16)		.0620	.050	-	1/4	2-1/2	958362-C6	73.80		
.062 (1/16)		.0620	.050	**.093** (1.5x)	1/4	2-1/2	37862-C6	69.50		
.062 (1/16)		.0620	.050	**.187** (3x)	1/4	2-1/2	31462-C6	69.50	813162-C6	74.80
.062 (1/16)		.0620	.050	**.250** (4x)	1/4	2-1/2	881562-C6	73.80		
.062 (1/16)		.0620	.050	**.312** (5x)	1/4	2-1/2	38762-C6	76.10	812962-C6	81.30
.062 (1/16)		.0620	.050	**.375** (6x)	1/4	2-1/2	858062-C6	77.50		
.062 (1/16)		.0620	.050	**.437** (7x)	1/4	2-1/2	863262-C6	78.80		
.062 (1/16)		.0620	.050	**.500** (8x)	1/4	2-1/2	32062-C6	80.20		
.062 (1/16)		.0620	.050	**.625** (10x)	1/4	2-1/2	919162-C6	104.10		
.062 (1/16)		.0620	.050	**.750** (12x)	1/4	4	33862-C6	104.10		
.062 (1/16)		.0620	.050	**.950** (15x)	1/4	4	973262-C6	118.70		
.078 (5/64)		.0780	.062	-	1/4	2-1/2	958378-C6	74.50		
.078 (5/64)		.0780	.062	**.117** (1.5x)	1/4	2-1/2	37878-C6	69.50		
.078 (5/64)		.0780	.062	**.234** (3x)	1/4	2-1/2	31478-C6	69.50	813178-C6	74.80
.078 (5/64)		.0780	.062	**.312** (4x)	1/4	2-1/2	881578-C6	76.80		
.078 (5/64)		.0780	.062	**.406** (5x)	1/4	2-1/2	38778-C6	76.10	812978-C6	82.00
.078 (5/64)		.0780	.062	**.625** (8x)	1/4	2-1/2	32078-C6	80.20		
.078 (5/64)		.0780	.062	**.781** (10x)	1/4	2-1/2	919178-C6	104.10		
.078 (5/64)		.0780	.062	**.937** (12x)	1/4	4	33878-C6	104.10		
.078 (5/64)		.0780	.062	**1.187** (15x)	1/4	4	973278-C6	118.70		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
	2.0 mm	.0787	1.60 mm	**6.00 mm** (3x)	6 mm	63 mm	882945-C6	76.10		
	2.0 mm	.0787	1.60 mm	**10.00 mm** (5x)	6 mm	63 mm	881745-C6	82.40		
.093 (3/32)		.0930	.074	**-**	1/4	2-1/2	958393-C6	73.80		
.093 (3/32)		.0930	.074	**.140** (1.5x)	1/4	2-1/2	37893-C6	69.50		
.093 (3/32)		.0930	.074	**.281** (3x)	1/4	2-1/2	31493-C6	69.50	813193-C6	74.80
.093 (3/32)		.0930	.074	**.375** (4x)	1/4	2-1/2	881593-C6	73.80		
.093 (3/32)		.0930	.074	**.500** (5x)	1/4	2-1/2	38793-C6	76.10	812993-C6	82.00
.093 (3/32)		.0930	.074	**.585** (6x)	1/4	2-1/2	858093-C6	78.30		
.093 (3/32)		.0930	.074	**.670** (7x)	1/4	2-1/2	863293-C6	79.60		
.093 (3/32)		.0930	.074	**.750** (8x)	1/4	2-1/2	32093-C6	80.20		
.093 (3/32)		.0930	.074	**.937** (10x)	1/4	4	919193-C6	104.10		
.093 (3/32)		.0930	.074	**1.125** (12x)	1/4	4	33893-C6	104.10		
.093 (3/32)		.0930	.074	**1.400** (15x)	1/4	4	973293-C6	118.70		
.118		.1180	.094	**.177** (1.5x)	1/4	2-1/2	37905-C6	78.70		
.118		.1180	.094	**.354** (3x)	1/4	2-1/2	31505-C6	78.70		
.118		.1180	.094	**.625** (5x)	1/4	2-1/2	38805-C6	88.50		
	3.0 mm	.1181	2.40 mm	**9.00 mm** (3x)	6 mm	63 mm	882957-C6	85.10		
	3.0 mm	.1181	2.40 mm	**15.00 mm** (5x)	6 mm	63 mm	881757-C6	96.00		
.125 (1/8)		.1250	.100	**-**	1/4	2-1/2	958408-C6	83.20		
.125 (1/8)		.1250	.100	**.187** (1.5x)	1/4	2-1/2	37908-C6	78.00		
.125 (1/8)		.1250	.100	**.375** (3x)	1/4	2-1/2	31508-C6	78.00	813208-C6	83.20
.125 (1/8)		.1250	.100	**.500** (4x)	1/4	2-1/2	881608-C6	86.30		
.125 (1/8)		.1250	.100	**.625** (5x)	1/4	2-1/2	38808-C6	88.50	813008-C6	93.90
.125 (1/8)		.1250	.100	**.750** (6x)	1/4	2-1/2	858108-C6	90.30		
.125 (1/8)		.1250	.100	**.875** (7x)	1/4	2-1/2	863308-C6	92.90		
.125 (1/8)		.1250	.100	**1.000** (8x)	1/4	2-1/2	32108-C6	93.90		
.125 (1/8)		.1250	.100	**1.250** (10x)	1/4	4	919208-C6	112.50		
.125 (1/8)		.1250	.100	**1.500** (12x)	1/4	4	33908-C6	112.50		
.125 (1/8)		.1250	.100	**1.875** (15x)	1/4	4	973308-C6	127.00		

D_1 +.000″ −.001″	+.000mm −.018mm	decimal equivalent	L_2 +.020″ −.000″ +.500mm −.000mm	L_3 +.020″ −.000″ +.500mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
.140 (9/64)		.1406	.112	**.220** (1.5x)	1/4	2-1/2	37909-C6	82.20		
.140 (9/64)		.1406	.112	**.425** (3x)	1/4	2-1/2			813209-C6	82.20
.156 (5/32)		.1560	.125	**.235** (1.5x)	1/4	2-1/2	37910-C6	78.00		
.156 (5/32)		.1560	.125	**.470** (3x)	1/4	2-1/2	31510-C6	78.00		
.156 (5/32)		.1560	.125	**.750** (5x)	1/4	2-1/2	38810-C6	88.50		
.187 (3/16)		.1870	.150	**-**	1/4	2-1/2	958412-C6	83.20		
.187 (3/16)		.1870	.150	**.285** (1.5x)	1/4	2-1/2	37912-C6	78.00		
.187 (3/16)		.1870	.150	**.570** (3x)	1/4	2-1/2	31512-C6	78.00	813212-C6	83.90
.187 (3/16)		.1870	.150	**.750** (4x)	1/4	2-1/2	881612-C6	89.30		
.187 (3/16)		.1870	.150	**1.000** (5x)	1/4	2-1/2	38812-C6	88.50	813012-C6	94.70
.187 (3/16)		.1870	.150	**1.500** (8x)	1/4	4	32112-C6	103.60		
.187 (3/16)		.1870	.150	**2.250** (12x)	1/4	4	33912-C6	127.00		
	6.0 mm	.2362	4.80 mm	**18.00 mm** (3x)	6 mm	63 mm	882966-C6	84.20		
	6.0 mm	.2362	4.80 mm	**30.00 mm** (5x)	6 mm	63 mm	881766-C6	96.00		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 +.000″ −.001″	+.000mm −.018mm	decimal equivalent	L_2 +.020″ −.000″ +.500mm −.000mm	L_3 +.020″ −.000″ +.500mm −.000mm	D_2 (h6)	L_1	2 FL	PRICE	3 FL	PRICE
.250 (1/4)		.2500	.200	-	1/4	2-1/2	958416-C6	83.20		
.250 (1/4)		.2500	.200	**.375** (1.5x)	1/4	2-1/2	37916-C6	78.00		
.250 (1/4)		.2500	.200	**.750** (3x)	1/4	2-1/2	31516-C6	88.50	813216-C6	94.70
.250 (1/4)		.2500	.200	**1.000** (4x)	1/4	2-1/2	881616-C6	89.30		
.250 (1/4)		.2500	.200	**1.250** (5x)	1/4	2-1/2	38816-C6	88.50	813016-C6	94.70
.250 (1/4)		.2500	.200	**1.500** (6x)	1/4	3	858116-C6	96.10		
.250 (1/4)		.2500	.200	**1.750** (7x)	1/4	3	863316-C6	96.90		
.250 (1/4)		.2500	.200	**2.000** (8x)	1/4	4	32116-C6	104.60		
.312 (5/16)		.3120	.250	**.470** (1.5x)	5/16	2-1/2	37920-C6	103.10		
.312 (5/16)		.3120	.250	**1.000** (3x)	5/16	2-1/2	31520-C6	109.00		
.375 (3/8)		.3750	.300	**.570** (1.5x)	3/8	2-1/2	37924-C6	109.90		
.375 (3/8)		.3750	.300	**1.125** (3x)	3/8	2-1/2	31524-C6	115.90		
.375 (3/8)		.3750	.300	**2.000** (5x)	3/8	4	38824-C6	130.90		

Guidelines For Milling Hardened Steels

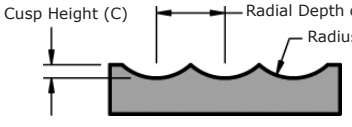
- Rigid machining enhances tool life by centering and balancing tool holders, which minimizes vibration.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

Speeds & Feeds (End Mills for Hardened Steels – Ball)

Important Note: Values in table are in inches and are based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 3 Flutes, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Hardness	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial*	Axial
45-55 Rc	700	Finishing (.8x Reach)	.00028	.00058	.00088	.00116	.00146	.00174	.00234	.00350	.00468	.00584	.00702	.00936	.10 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00027	.00056	.00084	.00111	.00140	.00167	.00224	.00335	.00449	.00560	.00673	.00897	.10 x Dia	.04 x Dia
		Finishing (3x Reach)	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429	.00535	.00644	.00858	.10 x Dia	.04 x Dia
		Finishing (4x Reach)	.00025	.00051	.00077	.00102	.00128	.00152	.00205	.00306	.00410	.00511	.00614	.00819	.10 x Dia	.04 x Dia
		Finishing (5x Reach)	.00023	.00048	.00073	.00097	.00122	.00145	.00195	.00292	.00390	.00487	.00585	.00780	.10 x Dia	.04 x Dia
		Finishing (6x Reach)	.00022	.00046	.00070	.00093	.00117	.00139	.00187	.00280	.00374	.00467	.00562	.00749	.10 x Dia	.03 x Dia
		Finishing (7x Reach)	.00022	.00044	.00067	.00089	.00112	.00133	.00179	.00268	.00359	.00448	.00538	.00718	.10 x Dia	.03 x Dia
		Finishing (8x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.10 x Dia	.03 x Dia
		Finishing (10x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.10 x Dia	.02 x Dia
		Finishing (12x Reach)	.00016	.00034	.00051	.00068	.00085	.00102	.00137	.00204	.00273	.00341	.00410	.00546	.08 x Dia	.02 x Dia
		Finishing (15x Reach)	.00015	.00031	.00048	.00063	.00079	.00094	.00127	.00190	.00254	.00316	.00380	.00507	.08 x Dia	.01 x Dia
56-68 Rc	600	Finishing (.8x Reach)	.00022	.00046	.00070	.00093	.00117	.00139	.00187	.00280	.00374	.00467	.00562	.00749	.07 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00022	.00044	.00067	.00089	.00112	.00133	.00179	.00268	.00359	.00448	.00538	.00718	.07 x Dia	.04 x Dia
		Finishing (3x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.07 x Dia	.04 x Dia
		Finishing (4x Reach)	.00020	.00041	.00062	.00081	.00102	.00122	.00164	.00245	.00328	.00409	.00491	.00655	.07 x Dia	.04 x Dia
		Finishing (5x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.07 x Dia	.04 x Dia
		Finishing (6x Reach)	.00018	.00037	.00056	.00074	.00093	.00111	.00150	.00224	.00300	.00374	.00449	.00599	.07 x Dia	.03 x Dia
		Finishing (7x Reach)	.00017	.00036	.00054	.00071	.00090	.00107	.00144	.00215	.00287	.00358	.00431	.00574	.07 x Dia	.03 x Dia
		Finishing (8x Reach)	.00016	.00034	.00052	.00068	.00086	.00102	.00137	.00205	.00275	.00343	.00412	.00549	.07 x Dia	.03 x Dia
		Finishing (10x Reach)	.00015	.00031	.00047	.00062	.0078	.00093	.00125	.00187	.00250	.00312	.00374	.00499	.07 x Dia	.02 x Dia
		Finishing (12x Reach)	.00013	.00027	.00041	.00054	.00068	.00081	.00109	.00163	.00218	.00273	.00328	.00437	.06 x Dia	.02 x Dia
		Finishing (15x Reach)	.00012	.00025	.00038	.00050	.00063	.00075	.00101	.00152	.00203	.00253	.00304	.00406	.06 x Dia	.01 x Dia

* Operator must consider proper Radial Depth of Cut since it relates directly to cusp height and part finish



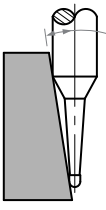
$$P = 2\,[R^2-(C-R)^2]^{1/2}$$

$$C = R-[R^2-(P^2/4)]^{1/2}$$

END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Solid tapered neck for increased rigidity and strength
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- 2 flutes
- Center cutting
- CNC ground in the USA



Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0000''}_{-.0006''}$	L_2 $^{+.010''}_{-.000''}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
0.5°	.031 (1/32)	.025	I	**.093**	**.757**	8.4°	1/4	2-1/2	998703-C6	72.20
	.031 (1/32)	.025	I	**.156**	**.817**	7.8°	1/4	2-1/2	998706-C6	79.80
	.031 (1/32)	.025	I	**.250**	**.906**	7.0°	1/4	2-1/2	998709-C6	83.40
	.047 (3/64)	.038	I	**.156**	**.772**	7.7°	1/4	2-1/2	998712-C6	73.60
	.047 (3/64)	.038	I	**.250**	**.862**	6.9°	1/4	2-1/2	998715-C6	79.80
	.047 (3/64)	.038	I	**.375**	**.981**	6.1°	1/4	2-1/2	998718-C6	83.40
	.062 (1/16)	.050	I	**.312**	**.879**	6.4°	1/4	2-1/2	998721-C6	72.20
	.062 (1/16)	.050	I	**.500**	**1.057**	5.3°	1/4	2-1/2	998724-C6	79.80
	.062 (1/16)	.050	I	**.750**	**1.295**	4.3°	1/4	2-1/2	998727-C6	82.60
	.078 (5/64)	.062	I	**.437**	**.953**	5.4°	1/4	2-1/2	998730-C6	73.60
	.078 (5/64)	.062	I	**.625**	**1.131**	4.5°	1/4	2-1/2	998733-C6	79.80
	.078 (5/64)	.062	I	**1.000**	**1.488**	3.4°	1/4	3	998736-C6	91.40
	.093 (3/32)	.074	I	**.500**	**.971**	4.9°	1/4	2-1/2	998739-C6	72.20
	.093 (3/32)	.074	I	**.750**	**1.208**	3.9°	1/4	2-1/2	998742-C6	78.30
	.093 (3/32)	.074	I	**1.125**	**1.565**	3.0°	1/4	3	998745-C6	91.40
	.125 (1/8)	.100	I	**.625**	**1.000**	3.9°	1/4	2-1/2	998748-C6	78.00
	.125 (1/8)	.100	I	**1.000**	**1.357**	2.8°	1/4	2-1/2	998751-C6	78.90
	.125 (1/8)	.100	I	**1.500**	**1.832**	2.1°	1/4	3	998754-C6	92.70

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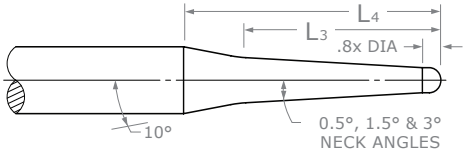
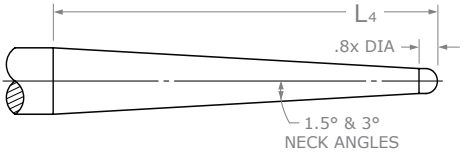
TYPE I



TYPE II



END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach (cont.)

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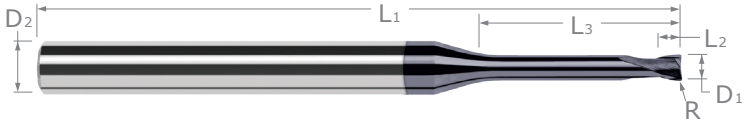
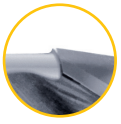
NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0000''}_{-.0006''}$	L_2 $^{+.010''}_{-.000''}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
1.5°	.031 (1/32)	.025	I	**.250**	**.875**	7.3°	1/4	2-1/2	997407-C6	79.80
	.031 (1/32)	.025	I	**.500**	**1.088**	5.9°	1/4	2-1/2	997414-C6	83.40
	.047 (3/64)	.038	I	**.375**	**.938**	6.4°	1/4	2-1/2	997421-C6	78.30
	.062 (1/16)	.050	I	**.500**	**1.004**	5.6°	1/4	2-1/2	997428-C6	78.30
	.062 (1/16)	.050	I	**1.000**	**1.429**	3.9°	1/4	3	997435-C6	91.40
	.078 (5/64)	.062	I	**.625**	**1.066**	4.8°	1/4	2-1/2	997442-C6	79.80
	.078 (5/64)	.062	I	**1.250**	**1.599**	3.2°	1/4	3	997449-C6	91.40
	.093 (3/32)	.074	I	**.750**	**1.132**	4.2°	1/4	2-1/2	997456-C6	78.30
	.093 (3/32)	.074	I	**1.500**	**1.771**	2.7°	1/4	3	997463-C6	91.40
	.125 (1/8)	.100	I	**1.000**	**1.258**	3.0°	1/4	2-1/2	997470-C6	80.40
	.125 (1/8)	.100	II	**2.487**	**2.487**	1.5°	1/4	4	997477-C6	91.90
3.0°	.031 (1/32)	.025	I	**.312**	**.714**	8.9°	1/4	2-1/2	994907-C6	82.90
	.031 (1/32)	.025	I	**.750**	**1.067**	6.0°	1/4	2-1/2	994914-C6	84.50
	.047 (3/64)	.038	I	**.875**	**1.140**	5.2°	1/4	2-1/2	994921-C6	82.90
	.047 (3/64)	.038	I	**1.250**	**1.442**	4.1°	1/4	3	994928-C6	92.30
	.062 (1/16)	.050	I	**.875**	**1.114**	5.0°	1/4	2-1/2	994935-C6	82.10
	.062 (1/16)	.050	II	**1.844**	**1.844**	3.0°	1/4	3	994942-C6	92.30
	.078 (5/64)	.062	I	**1.125**	**1.288**	4.0°	1/4	2-1/2	994949-C6	82.10
	.078 (5/64)	.062	II	**1.703**	**1.703**	3.0°	1/4	3	994956-C6	91.40
	.093 (3/32)	.074	I	**1.000**	**1.162**	4.1°	1/4	2-1/2	994963-C6	82.10
	.093 (3/32)	.074	II	**1.572**	**1.572**	3.0°	1/4	3	994970-C6	92.30
	.125 (1/8)	.100	II	**1.293**	**1.293**	2.9°	1/4	2-1/2	994977-C6	91.00
	.125 (1/8)	.100	II	**2.485**	**2.485**	3.0°	3/8	4	994984-C6	132.10

END MILLS FOR HARDENED STEELS

Finishers – Corner Radius



- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 $^{+.0000''}_{-.0006''}$	R $^{+.0002''}_{-.0002''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	4 FL	PRICE
.010	**.002**	.008	**.015** (1.5x)	1/4	2-1/2	40210-C6	99.50		
.010	**.002**	.008	**.031** (3x)	1/4	2-1/2	30610-C6	99.50		
.015 (1/64)	**.002**	.012	**.023** (1.5x)	1/4	2-1/2	40215-C6	78.70	951415-C6	79.90
.015 (1/64)	**.002**	.012	**.047** (3x)	1/4	2-1/2	30615-C6	78.70		
.015 (1/64)	**.002**	.012	**.078** (5x)	1/4	2-1/2	40615-C6	87.90		
.015 (1/64)	**.002**	.012	**.125** (8x)	1/4	2-1/2	31015-C6	89.30		
.015 (1/64)	**.002**	.012	**.187** (12x)	1/4	2-1/2	33015-C6	105.90		
.020	**.004**	.016	**.031** (1.5x)	1/4	2-1/2	40220-C6	78.70	951420-C6	79.90
.020	**.004**	.016	**.062** (3x)	1/4	2-1/2	30620-C6	78.70	938720-C6	79.90
.020	**.004**	.016	**.100** (5x)	1/4	2-1/2	40620-C6	85.10	996320-C6	86.30
.025	**.004**	.020	**.038** (1.5x)	1/4	2-1/2	40225-C6	78.70		
.025	**.004**	.020	**.075** (3x)	1/4	2-1/2	30625-C6	78.70		
.025	**.004**	.020	**.125** (5x)	1/4	2-1/2	40625-C6	84.20		
.031 (1/32)	**.005**	.025	**.047** (1.5x)	1/4	2-1/2	40231-C6	69.50	951431-C6	70.80
.031 (1/32)	**.005**	.025	**.093** (3x)	1/4	2-1/2	30631-C6	68.70	938731-C6	70.10
.031 (1/32)	**.005**	.025	**.156** (5x)	1/4	2-1/2	40631-C6	75.20	996331-C6	76.10
.031 (1/32)	**.005**	.025	**.250** (8x)	1/4	2-1/2	31031-C6	79.60	999031-C6	80.90
.031 (1/32)	**.005**	.025	**.375** (12x)	1/4	2-1/2	33031-C6	90.60		
.031 (1/32)	**.005**	.025	**.470** (15x)	1/4	2-1/2	942431-C6	106.10		
.031 (1/32)	**.010**	.025	**.093** (3x)	1/4	2-1/2	982631-C6	71.90		
.031 (1/32)	**.010**	.025	**.156** (5x)	1/4	2-1/2	957431-C6	77.90		
.039 (1 mm)	**.005**	.031	**.062** (1.5x)	1/4	2-1/2	40239-C6	68.70	951439-C6	70.80
.039 (1 mm)	**.005**	.031	**.117** (3x)	1/4	2-1/2	30639-C6	69.50	938739-C6	70.80
.039 (1 mm)	**.005**	.031	**.203** (5x)	1/4	2-1/2	40639-C6	74.50	996339-C6	76.10
.039 (1 mm)	**.005**	.031	**.312** (8x)	1/4	2-1/2	31039-C6	79.60		
.039 (1 mm)	**.005**	.031	**.468** (12x)	1/4	2-1/2	33039-C6	90.60		
.047 (3/64)	**.008**	.038	**.071** (1.5x)	1/4	2-1/2	40247-C6	68.70		
.047 (3/64)	**.008**	.038	**.141** (3x)	1/4	2-1/2	30647-C6	68.70	938747-C6	70.80
.047 (3/64)	**.008**	.038	**.250** (5x)	1/4	2-1/2	40647-C6	74.50	996347-C6	76.10
.047 (3/64)	**.008**	.038	**.375** (8x)	1/4	2-1/2	31047-C6	78.80	999047-C6	80.20
.047 (3/64)	**.008**	.038	**.564** (12x)	1/4	2-1/2	33047-C6	90.60		
.047 (3/64)	**.008**	.038	**.710** (15x)	1/4	2-1/2	942447-C6	106.10		

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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 $^{+.0000''}_{-.0006''}$	R $^{+.0002''}_{-.0002''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	4 FL	PRICE
.062 (1/16)	**.005**	.050	**.187** (3x)	1/4	2-1/2	893162-C6	68.70		
.062 (1/16)	**.010**	.050	**-**	1/4	2-1/2	870362-C6	67.80	862262-C6	69.00
.062 (1/16)	**.010**	.050	**.093** (1.5x)	1/4	2-1/2	40262-C6	68.70	951462-C6	70.10
.062 (1/16)	**.010**	.050	**.187** (3x)	1/4	2-1/2	30662-C6	68.70	938762-C6	70.10
.062 (1/16)	**.010**	.050	**.250** (4x)	1/4	2-1/2	784162-C6	71.90	783762-C6	73.40
.062 (1/16)	**.010**	.050	**.312** (5x)	1/4	2-1/2	40662-C6	74.50	996362-C6	76.10
.062 (1/16)	**.010**	.050	**.375** (6x)	1/4	2-1/2	783362-C6	76.60	782562-C6	78.20
.062 (1/16)	**.010**	.050	**.437** (7x)	1/4	2-1/2	782962-C6	78.00	782162-C6	79.30
.062 (1/16)	**.010**	.050	**.500** (8x)	1/4	2-1/2	31062-C6	78.80	999062-C6	80.20
.062 (1/16)	**.010**	.050	**.750** (12x)	1/4	4	33062-C6	101.80	924162-C6	103.10
.062 (1/16)	**.010**	.050	**.950** (15x)	1/4	4	942462-C6	116.90		
.062 (1/16)	**.020**	.050	**.187** (3x)	1/4	2-1/2	991562-C6	71.90		
.062 (1/16)	**.020**	.050	**.312** (5x)	1/4	2-1/2	953162-C6	77.10		
.078 (5/64)	**.010**	.062	**.117** (1.5x)	1/4	2-1/2	40278-C6	69.50		
.078 (5/64)	**.010**	.062	**.234** (3x)	1/4	2-1/2	30678-C6	68.70	938778-C6	70.80
.078 (5/64)	**.010**	.062	**.406** (5x)	1/4	2-1/2	40678-C6	74.50	996378-C6	76.10
.078 (5/64)	**.010**	.062	**.625** (8x)	1/4	2-1/2	31078-C6	79.60	999078-C6	80.20
.078 (5/64)	**.010**	.062	**.937** (12x)	1/4	4	33078-C6	101.80		
.093 (3/32)	**.005**	.074	**.281** (3x)	1/4	2-1/2	893193-C6	69.50		
.093 (3/32)	**.010**	.074	**.281** (3x)	1/4	2-1/2	982693-C6	69.50		
.093 (3/32)	**.015**	.074	**-**	1/4	2-1/2	850893-C6	67.80		
.093 (3/32)	**.015**	.074	**.140** (1.5x)	1/4	2-1/2	40293-C6	68.70	951493-C6	70.80
.093 (3/32)	**.015**	.074	**.281** (3x)	1/4	2-1/2	30693-C6	68.70	938793-C6	70.10
.093 (3/32)	**.015**	.074	**.375** (4x)	1/4	2-1/2	783993-C6	71.90	783593-C6	73.40
.093 (3/32)	**.015**	.074	**.500** (5x)	1/4	2-1/2	40693-C6	74.50	996393-C6	76.10
.093 (3/32)	**.015**	.074	**.585** (6x)	1/4	2-1/2	783193-C6	76.60	782393-C6	78.20
.093 (3/32)	**.015**	.074	**.670** (7x)	1/4	2-1/2	782793-C6	78.00	781993-C6	79.30
.093 (3/32)	**.015**	.074	**.750** (8x)	1/4	2-1/2	31093-C6	79.60	999093-C6	80.20
.093 (3/32)	**.015**	.074	**1.125** (12x)	1/4	4	33093-C6	101.80	924193-C6	103.10
.093 (3/32)	**.030**	.074	**.281** (3x)	1/4	2-1/2	963393-C6	71.90		
.093 (3/32)	**.030**	.074	**.500** (5x)	1/4	2-1/2	946393-C6	77.10		
.118 (3 mm)	**.015**	.094	**.177** (1.5x)	1/4	2-1/2	40305-C6	74.50		
.118 (3 mm)	**.015**	.094	**.354** (3x)	1/4	2-1/2	30705-C6	74.50		
.125 (1/8)	**.005**	.100	**.375** (3x)	1/4	2-1/2	893208-C6	74.50		
.125 (1/8)	**.010**	.100	**.375** (3x)	1/4	2-1/2	982708-C6	74.50		
.125 (1/8)	**.015**	.100	**-**	1/4	2-1/2	850908-C6	72.70		
.125 (1/8)	**.015**	.100	**.187** (1.5x)	1/4	2-1/2	40308-C6	73.80	951508-C6	75.00
.125 (1/8)	**.015**	.100	**.375** (3x)	1/4	2-1/2	30708-C6	73.80	938808-C6	75.00
.125 (1/8)	**.015**	.100	**.500** (4x)	1/4	2-1/2	784008-C6	78.10	783608-C6	80.80
.125 (1/8)	**.015**	.100	**.625** (5x)	1/4	2-1/2	40708-C6	80.90	996408-C6	88.50
.125 (1/8)	**.015**	.100	**.750** (6x)	1/4	2-1/2	783208-C6	83.50	782408-C6	90.90
.125 (1/8)	**.015**	.100	**.875** (7x)	1/4	2-1/2	782808-C6	85.20	782008-C6	92.30
.125 (1/8)	**.015**	.100	**1.000** (8x)	1/4	2-1/2	31108-C6	85.80	999108-C6	94.10
.125 (1/8)	**.015**	.100	**1.500** (12x)	1/4	4	33108-C6	109.00	924208-C6	117.40
.125 (1/8)	**.030**	.100	**.375** (3x)	1/4	2-1/2	963408-C6	76.30		
.125 (1/8)	**.030**	.100	**.625** (5x)	1/4	2-1/2	946408-C6	83.70	781808-C6	92.20

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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 $^{+.000''}_{-.001''}$	R $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	4 FL	PRICE
.156 (5/32)	**.015**	.125	**.235** (1.5x)	1/4	2-1/2	40310-C6	74.50		
.156 (5/32)	**.015**	.125	**.470** (3x)	1/4	2-1/2	30710-C6	73.80		
.187 (3/16)	**.015**	.150	**.285** (1.5x)	1/4	2-1/2	40312-C6	73.80	951512-C6	75.00
.187 (3/16)	**.015**	.150	**.570** (3x)	1/4	2-1/2	30712-C6	73.80	938812-C6	75.00
.187 (3/16)	**.015**	.150	**1.000** (5x)	1/4	2-1/2	40712-C6	80.90	996412-C6	88.50
.187 (3/16)	**.015**	.150	**1.500** (8x)	1/4	4	31112-C6	97.70		
.187 (3/16)	**.015**	.150	**2.250** (12x)	1/4	4	33112-C6	116.90		
.187 (3/16)	**.060**	.150	**.570** (3x)	1/4	2-1/2	939212-C6	85.50	934412-C6	92.10
.250 (1/4)	**.015**	.200	**.375** (1.5x)	1/4	2-1/2	40316-C6	73.80	951516-C6	75.00
.250 (1/4)	**.015**	.200	**.750** (3x)	1/4	2-1/2	30716-C6	77.30	938816-C6	84.50
.250 (1/4)	**.015**	.200	**1.000** (4x)	1/4	2-1/2	784016-C6	79.90	783616-C6	87.00
.250 (1/4)	**.015**	.200	**1.250** (5x)	1/4	2-1/2	40716-C6	80.90	996416-C6	88.80
.250 (1/4)	**.015**	.200	**2.000** (8x)	1/4	4	31116-C6	97.70		
.250 (1/4)	**.030**	.200	**1.000** (3x)	1/4	2-1/2			750716-C6	87.00
.250 (1/4)	**.060**	.200	**.750** (3x)	1/4	2-1/2	939216-C6	85.50	934416-C6	92.10
.312 (5/16)	**.030**	.250	**1.000** (3x)	5/16	2-1/2			938820-C6	93.10
.375 (3/8)	**.030**	.300	**.570** (1.5x)	3/8	2-1/2			951524-C6	104.40
.375 (3/8)	**.030**	.300	**1.125** (3x)	3/8	2-1/2			938824-C6	107.60
.375 (3/8)	**.030**	.300	**2.000** (5x)	3/8	4			996424-C6	112.80
.500 (1/2)	**.030**	.400	**1.500** (3x)	1/2	3			938832-C6	136.50

Guidelines For Milling Hardened Steels

- Rigid machining centers and balanced tool holders that minimize vibration and TIR will enhance tool life.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

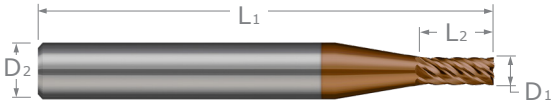
Speeds & Feeds (End Mills for Hardened Steels – Corner Radius)

Important Note: Values in table are in inches and based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 4 flutes, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
45-55 Rc	700	Finishing (0.8x Reach)	.00014	.00029	.00044	.00058	.00073	.00087	.00117	.00175	.00234	.00292	.00351	.00468	.35 x Dia	.02 x Dia
		Finishing (1.5x Reach)	.00013	.00028	.00042	.00056	.00070	.00083	.00112	.00168	.00224	.00280	.00336	.00449	.35 x Dia	.02 x Dia
		Finishing (3x Reach)	.00013	.00027	.00040	.00053	.00067	.00080	.00107	.00160	.00215	.00268	.00322	.00429	.35 x Dia	.02 x Dia
		Finishing (4x Reach)	.00013	.00025	.00039	.00050	.00064	.00077	.00103	.00153	.00205	.00255	.00308	.00410	.35 x Dia	.02 x Dia
		Finishing (5x Reach)	.00012	.00024	.00037	.00048	.00061	.00073	.00098	.00146	.00195	.00243	.00293	.00390	.35 x Dia	.02 x Dia
		Finishing (6x Reach)	.00012	.00023	.00036	.00046	.00059	.00070	.00094	.00140	.00187	.00233	.00281	.00374	.35 x Dia	.02 x Dia
		Finishing (7x Reach)	.00011	.00022	.00034	.00044	.00056	.00067	.00090	.00134	.00179	.00224	.00270	.00359	.35 x Dia	.02 x Dia
		Finishing (8x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.35 x Dia	.02 x Dia
		Finishing (12x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00068	.00102	.00137	.00170	.00205	.00273	.35 x Dia	.01 x Dia
		Finishing (15x Reach)	.00008	.00016	.00024	.00031	.00040	.00047	.00063	.00095	.00127	.00158	.00190	.00254	.35 x Dia	.01 x Dia
56-68 Rc	600	Finishing (0.8x Reach)	.00011	.00023	.00035	.00046	.00058	.00070	.00094	.00140	.00187	.00234	.00281	.00374	.25 x Dia	.02 x Dia
		Finishing (1.5x Reach)	.00011	.00022	.00034	.00044	.00056	.00067	.00090	.00134	.00179	.00224	.00269	.00359	.25 x Dia	.02 x Dia
		Finishing (3x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.25 x Dia	.02 x Dia
		Finishing (4x Reach)	.00009	.00020	.00030	.00041	.00051	.00061	.00082	.00123	.00164	.00205	.00246	.00328	.25 x Dia	.02 x Dia
		Finishing (5x Reach)	.00009	.00019	.00029	.00039	.00049	.00058	.00078	.00117	.00156	.00195	.00234	.00312	.25 x Dia	.02 x Dia
		Finishing (6x Reach)	.00009	.00018	.00028	.00037	.00047	.00056	.00075	.00112	.00150	.00187	.00225	.00300	.25 x Dia	.02 x Dia
		Finishing (7x Reach)	.00008	.00017	.00027	.00036	.00045	.00053	.00072	.00108	.00144	.00179	.00215	.00287	.25 x Dia	.02 x Dia
		Finishing (8x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00137	.00171	.00206	.00275	.25 x Dia	.02 x Dia
		Finishing (12x Reach)	.00007	.00014	.00021	.00027	.00034	.00041	.00055	.00082	.00109	.00136	.00164	.00218	.25 x Dia	.01 x Dia
		Finishing (15x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00076	.00101	.00127	.00152	.00203	.25 x Dia	.01 x Dia

VARIABLE PITCH END MILLS FOR TITANIUM ALLOYS

Square



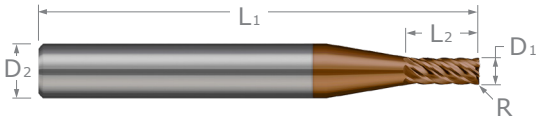
- Engineered for outstanding performance in High Efficiency Milling (HEM) of Titanium 6Al4V and other titanium alloys
- Variable pitch design decreases chatter and harmonics
- Not for use in traditional slotting and roughing toolpaths
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	Ti NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE
NEW	.062 (1/16)	.186 (3x)	1/4	2-1/2	711762-C10	52.70
NEW	.062 (1/16)	.312 (5x)	1/4	2-1/2	710362-C10	52.70
NEW	.078 (5/64)	.234 (3x)	1/4	2-1/2	711778-C10	52.70
NEW	.078 (5/64)	.406 (5x)	1/4	2-1/2	710378-C10	52.70
NEW	.093 (3/32)	.279 (3x)	1/4	2-1/2	711793-C10	52.70
NEW	.093 (3/32)	.500 (5x)	1/4	2-1/2	710393-C10	52.70
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE
NEW	.125 (1/8)	.375 (3x)	1/4	2-1/2	711808-C10	51.80
NEW	.125 (1/8)	.625 (5x)	1/4	2-1/2	710408-C10	51.80
NEW	.187 (3/16)	.570 (3x)	1/4	2-1/2	711812-C10	54.30
NEW	.187 (3/16)	1.000 (5x)	1/4	3	710412-C10	55.50
NEW	.250 (1/4)	.750 (3x)	1/4	2-1/2	711816-C10	52.50
NEW	.250 (1/4)	1.250 (5x)	1/4	4	710416-C10	66.90

NEW!

VARIABLE PITCH END MILLS FOR TITANIUM ALLOYS

Corner Radius



- Corner radius for improved strength
- Engineered for outstanding performance in High Efficiency Milling (HEM) of Titanium 6Al4V and other titanium alloys
- Variable pitch design decreases chatter and harmonics
- Not for use in traditional slotting and roughing toolpaths
- Ti Nano coating offers our best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

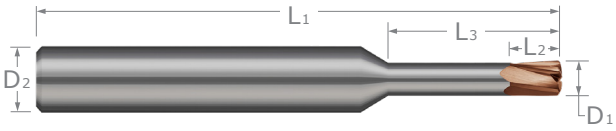
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	Ti NANO COATED		
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE	
.062 (1/16)	.005	**.186** (3x)	1/4	2-1/2	711562-C10	54.90	NEW
.062 (1/16)	.005	**.312** (5x)	1/4	2-1/2	711162-C10	56.70	NEW
.062 (1/16)	.010	**.186** (3x)	1/4	2-1/2	711362-C10	54.90	NEW
.062 (1/16)	.010	**.312** (5x)	1/4	2-1/2	710962-C10	56.70	NEW
.078 (5/64)	.005	**.234** (3x)	1/4	2-1/2	711578-C10	54.90	NEW
.078 (5/64)	.005	**.406** (5x)	1/4	2-1/2	711178-C10	56.70	NEW
.078 (5/64)	.010	**.234** (3x)	1/4	2-1/2	711378-C10	54.90	NEW
.078 (5/64)	.010	**.406** (5x)	1/4	2-1/2	710978-C10	56.70	NEW
.093 (3/32)	.005	**.279** (3x)	1/4	2-1/2	711593-C10	54.90	NEW
.093 (3/32)	.005	**.500** (5x)	1/4	2-1/2	711193-C10	56.70	NEW
.093 (3/32)	.010	**.279** (3x)	1/4	2-1/2	711393-C10	54.90	NEW
.093 (3/32)	.010	**.500** (5x)	1/4	2-1/2	710993-C10	56.70	NEW

D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	PRICE	
.125 (1/8)	.005	**.375** (3x)	1/4	2-1/2	711608-C10	55.70	NEW
.125 (1/8)	.005	**.625** (5x)	1/4	2-1/2	711208-C10	55.70	NEW
.125 (1/8)	.010	**.375** (3x)	1/4	2-1/2	711408-C10	55.70	NEW
.125 (1/8)	.010	**.625** (5x)	1/4	2-1/2	711008-C10	55.70	NEW
.187 (3/16)	.005	**.570** (3x)	1/4	2-1/2	711612-C10	58.60	NEW
.187 (3/16)	.005	**1.000** (5x)	1/4	3	711212-C10	59.80	NEW
.187 (3/16)	.010	**.570** (3x)	1/4	2-1/2	711412-C10	58.60	NEW
.187 (3/16)	.010	**1.000** (5x)	1/4	3	711012-C10	59.80	NEW
.250 (1/4)	.005	**.750** (3x)	1/4	2-1/2	711616-C10	58.90	NEW
.250 (1/4)	.005	**1.250** (5x)	1/4	4	711216-C10	73.30	NEW
.250 (1/4)	.010	**.750** (3x)	1/4	2-1/2	711416-C10	58.90	NEW
.250 (1/4)	.010	**1.250** (5x)	1/4	4	711016-C10	73.30	NEW

NEW!

HIGH FEED END MILLS FOR HIGH TEMP ALLOYS

High Feed End Mills



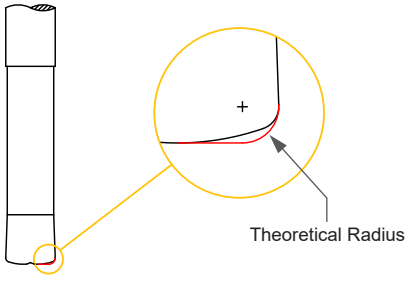
- Engineered to achieve maximum feed rates in steels up to 45 Rc
- Unique end profile geometry developed for ideal tool engagement and lowered cutting forces
- Variable pitch design decreases chatter and harmonics
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- End cutting geometry (non-center cutting)
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	NECK DIA.	FLUTES	THEORETICAL RADIUS*	SHANK DIA.	OVERALL LENGTH	Ti NANO COATED	
	D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″				D_2 (h6)	L_1	TOOL #	PRICE
NEW	.078 (5/64)	.078	.234 (3x)	.069	4	.0098	1/4	2	712378-C10	51.50
NEW	.078 (5/64)	.078	.391 (5x)	.069	4	.0098	1/4	2	712178-C10	51.50
NEW	.078 (5/64)	.078	.625 (8x)	.069	4	.0098	1/4	2	711978-C10	53.50
NEW	.093 (3/32)	.093	.279 (3x)	.082	4	.0117	1/4	2	712393-C10	54.50
NEW	.093 (3/32)	.093	.465 (5x)	.082	4	.0117	1/4	2	712193-C10	54.50
NEW	.093 (3/32)	.093	.744 (8x)	.082	4	.0117	1/4	2-1/2	711993-C10	56.50
NEW	.125 (1/8)	.125	.375 (3x)	.113	4	.0157	1/4	2	712408-C10	57.50
NEW	.125 (1/8)	.125	.625 (5x)	.113	4	.0157	1/4	2	712208-C10	57.50
NEW	.125 (1/8)	.125	1.000 (8x)	.113	4	.0157	1/4	2-1/2	712008-C10	59.50
NEW	.187 (3/16)	.187	.563 (3x)	.165	4	.0236	1/4	2	712412-C10	60.50
NEW	.187 (3/16)	.187	.938 (5x)	.165	4	.0236	1/4	2-1/2	712212-C10	60.50
NEW	.187 (3/16)	.187	1.500 (8x)	.165	4	.0236	1/4	3	712012-C10	63.50
NEW	.250 (1/4)	.250	.750 (3x)	.245	5	.0314	1/4	2	710216-C10	64.50
NEW	.250 (1/4)	.250	1.250 (5x)	.245	5	.0314	1/4	2-1/2	710016-C10	64.50
NEW	.250 (1/4)	.250	2.000 (8x)	.245	5	.0314	1/4	3-1/2	709816-C10	67.50

*Theoretical radius for use when programming in CAM software

Visit www.harveytool.com to download precise Simulation Files for all Feed Mills.

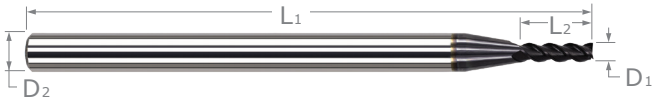
In the absence of a Simulation File, use the Theoretical Radius to approximate Harvey Tool's feed mills as corner radius end mills within your CAM software.



NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	ALTiN NANO COATED	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	942804-C6	65.00
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	973710-C6	60.50
.010		.0100	**.030** (3x)	3	1/8	1-1/2	967010-C6	59.90
.010		.0100	**.050** (5x)	3	1/8	2-1/2	990710-C6	70.50
.015 (1/64)		.0150	**.012** (0.8x)	3	1/8	1-1/2	888015-C6	50.90
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	973715-C6	49.60
.015 (1/64)		.0150	**.023** (1.5x)	4	1/8	1-1/2	841615-C6	51.60
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	967015-C6	49.00
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	875415-C6	51.10
.015 (1/64)		.0150	**.062** (4x)	3	1/8	2-1/2	886215-C6	58.00
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	990715-C6	60.30
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	942809-C6	48.00
	.5 mm	.0196	**.40 mm** (0.8x)	3	4 mm	50 mm	848011-C6	50.10
	.5 mm	.0196	**.75 mm** (1.5x)	3	4 mm	50 mm	954511-C6	48.00
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	942811-C6	48.00
.020		.0200	**.016** (0.8x)	3	1/8	1-1/2	888020-C6	44.80
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	973720-C6	43.40
.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	841620-C6	46.40
.020		.0200	**.060** (3x)	3	1/8	1-1/2	967020-C6	43.00
.020		.0200	**.060** (3x)	4	1/8	1-1/2	875420-C6	45.10
.020		.0200	**.080** (4x)	3	1/8	2-1/2	886220-C6	48.70
.020		.0200	**.100** (5x)	3	1/8	2-1/2	990720-C6	51.10
.020		.0200	**.100** (5x)	4	1/8	2-1/2	852920-C6	54.30
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	942813-C6	46.70
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	973725-C6	41.90
.025		.0250	**.075** (3x)	3	1/8	1-1/2	967025-C6	41.50
.025		.0250	**.075** (3x)	4	1/8	1-1/2	875425-C6	43.40
.025		.0250	**.100** (4x)	3	1/8	2-1/2	886225-C6	50.40
.025		.0250	**.125** (5x)	3	1/8	2-1/2	990725-C6	49.40
.025		.0250	**.125** (5x)	4	1/8	2-1/2	852925-C6	51.30
.030		.0300	**.024** (0.8x)	3	1/8	1-1/2	888030-C6	41.70
.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	973730-C6	41.90
.030		.0300	**.045** (1.5x)	4	1/8	1-1/2	841630-C6	44.00
.030		.0300	**.090** (3x)	3	1/8	1-1/2	967030-C6	41.50
.030		.0300	**.090** (3x)	4	1/8	1-1/2	875430-C6	43.40
.030		.0300	**.125** (4x)	3	1/8	2-1/2	886230-C6	50.40
.030		.0300	**.156** (5x)	3	1/8	2-1/2	990730-C6	49.40

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square (cont.)

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	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	888031-C6	37.90
	.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	973731-C6	35.80
	.031 (1/32)		.0310	**.047** (1.5x)	4	1/8	1-1/2	841631-C6	37.40
	.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	967031-C6	35.30
	.031 (1/32)		.0310	**.093** (3x)	4	1/8	1-1/2	875431-C6	37.40
	.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	886231-C6	42.50
	.031 (1/32)		.0310	**.125** (4x)	4	1/8	2-1/2	790731-C6	44.50
	.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	990731-C6	44.90
	.031 (1/32)		.0310	**.156** (5x)	4	1/8	2-1/2	852931-C6	46.90
		.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	942818-C6	40.80
		.8 mm	.0314	**4.00 mm** (5x)	3	4 mm	50 mm	910518-C6	42.90
	.035		.0350	**.028** (0.8x)	3	1/8	1-1/2	888035-C6	36.80
	.035		.0350	**.053** (1.5x)	3	1/8	1-1/2	973735-C6	35.80
	.035		.0350	**.053** (1.5x)	4	1/8	1-1/2	841635-C6	37.80
	.035		.0350	**.105** (3x)	3	1/8	1-1/2	967035-C6	35.30
	.035		.0350	**.105** (3x)	4	1/8	1-1/2	875435-C6	37.40
	.035		.0350	**.140** (4x)	3	1/8	2-1/2	886235-C6	43.30
	.035		.0350	**.187** (5x)	3	1/8	2-1/2	990735-C6	44.90
		1.0 mm	.0393	**.80 mm** (0.8x)	3	4 mm	50 mm	848022-C6	41.90
		1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	954522-C6	41.40
NEW		1.0 mm	.0393	**1.50 mm** (1.5x)	4	4 mm	50 mm	841622-C6	43.60
		1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	942822-C6	40.40
		1.0 mm	.0393	**3.00 mm** (3x)	4	4 mm	50 mm	821322-C6	42.60
		1.0 mm	.0393	**4.00 mm** (4x)	3	4 mm	50 mm	820722-C6	45.60
		1.0 mm	.0393	**5.00 mm** (5x)	3	4 mm	50 mm	910522-C6	50.00
		1.0 mm	.0393	**5.00 mm** (5x)	4	4 mm	50 mm	726822-C6	52.40
	.039		.0390	**.117** (3x)	3	1/8	1-1/2	967039-C6	37.70
	.040		.0400	**.032** (0.8x)	3	1/8	1-1/2	888040-C6	36.50
	.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	973740-C6	35.80
	.040		.0400	**.060** (1.5x)	4	1/8	1-1/2	841640-C6	37.80
	.040		.0400	**.120** (3x)	3	1/8	1-1/2	967040-C6	35.30
	.040		.0400	**.120** (3x)	4	1/8	1-1/2	875440-C6	37.40
	.040		.0400	**.160** (4x)	3	1/8	2-1/2	886240-C6	42.70
	.040		.0400	**.203** (5x)	3	1/8	2-1/2	990740-C6	44.90
	.040		.0400	**.203** (5x)	4	1/8	2-1/2	852940-C6	47.80
	.045		.0450	**.068** (1.5x)	3	1/8	1-1/2	973745-C6	35.80
	.045		.0450	**.135** (3x)	3	1/8	1-1/2	967045-C6	35.30
	.045		.0450	**.135** (3x)	4	1/8	1-1/2	875445-C6	37.40
	.045		.0450	**.225** (5x)	3	1/8	2-1/2	990745-C6	44.90
	.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	888047-C6	39.60
	.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	973747-C6	35.80
	.047 (3/64)		.0470	**.071** (1.5x)	4	1/8	1-1/2	841647-C6	37.60
	.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	967047-C6	35.30
	.047 (3/64)		.0470	**.141** (3x)	4	1/8	1-1/2	875447-C6	37.40
	.047 (3/64)		.0470	**.187** (4x)	3	1/8	2-1/2	886247-C6	42.50
	.047 (3/64)		.0470	**.187** (4x)	4	1/8	2-1/2	790747-C6	44.50
	.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	990747-C6	44.90
	.047 (3/64)		.0470	**.250** (5x)	4	1/8	2-1/2	852947-C6	46.90

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

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CUTTER DIAMETER D_1			LENGTH OF CUT L_2	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED		
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm				TOOL #	PRICE	
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	942827-C6	40.80	
.050		.0500	**.040** (0.8x)	3	1/8	1-1/2	888050-C6	34.90	
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	973750-C6	35.80	
.050		.0500	**.150** (3x)	3	1/8	1-1/2	967050-C6	35.30	
.050		.0500	**.150** (3x)	4	1/8	1-1/2	875450-C6	37.40	
.050		.0500	**.203** (4x)	3	1/8	1-1/2	886250-C6	43.30	
.050		.0500	**.250** (5x)	3	1/8	2-1/2	990750-C6	44.90	
.055		.0550	**.044** (0.8x)	3	1/8	1-1/2	888055-C6	34.90	NEW
.055		.0550	**.083** (1.5x)	3	1/8	1-1/2	973755-C6	35.80	
.055		.0550	**.165** (3x)	3	1/8	1-1/2	967055-C6	35.30	
.055		.0550	**.165** (3x)	4	1/8	1-1/2	875455-C6	38.10	
.055		.0550	**.275** (5x)	3	1/8	2-1/2	990755-C6	44.90	
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	942831-C6	38.30	
	1.5 mm	.0590	**2.20 mm** (1.5x)	3	4 mm	50 mm	954533-C6	38.80	
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	942833-C6	38.00	
	1.5 mm	.0590	**4.50 mm** (3x)	4	4 mm	50 mm	821333-C6	40.40	
	1.5 mm	.0590	**7.50 mm** (5x)	3	4 mm	50 mm	910533-C6	47.90	
.060		.0600	**.048** (0.8x)	3	1/8	1-1/2	888060-C6	35.60	
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	973760-C6	35.80	
.060		.0600	**.180** (3x)	3	1/8	1-1/2	967060-C6	35.30	
.060		.0600	**.180** (3x)	4	1/8	1-1/2	875460-C6	37.40	
.060		.0600	**.312** (5x)	3	1/8	2-1/2	990760-C6	44.90	
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	888062-C6	37.30	
.062 (1/16)		.0620	**.050** (0.8x)	4	1/8	1-1/2	790562-C6	39.30	
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	973762-C6	33.40	
.062 (1/16)		.0620	**.093** (1.5x)	4	1/8	1-1/2	841662-C6	35.20	
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	967062-C6	33.10	
.062 (1/16)		.0620	**.186** (3x)	4	1/8	1-1/2	875462-C6	35.10	
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	886262-C6	40.70	
.062 (1/16)		.0620	**.250** (4x)	4	1/8	2-1/2	790762-C6	42.80	
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	990762-C6	43.00	
.062 (1/16)		.0620	**.312** (5x)	4	1/8	2-1/2	852962-C6	45.10	
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	942836-C6	39.10	
.065		.0650	**.195** (3x)	3	1/8	1-1/2	967065-C6	38.00	
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	973770-C6	33.40	
.070		.0700	**.210** (3x)	3	1/8	1-1/2	967070-C6	33.10	
.070		.0700	**.210** (3x)	4	1/8	1-1/2	875470-C6	35.10	
.070		.0700	**.375** (5x)	3	1/8	2-1/2	990770-C6	43.00	
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	942840-C6	39.10	
.075		.0750	**.225** (3x)	3	1/8	1-1/2	967075-C6	38.00	
.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	888078-C6	37.30	
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	973778-C6	33.40	
.078 (5/64)		.0780	**.118** (1.5x)	4	1/8	1-1/2	841678-C6	35.20	
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	967078-C6	33.10	
.078 (5/64)		.0780	**.234** (3x)	4	1/8	1-1/2	875478-C6	35.10	
.078 (5/64)		.0780	**.312** (4x)	3	1/8	2-1/2	886278-C6	40.70	
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	990778-C6	43.00	

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.078 (5/64)		.0780	**.406** (5x)	4	1/8	2-1/2	852978-C6	45.10
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	954545-C6	38.80
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	942845-C6	38.00
	2.0 mm	.0787	**6.00 mm** (3x)	4	4 mm	50 mm	821345-C6	40.40
	2.0 mm	.0787	**10.00 mm** (5x)	3	4 mm	50 mm	910545-C6	47.90
.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	973780-C6	33.40
.080		.0800	**.240** (3x)	3	1/8	1-1/2	967080-C6	33.10
.080		.0800	**.406** (5x)	3	1/8	2-1/2	990780-C6	43.80
.085		.0850	**.255** (3x)	3	1/8	1-1/2	967085-C6	38.00
NEW .090		.0900	**.072** (0.8x)	3	1/8	1-1/2	888090-C6	37.30
.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	973790-C6	33.40
.090		.0900	**.135** (1.5x)	4	1/8	1-1/2	841690-C6	35.20
.090		.0900	**.270** (3x)	3	1/8	1-1/2	967090-C6	33.10
.090		.0900	**.450** (5x)	3	1/8	2-1/2	990790-C6	43.00
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	888093-C6	37.30
.093 (3/32)		.0930	**.074** (0.8x)	4	1/8	1-1/2	790593-C6	39.80
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	973793-C6	33.40
.093 (3/32)		.0930	**.140** (1.5x)	4	1/8	1-1/2	841693-C6	35.20
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	967093-C6	33.10
.093 (3/32)		.0930	**.279** (3x)	4	1/8	1-1/2	875493-C6	35.10
.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	886293-C6	40.70
.093 (3/32)		.0930	**.375** (4x)	4	1/8	2-1/2	790793-C6	42.80
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	990793-C6	43.00
.093 (3/32)		.0930	**.500** (5x)	4	1/8	2-1/2	852993-C6	45.10
.095		.0950	**.285** (3x)	3	1/8	1-1/2	967095-C6	37.90
	2.5 mm	.0984	**3.70 mm** (1.5x)	3	4 mm	50 mm	954551-C6	38.80
	2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	942851-C6	38.00
	2.5 mm	.0984	**7.50 mm** (3x)	4	4 mm	50 mm	821351-C6	40.40
	2.5 mm	.0984	**12.00 mm** (5x)	3	4 mm	50 mm	910551-C6	47.90
.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	973800-C6	33.40
.100		.1000	**.300** (3x)	3	1/8	1-1/2	967100-C6	33.10
.100		.1000	**.500** (5x)	3	1/8	2-1/2	990800-C6	43.00
.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	973802-C6	33.40
.109 (7/64)		.1090	**.164** (1.5x)	4	1/8	1-1/2	790802-C6	35.80
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	967102-C6	33.10
.109 (7/64)		.1090	**.327** (3x)	4	1/8	1-1/2	875502-C6	35.10
.109 (7/64)		.1090	**.570** (5x)	3	1/8	2-1/2	990802-C6	43.00
.118		.1180	**.354** (3x)	3	1/8	1-1/2	967105-C6	35.20
	3.0 mm	.1181	**2.40 mm** (0.8x)	3	4 mm	50 mm	848057-C6	38.50
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	954557-C6	38.80
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	942857-C6	38.00
	3.0 mm	.1181	**15.00 mm** (5x)	3	4 mm	50 mm	910557-C6	47.90

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

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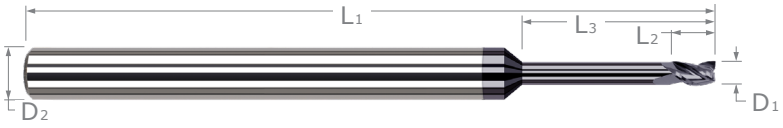
CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	888108-C6	37.30
.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	973808-C6	30.80
.125 (1/8)		.1250	**.187** (1.5x)	5	1/8	1-1/2	747108-C6	34.30
.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	967108-C6	30.80
.125 (1/8)		.1250	**.375** (3x)	5	1/8	1-1/2	747308-C6	34.30
.125 (1/8)		.1250	**.500** (4x)	4	1/8	2-1/2	886308-C6	40.70
.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	990808-C6	43.00
.140 (9/64)		.1406	**.112** (0.8x)	4	3/16	2	888109-C6	34.10
.140 (9/64)		.1406	**.220** (1.5x)	4	3/16	2	973809-C6	36.00
.140 (9/64)		.1406	**.220** (1.5x)	5	3/16	2	747109-C6	39.10
.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	967109-C6	36.00
.140 (9/64)		.1406	**.562** (4x)	4	3/16	3	886309-C6	43.30
.140 (9/64)		.1406	**.750** (5x)	4	3/16	3	990809-C6	45.60
.156 (5/32)		.1562	**.125** (0.8x)	4	3/16	2	888110-C6	35.30
.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	973810-C6	36.00
.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	967110-C6	36.00
.156 (5/32)		.1562	**.625** (4x)	4	3/16	3	886310-C6	38.00
.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	990810-C6	45.60
	4.0 mm	.1574	**12.00 mm** (3x)	4	6 mm	63 mm	942861-C6	48.00
.172 (11/64)		.1718	**.505** (3x)	4	3/16	2	967111-C6	39.00
.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	888112-C6	40.20
.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	973812-C6	33.50
.187 (3/16)		.1875	**.285** (1.5x)	5	3/16	2	747112-C6	37.10
.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	967112-C6	33.80
.187 (3/16)		.1875	**.562** (3x)	5	3/16	2	747312-C6	37.10
.187 (3/16)		.1875	**.750** (4x)	4	3/16	3	886312-C6	43.60
.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	990812-C6	45.60
	5.0 mm	.1968	**15.00 mm** (3x)	4	6 mm	63 mm	821364-C6	48.40
.218 (7/32)		.2187	**.330** (1.5x)	4	1/4	2-1/2	973814-C6	47.10
.218 (7/32)		.2187	**.660** (3x)	4	1/4	2-1/2	967114-C6	47.10
	6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	942866-C6	48.00
.250 (1/4)		.2500	**.200** (0.8x)	4	1/4	2-1/2	888116-C6	49.80
.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	973816-C6	42.00
.250 (1/4)		.2500	**.375** (1.5x)	5	1/4	2-1/2	747116-C6	46.00
.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	967116-C6	42.40
.250 (1/4)		.2500	**.750** (3x)	5	1/4	2-1/2	747316-C6	46.00
.250 (1/4)		.2500	**1.000** (4x)	4	1/4	4	886316-C6	52.60
.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	990816-C6	54.60
.312 (5/16)		.3125	**1.000** (3x)	4	5/16	2-1/2	967120-C6	59.10
.375 (3/8)		.3750	**.570** (1.5x)	4	3/8	2-1/2	973824-C6	67.80
.375 (3/8)		.3750	**1.125** (3x)	4	3/8	2-1/2	967124-C6	68.50
	10.0 mm	.3937	**30.0 mm** (3x)	4	10 mm	75 mm	942873-C6	77.10
.500 (1/2)		.5000	**.750** (1.5x)	4	1/2	3	973832-C6	88.50
.500 (1/2)		.5000	**1.500** (3x)	4	1/2	3	967132-C6	88.50

Please see Speeds & Feeds on page 155

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Long Reach, Stub Flute



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities • Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

	CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.010		.0100	.015	**.050** (5x)	3	1/8	2-1/2	985310-C6	75.50
	.010		.0100	.015	**.080** (8x)	3	1/8	2-1/2	978210-C6	76.30
	.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	985315-C6	64.60
	.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	978215-C6	65.80
	.020		.0200	.030	**.060** (3x)	3	1/8	1-1/2	940520-C6	60.50
	.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	985320-C6	61.70
	.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	791320-C6	64.00
	.020		.0200	.030	**.120** (6x)	3	1/8	2-1/2	895520-C6	61.70
	.020		.0200	.030	**.140** (7x)	3	1/8	2-1/2	880720-C6	63.70
	.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	978220-C6	63.00
	.020		.0200	.030	**.200** (10x)	3	1/8	2-1/2	935720-C6	69.30
	.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	985325-C6	61.70
	.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	978225-C6	63.00
	.030		.0300	.045	**.156** (5x)	3	1/8	2-1/2	985330-C6	61.70
	.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	978230-C6	63.00
	.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	940531-C6	56.00
	.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	985331-C6	57.20
NEW	.031 (1/32)		.0310	.047	**.156** (5x)	4	1/8	2-1/2	791331-C6	59.50
	.031 (1/32)		.0310	.047	**.187** (6x)	3	1/8	2-1/2	895531-C6	57.20
	.031 (1/32)		.0310	.047	**.218** (7x)	3	1/8	2-1/2	880731-C6	58.60
	.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	978231-C6	58.60
	.031 (1/32)		.0310	.047	**.250** (8x)	4	1/8	2-1/2	812331-C6	60.80
	.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	935731-C6	64.50
	.031 (1/32)		.0310	.047	**.375** (12x)	3	1/8	2-1/2	901331-C6	66.50
	.031 (1/32)		.0310	.047	**.470** (15x)	3	1/8	2-1/2	851531-C6	67.90
	.035		.0350	.053	**.187** (5x)	3	1/8	2-1/2	985335-C6	56.00
		1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	905022-C6	64.10
		1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	3	4 mm	50 mm	911422-C6	64.40
	.040		.0400	.060	**.203** (5x)	3	1/8	2-1/2	985340-C6	56.00
	.040		.0400	.060	**.203** (5x)	4	1/8	2-1/2	791340-C6	58.30
NEW	.040		.0400	.060	**.240** (6x)	3	1/8	2-1/2	895540-C6	56.60
	.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	978240-C6	57.20
	.045		.0450	.068	**.225** (5x)	3	1/8	2-1/2	985345-C6	56.00

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	985347-C6	56.00	
.047 (3/64)		.0470	.071	**.250** (5x)	4	1/8	2-1/2	791347-C6	58.80	
.047 (3/64)		.0470	.071	**.281** (6x)	3	1/8	2-1/2	895547-C6	56.60	
.047 (3/64)		.0470	.071	**.328** (7x)	3	1/8	2-1/2	880747-C6	57.70	
.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	978247-C6	57.20	
.047 (3/64)		.0470	.071	**.375** (8x)	4	1/8	2-1/2	812347-C6	59.40	
.047 (3/64)		.0470	.071	**.480** (10x)	3	1/8	2-1/2	935747-C6	62.80	
.050		.0500	.075	**.250** (5x)	3	1/8	2-1/2	985350-C6	56.00	
.055		.0550	.083	**.275** (5x)	3	1/8	2-1/2	985355-C6	56.00	
.060		.0600	.090	**.312** (5x)	3	1/8	2-1/2	985360-C6	56.00	
.060		.0600	.090	**.500** (8x)	3	1/8	2-1/2	978260-C6	57.20	
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	940562-C6	56.00	
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	985362-C6	57.20	
.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	791362-C6	59.40	
.062 (1/16)		.0620	.093	**.375** (6x)	3	1/8	2-1/2	895562-C6	57.20	
.062 (1/16)		.0620	.093	**.375** (6x)	4	1/8	2-1/2	720962-C6	60.00	NEW
.062 (1/16)		.0620	.093	**.437** (7x)	3	1/8	2-1/2	880762-C6	58.60	
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	978262-C6	58.60	
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	812362-C6	60.80	
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	935762-C6	64.50	
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	901362-C6	66.50	
.062 (1/16)		.0620	.093	**.950** (15x)	3	1/8	2-1/2	851562-C6	67.90	
.070		.0700	.105	**.375** (5x)	3	1/8	2-1/2	985370-C6	61.00	
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	985378-C6	56.00	
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	978278-C6	57.20	
.078 (5/64)		.0780	.118	**.625** (8x)	4	1/8	2-1/2	812378-C6	59.40	
.078 (5/64)		.0780	.118	**.800** (10x)	3	1/8	2-1/2	935778-C6	62.80	
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	905045-C6	64.90	
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	3	4 mm	50 mm	911445-C6	65.60	
	2.0 mm	.0787	3.00 mm	**20.0 mm** (10x)	3	4 mm	50 mm	935745-C6	69.00	NEW
.080		.0800	.120	**.406** (5x)	3	1/8	2-1/2	985380-C6	61.50	
.090		.0900	.135	**.450** (5x)	3	1/8	2-1/2	985390-C6	61.00	
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	940593-C6	56.00	
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	985393-C6	57.20	
.093 (3/32)		.0930	.140	**.500** (5x)	4	1/8	2-1/2	791393-C6	60.10	
.093 (3/32)		.0930	.140	**.585** (6x)	3	1/8	2-1/2	895593-C6	57.20	
.093 (3/32)		.0930	.140	**.670** (7x)	3	1/8	2-1/2	880793-C6	58.60	
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	978293-C6	58.60	
.093 (3/32)		.0930	.140	**.750** (8x)	4	1/8	2-1/2	812393-C6	60.80	
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	935793-C6	64.50	
.093 (3/32)		.0930	.140	**1.125** (12x)	3	1/8	2-1/2	901393-C6	66.50	
.093 (3/32)		.0930	.140	**1.400** (15x)	3	1/8	3	851593-C6	67.90	
.100		.1000	.150	**.500** (5x)	3	1/8	2-1/2	985400-C6	56.00	
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	978300-C6	57.70	
.109 (7/64)		.1090	.164	**.570** (5x)	3	1/8	2-1/2	985402-C6	56.00	
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	978302-C6	57.20	

continued on next page

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Long Reach, Stub Flute (cont.)

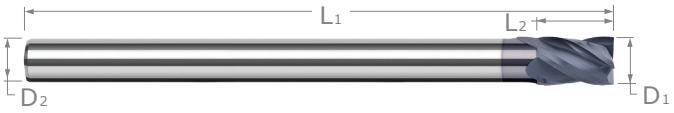
continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	L_3 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	905057-C6	58.40
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	911457-C6	58.60
.125 (1/8)		.1250	.187	**.375** (3x)	4	1/8	1-1/2	940608-C6	56.00
.125 (1/8)		.1250	.187	**.625** (5x)	4	1/8	2-1/2	985408-C6	57.20
.125 (1/8)		.1250	.187	**.750** (6x)	4	1/8	2-1/2	895608-C6	57.20
.125 (1/8)		.1250	.187	**.875** (7x)	4	1/8	2-1/2	880808-C6	58.60
.125 (1/8)		.1250	.187	**1.000** (8x)	4	1/8	2-1/2	978308-C6	58.60
.125 (1/8)		.1250	.187	**1.250** (10x)	4	1/8	2-1/2	935808-C6	64.50
.125 (1/8)		.1250	.187	**1.500** (12x)	4	1/8	3	901408-C6	68.70
.140 (9/64)		.1406	.220	**.750** (5x)	4	3/16	3	985409-C6	65.80
.140 (9/64)		.1406	.220	**1.125** (8x)	4	3/16	3	978309-C6	68.00
.156 (5/32)		.1562	.235	**.750** (5x)	4	3/16	3	985410-C6	61.70
.156 (5/32)		.1562	.235	**1.250** (8x)	4	3/16	3	978310-C6	63.00
.156 (5/32)		.1562	.235	**1.570** (10x)	4	3/16	3	935810-C6	68.70
.187 (3/16)		.1875	.285	**1.000** (5x)	4	3/16	3	985412-C6	61.70
.187 (3/16)		.1875	.285	**1.500** (8x)	4	3/16	3	978312-C6	63.00
.187 (3/16)		.1875	.285	**1.875** (10x)	4	3/16	4	935812-C6	68.70
	6.0 mm	.2362	9.00mm	**30.0mm** (5x)	4	6 mm	63 mm	905066-C6	74.20
.250 (1/4)		.2500	.375	**1.250** (5x)	4	1/4	4	985416-C6	69.00
.250 (1/4)		.2500	.375	**2.000** (8x)	4	1/4	4	978316-C6	70.40
.375 (3/8)		.3750	.570	**2.000** (5x)	4	3/8	4	985424-C6	78.50

Please see Speeds & Feeds on page 147

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Reduced Shank

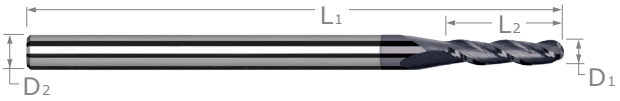


- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Reduced straight shank allows any chucking depth
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE
.125 (1/8)	**.187** (1.5x)	4	3 mm	2-1/2	740108-C6	115.80
.156 (5/32)	**.235** (1.5x)	4	1/8	2-1/2	740110-C6	115.80
.187 (3/16)	**.285** (1.5x)	4	5/32	2-1/2	740112-C6	118.40
.250 (1/4)	**.375** (1.5x)	4	3/16	3	740116-C6	128.60
.312 (5/16)	**.470** (1.5x)	4	1/4	4	740120-C6	154.80
.375 (3/8)	**.570** (1.5x)	4	5/16	4	740124-C6	173.70
.500 (1/2)	**.750** (1.5x)	4	7/16	6	740132-C6	187.90

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	975304-C6	74.50
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	944210-C6	69.00
.010		.0100	**.030** (3x)	3	1/8	1-1/2	970510-C6	69.00
.010		.0100	**.050** (5x)	3	1/8	2-1/2	930610-C6	79.80
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	944215-C6	58.60
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	970515-C6	58.60
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	930615-C6	69.80
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	975309-C6	61.50
	.5 mm	.0196	**.750 mm** (1.5x)	3	4 mm	50 mm	968011-C6	55.30
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	975311-C6	55.30
.020		.0200	**.016** (0.8x)	3	1/8	1-1/2	848120-C6	53.70
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	944220-C6	52.30
.020		.0200	**.060** (3x)	3	1/8	1-1/2	970520-C6	52.30
.020		.0200	**.060** (3x)	4	1/8	1-1/2	893020-C6	54.90
.020		.0200	**.080** (4x)	3	1/8	2-1/2	811220-C6	57.50
.020		.0200	**.100** (5x)	3	1/8	2-1/2	930620-C6	57.50
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	975313-C6	53.70
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	944225-C6	50.60
.025		.0250	**.075** (3x)	3	1/8	1-1/2	970525-C6	50.60
.025		.0250	**.125** (5x)	3	1/8	2-1/2	930625-C6	56.00
.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	944230-C6	44.80
.030		.0300	**.090** (3x)	3	1/8	1-1/2	970530-C6	44.80
.030		.0300	**.156** (5x)	3	1/8	2-1/2	930630-C6	50.50
.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	848131-C6	46.00
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	944231-C6	44.60
.031 (1/32)		.0310	**.047** (1.5x)	4	1/8	1-1/2	814531-C6	47.10
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	970531-C6	44.60
.031 (1/32)		.0310	**.093** (3x)	4	1/8	1-1/2	893031-C6	47.10
.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	811231-C6	53.90
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	930631-C6	53.90
.031 (1/32)		.0310	**.156** (5x)	4	1/8	2-1/2	778831-C6	56.40
	.8 mm	.0314	**1.20 mm** (1.5x)	3	4 mm	50 mm	968018-C6	47.60
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	975318-C6	47.10
.035		.0350	**.105** (3x)	3	1/8	1-1/2	970535-C6	44.80

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
	1.0 mm	.0393	**.80 mm** (0.8x)	3	4 mm	50 mm	872422-C6	47.80	
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	968022-C6	47.10	
	1.0 mm	.0393	**1.50 mm** (1.5x)	4	4 mm	50 mm	726622-C6	50.20	
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	975322-C6	47.10	
	1.0 mm	.0393	**3.00 mm** (3x)	4	4 mm	50 mm	793822-C6	50.20	
	1.0 mm	.0393	**4.00 mm** (4x)	3	4 mm	50 mm	790122-C6	57.00	
	1.0 mm	.0393	**5.00 mm** (5x)	3	4 mm	50 mm	911322-C6	56.50	
.040		.0400	**.032** (0.8x)	3	1/8	1-1/2	848140-C6	44.90	NEW
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	944240-C6	44.60	
.040		.0400	**.060** (1.5x)	4	1/8	1-1/2	814540-C6	47.50	
.040		.0400	**.120** (3x)	3	1/8	1-1/2	970540-C6	44.60	
.040		.0400	**.120** (3x)	4	1/8	1-1/2	893040-C6	47.10	
.040		.0400	**.160** (4x)	3	1/8	2-1/2	811240-C6	54.60	
.040		.0400	**.203** (5x)	3	1/8	2-1/2	930640-C6	54.10	
.045		.0450	**.135** (3x)	3	1/8	1-1/2	970545-C6	45.20	
.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	848147-C6	44.90	
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	944247-C6	44.60	
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	970547-C6	44.60	
.047 (3/64)		.0470	**.141** (3x)	4	1/8	1-1/2	893047-C6	47.10	
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	930647-C6	54.10	
	1.2 mm	.0472	**1.80 mm** (1.5x)	3	4 mm	50 mm	968027-C6	47.60	
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	975327-C6	47.60	
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	944250-C6	44.60	
.050		.0500	**.150** (3x)	3	1/8	1-1/2	970550-C6	44.60	
.050		.0500	**.250** (5x)	3	1/8	2-1/2	930650-C6	54.10	
.055		.0550	**.165** (3x)	3	1/8	1-1/2	970555-C6	44.80	
	1.4 mm	.0551	**2.10 mm** (1.5x)	3	4 mm	50 mm	968031-C6	47.60	
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	975331-C6	47.10	
	1.5 mm	.0590	**2.20 mm** (1.5x)	3	4 mm	50 mm	968033-C6	47.60	
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	975333-C6	47.10	
	1.5 mm	.0590	**7.50 mm** (5x)	3	4 mm	50 mm	911333-C6	56.50	
.060		.0600	**.048** (0.8x)	3	1/8	1-1/2	848160-C6	44.90	
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	944260-C6	44.60	
.060		.0600	**.090** (1.5x)	4	1/8	1-1/2	814560-C6	47.10	
.060		.0600	**.180** (3x)	3	1/8	1-1/2	970560-C6	44.60	
.060		.0600	**.312** (5x)	3	1/8	2-1/2	930660-C6	54.10	
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	848162-C6	43.40	
.062 (1/16)		.0620	**.050** (0.8x)	4	1/8	1-1/2	787162-C6	46.00	
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	944262-C6	41.90	
.062 (1/16)		.0620	**.093** (1.5x)	4	1/8	1-1/2	814562-C6	44.60	
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	970562-C6	41.90	
.062 (1/16)		.0620	**.186** (3x)	4	1/8	1-1/2	893062-C6	44.60	
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	811262-C6	51.70	
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	930662-C6	51.70	
.062 (1/16)		.0620	**.312** (5x)	4	1/8	2-1/2	778862-C6	54.20	
	1.6 mm	.0629	**2.40 mm** (1.5x)	3	4 mm	50 mm	968036-C6	44.30	
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	975336-C6	44.70	

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball (cont.)

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	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1			L_2		D_2 (h6)	L_1	TOOL #	PRICE
	+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm					
	.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	944270-C6	42.60
	.070		.0700	**.210** (3x)	3	1/8	1-1/2	970570-C6	42.60
	.070		.0700	**.210** (3x)	4	1/8	1-1/2	893070-C6	45.50
	.070		.0700	**.375** (5x)	3	1/8	2-1/2	930670-C6	51.00
		1.8 mm	.0708	**2.70 mm** (1.5x)	3	4 mm	50 mm	968040-C6	44.70
		1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	975340-C6	44.30
	.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	848178-C6	43.40
	.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	944278-C6	41.90
NEW	.078 (5/64)		.0780	**.118** (1.5x)	4	1/8	1-1/2	814578-C6	44.60
	.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	970578-C6	41.90
	.078 (5/64)		.0780	**.234** (3x)	4	1/8	1-1/2	893078-C6	44.60
	.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	930678-C6	51.10
		2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	968045-C6	44.70
		2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	975345-C6	44.30
		2.0 mm	.0787	**10.00 mm** (5x)	3	4 mm	50 mm	911345-C6	53.70
	.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	944280-C6	42.90
	.080		.0800	**.240** (3x)	3	1/8	1-1/2	970580-C6	42.60
	.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	944290-C6	42.90
	.090		.0900	**.270** (3x)	3	1/8	1-1/2	970590-C6	42.90
	.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	848193-C6	43.40
	.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	944293-C6	41.90
	.093 (3/32)		.0930	**.140** (1.5x)	4	1/8	1-1/2	814593-C6	44.60
	.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	970593-C6	41.90
	.093 (3/32)		.0930	**.279** (3x)	4	1/8	1-1/2	893093-C6	44.60
	.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	811293-C6	51.70
	.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	930693-C6	51.70
		2.5 mm	.0984	**3.70 mm** (1.5x)	3	4 mm	50 mm	968051-C6	47.10
		2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	975351-C6	46.60
	.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	944300-C6	42.20
	.100		.1000	**.300** (3x)	3	1/8	1-1/2	970600-C6	42.20
	.100		.1000	**.500** (5x)	3	1/8	2-1/2	930700-C6	52.20
	.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	944302-C6	44.80
	.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	970602-C6	44.80
		3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	968057-C6	44.70
		3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	975357-C6	44.30
		3.0 mm	.1181	**9.00 mm** (3x)	4	4 mm	50 mm	793857-C6	47.30
		3.0 mm	.1181	**15.00 mm** (5x)	3	4 mm	50 mm	911357-C6	53.70

	D_1			L_2		D_2 (h6)	L_1	TOOL #	PRICE
	+.000″ −.002″	+.00mm −.04mm	decimal equivalent	+.030″ −.000″ +.75mm −.00mm					
	.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	848208-C6	43.40
	.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	944308-C6	38.30
	.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	970608-C6	38.30
	.125 (1/8)		.1250	**.500** (4x)	4	1/8	2-1/2	811308-C6	51.70

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball (cont.)

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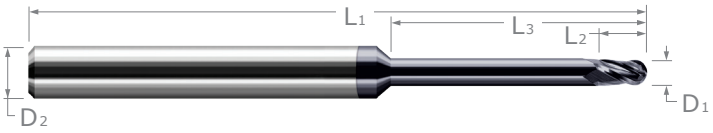
CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	930708-C6	51.70
.140 (9/64)		.1406	**.220** (1.5x)	4	3/16	2	944309-C6	54.10
.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	970609-C6	54.10
.140 (9/64)		.1406	**.750** (5x)	4	3/16	3	930709-C6	61.10
.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	944310-C6	44.80
.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	970610-C6	45.20
.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	930710-C6	54.50
.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	848212-C6	46.20
.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	944312-C6	40.70
.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	970612-C6	41.10
.187 (3/16)		.1875	**.750** (4x)	4	3/16	3	811312-C6	46.00
.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	930712-C6	54.50
	5.0 mm	.1968	**15.00 mm** (3x)	4	6 mm	63 mm	975364-C6	56.90
	6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	975372-C6	59.30
.250 (1/4)		.2500	**.200** (0.8x)	4	1/4	2-1/2	848216-C6	55.90
.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	944316-C6	49.30
.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	970616-C6	49.80
.250 (1/4)		.2500	**1.000** (4x)	4	1/4	4	811316-C6	61.30
.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	930716-C6	64.50
.375 (3/8)		.3750	**.570** (1.5x)	4	3/8	2-1/2	944324-C6	80.30
.375 (3/8)		.3750	**1.125** (3x)	4	3/8	2-1/2	970624-C6	79.60
.500 (1/2)		.5000	**.750** (1.5x)	4	1/2	3	944332-C6	96.80
.500 (1/2)		.5000	**1.500** (3x)	4	1/2	3	970632-C6	96.80

Please see Speeds & Feeds on page 155

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball – Long Reach, Stub Flute



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Suitable for steels up to 45Rc
- h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

Improves Performance

Contour Profiling

Tipped Multi-Axis Machining

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)		.0150	.022	**.078** (5x)	4	1/8	2-1/2	63615-C6	73.80
.015 (1/64)		.0150	.022	**.125** (8x)	4	1/8	2-1/2	56115-C6	75.20
.015 (1/64)		.0150	.022	**.187** (12x)	4	1/8	2-1/2	64815-C6	80.10
	.4 mm	.0157	.60 mm	**2.0 mm** (5x)	4	4 mm	50 mm	988709-C6	80.00
	.4 mm	.0157	.60 mm	**3.2 mm** (8x)	4	4 mm	50 mm	974009-C6	82.10
	.4 mm	.0157	.60 mm	**4.8 mm** (12x)	4	4 mm	50 mm	981309-C6	88.00
	.5 mm	.0196	.75 mm	**2.5 mm** (5x)	4	4 mm	50 mm	988711-C6	78.20
	.5 mm	.0196	.75 mm	**4.0 mm** (8x)	4	4 mm	50 mm	974011-C6	78.70
	.5 mm	.0196	.75 mm	**6.0 mm** (12x)	4	4 mm	50 mm	981311-C6	85.00
	.5 mm	.0196	.75 mm	**8.0 mm** (16x)	4	4 mm	50 mm	976511-C6	88.90
.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	63620-C6	69.80
.020		.0200	.030	**.160** (8x)	4	1/8	2-1/2	56120-C6	71.30
.020		.0200	.030	**.250** (12x)	4	1/8	2-1/2	64820-C6	77.10
	.6 mm	.0236	.90 mm	**3.0 mm** (5x)	4	4 mm	50 mm	988713-C6	75.50
	.6 mm	.0236	.90 mm	**4.8 mm** (8x)	4	4 mm	50 mm	974013-C6	77.20
	.6 mm	.0236	.90 mm	**7.2 mm** (12x)	4	4 mm	50 mm	981313-C6	83.10
.025		.0250	.037	**.125** (5x)	4	1/8	2-1/2	63625-C6	68.00
.025		.0250	.037	**.203** (8x)	4	1/8	2-1/2	56125-C6	69.50
.025		.0250	.037	**.312** (12x)	4	1/8	2-1/2	64825-C6	75.50
.031 (1/32)		.0310	.047	**.093** (3x)	4	1/8	1-1/2	929031-C6	62.30
.031 (1/32)		.0310	.047	**.156** (5x)	4	1/8	2-1/2	63631-C6	63.90
.031 (1/32)		.0310	.047	**.187** (6x)	4	1/8	2-1/2	797531-C6	64.50
.031 (1/32)		.0310	.047	**.250** (8x)	4	1/8	2-1/2	56131-C6	65.50
.031 (1/32)		.0310	.047	**.312** (10x)	4	1/8	2-1/2	887231-C6	67.40
.031 (1/32)		.0310	.047	**.375** (12x)	4	1/8	2-1/2	64831-C6	68.10
.031 (1/32)		.0310	.047	**.470** (15x)	4	1/8	2-1/2	953331-C6	70.80
	.8 mm	.0314	1.20 mm	**4.0 mm** (5x)	4	4 mm	50 mm	988718-C6	71.10
	.8 mm	.0314	1.20 mm	**6.5 mm** (8x)	4	4 mm	50 mm	974018-C6	72.10
	.8 mm	.0314	1.20 mm	**9.5 mm** (12x)	4	4 mm	50 mm	981318-C6	74.50
.035		.0350	.052	**.187** (5x)	4	1/8	2-1/2	63635-C6	63.90

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE	
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	4	4 mm	50 mm	988722-C6	70.50	
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	4	4 mm	50 mm	974022-C6	72.10	
	1.0 mm	.0393	1.50 mm	**12.0 mm** (12x)	4	4 mm	50 mm	981322-C6	73.90	
	1.0 mm	.0393	1.50 mm	**16.0 mm** (16x)	4	4 mm	50 mm	976522-C6	77.50	
.040		.0400	.060	**.203** (5x)	4	1/8	2-1/2	63640-C6	63.90	
.040		.0400	.060	**.325** (8x)	4	1/8	2-1/2	56140-C6	65.50	
.045		.0450	.067	**.225** (5x)	4	1/8	2-1/2	63645-C6	63.90	
.047 (3/64)		.0470	.070	**.250** (5x)	4	1/8	2-1/2	63647-C6	63.90	
.047 (3/64)		.0470	.070	**.281** (6x)	4	1/8	2-1/2	797547-C6	63.90	NEW
.047 (3/64)		.0470	.070	**.375** (8x)	4	1/8	2-1/2	56147-C6	65.50	
.047 (3/64)		.0470	.070	**.480** (10x)	4	1/8	2-1/2	887247-C6	66.70	
.047 (3/64)		.0470	.070	**.570** (12x)	4	1/8	2-1/2	64847-C6	67.50	
.050		.0500	.075	**.250** (5x)	4	1/8	2-1/2	63650-C6	63.90	
.050		.0500	.075	**.400** (8x)	4	1/8	2-1/2	56150-C6	65.50	
.055		.0550	.082	**.275** (5x)	4	1/8	2-1/2	63655-C6	64.50	
	1.5 mm	.0590	2.20 mm	**7.5 mm** (5x)	4	4 mm	50 mm	988733-C6	70.50	
	1.5 mm	.0590	2.20 mm	**12.0 mm** (8x)	4	4 mm	50 mm	974033-C6	72.10	
	1.5 mm	.0590	2.20 mm	**18.0 mm** (12x)	4	4 mm	50 mm	981333-C6	73.90	
	1.5 mm	.0590	2.20 mm	**24.0 mm** (16x)	4	4 mm	63 mm	976533-C6	78.20	
.060		.0600	.090	**.312** (5x)	4	1/8	2-1/2	63660-C6	63.90	
.060		.0600	.090	**.500** (8x)	4	1/8	2-1/2	56160-C6	65.50	
.062 (1/16)		.0620	.093	**.186** (3x)	4	1/8	1-1/2	929062-C6	62.30	
.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	63662-C6	63.90	
.062 (1/16)		.0620	.093	**.375** (6x)	4	1/8	2-1/2	797562-C6	63.90	
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	56162-C6	65.50	
.062 (1/16)		.0620	.093	**.625** (10x)	4	1/8	2-1/2	887262-C6	66.70	
.062 (1/16)		.0620	.093	**.750** (12x)	4	1/8	2-1/2	64862-C6	67.50	
.062 (1/16)		.0620	.093	**.950** (15x)	4	1/8	2-1/2	953362-C6	70.80	
.070		.0700	.105	**.375** (5x)	4	1/8	2-1/2	63670-C6	64.50	
.070		.0700	.105	**.570** (8x)	4	1/8	2-1/2	56170-C6	66.10	
.078 (5/64)		.0780	.117	**.406** (5x)	4	1/8	2-1/2	63678-C6	63.90	
.078 (5/64)		.0780	.117	**.475** (6x)	4	1/8	2-1/2	797578-C6	63.90	NEW
.078 (5/64)		.0780	.117	**.625** (8x)	4	1/8	2-1/2	56178-C6	65.50	
.078 (5/64)		.0780	.117	**.940** (12x)	4	1/8	2-1/2	64878-C6	67.50	
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	4	4 mm	50 mm	988745-C6	70.20	
	2.0 mm	.0787	3.00 mm	**12.0 mm** (6x)	4	4 mm	50 mm	749245-C6	71.70	
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	4	4 mm	50 mm	974045-C6	71.80	
	2.0 mm	.0787	3.00 mm	**24.0 mm** (12x)	4	4 mm	63 mm	981345-C6	73.90	
	2.0 mm	.0787	3.00 mm	**32.0 mm** (16x)	4	4 mm	63 mm	976545-C6	78.20	
.093 (3/32)		.0930	.139	**.279** (3x)	4	1/8	1-1/2	929093-C6	62.30	
.093 (3/32)		.0930	.139	**.500** (5x)	4	1/8	2-1/2	63693-C6	63.90	
.093 (3/32)		.0930	.139	**.585** (6x)	4	1/8	2-1/2	797593-C6	63.90	
.093 (3/32)		.0930	.139	**.750** (8x)	4	1/8	2-1/2	56193-C6	65.50	
.093 (3/32)		.0930	.139	**.950** (10x)	4	1/8	2-1/2	887293-C6	66.70	
.093 (3/32)		.0930	.139	**1.125** (12x)	4	1/8	2-1/2	64893-C6	68.10	
.093 (3/32)		.0930	.139	**1.400** (15x)	4	1/8	3	953393-C6	70.80	

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
.100		.1000	.150	**.500** (5x)	4	1/8	2-1/2	63700-C6	63.20
.100		.1000	.150	**.800** (8x)	4	1/8	2-1/2	56200-C6	65.10
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	4	4 mm	50 mm	988757-C6	66.60
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	4	4 mm	50 mm	974057-C6	68.20

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	1-1/2	929108-C6	62.30
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	63708-C6	63.40
.125 (1/8)	.1250	.187	**.750** (6x)	4	1/8	2-1/2	797608-C6	63.40
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	56208-C6	64.80
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	3	887308-C6	66.70
.125 (1/8)	.1250	.187	**1.500** (12x)	4	1/8	3	64908-C6	67.50
.140 (9/64)	.1406	.220	**.750** (5x)	4	3/16	3	63709-C6	69.50
.156 (5/32)	.1562	.234	**.750** (5x)	4	3/16	3	63710-C6	68.70
.156 (5/32)	.1562	.234	**1.250** (8x)	4	3/16	3	56210-C6	70.10
.156 (5/32)	.1562	.234	**1.570** (10x)	4	3/16	4	887310-C6	73.40
.187 (3/16)	.1875	.281	**1.000** (5x)	4	3/16	3	63712-C6	69.80
.187 (3/16)	.1875	.281	**1.500** (8x)	4	3/16	3	56212-C6	71.40
.187 (3/16)	.1875	.281	**1.875** (10x)	4	3/16	4	887312-C6	74.70
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	63716-C6	77.30
.250 (1/4)	.2500	.375	**2.000** (8x)	4	1/4	4	56216-C6	78.80
.250 (1/4)	.2500	.375	**2.500** (10x)	4	1/4	6	887316-C6	92.60
.375 (3/8)	.3750	.570	**2.000** (5x)	4	3/8	4	63724-C6	96.40

Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For High Temp Alloys)

Important Note: Values in table are in inches and are based on 4 flute, reached (8x Dia) end mills. For 3 flutes, table values of IPT must be increased to 105% before adjustments for different reaches. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%; for 6x, increase to 120%; for 7x, increase to 110%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 15x, reduce to 75%). For complete speeds and feeds charts, please see www.harveytool.com

Material	Hardness (HBn)	SFM
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7 **Tool Steels**: D, H, M, T, S series	275 - 300	160
	300 - 350	140
	350 - 400	100
	400 - 425	80
Titanium: All alloys	275 - 300	200
	300 - 350	125
	350 - 400	75
	400 - 425	75
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	80
	300 - 350	60
	350 - 400	50
	400 - 425	40

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00004	.00008	.00012	.00016	.00021	.00025	.00033	.00049	.00066	.00086	.00104	.00139
Roughing	.00005	.00010	.00016	.00021	.00026	.00031	.00042	.00063	.00084	.00110	.00132	.00176
Finishing	.00007	.00014	.00021	.00027	.00034	.00041	.00055	.00082	.00110	.00144	.00173	.00231
Max	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00099	.00132	.00173	.00208	.00277

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .28x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .28x Dia
Roughing: .5x - .7x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

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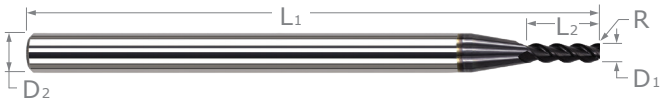
VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1			R	L_2		D_2 (h6)	L_1	TOOL #	PRICE
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.001″ −.001″ +.025mm −.025mm	+.010″ −.000″ +.25mm −.00mm					
	.2 mm	.0078	**.05 mm**	.30 mm (1.5x)	3	4 mm	50 mm	984104-C6	65.80
	.2 mm	.0078	**.05 mm**	.60 mm (3x)	3	4 mm	50 mm	979304-C6	65.80
.010		.0100	**.003**	.015 (1.5x)	3	1/8	1-1/2	52210-C6	61.70
.010		.0100	**.003**	.030 (3x)	3	1/8	1-1/2	46810-C6	62.10
	.3 mm	.0118	**.08 mm**	.45 mm (1.5x)	3	4 mm	50 mm	984106-C6	64.10
	.3 mm	.0118	**.08 mm**	.90 mm (3x)	3	4 mm	50 mm	979306-C6	64.10
.015 (1/64)		.0150	**.003**	.012 (0.8x)	3	1/8	1-1/2	954215-C6	54.40
.015 (1/64)		.0150	**.003**	.022 (1.5x)	3	1/8	1-1/2	52215-C6	50.20
.015 (1/64)		.0150	**.003**	.045 (3x)	3	1/8	1-1/2	46815-C6	50.20
.015 (1/64)		.0150	**.003**	.078 (5x)	3	1/8	2-1/2	53615-C6	61.60
.015 (1/64)		.0150	**.005**	.045 (3x)	3	1/8	1-1/2	936415-C6	58.20
	.4 mm	.0157	**.08 mm**	.60 mm (1.5x)	3	4 mm	50 mm	984109-C6	55.10
	.4 mm	.0157	**.08 mm**	1.20 mm (3x)	3	4 mm	50 mm	979309-C6	55.10
	.5 mm	.0196	**.10 mm**	.75 mm (1.5x)	3	4 mm	50 mm	984111-C6	49.20
	.5 mm	.0196	**.10 mm**	1.50 mm (3x)	3	4 mm	50 mm	979311-C6	48.70
	.5 mm	.0196	**.10 mm**	2.50 mm (5x)	3	4 mm	50 mm	965811-C6	62.10
.020		.0200	**.004**	.016 (0.8x)	3	1/8	1-1/2	954220-C6	47.50
.020		.0200	**.004**	.030 (1.5x)	3	1/8	1-1/2	52220-C6	44.20
.020		.0200	**.004**	.060 (3x)	3	1/8	1-1/2	46820-C6	44.20
.020		.0200	**.004**	.060 (3x)	4	1/8	1-1/2	786620-C6	47.50
.020		.0200	**.004**	.100 (5x)	3	1/8	2-1/2	53620-C6	54.80
	.6 mm	.0236	**.10 mm**	.90 mm (1.5x)	3	4 mm	50 mm	984113-C6	47.70
	.6 mm	.0236	**.10 mm**	1.80 mm (3x)	3	4 mm	50 mm	979313-C6	47.70
.025		.0250	**.004**	.020 (0.8x)	3	1/8	1-1/2	954225-C6	46.80
.025		.0250	**.004**	.038 (1.5x)	3	1/8	1-1/2	52225-C6	42.80
.025		.0250	**.004**	.075 (3x)	3	1/8	1-1/2	46825-C6	42.80
.025		.0250	**.004**	.075 (3x)	4	1/8	1-1/2	786625-C6	45.30
.025		.0250	**.004**	.125 (5x)	3	1/8	2-1/2	53625-C6	53.00
	.7 mm	.0275	**.10 mm**	2.10 mm (3x)	3	4 mm	50 mm	979315-C6	47.20
.030		.0300	**.004**	.045 (1.5x)	3	1/8	1-1/2	52230-C6	43.60
.030		.0300	**.004**	.090 (3x)	3	1/8	1-1/2	46830-C6	42.80
.030		.0300	**.004**	.156 (5x)	3	1/8	2-1/2	53630-C6	53.50

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.031 (1/32)		.0310	**.003**	.047 (1.5x)	3	1/8	1-1/2	853631-C6	39.30
.031 (1/32)		.0310	**.003**	.093 (3x)	3	1/8	1-1/2	923631-C6	36.80
.031 (1/32)		.0310	**.005**	.025 (0.8x)	3	1/8	1-1/2	954231-C6	38.10
.031 (1/32)		.0310	**.005**	.047 (1.5x)	3	1/8	1-1/2	52231-C6	36.50
.031 (1/32)		.0310	**.005**	.047 (1.5x)	4	1/8	1-1/2	795531-C6	39.50
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	46831-C6	36.50
.031 (1/32)		.0310	**.005**	.093 (3x)	4	1/8	1-1/2	850731-C6	39.10
.031 (1/32)		.0310	**.005**	.125 (4x)	3	1/8	2-1/2	796731-C6	41.20
.031 (1/32)		.0310	**.005**	.156 (5x)	3	1/8	2-1/2	53631-C6	46.00
.031 (1/32)		.0310	**.005**	.156 (5x)	4	1/8	2-1/2	796931-C6	49.20
.031 (1/32)		.0310	**.008**	.047 (1.5x)	3	1/8	1-1/2	847831-C6	39.50
.031 (1/32)		.0310	**.008**	.093 (3x)	3	1/8	1-1/2	848431-C6	40.30
.031 (1/32)		.0310	**.010**	.047 (1.5x)	3	1/8	1-1/2	912931-C6	39.30
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	950731-C6	39.50
.031 (1/32)		.0310	**.010**	.093 (3x)	4	1/8	1-1/2	856431-C6	39.50
.031 (1/32)		.0310	**.010**	.156 (5x)	3	1/8	2-1/2	869831-C6	49.20
	.8 mm	.0314	**.10 mm**	1.20 mm (1.5x)	3	4 mm	50 mm	984118-C6	41.40
	.8 mm	.0314	**.10 mm**	2.40 mm (3x)	3	4 mm	50 mm	979318-C6	41.40
.035		.0350	**.005**	.053 (1.5x)	3	1/8	1-1/2	52235-C6	36.50
.035		.0350	**.005**	.105 (3x)	3	1/8	1-1/2	46835-C6	36.50
.035		.0350	**.005**	.187 (5x)	3	1/8	2-1/2	53635-C6	46.00
.035		.0350	**.010**	.105 (3x)	3	1/8	1-1/2	950735-C6	39.50
	.9 mm	.0354	**.10 mm**	2.70 mm (3x)	3	4 mm	50 mm	979320-C6	41.40
	1.0 mm	.0393	**.10 mm**	1.50 mm (1.5x)	3	4 mm	50 mm	984122-C6	41.00
	1.0 mm	.0393	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	979322-C6	41.00
	1.0 mm	.0393	**.10 mm**	5.00 mm (5x)	3	4 mm	50 mm	965822-C6	50.90
	1.0 mm	.0393	**.30 mm**	3.00 mm (3x)	3	4 mm	50 mm	843322-C6	41.40
.040		.0400	**.003**	.120 (3x)	3	1/8	1-1/2	923640-C6	36.50
.040		.0400	**.005**	.032 (0.8x)	3	1/8	1-1/2	954240-C6	40.20
.040		.0400	**.005**	.060 (1.5x)	3	1/8	1-1/2	52240-C6	36.50
.040		.0400	**.005**	.120 (3x)	3	1/8	1-1/2	46840-C6	36.50
.040		.0400	**.005**	.203 (5x)	3	1/8	2-1/2	53640-C6	46.00
.040		.0400	**.010**	.120 (3x)	3	1/8	1-1/2	950740-C6	39.50
	1.1 mm	.0433	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	979324-C6	41.20
.045		.0450	**.005**	.068 (1.5x)	3	1/8	1-1/2	52245-C6	36.50
.045		.0450	**.005**	.135 (3x)	3	1/8	1-1/2	46845-C6	36.50
.045		.0450	**.005**	.225 (5x)	3	1/8	2-1/2	53645-C6	46.00
.047 (3/64)		.0470	**.003**	.141 (3x)	3	1/8	1-1/2	923647-C6	36.10
.047 (3/64)		.0470	**.005**	.038 (0.8x)	3	1/8	1-1/2	954247-C6	38.10
.047 (3/64)		.0470	**.005**	.071 (1.5x)	3	1/8	1-1/2	52247-C6	36.50
.047 (3/64)		.0470	**.005**	.071 (1.5x)	4	1/8	1-1/2	795547-C6	39.10
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	46847-C6	36.50
.047 (3/64)		.0470	**.005**	.141 (3x)	4	1/8	1-1/2	850747-C6	39.10
.047 (3/64)		.0470	**.005**	.187 (4x)	3	1/8	2-1/2	796747-C6	41.60
.047 (3/64)		.0470	**.005**	.250 (5x)	3	1/8	2-1/2	53647-C6	46.00
.047 (3/64)		.0470	**.005**	.250 (5x)	4	1/8	2-1/2	796947-C6	49.20
.047 (3/64)		.0470	**.010**	.071 (1.5x)	3	1/8	1-1/2	912947-C6	39.30
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	950747-C6	39.50
.047 (3/64)		.0470	**.015**	.071 (1.5x)	3	1/8	1-1/2	975647-C6	37.10
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	964147-C6	39.50

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	1.2 mm	.0472	**.10 mm**	1.80 mm (1.5x)	3	4 mm	50 mm	984127-C6	41.40
	1.2 mm	.0472	**.10 mm**	3.50 mm (3x)	3	4 mm	50 mm	979327-C6	41.40
.050		.0500	**.005**	.040 (0.8x)	3	1/8	1-1/2	954250-C6	39.80
.050		.0500	**.005**	.075 (1.5x)	3	1/8	1-1/2	52250-C6	36.10
.050		.0500	**.005**	.150 (3x)	3	1/8	1-1/2	46850-C6	36.10
.050		.0500	**.005**	.250 (5x)	3	1/8	2-1/2	53650-C6	46.00
.050		.0500	**.010**	.075 (1.5x)	3	1/8	1-1/2	912950-C6	39.30
.050		.0500	**.010**	.150 (3x)	3	1/8	1-1/2	950750-C6	40.30
.050		.0500	**.015**	.075 (1.5x)	3	1/8	1-1/2	975650-C6	39.50
.050		.0500	**.015**	.150 (3x)	3	1/8	1-1/2	964150-C6	38.20
	1.3 mm	.0511	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	979329-C6	41.40
.055		.0550	**.005**	.083 (1.5x)	3	1/8	1-1/2	52255-C6	36.10
.055		.0550	**.005**	.165 (3x)	3	1/8	1-1/2	46855-C6	36.10
.055		.0550	**.005**	.275 (5x)	3	1/8	2-1/2	53655-C6	46.00
.055		.0550	**.010**	.083 (1.5x)	3	1/8	1-1/2	912955-C6	40.00
.055		.0550	**.010**	.165 (3x)	3	1/8	1-1/2	950755-C6	40.30
.055		.0550	**.015**	.083 (1.5x)	3	1/8	1-1/2	975655-C6	40.30
.055		.0550	**.015**	.165 (3x)	3	1/8	1-1/2	964155-C6	40.30
	1.4 mm	.0551	**.10 mm**	2.10 mm (1.5x)	3	4 mm	50 mm	984131-C6	41.40
	1.4 mm	.0551	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	979331-C6	41.40
	1.5 mm	.0590	**.20 mm**	2.20 mm (1.5x)	3	4 mm	50 mm	984133-C6	38.40
	1.5 mm	.0590	**.20 mm**	4.50 mm (3x)	3	4 mm	50 mm	979333-C6	38.40
	1.5 mm	.0590	**.20 mm**	7.50 mm (5x)	3	4 mm	50 mm	965833-C6	47.40
.060		.0600	**.005**	.090 (1.5x)	3	1/8	1-1/2	908860-C6	36.10
.060		.0600	**.005**	.180 (3x)	3	1/8	1-1/2	936460-C6	36.10
.060		.0600	**.005**	.312 (5x)	3	1/8	2-1/2	869060-C6	46.00
.060		.0600	**.010**	.048 (0.8x)	3	1/8	1-1/2	954260-C6	40.20
.060		.0600	**.010**	.090 (1.5x)	3	1/8	1-1/2	52260-C6	36.10
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	46860-C6	36.10
.060		.0600	**.010**	.312 (5x)	3	1/8	2-1/2	53660-C6	46.00
.060		.0600	**.015**	.090 (1.5x)	3	1/8	1-1/2	975660-C6	36.50
.060		.0600	**.015**	.180 (3x)	3	1/8	1-1/2	964160-C6	37.10
.060		.0600	**.020**	.090 (1.5x)	3	1/8	1-1/2	931760-C6	37.60
.060		.0600	**.020**	.180 (3x)	3	1/8	1-1/2	959260-C6	37.90
.062 (1/16)		.0620	**.003**	.093 (1.5x)	3	1/8	1-1/2	853662-C6	34.60
.062 (1/16)		.0620	**.003**	.186 (3x)	3	1/8	1-1/2	923662-C6	33.90
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	908862-C6	33.90
.062 (1/16)		.0620	**.005**	.093 (1.5x)	4	1/8	1-1/2	795562-C6	37.10
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	936462-C6	33.90
.062 (1/16)		.0620	**.005**	.186 (3x)	4	1/8	1-1/2	850762-C6	36.50
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	869062-C6	43.80
.062 (1/16)		.0620	**.008**	.093 (1.5x)	3	1/8	1-1/2	847862-C6	33.90
.062 (1/16)		.0620	**.008**	.186 (3x)	3	1/8	1-1/2	848462-C6	34.60
.062 (1/16)		.0620	**.010**	.050 (0.8x)	3	1/8	1-1/2	954262-C6	34.40
.062 (1/16)		.0620	**.010**	.093 (1.5x)	3	1/8	1-1/2	52262-C6	33.90
.062 (1/16)		.0620	**.010**	.093 (1.5x)	4	1/8	1-1/2	797162-C6	39.10
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	46862-C6	33.90
.062 (1/16)		.0620	**.010**	.186 (3x)	4	1/8	1-1/2	856462-C6	39.10
.062 (1/16)		.0620	**.010**	.250 (4x)	3	1/8	2-1/2	796562-C6	40.50

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.062 (1/16)		.0620	**.010**	.312 (5x)	3	1/8	2-1/2	53662-C6	44.00
.062 (1/16)		.0620	**.010**	.312 (5x)	4	1/8	2-1/2	797362-C6	48.40
.062 (1/16)		.0620	**.015**	.093 (1.5x)	3	1/8	1-1/2	975662-C6	33.90
.062 (1/16)		.0620	**.015**	.186 (3x)	3	1/8	1-1/2	964162-C6	33.90
.062 (1/16)		.0620	**.015**	.312 (5x)	3	1/8	2-1/2	860262-C6	44.50
.062 (1/16)		.0620	**.020**	.093 (1.5x)	3	1/8	1-1/2	931762-C6	37.30
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	959262-C6	40.90
.062 (1/16)		.0620	**.020**	.186 (3x)	4	1/8	1-1/2	786462-C6	42.60
.062 (1/16)		.0620	**.020**	.312 (5x)	3	1/8	2-1/2	870662-C6	44.00
	1.6 mm	.0629	**.20 mm**	2.40 mm (1.5x)	3	4 mm	50 mm	984136-C6	38.40
	1.6 mm	.0629	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	979336-C6	38.40
	1.7 mm	.0669	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	979338-C6	38.40
.070		.0700	**.005**	.210 (3x)	3	1/8	1-1/2	936470-C6	34.60
.070		.0700	**.010**	.105 (1.5x)	3	1/8	1-1/2	52270-C6	33.90
.070		.0700	**.010**	.210 (3x)	3	1/8	1-1/2	46870-C6	33.90
.070		.0700	**.010**	.375 (5x)	3	1/8	2-1/2	53670-C6	44.50
	1.8 mm	.0708	**.20 mm**	2.70 mm (1.5x)	3	4 mm	50 mm	984140-C6	38.70
	1.8 mm	.0708	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	979340-C6	38.70
	1.9 mm	.0748	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	979342-C6	38.70
.078 (5/64)		.0780	**.003**	.234 (3x)	3	1/8	1-1/2	923678-C6	35.20
.078 (5/64)		.0780	**.005**	.117 (1.5x)	3	1/8	1-1/2	908878-C6	33.90
.078 (5/64)		.0780	**.005**	.117 (1.5x)	4	1/8	1-1/2	795578-C6	36.50
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	936478-C6	33.90
.078 (5/64)		.0780	**.005**	.406 (5x)	3	1/8	2-1/2	869078-C6	43.80
.078 (5/64)		.0780	**.010**	.062 (0.8x)	3	1/8	1-1/2	954278-C6	34.40
.078 (5/64)		.0780	**.010**	.117 (1.5x)	3	1/8	1-1/2	52278-C6	33.90
.078 (5/64)		.0780	**.010**	.117 (1.5x)	4	1/8	1-1/2	797178-C6	39.50
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	46878-C6	33.90
.078 (5/64)		.0780	**.010**	.234 (3x)	4	1/8	1-1/2	856478-C6	39.10
.078 (5/64)		.0780	**.010**	.312 (4x)	3	1/8	2-1/2	796578-C6	41.20
.078 (5/64)		.0780	**.010**	.406 (5x)	3	1/8	2-1/2	53678-C6	43.80
.078 (5/64)		.0780	**.010**	.406 (5x)	4	1/8	2-1/2	797378-C6	49.60
.078 (5/64)		.0780	**.015**	.117 (1.5x)	3	1/8	1-1/2	975678-C6	37.60
.078 (5/64)		.0780	**.015**	.234 (3x)	3	1/8	1-1/2	964178-C6	37.60
.078 (5/64)		.0780	**.020**	.117 (1.5x)	3	1/8	1-1/2	931778-C6	40.90
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	959278-C6	40.90
.078 (5/64)		.0780	**.020**	.406 (5x)	3	1/8	2-1/2	870678-C6	52.00
.078 (5/64)		.0780	**.025**	.234 (3x)	3	1/8	1-1/2	848878-C6	40.90
	2.0 mm	.0787	**.20 mm**	3.00 mm (1.5x)	3	4 mm	50 mm	984145-C6	38.40
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	3	4 mm	50 mm	979345-C6	38.40
	2.0 mm	.0787	**.20 mm**	10.00 mm (5x)	3	4 mm	50 mm	965845-C6	47.00
	2.0 mm	.0787	**.50 mm**	6.00 mm (3x)	3	4 mm	50 mm	842545-C6	38.70
.080		.0800	**.010**	.120 (1.5x)	3	1/8	1-1/2	52280-C6	34.60
.080		.0800	**.010**	.240 (3x)	3	1/8	1-1/2	46880-C6	33.90
.090		.0900	**.010**	.135 (1.5x)	3	1/8	1-1/2	52290-C6	33.90
.090		.0900	**.010**	.270 (3x)	3	1/8	1-1/2	46890-C6	34.60
.093 (3/32)		.0930	**.003**	.279 (3x)	3	1/8	1-1/2	923693-C6	34.00
.093 (3/32)		.0930	**.005**	.074 (0.8x)	3	1/8	1-1/2	840593-C6	34.70
.093 (3/32)		.0930	**.005**	.140 (1.5x)	3	1/8	1-1/2	908893-C6	33.90
.093 (3/32)		.0930	**.005**	.140 (1.5x)	4	1/8	1-1/2	795593-C6	39.10

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	CORNER RADIUS R +.001″ −.001″ +.025mm −.025mm	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	PRICE	
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	936493-C6	33.90	
.093 (3/32)		.0930	**.005**	.279 (3x)	4	1/8	1-1/2	850793-C6	39.50	
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	869093-C6	43.70	
.093 (3/32)		.0930	**.008**	.140 (1.5x)	3	1/8	1-1/2	847893-C6	33.90	
.093 (3/32)		.0930	**.008**	.279 (3x)	3	1/8	1-1/2	848493-C6	33.90	
.093 (3/32)		.0930	**.010**	.074 (0.8x)	3	1/8	1-1/2	954293-C6	34.70	
.093 (3/32)		.0930	**.010**	.140 (1.5x)	3	1/8	1-1/2	52293-C6	33.90	
.093 (3/32)		.0930	**.010**	.140 (1.5x)	4	1/8	1-1/2	797193-C6	39.10	
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	46893-C6	33.90	
.093 (3/32)		.0930	**.010**	.279 (3x)	4	1/8	1-1/2	856493-C6	39.10	
.093 (3/32)		.0930	**.010**	.375 (4x)	3	1/8	2-1/2	796593-C6	41.20	
.093 (3/32)		.0930	**.010**	.500 (5x)	3	1/8	2-1/2	53693-C6	43.80	
.093 (3/32)		.0930	**.010**	.500 (5x)	4	1/8	2-1/2	797393-C6	49.10	
.093 (3/32)		.0930	**.015**	.140 (1.5x)	3	1/8	1-1/2	975693-C6	34.60	
.093 (3/32)		.0930	**.015**	.279 (3x)	3	1/8	1-1/2	964193-C6	33.90	
.093 (3/32)		.0930	**.020**	.140 (1.5x)	3	1/8	1-1/2	931793-C6	33.90	
.093 (3/32)		.0930	**.020**	.279 (3x)	3	1/8	1-1/2	959293-C6	33.90	
.093 (3/32)		.0930	**.020**	.279 (3x)	4	1/8	1-1/2	786493-C6	39.10	
.093 (3/32)		.0930	**.020**	.500 (5x)	3	1/8	2-1/2	870693-C6	44.30	
.093 (3/32)		.0930	**.025**	.279 (3x)	3	1/8	1-1/2	848893-C6	41.10	
.093 (3/32)		.0930	**.030**	.140 (1.5x)	3	1/8	1-1/2	929393-C6	41.10	
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	943893-C6	41.10	
.093 (3/32)		.0930	**.030**	.500 (5x)	3	1/8	2-1/2	871493-C6	50.80	
	2.5 mm	.0984	**.20 mm**	3.70 mm (1.5x)	3	4 mm	50 mm	984151-C6	35.60	
	2.5 mm	.0984	**.20 mm**	7.50 mm (3x)	3	4 mm	50 mm	979351-C6	38.40	
	2.5 mm	.0984	**.20 mm**	7.50 mm (3x)	4	4 mm	50 mm	722951-C6	43.40	NEW
	2.5 mm	.0984	**.20 mm**	12.00 mm (5x)	3	4 mm	50 mm	965851-C6	47.00	
.100		.1000	**.005**	.150 (1.5x)	3	1/8	1-1/2	908800-C6	33.90	
.100		.1000	**.005**	.300 (3x)	3	1/8	1-1/2	936500-C6	33.90	
.100		.1000	**.010**	.150 (1.5x)	3	1/8	1-1/2	52300-C6	33.90	
.100		.1000	**.010**	.300 (3x)	3	1/8	1-1/2	46900-C6	33.90	
.100		.1000	**.010**	.500 (5x)	3	1/8	2-1/2	53700-C6	44.50	
.100		.1000	**.015**	.150 (1.5x)	3	1/8	1-1/2	907700-C6	38.40	
.100		.1000	**.015**	.300 (3x)	3	1/8	1-1/2	964200-C6	38.40	
.100		.1000	**.020**	.150 (1.5x)	3	1/8	1-1/2	931800-C6	40.90	
.100		.1000	**.020**	.300 (3x)	3	1/8	1-1/2	959300-C6	41.70	
.100		.1000	**.030**	.150 (1.5x)	3	1/8	1-1/2	929400-C6	41.80	
.100		.1000	**.030**	.300 (3x)	3	1/8	1-1/2	943900-C6	41.10	
.109 (7/64)		.1090	**.005**	.327 (3x)	3	1/8	1-1/2	936502-C6	33.90	
.109 (7/64)		.1090	**.010**	.327 (3x)	3	1/8	1-1/2	46902-C6	33.90	
.109 (7/64)		.1090	**.015**	.327 (3x)	3	1/8	1-1/2	964202-C6	37.60	
.118		.1180	**.010**	.177 (1.5x)	3	1/8	1-1/2	52305-C6	33.90	
.118		.1180	**.010**	.354 (3x)	3	1/8	1-1/2	46905-C6	33.90	
	3.0 mm	.1181	**.20 mm**	4.50 mm (1.5x)	3	4 mm	50 mm	984157-C6	38.40	
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	3	4 mm	50 mm	979357-C6	38.40	
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	4	4 mm	50 mm	723057-C6	43.40	
	3.0 mm	.1181	**.20 mm**	15.00 mm (5x)	3	4 mm	50 mm	965857-C6	47.00	
	3.0 mm	.1181	**.50 mm**	9.00 mm (3x)	3	4 mm	50 mm	842557-C6	38.70	
	3.0 mm	.1181	**.50 mm**	15.00 mm (5x)	3	4 mm	50 mm	760957-C6	47.40	
	3.0 mm	.1181	**1.00 mm**	9.00 mm (3x)	3	4 mm	50 mm	842157-C6	45.10	

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Corner Radius (cont.)

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	CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.000″ −.002″	D_1 +.00mm −.04mm decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.125 (1/8)	.1250	**.003**	.187 (1.5x)	4	1/8	1-1/2	853708-C6	33.70
	.125 (1/8)	.1250	**.003**	.375 (3x)	4	1/8	1-1/2	923708-C6	33.70
	.125 (1/8)	.1250	**.005**	.100 (0.8x)	4	1/8	1-1/2	840608-C6	33.70
	.125 (1/8)	.1250	**.005**	.187 (1.5x)	4	1/8	1-1/2	908908-C6	33.70
	.125 (1/8)	.1250	**.005**	.375 (3x)	4	1/8	1-1/2	936508-C6	33.70
	.125 (1/8)	.1250	**.005**	.625 (5x)	4	1/8	2-1/2	869108-C6	44.30
	.125 (1/8)	.1250	**.008**	.187 (1.5x)	4	1/8	1-1/2	847908-C6	33.70
	.125 (1/8)	.1250	**.008**	.375 (3x)	4	1/8	1-1/2	848508-C6	33.70
	.125 (1/8)	.1250	**.010**	.187 (1.5x)	4	1/8	1-1/2	913008-C6	31.30
	.125 (1/8)	.1250	**.010**	.375 (3x)	4	1/8	1-1/2	950808-C6	31.30
	.125 (1/8)	.1250	**.010**	.625 (5x)	4	1/8	2-1/2	869908-C6	44.30
	.125 (1/8)	.1250	**.015**	.100 (0.8x)	4	1/8	1-1/2	954308-C6	34.40
	.125 (1/8)	.1250	**.015**	.187 (1.5x)	4	1/8	1-1/2	52308-C6	31.30
	.125 (1/8)	.1250	**.015**	.375 (3x)	4	1/8	1-1/2	46908-C6	31.30
	.125 (1/8)	.1250	**.015**	.500 (4x)	4	1/8	2-1/2	796408-C6	38.00
	.125 (1/8)	.1250	**.015**	.625 (5x)	4	1/8	2-1/2	53708-C6	43.40
	.125 (1/8)	.1250	**.020**	.100 (0.8x)	4	1/8	1-1/2	816408-C6	34.70
	.125 (1/8)	.1250	**.020**	.187 (1.5x)	4	1/8	1-1/2	931808-C6	37.90
	.125 (1/8)	.1250	**.020**	.375 (3x)	4	1/8	1-1/2	959308-C6	37.90
	.125 (1/8)	.1250	**.020**	.625 (5x)	4	1/8	2-1/2	870708-C6	50.40
NEW	.125 (1/8)	.1250	**.025**	.187 (1.5x)	4	1/8	1-1/2	749408-C6	38.10
	.125 (1/8)	.1250	**.025**	.375 (3x)	4	1/8	1-1/2	848908-C6	38.10
NEW	.125 (1/8)	.1250	**.030**	.100 (0.8x)	4	1/8	1-1/2	718630-C6	39.20
	.125 (1/8)	.1250	**.030**	.187 (1.5x)	4	1/8	1-1/2	929408-C6	38.10
	.125 (1/8)	.1250	**.030**	.375 (3x)	4	1/8	1-1/2	943908-C6	38.10
	.125 (1/8)	.1250	**.030**	.625 (5x)	4	1/8	2-1/2	871508-C6	50.60
	.125 (1/8)	.1250	**.040**	.375 (3x)	4	1/8	1-1/2	844008-C6	40.90
	.140 (9/64)	.1406	**.010**	.425 (3x)	4	3/16	2	950809-C6	40.10
	.140 (9/64)	.1406	**.015**	.112 (0.8x)	4	3/16	2	954309-C6	41.20
	.140 (9/64)	.1406	**.015**	.220 (1.5x)	4	3/16	2	52309-C6	40.10
	.140 (9/64)	.1406	**.015**	.425 (3x)	4	3/16	2	46909-C6	40.40
	.140 (9/64)	.1406	**.015**	.750 (5x)	4	3/16	3	53709-C6	51.30
	.140 (9/64)	.1406	**.020**	.425 (3x)	4	3/16	2	959309-C6	41.20
	.140 (9/64)	.1406	**.030**	.425 (3x)	4	3/16	2	943909-C6	41.20
	.156 (5/32)	.1562	**.005**	.235 (1.5x)	4	3/16	2	908956-C6	36.50
	.156 (5/32)	.1562	**.005**	.470 (3x)	4	3/16	2	936510-C6	36.50
	.156 (5/32)	.1562	**.010**	.235 (1.5x)	4	3/16	2	913010-C6	34.20
	.156 (5/32)	.1562	**.010**	.470 (3x)	4	3/16	2	950810-C6	34.20
NEW	.156 (5/32)	.1562	**.010**	.750 (5x)	4	3/16	3	869910-C6	47.10
	.156 (5/32)	.1562	**.015**	.125 (0.8x)	4	3/16	2	954310-C6	37.30
	.156 (5/32)	.1562	**.015**	.235 (1.5x)	4	3/16	2	52310-C6	36.50
	.156 (5/32)	.1562	**.015**	.470 (3x)	4	3/16	2	46910-C6	36.50
	.156 (5/32)	.1562	**.015**	.750 (5x)	4	3/16	3	53710-C6	48.10
	.156 (5/32)	.1562	**.020**	.470 (3x)	4	3/16	2	959310-C6	36.50
	.156 (5/32)	.1562	**.025**	.470 (3x)	4	3/16	2	848910-C6	36.50
	.156 (5/32)	.1562	**.030**	.235 (1.5x)	4	3/16	2	929410-C6	34.20
	.156 (5/32)	.1562	**.030**	.470 (3x)	4	3/16	2	943910-C6	34.20
	.156 (5/32)	.1562	**.030**	.750 (5x)	4	3/16	3	871510-C6	47.10
	4.0 mm	.1574	**.40 mm**	6.00 mm (1.5x)	4	6 mm	63 mm	984161-C6	41.20
	4.0 mm	.1574	**.40 mm**	12.00 mm (3x)	4	6 mm	63 mm	979361-C6	41.20

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	D_1 +.00mm −.04mm	D_1 decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.187 (3/16)		.1875	**.005**	.285 (1.5x)	4	3/16	2	908910-C6	36.50
.187 (3/16)		.1875	**.005**	.562 (3x)	4	3/16	2	936512-C6	36.50
.187 (3/16)		.1875	**.005**	1.000 (5x)	4	3/16	3	869112-C6	47.60
.187 (3/16)		.1875	**.008**	.562 (3x)	4	3/16	2	848512-C6	36.50
.187 (3/16)		.1875	**.010**	.150 (0.8x)	4	3/16	2	763212-C6	39.10
.187 (3/16)		.1875	**.010**	.285 (1.5x)	4	3/16	2	913012-C6	33.90
.187 (3/16)		.1875	**.010**	.562 (3x)	4	3/16	2	950812-C6	34.20
.187 (3/16)		.1875	**.010**	1.000 (5x)	4	3/16	3	869912-C6	48.10
.187 (3/16)		.1875	**.015**	.150 (0.8x)	4	3/16	2	954312-C6	37.30
.187 (3/16)		.1875	**.015**	.285 (1.5x)	4	3/16	2	52312-C6	33.90
.187 (3/16)		.1875	**.015**	.562 (3x)	4	3/16	2	46912-C6	34.20
.187 (3/16)		.1875	**.015**	.750 (4x)	4	3/16	3	796412-C6	40.70
.187 (3/16)		.1875	**.015**	1.000 (5x)	4	3/16	3	53712-C6	48.10
.187 (3/16)		.1875	**.020**	.150 (0.8x)	4	3/16	2	816412-C6	45.30
.187 (3/16)		.1875	**.020**	.285 (1.5x)	4	3/16	2	931812-C6	40.20
.187 (3/16)		.1875	**.020**	.562 (3x)	4	3/16	2	959312-C6	40.20
.187 (3/16)		.1875	**.020**	1.000 (5x)	4	3/16	3	870712-C6	45.10
.187 (3/16)		.1875	**.025**	.285 (1.5x)	4	3/16	2	749412-C6	40.50
.187 (3/16)		.1875	**.025**	.562 (3x)	4	3/16	2	848912-C6	47.60
.187 (3/16)		.1875	**.030**	.285 (1.5x)	4	3/16	2	929412-C6	40.50
.187 (3/16)		.1875	**.030**	.562 (3x)	4	3/16	2	943912-C6	41.90
.187 (3/16)		.1875	**.030**	1.000 (5x)	4	3/16	3	871512-C6	47.60
.187 (3/16)		.1875	**.040**	.562 (3x)	4	3/16	2	844012-C6	44.30
.187 (3/16)		.1875	**.045**	.285 (1.5x)	4	3/16	2	857612-C6	43.40
.187 (3/16)		.1875	**.045**	.562 (3x)	4	3/16	2	864512-C6	43.40
.187 (3/16)		.1875	**.060**	.285 (1.5x)	4	3/16	2	845412-C6	40.20
.187 (3/16)		.1875	**.060**	.562 (3x)	4	3/16	2	885612-C6	40.20
.187 (3/16)		.1875	**.060**	1.000 (5x)	4	3/16	3	804412-C6	44.00
	5.0 mm	.1968	**.40 mm**	7.50 mm (1.5x)	4	6 mm	63 mm	984164-C6	41.20
	5.0 mm	.1968	**.40 mm**	15.00 mm (3x)	4	6 mm	63 mm	979364-C6	41.20
	5.0 mm	.1968	**1.00 mm**	7.50 mm (1.5x)	4	6 mm	63 mm	752464-C6	41.60
	5.0 mm	.1968	**1.00 mm**	15.00 mm (3x)	4	6 mm	63 mm	752964-C6	41.60
	6.0 mm	.2362	**.40 mm**	9.00 mm (1.5x)	4	6 mm	63 mm	984166-C6	41.60
	6.0 mm	.2362	**.40 mm**	18.00 mm (3x)	4	6 mm	63 mm	979366-C6	41.60
.250 (1/4)		.2500	**.005**	.375 (1.5x)	4	1/4	2-1/2	908916-C6	45.60
.250 (1/4)		.2500	**.005**	.750 (3x)	4	1/4	2-1/2	936516-C6	45.60
.250 (1/4)		.2500	**.008**	.750 (3x)	4	1/4	2-1/2	848516-C6	45.60
.250 (1/4)		.2500	**.010**	.375 (1.5x)	4	1/4	2-1/2	913016-C6	42.90
.250 (1/4)		.2500	**.010**	.750 (3x)	4	1/4	2-1/2	950816-C6	42.90
.250 (1/4)		.2500	**.015**	.200 (0.8x)	4	1/4	2-1/2	954316-C6	47.00
.250 (1/4)		.2500	**.015**	.375 (1.5x)	4	1/4	2-1/2	52316-C6	43.20
.250 (1/4)		.2500	**.015**	.750 (3x)	4	1/4	2-1/2	46916-C6	43.20
.250 (1/4)		.2500	**.015**	1.250 (5x)	4	1/4	4	53716-C6	59.50
.250 (1/4)		.2500	**.020**	.200 (0.8x)	4	1/4	2-1/2	816416-C6	53.00
.250 (1/4)		.2500	**.020**	.375 (1.5x)	4	1/4	2-1/2	931816-C6	48.80
.250 (1/4)		.2500	**.020**	.750 (3x)	4	1/4	2-1/2	959316-C6	49.30
.250 (1/4)		.2500	**.025**	.750 (3x)	4	1/4	2-1/2	848916-C6	49.30
.250 (1/4)		.2500	**.030**	.375 (1.5x)	4	1/4	2-1/2	929416-C6	49.30
.250 (1/4)		.2500	**.030**	.750 (3x)	4	1/4	2-1/2	943916-C6	48.80

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.250 (1/4)	.2500	**.030**	1.250 (5x)	4	1/4	4	871516-C6	56.10
.250 (1/4)	.2500	**.040**	.750 (3x)	4	1/4	2-1/2	844016-C6	52.70
.250 (1/4)	.2500	**.045**	.750 (3x)	4	1/4	2-1/2	864516-C6	53.60
.250 (1/4)	.2500	**.060**	.375 (1.5x)	4	1/4	2-1/2	845416-C6	49.30
.250 (1/4)	.2500	**.060**	.750 (3x)	4	1/4	2-1/2	885616-C6	49.30
.312 (5/16)	.3125	**.015**	.470 (1.5x)	4	5/16	2-1/2	52320-C6	61.90
.312 (5/16)	.3125	**.015**	1.000 (3x)	4	5/16	2-1/2	46920-C6	62.50
.375 (3/8)	.3750	**.015**	.570 (1.5x)	4	3/8	2-1/2	52324-C6	71.30
.375 (3/8)	.3750	**.015**	1.125 (3x)	4	3/8	2-1/2	46924-C6	72.10
.375 (3/8)	.3750	**.020**	.570 (1.5x)	4	3/8	2-1/2	931824-C6	77.30
.375 (3/8)	.3750	**.030**	.570 (1.5x)	4	3/8	2-1/2	929424-C6	77.30
.375 (3/8)	.3750	**.030**	1.125 (3x)	4	3/8	2-1/2	943924-C6	79.60
.375 (3/8)	.3750	**.040**	1.125 (3x)	4	3/8	2-1/2	844024-C6	79.60
.500 (1/2)	.5000	**.015**	.750 (1.5x)	4	1/2	3	816232-C6	92.20
.500 (1/2)	.5000	**.030**	.750 (1.5x)	4	1/2	3	52332-C6	93.20
.500 (1/2)	.5000	**.030**	1.500 (3x)	4	1/2	3	843932-C6	92.20
.500 (1/2)	.5000	**.060**	.750 (1.5x)	4	1/2	3	845532-C6	92.20

Speeds & Feeds (Variable Helix For High Temp Alloys)

Important Note:Values in table are in inches and are based on 4 flute, standard (3x Dia) length of cut end mills. For 3 flutes, table values of IPT must be increased to 105% before adjustments for different lengths of cut. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase to 115%; for 1.5x, increase to 108%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300	160
	300 - 350	140
	350 - 400	100
Tool Steels: D, H, M, T, S series	400 - 425	80
Titanium: All alloys	275 - 300	200
	300 - 350	125
	350 - 400	75
	400 - 425	75
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	80
	300 - 350	60
	350 - 400	50
	400 - 425	40

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00005	.00010	.00016	.00020	.00026	.00031	.00041	.00062	.00083	.00108	.00130	.00173
Roughing	.00006	.00013	.00020	.00026	.00033	.00039	.00053	.00079	.00105	.00138	.00165	.00221
Finishing	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	.00180	.00217	.00289
Max	.00010	.00020	.00031	.00041	.00051	.00061	.00083	.00123	.00165	.00216	.00260	.00347

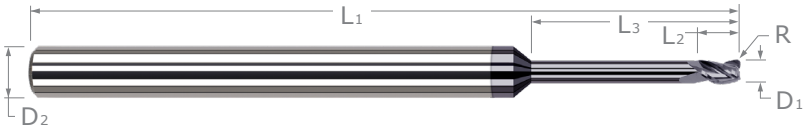
Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .4x Dia
Finishing: .1x Dia

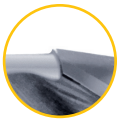
Axial Depth of Cut*:
Slotting: .4x Dia
Roughing: .5x - .7x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute





Reduced Neck Diameter to Avoid Heeling

- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities • Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	decimal equivalent	R +.001″ −.001″ / +.025mm −.025mm	L_2 +.010″ −.000″ / +.25mm −.00mm	L_3 +.010″ −.000″ / +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.003**	.022	.045 (3x)	3	1/8	1-1/2	947615-C6	65.80
.015 (1/64)		.0150	**.003**	.022	.078 (5x)	3	1/8	2-1/2	64415-C6	66.10
.015 (1/64)		.0150	**.003**	.022	.125 (8x)	3	1/8	2-1/2	54815-C6	66.80
.015 (1/64)		.0150	**.003**	.022	.187 (12x)	3	1/8	2-1/2	63015-C6	73.80
.015 (1/64)		.0150	**.003**	.022	.225 (15x)	3	1/8	2-1/2	968915-C6	80.90
	.4 mm	.0157	**.08 mm**	.60 mm	2.0 mm (5x)	3	4 mm	50 mm	980709-C6	73.40
	.4 mm	.0157	**.08 mm**	.60 mm	3.2 mm (8x)	3	4 mm	50 mm	975009-C6	75.80
	.4 mm	.0157	**.08 mm**	.60 mm	4.8 mm (12x)	3	4 mm	50 mm	987309-C6	80.90
	.5 mm	.0196	**.10 mm**	.75 mm	2.5 mm (5x)	3	4 mm	50 mm	980711-C6	70.50
	.5 mm	.0196	**.10 mm**	.75 mm	4.0 mm (8x)	3	4 mm	50 mm	975011-C6	72.70
	.5 mm	.0196	**.10 mm**	.75 mm	6.0 mm (12x)	3	4 mm	50 mm	987311-C6	78.50
	.5 mm	.0196	**.10 mm**	.75 mm	8.0 mm (16x)	3	4 mm	50 mm	971511-C6	82.10
.020		.0200	**.004**	.030	.060 (3x)	3	1/8	1-1/2	947620-C6	62.50
.020		.0200	**.004**	.030	.100 (5x)	3	1/8	2-1/2	64420-C6	62.50
.020		.0200	**.004**	.030	.160 (8x)	3	1/8	2-1/2	54820-C6	63.90
.020		.0200	**.004**	.030	.200 (10x)	3	1/8	2-1/2	932520-C6	67.80
.020		.0200	**.004**	.030	.250 (12x)	3	1/8	2-1/2	63020-C6	70.40
	.6 mm	.0236	**.10 mm**	.90 mm	3.0 mm (5x)	3	4 mm	50 mm	980713-C6	69.90
	.6 mm	.0236	**.10 mm**	.90 mm	4.8 mm (8x)	3	4 mm	50 mm	975013-C6	71.10
	.6 mm	.0236	**.10 mm**	.90 mm	7.2 mm (12x)	3	4 mm	50 mm	987313-C6	76.00
.025		.0250	**.004**	.038	.075 (3x)	3	1/8	1-1/2	947625-C6	60.60
.025		.0250	**.004**	.038	.125 (5x)	3	1/8	2-1/2	64425-C6	61.10
.025		.0250	**.004**	.038	.203 (8x)	3	1/8	2-1/2	54825-C6	62.30
.025		.0250	**.004**	.038	.312 (12x)	3	1/8	2-1/2	63025-C6	68.70
.031 (1/32)		.0310	**.005**	.047	.093 (3x)	3	1/8	1-1/2	947631-C6	56.70
.031 (1/32)		.0310	**.005**	.047	.156 (5x)	3	1/8	2-1/2	64431-C6	57.90
.031 (1/32)		.0310	**.005**	.047	.156 (5x)	4	1/8	2-1/2	812131-C6	60.70
.031 (1/32)		.0310	**.005**	.047	.187 (6x)	3	1/8	2-1/2	796131-C6	60.70
.031 (1/32)		.0310	**.005**	.047	.250 (8x)	3	1/8	2-1/2	54831-C6	59.20
.031 (1/32)		.0310	**.005**	.047	.312 (10x)	3	1/8	2-1/2	932531-C6	60.70
.031 (1/32)		.0310	**.005**	.047	.375 (12x)	3	1/8	2-1/2	63031-C6	61.70
.031 (1/32)		.0310	**.005**	.047	.470 (15x)	3	1/8	2-1/2	968931-C6	68.60
.031 (1/32)		.0310	**.010**	.047	.156 (5x)	3	1/8	2-1/2	917331-C6	56.40
.031 (1/32)		.0310	**.010**	.047	.250 (8x)	3	1/8	2-1/2	908631-C6	58.40
	.8 mm	.0314	**.10 mm**	1.20 mm	4.0 mm (5x)	3	4 mm	50 mm	980718-C6	63.60
	.8 mm	.0314	**.10 mm**	1.20 mm	6.5 mm (8x)	3	4 mm	50 mm	975018-C6	66.00
	.8 mm	.0314	**.10 mm**	1.20 mm	9.5 mm (12x)	3	4 mm	50 mm	987318-C6	67.80

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.035		.0350	**.005**	.053	.105 (3x)	3	1/8	1-1/2	947635-C6	56.70
.035		.0350	**.005**	.053	.187 (5x)	3	1/8	2-1/2	64435-C6	58.50
.035		.0350	**.005**	.053	.281 (8x)	3	1/8	2-1/2	54835-C6	59.20
.035		.0350	**.005**	.053	.350 (10x)	3	1/8	2-1/2	932535-C6	61.70
	1.0 mm	.0393	**.10 mm**	1.50 mm	5.0 mm (5x)	3	4 mm	50 mm	980722-C6	63.60
	1.0 mm	.0393	**.10 mm**	1.50 mm	8.0 mm (8x)	3	4 mm	50 mm	975022-C6	65.30
	1.0 mm	.0393	**.10 mm**	1.50 mm	12.0 mm (12x)	3	4 mm	50 mm	987322-C6	67.20
	1.0 mm	.0393	**.10 mm**	1.50 mm	16.0 mm (16x)	3	4 mm	50 mm	971522-C6	71.50
.040		.0400	**.005**	.060	.120 (3x)	3	1/8	1-1/2	947640-C6	56.70
.040		.0400	**.005**	.060	.203 (5x)	3	1/8	2-1/2	64440-C6	57.90
.040		.0400	**.005**	.060	.325 (8x)	3	1/8	2-1/2	54840-C6	59.20
.045		.0450	**.005**	.068	.135 (3x)	3	1/8	1-1/2	947645-C6	57.90
.045		.0450	**.005**	.068	.225 (5x)	3	1/8	2-1/2	64445-C6	57.90
.045		.0450	**.005**	.068	.375 (8x)	3	1/8	2-1/2	54845-C6	59.20
.047 (3/64)		.0470	**.005**	.070	.141 (3x)	3	1/8	1-1/2	947647-C6	56.70
.047 (3/64)		.0470	**.005**	.070	.250 (5x)	3	1/8	2-1/2	64447-C6	57.90
.047 (3/64)		.0470	**.005**	.070	.281 (6x)	3	1/8	2-1/2	796147-C6	57.90
.047 (3/64)		.0470	**.005**	.070	.375 (8x)	3	1/8	2-1/2	54847-C6	59.20
.047 (3/64)		.0470	**.005**	.070	.570 (12x)	3	1/8	2-1/2	63047-C6	61.70
.047 (3/64)		.0470	**.005**	.070	.710 (15x)	3	1/8	2-1/2	968947-C6	68.00
.047 (3/64)		.0470	**.010**	.070	.250 (5x)	3	1/8	2-1/2	917347-C6	57.90
.047 (3/64)		.0470	**.010**	.070	.375 (8x)	3	1/8	2-1/2	908647-C6	59.70
.050		.0500	**.005**	.075	.150 (3x)	3	1/8	1-1/2	947650-C6	57.90
.050		.0500	**.005**	.075	.250 (5x)	3	1/8	2-1/2	64450-C6	57.00
.050		.0500	**.005**	.075	.400 (8x)	3	1/8	2-1/2	54850-C6	58.40
.055		.0550	**.005**	.083	.275 (5x)	3	1/8	2-1/2	64455-C6	58.20
.055		.0550	**.005**	.083	.450 (8x)	3	1/8	2-1/2	54855-C6	58.40
	1.5 mm	.0590	**.20 mm**	2.20 mm	7.5 mm (5x)	3	4 mm	50 mm	980733-C6	63.60
	1.5 mm	.0590	**.20 mm**	2.20 mm	12.0 mm (8x)	3	4 mm	50 mm	975033-C6	66.00
	1.5 mm	.0590	**.20 mm**	2.20 mm	18.0 mm (12x)	3	4 mm	50 mm	987333-C6	67.80
	1.5 mm	.0590	**.20 mm**	2.20 mm	24.0 mm (16x)	3	4 mm	63 mm	971533-C6	71.50
.060		.0600	**.005**	.090	.312 (5x)	3	1/8	2-1/2	919860-C6	58.20
.060		.0600	**.005**	.090	.500 (8x)	3	1/8	2-1/2	915360-C6	59.50
.060		.0600	**.010**	.090	.312 (5x)	3	1/8	2-1/2	64460-C6	57.00
.060		.0600	**.010**	.090	.500 (8x)	3	1/8	2-1/2	54860-C6	58.40
.060		.0600	**.010**	.090	.625 (10x)	3	1/8	2-1/2	932560-C6	61.70
.062 (1/16)		.0620	**.005**	.093	.312 (5x)	3	1/8	2-1/2	919862-C6	56.40
.062 (1/16)		.0620	**.005**	.093	.500 (8x)	3	1/8	2-1/2	915362-C6	58.40
.062 (1/16)		.0620	**.005**	.093	.625 (10x)	3	1/8	2-1/2	884462-C6	59.00
.062 (1/16)		.0620	**.010**	.093	.186 (3x)	3	1/8	1-1/2	947662-C6	56.40
.062 (1/16)		.0620	**.010**	.093	.312 (5x)	3	1/8	2-1/2	64462-C6	57.00
.062 (1/16)		.0620	**.010**	.093	.312 (5x)	4	1/8	2-1/2	811862-C6	59.20
.062 (1/16)		.0620	**.010**	.093	.375 (6x)	3	1/8	2-1/2	795962-C6	59.20
.062 (1/16)		.0620	**.010**	.093	.500 (8x)	3	1/8	2-1/2	54862-C6	58.40
.062 (1/16)		.0620	**.010**	.093	.625 (10x)	3	1/8	2-1/2	932562-C6	60.70
.062 (1/16)		.0620	**.010**	.093	.750 (12x)	3	1/8	2-1/2	63062-C6	61.70
.062 (1/16)		.0620	**.010**	.093	.950 (15x)	3	1/8	2-1/2	968962-C6	68.60

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1			R	L_2	L_3		D_2 (h6)	L_1	TOOL #	PRICE
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.001″ −.001″ +.025mm −.025mm	+.010″ −.000″ +.25mm −.00mm	+.010″ −.000″ +.25mm −.00mm					
.062 (1/16)		.0620	**.015**	.093	.312 (5x)	3	1/8	2-1/2	902662-C6	57.40
.062 (1/16)		.0620	**.015**	.093	.500 (8x)	3	1/8	2-1/2	912062-C6	58.40
.062 (1/16)		.0620	**.020**	.093	.312 (5x)	3	1/8	2-1/2	866862-C6	57.40
.062 (1/16)		.0620	**.020**	.093	.500 (8x)	3	1/8	2-1/2	847562-C6	59.50
.078 (5/64)		.0780	**.005**	.117	.406 (5x)	3	1/8	2-1/2	919878-C6	57.00
.078 (5/64)		.0780	**.005**	.117	.625 (8x)	3	1/8	2-1/2	915378-C6	58.40
.078 (5/64)		.0780	**.010**	.117	.234 (3x)	3	1/8	1-1/2	947678-C6	57.40
.078 (5/64)		.0780	**.010**	.117	.406 (5x)	3	1/8	2-1/2	64478-C6	57.00
.078 (5/64)		.0780	**.010**	.117	.406 (5x)	4	1/8	2-1/2	811878-C6	59.20
.078 (5/64)		.0780	**.010**	.117	.475 (6x)	3	1/8	2-1/2	795978-C6	57.00
.078 (5/64)		.0780	**.010**	.117	.625 (8x)	3	1/8	2-1/2	54878-C6	58.40
.078 (5/64)		.0780	**.010**	.117	.940 (12x)	3	1/8	2-1/2	63078-C6	61.70
.078 (5/64)		.0780	**.010**	.117	1.187 (15x)	3	1/8	2-1/2	968978-C6	68.60
	2.0 mm	.0787	**.20 mm**	3.00 mm	10.0 mm (5x)	3	4 mm	50 mm	980745-C6	64.30
	2.0 mm	.0787	**.20 mm**	3.00 mm	16.0 mm (8x)	3	4 mm	50 mm	975045-C6	65.30
	2.0 mm	.0787	**.20 mm**	3.00 mm	24.0 mm (12x)	3	4 mm	63 mm	987345-C6	67.80
	2.0 mm	.0787	**.20 mm**	3.00 mm	32.0 mm (16x)	3	4 mm	63 mm	971545-C6	71.50
.093 (3/32)		.0930	**.005**	.139	.500 (5x)	3	1/8	2-1/2	919893-C6	56.40
.093 (3/32)		.0930	**.005**	.139	.750 (8x)	3	1/8	2-1/2	915393-C6	59.50
.093 (3/32)		.0930	**.010**	.139	.279 (3x)	3	1/8	1-1/2	947693-C6	56.40
.093 (3/32)		.0930	**.010**	.139	.500 (5x)	3	1/8	2-1/2	64493-C6	57.00
.093 (3/32)		.0930	**.010**	.139	.500 (5x)	4	1/8	2-1/2	811893-C6	59.20
.093 (3/32)		.0930	**.010**	.139	.585 (6x)	3	1/8	2-1/2	795993-C6	57.00
.093 (3/32)		.0930	**.010**	.139	.750 (8x)	3	1/8	2-1/2	54893-C6	58.40
.093 (3/32)		.0930	**.010**	.139	.950 (10x)	3	1/8	2-1/2	932593-C6	60.70
.093 (3/32)		.0930	**.010**	.139	1.125 (12x)	3	1/8	2-1/2	63093-C6	61.70
.093 (3/32)		.0930	**.010**	.139	1.400 (15x)	3	1/8	3	968993-C6	68.00
.093 (3/32)		.0930	**.015**	.139	.500 (5x)	3	1/8	2-1/2	902693-C6	56.40
.093 (3/32)		.0930	**.015**	.139	.750 (8x)	3	1/8	2-1/2	912093-C6	59.50
.093 (3/32)		.0930	**.020**	.139	.500 (5x)	3	1/8	2-1/2	866893-C6	57.40
.093 (3/32)		.0930	**.020**	.139	.750 (8x)	3	1/8	2-1/2	847593-C6	59.50
.093 (3/32)		.0930	**.030**	.139	.500 (5x)	3	1/8	2-1/2	910193-C6	57.40
.093 (3/32)		.0930	**.030**	.139	.750 (8x)	3	1/8	2-1/2	906493-C6	58.40
.100		.1000	**.010**	.150	.500 (5x)	3	1/8	2-1/2	64500-C6	56.40
.100		.1000	**.010**	.150	.800 (8x)	3	1/8	2-1/2	54900-C6	58.00
	3.0 mm	.1181	**.20 mm**	4.50 mm	15.0 mm (5x)	3	4 mm	50 mm	980757-C6	60.40
	3.0 mm	.1181	**.20 mm**	4.50 mm	24.0 mm (8x)	3	4 mm	50 mm	975057-C6	60.50

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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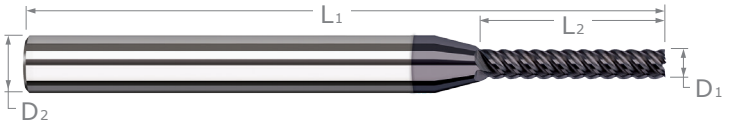
CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.005**	.187	.625 (5x)	4	1/8	2-1/2	919908-C6	53.10
.125 (1/8)	.1250	**.005**	.187	1.000 (8x)	4	1/8	2-1/2	915408-C6	55.00
.125 (1/8)	.1250	**.010**	.187	.625 (5x)	4	1/8	2-1/2	917408-C6	56.00
.125 (1/8)	.1250	**.010**	.187	1.000 (8x)	4	1/8	2-1/2	908708-C6	58.00
.125 (1/8)	.1250	**.015**	.187	.375 (3x)	4	1/8	1-1/2	947708-C6	53.90
.125 (1/8)	.1250	**.015**	.187	.625 (5x)	4	1/8	2-1/2	64508-C6	56.40
.125 (1/8)	.1250	**.015**	.187	.750 (6x)	4	1/8	2-1/2	795808-C6	57.40
.125 (1/8)	.1250	**.015**	.187	1.000 (8x)	4	1/8	2-1/2	54908-C6	58.00
.125 (1/8)	.1250	**.015**	.187	1.250 (10x)	4	1/8	2-1/2	932608-C6	60.70
.125 (1/8)	.1250	**.015**	.187	1.500 (12x)	4	1/8	3	63108-C6	61.70
.125 (1/8)	.1250	**.020**	.187	.625 (5x)	4	1/8	2-1/2	866908-C6	57.00
.125 (1/8)	.1250	**.020**	.187	1.000 (8x)	4	1/8	2-1/2	847608-C6	58.00
.125 (1/8)	.1250	**.030**	.187	.625 (5x)	4	1/8	2-1/2	910208-C6	56.00
.125 (1/8)	.1250	**.030**	.187	1.000 (8x)	4	1/8	2-1/2	906508-C6	58.00
.140 (9/64)	.1406	**.015**	.220	.750 (5x)	4	3/16	3	64509-C6	63.60
.140 (9/64)	.1406	**.015**	.220	1.125 (8x)	4	3/16	3	54909-C6	64.80
.156 (5/32)	.1562	**.010**	.235	.750 (5x)	4	3/16	3	917410-C6	62.30
.156 (5/32)	.1562	**.015**	.235	.750 (5x)	4	3/16	3	64510-C6	62.30
.156 (5/32)	.1562	**.015**	.235	1.250 (8x)	4	3/16	3	54910-C6	63.70
.156 (5/32)	.1562	**.015**	.235	1.875 (12x)	4	3/16	4	63110-C6	78.30
.156 (5/32)	.1562	**.030**	.235	.750 (5x)	4	3/16	3	910210-C6	62.30
.187 (3/16)	.1875	**.005**	.281	1.000 (5x)	4	3/16	3	919912-C6	61.10
.187 (3/16)	.1875	**.005**	.281	1.500 (8x)	4	3/16	3	915412-C6	62.60
.187 (3/16)	.1875	**.010**	.281	1.000 (5x)	4	3/16	3	917412-C6	64.20
.187 (3/16)	.1875	**.010**	.281	1.500 (8x)	4	3/16	3	908712-C6	64.50
.187 (3/16)	.1875	**.015**	.281	1.000 (5x)	4	3/16	3	64512-C6	63.00
.187 (3/16)	.1875	**.015**	.281	1.156 (6x)	4	3/16	3	795812-C6	64.20
.187 (3/16)	.1875	**.015**	.281	1.500 (8x)	4	3/16	3	54912-C6	64.50
.187 (3/16)	.1875	**.015**	.281	1.875 (10x)	4	3/16	4	932612-C6	76.30
.187 (3/16)	.1875	**.015**	.281	2.250 (12x)	4	3/16	4	63112-C6	77.50
.187 (3/16)	.1875	**.020**	.281	1.000 (5x)	4	3/16	3	866912-C6	63.80
.187 (3/16)	.1875	**.020**	.281	1.500 (8x)	4	3/16	3	847612-C6	65.40
.187 (3/16)	.1875	**.030**	.281	1.000 (5x)	4	3/16	3	910212-C6	62.50
.187 (3/16)	.1875	**.030**	.281	1.500 (8x)	4	3/16	3	906512-C6	64.10
.187 (3/16)	.1875	**.040**	.281	1.000 (5x)	4	3/16	3	785612-C6	62.50
.187 (3/16)	.1875	**.040**	.281	1.500 (8x)	4	3/16	3	785412-C6	65.40
.250 (1/4)	.2500	**.015**	.375	1.250 (5x)	4	1/4	4	64516-C6	71.40
.250 (1/4)	.2500	**.015**	.375	2.000 (8x)	4	1/4	4	54916-C6	71.10
.250 (1/4)	.2500	**.015**	.375	3.000 (12x)	4	1/4	6	63116-C6	87.60
.250 (1/4)	.2500	**.030**	.375	1.250 (5x)	4	1/4	4	910216-C6	71.00
.250 (1/4)	.2500	**.030**	.375	2.000 (8x)	4	1/4	4	906516-C6	72.00
.375 (3/8)	.3750	**.015**	.570	2.000 (5x)	4	3/8	4	64524-C6	80.20

Please see Speeds & Feeds on page 147

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square



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- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
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- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
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- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	
	.2 mm	.0078	**.60 mm** (3x)	4	4 mm	50 mm	967604-C6	64.30	
	.2 mm	.0078	**1.00 mm** (5x)	4	4 mm	50 mm	974504-C6	73.90	
	.2 mm	.0078	**1.60 mm** (8x)	4	4 mm	50 mm	976104-C6	75.80	
.010		.0100	**.030** (3x)	4	1/8	1-1/2	57810-C6	63.00	
.010		.0100	**.050** (5x)	4	1/8	2-1/2	62610-C6	72.30	
	.3 mm	.0118	**.90 mm** (3x)	4	4 mm	50 mm	967606-C6	59.30	
.015 (1/64)		.0150	**.023** (1.5x)	4	1/8	1-1/2	946115-C6	49.00	
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	57815-C6	49.00	
.015 (1/64)		.0150	**.062** (4x)	4	1/8	2-1/2	890115-C6	60.90	
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	62615-C6	60.90	
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	59015-C6	63.40	
.015 (1/64)		.0150	**.156** (10x)	4	1/8	2-1/2	941815-C6	74.50	
	.4 mm	.0157	**1.20 mm** (3x)	4	4 mm	50 mm	967609-C6	56.40	
	.4 mm	.0157	**2.00 mm** (5x)	4	4 mm	50 mm	974509-C6	66.10	
	.4 mm	.0157	**3.20 mm** (8x)	4	4 mm	50 mm	976109-C6	68.10	
	.5 mm	.0196	**1.50 mm** (3x)	4	4 mm	50 mm	967611-C6	56.40	
	.5 mm	.0196	**2.50 mm** (5x)	4	4 mm	50 mm	974511-C6	64.50	
	.5 mm	.0196	**4.00 mm** (8x)	4	4 mm	50 mm	976111-C6	66.80	
.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	946120-C6	48.10	
.020		.0200	**.060** (3x)	4	1/8	1-1/2	57820-C6	48.10	
.020		.0200	**.080** (4x)	4	1/8	2-1/2	890120-C6	60.60	
.020		.0200	**.100** (5x)	4	1/8	2-1/2	62620-C6	60.60	
.020		.0200	**.160** (8x)	4	1/8	2-1/2	59020-C6	63.20	
.020		.0200	**.200** (10x)	4	1/8	2-1/2	941820-C6	74.50	
	.6 mm	.0236	**1.80 mm** (3x)	4	4 mm	50 mm	967613-C6	56.40	
	.6 mm	.0236	**3.00 mm** (5x)	4	4 mm	50 mm	974513-C6	64.50	
	.6 mm	.0236	**4.80 mm** (8x)	4	4 mm	50 mm	976113-C6	66.80	
.025		.0250	**.075** (3x)	4	1/8	1-1/2	57825-C6	45.10	
.025		.0250	**.125** (5x)	4	1/8	2-1/2	62625-C6	58.40	
.025		.0250	**.150** (6x)	4	1/8	2-1/2	718425-C6	59.80	NEW
.025		.0250	**.203** (8x)	4	1/8	2-1/2	59025-C6	61.10	
.025		.0250	**.250** (10x)	4	1/8	2-1/2	941825-C6	71.80	
	.7 mm	.0275	**2.10 mm** (3x)	4	4 mm	50 mm	967615-C6	56.10	
.030		.0300	**.090** (3x)	6	1/8	1-1/2	57830-C6	45.10	
.030		.0300	**.156** (5x)	6	1/8	2-1/2	62630-C6	59.50	

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.031 (1/32)		.0310	**.047** (1.5x)	6	1/8	1-1/2	946131-C6	40.40
.031 (1/32)		.0310	**.093** (3x)	6	1/8	1-1/2	57831-C6	40.40
.031 (1/32)		.0310	**.125** (4x)	6	1/8	2-1/2	890131-C6	55.90
.031 (1/32)		.0310	**.156** (5x)	6	1/8	2-1/2	62631-C6	55.90
.031 (1/32)		.0310	**.187** (6x)	6	1/8	2-1/2	868531-C6	57.30
.031 (1/32)		.0310	**.218** (7x)	6	1/8	2-1/2	881331-C6	57.30
.031 (1/32)		.0310	**.250** (8x)	6	1/8	2-1/2	59031-C6	58.40
.031 (1/32)		.0310	**.312** (10x)	6	1/8	2-1/2	941831-C6	68.70
.031 (1/31)		.0310	**.375** (12x)	6	1/8	2-1/2	69131-C6	73.90
	.8 mm	.0314	**2.40 mm** (3x)	6	4 mm	50 mm	967618-C6	50.10
	.8 mm	.0314	**4.00 mm** (5x)	6	4 mm	50 mm	974518-C6	58.70
	.8 mm	.0314	**6.50 mm** (8x)	6	4 mm	50 mm	976118-C6	60.50
.035		.0350	**.105** (3x)	6	1/8	1-1/2	57835-C6	44.30
.035		.0350	**.187** (5x)	6	1/8	2-1/2	62635-C6	46.40
	.9 mm	.0354	**2.70 mm** (3x)	6	4 mm	50 mm	967620-C6	48.70
	1.0 mm	.0393	**1.50 mm** (1.5x)	6	4 mm	50 mm	846722-C6	48.70
	1.0 mm	.0393	**3.00 mm** (3x)	6	4 mm	50 mm	967622-C6	48.70
	1.0 mm	.0393	**4.00 mm** (4x)	6	4 mm	50 mm	726422-C6	54.60
	1.0 mm	.0393	**5.00 mm** (5x)	6	4 mm	50 mm	974522-C6	60.40
	1.0 mm	.0393	**8.00 mm** (8x)	6	4 mm	50 mm	976122-C6	64.10
	1.0 mm	.0393	**10.00 mm** (10x)	6	4 mm	50 mm	938322-C6	72.20
.040		.0400	**.060** (1.5x)	6	1/8	1-1/2	946140-C6	40.40
.040		.0400	**.120** (3x)	6	1/8	1-1/2	57840-C6	40.40
.040		.0400	**.160** (4x)	6	1/8	2-1/2	890140-C6	56.90
.040		.0400	**.203** (5x)	6	1/8	2-1/2	62640-C6	55.90
.040		.0400	**.240** (6x)	6	1/8	2-1/2	868540-C6	57.80
.040		.0400	**.325** (8x)	6	1/8	2-1/2	59040-C6	58.40
	1.1 mm	.0433	**3.00 mm** (3x)	6	4 mm	50 mm	967624-C6	47.20
.045		.0450	**.135** (3x)	6	1/8	1-1/2	57845-C6	44.30
.045		.0450	**.225** (5x)	6	1/8	2-1/2	62645-C6	46.80
.047 (3/64)		.0470	**.071** (1.5x)	6	1/8	1-1/2	946147-C6	41.40
.047 (3/64)		.0470	**.141** (3x)	6	1/8	1-1/2	57847-C6	40.40
.047 (3/64)		.0470	**.187** (4x)	6	1/8	2-1/2	890147-C6	55.90
.047 (3/64)		.0470	**.250** (5x)	6	1/8	2-1/2	62647-C6	55.90
.047 (3/64)		.0470	**.281** (6x)	6	1/8	2-1/2	868547-C6	57.30
.047 (3/64)		.0470	**.328** (7x)	6	1/8	2-1/2	881347-C6	57.30
.047 (3/64)		.0470	**.375** (8x)	6	1/8	2-1/2	59047-C6	58.40
.047 (3/64)		.0470	**.480** (10x)	6	1/8	2-1/2	941847-C6	68.70
.047 (3/64)		.0470	**.570** (12x)	6	1/8	2-1/2	69147-C6	74.50
	1.2 mm	.0472	**3.50 mm** (3x)	6	4 mm	50 mm	967627-C6	49.30
	1.2 mm	.0472	**6.00 mm** (5x)	6	4 mm	50 mm	974527-C6	61.00
	1.2 mm	.0472	**9.50 mm** (8x)	6	4 mm	50 mm	976127-C6	64.10

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.050		.0500	**.075** (1.5x)	7	1/8	1-1/2	946150-C6	41.40
.050		.0500	**.150** (3x)	7	1/8	1-1/2	57850-C6	40.40
.050		.0500	**.250** (5x)	7	1/8	2-1/2	62650-C6	55.90
.050		.0500	**.400** (8x)	7	1/8	2-1/2	59050-C6	58.40
	1.3 mm	.0511	**4.00 mm** (3x)	7	4 mm	50 mm	967629-C6	49.30
.055		.0550	**.165** (3x)	7	1/8	1-1/2	57855-C6	43.60
.055		.0550	**.275** (5x)	7	1/8	2-1/2	62655-C6	45.20
	1.4 mm	.0551	**4.00 mm** (3x)	7	4 mm	50 mm	967631-C6	48.70
	1.4 mm	.0551	**7.00 mm** (5x)	7	4 mm	50 mm	974531-C6	60.40
	1.4 mm	.0551	**11.00 mm** (8x)	7	4 mm	50 mm	976131-C6	64.10
	1.5 mm	.0590	**2.20 mm** (1.5x)	7	4 mm	50 mm	846733-C6	47.60
	1.5 mm	.0590	**4.50 mm** (3x)	7	4 mm	50 mm	967633-C6	47.60
	1.5 mm	.0590	**7.50 mm** (5x)	7	4 mm	50 mm	974533-C6	58.70
	1.5 mm	.0590	**12.00 mm** (8x)	7	4 mm	50 mm	976133-C6	62.30
	1.5 mm	.0590	**15.00 mm** (10x)	7	4 mm	50 mm	938333-C6	73.70
.060		.0600	**.090** (1.5x)	7	1/8	1-1/2	946160-C6	39.80
.060		.0600	**.180** (3x)	7	1/8	1-1/2	57860-C6	39.80
.060		.0600	**.312** (5x)	7	1/8	2-1/2	62660-C6	51.50
.060		.0600	**.500** (8x)	7	1/8	2-1/2	59060-C6	54.10
.062 (1/16)		.0620	**.093** (1.5x)	7	1/8	1-1/2	946162-C6	39.80
.062 (1/16)		.0620	**.186** (3x)	7	1/8	1-1/2	57862-C6	39.80
.062 (1/16)		.0620	**.250** (4x)	7	1/8	2-1/2	890162-C6	52.70
.062 (1/16)		.0620	**.312** (5x)	7	1/8	2-1/2	62662-C6	52.70
.062 (1/16)		.0620	**.375** (6x)	7	1/8	2-1/2	868562-C6	54.20
.062 (1/16)		.0620	**.437** (7x)	7	1/8	2-1/2	881362-C6	54.20
.062 (1/16)		.0620	**.500** (8x)	7	1/8	2-1/2	59062-C6	55.10
.062 (1/16)		.0620	**.625** (10x)	7	1/8	2-1/2	941862-C6	70.00
.062 (1/16)		.0620	**.750** (12x)	7	1/8	2-1/2	69162-C6	79.40
.062 (1/16)		.0620	**.950** (15x)	7	1/8	2-1/2	68762-C6	100.00
	1.6 mm	.0629	**5.00 mm** (3x)	7	4 mm	50 mm	967636-C6	47.60
	1.6 mm	.0629	**8.00 mm** (5x)	7	4 mm	50 mm	974536-C6	58.70
	1.6 mm	.0629	**13.00 mm** (8x)	7	4 mm	50 mm	976136-C6	62.30
	1.7 mm	.0669	**5.00 mm** (3x)	7	4 mm	50 mm	967638-C6	47.10
	1.7 mm	.0669	**8.50 mm** (5x)	7	4 mm	50 mm	974538-C6	58.70 NEW
.070		.0700	**.210** (3x)	7	1/8	1-1/2	57870-C6	37.60
.070		.0700	**.375** (5x)	7	1/8	2-1/2	62670-C6	52.70
.070		.0700	**.570** (8x)	7	1/8	2-1/2	59070-C6	55.10
	1.8 mm	.0708	**5.50 mm** (3x)	7	4 mm	50 mm	967640-C6	47.60
	1.8 mm	.0708	**9.00 mm** (5x)	7	4 mm	50 mm	974540-C6	58.70
	1.8 mm	.0708	**14.00 mm** (8x)	7	4 mm	50 mm	976140-C6	62.30
	1.9 mm	.0748	**5.50 mm** (3x)	7	4 mm	50 mm	967642-C6	47.60

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Finishers – Square (cont.)

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	CUTTER DIAMETER		LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1		L_2		D_2 (h6)	L_1	TOOL #	PRICE
	+.0005″ −.0005″	+.00mm −.02mm decimal equivalent	+.010″ −.000″ +.25mm −.00mm					
	.078 (5/64)	.0780	**.117** (1.5x)	7	1/8	1-1/2	946178-C6	37.60
	.078 (5/64)	.0780	**.234** (3x)	7	1/8	1-1/2	57878-C6	37.60
	.078 (5/64)	.0780	**.312** (4x)	7	1/8	2-1/2	890178-C6	52.70
	.078 (5/64)	.0780	**.406** (5x)	7	1/8	2-1/2	62678-C6	52.70
	.078 (5/64)	.0780	**.475** (6x)	7	1/8	2-1/2	868578-C6	54.20
	.078 (5/64)	.0780	**.550** (7x)	7	1/8	2-1/2	881378-C6	54.20
	.078 (5/64)	.0780	**.625** (8x)	7	1/8	2-1/2	59078-C6	55.10
	.078 (5/64)	.0780	**.800** (10x)	7	1/8	2-1/2	941878-C6	70.00
	.078 (5/64)	.0780	**.940** (12x)	7	1/8	2-1/2	69178-C6	79.40
	.078 (5/64)	.0780	**1.187** (15x)	7	1/8	2-1/2	68778-C6	100.00
	2.0 mm	.0787	**3.00 mm** (1.5x)	7	4 mm	50 mm	846745-C6	47.10
	2.0 mm	.0787	**6.00 mm** (3x)	7	4 mm	50 mm	967645-C6	47.10
	2.0 mm	.0787	**10.00 mm** (5x)	7	4 mm	50 mm	974545-C6	58.40
	2.0 mm	.0787	**16.00 mm** (8x)	7	4 mm	50 mm	976145-C6	61.80
	.080	.0800	**.120** (1.5x)	7	1/8	1-1/2	946180-C6	40.60
	.080	.0800	**.240** (3x)	7	1/8	1-1/2	57880-C6	37.60
	.080	.0800	**.406** (5x)	7	1/8	2-1/2	62680-C6	53.60
	.080	.0800	**.650** (8x)	7	1/8	2-1/2	59080-C6	55.60
	.090	.0900	**.270** (3x)	7	1/8	1-1/2	57890-C6	38.40
	.090	.0900	**.450** (5x)	7	1/8	2-1/2	62690-C6	52.70
	.090	.0900	**.750** (8x)	7	1/8	2-1/2	59090-C6	55.60
	.093 (3/32)	.0930	**.074** (0.8x)	7	1/8	1-1/2	836593-C6	41.50
	.093 (3/32)	.0930	**.140** (1.5x)	7	1/8	1-1/2	946193-C6	37.60
	.093 (3/32)	.0930	**.279** (3x)	7	1/8	1-1/2	57893-C6	37.60
	.093 (3/32)	.0930	**.375** (4x)	7	1/8	2-1/2	890193-C6	52.70
	.093 (3/32)	.0930	**.500** (5x)	7	1/8	2-1/2	62693-C6	52.70
	.093 (3/32)	.0930	**.585** (6x)	7	1/8	2-1/2	868593-C6	54.20
	.093 (3/32)	.0930	**.670** (7x)	7	1/8	2-1/2	881393-C6	54.20
	.093 (3/32)	.0930	**.750** (8x)	7	1/8	2-1/2	59093-C6	55.10
	.093 (3/32)	.0930	**.950** (10x)	7	1/8	2-1/2	941893-C6	70.70
	.093 (3/32)	.0930	**1.125** (12x)	7	1/8	2-1/2	69193-C6	78.70
	.093 (3/32)	.0930	**1.400** (15x)	7	1/8	3	68793-C6	99.40
	2.5 mm	.0984	**7.50 mm** (3x)	7	4 mm	50 mm	967651-C6	47.10
	.100	.1000	**.150** (1.5x)	7	1/8	1-1/2	960100-C6	38.60
	.100	.1000	**.300** (3x)	7	1/8	1-1/2	57900-C6	37.60
	.100	.1000	**.500** (5x)	7	1/8	2-1/2	62700-C6	52.70
NEW	.100	.1000	**.800** (8x)	7	1/8	2-1/2	59100-C6	55.10
	.109 (7/64)	.1090	**.164** (1.5x)	7	1/8	1-1/2	960102-C6	38.60
	.109 (7/64)	.1090	**.327** (3x)	7	1/8	1-1/2	57902-C6	37.60
	.109 (7/64)	.1090	**.570** (5x)	7	1/8	2-1/2	62702-C6	52.70
	.109 (7/64)	.1090	**.900** (8x)	7	1/8	2-1/2	59102-C6	58.10
	3.0 mm	.1181	**4.50 mm** (1.5x)	7	4 mm	50 mm	846757-C6	47.60
	3.0 mm	.1181	**9.00 mm** (3x)	7	4 mm	50 mm	967657-C6	47.10
	3.0 mm	.1181	**12.00 mm** (4x)	7	4 mm	50 mm	773057-C6	47.60
	3.0 mm	.1181	**15.00 mm** (5x)	7	4 mm	50 mm	974557-C6	48.60
	3.0 mm	.1181	**24.00 mm** (8x)	7	4 mm	50 mm	976157-C6	53.40

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)		.1250	**.100** (0.8x)	7	1/8	1-1/2	836608-C6	40.10
.125 (1/8)		.1250	**.187** (1.5x)	7	1/8	1-1/2	960108-C6	36.10
.125 (1/8)		.1250	**.375** (3x)	7	1/8	1-1/2	57908-C6	35.40
.125 (1/8)		.1250	**.500** (4x)	7	1/8	2-1/2	890208-C6	51.80
.125 (1/8)		.1250	**.625** (5x)	7	1/8	2-1/2	62708-C6	51.80
.125 (1/8)		.1250	**.750** (6x)	7	1/8	2-1/2	868608-C6	53.40
.125 (1/8)		.1250	**.875** (7x)	7	1/8	2-1/2	881408-C6	53.40
.125 (1/8)		.1250	**1.000** (8x)	7	1/8	2-1/2	59108-C6	54.20
.125 (1/8)		.1250	**1.250** (10x)	7	1/8	2-1/2	941908-C6	69.30
.125 (1/8)		.1250	**1.500** (12x)	7	1/8	3	69208-C6	78.80
.125 (1/8)		.1250	**1.875** (15x)	7	1/8	3	68808-C6	102.10
.140 (9/64)		.1406	**.220** (1.5x)	7	3/16	2	960109-C6	50.20
.140 (9/64)		.1406	**.425** (3x)	7	3/16	2	57909-C6	49.60
.140 (9/64)		.1406	**.750** (5x)	7	3/16	3	62709-C6	51.80
.140 (9/64)		.1406	**1.125** (8x)	7	3/16	3	59109-C6	56.80
.156 (5/32)		.1562	**.235** (1.5x)	7	3/16	2	960110-C6	40.90
.156 (5/32)		.1562	**.470** (3x)	7	3/16	2	57910-C6	40.40
.156 (5/32)		.1562	**.625** (4x)	7	3/16	3	890210-C6	41.20
.156 (5/32)		.1562	**.750** (5x)	7	3/16	3	62710-C6	54.50
.156 (5/32)		.1562	**1.250** (8x)	7	3/16	3	59110-C6	60.20
.187 (3/16)		.1875	**.150** (0.8x)	7	3/16	2	836612-C6	45.00
.187 (3/16)		.1875	**.285** (1.5x)	7	3/16	2	960112-C6	40.90
.187 (3/16)		.1875	**.570** (3x)	7	3/16	2	57912-C6	40.40
.187 (3/16)		.1875	**.750** (4x)	7	3/16	3	890212-C6	55.50
.187 (3/16)		.1875	**1.000** (5x)	7	3/16	3	62712-C6	54.50
.187 (3/16)		.1875	**1.156** (6x)	7	3/16	3	868612-C6	58.80
.187 (3/16)		.1875	**1.312** (7x)	7	3/16	3	881412-C6	59.40
.187 (3/16)		.1875	**1.500** (8x)	7	3/16	3	59112-C6	59.80
	5.0 mm	.1968	**25.00 mm** (5x)	7	6 mm	63 mm	974564-C6	56.80
.218 (7/32)		.2187	**.660** (3x)	7	1/4	2-1/2	57814-C6	54.70
.218 (7/32)		.2187	**1.125** (5x)	7	1/4	4	62714-C6	69.40
	6.0 mm	.2362	**18.00 mm** (3x)	7	6 mm	63 mm	967666-C6	53.50
	6.0 mm	.2362	**30.00 mm** (5x)	7	6 mm	63 mm	974566-C6	56.80
.250 (1/4)		.2500	**.200** (0.8x)	7	1/4	2-1/2	836616-C6	57.50
.250 (1/4)		.2500	**.375** (1.5x)	7	1/4	2-1/2	960116-C6	53.30
.250 (1/4)		.2500	**.750** (3x)	7	1/4	2-1/2	57916-C6	52.50
.250 (1/4)		.2500	**1.000** (4x)	7	1/4	4	890216-C6	68.20
.250 (1/4)		.2500	**1.250** (5x)	7	1/4	4	62716-C6	66.90
.250 (1/4)		.2500	**1.500** (6x)	7	1/4	4	868616-C6	72.70
.250 (1/4)		.2500	**1.750** (7x)	7	1/4	4	881416-C6	72.70
.250 (1/4)		.2500	**2.000** (8x)	7	1/4	4	59116-C6	72.80
.312 (5/16)		.3125	**.470** (1.5x)	7	5/16	2-1/2	960120-C6	73.50
.312 (5/16)		.3125	**1.000** (3x)	7	5/16	2-1/2	57920-C6	71.10
.375 (3/8)		.3750	**.570** (1.5x)	7	3/8	2-1/2	960124-C6	81.80
.375 (3/8)		.3750	**1.125** (3x)	7	3/8	2-1/2	57924-C6	81.20
.375 (3/8)		.3750	**2.000** (5x)	7	3/8	4	62724-C6	105.00
.500 (1/2)		.5000	**.750** (1.5x)	7	1/2	3	960132-C6	107.20
.500 (1/2)		.5000	**1.500** (3x)	7	1/2	3	57932-C6	107.20

Please see Speeds & Feeds on page 165-166

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

SPEEDS & FEEDS (Finishers for High Temp Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300 300 - 350	400 350	Finishing (0.8x LOC)	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00158	.00212	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00010	.00021	.00031	.00042	.00052	.00062	.00084	.00125	.00167	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00007	.00015	.00022	.00030	.00037	.00044	.00060	.00089	.00119	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00006	.00013	.00020	.00026	.00032	.00039	.00052	.00078	.00104	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (0.8x LOC)	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00158	.00212	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00010	.00021	.00031	.00042	.00052	.00062	.00084	.00125	.00167	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00007	.00015	.00022	.00030	.00037	.00044	.00060	.00089	.00119	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00006	.00013	.00020	.00026	.00032	.00039	.00052	.00078	.00104	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
	350 - 400	250	Finishing (0.8x LOC)	.00010	.00021	.00032	.00042	.00053	.00063	.00085	.00127	.00169	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00009	.00019	.00029	.00038	.00048	.00057	.00077	.00115	.00154	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00008	.00017	.00026	.00035	.00044	.00052	.00070	.00105	.00140	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00008	.00017	.00025	.00033	.00042	.00050	.00067	.00100	.00134	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00006	.00013	.00020	.00026	.00033	.00039	.00053	.00079	.00105	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00006	.00012	.00018	.00024	.00030	.00035	.00048	.00071	.00095	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00005	.00010	.00016	.00021	.00026	.00031	.00042	.00062	.00083	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00005	.00010	.00014	.00019	.00024	.00029	.00039	.00058	.00077	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00009	.00014	.00018	.00023	.00027	.00036	.00054	.00073	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00016	.00020	.00023	.00032	.00047	.00063	< .02x Dia	.5x - 15x Dia
	400 - 540	200	Finishing (0.8x LOC)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00125	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00007	.00014	.00021	.00028	.00035	.00042	.00057	.00085	.00114	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00007	.00013	.00020	.00027	.00034	.00040	.00054	.00081	.00109	< .10x Dia	.5x - 5x Dia
			Finishing (5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00005	.00010	.00015	.00019	.00024	.00029	.00039	.00058	.00077	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00004	.00008	.00013	.00017	.00021	.00025	.00034	.00050	.00067	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00004	.00008	.00012	.00016	.00020	.00023	.00031	.00047	.00063	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00007	.00011	.00015	.00018	.00022	.00030	.00044	.00059	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00007	.00011	.00014	.00018	.00021	.00028	.00043	.00057	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00013	.00016	.00019	.00026	.00038	.00051	< .02x Dia	.5x - 15x Dia

continued on next page

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

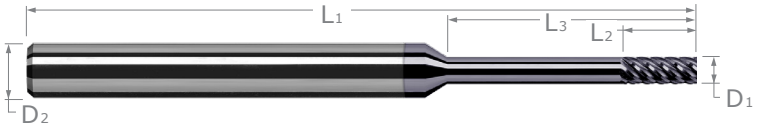
continued from previous page

SPEEDS & FEEDS (Finishers for High Temp Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Titanium: All alloys	275 - 300 300 - 350	300 200	Finishing (0.8x LOC)	.00006	.00012	.00018	.00023	.00029	.00035	.00047	.00070	.00094	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00005	.00010	.00015	.00019	.00024	.00029	.00039	.00058	.00078	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00004	.00009	.00014	.00018	.00023	.00028	.00037	.00055	.00074	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00003	.00007	.00010	.00013	.00016	.00020	.00026	.00039	.00053	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00003	.00006	.00009	.00011	.00014	.00017	.00023	.00034	.00046	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00003	.00005	.00008	.00011	.00013	.00016	.00021	.00032	.00043	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00005	.00008	.00010	.00013	.00015	.00020	.00030	.00040	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00005	.00007	.00010	.00012	.00014	.00019	.00029	.00039	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00009	.00011	.00013	.00017	.00026	.00035	< .02x Dia	.5x - 15x Dia
	350 - 400 400 - 425	150 100	Finishing (0.8x LOC)	.00005	.00009	.00014	.00019	.00023	.00028	.00038	.00056	.00075	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00004	.00008	.00013	.00017	.00021	.00025	.00034	.00051	.00068	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00004	.00008	.00012	.00015	.00019	.00023	.00031	.00046	.00062	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00004	.00007	.00011	.00015	.00019	.00022	.00030	.00044	.00059	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00003	.00006	.00009	.00012	.00015	.00017	.00023	.00035	.00047	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00003	.00005	.00008	.00010	.00013	.00016	.00021	.00032	.00042	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00002	.00005	.00007	.00009	.00011	.00014	.00018	.00028	.00037	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00026	.00034	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00032	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00023	.00031	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00007	.00009	.00010	.00014	.00021	.00028	< .02x Dia	.5x - 15x Dia
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300 300 - 350	150 100	Finishing (0.8x LOC)	.00002	.00005	.00007	.00010	.00012	.00015	.00020	.00029	.00039	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00002	.00004	.00007	.00009	.00011	.00013	.00018	.00027	.00036	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00033	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00002	.00004	.00005	.00007	.00009	.00011	.00014	.00021	.00029	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00001	.00002	.00004	.00005	.00006	.00007	.00010	.00015	.00020	< .05x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00001	.00002	.00003	.00005	.00006	.00007	.00009	.00014	.00018	< .05x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00007	.00011	.00015	< .03x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00011	.00015	< .03x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	< .02x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00002	.00002	.00003	.00004	.00005	.00007	.00010	.00013	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00003	.00004	.00004	.00006	.00009	.00011	< .01x Dia	.5x - 15x Dia
	350 - 400 400 - 425	80 60	Finishing (0.8x LOC)	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00031	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00002	.00004	.00005	.00007	.00009	.00011	.00014	.00021	.00029	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00003	.00005	.00006	.00008	.00010	.00013	.00019	.00026	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00001	.00003	.00004	.00006	.00007	.00009	.00011	.00017	.00023	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00012	.00016	< .05x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00001	.00002	.00003	.00004	.00005	.00005	.00007	.00011	.00015	< .05x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00001	.00001	.00002	.00003	.00004	.00004	.00006	.00009	.00012	< .03x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00001	.00002	.00002	.00003	.00004	.00005	.00006	.00009	.00012	< .03x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00006	.00008	.00011	< .02x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00010	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00002	.00003	.00003	.00005	.00007	.00009	< .01x Dia	.5x - 15x Dia

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square – Long Reach



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities and increased rigidity • Reduced neck diameter to avoid heeling
  - Length of cut = 3x diameter • Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
  - Latest generation AlTiN Nano coating offers superior hardness and heat resistance
  - h6 shank tolerance for high precision tool holders • End cutting (not center cutting)
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	.045	**.078** (5x)	4	1/8	2-1/2	940715-C6	65.80
.015 (1/64)		.0150	.045	**.125** (8x)	4	1/8	2-1/2	962115-C6	68.00
.015 (1/64)		.0150	.045	**.187** (12x)	4	1/8	2-1/2	951815-C6	72.30
.020		.0200	.060	**.160** (8x)	4	1/8	2-1/2	962120-C6	60.10
.025		.0250	.075	**.203** (8x)	4	1/8	2-1/2	962125-C6	59.40
.031 (1/32)		.0310	.093	**.156** (5x)	6	1/8	2-1/2	940731-C6	57.90
.031 (1/32)		.0310	.093	**.187** (6x)	6	1/8	2-1/2	792531-C6	57.90
.031 (1/32)		.0310	.093	**.250** (8x)	6	1/8	2-1/2	962131-C6	59.40
.031 (1/32)		.0310	.093	**.312** (10x)	6	1/8	2-1/2	862831-C6	62.10
.031 (1/32)		.0310	.093	**.375** (12x)	6	1/8	2-1/2	951831-C6	63.20
	1.0 mm	.0393	3.00 mm	**8.0 mm** (8x)	6	4 mm	50 mm	924722-C6	60.60
.040		.0400	.120	**.325** (8x)	6	1/8	2-1/2	962140-C6	60.10
.047 (3/64)		.0470	.141	**.250** (5x)	6	1/8	2-1/2	940747-C6	57.90
.047 (3/64)		.0470	.141	**.375** (8x)	6	1/8	2-1/2	962147-C6	59.40
.047 (3/64)		.0470	.141	**.570** (12x)	6	1/8	2-1/2	951847-C6	63.20
.050		.0500	.150	**.250** (5x)	7	1/8	2-1/2	940750-C6	57.90
.050		.0500	.150	**.400** (8x)	7	1/8	2-1/2	962150-C6	59.40
	1.5 mm	.0590	4.50 mm	**12.0 mm** (8x)	7	4 mm	50 mm	924733-C6	60.60
.060		.0600	.180	**.500** (8x)	7	1/8	2-1/2	962160-C6	59.40
.062 (1/16)		.0620	.186	**.312** (5x)	7	1/8	2-1/2	940762-C6	55.30
.062 (1/16)		.0620	.186	**.375** (6x)	7	1/8	2-1/2	792562-C6	55.30
.062 (1/16)		.0620	.186	**.500** (8x)	7	1/8	2-1/2	962162-C6	57.00
.062 (1/16)		.0620	.186	**.625** (10x)	7	1/8	2-1/2	862862-C6	59.00
.062 (1/16)		.0620	.186	**.750** (12x)	7	1/8	2-1/2	951862-C6	60.90
.070		.0700	.210	**.570** (8x)	7	1/8	2-1/2	962170-C6	57.50
.078 (5/64)		.0780	.234	**.406** (5x)	7	1/8	2-1/2	940778-C6	55.30
.078 (5/64)		.0780	.234	**.625** (8x)	7	1/8	2-1/2	962178-C6	57.00
.078 (5/64)		.0780	.234	**.940** (12x)	7	1/8	2-1/2	951878-C6	60.90
	2.0 mm	.0787	6.00 mm	**16.0 mm** (8x)	7	4 mm	50 mm	924745-C6	58.10

continued on next page

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square – Long Reach (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.080		.0800	.240	**.650** (8x)	7	1/8	2-1/2	962180-C6	57.50
.090		.0900	.270	**.750** (8x)	7	1/8	2-1/2	962190-C6	57.50
.093 (3/32)		.0930	.279	**.500** (5x)	7	1/8	2-1/2	940793-C6	55.30
.093 (3/32)		.0930	.279	**.585** (6x)	7	1/8	2-1/2	792593-C6	55.80
.093 (3/32)		.0930	.279	**.750** (8x)	7	1/8	2-1/2	962193-C6	57.00
.093 (3/32)		.0930	.279	**.950** (10x)	7	1/8	2-1/2	862893-C6	59.50
.093 (3/32)		.0930	.279	**1.125** (12x)	7	1/8	2-1/2	951893-C6	60.90
.100		.1000	.300	**.800** (8x)	7	1/8	2-1/2	962200-C6	57.00
.109 (7/64)		.1094	.327	**.570** (5x)	7	1/8	2-1/2	940802-C6	55.30
.109 (7/64)		.1094	.327	**.900** (8x)	7	1/8	2-1/2	962202-C6	57.00
	3.0 mm	.1181	9.00 mm	**24.0 mm** (8x)	7	4 mm	50 mm	924757-C6	57.50

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	.375	**.625** (5x)	7	1/8	2-1/2	940808-C6	53.50
.125 (1/8)	.1250	.375	**.750** (6x)	7	1/8	2-1/2	792608-C6	53.90
.125 (1/8)	.1250	.375	**1.000** (8x)	7	1/8	2-1/2	962208-C6	55.00
.125 (1/8)	.1250	.375	**1.250** (10x)	7	1/8	3	862908-C6	57.30
.125 (1/8)	.1250	.375	**1.500** (12x)	7	1/8	3	951908-C6	58.60
.140 (9/64)	.1406	.425	**.703** (5x)	7	3/16	3	940809-C6	57.50
.140 (9/64)	.1406	.425	**1.125** (8x)	7	3/16	3	962209-C6	59.10
.156 (5/32)	.1562	.470	**.750** (5x)	7	3/16	3	940810-C6	53.50
.156 (5/32)	.1562	.470	**1.250** (8x)	7	3/16	3	962210-C6	55.00
.187 (3/16)	.1875	.570	**1.000** (5x)	7	3/16	3	940812-C6	56.70
.187 (3/16)	.1875	.570	**1.500** (8x)	7	3/16	3	962212-C6	58.70
.250 (1/4)	.2500	.750	**1.250** (5x)	7	1/4	4	940816-C6	68.40
.250 (1/4)	.2500	.750	**2.000** (8x)	7	1/4	4	962216-C6	71.40

Please see Speeds & Feeds on page 169

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

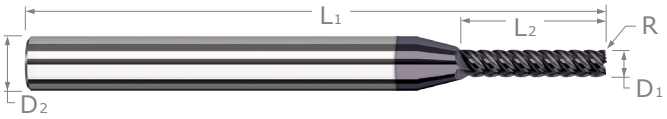
Finishers – Square – Long Reach (cont.)

SPEEDS & FEEDS (Finishers – Long Reach for High Temp Alloys)															
Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300	400	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00009	.00018	.00028	.00037	.00046	.00055	.00074	.00111	.00148	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	< .07x Dia	.5x - 3x Dia
	300 - 350	350	Finishing (10x Reach)	.00007	.00015	.00023	.00031	.00039	.00046	.00062	.00093	.00124	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	< .05x Dia	.5x - 3x Dia
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00009	.00018	.00028	.00037	.00046	.00055	.00074	.00111	.00148	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	< .07x Dia	.5x - 3x Dia
			Finishing (10x Reach)	.00007	.00015	.00023	.00031	.00039	.00046	.00062	.00093	.00124	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	< .05x Dia	.5x - 3x Dia
	350 - 400	250	Finishing (5x Reach)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00126	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00089	.00118	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00006	.00013	.00020	.00026	.00033	.00039	.00052	.00078	.00105	< .07x Dia	.5x - 3x Dia
			Finishing (10x Reach)	.00006	.00012	.00019	.00025	.00031	.00037	.00050	.00074	.00100	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00006	.00012	.00018	.00023	.00029	.00035	.00047	.00071	.00095	< .05x Dia	.5x - 3x Dia
	400 - 540	200	Finishing (5x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00077	.00102	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00005	.00011	.00016	.00021	.00027	.00032	.00042	.00064	.00085	< .07x Dia	.5x - 3x Dia
			Finishing (10x Reach)	.00005	.00010	.00015	.00020	.00025	.00030	.00040	.00060	.00081	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00005	.00010	.00014	.00019	.00024	.00029	.00038	.00057	.00077	< .05x Dia	.5x - 3x Dia
Titanium: All alloys	275 - 300	300	Finishing (5x Reach)	.00004	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00004	.00008	.00012	.00016	.00020	.00024	.00033	.00049	.00066	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	< .07x Dia	.5x - 3x Dia
	300 - 350	200	Finishing (10x Reach)	.00003	.00007	.00010	.00014	.00017	.00020	.00028	.00041	.00055	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00003	.00006	.00010	.00013	.00016	.00019	.00026	.00039	.00052	< .05x Dia	.5x - 3x Dia
	350 - 400	150	Finishing (5x Reach)	.00003	.00007	.00010	.00014	.00017	.00021	.00028	.00042	.00056	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00003	.00007	.00010	.00013	.00016	.00020	.00026	.00039	.00052	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00003	.00006	.00009	.00011	.00014	.00017	.00023	.00035	.00046	< .07x Dia	.5x - 3x Dia
	400 - 425	100	Finishing (10x Reach)	.00003	.00005	.00008	.00011	.00014	.00016	.00022	.00033	.00044	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00003	.00005	.00008	.00010	.00013	.00016	.00021	.00031	.00042	< .05x Dia	.5x - 3x Dia
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	150	Finishing (5x Reach)	.00002	.00004	.00005	.00007	.00009	.00011	.00015	.00022	.00029	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00001	.00002	.00004	.00005	.00006	.00007	.00010	.00014	.00019	< .05x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00001	.00002	.00003	.00004	.00005	.00007	.00009	.00013	.00018	< .05x Dia	.5x - 3x Dia
	300 - 350	100	Finishing (10x Reach)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00012	.00016	< .03x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	< .03x Dia	.5x - 3x Dia
	350 - 400	80	Finishing (5x Reach)	.00001	.00003	.00004	.00006	.00007	.00009	.00012	.00018	.00023	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00012	.00015	< .05x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00011	.00014	< .05x Dia	.5x - 3x Dia
	400 - 425	60	Finishing (10x Reach)	.00001	.00002	.00002	.00003	.00004	.00005	.00006	.00010	.00013	< .03x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00001	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00011	< .03x Dia	.5x - 3x Dia

NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Corner Radius



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.25mm		D_2 (h6)	L_1	TOOL #	PRICE	
.015 (1/64)		.0150	**.003**	.045 (3x)	4	1/8	1-1/2	775615-C6	46.10	
.015 (1/64)		.0150	**.003**	.078 (5x)	4	1/8	2-1/2	774715-C6	62.10	
.020		.0200	**.003**	.060 (3x)	4	1/8	1-1/2	775620-C6	46.10	
.020		.0200	**.003**	.100 (5x)	4	1/8	2-1/2	774720-C6	62.10	
.020		.0200	**.005**	.060 (3x)	4	1/8	1-1/2	873020-C6	46.10	
.020		.0200	**.005**	.100 (5x)	4	1/8	1-1/2	874620-C6	61.40	
.031 (1/32)		.0310	**.005**	.093 (3x)	6	1/8	1-1/2	873031-C6	43.40	
.031 (1/32)		.0310	**.005**	.156 (5x)	6	1/8	2-1/2	874631-C6	59.20	
.031 (1/32)		.0310	**.010**	.093 (3x)	6	1/8	1-1/2	882631-C6	43.80	
.031 (1/32)		.0310	**.010**	.156 (5x)	6	1/8	2-1/2	885431-C6	59.70	
	1.0 mm	.0393	**.10 mm**	3.00 mm (3x)	6	4 mm	50 mm	749122-C6	45.80	
	1.0 mm	.0393	**.10 mm**	5.00 mm (5x)	6	4 mm	50 mm	748522-C6	61.90	
.040		.0400	**.005**	.120 (3x)	6	1/8	1-1/2	873040-C6	43.80	
.040		.0400	**.010**	.120 (3x)	6	1/8	1-1/2	882640-C6	59.70	
.047 (3/64)		.0470	**.005**	.141 (3x)	6	1/8	1-1/2	873047-C6	43.40	
.047 (3/64)		.0470	**.005**	.250 (5x)	6	1/8	2-1/2	874647-C6	59.70	
.047 (3/64)		.0470	**.010**	.141 (3x)	6	1/8	1-1/2	882647-C6	43.40	
.047 (3/64)		.0470	**.010**	.250 (5x)	6	1/8	2-1/2	885447-C6	59.70	
.062 (1/16)		.0620	**.005**	.093 (1.5x)	7	1/8	1-1/2	872262-C6	43.20	NEW
.062 (1/16)		.0620	**.005**	.186 (3x)	7	1/8	1-1/2	873062-C6	43.20	
.062 (1/16)		.0620	**.005**	.312 (5x)	7	1/8	2-1/2	874662-C6	56.70	
.062 (1/16)		.0620	**.010**	.186 (3x)	7	1/8	1-1/2	882662-C6	43.20	
.062 (1/16)		.0620	**.010**	.312 (5x)	7	1/8	2-1/2	885462-C6	56.70	
.078 (5/64)		.0780	**.005**	.234 (3x)	7	1/8	1-1/2	873078-C6	41.20	
.078 (5/64)		.0780	**.005**	.406 (5x)	7	1/8	2-1/2	874678-C6	56.70	
.078 (5/64)		.0780	**.010**	.234 (3x)	7	1/8	1-1/2	882678-C6	41.60	
.078 (5/64)		.0780	**.010**	.406 (5x)	7	1/8	2-1/2	885478-C6	56.70	
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	7	4 mm	50 mm	748745-C6	45.80	
	2.0 mm	.0787	**.20 mm**	10.00 mm (5x)	7	4 mm	50 mm	747945-C6	61.90	
.093 (3/32)		.0930	**.005**	.140 (1.5x)	7	1/8	1-1/2	872293-C6	41.20	NEW
.093 (3/32)		.0930	**.005**	.279 (3x)	7	1/8	1-1/2	873093-C6	41.20	
.093 (3/32)		.0930	**.005**	.500 (5x)	7	1/8	2-1/2	874693-C6	56.70	
.093 (3/32)		.0930	**.010**	.279 (3x)	7	1/8	1-1/2	882693-C6	41.20	
.093 (3/32)		.0930	**.010**	.500 (5x)	7	1/8	2-1/2	885493-C6	56.70	
.093 (3/32)		.0930	**.020**	.279 (3x)	7	1/8	1-1/2	774093-C6	41.60	
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	7	4 mm	50 mm	748757-C6	45.80	
	3.0 mm	.1181	**.20 mm**	15.00 mm (5x)	7	4 mm	50 mm	747957-C6	61.90	

continued on next page

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Corner Radius (cont.)

continued from previous page

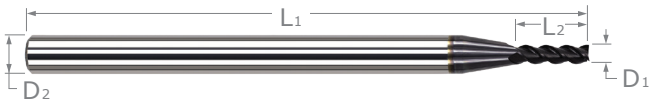
	CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.000''}_{-.002''}$	decimal equivalent	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
	.125 (1/8)	.1250	**.005**	.187 (1.5x)	7	1/8	1-1/2	872308-C6	36.00
	.125 (1/8)	.1250	**.005**	.375 (3x)	7	1/8	1-1/2	873108-C6	36.00
	.125 (1/8)	.1250	**.005**	.625 (5x)	7	1/8	2-1/2	874708-C6	38.90
	.125 (1/8)	.1250	**.010**	.187 (1.5x)	7	1/8	1-1/2	880108-C6	36.00
	.125 (1/8)	.1250	**.010**	.375 (3x)	7	1/8	1-1/2	882708-C6	36.00
	.125 (1/8)	.1250	**.010**	.625 (5x)	7	1/8	2-1/2	885508-C6	38.90
	.125 (1/8)	.1250	**.015**	.375 (3x)	7	1/8	1-1/2	813808-C6	36.00
	.125 (1/8)	.1250	**.020**	.375 (3x)	7	1/8	1-1/2	774108-C6	36.00
	.125 (1/8)	.1250	**.030**	.187 (1.5x)	7	1/8	1-1/2	890508-C6	37.00
	.125 (1/8)	.1250	**.030**	.375 (3x)	7	1/8	1-1/2	892708-C6	36.00
	.156 (5/32)	.1560	**.005**	.470 (3x)	7	3/16	2	873110-C6	40.30
	.156 (5/32)	.1560	**.010**	.470 (3x)	7	3/16	2	882710-C6	40.30
	.187 (3/16)	.1870	**.005**	.285 (1.5x)	7	3/16	2	872312-C6	40.50
	.187 (3/16)	.1870	**.005**	.570 (3x)	7	3/16	2	873112-C6	40.30
	.187 (3/16)	.1870	**.010**	.285 (1.5x)	7	3/16	2	880112-C6	41.60
	.187 (3/16)	.1870	**.010**	.570 (3x)	7	3/16	2	882712-C6	40.30
	.187 (3/16)	.1870	**.015**	.570 (3x)	7	3/16	2	813812-C6	40.30
	.187 (3/16)	.1870	**.020**	.570 (3x)	7	3/16	2	774112-C6	40.30
	.187 (3/16)	.1870	**.030**	.285 (1.5x)	7	3/16	2	890512-C6	40.90
	.187 (3/16)	.1870	**.030**	.570 (3x)	7	3/16	2	892712-C6	40.30
	.250 (1/4)	.2500	**.005**	.375 (1.5x)	7	1/4	2-1/2	872316-C6	52.20
	.250 (1/4)	.2500	**.005**	.750 (3x)	7	1/4	2-1/2	873116-C6	51.90
	.250 (1/4)	.2500	**.010**	.375 (1.5x)	7	1/4	2-1/2	880116-C6	52.70
	.250 (1/4)	.2500	**.010**	.750 (3x)	7	1/4	2-1/2	882716-C6	51.90
	.250 (1/4)	.2500	**.010**	1.250 (5x)	7	1/4	4	885516-C6	57.40
	.250 (1/4)	.2500	**.015**	.750 (3x)	7	1/4	2-1/2	813816-C6	51.90
	.250 (1/4)	.2500	**.020**	.750 (3x)	7	1/4	2-1/2	774116-C6	51.90
	.250 (1/4)	.2500	**.030**	.375 (1.5x)	7	1/4	2-1/2	890516-C6	52.70
	.250 (1/4)	.2500	**.030**	.750 (3x)	7	1/4	2-1/2	892716-C6	51.90
NEW	.375 (3/8)	.3750	**.005**	1.125 (3x)	7	3/8	2-1/2	873124-C6	64.40

Please see Speeds & Feeds on page 165

NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	964910-C3	60.00
.010		.0100	**.030** (3x)	3	1/8	1-1/2	958510-C3	60.00
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	964915-C3	47.80
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	958515-C3	47.80
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	952615-C3	60.30
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	945911-C3	47.20
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	964920-C3	42.00
.020		.0200	**.060** (3x)	3	1/8	1-1/2	958520-C3	42.00
.020		.0200	**.100** (5x)	3	1/8	2-1/2	952620-C3	52.50
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	964925-C3	40.40
.025		.0250	**.075** (3x)	3	1/8	1-1/2	958525-C3	40.40
.025		.0250	**.125** (5x)	3	1/8	2-1/2	952625-C3	51.40
.030		.0300	**.090** (3x)	3	1/8	1-1/2	958530-C3	40.10
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	964931-C3	34.00
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	958531-C3	34.00
.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	814831-C3	44.60
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	952631-C3	44.60
.035		.0350	**.053** (1.5x)	3	1/8	1-1/2	964935-C3	34.70
.035		.0350	**.105** (3x)	3	1/8	1-1/2	958535-C3	34.00
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	945922-C3	39.10
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	964940-C3	34.20
.040		.0400	**.120** (3x)	3	1/8	1-1/2	958540-C3	34.20
.040		.0400	**.203** (5x)	3	1/8	2-1/2	952640-C3	44.80
.045		.0450	**.068** (1.5x)	3	1/8	1-1/2	964945-C3	34.20
.045		.0450	**.135** (3x)	3	1/8	1-1/2	958545-C3	34.20
.045		.0450	**.225** (5x)	3	1/8	2-1/2	952645-C3	45.20
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	964947-C3	34.00
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	958547-C3	34.00
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	952647-C3	45.00
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	964950-C3	34.20
.050		.0500	**.150** (3x)	3	1/8	1-1/2	958550-C3	34.20
.050		.0500	**.250** (5x)	3	1/8	2-1/2	952650-C3	45.20
.055		.0550	**.083** (1.5x)	3	1/8	1-1/2	964955-C3	34.70
.055		.0550	**.165** (3x)	3	1/8	1-1/2	958555-C3	34.00
.055		.0550	**.275** (5x)	3	1/8	2-1/2	952655-C3	45.00
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	945933-C3	36.60
.060		.0600	**.180** (3x)	3	1/8	1-1/2	958560-C3	35.30
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	835762-C3	35.20
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	964962-C3	31.80
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	958562-C3	31.80
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	814862-C3	36.90

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square (cont.)

continued from previous page

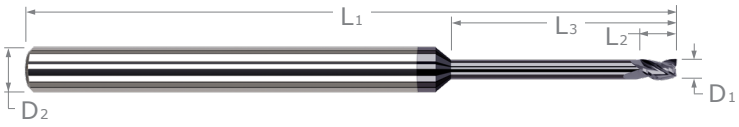
	CUTTER DIAMETER		LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
	D_1 +.0005″ −.0005″ / +.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ / +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.062 (1/16)	.0620	**.312** (5x)	3	1/8	2-1/2	952662-C3	42.60
NEW	.062 (1/16)	.0620	**.500** (8x)	3	1/8	2-1/2	714262-C3	44.60
	.070	.0700	**.105** (1.5x)	3	1/8	1-1/2	964970-C3	32.40
	.070	.0700	**.210** (3x)	3	1/8	1-1/2	958570-C3	32.40
	.078 (5/64)	.0780	**.118** (1.5x)	3	1/8	1-1/2	964978-C3	31.80
	.078 (5/64)	.0780	**.234** (3x)	3	1/8	1-1/2	958578-C3	31.80
	.078 (5/64)	.0780	**.406** (5x)	3	1/8	2-1/2	952678-C3	42.60
NEW	.078 (5/64)	.0780	**.625** (8x)	3	1/8	2-1/2	714278-C3	44.60
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	945945-C3	36.60
	.080	.0800	**.240** (3x)	3	1/8	1-1/2	958580-C3	31.80
	.090	.0900	**.270** (3x)	3	1/8	1-1/2	958590-C3	31.80
	.093 (3/32)	.0930	**.074** (0.8x)	3	1/8	1-1/2	835793-C3	35.20
	.093 (3/32)	.0930	**.140** (1.5x)	3	1/8	1-1/2	964993-C3	31.80
	.093 (3/32)	.0930	**.279** (3x)	3	1/8	1-1/2	958593-C3	31.80
	.093 (3/32)	.0930	**.375** (4x)	3	1/8	2-1/2	814893-C3	36.90
	.093 (3/32)	.0930	**.500** (5x)	3	1/8	2-1/2	952693-C3	42.60
NEW	.093 (3/32)	.0930	**.750** (8x)	3	1/8	2-1/2	714293-C3	44.60
	.100	.1000	**.150** (1.5x)	3	1/8	1-1/2	965000-C3	31.80
	.100	.1000	**.300** (3x)	3	1/8	1-1/2	958600-C3	31.80
	.109 (7/64)	.1090	**.164** (1.5x)	3	1/8	1-1/2	965002-C3	31.80
	.109 (7/64)	.1090	**.327** (3x)	3	1/8	1-1/2	958602-C3	31.80
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	945957-C3	36.60

	D_1 +.000″ −.002″ / +.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ / +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.125 (1/8)	.1250	**.100** (0.8x)	4	1/8	1-1/2	835808-C3	33.20
	.125 (1/8)	.1250	**.187** (1.5x)	4	1/8	1-1/2	965008-C3	29.60
	.125 (1/8)	.1250	**.375** (3x)	4	1/8	1-1/2	958608-C3	29.60
	.125 (1/8)	.1250	**.500** (4x)	4	1/8	2-1/2	814908-C3	38.50
	.125 (1/8)	.1250	**.625** (5x)	4	1/8	2-1/2	952708-C3	41.70
NEW	.125 (1/8)	.1250	**1.000** (8x)	4	1/8	2-1/2	714308-C3	45.70
	.140 (9/64)	.1406	**.220** (1.5x)	4	3/16	2	965009-C3	43.40
	.140 (9/64)	.1406	**.425** (3x)	4	3/16	2	958609-C3	43.40
	.156 (5/32)	.1562	**.235** (1.5x)	4	3/16	2	965010-C3	31.90
	.156 (5/32)	.1562	**.470** (3x)	4	3/16	2	958610-C3	32.20
	.156 (5/32)	.1562	**.750** (5x)	4	3/16	3	952710-C3	44.60
	.187 (3/16)	.1875	**.150** (0.8x)	4	3/16	2	835812-C3	35.50
	.187 (3/16)	.1875	**.285** (1.5x)	4	3/16	2	965012-C3	31.90
	.187 (3/16)	.1875	**.562** (3x)	4	3/16	2	958612-C3	32.20
	.187 (3/16)	.1875	**1.000** (5x)	4	3/16	3	952712-C3	44.60
	6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	945972-C3	36.90
	.250 (1/4)	.2500	**.375** (1.5x)	4	1/4	2-1/2	965016-C3	40.50
	.250 (1/4)	.2500	**.750** (3x)	4	1/4	2-1/2	958616-C3	40.90
	.250 (1/4)	.2500	**1.250** (5x)	4	1/4	4	952716-C3	49.20
	.312 (5/16)	.3125	**1.000** (3x)	4	5/16	2-1/2	958620-C3	45.80
	.375 (3/8)	.3750	**.570** (1.5x)	4	3/8	2-1/2	965024-C3	50.60
	.375 (3/8)	.3750	**1.125** (3x)	4	3/8	2-1/2	958624-C3	50.60
	.500 (1/2)	.5000	**1.500** (3x)	4	1/2	3	958632-C3	73.10

Please see Speeds & Feeds on page 177

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	936115-C3	63.80
.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	933815-C3	64.10
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	936120-C3	60.30
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	933820-C3	62.70
.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	936125-C3	59.80
.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	933825-C3	60.30
.030		.0300	.045	**.156** (5x)	3	1/8	2-1/2	936130-C3	55.20
.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	933830-C3	57.40
.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	945331-C3	54.50
.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	936131-C3	56.30
.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	933831-C3	56.40
.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	931131-C3	60.60
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	886422-C3	59.70
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	3	4 mm	50 mm	887122-C3	60.90
.040		.0400	.060	**.203** (5x)	3	1/8	2-1/2	936140-C3	58.40
.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	933840-C3	60.00
.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	936147-C3	55.20
.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	933847-C3	56.40
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	945362-C3	54.80
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	936162-C3	54.90
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	933862-C3	56.40
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	931162-C3	60.10
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	936178-C3	54.90
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	933878-C3	57.40
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	886445-C3	59.70
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	3	4 mm	50 mm	887145-C3	60.90
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	945393-C3	53.80
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	936193-C3	54.90
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	933893-C3	56.40
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	931193-C3	60.60

continued on next page

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

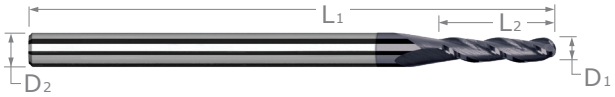
CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.100		.1000	.150	**.500** (5x)	3	1/8	2-1/2	936200-C3	59.50
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	933900-C3	61.10
.109 (7/64)		.1090	.164	**.570** (5x)	3	1/8	2-1/2	936202-C3	59.50
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	933902-C3	61.10
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	886457-C3	61.20
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	887157-C3	62.60

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	1-1/2	945408-C3	54.80
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	936208-C3	54.20
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	933908-C3	55.90
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	2-1/2	931208-C3	56.70
.156 (5/32)	.1562	.235	**.750** (5x)	4	3/16	3	936210-C3	60.30
.187 (3/16)	.1875	.285	**1.000** (5x)	4	3/16	3	936212-C3	60.30
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	936216-C3	67.30

Please See Speeds & Feeds On Page 179

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	974804-C3	69.80
.010		.0100	**.030** (3x)	3	1/8	1-1/2	971810-C3	68.10
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	963015-C3	57.20
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	971815-C3	56.20
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	974809-C3	60.50
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	974811-C3	52.10
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	963020-C3	51.70
.020		.0200	**.060** (3x)	3	1/8	1-1/2	971820-C3	51.10
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	974813-C3	50.50
.025		.0250	**.075** (3x)	3	1/8	1-1/2	971825-C3	50.00
.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	883931-C3	45.30
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	963031-C3	42.30
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	971831-C3	42.30
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	888631-C3	53.00
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	974818-C3	43.80
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	929222-C3	43.80
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	974822-C3	43.80
.040		.0400	**.120** (3x)	3	1/8	1-1/2	971840-C3	43.30
.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	883947-C3	47.20
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	963047-C3	42.30
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	971847-C3	43.10
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	974827-C3	43.80
.050		.0500	**.150** (3x)	3	1/8	1-1/2	971850-C3	42.90
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	974831-C3	43.80
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	974833-C3	41.40
.060		.0600	**.180** (3x)	3	1/8	1-1/2	971860-C3	43.30
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	883962-C3	42.80
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	963062-C3	39.90
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	971862-C3	39.90
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	888662-C3	50.40
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	974836-C3	41.40
.070		.0700	**.210** (3x)	3	1/8	1-1/2	971870-C3	40.90
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	974840-C3	41.40
.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	883978-C3	45.90
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	963078-C3	40.70
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	971878-C3	40.70

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	974845-C3	41.40
.080		.0800	**.240** (3x)	3	1/8	1-1/2	971880-C3	40.90
.090		.0900	**.270** (3x)	3	1/8	1-1/2	971890-C3	40.90
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	883993-C3	43.60
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	963093-C3	39.90
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	971893-C3	39.90
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	888693-C3	50.40
.100		.1000	**.300** (3x)	3	1/8	1-1/2	971900-C3	40.50
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	971902-C3	40.70
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	929257-C3	41.60
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	974857-C3	41.60

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.100** (0.8x)	4	1/8	1-1/2	884008-C3	43.60
.125 (1/8)	.1250	**.187** (1.5x)	4	1/8	1-1/2	963108-C3	36.90
.125 (1/8)	.1250	**.375** (3x)	4	1/8	1-1/2	971908-C3	37.30
.125 (1/8)	.1250	**.625** (5x)	4	1/8	2-1/2	888708-C3	50.40
.140 (9/64)	.1406	**.425** (3x)	4	3/16	2	971909-C3	54.10
.156 (5/32)	.1562	**.235** (1.5x)	4	3/16	2	963110-C3	43.40
.156 (5/32)	.1562	**.470** (3x)	4	3/16	2	971910-C3	43.40
.187 (3/16)	.1875	**.150** (0.8x)	4	3/16	2	884012-C3	46.60
.187 (3/16)	.1875	**.285** (1.5x)	4	3/16	2	963112-C3	40.60
.187 (3/16)	.1875	**.562** (3x)	4	3/16	2	971912-C3	39.80
.250 (1/4)	.2500	**.375** (1.5x)	4	1/4	2-1/2	963116-C3	48.20
.250 (1/4)	.2500	**.750** (3x)	4	1/4	2-1/2	971916-C3	48.60

Speeds & Feeds (Variable Helix For Medium Alloy Steels)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	250
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	250 - 275	220
Tool Steels: A, L, O, P, W series	275 - 300	180

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00008	.00017	.00026	.00035	.00043	.00052	.00066	.00099	.00133	.00174	.00209	.00278
Roughing	.00010	.00021	.00032	.00042	.00052	.00062	.00080	.00120	.00160	.00210	.00252	.00336
Finishing	.00012	.00025	.00038	.00050	.00063	.00075	.00096	.00144	.00193	.00252	.00303	.00404
Max	.00016	.00032	.00049	.00064	.00081	.00097	.00124	.00185	.00248	.00324	.00390	.00520

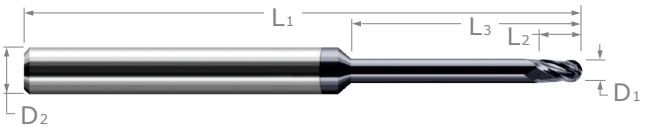
Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

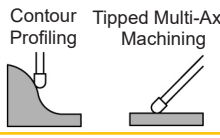
VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

IMPROVES PERFORMANCE



CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)		.0150	.022	**.078** (5x)	4	1/8	2-1/2	64215-C3	72.30
.015 (1/64)		.0150	.022	**.125** (8x)	4	1/8	2-1/2	56615-C3	73.80
.015 (1/64)		.0150	.022	**.187** (12x)	4	1/8	2-1/2	65415-C3	78.30
	.4 mm	.0157	.60 mm	**2.0 mm** (5x)	4	4 mm	50 mm	984709-C3	79.40
	.4 mm	.0157	.60 mm	**3.2 mm** (8x)	4	4 mm	50 mm	971009-C3	80.90
	.4 mm	.0157	.60 mm	**4.8 mm** (12x)	4	4 mm	50 mm	988309-C3	87.30
	.5 mm	.0196	.75 mm	**2.5 mm** (5x)	4	4 mm	50 mm	984711-C3	76.40
	.5 mm	.0196	.75 mm	**4.0 mm** (8x)	4	4 mm	50 mm	971011-C3	77.50
	.5 mm	.0196	.75 mm	**6.0 mm** (12x)	4	4 mm	50 mm	988311-C3	84.40
	.5 mm	.0196	.75 mm	**8.0 mm** (16x)	4	4 mm	50 mm	979511-C3	88.00
.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	64220-C3	68.40
.020		.0200	.030	**.160** (8x)	4	1/8	2-1/2	56620-C3	69.80
.020		.0200	.030	**.250** (12x)	4	1/8	2-1/2	65420-C3	75.00
	.6 mm	.0236	.90 mm	**3.0 mm** (5x)	4	4 mm	50 mm	984713-C3	74.70
	.6 mm	.0236	.90 mm	**4.8 mm** (8x)	4	4 mm	50 mm	971013-C3	76.20
	.6 mm	.0236	.90 mm	**7.2 mm** (12x)	4	4 mm	50 mm	988313-C3	81.20
.025		.0250	.037	**.125** (5x)	4	1/8	2-1/2	64225-C3	67.50
.025		.0250	.037	**.203** (8x)	4	1/8	2-1/2	56625-C3	68.00
.025		.0250	.037	**.312** (12x)	4	1/8	2-1/2	65425-C3	74.30
.031 (1/32)		.0310	.046	**.156** (5x)	4	1/8	2-1/2	64231-C3	62.50
.031 (1/32)		.0310	.046	**.250** (8x)	4	1/8	2-1/2	56631-C3	63.90
.031 (1/32)		.0310	.046	**.375** (12x)	4	1/8	2-1/2	65431-C3	66.80
	.8 mm	.0314	1.20 mm	**4.0 mm** (5x)	4	4 mm	50 mm	984718-C3	69.90
	.8 mm	.0314	1.20 mm	**6.5 mm** (8x)	4	4 mm	50 mm	971018-C3	71.10
	.8 mm	.0314	1.20 mm	**9.5 mm** (12x)	4	4 mm	50 mm	988318-C3	73.50
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	4	4 mm	50 mm	984722-C3	69.30
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	4	4 mm	50 mm	971022-C3	70.50
	1.0 mm	.0393	1.50 mm	**12.0 mm** (12x)	4	4 mm	50 mm	988322-C3	73.50
	1.0 mm	.0393	1.50 mm	**16.0 mm** (16x)	4	4 mm	50 mm	979522-C3	76.80
.040		.0400	.060	**.203** (5x)	4	1/8	2-1/2	64240-C3	62.50
.040		.0400	.060	**.325** (8x)	4	1/8	2-1/2	56640-C3	63.90
.047 (3/64)		.0470	.070	**.250** (5x)	4	1/8	2-1/2	64247-C3	62.50
.047 (3/64)		.0470	.070	**.375** (8x)	4	1/8	2-1/2	56647-C3	63.90
.047 (3/64)		.0470	.070	**.570** (12x)	4	1/8	2-1/2	65447-C3	66.20
	1.5 mm	.0590	2.20 mm	**7.5 mm** (5x)	4	4 mm	50 mm	984733-C3	69.30
	1.5 mm	.0590	2.20 mm	**12.0 mm** (8x)	4	4 mm	50 mm	971033-C3	71.10
	1.5 mm	.0590	2.20 mm	**18.0 mm** (12x)	4	4 mm	50 mm	988333-C3	73.50
	1.5 mm	.0590	2.20 mm	**24.0 mm** (16x)	4	4 mm	63 mm	979533-C3	76.80

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	PRICE
.062 (1/16)		.0620	.093	**.186** (3x)	4	1/8	1-1/2	755462-C3	61.00
.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	64262-C3	62.50
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	56662-C3	63.90
.062 (1/16)		.0620	.093	**.750** (12x)	4	1/8	2-1/2	65462-C3	66.20
.078 (5/64)		.0780	.117	**.234** (3x)	4	1/8	1-1/2	755478-C3	61.00
.078 (5/64)		.0780	.117	**.406** (5x)	4	1/8	2-1/2	64278-C3	62.50
.078 (5/64)		.0780	.117	**.625** (8x)	4	1/8	2-1/2	56678-C3	63.90
.078 (5/64)		.0780	.117	**.940** (12x)	4	1/8	2-1/2	65478-C3	66.20
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	4	4 mm	50 mm	984745-C3	69.90
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	4	4 mm	50 mm	971045-C3	71.10
	2.0 mm	.0787	3.00 mm	**24.0 mm** (12x)	4	4 mm	63 mm	988345-C3	73.50
	2.0 mm	.0787	3.00 mm	**32.0 mm** (16x)	4	4 mm	63 mm	979545-C3	76.80
.093 (3/32)		.0930	.139	**.279** (3x)	4	1/8	1-1/2	755493-C3	61.00
.093 (3/32)		.0930	.139	**.500** (5x)	4	1/8	2-1/2	64293-C3	62.50
.093 (3/32)		.0930	.139	**.750** (8x)	4	1/8	2-1/2	56693-C3	63.90
.093 (3/32)		.0930	.139	**1.125** (12x)	4	1/8	2-1/2	65493-C3	66.80
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	4	4 mm	50 mm	984757-C3	66.00

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	2-1/2	755508-C3	62.40
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	64308-C3	61.70
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	56708-C3	63.20
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	2-1/2	733108-C3	64.70
.125 (1/8)	.1250	.187	**1.500** (12x)	4	1/8	3	65508-C3	66.20
.156 (5/32)	.1562	.234	**.750** (5x)	4	3/16	3	64310-C3	68.00
.156 (5/32)	.1562	.234	**1.250** (8x)	4	3/16	3	56710-C3	69.50
.187 (3/16)	.1875	.281	**1.000** (5x)	4	3/16	3	64312-C3	69.50
.187 (3/16)	.1875	.281	**1.500** (8x)	4	3/16	3	56712-C3	70.10
.250 (1/4)	.2500	.375	**.750** (3x)	4	1/4	4	755516-C3	76.50
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	64316-C3	75.80
.250 (1/4)	.2500	.375	**2.000** (8x)	4	1/4	4	56716-C3	77.30

Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For Medium Alloy Steels)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 16x, reduce to 75%) For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	250
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	250 - 275	220
Tool Steels: A, L, O, P, W series	275 - 300	180

	Chip Load Per Tooth (IPT) By Cutter Diameter								
	.015	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00007	.00014	.00021	.00028	.00035	.00041	.00053	.00079	.00106
Roughing	.00008	.00017	.00025	.00033	.00042	.00050	.00064	.00096	.00128
Finishing	.00010	.00020	.00030	.00040	.00050	.00060	.00077	.00115	.00154
Max	.00012	.00026	.00039	.00052	.00065	.00077	.00099	.00148	.00198

Radial Depth of Cut*:	Axial Depth of Cut*:
Slotting: 1x Dia	Slotting: .35x Dia
Roughing: .35x Dia	Roughing: .5x - 1x Dia
Finishing: .1x Dia	Finishing: .5x - 1x Dia

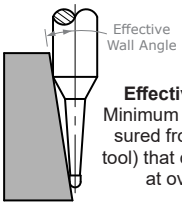
* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters)

Excellent in Readily Machinable Mold Steels, Stainless Steels, & Tool Steels

- Very short length of cut and solid tapered neck for maximum rigidity
- Ideal for contour machining of mold and die cavities
- 35° helix for increased cutting performance
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- 2 flutes to center • Solid carbide • CNC ground in the USA



Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 +0°00′ −0°30′	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
0° (straight neck)	.062 (1/16)	.050	I	.500	**.610**	6.2°	3/16	2	882843-C6	64.50
	.062 (1/16)	.050	I	1.000	**1.110**	3.3°	3/16	2-1/2	882850-C6	70.40
	.093 (3/32)	.074	I	.750	**.833**	3.4°	3/16	2	882864-C6	64.50
	.093 (3/32)	.074	I	1.125	**1.208**	2.3°	3/16	2-1/2	882871-C6	70.40
	.125 (1/8)	.100	I	1.000	**1.058**	1.8°	3/16	2-1/2	882877-C6	70.40
	.125 (1/8)	.100	I	1.750	**1.808**	1.0°	3/16	3	882885-C6	72.60
1°	.062 (1/16)	.050	I	.500	**.595**	6.4°	3/16	2	927543-C6	63.40
	.062 (1/16)	.050	I	1.000	**1.080**	3.5°	3/16	2-1/2	927550-C6	69.30
	.093 (3/32)	.074	I	.750	**.811**	3.6°	3/16	2	927564-C6	64.10
	.093 (3/32)	.074	I	1.125	**1.175**	2.4°	3/16	2-1/2	927571-C6	69.30
	.125 (1/8)	.100	I	1.000	**1.027**	1.9°	3/16	2	927577-C6	66.00
	.125 (1/8)	.100	II	1.890	**1.890**	1.0°	3/16	3	927585-C6	71.60
	.187 (3/16)	.150	II	1.940	**1.940**	1.0°	1/4	4	927587-C6	84.10
	.250 (1/4)	.200	II	1.990	**1.990**	1.0°	5/16	4	927592-C6	89.80
1.5°	.015 (1/64)	.012	I	.125	**.269**	18.2°	3/16	2	19001-C6	72.00
	.015 (1/64)	.012	I	.250	**.389**	12.8°	3/16	2	19008-C6	72.00
	.031 (1/32)	.025	I	.250	**.375**	12.3°	3/16	2	19015-C6	70.40
	.031 (1/32)	.025	I	.500	**.614**	7.5°	3/16	2	19022-C6	70.40
	.039 (1 mm)	.031	I	.375	**.488**	9.0°	3/16	2	19025-C6	67.40
	.047 (3/64)	.038	I	.375	**.481**	8.7°	3/16	2	19029-C6	67.40
	.047 (3/64)	.038	I	.750	**.839**	5.0°	3/16	2	19036-C6	67.40
	.062 (1/16)	.050	I	.500	**.588**	6.4°	3/16	2	19043-C6	63.40
	.062 (1/16)	.050	I	1.000	**1.066**	3.5°	3/16	2-1/2	19050-C6	69.90
	.062 (1/16)	.050	I	1.500	**1.543**	2.4°	3/16	3	19053-C6	71.90
	.078 (5/64)	.062	I	.625	**.694**	4.8°	3/16	2	19057-C6	64.10
	.093 (3/32)	.074	I	.750	**.801**	3.6°	3/16	2	19064-C6	63.40
	.093 (3/32)	.074	I	1.500	**1.517**	1.9°	3/16	2-1/2	19066-C6	69.30
	.093 (3/32)	.074	II	1.878	**1.878**	1.5°	3/16	3	19068-C6	72.60
	.125 (1/8)	.100	II	1.293	**1.293**	1.5°	3/16	2-1/2	19071-C6	66.00
	.125 (1/8)	.100	II	2.487	**2.487**	1.5°	1/4	4	19078-C6	77.50
	.187 (3/16)	.150	II	1.343	**1.343**	1.5°	1/4	2-1/2	19085-C6	71.70
	.250 (1/4)	.200	II	1.393	**1.393**	1.5°	5/16	2-1/2	19092-C6	91.50

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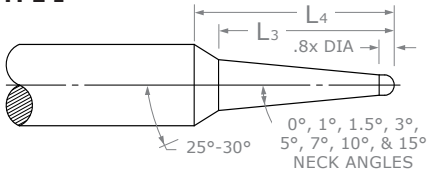
TYPE I



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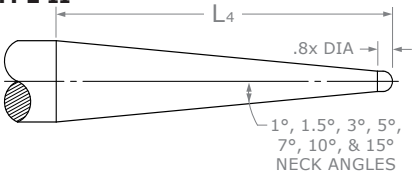

HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters) (cont.)

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NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
	.015 (1/64)	.012	I	.156	**.292**	16.8°	3/16	2-1/2	36901-C6	77.40
	.015 (1/64)	.012	I	.375	**.491**	10.1°	3/16	2-1/2	66643-C6	72.60
	.015 (1/64)	.012	I	.875	**.946**	5.3°	3/16	2-1/2	66648-C6	71.90
	.020	.016	I	.250	**.374**	13.0°	3/16	2-1/2	36904-C6	76.70
	.020	.016	I	.500	**.601**	8.1°	3/16	2-1/2	36907-C6	76.70
	.025	.020	I	.250	**.370**	12.8°	3/16	2-1/2	36910-C6	77.10
	.025	.020	I	.500	**.597**	7.9°	3/16	2-1/2	36913-C6	76.40
	.031 (1/32)	.025	I	.312	**.421**	10.9°	3/16	2-1/2	36916-C6	77.10
	.031 (1/32)	.025	I	.750	**.820**	5.6°	3/16	2-1/2	67046-C6	63.20
	.031 (1/32)	.025	II	1.518	**1.518**	3.0°	3/16	2-1/2	36931-C6	63.20
	.039 (1 mm)	.031	I	.375	**.472**	9.3°	3/16	2-1/2	36917-C6	77.10
	.039 (1 mm)	.031	I	.750	**.813**	5.4°	3/16	2-1/2	36919-C6	76.40
	.039 (1 mm)	.031	II	1.448	**1.448**	3.0°	3/16	2-1/2	36921-C6	77.10
	.047 (3/64)	.038	I	.375	**.466**	9.0°	3/16	2-1/2	36922-C6	73.80
	.047 (3/64)	.038	I	.875	**.921**	4.5°	3/16	2-1/2	67348-C6	59.60
	.047 (3/64)	.038	II	1.378	**1.378**	3.0°	3/16	2-1/2	36947-C6	59.60
	.050	.040	I	.500	**.577**	7.1°	3/16	2-1/2	36925-C6	73.80
	.060	.048	I	.625	**.683**	5.6°	3/16	2-1/2	36928-C6	73.80
	.062 (1/16)	.050	I	.375	**.454**	8.4°	3/16	2-1/2	36934-C6	69.60
3°	.062 (1/16)	.050	I	.625	**.681**	5.5°	3/16	2-1/2	66946-C6	59.60
	.062 (1/16)	.050	I	.875	**.909**	4.1°	3/16	2-1/2	36937-C6	69.00
	.062 (1/16)	.050	II	1.247	**1.247**	3.0°	3/16	2-1/2	36962-C6	59.60
	.062 (1/16)	.050	II	1.843	**1.843**	3.0°	1/4	3	37362-C6	78.80
	.078 (5/64)	.062	I	.500	**.555**	6.1°	3/16	2-1/2	36940-C6	69.00
	.078 (5/64)	.062	II	1.107	**1.107**	3.0°	3/16	2-1/2	36978-C6	58.00
	.093 (3/32)	.074	I	.625	**.657**	4.5°	3/16	2	36943-C6	63.40
	.093 (3/32)	.074	II	.976	**.976**	3.0°	3/16	2	36993-C6	52.80
	.093 (3/32)	.074	II	1.572	**1.572**	3.0°	1/4	3	37393-C6	77.40
	.100	.080	II	1.511	**1.511**	3.0°	1/4	3	37400-C6	80.10
	.109 (7/64)	.087	II	1.432	**1.432**	3.0°	1/4	3	37402-C6	80.10
	.118 (3 mm)	.094	II	1.354	**1.354**	2.9°	1/4	2-1/2	37405-C6	79.30
	.125 (1/8)	.100	I	.875	**.913**	4.2°	1/4	2-1/2	36946-C6	75.80
	.125 (1/8)	.100	II	1.293	**1.293**	2.9°	1/4	2-1/2	37408-C6	72.10
	.125 (1/8)	.100	II	2.485	**2.485**	3.0°	3/8	4	37708-C6	113.10
	.156 (5/32)	.125	II	1.020	**1.020**	2.8°	1/4	2-1/2	37410-C6	78.80
	.187 (3/16)	.150	II	.746	**.746**	2.8°	1/4	2-1/2	37412-C6	78.10
	.187 (3/16)	.150	II	1.343	**1.343**	2.9°	5/16	2-1/2	36949-C6	91.50
	.187 (3/16)	.150	II	1.939	**1.939**	2.9°	3/8	4	37712-C6	113.10
	.250 (1/4)	.200	II	1.393	**1.393**	2.9°	3/8	2-1/2	37716-C6	94.30
	.015 (1/64)	.012	I	.375	**.469**	10.6°	3/16	2	66664-C6	65.10
	.015 (1/64)	.012	II	.998	**.998**	5.0°	3/16	2	38515-C6	64.80
	.020	.016	I	.562	**.624**	7.8°	3/16	2	38907-C6	70.80
	.020	.016	II	.973	**.973**	5.0°	3/16	2	38520-C6	70.40
5°	.025	.020	I	.562	**.621**	7.6°	3/16	2	38914-C6	71.50
	.025	.020	II	.949	**.949**	5.0°	3/16	2	38525-C6	71.20
	.031 (1/32)	.025	I	.375	**.457**	10.1°	3/16	2	67065-C6	57.90
	.031 (1/32)	.025	II	.919	**.919**	5.0°	3/16	2	38531-C6	57.90
	.039 (1 mm)	.031	I	.625	**.664**	6.6°	3/16	2	38921-C6	70.40

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HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters) (cont.)

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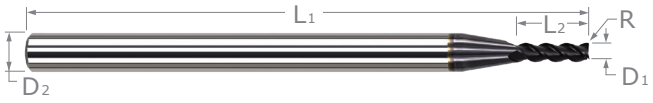
NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE
5°	.047 (3/64)	.038	II	.841	**.841**	5.0°	3/16	2	38547-C6	58.50
	.047 (3/64)	.038	II	1.198	**1.198**	5.0°	1/4	2-1/2	38947-C6	78.10
	.050	.040	II	.826	**.826**	4.9°	3/16	2	38928-C6	58.90
	.060	.048	II	.777	**.777**	4.9°	3/16	2	38935-C6	58.40
	.060	.048	II	1.134	**1.134**	5.0°	1/4	2-1/2	38960-C6	78.10
	.062 (1/16)	.050	I	.375	**.434**	8.8°	3/16	2	66963-C6	55.10
	.062 (1/16)	.050	II	.767	**.767**	4.9°	3/16	2	38562-C6	54.50
	.062 (1/16)	.050	II	1.124	**1.124**	5.0°	1/4	2-1/2	38962-C6	78.10
	.078 (5/64)	.062	II	1.045	**1.045**	4.9°	1/4	2-1/2	38978-C6	74.50
	.093 (3/32)	.074	II	.972	**.972**	4.9°	1/4	2-1/2	38993-C6	75.20
	.093 (3/32)	.074	II	1.686	**1.686**	5.0°	3/8	3	39293-C6	99.80
	.100	.080	II	.937	**.937**	4.9°	1/4	2-1/2	39000-C6	75.70
	.109 (7/64)	.087	II	.893	**.893**	4.8°	1/4	2-1/2	39002-C6	75.70
	.118 (3 mm)	.094	II	.849	**.849**	4.7°	1/4	2-1/2	39005-C6	75.00
	.125 (1/8)	.100	I	.500	**.548**	7.3°	1/4	2-1/2	38942-C6	71.40
	.125 (1/8)	.100	II	.814	**.814**	4.8°	1/4	2-1/2	39008-C6	71.00
	.125 (1/8)	.100	II	1.529	**1.529**	4.9°	3/8	3	39308-C6	95.40
	.156 (5/32)	.125	II	.661	**.661**	4.6°	1/4	2-1/2	39010-C6	74.50
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	2-1/2	39312-C6	91.50
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	4	922312-C6	102.00
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	2-1/2	39316-C6	92.40
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	4	922316-C6	102.00
7°	.015 (1/64)	.012	I	.187	**.299**	16.5°	3/16	2	66678-C6	65.10
	.015 (1/64)	.012	II	.714	**.714**	7.0°	3/16	2	40015-C6	65.80
	.020	.016	II	.698	**.698**	7.0°	3/16	2	40020-C6	65.10
	.031 (1/32)	.025	I	.250	**.338**	13.6°	3/16	2	67078-C6	58.40
	.031 (1/32)	.025	II	.662	**.662**	6.9°	3/16	2	40031-C6	58.40
	.031 (1/32)	.025	II	.917	**.917**	7.0°	1/4	2-1/2	40431-C6	74.50
	.039 (1 mm)	.031	II	.636	**.636**	6.9°	3/16	2	40007-C6	58.40
	.047 (3/64)	.038	I	.375	**.425**	9.9°	3/16	2	40014-C6	58.40
	.047 (3/64)	.038	II	.610	**.610**	6.9°	3/16	2	40047-C6	58.40
	.047 (3/64)	.038	II	.864	**.864**	6.9°	1/4	2-1/2	40447-C6	74.50
	.060	.048	II	.822	**.822**	6.9°	1/4	2-1/2	40460-C6	75.20
	.062 (1/16)	.050	I	.500	**.567**	9.9°	1/4	2-1/2	66980-C6	74.50
	.062 (1/16)	.050	II	.815	**.815**	6.9°	1/4	2-1/2	40462-C6	74.50
	.062 (1/16)	.050	II	1.324	**1.324**	6.9°	3/8	2-1/2	40862-C6	95.60
	.078 (5/64)	.062	II	1.272	**1.272**	6.9°	3/8	2-1/2	40878-C6	95.60
	.093 (3/32)	.074	II	.714	**.714**	6.7°	1/4	2-1/2	40493-C6	71.00
	.093 (3/32)	.074	II	1.223	**1.223**	6.9°	3/8	2-1/2	40893-C6	95.60
	.125 (1/8)	.100	II	.609	**.609**	6.5°	1/4	2-1/2	40508-C6	67.70
	.125 (1/8)	.100	II	1.118	**1.118**	6.8°	3/8	2-1/2	40908-C6	92.40
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	2-1/2	40912-C6	92.40
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	4	917212-C6	103.10
10°	.031 (1/32)	.025	I	.250	**.317**	14.5°	3/16	2	774631-C6	58.90
	.062 (1/16)	.050	I	.500	**.525**	10.7°	1/4	2	774662-C6	75.20
	.125 (1/8)	.100	II	.632	**.632**	9.0°	5/16	2-1/2	774608-C6	92.40
15°	.031 (1/32)	.025	I	.250	**.281**	16.3°	3/16	2	773931-C6	58.90
	.062 (1/16)	.050	II	.401	**.401**	14.1°	1/4	2	773962-C6	75.20
	.125 (1/8)	.100	II	.567	**.567**	13.7°	3/8	2-1/2	773908-C6	92.40

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078	**.05 mm**	.30 mm (1.5x)	3	4 mm	50 mm	985604-C3	64.10
	.2 mm	.0078	**.05 mm**	.60 mm (3x)	3	4 mm	50 mm	976804-C3	64.10
.010		.0100	**.003**	.015 (1.5x)	3	1/8	1-1/2	52610-C3	60.20
.010		.0100	**.003**	.030 (3x)	3	1/8	1-1/2	45610-C3	60.20
	.3 mm	.0118	**.08 mm**	.90 mm (3x)	3	4 mm	50 mm	976806-C3	62.80
.015 (1/64)		.0150	**.003**	.022 (1.5x)	3	1/8	1-1/2	52615-C3	49.70
.015 (1/64)		.0150	**.003**	.045 (3x)	3	1/8	1-1/2	45615-C3	48.80
.015 (1/64)		.0150	**.003**	.078 (5x)	3	1/8	2-1/2	53815-C3	60.30
	.4 mm	.0157	**.08 mm**	.60 mm (1.5x)	3	4 mm	50 mm	985609-C3	53.50
	.4 mm	.0157	**.08 mm**	1.20 mm (3x)	3	4 mm	50 mm	976809-C3	53.00
	.5 mm	.0196	**.10 mm**	.75 mm (1.5x)	3	4 mm	50 mm	985611-C3	47.90
	.5 mm	.0196	**.10 mm**	1.50 mm (3x)	3	4 mm	50 mm	976811-C3	47.90
.020		.0200	**.004**	.030 (1.5x)	3	1/8	1-1/2	52620-C3	43.60
.020		.0200	**.004**	.060 (3x)	3	1/8	1-1/2	45620-C3	43.60
.020		.0200	**.004**	.100 (5x)	3	1/8	2-1/2	53820-C3	53.40
	.6 mm	.0236	**.10 mm**	.90 mm (1.5x)	3	4 mm	50 mm	985613-C3	46.40
	.6 mm	.0236	**.10 mm**	1.80 mm (3x)	3	4 mm	50 mm	976813-C3	46.40
.025		.0250	**.004**	.038 (1.5x)	3	1/8	1-1/2	52625-C3	41.40
.025		.0250	**.004**	.075 (3x)	3	1/8	1-1/2	45625-C3	42.20
.025		.0250	**.004**	.125 (5x)	3	1/8	2-1/2	53825-C3	50.90
	.7 mm	.0275	**.10 mm**	2.10 mm (3x)	3	4 mm	50 mm	976815-C3	46.40
.031 (1/32)		.0310	**.005**	.047 (1.5x)	3	1/8	1-1/2	52631-C3	34.90
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	45631-C3	34.90
.031 (1/32)		.0310	**.005**	.156 (5x)	3	1/8	2-1/2	53831-C3	43.90
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	907231-C3	34.80
	.8 mm	.0314	**.10 mm**	1.20 mm (1.5x)	3	4 mm	50 mm	985618-C3	40.00
	.8 mm	.0314	**.10 mm**	2.40 mm (3x)	3	4 mm	50 mm	976818-C3	39.60
.035		.0350	**.005**	.053 (1.5x)	3	1/8	1-1/2	52635-C3	35.70
.035		.0350	**.005**	.105 (3x)	3	1/8	1-1/2	45635-C3	35.70
.035		.0350	**.005**	.187 (5x)	3	1/8	2-1/2	53835-C3	44.80
	.9 mm	.0354	**.10 mm**	2.70 mm (3x)	3	4 mm	50 mm	976820-C3	39.60

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	1.0 mm	.0393	**.10 mm**	1.50 mm (1.5x)	3	4 mm	50 mm	985622-C3	40.00
	1.0 mm	.0393	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	976822-C3	40.00
.040		.0400	**.005**	.060 (1.5x)	3	1/8	1-1/2	52640-C3	35.70
.040		.0400	**.005**	.120 (3x)	3	1/8	1-1/2	45640-C3	35.70
.040		.0400	**.005**	.203 (5x)	3	1/8	2-1/2	53840-C3	43.90
	1.1 mm	.0433	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	976824-C3	40.00
.045		.0450	**.005**	.068 (1.5x)	3	1/8	1-1/2	52645-C3	35.70
.045		.0450	**.005**	.135 (3x)	3	1/8	1-1/2	45645-C3	35.00
.045		.0450	**.005**	.225 (5x)	3	1/8	2-1/2	53845-C3	44.80
.047 (3/64)		.0470	**.005**	.071 (1.5x)	3	1/8	1-1/2	52647-C3	35.60
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	45647-C3	34.90
.047 (3/64)		.0470	**.005**	.250 (5x)	3	1/8	2-1/2	53847-C3	43.90
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	907247-C3	34.90
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	903447-C3	34.90
	1.2 mm	.0472	**.10 mm**	1.80 mm (1.5x)	3	4 mm	50 mm	985627-C3	40.00
	1.2 mm	.0472	**.10 mm**	3.50 mm (3x)	3	4 mm	50 mm	976827-C3	39.60
.050		.0500	**.005**	.075 (1.5x)	3	1/8	1-1/2	52650-C3	35.70
.050		.0500	**.005**	.150 (3x)	3	1/8	1-1/2	45650-C3	35.00
.050		.0500	**.005**	.250 (5x)	3	1/8	2-1/2	53850-C3	43.90
	1.3 mm	.0511	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	976829-C3	40.00
.055		.0550	**.005**	.083 (1.5x)	3	1/8	1-1/2	52655-C3	35.70
.055		.0550	**.005**	.165 (3x)	3	1/8	1-1/2	45655-C3	35.00
.055		.0550	**.005**	.275 (5x)	3	1/8	2-1/2	53855-C3	43.90
	1.4 mm	.0551	**.10 mm**	2.10 mm (1.5x)	3	4 mm	50 mm	985631-C3	40.00
	1.4 mm	.0551	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	976831-C3	40.00
	1.5 mm	.0590	**.20 mm**	2.20 mm (1.5x)	3	4 mm	50 mm	985633-C3	37.70
	1.5 mm	.0590	**.20 mm**	4.50 mm (3x)	3	4 mm	50 mm	976833-C3	37.30
.060		.0600	**.010**	.090 (1.5x)	3	1/8	1-1/2	52660-C3	35.70
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	45660-C3	35.70
.060		.0600	**.010**	.312 (5x)	3	1/8	2-1/2	53860-C3	44.80
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	881862-C3	32.30
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	913862-C3	32.30
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	759662-C3	43.10
.062 (1/16)		.0620	**.010**	.093 (1.5x)	3	1/8	1-1/2	52662-C3	32.30
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	45662-C3	32.30
.062 (1/16)		.0620	**.010**	.312 (5x)	3	1/8	2-1/2	53862-C3	42.30
.062 (1/16)		.0620	**.015**	.186 (3x)	3	1/8	1-1/2	903462-C3	32.30
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	931362-C3	32.30
	1.6 mm	.0629	**.20 mm**	2.40 mm (1.5x)	3	4 mm	50 mm	985636-C3	37.70
	1.6 mm	.0629	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	976836-C3	37.70
	1.7 mm	.0669	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	976838-C3	37.70
.070		.0700	**.010**	.105 (1.5x)	3	1/8	1-1/2	52670-C3	33.10
.070		.0700	**.010**	.210 (3x)	3	1/8	1-1/2	45670-C3	32.40
	1.8 mm	.0708	**.20 mm**	2.70 mm (1.5x)	3	4 mm	50 mm	985640-C3	37.70
	1.8 mm	.0708	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	976840-C3	37.70

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	1.9 mm	.0748	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	976842-C3	37.70
.078 (5/64)		.0780	**.005**	.118 (1.5x)	3	1/8	1-1/2	881878-C3	32.40
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	913878-C3	32.40
.078 (5/64)		.0780	**.010**	.118 (1.5x)	3	1/8	1-1/2	52678-C3	32.40
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	45678-C3	32.40
.078 (5/64)		.0780	**.010**	.406 (5x)	3	1/8	2-1/2	53878-C3	42.30
.078 (5/64)		.0780	**.015**	.234 (3x)	3	1/8	1-1/2	903478-C3	33.10
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	931378-C3	33.10
	2.0 mm	.0787	**.20 mm**	3.00 mm (1.5x)	3	4 mm	50 mm	985645-C3	37.70
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	3	4 mm	50 mm	976845-C3	37.70
.080		.0800	**.010**	.120 (1.5x)	3	1/8	1-1/2	52680-C3	33.10
.080		.0800	**.010**	.240 (3x)	3	1/8	1-1/2	45680-C3	33.10
.090		.0900	**.010**	.270 (3x)	3	1/8	1-1/2	45690-C3	33.10
.093 (3/32)		.0930	**.005**	.140 (1.5x)	3	1/8	1-1/2	881893-C3	32.30
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	913893-C3	32.30
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	759693-C3	43.10
.093 (3/32)		.0930	**.010**	.140 (1.5x)	3	1/8	1-1/2	52693-C3	32.30
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	45693-C3	32.30
.093 (3/32)		.0930	**.010**	.500 (5x)	3	1/8	2-1/2	53893-C3	42.30
.093 (3/32)		.0930	**.015**	.140 (1.5x)	3	1/8	1-1/2	792393-C3	32.30
.093 (3/32)		.0930	**.015**	.279 (3x)	3	1/8	1-1/2	903493-C3	32.30
.093 (3/32)		.0930	**.020**	.279 (3x)	3	1/8	1-1/2	931393-C3	32.30
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	927893-C3	37.90
	2.5 mm	.0984	**.20 mm**	3.70 mm (1.5x)	3	4 mm	50 mm	985651-C3	37.30
	2.5 mm	.0984	**.20 mm**	7.50 mm (3x)	3	4 mm	50 mm	976851-C3	37.30
.100		.1000	**.010**	.150 (1.5x)	3	1/8	1-1/2	52700-C3	33.10
.100		.1000	**.010**	.300 (3x)	3	1/8	1-1/2	45700-C3	33.10
.100		.1000	**.010**	.500 (5x)	3	1/8	2-1/2	53900-C3	42.70
.109 (7/64)		.1090	**.010**	.164 (1.5x)	3	1/8	1-1/2	52702-C3	32.40
.109 (7/64)		.1090	**.010**	.327 (3x)	3	1/8	1-1/2	45702-C3	33.10
	3.0 mm	.1181	**.20 mm**	4.50 mm (1.5x)	3	4 mm	50 mm	985657-C3	37.70
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	3	4 mm	50 mm	976857-C3	37.70

D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.005**	.187 (1.5x)	4	1/8	1-1/2	881908-C3	33.10
.125 (1/8)	.1250	**.005**	.375 (3x)	4	1/8	1-1/2	913908-C3	32.40
.125 (1/8)	.1250	**.010**	.375 (3x)	4	1/8	1-1/2	907308-C3	30.40
.125 (1/8)	.1250	**.015**	.187 (1.5x)	4	1/8	1-1/2	52708-C3	30.00
.125 (1/8)	.1250	**.015**	.375 (3x)	4	1/8	1-1/2	45708-C3	30.00
.125 (1/8)	.1250	**.015**	.625 (5x)	4	1/8	2-1/2	53908-C3	42.30
.125 (1/8)	.1250	**.020**	.187 (1.5x)	4	1/8	1-1/2	778708-C3	30.40
.125 (1/8)	.1250	**.020**	.375 (3x)	4	1/8	1-1/2	931408-C3	30.00
.125 (1/8)	.1250	**.020**	.625 (5x)	4	1/8	2-1/2	767308-C3	41.20
.125 (1/8)	.1250	**.030**	.375 (3x)	4	1/8	1-1/2	927908-C3	35.60
.140 (9/64)	.1406	**.015**	.220 (1.5x)	4	3/16	2	52709-C3	39.20
.140 (9/64)	.1406	**.015**	.425 (3x)	4	3/16	2	45709-C3	39.90

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.156 (5/32)	.1562	**.015**	.235 (1.5x)	4	3/16	2	52710-C3	35.20
.156 (5/32)	.1562	**.015**	.470 (3x)	4	3/16	2	45710-C3	35.90
.156 (5/32)	.1562	**.015**	.750 (5x)	4	3/16	3	53910-C3	46.60
.156 (5/32)	.1562	**.030**	.470 (3x)	4	3/16	2	927910-C3	41.60
.187 (3/16)	.1875	**.005**	.562 (3x)	4	3/16	2	913912-C3	35.80
.187 (3/16)	.1875	**.010**	.562 (3x)	4	3/16	2	907312-C3	35.80
.187 (3/16)	.1875	**.015**	.285 (1.5x)	4	3/16	2	52712-C3	33.00
.187 (3/16)	.1875	**.015**	.562 (3x)	4	3/16	2	45712-C3	33.00
.187 (3/16)	.1875	**.015**	1.000 (5x)	4	3/16	3	53912-C3	46.60
.187 (3/16)	.1875	**.020**	.562 (3x)	4	3/16	2	931412-C3	40.10
.187 (3/16)	.1875	**.030**	.562 (3x)	4	3/16	2	927912-C3	40.10
.187 (3/16)	.1875	**.060**	.562 (3x)	4	3/16	2	816812-C3	40.10
.250 (1/4)	.2500	**.015**	.375 (1.5x)	4	1/4	2-1/2	52716-C3	41.50
.250 (1/4)	.2500	**.015**	.750 (3x)	4	1/4	2-1/2	45716-C3	41.50
.250 (1/4)	.2500	**.015**	1.250 (5x)	4	1/4	4	53916-C3	57.90
.250 (1/4)	.2500	**.020**	.750 (3x)	4	1/4	2-1/2	931416-C3	41.50
.250 (1/4)	.2500	**.060**	.750 (3x)	4	1/4	2-1/2	816816-C3	41.50
.312 (5/16)	.3125	**.015**	.470 (1.5x)	4	5/16	2-1/2	52720-C3	62.20
.312 (5/16)	.3125	**.015**	1.000 (3x)	4	5/16	2-1/2	45720-C3	61.10
.375 (3/8)	.3750	**.015**	.570 (1.5x)	4	3/8	2-1/2	52724-C3	71.00
.375 (3/8)	.3750	**.015**	1.125 (3x)	4	3/8	2-1/2	45724-C3	71.00
.500 (1/2)	.5000	**.030**	.750 (1.5x)	4	1/2	3	52732-C3	91.80

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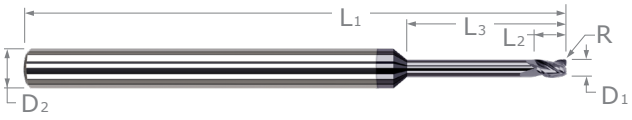
VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- Corner radius for improved strength • AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.003**	.022	.078 (5x)	3	1/8	2-1/2	62415-C3	64.70
.015 (1/64)		.0150	**.003**	.022	.125 (8x)	3	1/8	2-1/2	55015-C3	66.10
.015 (1/64)		.0150	**.003**	.022	.187 (12x)	3	1/8	2-1/2	63815-C3	72.30
	.4 mm	.0157	**.08 mm**	.60 mm	2.0 mm (5x)	3	4 mm	50 mm	986709-C3	72.70
	.4 mm	.0157	**.08 mm**	.60 mm	3.2 mm (8x)	3	4 mm	50 mm	978009-C3	74.20
	.4 mm	.0157	**.08 mm**	.60 mm	4.8 mm (12x)	3	4 mm	50 mm	982309-C3	80.50
	.5 mm	.0196	**.10 mm**	.75 mm	2.5 mm (5x)	3	4 mm	50 mm	986711-C3	69.90
	.5 mm	.0196	**.10 mm**	.75 mm	4.0 mm (8x)	3	4 mm	50 mm	978011-C3	71.10
	.5 mm	.0196	**.10 mm**	.75 mm	6.0 mm (12x)	3	4 mm	50 mm	982311-C3	77.90
	.5 mm	.0196	**.10 mm**	.75 mm	8.0 mm (16x)	3	4 mm	50 mm	975511-C3	81.40
.020		.0200	**.004**	.030	.100 (5x)	3	1/8	2-1/2	62420-C3	61.70
.020		.0200	**.004**	.030	.160 (8x)	3	1/8	2-1/2	55020-C3	63.00
.020		.0200	**.004**	.030	.250 (12x)	3	1/8	2-1/2	63820-C3	69.80
	.6 mm	.0236	**.10 mm**	.90 mm	3.0 mm (5x)	3	4 mm	50 mm	986713-C3	68.30
	.6 mm	.0236	**.10 mm**	.90 mm	4.8 mm (8x)	3	4 mm	50 mm	978013-C3	69.90
	.6 mm	.0236	**.10 mm**	.90 mm	7.2 mm (12x)	3	4 mm	50 mm	982313-C3	74.50
.025		.0250	**.004**	.038	.125 (5x)	3	1/8	2-1/2	62425-C3	59.40
.025		.0250	**.004**	.038	.203 (8x)	3	1/8	2-1/2	55025-C3	61.10
.025		.0250	**.004**	.038	.312 (12x)	3	1/8	2-1/2	63825-C3	67.90
.031 (1/32)		.0310	**.005**	.047	.156 (5x)	3	1/8	2-1/2	62431-C3	56.30
.031 (1/32)		.0310	**.005**	.047	.250 (8x)	3	1/8	2-1/2	55031-C3	57.50
.031 (1/32)		.0310	**.005**	.047	.375 (12x)	3	1/8	2-1/2	63831-C3	60.10
	.8 mm	.0314	**.10 mm**	1.20 mm	4.0 mm (5x)	3	4 mm	50 mm	986718-C3	63.00
	.8 mm	.0314	**.10 mm**	1.20 mm	6.5 mm (8x)	3	4 mm	50 mm	978018-C3	64.30
	.8 mm	.0314	**.10 mm**	1.20 mm	9.5 mm (12x)	3	4 mm	50 mm	982318-C3	66.60
.035		.0350	**.005**	.053	.187 (5x)	3	1/8	2-1/2	62435-C3	57.20
	1.0 mm	.0393	**.10 mm**	1.50 mm	5.0 mm (5x)	3	4 mm	50 mm	986722-C3	63.00
	1.0 mm	.0393	**.10 mm**	1.50 mm	8.0 mm (8x)	3	4 mm	50 mm	978022-C3	63.60
	1.0 mm	.0393	**.10 mm**	1.50 mm	12.0 mm (12x)	3	4 mm	50 mm	982322-C3	66.60
	1.0 mm	.0393	**.10 mm**	1.50 mm	16.0 mm (16x)	3	4 mm	50 mm	975522-C3	70.50
.040		.0400	**.005**	.060	.203 (5x)	3	1/8	2-1/2	62440-C3	56.70
.045		.0450	**.005**	.068	.225 (5x)	3	1/8	2-1/2	62445-C3	57.20
.047 (3/64)		.0470	**.005**	.070	.250 (5x)	3	1/8	2-1/2	62447-C3	56.70
.047 (3/64)		.0470	**.005**	.070	.375 (8x)	3	1/8	2-1/2	55047-C3	57.50
.047 (3/64)		.0470	**.005**	.070	.570 (12x)	3	1/8	2-1/2	63847-C3	60.60

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius – Long Reach, Stub Flute (cont.)

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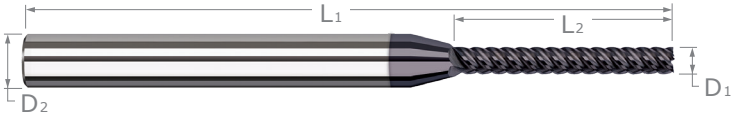
CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.050		.0500	**.005**	.075	.250 (5x)	3	1/8	2-1/2	62450-C3	56.00
.055		.0550	**.005**	.083	.275 (5x)	3	1/8	2-1/2	62455-C3	56.60
	1.5 mm	.0590	**.20 mm**	2.20 mm	7.5 mm (5x)	3	4 mm	50 mm	986733-C3	63.00
	1.5 mm	.0590	**.20 mm**	2.20 mm	12.0 mm (8x)	3	4 mm	50 mm	978033-C3	64.30
	1.5 mm	.0590	**.20 mm**	2.20 mm	18.0 mm (12x)	3	4 mm	50 mm	982333-C3	66.60
	1.5 mm	.0590	**.20 mm**	2.20 mm	24.0 mm (16x)	3	4 mm	63 mm	975533-C3	70.50
.060		.0600	**.010**	.090	.312 (5x)	3	1/8	2-1/2	62460-C3	57.20
.062 (1/16)		.0620	**.005**	.093	.312 (5x)	3	1/8	2-1/2	815662-C3	59.30
.062 (1/16)		.0620	**.005**	.093	.500 (8x)	3	1/8	2-1/2	816562-C3	60.60
.062 (1/16)		.0620	**.010**	.093	.312 (5x)	3	1/8	2-1/2	62462-C3	56.30
.062 (1/16)		.0620	**.010**	.093	.500 (8x)	3	1/8	2-1/2	55062-C3	57.50
.062 (1/16)		.0620	**.010**	.093	.750 (12x)	3	1/8	2-1/2	63862-C3	60.10
.078 (5/64)		.0780	**.010**	.117	.406 (5x)	3	1/8	2-1/2	62478-C3	56.30
.078 (5/64)		.0780	**.010**	.117	.625 (8x)	3	1/8	2-1/2	55078-C3	57.50
.078 (5/64)		.0780	**.010**	.117	.940 (12x)	3	1/8	2-1/2	63878-C3	60.60
	2.0 mm	.0787	**.20 mm**	3.00 mm	10.0 mm (5x)	3	4 mm	50 mm	986745-C3	63.00
	2.0 mm	.0787	**.20 mm**	3.00 mm	16.0 mm (8x)	3	4 mm	50 mm	978045-C3	64.30
	2.0 mm	.0787	**.20 mm**	3.00 mm	24.0 mm (12x)	3	4 mm	63 mm	982345-C3	66.60
	2.0 mm	.0787	**.20 mm**	3.00 mm	32.0 mm (16x)	3	4 mm	63 mm	975545-C3	70.50
.093 (3/32)		.0930	**.005**	.139	.500 (5x)	3	1/8	2-1/2	815693-C3	59.30
.093 (3/32)		.0930	**.005**	.139	.750 (8x)	3	1/8	2-1/2	816593-C3	60.60
.093 (3/32)		.0930	**.010**	.139	.500 (5x)	3	1/8	2-1/2	62493-C3	56.30
.093 (3/32)		.0930	**.010**	.139	.750 (8x)	3	1/8	2-1/2	55093-C3	57.50
.093 (3/32)		.0930	**.010**	.139	1.125 (12x)	3	1/8	2-1/2	63893-C3	60.60
.100		.1000	**.010**	.150	.500 (5x)	3	1/8	2-1/2	62500-C3	59.00
	3.0 mm	.1181	**.20 mm**	4.50 mm	15.0 mm (5x)	3	4 mm	50 mm	986757-C3	59.20
D_1 +.000″ −.002″		decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)		.1250	**.010**	.187	.625 (5x)	4	1/8	2-1/2	815708-C3	56.30
.125 (1/8)		.1250	**.010**	.187	1.000 (8x)	4	1/8	2-1/2	816608-C3	57.40
.125 (1/8)		.1250	**.015**	.187	.625 (5x)	4	1/8	2-1/2	62508-C3	56.30
.125 (1/8)		.1250	**.015**	.187	1.000 (8x)	4	1/8	2-1/2	55108-C3	56.40
.125 (1/8)		.1250	**.015**	.187	1.500 (12x)	4	1/8	3	63908-C3	60.10
.156 (5/32)		.1562	**.015**	.235	.750 (5x)	4	3/16	3	62510-C3	60.90
.156 (5/32)		.1562	**.015**	.235	1.250 (8x)	4	3/16	3	55110-C3	62.30
.156 (5/32)		.1562	**.015**	.235	1.875 (12x)	4	3/16	4	63910-C3	78.10
.156 (5/32)		.1562	**.030**	.235	1.250 (8x)	4	3/16	3	817310-C3	68.00
.187 (3/16)		.1875	**.015**	.281	1.000 (5x)	4	3 /16	3	62512-C3	60.90
.187 (3/16)		.1875	**.015**	.281	1.500 (8x)	4	3/16	3	55112-C3	62.30
.187 (3/16)		.1875	**.015**	.281	2.250 (12x)	4	3/16	4	63912-C3	78.10
.187 (3/16)		.1875	**.030**	.281	1.500 (8x)	4	3/16	3	817312-C3	69.40
.250 (1/4)		.2500	**.015**	.375	1.250 (5x)	4	1/4	4	62516-C3	69.20
.250 (1/4)		.2500	**.015**	.375	2.000 (8x)	4	1/4	4	55116-C3	69.20
.250 (1/4)		.2500	**.015**	.375	3.000 (12x)	4	1/4	6	63916-C3	86.30

Please See Speeds & Feeds On Page 179

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square



Down to .2 mm!

- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Multi-flute, high helix (approx. 44°), coated design improves finishing in carbon steels, 300 and 400 stainless steels, and machinable tool steels • Can be used in light duty roughing and profiling applications
- AlTiN Nano coating offers superior hardness and heat resistance • h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
	.2 mm	.0078	**.60 mm** (3x)	4	4 mm	50 mm	977704-C6	60.10
	.2 mm	.0078	**1.00 mm** (5x)	4	4 mm	50 mm	980104-C6	69.50
	.2 mm	.0078	**1.60 mm** (8x)	4	4 mm	50 mm	981704-C6	71.20
.010		.0100	**.050** (5x)	4	1/8	2-1/2	53310-C6	60.50
	.3 mm	.0118	**.90 mm** (3x)	4	4 mm	50 mm	977706-C6	55.50
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	24315-C6	48.50
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	53315-C6	60.50
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	62815-C6	61.70
	.4 mm	.0157	**1.20 mm** (3x)	4	4 mm	50 mm	977709-C6	52.80
	.4 mm	.0157	**2.00 mm** (5x)	4	4 mm	50 mm	980109-C6	61.70
	.4 mm	.0157	**3.20 mm** (8x)	4	4 mm	50 mm	981709-C6	63.90
	.5 mm	.0196	**1.50 mm** (3x)	4	4 mm	50 mm	977711-C6	52.10
	.5 mm	.0196	**2.50 mm** (5x)	4	4 mm	50 mm	980111-C6	60.10
	.5 mm	.0196	**4.00 mm** (8x)	4	4 mm	50 mm	981711-C6	62.80
.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	935920-C6	47.90
.020		.0200	**.060** (3x)	4	1/8	1-1/2	24320-C6	47.40
.020		.0200	**.080** (4x)	4	1/8	1-1/2	835320-C6	50.00
.020		.0200	**.100** (5x)	4	1/8	2-1/2	53320-C6	59.40
.020		.0200	**.160** (8x)	4	1/8	2-1/2	62820-C6	61.20
	.6 mm	.0236	**1.80 mm** (3x)	4	4 mm	50 mm	977713-C6	52.10
	.6 mm	.0236	**3.00 mm** (5x)	4	4 mm	50 mm	980113-C6	60.60
	.6 mm	.0236	**4.80 mm** (8x)	4	4 mm	50 mm	981713-C6	62.80
.025		.0250	**.038** (1.5x)	4	1/8	1-1/2	935925-C6	44.60
.025		.0250	**.075** (3x)	4	1/8	1-1/2	24325-C6	44.60
.025		.0250	**.125** (5x)	4	1/8	2-1/2	53325-C6	57.50
.025		.0250	**.203** (8x)	4	1/8	2-1/2	62825-C6	58.80
	.7 mm	.0275	**2.10 mm** (3x)	4	4 mm	50 mm	977715-C6	52.10
.030		.0300	**.156** (5x)	5	1/8	2-1/2	53330-C6	55.80
.031 (1/32)		.0310	**.047** (1.5x)	5	1/8	1-1/2	935931-C6	39.10
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	24331-C6	39.10
.031 (1/32)		.0310	**.125** (4x)	5	1/8	2-1/2	835331-C6	55.30
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	53331-C6	55.30
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	62831-C6	56.90
.031 (1/32)		.0310	**.312** (10x)	5	1/8	2-1/2	882431-C6	65.10
.031 (1/32)		.0310	**.375** (12x)	5	1/8	2-1/2	68531-C6	69.50
	.8 mm	.0314	**2.40 mm** (3x)	5	4 mm	50 mm	977718-C6	45.40
	.8 mm	.0314	**4.00 mm** (5x)	5	4 mm	50 mm	980118-C6	57.20
	.8 mm	.0314	**6.50 mm** (8x)	5	4 mm	50 mm	981718-C6	58.90
	.9 mm	.0354	**2.70 mm** (3x)	5	4 mm	50 mm	977720-C6	45.40

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1			L_2		D_2 (h6)	L_1	TOOL #	PRICE
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm					
	1.0 mm	.0393	**1.50 mm** (1.5x)	5	4 mm	50 mm	778522-C6	45.80
	1.0 mm	.0393	**3.00 mm** (3x)	5	4 mm	50 mm	977722-C6	45.80
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	980122-C6	56.70
	1.0 mm	.0393	**8.00 mm** (8x)	5	4 mm	50 mm	981722-C6	58.90
.040		.0400	**.060** (1.5x)	5	1/8	1-1/2	935940-C6	39.60
.040		.0400	**.120** (3x)	5	1/8	1-1/2	24340-C6	39.60
.040		.0400	**.160** (4x)	5	1/8	2-1/2	835340-C6	55.30
.040		.0400	**.203** (5x)	5	1/8	2-1/2	53340-C6	55.30
.040		.0400	**.325** (8x)	5	1/8	2-1/2	62840-C6	56.30
	1.1 mm	.0433	**3.00 mm** (3x)	5	4 mm	50 mm	977724-C6	45.80
.047 (3/64)		.0470	**.071** (1.5x)	5	1/8	1-1/2	935947-C6	39.10
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	24347-C6	39.10
.047 (3/64)		.0470	**.187** (4x)	5	1/8	2-1/2	835347-C6	50.70
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	53347-C6	55.30
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	62847-C6	56.30
.047 (3/64)		.0470	**.480** (10x)	5	1/8	2-1/2	882447-C6	65.10
.047 (3/64)		.0470	**.570** (12x)	5	1/8	2-1/2	68547-C6	70.10
	1.2 mm	.0472	**3.50 mm** (3x)	5	4 mm	50 mm	977727-C6	45.40
	1.2 mm	.0472	**6.00 mm** (5x)	5	4 mm	50 mm	980127-C6	57.20
	1.2 mm	.0472	**9.50 mm** (8x)	5	4 mm	50 mm	981727-C6	58.90
.050		.0500	**.075** (1.5x)	5	1/8	1-1/2	935950-C6	40.00
.050		.0500	**.150** (3x)	5	1/8	1-1/2	24350-C6	39.60
.050		.0500	**.250** (5x)	5	1/8	2-1/2	53350-C6	55.30
.050		.0500	**.400** (8x)	5	1/8	2-1/2	62850-C6	56.30
	1.3 mm	.0511	**4.00 mm** (3x)	5	4 mm	50 mm	977729-C6	45.80
	1.4 mm	.0551	**4.00 mm** (3x)	5	4 mm	50 mm	977731-C6	45.80
	1.4 mm	.0551	**7.00 mm** (5x)	5	4 mm	50 mm	980131-C6	57.20
	1.4 mm	.0551	**11.00 mm** (8x)	5	4 mm	50 mm	981731-C6	58.90
	1.5 mm	.0590	**4.50 mm** (3x)	5	4 mm	50 mm	977733-C6	43.80
	1.5 mm	.0590	**7.50 mm** (5x)	5	4 mm	50 mm	980133-C6	55.50
	1.5 mm	.0590	**12.00 mm** (8x)	5	4 mm	50 mm	981733-C6	57.00
.060		.0600	**.090** (1.5x)	5	1/8	1-1/2	935960-C6	40.00
.060		.0600	**.180** (3x)	5	1/8	1-1/2	24360-C6	39.60
.060		.0600	**.312** (5x)	5	1/8	2-1/2	53360-C6	55.30
.060		.0600	**.500** (8x)	5	1/8	2-1/2	62860-C6	56.30
.062 (1/16)		.0620	**.093** (1.5x)	5	1/8	1-1/2	935962-C6	36.80
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	24362-C6	36.80
.062 (1/16)		.0620	**.250** (4x)	5	1/8	2-1/2	835362-C6	51.60
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	53362-C6	52.10
.062 (1/16)		.0620	**.375** (6x)	5	1/8	2-1/2	778362-C6	52.10
.062 (1/16)		.0620	**.437** (7x)	5	1/8	2-1/2	726262-C6	52.80
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	62862-C6	52.80
.062 (1/16)		.0620	**.625** (10x)	5	1/8	2-1/2	882462-C6	65.80
.062 (1/16)		.0620	**.750** (12x)	5	1/8	2-1/2	68562-C6	74.20
.062 (1/16)		.0620	**.950** (15x)	5	1/8	2-1/2	68962-C6	93.50
	1.6 mm	.0629	**5.00 mm** (3x)	5	4 mm	50 mm	977736-C6	43.80
	1.6 mm	.0629	**8.00 mm** (5x)	5	4 mm	50 mm	980136-C6	55.30
	1.6 mm	.0629	**13.00 mm** (8x)	5	4 mm	50 mm	981736-C6	56.90
	1.7 mm	.0669	**5.00 mm** (3x)	5	4 mm	50 mm	977738-C6	43.80

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1			L_2		D_2 (h6)	L_1		
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm				TOOL #	PRICE
.070		.0700	**.210** (3x)	5	1/8	1-1/2	24370-C6	37.30
.070		.0700	**.375** (5x)	5	1/8	2-1/2	53370-C6	52.10
.070		.0700	**.570** (8x)	5	1/8	2-1/2	62870-C6	53.40
	1.8 mm	.0708	**5.50 mm** (3x)	5	4 mm	50 mm	977740-C6	44.30
	1.8 mm	.0708	**9.00 mm** (5x)	5	4 mm	50 mm	980140-C6	55.50
	1.8 mm	.0708	**14.00 mm** (8x)	5	4 mm	50 mm	981740-C6	57.50
	1.9 mm	.0748	**5.50 mm** (3x)	5	4 mm	50 mm	977742-C6	44.30
.078 (5/64)		.0780	**.117** (1.5x)	5	1/8	1-1/2	935978-C6	36.80
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	24378-C6	36.80
.078 (5/64)		.0780	**.312** (4x)	5	1/8	2-1/2	835378-C6	47.50
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	53378-C6	52.10
.078 (5/64)		.0780	**.475** (6x)	5	1/8	2-1/2	778378-C6	52.10
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	62878-C6	52.80
.078 (5/64)		.0780	**.800** (10x)	5	1/8	2-1/2	882478-C6	66.40
.078 (5/64)		.0780	**.940** (12x)	5	1/8	2-1/2	68578-C6	74.20
.078 (5/64)		.0780	**1.187** (15x)	5	1/8	2-1/2	68978-C6	94.40
	2.0 mm	.0787	**6.00 mm** (3x)	5	4 mm	50 mm	977745-C6	43.80
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	980145-C6	55.00
	2.0 mm	.0787	**16.00 mm** (8x)	5	4 mm	50 mm	981745-C6	57.50
.080		.0800	**.120** (1.5x)	5	1/8	1-1/2	935980-C6	37.70
.080		.0800	**.240** (3x)	5	1/8	1-1/2	24380-C6	37.30
.080		.0800	**.406** (5x)	5	1/8	2-1/2	53380-C6	52.10
.080		.0800	**.650** (8x)	5	1/8	2-1/2	62880-C6	53.40
.090		.0900	**.270** (3x)	5	1/8	1-1/2	24390-C6	37.30
.090		.0900	**.450** (5x)	5	1/8	2-1/2	53390-C6	52.10
.090		.0900	**.750** (8x)	5	1/8	2-1/2	62890-C6	53.40
.093 (3/32)		.0930	**.140** (1.5x)	5	1/8	1-1/2	935993-C6	36.80
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	24393-C6	36.80
.093 (3/32)		.0930	**.375** (4x)	5	1/8	2-1/2	835393-C6	51.60
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	53393-C6	52.10
.093 (3/32)		.0930	**.585** (6x)	5	1/8	2-1/2	778393-C6	52.10
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	62893-C6	52.80
.093 (3/32)		.0930	**.950** (10x)	5	1/8	2-1/2	882493-C6	65.80
.093 (3/32)		.0930	**1.125** (12x)	5	1/8	2-1/2	68593-C6	74.90
.093 (3/32)		.0930	**1.400** (15x)	5	1/8	3	68993-C6	95.10
	2.5 mm	.0984	**7.50 mm** (3x)	5	4 mm	50 mm	977751-C6	43.80
	2.5 mm	.0984	**12.00 mm** (5x)	5	4 mm	50 mm	980151-C6	55.10
.100		.1000	**.150** (1.5x)	5	1/8	1-1/2	936000-C6	37.70
.100		.1000	**.300** (3x)	5	1/8	1-1/2	24399-C6	37.30
.100		.1000	**.500** (5x)	5	1/8	2-1/2	53399-C6	52.10
.100		.1000	**.800** (8x)	5	1/8	2-1/2	53400-C6	53.40
.109 (7/64)		.1090	**.327** (3x)	5	1/8	1-1/2	24402-C6	37.50
.109 (7/64)		.1090	**.570** (5x)	5	1/8	2-1/2	63502-C6	52.10
	3.0 mm	.1181	**9.00 mm** (3x)	5	4 mm	50 mm	977757-C6	43.80
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	980157-C6	54.50
	3.0 mm	.1181	**24.00 mm** (8x)	5	4 mm	50 mm	981757-C6	57.20

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

continued from previous page

CUTTER DIAMETER		LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	936008-C6	32.30
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	795408-C6	32.70
.125 (1/8)	.1250	**.500** (4x)	5	1/8	1-1/2	24408-C6	32.30
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	776908-C6	50.20
.125 (1/8)	.1250	**.750** (6x)	5	1/8	2-1/2	63508-C6	50.20
.125 (1/8)	.1250	**.875** (7x)	5	1/8	2-1/2	726308-C6	52.10
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	53408-C6	52.10
.125 (1/8)	.1250	**1.125** (10x)	5	1/8	2-1/2	882508-C6	64.70
.125 (1/8)	.1250	**1.500** (12x)	5	1/8	3	68608-C6	73.80
.125 (1/8)	.1250	**1.875** (15x)	5	1/8	3	69008-C6	93.10
.140 (9/64)	.1406	**.500** (3x)	5	3/16	2	24409-C6	49.20
.140 (9/64)	.1406	**.750** (5x)	5	3/16	3	63509-C6	51.40
.156 (5/32)	.1562	**.235** (1.5x)	5	3/16	2	936010-C6	40.80
.156 (5/32)	.1562	**.562** (3x)	5	3/16	2	24410-C6	40.40
.156 (5/32)	.1562	**.625** (4x)	5	3/16	3	835410-C6	54.20
.156 (5/32)	.1562	**.875** (5x)	5	3/16	3	63510-C6	54.80
.156 (5/32)	.1562	**1.250** (8x)	5	3/16	3	53410-C6	55.60
.187 (3/16)	.1875	**.285** (1.5x)	5	3/16	2	936012-C6	37.20
.187 (3/16)	.1875	**.625** (3x)	5	3/16	2	24412-C6	37.20
.187 (3/16)	.1875	**.750** (4x)	5	3/16	3	835412-C6	48.90
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	63512-C6	54.80
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	53412-C6	55.60
.250 (1/4)	.2500	**.375** (1.5x)	5	1/4	2-1/2	936016-C6	47.30
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	24416-C6	47.30
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	63516-C6	66.80
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	53416-C6	68.10
.375 (3/8)	.3750	**1.125** (3x)	5	3/8	2-1/2	24424-C6	75.30
.500 (1/2)	.5000	**.750** (1.5x)	5	1/2	3	936032-C6	102.70
.500 (1/2)	.5000	**1.500** (3x)	5	1/2	3	24432-C6	98.00
.500 (1/2)	.5000	**2.625** (5x)	5	1/2	4	63532-C6	110.60

Please See Speeds & Feeds On Page 193

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers

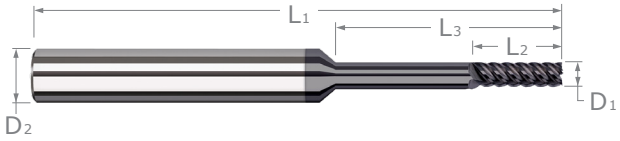
SPEEDS & FEEDS (High-Helix Finishers for Medium Alloy Steels)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250 250 - 275	600 550	Finishing (1.5x LOC)	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00018	.00037	.00056	.00074	.00094	.00112	.00150	.00224	.00300	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00016	.00032	.00049	.00065	.00081	.00097	.00131	.00195	.00261	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00014	.00028	.00042	.00056	.00070	.00084	.00113	.00168	.00225	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00011	.00023	.00035	.00047	.00059	.00070	.00094	.00140	.00188	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00010	.00020	.00031	.00041	.00051	.00061	.00083	.00123	.00165	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00019	.00029	.00039	.00049	.00058	.00078	.00117	.00156	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00019	.00028	.00037	.00047	.00056	.00075	.00112	.00150	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00033	.00042	.00050	.00068	.00101	.00135	< .02x Dia	.5x - 15x Dia
	275 - 300	500	Finishing (1.5x LOC)	.00018	.00038	.00057	.00075	.00094	.00113	.00151	.00226	.00303	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00017	.00034	.00052	.00068	.00086	.00102	.00138	.00206	.00275	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00014	.00030	.00045	.00059	.00075	.00089	.00120	.00179	.00239	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00012	.00026	.00039	.00051	.00064	.00077	.00103	.00154	.00206	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00129	.00172	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00009	.00019	.00028	.00038	.00047	.00056	.00076	.00113	.00151	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00018	.00027	.00035	.00045	.00053	.00072	.00107	.00143	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00031	.00039	.00046	.00062	.00093	.00124	< .02x Dia	.5x - 15x Dia
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502 **Tool Steels:** A, L, O, P, W series	225 - 250 250 - 275	500 500	Finishing (1.5x LOC)	.00017	.00034	.00052	.00068	.00086	.00102	.00138	.00206	.00275	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00015	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00013	.00027	.00041	.00054	.00068	.00081	.00109	.00163	.00218	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00011	.00023	.00035	.00047	.00059	.00070	.00094	.00140	.00188	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00009	.00019	.00029	.00039	.00049	.00058	.00078	.00117	.00156	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00016	.00024	.00032	.00041	.00048	.00065	.00097	.00130	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00014	.00021	.00028	.00035	.00042	.00056	.00084	.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00028	.00035	.00042	.00056	.00084	.00113	< .02x Dia	.5x - 15x Dia
	275 - 300 300 - 350	500 500	Finishing (1.5x LOC)	.00015	.00031	.00047	.00061	.00077	.00092	.00124	.00185	.00248	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00014	.00028	.00042	.00056	.00070	.00084	.00113	.00168	.00225	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00012	.00024	.00037	.00049	.00061	.00073	.00098	.00146	.00196	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00010	.00021	.00032	.00042	.00053	.00063	.00084	.00126	.00169	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00008	.00017	.00026	.00035	.00044	.00052	.00070	.00105	.00141	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00007	.00015	.00023	.00031	.00039	.00046	.00062	.00093	.00124	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00117	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00014	.00021	.00028	.00035	.00042	.00056	.00084	.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00025	.00032	.00038	.00051	.00076	.00101	< .02x Dia	.5x - 15x Dia

NEW!

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square – Long Reach

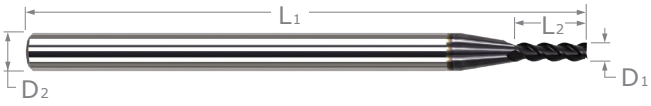


- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Multi-flute, high helix (approx. 44°), coated design improves finishing in carbon steels, 300 and 400 stainless steels, and machinable tool steels
- AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE	
.031 (1/32)	.093	**.156** (5x)	1/8	2-1/2	718231-C6	59.40	NEW
.047 (3/64)	.141	**.250** (5x)	1/8	2-1/2	718247-C6	59.40	NEW
.062 (1/16)	.186	**.312** (5x)	1/8	2-1/2	718262-C6	56.70	NEW
.078 (5/64)	.234	**.406** (5x)	1/8	2-1/2	718278-C6	56.70	NEW
.093 (3/32)	.279	**.500** (5x)	1/8	2-1/2	718293-C6	56.70	NEW
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	5 FL	PRICE	
.125 (1/8)	.375	**.625** (5x)	1/8	2-1/2	718308-C6	54.90	NEW
.187 (3/16)	.570	**1.000** (5x)	3/16	3	718312-C6	58.10	NEW
.250 (1/4)	.750	**1.250** (5x)	1/4	4	718316-C6	70.10	NEW

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

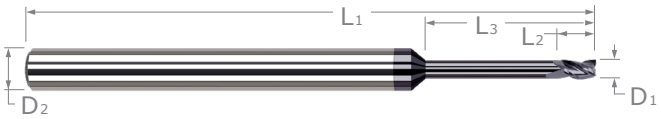
CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	939815-C3	48.10
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	945715-C3	47.20
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	952411-C3	46.80
.020		.0200	**.060** (3x)	3	1/8	1-1/2	945720-C3	43.40
.025		.0250	**.075** (3x)	3	1/8	1-1/2	945725-C3	41.80
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	939831-C3	34.10
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	945731-C3	34.10
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	900531-C3	43.90
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	926022-C3	38.70
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	952422-C3	39.10
.040		.0400	**.120** (3x)	3	1/8	1-1/2	945740-C3	35.20
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	939847-C3	34.80
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	945747-C3	34.10
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	952433-C3	36.90
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	939862-C3	31.90
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	945762-C3	31.90
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	900562-C3	41.90
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	939878-C3	31.90
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	945778-C3	31.90
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	952445-C3	36.90
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	939893-C3	31.90
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	945793-C3	31.90
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	900593-C3	41.90
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	926057-C3	36.60
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	952457-C3	36.60

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	4	1/8	1-1/2	939908-C3	29.60
.125 (1/8)	.1250	**.375** (3x)	4	1/8	1-1/2	945808-C3	29.60
.125 (1/8)	.1250	**.625** (5x)	4	1/8	2-1/2	900608-C3	41.70
.156 (5/32)	.1562	**.235** (1.5x)	4	3/16	2	939910-C3	34.20
.156 (5/32)	.1562	**.470** (3x)	4	3/16	2	945810-C3	34.20
.187 (3/16)	.1875	**.285** (1.5x)	4	3/16	2	939912-C3	31.90
.187 (3/16)	.1875	**.562** (3x)	4	3/16	2	945812-C3	32.20
.250 (1/4)	.2500	**.375** (1.5x)	4	1/4	2-1/2	939916-C3	40.90
.250 (1/4)	.2500	**.750** (3x)	4	1/4	2-1/2	945816-C3	40.90

Please See Speeds & Feeds On Page 198

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square – Long Reach, Stub Flute



- Optimized for free machining varieties of carbon steels and stainless steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)	.023	**.078** (5x)	3	1/8	2-1/2	915015-C3	62.50
.015 (1/64)	.023	**.125** (8x)	3	1/8	2-1/2	920215-C3	63.80
.020	.030	**.100** (5x)	3	1/8	2-1/2	915020-C3	59.00
.020	.030	**.160** (8x)	3	1/8	2-1/2	920220-C3	61.70
.025	.038	**.125** (5x)	3	1/8	2-1/2	915025-C3	58.60
.025	.038	**.203** (8x)	3	1/8	2-1/2	920225-C3	58.80
.031 (1/32)	.047	**.093** (3x)	3	1/8	1-1/2	927331-C3	53.80
.031 (1/32)	.047	**.156** (5x)	3	1/8	2-1/2	915031-C3	55.20
.031 (1/32)	.047	**.250** (8x)	3	1/8	2-1/2	920231-C3	56.60
.031 (1/32)	.047	**.312** (10x)	3	1/8	2-1/2	909531-C3	58.60
.047 (3/64)	.071	**.250** (5x)	3	1/8	2-1/2	915047-C3	55.20
.047 (3/64)	.071	**.375** (8x)	3	1/8	2-1/2	920247-C3	55.50
.062 (1/16)	.093	**.186** (3x)	3	1/8	1-1/2	927362-C3	54.80
.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	915062-C3	54.20
.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	920262-C3	55.20
.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	909562-C3	58.60
.078 (5/64)	.118	**.406** (5x)	3	1/8	2-1/2	915078-C3	54.20
.078 (5/64)	.118	**.625** (8x)	3	1/8	2-1/2	920278-C3	55.20
.093 (3/32)	.140	**.279** (3x)	3	1/8	1-1/2	927393-C3	53.80
.093 (3/32)	.140	**.500** (5x)	3	1/8	2-1/2	915093-C3	54.20
.093 (3/32)	.140	**.750** (8x)	3	1/8	2-1/2	920293-C3	55.20
.093 (3/32)	.140	**.950** (10x)	3	1/8	2-1/2	909593-C3	58.60

continued on next page

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.187	**.375** (3x)	4	1/8	1-1/2	927408-C3	54.80
.125 (1/8)	.187	**.625** (5x)	4	1/8	2-1/2	915108-C3	55.20
.125 (1/8)	.187	**1.000** (8x)	4	1/8	2-1/2	920308-C3	56.30
.125 (1/8)	.187	**1.250** (10x)	4	1/8	2-1/2	909608-C3	57.60
.156 (5/32)	.235	**.750** (5x)	4	3/16	3	915110-C3	58.60
.187 (3/16)	.285	**1.000** (5x)	4	3/16	3	915112-C3	58.60
.250 (1/4)	.375	**1.250** (5x)	4	1/4	4	915116-C3	65.90

Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For Free Machining Steels)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx **Stainless Steels**: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X,, 420 F, 420 F Se	100-125	500
	125-150	425
	150-175	400
	175-200	375
	200-225	350

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00010	.00021	.00031	.00041	.00052	.00062	.00079	.00118	.00158	.00207	.00249	.00332
Roughing	.00012	.00025	.00038	.00050	.00063	.00075	.00096	.00144	.00192	.00252	.00302	.00403
Finishing	.00014	.00030	.00045	.00060	.00075	.00090	.00115	.00172	.00230	.00301	.00362	.00483
Max	.00019	.00039	.00058	.00077	.00097	.00116	.00148	.00221	.00296	.00388	.00466	.00622

Radial Depth of Cut*:

Slotting: 1x Dia

Roughing: .35x Dia

Finishing: .1x Dia

Axial Depth of Cut*:

Slotting: .35x Dia

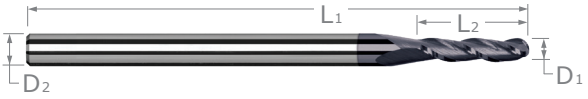
Roughing: .5x - 1x Dia

Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Ball



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)	**.045** (3x)	3	1/8	1-1/2	950015-C3	57.20
.031 (1/32)	**.047** (1.5x)	3	1/8	1-1/2	911531-C3	42.30
.031 (1/32)	**.093** (3x)	3	1/8	1-1/2	950031-C3	43.10
.047 (3/64)	**.141** (3x)	3	1/8	1-1/2	950047-C3	43.10
.062 (1/16)	**.093** (1.5x)	3	1/8	1-1/2	911562-C3	42.30
.062 (1/16)	**.186** (3x)	3	1/8	1-1/2	950062-C3	41.10
.078 (5/64)	**.234** (3x)	3	1/8	1-1/2	950078-C3	39.90
.093 (3/32)	**.140** (1.5x)	3	1/8	1-1/2	911593-C3	40.70
.093 (3/32)	**.279** (3x)	3	1/8	1-1/2	950093-C3	39.90
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	**.187** (1.5x)	4	1/8	1-1/2	911608-C3	36.90
.125 (1/8)	**.375** (3x)	4	1/8	1-1/2	950108-C3	36.90
.156 (5/32)	**.470** (3x)	4	3/16	2	950110-C3	43.40
.187 (3/16)	**.562** (3x)	4	3/16	2	950112-C3	39.80
.250 (1/4)	**.750** (3x)	4	1/4	2-1/2	950116-C3	48.60

Speeds & Feeds (Variable Helix For Free Machining Steels)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx	100-125	500
	125-150	425
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se	150-175	400
	175-200	375
	200-225	350

	Chip Load Per Tooth (IPT) By Cutter Diameter											
	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00013	.00026	.00040	.00053	.00067	.00079	.00099	.00148	.00198	.00259	.00311	.00415
Roughing	.00016	.00032	.00049	.00064	.00081	.00096	.00120	.00180	.00240	.00314	.00378	.00504
Finishing	.00019	.00039	.00058	.00077	.00097	.00116	.00144	.00215	.00288	.00377	.00453	.00604
Max	.00024	.00050	.00075	.00099	.00125	.00149	.00185	.00277	.00370	.00485	.00583	.00777

Radial Depth of Cut*:

Slotting: 1x Dia

Roughing: .5x Dia

Finishing: .1x Dia

Axial Depth of Cut*:

Slotting: .5x Dia

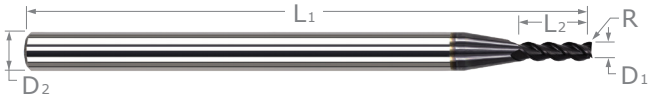
Roughing: .5x - 1x Dia

Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Corner Radius



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.25mm −.25mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.002**	.023 (1.5x)	3	1/8	1-1/2	969415-C3	49.70
.015 (1/64)		.0150	**.002**	.045 (3x)	3	1/8	1-1/2	971215-C3	49.70
.015 (1/64)		.0150	**.002**	.078 (5x)	3	1/8	2-1/2	980315-C3	60.30
.015 (1/64)		.0150	**.005**	.045 (3x)	3	1/8	1-1/2	859815-C3	49.70
.020		.0200	**.002**	.060 (3x)	3	1/8	1-1/2	971220-C3	43.90
.020		.0200	**.005**	.060 (3x)	3	1/8	1-1/2	859820-C3	43.40
.025		.0250	**.002**	.075 (3x)	3	1/8	1-1/2	971225-C3	42.40
.025		.0250	**.005**	.075 (3x)	3	1/8	1-1/2	859825-C3	42.40
.031 (1/32)		.0310	**.003**	.047 (1.5x)	3	1/8	1-1/2	969431-C3	35.00
.031 (1/32)		.0310	**.003**	.093 (3x)	3	1/8	1-1/2	971231-C3	35.00
.031 (1/32)		.0310	**.003**	.156 (5x)	3	1/8	2-1/2	980331-C3	43.90
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	859831-C3	35.60
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	856631-C3	38.10
	1.0 mm	.0393	**.08 mm**	3.00 mm (3x)	3	4 mm	50 mm	901822-C3	39.50
.040		.0400	**.003**	.120 (3x)	3	1/8	1-1/2	971240-C3	35.90
.040		.0400	**.005**	.120 (3x)	3	1/8	1-1/2	859840-C3	35.80
.047 (3/64)		.0470	**.003**	.071 (1.5x)	3	1/8	1-1/2	969447-C3	35.00
.047 (3/64)		.0470	**.003**	.141 (3x)	3	1/8	1-1/2	971247-C3	35.00
.047 (3/64)		.0470	**.003**	.250 (5x)	3	1/8	2-1/2	980347-C3	43.90
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	859847-C3	35.60
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	856647-C3	35.60
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	857447-C3	38.10
.050		.0500	**.003**	.150 (3x)	3	1/8	1-1/2	971250-C3	35.80
.050		.0500	**.005**	.150 (3x)	3	1/8	1-1/2	859850-C3	35.80
.060		.0600	**.005**	.180 (3x)	3	1/8	1-1/2	971260-C3	35.80
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	856660-C3	35.80
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	969462-C3	32.40
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	971262-C3	32.40
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	980362-C3	42.30
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	856662-C3	33.10
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	858262-C3	35.70
.078 (5/64)		.0780	**.005**	.118 (1.5x)	3	1/8	1-1/2	969478-C3	32.40
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	971278-C3	32.40
.078 (5/64)		.0780	**.005**	.406 (5x)	3	1/8	2-1/2	980378-C3	43.10
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	856678-C3	32.40
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	858278-C3	35.00

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VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Corner Radius (cont.)

continued from previous page

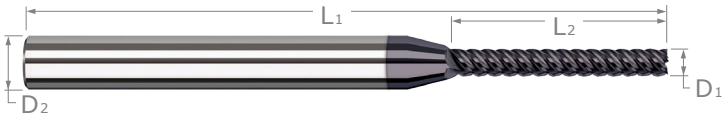
CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	CORNER RADIUS R +.001″ −.001″ +.25mm −.25mm	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN COATED TOOL #	PRICE
	2.0 mm	.0787	**.10 mm**	6.00 mm (3x)	3	4 mm	50 mm	901845-C3	37.30
.093 (3/32)		.0930	**.005**	.140 (1.5x)	3	1/8	1-1/2	969493-C3	32.40
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	971293-C3	32.40
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	980393-C3	42.30
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	856693-C3	32.40
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	859093-C3	35.70
.100		.1000	**.005**	.300 (3x)	3	1/8	1-1/2	971300-C3	33.20
	3.0 mm	.1181	**.10 mm**	9.00 mm (3x)	3	4 mm	50 mm	901857-C3	37.30

D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.005**	.187 (1.5x)	4	1/8	1-1/2	969508-C3	30.00
.125 (1/8)	.1250	**.005**	.375 (3x)	4	1/8	1-1/2	971308-C3	30.00
.125 (1/8)	.1250	**.005**	.625 (5x)	4	1/8	2-1/2	980408-C3	42.30
.125 (1/8)	.1250	**.010**	.375 (3x)	4	1/8	1-1/2	856708-C3	33.10
.125 (1/8)	.1250	**.030**	.375 (3x)	4	1/8	1-1/2	859108-C3	35.70
.156 (5/32)	.1562	**.010**	.235 (1.5x)	4	3/16	2	969510-C3	35.20
.156 (5/32)	.1562	**.010**	.470 (3x)	4	3/16	2	971310-C3	35.90
.156 (5/32)	.1562	**.010**	.750 (5x)	4	3/16	3	980410-C3	46.60
.187 (3/16)	.1875	**.010**	.285 (1.5x)	4	3/16	2	969512-C3	32.70
.187 (3/16)	.1875	**.010**	.562 (3x)	4	3/16	2	971312-C3	33.00
.187 (3/16)	.1875	**.010**	1.000 (5x)	4	3/16	3	980412-C3	46.60
.250 (1/4)	.2500	**.010**	.375 (1.5x)	4	1/4	2-1/2	969516-C3	41.50
.250 (1/4)	.2500	**.010**	.750 (3x)	4	1/4	2-1/2	971316-C3	41.50
.250 (1/4)	.2500	**.010**	1.250 (5x)	4	1/4	4	980416-C3	57.90
.312 (5/16)	.3125	**.010**	.470 (1.5x)	4	5/16	2-1/2	969520-C3	62.20
.312 (5/16)	.3125	**.010**	1.000 (3x)	4	5/16	2-1/2	971320-C3	61.10
.375 (3/8)	.3750	**.010**	.570 (1.5x)	4	3/8	2-1/2	969524-C3	70.30
.375 (3/8)	.3750	**.010**	1.125 (3x)	4	3/8	2-1/2	971324-C3	70.30
.500 (1/2)	.5000	**.015**	.750 (1.5x)	4	1/2	3	969532-C3	91.80

Please See Speeds & Feeds On Page 198

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 47°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	967815-C3	48.70
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	972415-C3	59.80
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	983615-C3	61.20
.020		.0200	**.060** (3x)	4	1/8	1-1/2	967820-C3	47.90
.020		.0200	**.100** (5x)	4	1/8	2-1/2	972420-C3	60.10
.025		.0250	**.075** (3x)	4	1/8	1-1/2	967825-C3	45.00
.025		.0250	**.125** (5x)	4	1/8	2-1/2	972425-C3	57.50
.031 (1/32)		.0310	**.047** (1.5x)	5	1/8	1-1/2	935131-C3	39.60
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	967831-C3	39.60
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	972431-C3	55.30
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	983631-C3	56.30
	1.0 mm	.0393	**3.00 mm** (3x)	5	4 mm	50 mm	921922-C3	45.80
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	916422-C3	57.20
.040		.0400	**.120** (3x)	5	1/8	1-1/2	967840-C3	40.80
.040		.0400	**.203** (5x)	5	1/8	2-1/2	972440-C3	56.60
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	967847-C3	40.00
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	972447-C3	55.30
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	983647-C3	56.30
.050		.0500	**.150** (3x)	5	1/8	1-1/2	967850-C3	40.40
.050		.0500	**.250** (5x)	5	1/8	2-1/2	972450-C3	56.60
.060		.0600	**.180** (3x)	5	1/8	1-1/2	967860-C3	40.80
.060		.0600	**.312** (5x)	5	1/8	2-1/2	972460-C3	56.60
.062 (1/16)		.0620	**.093** (1.5x)	5	1/8	1-1/2	935162-C3	37.70
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	967862-C3	37.30
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	972462-C3	52.10
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	983662-C3	52.80
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	967878-C3	37.30
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	972478-C3	52.10
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	983678-C3	53.40
	2.0 mm	.0787	**6.00 mm** (3x)	5	4 mm	50 mm	921945-C3	43.80
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	916445-C3	55.50

continued on next page

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE
.093 (3/32)		.0930	**.140** (1.5x)	5	1/8	1-1/2	935193-C3	37.30
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	967893-C3	37.30
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	972493-C3	52.10
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	983693-C3	52.80
.100		.1000	**.300** (3x)	5	1/8	1-1/2	967900-C3	38.20
.100		.1000	**.500** (5x)	5	1/8	2-1/2	972500-C3	52.60
	3.0 mm	.1181	**9.00 mm** (3x)	5	4 mm	50 mm	921957-C3	43.80
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	916457-C3	55.00

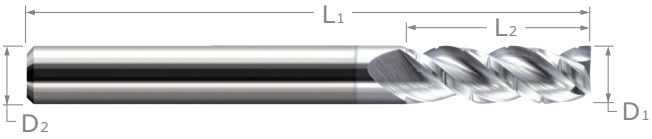
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	935208-C3	35.80
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	967908-C3	35.40
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	972508-C3	50.80
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	983708-C3	52.10
.156 (5/32)	.1562	**.470** (3x)	5	3/16	2	967910-C3	40.80
.156 (5/32)	.1562	**.750** (5x)	5	3/16	3	972510-C3	54.20
.187 (3/16)	.1875	**.570** (3x)	5	3/16	2	967912-C3	40.40
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	972512-C3	54.20
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	983712-C3	55.60
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	967916-C3	51.80
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	972516-C3	66.80
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	983716-C3	68.10

Speeds & Feeds (High-Helix Finishers For Free Machining Steels)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Axial
Carbon Steels: 10xx - 1030 & all 10Lxx, 11xx - 1140 & all 11Lxx, 12xx - 1215 & all 12Lxx	100 - 125	500	Finishing (1.5x LOC)	.00025	.00051	.00078	.00102	.00129	.00153	.00206	.00309	.00413	< .10x Dia	.5x - 1.5x Dia
	125 - 150	425	Finishing (3x LOC)	.00023	.00047	.00071	.00093	.00117	.00140	.00188	.00281	.00375	< .10x Dia	.5x - 3x Dia
	150 - 175	400												
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se, 440 F, 440 F Se	175 - 200	375	Finishing (5x LOC)	.00017	.00035	.00053	.00070	.00088	.00105	.00141	.00210	.00281	< .07x Dia	.5x - 5x Dia
	200 - 225	350	Finishing (8x LOC)	.00012	.00026	.00039	.00051	.00064	.00077	.00103	.00154	.00206	< .05x Dia	.5x - 8x Dia

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Chipbreaker Roughers – Square



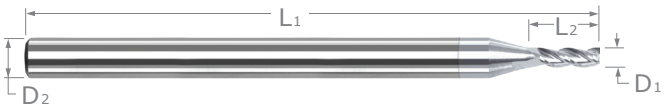
- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Chipbreaker geometry to improve chip management
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.062 (1/16)	.186 (3x)	3	1/8	1-1/2	769062	30.30	769062-C8	38.40
.078 (5/64)	.234 (3x)	3	1/8	1-1/2	769078	30.90	769078-C8	38.90
.093 (3/32)	.279 (3x)	3	1/8	1-1/2	769093	30.90	769093-C8	38.90

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.375 (3x)	3	1/8	1-1/2	769108	29.60	769108-C8	37.70
.187 (3/16)	.562 (3x)	3	3/16	2	769112	33.00	769112-C8	41.00
.250 (1/4)	.750 (3x)	3	1/4	2-1/2	769116	41.20	769116-C8	50.50

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND		ZrN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equiv.	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	968710	53.30	968710-C8	61.40				
.010		.0100	**.030** (3x)	3	1/8	1-1/2	942210	53.30	942210-C8	61.40				
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	968715	42.90	968715-C8	51.00				
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	942215	42.90	942215-C8	51.00	942215-C4	56.70		
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	923015	54.30	923015-C8	62.40				
	0.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	900411	43.40	900411-C8	51.40				
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	968720	37.80	968720-C8	44.90	968720-C4	51.60		
.020		.0200	**.060** (3x)	3	1/8	1-1/2	942220	37.80	942220-C8	44.90	942220-C4	51.60		
.020		.0200	**.100** (5x)	3	1/8	2-1/2	923020	49.00	923020-C8	57.10				
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	968725	37.80	968725-C8	44.90				
.025		.0250	**.075** (3x)	3	1/8	1-1/2	942225	37.80	942225-C8	44.90	942225-C4	51.60		
.025		.0250	**.125** (5x)	3	1/8	2-1/2	923025	49.00	923025-C8	57.10				
.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	968730	37.80	968730-C8	44.90				
.030		.0300	**.090** (3x)	3	1/8	1-1/2	942230	37.80	942230-C8	44.90	942230-C4	51.60		
.030		.0300	**.156** (5x)	3	1/8	2-1/2	923030	49.00	923030-C8	57.10				
.031 (1/32)		.0310	**.025** (.8x)	3	1/8	1-1/2	873531	33.30	873531-C8	41.40				
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	968731	30.10	968731-C8	37.20	968731-C4	43.90		
.031 (1/32)		.0310	**.093** (3x)	2	1/8	1-1/2	792131	30.10	792131-C8	38.20				
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	942231	30.10	942231-C8	37.20	942231-C4	43.90	942231-C7	37.20
.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	857231	41.40	857231-C8	49.50				
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	923031	41.40	923031-C8	48.60	923031-C4	55.30		
.031 (1/32)		.0310	**.250** (8x)	3	1/8	2-1/2	746031	45.40	746031-C8	53.50				
	0.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	900418	33.90	900418-C8	41.90				
.035		.0350	**.105** (3x)	3	1/8	1-1/2	942235	35.10	942235-C8	43.10				
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	858422	33.90	858422-C8	42.40				
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	900422	33.60	900422-C8	40.80	900422-C4	49.80		
	1.0 mm	.0393	**5.00 mm** (5x)	3	4 mm	50 mm	845922	35.60	845922-C8	44.10				
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	968740	30.30	968740-C8	37.20				
.040		.0400	**.120** (3x)	3	1/8	1-1/2	942240	30.30	942240-C8	37.20	942240-C4	43.90		
.040		.0400	**.160** (4x)	3	1/8	2-1/2	857240	41.40	857240-C8	49.50				
.040		.0400	**.203** (5x)	3	1/8	2-1/2	923040	41.40	923040-C8	48.60	923040-C4	55.30		
.045		.0450	**.135** (3x)	3	1/8	1-1/2	942245	30.30	942245-C8	38.40				
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	968747	30.10	968747-C8	37.20	968747-C4	43.90		
.047 (3/64)		.0470	**.141** (3x)	2	1/8	1-1/2	792147	30.10	792147-C8	38.20				
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	942247	30.10	942247-C8	37.20	942247-C4	43.90	942247-C7	37.20
.047 (3/64)		.0470	**.187** (4x)	3	1/8	2-1/2	857247	41.40	857247-C8	49.50				
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	923047	41.40	923047-C8	48.60	923047-C4	55.30		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB$_2$ COATED		AMORPHOUS DIAMOND		ZrN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equiv.	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	968750	30.30	968750-C8	37.20				
.050		.0500	**.150** (3x)	3	1/8	1-1/2	942250	30.90	942250-C8	37.90	942250-C4	44.20		
.050		.0500	**.250** (5x)	3	1/8	2-1/2	923050	41.40	923050-C8	48.60				
.055		.0550	**.083** (1.5x)	3	1/8	1-1/2	968755	30.30	968755-C8	38.40				
.055		.0550	**.165** (3x)	3	1/8	1-1/2	942255	30.30	942255-C8	38.40	942255-C4	44.10		
.055		.0550	**.275** (5x)	3	1/8	2-1/2	923055	42.20	923055-C8	50.20				
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	900433	35.60	900433-C8	44.10				
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	968760	28.10	968760-C8	36.20				
.060		.0600	**.180** (3x)	3	1/8	1-1/2	942260	30.30	942260-C8	37.20	942260-C4	43.90		
.060		.0600	**.250** (4x)	3	1/8	2-1/2	857260	42.20	857260-C8	50.20				
.060		.0600	**.312** (5x)	3	1/8	2-1/2	923060	41.40	923060-C8	48.60				
.062 (1/16)		.0620	**.050** (.8x)	3	1/8	1-1/2	873562	30.10	873562-C8	38.20	873562-C4	50.80		
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	968762	28.00	968762-C8	34.80	968762-C4	41.40		
.062 (1/16)		.0620	**.186** (3x)	2	1/8	1-1/2	792162	28.00	792162-C8	36.10				
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	942262	28.00	942262-C8	34.80	942262-C4	41.40	942262-C7	34.70
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	857262	39.10	857262-C8	47.20	857262-C4	53.00		
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	923062	39.10	923062-C8	46.10	923062-C4	53.00		
.062 (1/16)		.0620	**.500** (8x)	3	1/8	2-1/2	746062	42.30	746062-C8	50.30				
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	968770	28.10	968770-C8	36.20				
.070		.0700	**.210** (3x)	3	1/8	1-1/2	942270	28.10	942270-C8	34.80	942270-C4	41.40		
.070		.0700	**.375** (5x)	3	1/8	2-1/2	923070	39.10	923070-C8	46.10				
.075		.0750	**.225** (3x)	3	1/8	1-1/2	942275	28.10	942275-C8	35.20				
.078 (5/64)		.0780	**.117** (1.5x)	3	1/8	1-1/2	968778	28.00	968778-C8	34.80	968778-C4	41.40		
.078 (5/64)		.0780	**.234** (3x)	2	1/8	1-1/2	792178	28.00	792178-C8	36.10				
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	942278	28.00	942278-C8	34.80	942278-C4	41.40	942278-C7	34.70
.078 (5/64)		.0780	**.312** (4x)	3	1/8	2-1/2	857278	39.10	857278-C8	47.20				
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	923078	39.10	923078-C8	46.10	923078-C4	53.70		
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	858445	31.50	858445-C8	40.10				
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	900445	31.30	900445-C8	38.40	900445-C4	47.70		
	2.0 mm	.0787	**10.00 mm** (5x)	3	4 mm	50 mm	845945	33.30	845945-C8	41.90				
.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	968780	28.10	968780-C8	35.20				
.080		.0800	**.240** (3x)	3	1/8	1-1/2	942280	28.10	942280-C8	34.80	942280-C4	41.40		
.080		.0800	**.406** (5x)	3	1/8	2-1/2	923080	39.10	923080-C8	46.10				
.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	968790	28.10	968790-C8	36.20				
.090		.0900	**.270** (3x)	3	1/8	1-1/2	942290	28.10	942290-C8	34.80	942290-C4	41.90		
.090		.0900	**.450** (5x)	3	1/8	2-1/2	923090	39.10	923090-C8	46.10				
.093 (3/32)		.0930	**.074** (.8x)	3	1/8	1-1/2	873593	30.10	873593-C8	38.20				
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	968793	28.00	968793-C8	34.80	968793-C4	41.40		
.093 (3/32)		.0930	**.279** (3x)	2	1/8	1-1/2	792193	28.00	792193-C8	36.10				
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	942293	28.00	942293-C8	34.80	942293-C4	41.40	942293-C7	34.70
.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	857293	39.10	857293-C8	47.20	857293-C4	53.00		
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	923093	39.10	923093-C8	46.10	923093-C4	53.00		
.093 (3/32)		.0930	**.750** (8x)	3	1/8	2-1/2	746093	42.30	746093-C8	50.30				
	2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	900451	33.70	900451-C8	42.20				

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND		ZrN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equiv.	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	968800	28.10	968800-C8	34.80				
.100		.1000	**.300** (3x)	3	1/8	1-1/2	942300	28.10	942300-C8	34.80	942300-C4	41.40		
.100		.1000	**.500** (5x)	3	1/8	2-1/2	923100	39.10	923100-C8	46.10				
.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	968802	28.10	968802-C8	34.80				
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	942302	28.10	942302-C8	34.80	942302-C4	41.90		
.109 (7/64)		.1090	**.570** (5x)	3	1/8	2-1/2	923102	39.10	923102-C8	46.10				
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50mm	858457	31.60	858457-C8	40.20				
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	900457	31.30	900457-C8	38.40	900457-C4	47.70		
	3.0 mm	.1181	**12.00 mm** (4x)	3	4 mm	50 mm	770057	33.30	770057-C8	41.90				
	3.0 mm	.1181	**15.00 mm** (5x)	3	4 mm	50 mm	845957	35.10	845957-C8	43.70				

D_1 +.000″ −.002″	+.00mm −.04mm	decimal equiv.	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)		.1250	**.100** (.8x)	3	1/8	1-1/2	873608	31.00	873608-C8	39.00	873608-C4	44.80		
.125 (1/8)		.1250	**.187** (1.5x)	3	1/8	1-1/2	968808	26.00	968808-C8	34.00	968808-C4	39.80		
.125 (1/8)		.1250	**.375** (3x)	2	1/8	1-1/2	792208	26.00	792208-C8	34.00				
.125 (1/8)		.1250	**.375** (3x)	3	1/8	1-1/2	942308	26.00	942308-C8	34.00	942308-C4	39.80	942308-C7	33.10
.125 (1/8)		.1250	**.500** (4x)	3	1/8	2-1/2	857308	38.80	857308-C8	46.80	857308-C4	52.60		
.125 (1/8)		.1250	**.625** (5x)	3	1/8	2-1/2	923108	38.80	923108-C8	46.10	923108-C4	52.60		
.125 (1/8)		.1250	**1.000** (8x)	3	1/8	2-1/2	746108	41.90	746108-C8	50.00				
.140 (9/64)		.1406	**.220** (1.5x)	3	3/16	2	968809	28.90	968809-C8	36.90				
.140 (9/64)		.1406	**.425** (3x)	3	3/16	2	942309	28.90	942309-C8	36.90				
.140 (9/64)		.1406	**.750** (5x)	3	3/16	3	923109	40.10	923109-C8	48.20				
.156 (5/32)		.1562	**.235** (1.5x)	3	3/16	2	968810	29.10	968810-C8	37.10	968810-C4	45.70		
.156 (5/32)		.1562	**.469** (3x)	3	3/16	2	942310	29.10	942310-C8	37.10	942310-C4	45.70		
.156 (5/32)		.1562	**.750** (5x)	3	3/16	3	923110	40.10	923110-C8	48.20	923110-C4	59.30		
	4.0 mm	.1574	**12.00 mm** (3x)	3	6 mm	63 mm	900461	43.60	900461-C8	52.70				
.187 (3/16)		.1875	**.150** (.8x)	3	3/16	2	873612	32.20	873612-C8	40.20				
.187 (3/16)		.1875	**.285** (1.5x)	3	3/16	2	968812	27.90	968812-C8	35.90	968812-C4	44.80		
.187 (3/16)		.1875	**.562** (3x)	2	3/16	2	792212	27.90	792212-C8	35.90				
.187 (3/16)		.1875	**.562** (3x)	3	3/16	2	942312	27.90	942312-C8	35.90	942312-C4	44.80	942312-C7	36.40
.187 (3/16)		.1875	**.750** (4x)	3	3/16	3	857312	32.40	857312-C8	40.50				
.187 (3/16)		.1875	**1.000** (5x)	3	3/16	3	923112	40.10	923112-C8	48.20	923112-C4	59.30		
	5.0 mm	.1968	**15.00 mm** (3x)	3	6 mm	63 mm	900464	43.60	900464-C8	52.70				
.218 (7/32)		.2187	**.625** (3x)	3	1/4	2-1/2	942314	41.60	942314-C8	50.90				
	6.0 mm	.2362	**18.00 mm** (3x)	3	6 mm	63 mm	900466	43.20	900466-C8	52.30				
.250 (1/4)		.2500	**.200** (.8x)	3	1/4	2-1/2	873616	41.00	873616-C8	50.30				
.250 (1/4)		.2500	**.375** (1.5x)	3	1/4	2-1/2	968816	33.70	968816-C8	43.20	968816-C4	55.30		
.250 (1/4)		.2500	**.750** (3x)	3	1/4	2-1/2	942316	34.00	942316-C8	43.50	942316-C4	55.60	942316-C7	44.50
.250 (1/4)		.2500	**1.000** (4x)	3	1/4	4	857316	38.50	857316-C8	48.80				
.250 (1/4)		.2500	**1.250** (5x)	3	1/4	4	923116	47.60	923116-C8	58.00	923116-C4	69.40		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND		ZrN COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equiv.	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.312 (5/16)		.3125	**1.000** (3x)	3	5/16	2-1/2	942320	42.70	942320-C8	58.30				
.375 (3/8)		.3750	**.570** (1.5x)	3	3/8	2-1/2	968824	46.50	968824-C8	65.60				
.375 (3/8)		.3750	**1.125** (3x)	3	3/8	2-1/2	942324	46.50	942324-C8	65.60	942324-C4	73.90	942324-C7	57.20
.375 (3/8)		.3750	**2.000** (5x)	3	3/8	4	923124	51.60	923124-C8	73.80				
.500 (1/2)		.5000	**.750** (1.5x)	3	1/2	3	968832	49.20	968832-C8	71.90				
.500 (1/2)		.5000	**1.500** (3x)	3	1/2	3	942332	48.60	942332-C8	71.40	942332-C4	82.20	942332-C7	65.30
.500 (1/2)		.5000	**2.625** (5x)	3	1/2	4	923132	53.70	923132-C8	74.10				

Speeds & Feeds (Variable Helix For Aluminum & Non-Ferrous Alloys)

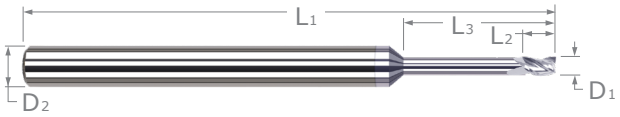
Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For 2 flutes, table values of IPT must be increased to 110% before adjustments for different lengths of cut. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%; for 8x, reduce to 58%). For complete speeds and feeds charts, please see www.harveytool.com

Cutter Series	Material	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Roughing	.00023	.00048	.00072	.00095	.00120	.00143	.00193	.00288	.00385
	Magnesium Alloys: All alloys	1500	Finishing	.00025	.00051	.00078	.00102	.00129	.00153	.00206	.00309	.00413
	Zinc Alloys: All alloys	800	Max	.00026	.00055	.00083	.00109	.00137	.00164	.00220	.00329	.00440
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225	Slotting	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx)	500	Roughing	.00018	.00038	.00058	.00076	.00096	.00115	.00154	.00230	.00308
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Finishing	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Max	.00021	.00044	.00066	.00087	.00110	.00131	.00176	.00263	.00352
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500			**Radial Depth of Cut*:**			**Axial Depth of Cut*:**				
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225			Slotting: 1x Dia			Slotting: .5x Dia				
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550			Roughing: .5x Dia			Roughing: .5x - 1x Dia				
					Finishing: .1x Dia			Finishing: .5x - 1x Dia				
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Slotting	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Roughing	.00030	.00062	.00094	.00124	.00156	.00186	.00250	.00374	.00501
	Magnesium Alloys: All alloys	2000	Finishing	.00032	.00066	.00101	.00133	.00167	.00199	.00268	.00401	.00536
	Zinc Alloys: All alloys	1100	Max	.00034	.00071	.00108	.00142	.00178	.00213	.00286	.00428	.00572
					Radial Depth of Cut*:			**Axial Depth of Cut*:**				
					Slotting: 1x Dia			Slotting: .5x Dia				
					Roughing: .5x Dia			Roughing: .5x - 1x Dia				
					Finishing: .1x Dia			Finishing: .5x - 1x Dia				
Amorphous Diamond	**Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500	Slotting	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000	Roughing	.00025	.00053	.00080	.00105	.00132	.00158	.00212	.00317	.00424
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500	Finishing	.00027	.00056	.00085	.00113	.00142	.00169	.00227	.00339	.00454
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000	Max	.00029	.00060	.00091	.00120	.00151	.00180	.00242	.00362	.00484
	Wrought - 5% - 8% Si (4xxx)	2200										
	Wrought - 8% - 12% Si (4xxx)	1700										
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	800	Slotting	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx)	1500	Roughing	.00020	.00042	.00064	.00084	.00106	.00126	.00169	.00253	.00339
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800	Finishing	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000	Max	.00023	.00048	.00073	.00096	.00121	.00144	.00194	.00290	.00387
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000										
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800										
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150			**Radial Depth of Cut*:**			**Axial Depth of Cut*:**				
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750			Slotting: 1x Dia			Slotting: .4x Dia				
					Roughing: .4x Dia			Roughing: .3x - .8x Dia				
					Finishing: .1x Dia			Finishing: .5x - 1x Dia				

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	930815	55.90	930815-C8	63.90		
.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	927115	57.10	927115-C8	65.20		
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	930820	53.40	930820-C8	61.50		
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	927120	54.90	927120-C8	63.00		
.020		.0200	.030	**.200** (10x)	3	1/8	2-1/2	919320	57.90	919320-C8	66.00		
.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	930825	52.20	930825-C8	60.20		
.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	927125	53.40	927125-C8	61.50		
.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	927130	53.40	927130-C8	61.50		
.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	924531	48.30	924531-C8	56.30		
.031 (1/32)		.0310	.047	**.125** (4x)	3	1/8	2-1/2	814331	48.80	814331-C8	56.90		
.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	930831	48.80	930831-C8	56.90	930831-C4	63.40
.031 (1/32)		.0310	.047	**.186** (6x)	3	1/8	2-1/2	814131	48.80	814131-C8	56.90		
.031 (1/32)		.0310	.047	**.218** (7x)	3	1/8	2-1/2	813931	50.00	813931-C8	58.00		
.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	927131	50.00	927131-C8	58.00	927131-C4	63.80
.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	919331	52.80	919331-C8	61.00		
.031 (1/32)		.0310	.047	**.375** (12x)	3	1/8	2-1/2	879231	54.80	879231-C8	62.90		
	1.0 mm	.0393	1.5 mm	**8 mm** (8x)	3	4 mm	50 mm	795322	55.00	795322-C8	63.50		
.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	927140	52.50	927140-C8	60.60		
.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	930847	48.80	930847-C8	56.90		
.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	927147	50.00	927147-C8	58.00		
.047 (3/64)		.0470	.071	**.480** (10x)	3	1/8	2-1/2	919347	53.20	919347-C8	61.30		
.050		.0500	.075	**.400** (8x)	3	1/8	2-1/2	927150	54.30	927150-C8	62.40		
.055		.0550	.083	**.450** (8x)	3	1/8	2-1/2	927155	54.30	927155-C8	62.40		
.060		.0600	.090	**.500** (8x)	3	1/8	2-1/2	927160	54.30	927160-C8	62.40		
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	924562	48.30	924562-C8	56.30		
.062 (1/16)		.0620	.093	**.250** (4x)	3	1/8	2-1/2	814362	48.80	814362-C8	56.90		
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	930862	48.80	930862-C8	56.90	930862-C4	63.40
.062 (1/16)		.0620	.093	**.375** (6x)	3	1/8	2-1/2	814162	49.60	814162-C8	57.70		
.062 (1/16)		.0620	.093	**.437** (7x)	3	1/8	2-1/2	813962	49.60	813962-C8	57.70		
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	927162	49.60	927162-C8	57.70	927162-C4	63.50
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	919362	52.80	919362-C8	61.00		
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	879262	54.80	879262-C8	62.90		
.070		.0700	.105	**.570** (8x)	3	1/8	2-1/2	927170	50.80	927170-C8	58.90		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	930878	48.80	930878-C8	56.90		
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	927178	49.60	927178-C8	57.70		
.078 (5/64)		.0780	.118	**.800** (10x)	3	1/8	2-1/2	919378	53.20	919378-C8	61.30		
	2.0 mm	.0787	3 mm	**16 mm** (8x)	3	4 mm	50 mm	795345	55.00	795345-C8	63.50		
.080		.0800	.120	**.650** (8x)	3	1/8	2-1/2	927180	52.00	927180-C8	60.10		
.090		.0900	.135	**.750** (8x)	3	1/8	2-1/2	927190	52.00	927190-C8	59.60		
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	924593	48.30	924593-C8	56.30		
.093 (3/32)		.0930	.140	**.375** (4x)	3	1/8	2-1/2	814393	48.80	814393-C8	56.90		
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	930893	48.80	930893-C8	56.90	930893-C4	62.70
.093 (3/32)		.0930	.140	**.585** (6x)	3	1/8	2-1/2	814193	49.60	814193-C8	57.70		
.093 (3/32)		.0930	.140	**.670** (7x)	3	1/8	2-1/2	813993	49.60	813993-C8	57.70		
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	927193	49.60	927193-C8	57.70	927193-C4	64.20
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	919393	52.80	919393-C8	61.00		
.093 (3/32)		.0930	.140	**1.125** (12x)	3	1/8	2-1/2	879293	54.80	879293-C8	62.90		
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	927200	54.30	927200-C8	62.40		
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	927202	54.30	927202-C8	62.40		
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	795357	57.30	795357-C8	65.80		

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	.187	**.375** (3x)	3	1/8	1-1/2	924608	48.30	924608-C8	56.30		
.125 (1/8)	.1250	.187	**.500** (4x)	3	1/8	2-1/2	814408	48.80	814408-C8	56.90		
.125 (1/8)	.1250	.187	**.625** (5x)	3	1/8	2-1/2	930908	48.80	930908-C8	56.90	930908-C4	63.40
.125 (1/8)	.1250	.187	**.750** (6x)	3	1/8	2-1/2	814208	49.60	814208-C8	57.70		
.125 (1/8)	.1250	.187	**.875** (7x)	3	1/8	2-1/2	814008	49.60	814008-C8	57.70		
.125 (1/8)	.1250	.187	**1.000** (8x)	3	1/8	2-1/2	927208	49.60	927208-C8	57.70	927208-C4	63.50
.125 (1/8)	.1250	.187	**1.250** (10x)	3	1/8	2-1/2	919408	52.80	919408-C8	61.00		
.125 (1/8)	.1250	.187	**1.500** (12x)	3	1/8	3	879308	54.80	879308-C8	62.90		
.140 (9/64)	.1406	.220	**1.125** (8x)	3	3/16	3	927209	57.60	927209-C8	65.60		
.156 (5/32)	.1562	.235	**.750** (5x)	3	3/16	3	930910	53.40	930910-C8	61.50		
.156 (5/32)	.1562	.235	**1.250** (8x)	3	3/16	3	927210	54.90	927210-C8	63.00		
.156 (5/32)	.1562	.235	**1.570** (10x)	3	3/16	3	919410	56.80	919410-C8	64.90		
.187 (3/16)	.1875	.285	**1.000** (5x)	3	3/16	3	930912	53.40	930912-C8	61.50	930912-C4	69.90
.187 (3/16)	.1875	.285	**1.156** (6x)	3	3/16	3	814212	53.40	814212-C8	61.50		
.187 (3/16)	.1875	.285	**1.312** (7x)	3	3/16	3	814012	54.90	814012-C8	63.00		
.187 (3/16)	.1875	.285	**1.500** (8x)	3	3/16	3	927212	54.90	927212-C8	63.00		
.187 (3/16)	.1875	.285	**1.875** (10x)	3	3/16	4	919412	56.80	919412-C8	65.50		
.250 (1/4)	.2500	.375	**1.250** (5x)	3	1/4	4	930916	57.00	930916-C8	67.50		
.250 (1/4)	.2500	.375	**2.000** (8x)	3	1/4	4	927216	58.30	927216-C8	68.80		
.250 (1/4)	.2500	.375	**2.500** (10x)	3	1/4	4	919416	60.30	919416-C8	70.80		
.375 (3/8)	.3750	.570	**2.000** (5x)	3	3/8	4	930924	68.10	930924-C8	89.40		
.500 (1/2)	.5000	.750	**2.500** (5x)	3	1/2	4	930932	82.60	930932-C8	101.00		

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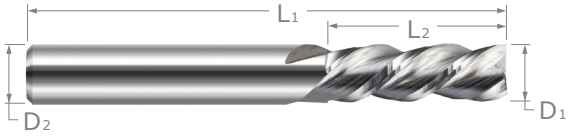
VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Downcut



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- Prevents lifting of workpiece
- h6 shank tolerance for high precision tool holders
- 3 left hand spiral, right hand cut flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.015 (1/64)		.0150	.045 (3x)	3	1/8	1-1/2	896215	49.20	896215-C8	57.30
.031 (1/32)		.0310	.047 (1.5x)	3	1/8	1-1/2	858531	34.90	858531-C8	43.00
.031 (1/32)		.0310	.093 (3x)	3	1/8	1-1/2	896231	34.70	896231-C8	42.80
.047 (3/64)		.0470	.141 (3x)	3	1/8	1-1/2	896247	34.70	896247-C8	42.80
.062 (1/16)		.0620	.093 (1.5x)	3	1/8	1-1/2	858562	32.50	858562-C8	40.60
.062 (1/16)		.0620	.186 (3x)	3	1/8	1-1/2	896262	32.30	896262-C8	40.40
.078 (5/64)		.0780	.234 (3x)	3	1/8	1-1/2	896278	32.30	896278-C8	40.40
.093 (3/32)		.0930	.140 (1.5x)	3	1/8	1-1/2	858593	32.50	858593-C8	40.60
.093 (3/32)		.0930	.279 (3x)	3	1/8	1-1/2	896293	32.30	896293-C8	40.40
	3.00 mm	.1181	4.50 mm (1.5x)	3	4 mm	50 mm	756057	35.90	756057-C8	43.90
	3.00 mm	.1181	9.00 mm (3x)	3	4 mm	50 mm	754057	35.70	754057-C8	43.70

D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.125 (1/8)		.1250	.187 (1.5x)	3	1/8	1-1/2	858608	32.20	858608-C8	40.30
.125 (1/8)		.1250	.375 (3x)	3	1/8	1-1/2	896308	32.00	896308-C8	40.10
.156 (5/32)		.1560	.235 (1.5x)	3	3/16	2	858610	36.50	858610-C8	44.50
.156 (5/32)		.1560	.469 (3x)	3	3/16	2	896310	36.30	896310-C8	44.30
.187 (3/16)		.1870	.285 (1.5x)	3	3/16	2	858612	33.70	858612-C8	41.70
.187 (3/16)		.1870	.562 (3x)	3	3/16	2	896312	33.40	896312-C8	41.40
	6.00 mm	.2362	9.00 mm (1.5x)	3	6 mm	63 mm	756066	45.40	756066-C8	55.70
	6.00 mm	.2362	18.00 mm (3x)	3	6 mm	63 mm	754066	45.00	754066-C8	54.10
.250 (1/4)		.2500	.375 (1.5x)	3	1/4	2-1/2	858616	42.10	858616-C8	51.20
.250 (1/4)		.2500	.750 (3x)	3	1/4	2-1/2	896316	41.70	896316-C8	50.80
.375 (3/8)		.3750	.570 (1.5x)	3	3/8	2-1/2	858624	56.30	858624-C8	74.30
.375 (3/8)		.3750	1.125 (3x)	3	3/8	2-1/2	896324	55.80	896324-C8	73.80
.500 (1/2)		.5000	.750 (1.5x)	3	1/2	3	858632	108.40	858632-C8	127.10
.500 (1/2)		.5000	1.500 (3x)	3	1/2	3	896332	110.50	896332-C8	129.10

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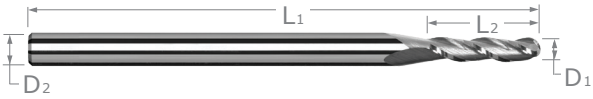
VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders • 3 flutes
- Center cutting • Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND	
D1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L2 +.010" −.000" +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	977504	63.90	977504-C8	72.40		
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	958110	64.70	958110-C8	71.80		
.010		.0100	**.030** (3x)	3	1/8	1-1/2	989710	63.60	989710-C8	70.70		
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	958115	51.30	958115-C8	59.40		
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	989715	51.30	989715-C8	59.40		
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	977509	51.60	977509-C8	60.10		
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	977511	46.20	977511-C8	54.70		
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	958120	44.90	958120-C8	53.00		
.020		.0200	**.060** (3x)	3	1/8	1-1/2	989720	44.90	989720-C8	53.00		
.020		.0200	**.100** (5x)	3	1/8	2-1/2	850020	46.40	850020-C8	54.00		
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	977513	43.40	977513-C8	51.90		
.025		.0250	**.075** (3x)	3	1/8	1-1/2	989725	43.20	989725-C8	50.30		
.030		.0300	**.090** (3x)	3	1/8	1-1/2	989730	37.90	989730-C8	46.00		
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	958131	37.50	958131-C8	45.60		
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	989731	37.10	989731-C8	45.20	989731-C4	50.90
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	850031	46.10	850031-C8	54.10		
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	977518	37.30	977518-C8	45.80		
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	908322	37.70	908322-C8	45.70		
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	977522	37.70	977522-C8	46.20		
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	958140	40.80	958140-C8	48.80		
.040		.0400	**.120** (3x)	3	1/8	1-1/2	989740	39.60	989740-C8	47.70		
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	958147	37.50	958147-C8	44.60		
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	989747	37.10	989747-C8	45.20		
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	850047	46.10	850047-C8	53.70		
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	977527	37.70	977527-C8	45.70		
.050		.0500	**.150** (3x)	3	1/8	1-1/2	989750	38.10	989750-C8	46.20		
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	977531	37.70	977531-C8	45.70		
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	977533	34.90	977533-C8	43.50		
.060		.0600	**.180** (3x)	3	1/8	1-1/2	989760	37.30	989760-C8	45.40		
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	958162	35.10	958162-C8	43.10		
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	989762	35.10	989762-C8	43.10	989762-C4	48.90
.062 (1/16)		.0620	**.248** (4x)	3	1/8	2-1/2	791162	43.90	791162-C8	52.00		
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	850062	43.90	850062-C8	52.00		
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	977536	35.20	977536-C8	43.20		
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	977540	34.90	977540-C8	43.50		

continued on next page

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	958178	35.10	958178-C8	43.10		
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	989778	35.10	989778-C8	43.10		
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	850078	43.90	850078-C8	52.00		
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	908345	34.90	908345-C8	43.50		
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	977545	34.90	977545-C8	43.50		
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	958193	35.10	958193-C8	43.10		
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	989793	35.10	989793-C8	43.10	989793-C4	48.90
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	850093	43.90	850093-C8	52.00		
.100		.1000	**.300** (3x)	3	1/8	1-1/2	989800	35.20	989800-C8	43.30		
.109 (7/64)		.1094	**.327** (3x)	3	1/8	1-1/2	989802	36.10	989802-C8	43.20		
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	977557	36.00	977557-C8	44.50		

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	3	1/8	1-1/2	958208	32.70	958208-C8	40.70		
.125 (1/8)	.1250	**.375** (3x)	3	1/8	1-1/2	989808	32.70	989808-C8	40.70	989808-C4	46.50
.125 (1/8)	.1250	**.500** (4x)	3	1/8	2-1/2	791208	43.90	791208-C8	52.00		
.125 (1/8)	.1250	**.625** (5x)	3	1/8	2-1/2	850108	43.90	850108-C8	52.00		
.156 (5/32)	.1562	**.235** (1.5x)	3	3/16	2	958210	36.20	958210-C8	44.20		
.156 (5/32)	.1562	**.470** (3x)	3	3/16	2	989810	36.20	989810-C8	44.20		
.187 (3/16)	.1875	**.285** (1.5x)	3	3/16	2	958212	33.70	958212-C8	41.70		
.187 (3/16)	.1875	**.562** (3x)	3	3/16	2	989812	34.00	989812-C8	42.00	989812-C4	50.70
.187 (3/16)	.1875	**1.000** (5x)	3	3/16	3	850112	35.30	850112-C8	43.40		
.250 (1/4)	.2500	**.375** (1.5x)	3	1/4	2-1/2	958216	40.20	958216-C8	49.80		
.250 (1/4)	.2500	**.750** (3x)	3	1/4	2-1/2	989816	40.50	989816-C8	50.10	989816-C4	62.10
.250 (1/4)	.2500	**1.250** (5x)	3	1/4	4	850116	53.50	850116-C8	64.00		
.375 (3/8)	.3750	**.570** (1.5x)	3	3/8	2-1/2	958224	53.80	958224-C8	72.10		
.375 (3/8)	.3750	**1.125** (3x)	3	3/8	2-1/2	989824	53.80	989824-C8	72.10		
.500 (1/2)	.5000	**.750** (1.5x)	3	1/2	3	958232	56.50	958232-C8	78.40		
.500 (1/2)	.5000	**1.500** (3x)	3	1/2	3	989832	56.50	989832-C8	78.40		

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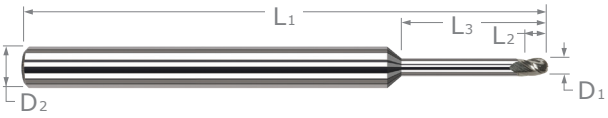
VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) improves performance in off-center contour milling applications
- Reduced neck diameter to avoid heeling • Ball end for profiling
- h6 shank tolerance for high precision tool holders • 3 flutes
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK FLUTES	SHANK DIA	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.015 (1/64)		.0150	.022	**.078** (5x)	3	1/8	2-1/2	947015	57.00	947015-C8	64.60		
.015 (1/64)		.0150	.022	**.125** (8x)	3	1/8	2-1/2	54415	66.20	54415-C8	74.30		
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	947020	61.30	947020-C8	68.90		
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	54420	62.50	54420-C8	70.60		
.025		.0250	.037	**.125** (5x)	3	1/8	2-1/2	947025	60.30	947025-C8	67.90		
.025		.0250	.037	**.203** (8x)	3	1/8	2-1/2	54425	61.70	54425-C8	69.30		
.031 (1/32)		.0310	.046	**.156** (5x)	3	1/8	2-1/2	947031	56.30	947031-C8	64.40		
.031 (1/32)		.0310	.046	**.250** (8x)	3	1/8	2-1/2	54431	59.60	54431-C8	67.70	54431-C4	74.20
.031 (1/32)		.0310	.046	**.312** (10x)	3	1/8	2-1/2	925131	63.20	925131-C8	71.40		
.031 (1/32)		.0310	.046	**.375** (12x)	3	1/8	2-1/2	879431	65.00	879431-C8	73.10		
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	851322	63.20	851322-C8	71.80		
.047 (3/64)		.0470	.070	**.250** (5x)	3	1/8	2-1/2	947047	56.30	947047-C8	64.40		
.047 (3/64)		.0470	.070	**.375** (8x)	3	1/8	2-1/2	54447	57.00	54447-C8	65.10	54447-C4	70.90
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	947062	56.30	947062-C8	64.40		
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	54462	57.00	54462-C8	65.10	54462-C4	70.90
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	925162	63.20	925162-C8	71.40		
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	879462	66.50	879462-C8	74.70		
.078 (5/64)		.0780	.117	**.406** (5x)	3	1/8	2-1/2	947078	56.30	947078-C8	64.40		
.078 (5/64)		.0780	.117	**.625** (8x)	3	1/8	2-1/2	54478	57.00	54478-C8	65.10	54478-C4	71.60
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	851345	58.80	851345-C8	67.30		
.093 (3/32)		.0930	.139	**.500** (5x)	3	1/8	2-1/2	947093	56.30	947093-C8	64.40		
.093 (3/32)		.0930	.139	**.750** (8x)	3	1/8	2-1/2	54493	57.00	54493-C8	65.10	54493-C4	71.60
.093 (3/32)		.0930	.139	**.950** (10x)	3	1/8	2-1/2	925193	63.20	925193-C8	71.40		
.093 (3/32)		.0930	.139	**1.125** (12x)	3	1/8	2-1/2	879493	66.50	879493-C8	74.70		
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	851357	63.20	851357-C8	71.80		

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	.187	**.625** (5x)	3	1/8	2-1/2	947108	55.10	947108-C8	63.20		
.125 (1/8)	.1250	.187	**1.000** (8x)	3	1/8	2-1/2	54508	56.30	54508-C8	64.40	54508-C4	70.30
.125 (1/8)	.1250	.187	**1.250** (10x)	3	1/8	2-1/2	925208	63.20	925208-C8	71.40		
.125 (1/8)	.1250	.187	**1.500** (12x)	3	1/8	3	879508	66.50	879508-C8	74.70		
.156 (5/32)	.1562	.234	**.750** (5x)	3	3/16	3	947110	62.30	947110-C8	70.40		
.156 (5/32)	.1562	.234	**1.250** (8x)	3	3/16	3	54510	62.50	54510-C8	70.60		
.187 (3/16)	.1875	.281	**1.000** (5x)	3	3/16	3	947112	62.30	947112-C8	70.40		
.187 (3/16)	.1875	.281	**1.500** (8x)	3	3/16	3	54512	62.80	54512-C8	70.90	54512-C4	79.30
.250 (1/4)	.2500	.375	**1.250** (5x)	3	1/4	4	947116	64.60	947116-C8	74.90		
.250 (1/4)	.2500	.375	**2.000** (8x)	3	1/4	4	54516	65.80	54516-C8	76.10	54516-C4	87.70

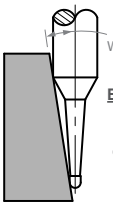
Please See Speeds & Feeds On Page 221

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Tapered Reach (Mold Cutters)

Excellent in Aluminum & Other Non-Ferrous Materials

- Very short length of cut and solid tapered neck for maximum rigidity
- 1°, 1.5°, 3°, 5°, and 7° neck angles to address common draft angles for molds
- 45° helix, large flute valley, and sharper cutting edge for faster chip removal and better finish
- Offered with TiB_2 coating to minimize galling and enhance performance
- 2 flutes to center
- Solid carbide
- CNC ground in the USA



Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

NECK ANGLE	CUTTER DIA.	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
1°	.062 (1/16)	.050	I	.500	**.595**	6.4°	3/16	2	925049	57.20	925049-C8	65.20
	.062 (1/16)	.050	I	1.000	**1.080**	3.5°	3/16	2-1/2	925056	57.20	925056-C8	65.30
	.093 (3/32)	.074	I	.750	**.811**	3.6°	3/16	2	925070	54.80	925070-C8	62.80
	.093 (3/32)	.074	I	1.125	**1.175**	2.4°	3/16	2-1/2	925072	57.20	925072-C8	65.30
	.125 (1/8)	.100	I	1.000	**1.027**	1.9°	3/16	2	925091	69.30	925091-C8	77.30
	.125 (1/8)	.100	II	1.890	**1.890**	1.0°	3/16	3	925077	71.60	925077-C8	79.70
	.187 (3/16)	.150	II	1.940	**1.940**	1.0°	1/4	4	925087	72.10	925087-C8	82.50
	.250 (1/4)	.200	II	1.990	**1.990**	1.0°	5/16	4	925092	77.30	925092-C8	94.10
1.5°	.015 (1/64)	.012	I	.125	**.269**	18.2°	3/16	2	997807	64.70	997807-C8	72.70
	.015 (1/64)	.012	I	.250	**.389**	12.8°	3/16	2	997814	64.10	997814-C8	72.10
	.031 (1/32)	.025	I	.250	**.375**	12.3°	3/16	2	997821	58.90	997821-C8	66.90
	.031 (1/32)	.025	I	.500	**.614**	7.5°	3/16	2	997828	58.90	997828-C8	66.90
	.047 (3/64)	.038	I	.375	**.481**	8.7°	3/16	2	997835	58.60	997835-C8	66.60
	.047 (3/64)	.038	I	.750	**.839**	5.0°	3/16	2	997842	58.60	997842-C8	66.60
	.062 (1/16)	.050	I	.500	**.588**	6.4°	3/16	2	997849	57.20	997849-C8	65.20
	.062 (1/16)	.050	I	1.000	**1.066**	3.5°	3/16	2-1/2	997856	57.20	997856-C8	65.30
	.078 (5/64)	.062	I	.625	**.694**	4.8°	3/16	2	997863	55.80	997863-C8	63.80
	.093 (3/32)	.074	I	.750	**.801**	3.6°	3/16	2	997870	54.80	997870-C8	62.80
	.125 (1/8)	.100	II	1.293	**1.293**	1.5°	3/16	2-1/2	997877	69.30	997877-C8	77.40
	.187 (3/16)	.150	II	1.343	**1.343**	1.5°	1/4	2-1/2	997887	70.10	997887-C8	80.40
	.250 (1/4)	.200	II	1.393	**1.393**	1.5°	5/16	2-1/2	997892	75.70	997892-C8	88.00

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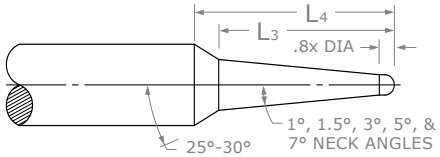
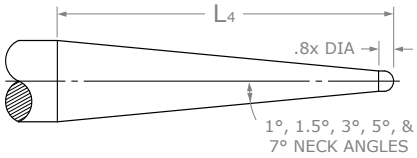
TYPE I



TYPE II



HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Tapered Reach (Mold Cutters) (cont.)

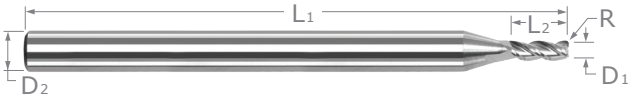
continued from previous page

NECK ANGLE	CUTTER DIA.	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
3°	.031 (1/32)	.025	I	.750	**.820**	5.6°	3/16	2-1/2	996607	60.90	996607-C8	69.50
	.031 (1/32)	.025	II	1.518	**1.518**	3.0°	3/16	2-1/2	996614	60.90	996614-C8	69.00
	.047 (3/64)	.038	I	.875	**.921**	4.5°	3/16	2-1/2	996621	57.00	996621-C8	65.10
	.047 (3/64)	.038	II	1.378	**1.378**	3.0°	3/16	2-1/2	996628	57.50	996628-C8	65.60
	.062 (1/16)	.050	I	.625	**.681**	5.5°	3/16	2-1/2	996635	57.50	996635-C8	65.60
	.062 (1/16)	.050	II	1.247	**1.247**	3.0°	3/16	2-1/2	996642	57.50	996642-C8	65.60
	.078 (5/64)	.062	II	1.107	**1.107**	3.0°	3/16	2-1/2	996649	55.80	996649-C8	63.90
	.093 (3/32)	.074	II	.976	**.976**	3.0°	3/16	2	996656	50.50	996656-C8	58.50
	.125 (1/8)	.100	II	1.293	**1.293**	2.9°	1/4	2-1/2	996663	69.30	996663-C8	78.50
	.187 (3/16)	.150	II	.746	**.746**	2.8°	1/4	2-1/2	996670	75.00	996670-C8	85.30
	.187 (3/16)	.150	II	1.939	**1.939**	2.9°	3/8	4	996674	78.10	996674-C8	98.50
	.250 (1/4)	.200	II	1.393	**1.393**	2.9°	3/8	2-1/2	996692	76.40	996692-C8	93.20
5°	.031 (1/32)	.025	II	.919	**.919**	5.0°	3/16	2	996007	55.50	996007-C8	63.50
	.047 (3/64)	.038	II	.841	**.841**	5.0°	3/16	2	996014	55.00	996014-C8	63.00
	.062 (1/16)	.050	II	.767	**.767**	4.9°	3/16	2	996021	51.70	996021-C8	59.70
	.078 (5/64)	.062	II	1.045	**1.045**	4.9°	1/4	2-1/2	996028	71.60	996028-C8	80.90
	.093 (3/32)	.074	II	.971	**.971**	4.9°	1/4	2-1/2	996035	72.20	996035-C8	81.50
	.125 (1/8)	.100	II	.814	**.814**	4.8°	1/4	2-1/2	996042	74.50	996042-C8	83.80
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	2-1/2	996087	77.10	996087-C8	91.70
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	2-1/2	996092	77.10	996092-C8	93.90
7°	.031 (1/32)	.025	II	.662	**.662**	6.9°	3/16	2	995607	55.00	995607-C8	63.00
	.047 (3/64)	.038	II	.610	**.610**	6.9°	3/16	2	995614	55.50	995614-C8	63.50
	.062 (1/16)	.050	II	.816	**.816**	6.9°	1/4	2-1/2	995621	71.60	995621-C8	80.90
	.078 (5/64)	.062	II	.762	**.762**	6.8°	1/4	2-1/2	995628	72.20	995628-C8	81.50
	.093 (3/32)	.074	II	.713	**.713**	6.7°	1/4	2-1/2	995635	68.00	995635-C8	77.30
	.125 (1/8)	.100	II	.609	**.609**	6.5°	1/4	2-1/2	995642	65.40	995642-C8	74.60
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	2-1/2	995687	77.10	995687-C8	91.70

NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes • Center cutting
- Solid carbide • CNC ground in the USA

TiB_2 Titanium Diboride	**Best used in Non-Abrasive Aluminum Alloys and Magnesium Alloys!** Extremely low affinity to aluminum. Prevents build-up on cutting edge and chip packing, extending tool life.
Amorphous Diamond	**Outstanding performance in Copper, Brass, Bronze and High Silicon Aluminum!** Improves wear resistance and lubricity. Thin film coating maintains sharp edge, improving performance and finish.

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	R +.001" −.001" +.025mm −.025mm	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
	.2 mm	.0078	**.03 mm**	.30 mm (1.5x)	3	4 mm	50 mm	986204	57.90	986204-C8	65.90		
	.2 mm	.0078	**.03 mm**	.60 mm (3x)	3	4 mm	50 mm	973504	57.90	973504-C8	65.90		
.010		.0100	**.002**	.030 (3x)	3	1/8	1-1/2	50010	47.20	50010-C8	55.30		
	.3 mm	.0118	**.05 mm**	.90 mm (3x)	3	4 mm	50 mm	973506	56.30	973506-C8	64.30		
.015 (1/64)		.0150	**.002**	.022 (1.5x)	3	1/8	1-1/2	61715	45.00	61715-C8	53.10		
.015 (1/64)		.0150	**.002**	.045 (3x)	3	1/8	1-1/2	50015	44.20	50015-C8	52.20	50015-C4	58.00
.015 (1/64)		.0150	**.002**	.078 (5x)	3	1/8	2-1/2	53015	53.70	53015-C8	61.30	53015-C4	68.10
	.4 mm	.0157	**.05 mm**	.60 mm (1.5x)	3	4 mm	50 mm	986209	47.70	986209-C8	55.70		
	.4 mm	.0157	**.05 mm**	1.20 mm (3x)	3	4 mm	50 mm	973509	47.70	973509-C8	55.70		
	.5 mm	.0196	**.05 mm**	.75 mm (1.5x)	3	4 mm	50 mm	986211	42.00	986211-C8	50.00		
	.5 mm	.0196	**.05 mm**	1.50 mm (3x)	3	4 mm	50 mm	973511	42.00	973511-C8	50.00		
.020		.0200	**.002**	.030 (1.5x)	3	1/8	1-1/2	61720	37.80	61720-C8	45.90		
.020		.0200	**.002**	.060 (3x)	3	1/8	1-1/2	50020	37.80	50020-C8	45.90	50020-C4	51.60
.020		.0200	**.002**	.100 (5x)	3	1/8	2-1/2	53020	47.00	53020-C8	55.10	53020-C4	61.40
	.6 mm	.0236	**.05 mm**	.90 mm (1.5x)	3	4 mm	50 mm	986213	40.40	986213-C8	48.40		
	.6 mm	.0236	**.05 mm**	1.80 mm (3x)	3	4 mm	50 mm	973513	40.10	973513-C8	48.10		
.025		.0250	**.002**	.038 (1.5x)	3	1/8	1-1/2	61725	36.50	61725-C8	43.60		
.025		.0250	**.002**	.075 (3x)	3	1/8	1-1/2	50025	36.50	50025-C8	44.50	50025-C4	50.30
.025		.0250	**.002**	.125 (5x)	3	1/8	2-1/2	53025	45.50	53025-C8	53.60	53025-C4	60.10
	.7 mm	.0275	**.08 mm**	2.10 mm (3x)	3	4 mm	50 mm	973515	40.10	973515-C8	48.10		
.031 (1/32)		.0310	**.003**	.047 (1.5x)	3	1/8	1-1/2	61731	30.30	61731-C8	38.40		
.031 (1/32)		.0310	**.003**	.093 (3x)	3	1/8	1-1/2	50031	30.30	50031-C8	38.40	50031-C4	44.10
.031 (1/32)		.0310	**.003**	.156 (5x)	3	1/8	2-1/2	53031	38.70	53031-C8	46.90	53031-C4	53.30
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	901531	29.80	901531-C8	37.90		
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	904631	29.80	904631-C8	37.90		
	.8 mm	.0314	**.08 mm**	1.20 mm (1.5x)	3	4 mm	50 mm	986218	34.10	986218-C8	42.10		
	.8 mm	.0314	**.08 mm**	2.40 mm (3x)	3	4 mm	50 mm	973518	34.10	973518-C8	42.10		
.035		.0350	**.003**	.053 (1.5x)	3	1/8	1-1/2	61735	30.30	61735-C8	38.40		
.035		.0350	**.003**	.105 (3x)	3	1/8	1-1/2	50035	30.10	50035-C8	37.20		
	.9 mm	.0354	**.08 mm**	2.7 mm (3x)	3	4 mm	50 mm	973520	34.10	973520-C8	42.10		
	1.0 mm	.0393	**.08 mm**	1.50 mm (1.5x)	3	4 mm	50 mm	986222	34.10	986222-C8	42.60		
	1.0 mm	.0393	**.08 mm**	3.00 mm (3x)	3	4 mm	50 mm	973522	33.80	973522-C8	42.30		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1			R	L_2		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.001″ −.001″ +.025mm −.025mm	+.010″ −.000″ +.25mm −.00mm									
.040		.0400	**.003**	.060 (1.5x)	3	1/8	1-1/2	61740	30.30	61740-C8	38.40		
.040		.0400	**.003**	.120 (3x)	3	1/8	1-1/2	50040	30.30	50040-C8	38.40		
.040		.0400	**.003**	.203 (5x)	3	1/8	2-1/2	53040	38.70	53040-C8	46.90		
	1.1 mm	.0433	**.08 mm**	3.00 mm (3x)	3	4 mm	50 mm	973524	34.10	973524-C8	42.10		
.045		.0450	**.003**	.135 (3x)	3	1/8	1-1/2	50045	30.30	50045-C8	37.40		
.047 (3/64)		.0470	**.003**	.070 (1.5x)	3	1/8	1-1/2	61747	30.30	61747-C8	38.40		
.047 (3/64)		.0470	**.003**	.141 (3x)	3	1/8	1-1/2	50047	30.10	50047-C8	38.20	50047-C4	43.90
.047 (3/64)		.0470	**.003**	.250 (5x)	3	1/8	2-1/2	53047	38.70	53047-C8	46.90	53047-C4	53.30
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	901547	29.80	901547-C8	36.90		
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	904647	29.80	904647-C8	37.90	904647-C4	43.60
.047 (3/64)		.0470	**.010**	.250 (5x)	3	1/8	2-1/2	840747	38.90	840747-C8	47.00		
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	912347	29.80	912347-C8	37.90		
	1.2 mm	.0472	**.08 mm**	1.80 mm (1.5x)	3	4 mm	50 mm	986227	34.10	986227-C8	42.10		
	1.2 mm	.0472	**.08 mm**	3.50 mm (3x)	3	4 mm	50 mm	973527	34.10	973527-C8	42.10		
.050		.0500	**.003**	.075 (1.5x)	3	1/8	1-1/2	61750	30.10	61750-C8	37.20		
.050		.0500	**.003**	.150 (3x)	3	1/8	1-1/2	50050	30.10	50050-C8	38.20		
.050		.0500	**.003**	.250 (5x)	3	1/8	2-1/2	53050	38.70	53050-C8	46.30		
	1.3 mm	.0511	**.08 mm**	4.00 mm (3x)	3	4 mm	50 mm	973529	34.10	973529-C8	42.10		
.055		.0550	**.003**	.083 (1.5x)	3	1/8	1-1/2	61755	30.10	61755-C8	38.20		
.055		.0550	**.003**	.165 (3x)	3	1/8	1-1/2	50055	30.10	50055-C8	37.20		
.055		.0550	**.003**	.275 (5x)	3	1/8	2-1/2	53055	38.70	53055-C8	46.90		
	1.4 mm	.0551	**.08 mm**	2.10 mm (1.5x)	3	4 mm	50 mm	986231	33.80	986231-C8	42.30		
	1.4 mm	.0551	**.08 mm**	4.00 mm (3x)	3	4 mm	50 mm	973531	34.10	973531-C8	42.10		
	1.5 mm	.0590	**.10 mm**	2.20 mm (1.5x)	3	4 mm	50 mm	986233	31.50	986233-C8	39.50		
	1.5 mm	.0590	**.10 mm**	4.50 mm (3x)	3	4 mm	50 mm	973533	31.50	973533-C8	39.50		
.060		.0600	**.005**	.090 (1.5x)	3	1/8	1-1/2	61760	30.10	61760-C8	38.20		
.060		.0600	**.005**	.180 (3x)	3	1/8	1-1/2	50060	30.10	50060-C8	38.20		
.060		.0600	**.005**	.312 (5x)	3	1/8	2-1/2	53060	39.10	53060-C8	47.20		
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	904660	38.10	904660-C8	46.20		
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	61762	27.90	61762-C8	36.00	61762-C4	41.70
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	50062	27.80	50062-C8	35.90	50062-C4	41.60
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	53062	36.70	53062-C8	44.80	53062-C4	51.00
.062 (1/16)		.0620	**.010**	.093 (1.5x)	3	1/8	1-1/2	878562	27.90	878562-C8	36.00		
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	904662	27.80	904662-C8	35.90		
.062 (1/16)		.0620	**.010**	.312 (5x)	3	1/8	2-1/2	840762	36.70	840762-C8	44.80		
.062 (1/16)		.0620	**.015**	.186 (3x)	3	1/8	1-1/2	912362	27.80	912362-C8	35.90		
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	925862	27.80	925862-C8	35.90		
	1.6 mm	.0629	**.10 mm**	2.40 mm (1.5x)	3	4 mm	50 mm	986236	31.30	986236-C8	39.90		
	1.6 mm	.0629	**.10 mm**	5.00 mm (3x)	3	4 mm	50 mm	973536	31.50	973536-C8	39.50		
	1.7 mm	.0669	**.10 mm**	5.00 mm (3x)	3	4 mm	50 mm	973538	31.50	973538-C8	39.50		
.070		.0700	**.005**	.210 (3x)	3	1/8	1-1/2	50070	29.00	50070-C8	37.00		
	1.8 mm	.0708	**.10 mm**	2.70 mm (1.5x)	3	4 mm	50 mm	986240	31.30	986240-C8	39.90		
	1.8 mm	.0708	**.10 mm**	5.50 mm (3x)	3	4 mm	50 mm	973540	31.50	973540-C8	40.10		
	1.9 mm	.0748	**.10 mm**	5.50 mm (3x)	3	4 mm	50 mm	973542	31.30	973542-C8	39.90		

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NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND		
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L2 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE	
.078 (5/64)		.0780	**.005**	.118 (1.5x)	3	1/8	1-1/2	61778	27.90	61778-C8	36.00	61778-C4	41.70	
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	50078	27.80	50078-C8	35.90	50078-C4	41.60	
.078 (5/64)		.0780	**.005**	.406 (5x)	3	1/8	2-1/2	53078	36.70	53078-C8	44.80	53078-C4	51.00	
.078 (5/64)		.0780	**.010**	.118 (1.5x)	3	1/8	1-1/2	878578	27.90	878578-C8	36.00			
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	904678	27.80	904678-C8	35.90			
.078 (5/64)		.0780	**.015**	.117 (1.5x)	3	1/8	1-1/2	831178	27.80	831178-C8	35.90			
.078 (5/64)		.0780	**.015**	.234 (3x)	3	1/8	1-1/2	912378	27.80	912378-C8	35.90	912378-C4	41.60	
.078 (5/64)		.0780	**.020**	.118 (1.5x)	3	1/8	1-1/2	725878	27.80	725878-C8	34.90			
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	925878	27.80	925878-C8	35.90	925878-C4	41.60	
.078 (5/64)		.0780	**.020**	.406 (5x)	3	1/8	2-1/2	838278	37.10	838278-C8	45.20			
	2.0 mm	.0787	**.10 mm**	3.00 mm (1.5x)	3	4 mm	50 mm	986245	31.30	986245-C8	39.90			
	2.0 mm	.0787	**.10 mm**	6.00 mm (3x)	3	4 mm	50 mm	973545	31.50	973545-C8	40.10			
.080		.0800	**.005**	.240 (3x)	3	1/8	1-1/2	50080	29.00	50080-C8	36.10			
.090		.0900	**.005**	.270 (3x)	3	1/8	1-1/2	50090	29.00	50090-C8	37.00			
.093 (3/32)		.0930	**.005**	.139 (1.5x)	3	1/8	1-1/2	61793	27.90	61793-C8	36.00	61793-C4	41.70	
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	50093	27.80	50093-C8	35.90	50093-C4	41.60	
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	53093	36.70	53093-C8	44.80	53093-C4	51.00	
.093 (3/32)		.0930	**.010**	.139 (1.5x)	3	1/8	1-1/2	878593	27.90	878593-C8	36.00	878593-C4	41.70	NEW
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	904693	27.80	904693-C8	35.90	904693-C4	41.60	
.093 (3/32)		.0930	**.010**	.500 (5x)	3	1/8	2-1/2	840793	36.70	840793-C8	44.80			
.093 (3/32)		.0930	**.015**	.279 (3x)	3	1/8	1-1/2	912393	27.80	912393-C8	35.90			
.093 (3/32)		.0930	**.020**	.139 (1.5x)	3	1/8	1-1/2	889493	28.40	889493-C8	36.50			
.093 (3/32)		.0930	**.020**	.279 (3x)	3	1/8	1-1/2	925893	27.80	925893-C8	35.90			
.093 (3/32)		.0930	**.030**	.139 (1.5x)	3	1/8	1-1/2	893893	27.90	893893-C8	36.00			
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	904193	27.80	904193-C8	35.90			
	2.5 mm	.0984	**.10 mm**	7.50 mm (3x)	3	4 mm	50 mm	973551	31.50	973551-C8	39.50			
.100		.1000	**.005**	.150 (1.5x)	3	1/8	1-1/2	61800	27.90	61800-C8	36.00			
.100		.1000	**.005**	.300 (3x)	3	1/8	1-1/2	50100	27.90	50100-C8	36.00			
.109 (7/64)		.1090	**.005**	.164 (1.5x)	3	1/8	1-1/2	61807	27.90	61807-C8	35.00			
.109 (7/64)		.1090	**.005**	.327 (3x)	3	1/8	1-1/2	50107	27.90	50107-C8	35.00			
	3.0 mm	.1181	**.10 mm**	9.00 mm (3x)	3	4 mm	50 mm	973557	31.30	973557-C8	39.90			

D1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L2 +.030″ −.000″		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	**.005**	.187 (1.5x)	3	1/8	1-1/2	61808	27.80	61808-C8	35.90	61808-C4	41.60
.125 (1/8)	.1250	**.005**	.375 (3x)	3	1/8	1-1/2	50108	27.80	50108-C8	35.90	50108-C4	41.60
.125 (1/8)	.1250	**.005**	.625 (5x)	3	1/8	2-1/2	53108	36.70	53108-C8	44.80	53108-C4	51.00
.125 (1/8)	.1250	**.010**	.187 (1.5x)	3	1/8	1-1/2	878608	26.50	878608-C8	34.50		
.125 (1/8)	.1250	**.010**	.375 (3x)	3	1/8	1-1/2	904708	25.80	904708-C8	33.80	904708-C4	39.60
.125 (1/8)	.1250	**.010**	.625 (5x)	3	1/8	2-1/2	840808	36.20	840808-C8	44.30		
.125 (1/8)	.1250	**.015**	.187 (1.5x)	3	1/8	1-1/2	831208	26.00	831208-C8	34.00		
.125 (1/8)	.1250	**.015**	.375 (3x)	3	1/8	1-1/2	912408	25.80	912408-C8	33.80	912408-C4	39.60
.125 (1/8)	.1250	**.015**	.625 (5x)	3	1/8	2-1/2	852408	36.20	852408-C8	44.30		
.125 (1/8)	.1250	**.020**	.187 (1.5x)	3	1/8	1-1/2	889508	29.20	889508-C8	37.20		
.125 (1/8)	.1250	**.020**	.375 (3x)	3	1/8	1-1/2	925908	25.80	925908-C8	33.80	925908-C4	39.60
.125 (1/8)	.1250	**.020**	.625 (5x)	3	1/8	2-1/2	838308	35.90	838308-C8	44.00		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

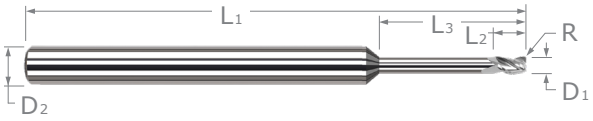
continued from previous page

CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	**.030**	.187 (1.5x)	3	1/8	1-1/2	893908	29.20	893908-C8	37.20		
.125 (1/8)	.1250	**.030**	.375 (3x)	3	1/8	1-1/2	904208	25.80	904208-C8	33.80	904208-C4	39.60
.125 (1/8)	.1250	**.030**	.625 (5x)	3	1/8	2-1/2	829708	35.90	829708-C8	44.00		
.125 (1/8)	.1250	**.040**	.375 (3x)	3	1/8	1-1/2	892808	31.40	892808-C8	39.50		
.140 (9/64)	.1406	**.015**	.425 (3x)	3	3/16	2	912409	28.90	912409-C8	36.90		
.156 (5/32)	.1562	**.005**	.235 (1.5x)	3	3/16	2	61810	28.90	61810-C8	36.90		
.156 (5/32)	.1562	**.005**	.470 (3x)	3	3/16	2	50110	28.90	50110-C8	36.90	50110-C4	45.50
.156 (5/32)	.1562	**.005**	.750 (5x)	3	3/16	3	53110	40.90	53110-C8	49.30		
.156 (5/32)	.1562	**.020**	.470 (3x)	3	3/16	2	925910	28.90	925910-C8	36.90		
.156 (5/32)	.1562	**.030**	.470 (3x)	3	3/16	2	904210	28.90	904210-C8	36.90		
.187 (3/16)	.1875	**.005**	.285 (1.5x)	3	3/16	2	61812	28.90	61812-C8	36.90	61812-C4	45.50
.187 (3/16)	.1875	**.005**	.562 (3x)	3	3/16	2	50112	28.90	50112-C8	36.90	50112-C4	45.50
.187 (3/16)	.1875	**.005**	1.000 (5x)	3	3/16	3	53112	40.90	53112-C8	49.50	53112-C4	57.30
.187 (3/16)	.1875	**.010**	.562 (3x)	3	3/16	2	904712	40.00	904712-C8	48.00		
.187 (3/16)	.1875	**.015**	.285 (1.5x)	3	3/16	2	831212	41.10	831212-C8	49.10		
.187 (3/16)	.1875	**.015**	.562 (3x)	3	3/16	2	912412	40.00	912412-C8	48.00		
.187 (3/16)	.1875	**.020**	.285 (1.5x)	3	3/16	2	889512	40.00	889512-C8	48.00		
.187 (3/16)	.1875	**.020**	.562 (3x)	3	3/16	2	925912	40.00	925912-C8	48.00		
.187 (3/16)	.1875	**.030**	.285 (1.5x)	3	3/16	2	893912	40.00	893912-C8	48.00		
.187 (3/16)	.1875	**.030**	.562 (3x)	3	3/16	2	904212	40.00	904212-C8	48.00	904212-C4	56.40
.187 (3/16)	.1875	**.030**	1.000 (5x)	3	3/16	3	829712	43.90	829712-C8	52.00		
.187 (3/16)	.1875	**.060**	.562 (3x)	3	3/16	2	834812	40.00	834812-C8	48.00		
.250 (1/4)	.2500	**.005**	.375 (1.5x)	3	1/4	2-1/2	726116	38.00	726116-C8	48.30		
.250 (1/4)	.2500	**.005**	.750 (3x)	3	1/4	2-1/2	901616	38.00	901616-C8	47.30		
.250 (1/4)	.2500	**.010**	.375 (1.5x)	3	1/4	2-1/2	61816	33.70	61816-C8	43.20	61816-C4	55.30
.250 (1/4)	.2500	**.010**	.750 (3x)	3	1/4	2-1/2	50116	33.70	50116-C8	43.20	50116-C4	55.30
.250 (1/4)	.2500	**.010**	1.250 (5x)	3	1/4	4	53116	50.00	53116-C8	60.20	53116-C4	71.20
.250 (1/4)	.2500	**.015**	.750 (3x)	3	1/4	2-1/2	912416	35.80	912416-C8	45.30		
.250 (1/4)	.2500	**.020**	.375 (1.5x)	3	1/4	2-1/2	889516	35.80	889516-C8	45.30		
.250 (1/4)	.2500	**.020**	.750 (3x)	3	1/4	2-1/2	925916	35.80	925916-C8	45.30	925916-C4	55.60
.250 (1/4)	.2500	**.030**	.375 (1.5x)	3	1/4	2-1/2	893916	35.80	893916-C8	45.30		
.250 (1/4)	.2500	**.030**	.750 (3x)	3	1/4	2-1/2	904216	35.80	904216-C8	45.30		
.250 (1/4)	.2500	**.060**	.750 (3x)	3	1/4	2-1/2	834816	35.80	834816-C8	45.30		
.375 (3/8)	.3750	**.015**	1.125 (3x)	3	3/8	2-1/2	912424	58.40	912424-C8	77.00		
.375 (3/8)	.3750	**.030**	1.125 (3x)	3	3/8	2-1/2	904224	58.40	904224-C8	77.00		
.375 (3/8)	.3750	**.060**	.570 (1.5x)	3	3/8	2-1/2	744960	58.40	744960-C8	77.00		
.500 (1/2)	.5000	**.015**	.750 (1.5x)	3	1/2	3	831232	85.20	831232-C8	102.20		
.500 (1/2)	.5000	**.030**	.750 (1.5x)	3	1/2	3	893932	85.20	893932-C8	102.20		

Please See Speeds & Feeds On Page 207

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities • Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- Small corner radius for improved strength • 3 flutes • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED	
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L2 +.010″ −.000″ +.25mm −.00mm	L3 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE
.015 (1/64)		.0150	**.002**	.023	.078 (5x)	3	1/8	2-1/2	956515	58.40	956515-C8	66.50
.015 (1/64)		.0150	**.002**	.023	.125 (8x)	3	1/8	2-1/2	961315	60.30	961315-C8	67.90
.020		.0200	**.002**	.030	.100 (5x)	3	1/8	2-1/2	956520	55.30	956520-C8	63.40
.025		.0250	**.002**	.038	.125 (5x)	3	1/8	2-1/2	956525	54.40	956525-C8	62.00
.031 (1/32)		.0310	**.003**	.047	.156 (5x)	3	1/8	2-1/2	956531	50.30	956531-C8	58.40
.031 (1/32)		.0310	**.003**	.047	.250 (8x)	3	1/8	2-1/2	961331	51.70	961331-C8	59.80
.031 (1/32)		.0310	**.003**	.047	.312 (10x)	3	1/8	2-1/2	861031	56.40	861031-C8	64.00
.031 (1/32)		.0310	**.003**	.047	.375 (12x)	3	1/8	2-1/2	949631	57.20	949631-C8	65.40
.031 (1/32)		.0310	**.010**	.047	.250 (8x)	3	1/8	2-1/2	876231	52.10	876231-C8	59.70
	1.0 mm	.0393	**.08 mm**	1.50 mm	5.0 mm (5x)	3	4 mm	50 mm	907622	55.90	907622-C8	63.90
.040		.0400	**.003**	.060	.203 (5x)	3	1/8	2-1/2	956540	50.60	956540-C8	58.20
.040		.0400	**.003**	.060	.325 (8x)	3	1/8	2-1/2	961340	51.70	961340-C8	59.80
.047 (3/64)		.0470	**.003**	.071	.250 (5x)	3	1/8	2-1/2	956547	50.30	956547-C8	58.40
.047 (3/64)		.0470	**.003**	.071	.375 (8x)	3	1/8	2-1/2	961347	51.70	961347-C8	59.80
.047 (3/64)		.0470	**.003**	.071	.570 (12x)	3	1/8	2-1/2	949647	57.20	949647-C8	65.40
.047 (3/64)		.0470	**.010**	.071	.375 (8x)	3	1/8	2-1/2	876247	52.10	876247-C8	60.20
.062 (1/16)		.0620	**.005**	.093	.312 (5x)	3	1/8	2-1/2	956562	50.30	956562-C8	58.40
.062 (1/16)		.0620	**.005**	.093	.500 (8x)	3	1/8	2-1/2	961362	51.70	961362-C8	59.80
.062 (1/16)		.0620	**.005**	.093	.625 (10x)	3	1/8	2-1/2	861062	55.90	861062-C8	64.00
.062 (1/16)		.0620	**.005**	.093	.750 (12x)	3	1/8	2-1/2	949662	57.20	949662-C8	65.40
.062 (1/16)		.0620	**.005**	.093	.950 (15x)	3	1/8	2-1/2	886862	57.20	886862-C8	65.40
.062 (1/16)		.0620	**.010**	.093	.500 (8x)	3	1/8	2-1/2	876262	51.70	876262-C8	59.80
.078 (5/64)		.0780	**.005**	.118	.406 (5x)	3	1/8	2-1/2	956578	50.30	956578-C8	58.40
.078 (5/64)		.0780	**.005**	.118	.625 (8x)	3	1/8	2-1/2	961378	51.70	961378-C8	59.80
.078 (5/64)		.0780	**.005**	.118	.940 (12x)	3	1/8	2-1/2	949678	57.20	949678-C8	65.40
.078 (5/64)		.0780	**.010**	.118	.625 (8x)	3	1/8	2-1/2	876278	51.70	876278-C8	59.80
	2.0 mm	.0787	**.10 mm**	3.00 mm	10.0 mm (5x)	3	4 mm	50 mm	907645	55.90	907645-C8	64.40
.093 (3/32)		.0930	**.005**	.140	.500 (5x)	3	1/8	2-1/2	956593	50.30	956593-C8	58.40
.093 (3/32)		.0930	**.005**	.140	.750 (8x)	3	1/8	2-1/2	961393	51.70	961393-C8	59.80
.093 (3/32)		.0930	**.005**	.140	.950 (10x)	3	1/8	2-1/2	861093	55.90	861093-C8	64.00
.093 (3/32)		.0930	**.005**	.140	1.125 (12x)	3	1/8	2-1/2	949693	57.20	949693-C8	65.40
.093 (3/32)		.0930	**.005**	.140	1.400 (15x)	3	1/8	3	886893	60.10	886893-C8	68.30
.093 (3/32)		.0930	**.010**	.140	.750 (8x)	3	1/8	2-1/2	876293	51.70	876293-C8	59.80
.093 (3/32)		.0930	**.030**	.140	.500 (5x)	3	1/8	2-1/2	761093	50.30	761093-C8	58.40
.093 (3/32)		.0930	**.030**	.140	.750 (8x)	3	1/8	2-1/2	891893	51.70	891893-C8	59.80
	3.0 mm	.1181	**.10 mm**	4.50 mm	15.0 mm (5x)	3	4 mm	50 mm	907657	52.60	907657-C8	61.10
D1 +.000″ −.002″		decimal equivalent	R +.001″ −.001″	L2 +.030″ −.000″	L3 +.030″ −.000″		D2 (h6)	L1	3 FL	PRICE	3 FL	PRICE
.125 (1/8)		.1250	**.005**	.187	.625 (5x)	3	1/8	2-1/2	956608	48.80	956608-C8	56.90
.125 (1/8)		.1250	**.005**	.187	1.000 (8x)	3	1/8	2-1/2	961408	50.00	961408-C8	58.00

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB$_2$ COATED	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	.1250	**.005**	.187	1.250 (10x)	3	1/8	2-1/2	861108	53.50	861108-C8	61.60
.125 (1/8)	.1250	**.005**	.187	1.500 (12x)	3	1/8	3	949708	54.80	949708-C8	62.90
.125 (1/8)	.1250	**.005**	.187	1.875 (15x)	3	1/8	3	886908	58.30	886908-C8	66.40
.125 (1/8)	.1250	**.010**	.187	1.000 (8x)	3	1/8	2-1/2	876308	50.00	876308-C8	58.00
.125 (1/8)	.1250	**.030**	.187	1.000 (8x)	3	1/8	2-1/2	891908	50.00	891908-C8	58.00
.156 (5/32)	.1562	**.005**	.235	.750 (5x)	3	3/16	3	956610	54.90	956610-C8	63.00
.156 (5/32)	.1562	**.005**	.235	1.250 (8x)	3	3/16	3	961410	56.40	961410-C8	64.50
.187 (3/16)	.1875	**.005**	.285	1.000 (5x)	3	3/16	3	956612	54.90	956612-C8	63.00
.187 (3/16)	.1875	**.005**	.285	1.500 (8x)	3	3/16	3	961412	56.40	961412-C8	64.50
.187 (3/16)	.1875	**.005**	.285	2.250 (12x)	3	3/16	4	949712	71.40	949712-C8	80.10
.187 (3/16)	.1875	**.030**	.285	1.000 (5x)	3	3/16	3	761112	54.90	761112-C8	63.00
.187 (3/16)	.1875	**.030**	.285	1.500 (8x)	3	3/16	3	891912	56.40	891912-C8	64.50
.250 (1/4)	.2500	**.010**	.375	1.250 (5x)	3	1/4	4	956616	58.60	956616-C8	69.10
.250 (1/4)	.2500	**.010**	.375	2.000 (8x)	3	1/4	4	961416	59.80	961416-C8	70.30
.250 (1/4)	.2500	**.010**	.375	3.000 (12x)	3	1/4	6	949716	75.70	949716-C8	89.70
.250 (1/4)	.2500	**.030**	.375	1.250 (5x)	3	1/4	4	761116	58.60	761116-C8	69.10
.250 (1/4)	.2500	**.030**	.375	2.000 (8x)	3	1/4	4	891916	59.80	891916-C8	70.30

Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For Aluminum Alloys)

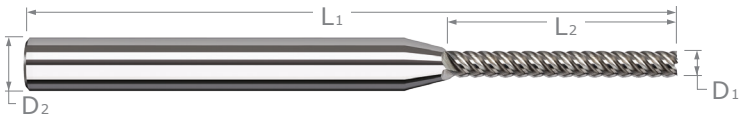
Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

Cutter Series	Material	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter								
			.015	.031	.047	.062	.078	.093	.125	.187	.250
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Roughing	.00018	.00038	.00058	.00076	.00096	.00115	.00154	.00230	.00308
	Magnesium Alloys: All alloys	1500	Finishing	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Zinc Alloys: All alloys	800	Max	.00021	.00044	.00066	.00087	.00110	.00131	.00176	.00263	.00352
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225	Slotting	.00013	.00026	.00040	.00052	.00066	.00079	.00106	.00158	.00211
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500	Roughing	.00015	.00031	.00046	.00061	.00077	.00092	.00123	.00184	.00246
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Finishing	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Max	.00017	.00035	.00053	.00070	.00088	.00105	.00141	.00211	.00282
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500				**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia		**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia		
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225										
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550										
TiB$_2$	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Slotting	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Roughing	.00024	.00050	.00075	.00099	.00125	.00149	.00200	.00299	.00400
	Magnesium Alloys: All alloys	2000	Finishing	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429
	Zinc Alloys: All alloys	1100	Max	.00027	.00057	.00086	.00113	.00143	.00170	.00229	.00342	.00458
						Radial Depth of Cut*: Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia		**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia		
Amorphous Diamond	**Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500	Slotting	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000	Roughing	.00020	.00042	.00064	.00084	.00106	.00126	.00169	.00253	.00339
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500	Finishing	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000	Max	.00023	.00048	.00073	.00096	.00121	.00144	.00194	.00290	.00387
	Wrought - 5% - 8% Si (4xxx)	2200										
	Wrought - 8% - 12% Si (4xxx)	1700										
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	800	Slotting	.00014	.00029	.00044	.00058	.00072	.00086	.00116	.00174	.00232
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	1500	Roughing	.00016	.00034	.00051	.00067	.00085	.00101	.00136	.00203	.00271
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800	Finishing	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000	Max	.00019	.00038	.00058	.00077	.00097	.00115	.00155	.00232	.00310
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000				**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .3x Dia; Finishing: .1x Dia		**Axial Depth of Cut*:** Slotting: .3x Dia; Roughing: .3x - .8x Dia; Finishing: .5x - 1x Dia		
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800										
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150										
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750										

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 50°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation • h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	66715	52.80	66715-C8	60.90
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	67115	52.50	67115-C8	60.10
.020		.0200	**.100** (5x)	4	1/8	2-1/2	66720	50.40	66720-C8	58.40
.020		.0200	**.160** (8x)	4	1/8	2-1/2	67120	53.10	67120-C8	60.70
.025		.0250	**.125** (5x)	4	1/8	2-1/2	66725	49.00	66725-C8	57.10
.025		.0250	**.203** (8x)	4	1/8	2-1/2	67125	50.20	67125-C8	58.20
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	948831	33.40	948831-C8	41.50
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	66731	46.80	66731-C8	54.90
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	67131	48.10	67131-C8	56.10
.031 (1/32)		.0310	**.312** (10x)	5	1/8	2-1/2	917631	61.40	917631-C8	69.40
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	915522	48.70	915522-C8	56.70
	1.0 mm	.0393	**8.00 mm** (8x)	5	4 mm	50 mm	907122	50.80	907122-C8	59.40
.040		.0400	**.203** (5x)	5	1/8	2-1/2	66740	46.80	66740-C8	54.90
.040		.0400	**.325** (8x)	5	1/8	2-1/2	67140	48.10	67140-C8	56.10
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	948847	33.40	948847-C8	41.50
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	66747	46.80	66747-C8	54.90
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	67147	48.10	67147-C8	56.10
.050		.0500	**.250** (5x)	5	1/8	2-1/2	66750	46.80	66750-C8	54.90
.050		.0500	**.400** (8x)	5	1/8	2-1/2	67150	48.10	67150-C8	56.10
.060		.0600	**.312** (5x)	5	1/8	2-1/2	66760	43.40	66760-C8	51.50
.060		.0600	**.500** (8x)	5	1/8	2-1/2	67160	44.80	67160-C8	52.90
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	948862	31.20	948862-C8	39.20
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	66762	43.40	66762-C8	51.50
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	67162	44.80	67162-C8	52.90
.062 (1/16)		.0620	**.625** (10x)	5	1/8	2-1/2	917662	65.90	917662-C8	74.00
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	948878	31.20	948878-C8	39.20
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	66778	43.40	66778-C8	51.50
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	67178	44.80	67178-C8	52.90
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	915545	47.70	915545-C8	56.20
	2.0 mm	.0787	**16.00 mm** (8x)	5	4 mm	50 mm	907145	48.70	907145-C8	57.20
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	948893	31.20	948893-C8	39.20
.093 (3/32)		.0930	**.375** (4x)	5	1/8	2-1/2	829493	42.90	829493-C8	51.00
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	66793	43.40	66793-C8	51.50
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	67193	44.80	67193-C8	52.90
.093 (3/32)		.0930	**.950** (10x)	5	1/8	2-1/2	917693	67.20	917693-C8	74.80

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB2 COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.100		.1000	**.500** (5x)	5	1/8	2-1/2	66800	43.40	66800-C8	51.50
.100		.1000	**.800** (8x)	5	1/8	2-1/2	67200	44.80	67200-C8	52.90
.109 (7/64)		.1090	**.570** (5x)	5	1/8	2-1/2	66802	43.40	66802-C8	51.50
.109 (7/64)		.1090	**.900** (8x)	5	1/8	2-1/2	67202	44.80	67202-C8	52.90
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	915557	47.20	915557-C8	55.80
	3.0 mm	.1181	**24.00 mm** (8x)	5	4 mm	50 mm	907157	48.70	907157-C8	57.20

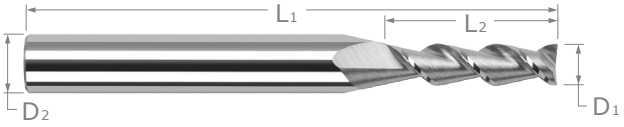
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	856908	28.90	856908-C8	36.90
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	948908	28.90	948908-C8	36.90
.125 (1/8)	.1250	**.500** (4x)	5	1/8	2-1/2	829508	41.80	829508-C8	49.90
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	66808	42.40	66808-C8	50.40
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	67208	43.90	67208-C8	52.00
.125 (1/8)	.1250	**1.125** (10x)	5	1/8	2-1/2	917708	66.00	917708-C8	74.10
.156 (5/32)	.1562	**.750** (5x)	5	3/16	3	66810	45.30	66810-C8	53.40
.156 (5/32)	.1562	**1.250** (8x)	5	3/16	3	67210	48.10	67210-C8	56.10
.187 (3/16)	.1875	**.285** (1.5x)	5	3/16	2	856912	34.00	856912-C8	42.00
.187 (3/16)	.1875	**.570** (3x)	5	3/16	2	948912	34.00	948912-C8	42.00
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	66812	45.30	66812-C8	53.40
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	67212	48.10	67212-C8	56.10
.187 (3/16)	.1875	**1.875** (10x)	5	3/16	4	917712	67.00	917712-C8	75.80
.250 (1/4)	.2500	**.375** (1.5x)	5	1/4	2-1/2	856916	44.90	856916-C8	54.20
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	948916	44.90	948916-C8	54.20
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	66816	55.30	66816-C8	65.80
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	67216	57.90	67216-C8	68.40
.375 (3/8)	.3750	**1.125** (3x)	5	3/8	2-1/2	948924	62.70	948924-C8	80.60
.500 (1/2)	.5000	**1.500** (3x)	5	1/2	3	948932	84.50	948932-C8	104.90

SPEEDS & FEEDS (High Helix Finishers for Aluminum & Non-Ferrous Alloys)

Cutter Series	Material	SFM		Chip Load Per Tooth (IPT) .015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Axial
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750												
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Finishing (3x LOC)	.00027	.00056	.00085	.00112	.00140	.00167	.00225	.00337	.00450	.12x Dia	.5x - 3x Dia
	Magnesium Alloys: All alloys	1500												
	Zinc Alloys: All alloys	800												
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225												
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500	Finishing (4x LOC)	.00024	.00049	.00074	.00098	.00123	.00146	.00197	.00295	.00394	.10x Dia	.5x - 4x Dia
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225												
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Finishing (5x LOC)	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.09x Dia	.5x - 5x Dia
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500												
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225	Finishing (8x LOC)	.00015	.00031	.00047	.00061	.00077	.00092	.00124	.00185	.00248	.07x Dia	.5x - 8x Dia
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Finishing (10x LOC)	.00014	.00029	.00044	.00058	.00073	.00087	.00117	.00175	.00234	.05x Dia	.5x - 10x Dia
TiB2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Finishing (3x LOC)	.00035	.00073	.00110	.00145	.00183	.00218	.00293	.00438	.00585	.12x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00031	.00063	.00096	.00127	.00160	.00190	.00256	.00383	.00512	.10x Dia	.5x - 4x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Finishing (5x LOC)	.00026	.00054	.00082	.00109	.00137	.00163	.00219	.00328	.00439	.09x Dia	.5x - 5x Dia
	Magnesium Alloys: All alloys	2000	Finishing (8x LOC)	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00241	.00322	.07x Dia	.5x - 8x Dia
	Zinc Alloys: All alloys	1100	Finishing (10x LOC)	.00018	.00038	.00057	.00075	.00095	.00113	.00152	.00228	.00304	.05x Dia	.5x - 10x Dia

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square



◀ **Down to .010"!**

- 2 flute and 3 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

Outstanding in Aluminum!

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIA.	OVERALL LENGTH	UNCOATED			ZrN COATED		TiB_2 COATED		
D_1 +.0005" −.0005"	L_2 +.010" −.000"	D_2 (h6)	L_1	2 FL	3 FL	PRICE	2 FL	PRICE	2 FL	3 FL	PRICE
.010	**.030** (3x)	1/8	1-1/2	24110		33.70			24110-C8		40.80
.015 (1/64)	**.045** (3x)	1/8	1-1/2	24115		32.90			24115-C8		40.90
.020	**.060** (3x)	1/8	1-1/2	24120		30.90			24120-C8		38.90
.025	**.075** (3x)	1/8	1-1/2	24125		28.60			24125-C8		36.70
.030	**.090** (3x)	1/8	1-1/2	24130		24.80			24130-C8		31.90
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	935531		24.80			935531-C8		32.90
.031 (1/32)	**.093** (3x)	1/8	1-1/2	24131	747431	24.80	24131-C7	31.50	24131-C8	747431-C8	32.90
.031 (1/32)	**.156** (5x)	1/8	2-1/2	932031		31.90			932031-C8		40.00
.039 (1 mm)	**.117** (3x)	1/8	1-1/2	24139		24.80			24139-C8		32.90
.040	**.120** (3x)	1/8	1-1/2	24140		24.80	24140-C7	31.50	24140-C8		32.90
.040	**.203** (5x)	1/8	2-1/2	932040		31.90			932040-C8		40.00
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2	935547		24.80			935547-C8		32.90
.047 (3/64)	**.141** (3x)	1/8	1-1/2	24147	747447	24.80	24147-C7	31.50	24147-C8	747447-C8	32.90
.047 (3/64)	**.250** (5x)	1/8	2-1/2	932047		31.90			932047-C8		40.00
.050	**.150** (3x)	1/8	1-1/2	24150		24.80	24150-C7	31.50	24150-C8		32.90
.050	**.250** (5x)	1/8	2-1/2	932050		31.90			932050-C8		40.00
.060	**.180** (3x)	1/8	1-1/2	24160		24.80	24160-C7	31.50	24160-C8		32.90
.060	**.312** (5x)	1/8	2-1/2	932060		33.70			932060-C8		41.80
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	935562		21.70			935562-C8		29.80
.062 (1/16)	**.186** (3x)	1/8	1-1/2	24162	747462	21.70	24162-C7	28.30	24162-C8	747462-C8	29.80
.062 (1/16)	**.250** (4x)	1/8	2-1/2	789662		33.10			789662-C8		41.10
.062 (1/16)	**.312** (5x)	1/8	2-1/2	932062		33.10	932062-C7	39.50	932062-C8		41.10
.070	**.210** (3x)	1/8	1-1/2	24170		21.70	24170-C7	28.30	24170-C8		29.80
.078 (5/64)	**.117** (1.5x)	1/8	1-1/2	935578		21.70			935578-C8		29.80
.078 (5/64)	**.234** (3x)	1/8	1-1/2	24178	747478	21.70	24178-C7	28.30	24178-C8	747478-C8	29.80
.078 (5/64)	**.406** (5x)	1/8	2-1/2	932078		33.10			932078-C8		41.10
.080	**.240** (3x)	1/8	1-1/2	24180		21.70	24180-C7	28.80	24180-C8		29.80
.090	**.270** (3x)	1/8	1-1/2	24190		21.70	24190-C7	28.30	24190-C8		29.80
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	935593		21.70			935593-C8		29.80
.093 (3/32)	**.279** (3x)	1/8	1-1/2	24193	747493	21.70	24193-C7	28.30	24193-C8	747493-C8	29.80
.093 (3/32)	**.375** (4x)	1/8	2-1/2	789693		33.10			789693-C8		41.10
.093 (3/32)	**.500** (5x)	1/8	2-1/2	932093		33.10			932093-C8		41.10
.100	**.300** (3x)	1/8	1-1/2	24199		21.70	24199-C7	28.30	24199-C8		29.80
.109 (7/64)	**.327** (3x)	1/8	1-1/2	24202		32.90			24202-C8		40.90
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	24205		32.50			24205-C8		40.60

continued on next page

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIA.	OVERALL LENGTH	UNCOATED			ZrN COATED		TiB_2 COATED		
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2 (h6)	L_1	2 FL	3 FL	PRICE	2 FL	PRICE	2 FL	3 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	935608		19.40			935608-C8		27.40
.125 (1/8)	**.375** (3x)	1/8	1-1/2	752708	747508	19.60			752708-C8	747508-C8	27.60
.125 (1/8)	**.500** (4x)	1/8	1-1/2	24208		19.40	24208-C7	26.10	24208-C8		27.40
.125 (1/8)	**.625** (5x)	1/8	2-1/2	932108		27.10			932108-C8		35.10
.140 (9/64)	**.500** (3x)	3/16	2	24209		27.00			24209-C8		35.00
.156 (5/32)	**.235** (1.5x)	3/16	2	935610		22.10			935610-C8		30.10
.156 (5/32)	**.562** (3x)	3/16	2	24210		22.10	24210-C7	30.60	24210-C8		30.10
.156 (5/32)	**.750** (5x)	3/16	3	932110		27.10			932110-C8		35.50
.187 (3/16)	**.285** (1.5x)	3/16	2	935612		22.10			935612-C8		30.10
.187 (3/16)	**.625** (3x)	3/16	2	24212		21.90	24212-C7	29.20	24212-C8		29.90
.187 (3/16)	**1.000** (5x)	3/16	3	932112		27.10			932112-C8		35.50
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	935616		27.30			935616-C8		36.70
.250 (1/4)	**.750** (3x)	1/4	2-1/2	24216		27.30	24216-C7	37.70	24216-C8		36.70
.250 (1/4)	**1.250** (5x)	1/4	4	932116		33.90			932116-C8		44.90
.375 (3/8)	**1.125** (3x)	3/8	2-1/2	752724		37.30			752724-C8		56.80

Speeds & Feeds (45° Helix)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 90%; for 5x, reduce to 80%), For complete speeds and feeds charts, please see www.harveytool.com

SERIES	MATERIAL	SFM	CHIP LOAD PER TOOTH (IPT) BY CUTTER DIAMETER
Uncoated	**Aluminum Alloys:**		
	Casting (2xx, 5xx, 7xx, 8xx)	750	
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	
	Copper Alloys:		
	High Coppers - 90%+ (C1xxxx)	225	
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500	
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500	
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225	
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	
	Magnesium Alloys	1500	
	Zinc Alloys	800	

	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250
Roughing	.00037	.00056	.00074	.00094	.00112	.00150	.00224	.00300
Finishing	.00025	.00038	.00050	.00062	.00074	.00100	.00150	.00200

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: 1x - 3x Dia

SERIES	MATERIAL	SFM
ZrN	**Aluminum Alloys (High Silicon):**	
	Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000
	Wrought - 5% - 8% Si (4xxx)	2200
	Wrought - 8% - 12% Si (4xxx)	1700
	Copper Alloys:	
	High Coppers - 90%+ (C1xxxx)	800
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	1500
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750
	Magnesium Alloys	2000
	Zinc Alloys	1100

	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00039	.00059	.00078	.00098	.00116	.00156	.00234	.00313
Roughing	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
Finishing	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250

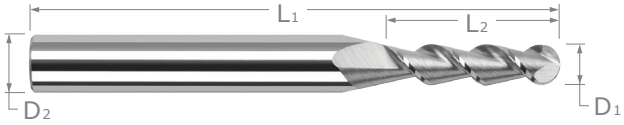
Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: 1x - 3x Dia

SERIES	MATERIAL	SFM
TiB_2	**Aluminum Alloys:**	
	Casting (2xx, 5xx, 7xx, 8xx)	1000
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400
	Magnesium Alloys	2000
	Zinc Alloys	1100

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Ball



- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

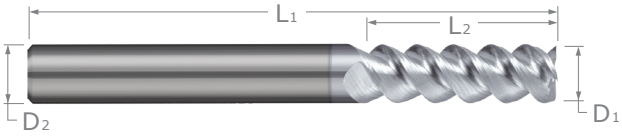
Outstanding in Aluminum!

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB_2 COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.015 (1/64)	**.045** (3x)	1/8	1-1/2	27815	37.80			27815-C8	44.90
.020	**.060** (3x)	1/8	1-1/2	27820	35.30			27820-C8	43.40
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	894831	28.60			894831-C8	35.70
.031 (1/32)	**.093** (3x)	1/8	1-1/2	27831	28.60	27831-C7	35.30	27831-C8	36.70
.031 (1/32)	**.156** (5x)	1/8	2-1/2	887631	35.40			887631-C8	43.00
.040	**.120** (3x)	1/8	1-1/2	27840	28.60	27840-C7	35.30	27840-C8	35.70
.047 (3/64)	**.141** (3x)	1/8	1-1/2	27847	28.60	27847-C7	35.30	27847-C8	36.70
.050	**.150** (3x)	1/8	1-1/2	27850	28.60	27850-C7	35.30	27850-C8	35.70
.060	**.180** (3x)	1/8	1-1/2	27860	28.60	27860-C7	35.30	27860-C8	36.70
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	894862	27.10			894862-C8	35.10
.062 (1/16)	**.186** (3x)	1/8	1-1/2	27862	27.10	27862-C7	33.70	27862-C8	35.10
.062 (1/16)	**.312** (5x)	1/8	2-1/2	887662	35.40			887662-C8	43.00
.070	**.210** (3x)	1/8	1-1/2	27870	27.60	27870-C7	34.70	27870-C8	34.70
.078 (5/64)	**.234** (3x)	1/8	1-1/2	27878	27.10	27878-C7	33.70	27878-C8	35.10
.080	**.240** (3x)	1/8	1-1/2	27880	27.10	27880-C7	33.70	27880-C8	34.20
.090	**.270** (3x)	1/8	1-1/2	27890	27.60	27890-C7	34.30	27890-C8	34.70
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	894893	27.10			894893-C8	34.20
.093 (3/32)	**.279** (3x)	1/8	1-1/2	27893	27.10	27893-C7	33.70	27893-C8	35.10
.093 (3/32)	**.500** (5x)	1/8	2-1/2	887693	36.10			887693-C8	44.20
.100	**.300** (3x)	1/8	1-1/2	27899	27.10	27899-C7	33.70	27899-C8	35.10
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	27905	36.90			27905-C8	44.90
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	894908	24.90			894908-C8	32.90
.125 (1/8)	**.500** (4x)	1/8	1-1/2	27908	24.20	27908-C7	31.00	27908-C8	32.20
.125 (1/8)	**.625** (5x)	1/8	2-1/2	887708	30.50			887708-C8	38.50
.156 (5/32)	**.562** (3x)	3/16	2	27910	26.30			27910-C8	34.30
.187 (3/16)	**.625** (3x)	3/16	2	27912	26.30	27912-C7	33.70	27912-C8	34.30
.250 (1/4)	**.750** (3x)	1/4	2-1/2	27916	30.00	27916-C7	40.40	27916-C8	39.50

Please See Speeds & Feeds On Page 224

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

60° Helix – Square



- 60° helix for excellent finishing operations in aluminum and other non-ferrous materials
- High helix design for faster chip removal
- h6 tolerance for high precision holders
- Center cutting
- Solid carbide
- CNC ground in the USA

Outstanding in Aluminum!

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.031 (1/32)	**.093** (3x)	1/8	1-1/2	745231	26.20	745231-C8	33.30
.062 (1/16)	**.186** (3x)	1/8	1-1/2	745262	23.10	745262-C8	31.20
.093 (3/32)	**.279** (3x)	1/8	1-1/2	745293	23.10	745293-C8	30.20
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
.125 (1/8)	**.375** (3x)	1/8	1-1/2	745308	20.90	745308-C8	29.00
.187 (3/16)	**.563** (3x)	3/16	2	745312	23.60	745312-C8	31.60
.250 (1/4)	**.750** (3x)	1/4	2-1/2	745316	29.20	745316-C8	38.20
.375 (3/8)	**1.125** (3x)	3/8	2-1/2	745324	39.80	745324-C8	54.40

SPEEDS & FEEDS (High Helix for Aluminum & Non-Ferrous Alloys)

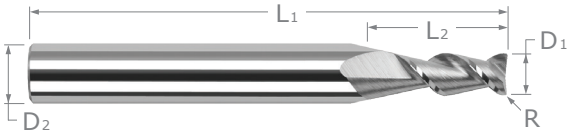
Important Note: : Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased. For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 90%; for 5x, reduce to 80%), For complete speeds and feeds charts, please see www.harveytool.com

Cutter Series	Material	SFM		Chip Load Per Tooth (IPT) .015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Axial
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00014	.00028	.00043	.00049	.00062	.00074	.00099	.00148	.00198	1x Dia	.5x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000												
	Magnesium Alloys	1500												
	Zinc Alloys	800												
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Roughing	.00014	.00028	.00043	.00049	.00062	.00074	.00099	.00148	.00198	.5x Dia	.5x - 1x Dia
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500												
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	225	Finishing	.00017	.00036	.00054	.00062	.00078	.00093	.00125	.00187	.00250	.1x Dia	1x - 3x Dia
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	550												
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Slotting	.00018	.00037	.00056	.00064	.00080	.00096	.00129	.00193	.00257	.12x Dia	.5x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400												
	Magnesium Alloys	2000	Roughing	.00018	.00037	.00056	.00064	.00080	.00096	.00129	.001993	.00257	.05x Dia	.5x - 1x Dia
	Zinc Alloys	1100	Finishing	.00022	.00046	.00070	.00081	.00102	.00121	.00163	.00243	.00325	1x Dia	1x - 3x Dia

NEW!

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Corner Radius

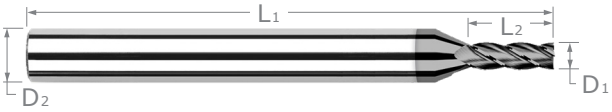


- Corner radius for improved strength
- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- TiB2 coating prevents built-up edge and extends tool life
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB2 COATED		
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	
.031 (1/32)	.010	**.093** (3x)	1/8	1-1/2	718031	26.70	718031-C8	33.80	NEW
.047 (3/64)	.010	**.141** (3x)	1/8	1-1/2	718047	26.70	718047-C8	33.80	NEW
.062 (1/16)	.010	**.186** (3x)	1/8	1-1/2	718062	24.40	718062-C8	31.50	NEW
.078 (5/64)	.010	**.234** (3x)	1/8	1-1/2	718078	24.40	718078-C8	31.50	NEW
.093 (3/32)	.010	**.279** (3x)	1/8	1-1/2	718093	24.40	718093-C8	31.50	NEW
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	
.125 (1/8)	.010	**.375** (3x)	1/8	1-1/2	718108	21.90	718108-C8	29.00	NEW
.187 (3/16)	.010	**.570** (3x)	3/16	2	718112	24.10	718112-C8	32.10	NEW
.250 (1/4)	.010	**.750** (3x)	1/4	2-1/2	718116	28.60	718116-C8	38.90	NEW

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square



Outstanding in Graphite!

- True crystalline CVD diamond on solid carbide substrate
- 4 µm CVD diamond coating yields a sharper cutting edge and therefore leaves a smoother finish on non-ferrous alloys and composites
- 9 µm CVD diamond coating offers increased tool life for non-ferrous alloys and composites, especially higher abrasive materials such as graphite, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- 4 flutes • h6 shank tolerance for high precision tool holders
- Center cutting • CNC ground in the USA

CVD diamond (4 µm) layer for a balance between wear resistance and edge sharpness.

CVD diamond (9 µm) layer for increased tool life, especially in abrasive materials.

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
.015 (1/64)	**.023** (1.5x)	1/8	1-1/2			962715	97.30
.015 (1/64)	**.045** (3x)	1/8	1-1/2	799715	83.50	995715	97.30
.015 (1/64)	**.078** (5x)	1/8	2-1/2			936615	110.10
.020	**.030** (1.5x)	1/8	1-1/2			962720	98.20
.020	**.060** (3x)	1/8	1-1/2	799720	83.50	995720	97.30
.020	**.100** (5x)	1/8	2-1/2			936620	110.10
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2			962731	97.30
.031 (1/32)	**.093** (3x)	1/8	1-1/2	799731	83.50	995731	97.30
.031 (1/32)	**.156** (5x)	1/8	2-1/2			936631	110.10
.031 (1/32)	**.250** (8x)	1/8	2-1/2			891531	98.20
.039 (1 mm)	**.117** (3x)	1/8	1-1/2			995739	97.30
.040	**.120** (3x)	1/8	1-1/2			995740	97.30
.040	**.203** (5x)	1/8	2-1/2			936640	110.10
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2			962747	97.30
.047 (3/64)	**.141** (3x)	1/8	1-1/2	799747	83.50	995747	97.30
.047 (3/64)	**.250** (5x)	1/8	2-1/2			936647	110.10
.050	**.150** (3x)	1/8	1-1/2			995750	97.30
.050	**.250** (5x)	1/8	2-1/2			936650	110.10
.060	**.090** (1.5x)	1/8	1-1/2			962760	98.20
.060	**.180** (3x)	1/8	1-1/2			995760	97.30
.060	**.312** (5x)	1/8	2-1/2			936660	110.10
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2			962762	96.40
.062 (1/16)	**.186** (3x)	1/8	1-1/2	799762	81.90	995762	96.40
.062 (1/16)	**.250** (4x)	1/8	2-1/2			871262	108.50
.062 (1/16)	**.312** (5x)	1/8	2-1/2			936662	109.60
.062 (1/16)	**.500** (8x)	1/8	2-1/2			891562	112.70
.078 (5/64)	**.118** (1.5x)	1/8	1-1/2			962778	97.40
.078 (5/64)	**.234** (3x)	1/8	1-1/2			995778	96.40
.078 (5/64)	**.406** (5x)	1/8	2-1/2			936678	109.60
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2			962793	96.40
.093 (3/32)	**.279** (3x)	1/8	1-1/2	799793	82.70	995793	96.40
.093 (3/32)	**.375** (4x)	1/8	2-1/2			871293	108.50
.093 (3/32)	**.500** (5x)	1/8	2-1/2			936693	109.60
.093 (3/32)	**.750** (8x)	1/8	2-1/2			891593	112.70

continued on next page

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

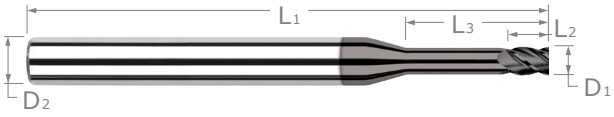
CVD Diamond – Square (cont.)

continued from previous page

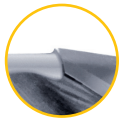
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
.100	**.300** (3x)	1/8	1-1/2			995800	97.40
.109 (7/64)	**.327** (3x)	1/8	1-1/2			995802	96.40
.118 (3 mm)	**.354** (3x)	1/8	1-1/2			995805	96.40
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2			962808	98.20
.125 (1/8)	**.375** (3x)	1/8	1-1/2	799808	83.40	995808	98.20
.125 (1/8)	**.500** (4x)	1/8	2-1/2			871308	108.80
.125 (1/8)	**.625** (5x)	1/8	2-1/2			936708	110.10
.125 (1/8)	**1.000** (8x)	1/8	2-1/2			891608	113.20
.140 (9/64)	**.425** (3x)	3/16	2			995809	124.50
.156 (5/32)	**.235** (1.5x)	3/16	2			962810	123.30
.156 (5/32)	**.470** (3x)	3/16	2			995810	123.30
.187 (3/16)	**.285** (1.5x)	3/16	2			962812	123.30
.187 (3/16)	**.570** (3x)	3/16	2	799812	104.80	995812	123.30
.187 (3/16)	**.750** (4x)	3/16	3			871312	141.50
.187 (3/16)	**1.000** (5x)	3/16	3	741912	133.00	936712	156.90
.187 (3/16)	**1.500** (8x)	3/16	3			891612	174.60
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2			962816	164.40
.250 (1/4)	**.750** (3x)	1/4	2-1/2	799816	139.70	995816	164.40
.250 (1/4)	**1.000** (4x)	1/4	4			871316	174.10
.250 (1/4)	**1.250** (5x)	1/4	4			936716	176.80
.312 (5/16)	**.470** (1.5x)	5/16	2-1/2			962820	184.50
.312 (5/16)	**1.000** (3x)	5/16	2-1/2			995820	184.50
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2			962824	197.40
.375 (3/8)	**1.125** (3x)	3/8	2-1/2	741924	176.40	995824	208.20
.375 (3/8)	**2.000** (5x)	3/8	4			936724	217.60
.500 (1/2)	**.750** (1.5x)	1/2	3			962832	318.30
.500 (1/2)	**1.500** (3x)	1/2	3	741932	277.50	995832	327.70
.500 (1/2)	**2.625** (5x)	1/2	6			936732	338.50

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square – Long Reach, Stub Flute



Outstanding in Graphite!



Reduced Neck Diameter to Avoid Heeling

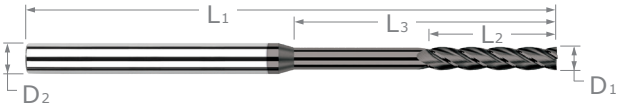
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity • 4 flutes
- h6 shank tolerance for high precision tool holders • Center cutting • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.023	**.078** (5x)	1/8	2-1/2	943015	146.80
.015 (1/64)	.023	**.125** (8x)	1/8	2-1/2	960215	146.80
.015 (1/64)	.023	**.187** (12x)	1/8	2-1/2	974615	150.40
.020	.030	**.100** (5x)	1/8	2-1/2	943020	146.80
.020	.030	**.160** (8x)	1/8	2-1/2	960220	146.80
.020	.030	**.250** (12x)	1/8	2-1/2	974620	150.40
.025	.038	**.125** (5x)	1/8	2-1/2	943025	146.80
.025	.038	**.203** (8x)	1/8	2-1/2	960225	146.80
.025	.038	**.312** (12x)	1/8	2-1/2	974625	150.40
.031 (1/32)	.047	**.156** (5x)	1/8	2-1/2	943031	146.80
.031 (1/32)	.047	**.250** (8x)	1/8	2-1/2	960231	146.80
.031 (1/32)	.047	**.375** (12x)	1/8	2-1/2	974631	150.40
.039 (1 mm)	.059	**.203** (5x)	1/8	2-1/2	943039	146.80
.039 (1 mm)	.059	**.325** (8x)	1/8	2-1/2	960239	146.80
.047 (3/64)	.071	**.250** (5x)	1/8	2-1/2	943047	146.80
.047 (3/64)	.071	**.375** (8x)	1/8	2-1/2	960247	146.80
.047 (3/64)	.071	**.570** (12x)	1/8	2-1/2	974647	150.40
.062 (1/16)	.093	**.312** (5x)	1/8	2-1/2	943062	133.90
.062 (1/16)	.093	**.500** (8x)	1/8	2-1/2	960262	133.90
.062 (1/16)	.093	**.750** (12x)	1/8	2-1/2	974662	137.80
.078 (5/64)	.117	**.406** (5x)	1/8	2-1/2	943078	133.90
.078 (5/64)	.117	**.625** (8x)	1/8	2-1/2	960278	133.90
.078 (5/64)	.117	**.940** (12x)	1/8	2-1/2	974678	137.80
.093 (3/32)	.140	**.500** (5x)	1/8	2-1/2	943093	133.90
.093 (3/32)	.140	**.750** (8x)	1/8	2-1/2	960293	133.90
.093 (3/32)	.140	**1.125** (12x)	1/8	2-1/2	974693	137.80
.118 (3 mm)	.177	**.625** (5x)	1/8	2-1/2	943105	133.90
.118 (3 mm)	.177	**.950** (8x)	1/8	2-1/2	960305	133.90

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.187	**.625** (5x)	1/8	2-1/2	943108	136.50
.125 (1/8)	.187	**1.000** (8x)	1/8	2-1/2	960308	136.50
.125 (1/8)	.187	**1.500** (12x)	1/8	3	974708	140.40
.187 (3/16)	.285	**1.000** (5x)	3/16	3	943112	187.10
.187 (3/16)	.285	**1.500** (8x)	3/16	3	960312	187.10
.250 (1/4)	.375	**1.250** (5x)	1/4	4	943116	208.10
.250 (1/4)	.375	**2.000** (8x)	1/4	4	960316	208.10
.375 (3/8)	.570	**1.250** (3x)	3/8	2-1/2	977924	255.80
.375 (3/8)	.570	**2.000** (5x)	3/8	4	943124	282.40
.500 (1/2)	.750	**1.500** (3x)	1/2	3	977932	383.50
.500 (1/2)	.750	**2.625** (5x)	1/2	4	943132	401.10

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square – Long Reach, Long Flute



Outstanding in Graphite!

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- h6 shank tolerance for high precision tool holders
- 4 flutes
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000″}_{-.001″}$	L_2 $^{+.010″}_{-.000″}$	L_3 $^{+.010″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.078	**.156** (10x)	1/8	2-1/2	36315	168.30
.020	.100	**.200** (10x)	1/8	2-1/2	36320	168.30
.025	.125	**.250** (10x)	1/8	2-1/2	36325	168.30
.031 (1/32)	.156	**.250** (8x)	1/8	2-1/2	746231	164.50
.031 (1/32)	.156	**.312** (10x)	1/8	2-1/2	36331	168.30
.047 (3/64)	.250	**.480** (10x)	1/8	2-1/2	36347	168.30
.062 (1/16)	.312	**.500** (8x)	1/8	2-1/2	746262	150.20
.062 (1/16)	.312	**.625** (10x)	1/8	2-1/2	36362	154.00
.078 (5/64)	.406	**.800** (10x)	1/8	2-1/2	36378	154.00
.093 (3/32)	.500	**.750** (8x)	1/8	2-1/2	746293	150.20
.093 (3/32)	.500	**.950** (10x)	1/8	2-1/2	36393	154.00
D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	L_3 $^{+.030″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.625	**1.00** (8x)	1/8	2-1/2	746308	160.40
.125 (1/8)	.625	**1.250** (10x)	1/8	2-1/2	36408	164.50
.187 (3/16)	1.000	**1.875** (10x)	3/16	3	36412	217.00
.250 (1/4)	1.250	**2.500** (10x)	1/4	4	36416	241.00

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball

Outstanding in Graphite!

- True crystalline CVD diamond on solid carbide substrate
- 4 µm CVD diamond coating yields a sharper cutting edge and therefore leaves a smoother finish on non-ferrous alloys and composites
- 9 µm CVD diamond coating offers increased tool life for non-ferrous alloys and composites, especially higher abrasive materials such as graphite, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- 4 flutes • h6 shank tolerance for high precision tool holders
- Center cutting • CNC ground in the USA

CVD diamond (4 µm) layer for a balance between wear resistance and edge sharpness.

CVD diamond (9 µm) layer for increased tool life, especially in abrasive materials.

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
.015 (1/64)	**.023** (1.5x)	1/8	1-1/2			914415	106.00
.015 (1/64)	**.045** (3x)	1/8	1-1/2	799515	90.90	999315	106.00
.015 (1/64)	**.078** (5x)	1/8	2-1/2			940915	118.60
.020	**.030** (1.5x)	1/8	1-1/2			914420	106.00
.020	**.060** (3x)	1/8	1-1/2	799520	90.90	999320	106.00
.020	**.100** (5x)	1/8	2-1/2			940920	118.60
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2			914431	106.00
.031 (1/32)	**.093** (3x)	1/8	1-1/2	799531	90.90	999331	106.00
.031 (1/32)	**.125** (4x)	1/8	2-1/2			818631	117.50
.031 (1/32)	**.156** (5x)	1/8	2-1/2			940931	118.60
.039 (1 mm)	**.117** (3x)	1/8	1-1/2			999339	106.00
.040	**.120** (3x)	1/8	1-1/2			999340	107.00
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2			914447	107.00
.047 (3/64)	**.141** (3x)	1/8	1-1/2	799547	90.90	999347	106.00
.047 (3/64)	**.250** (5x)	1/8	2-1/2			940947	118.60
.050	**.150** (3x)	1/8	1-1/2			999350	107.00
.060	**.180** (3x)	1/8	1-1/2			999360	106.00
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2			914462	102.60
.062 (1/16)	**.186** (3x)	1/8	1-1/2	799562	87.20	999362	102.60
.062 (1/16)	**.250** (4x)	1/8	2-1/2			818662	114.50
.062 (1/16)	**.312** (5x)	1/8	2-1/2			940962	115.50
.078 (5/64)	**.118** (1.5x)	1/8	1-1/2			914478	102.60
.078 (5/64)	**.234** (3x)	1/8	1-1/2			999378	102.60
.078 (5/64)	**.406** (5x)	1/8	2-1/2			940978	115.50
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2			914493	103.50
.093 (3/32)	**.279** (3x)	1/8	1-1/2	799593	88.00	999393	102.60
.093 (3/32)	**.500** (5x)	1/8	2-1/2			940993	115.50
.100	**.300** (3x)	1/8	1-1/2			999400	103.50
.118 (3 mm)	**.354** (3x)	1/8	1-1/2			999405	102.60

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DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball (cont.)

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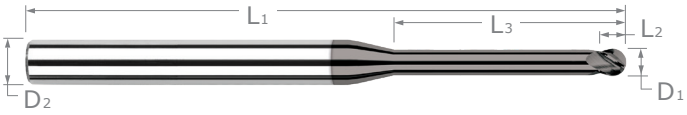
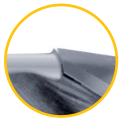
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2			914508	104.10
.125 (1/8)	**.375** (3x)	1/8	1-1/2	799608	88.50	999408	104.10
.125 (1/8)	**.500** (4x)	1/8	2-1/2			818708	117.20
.125 (1/8)	**.625** (5x)	1/8	2-1/2			941008	118.40
.156 (5/32)	**.235** (1.5x)	3/16	2			914510	130.40
.156 (5/32)	**.470** (3x)	3/16	2			999410	129.30
.187 (3/16)	**.285** (1.5x)	3/16	2			914512	130.40
.187 (3/16)	**.570** (3x)	3/16	2	799612	110.90	999412	129.30
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2			914516	170.90
.250 (1/4)	**.750** (3x)	1/4	2-1/2	799616	145.30	999416	170.90
.250 (1/4)	**1.250** (5x)	1/4	4			941016	183.30
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2			914524	213.20
.500 (1/2)	**.750** (1.5x)	1/2	3			914532	334.90
.500 (1/2)	**1.500** (3x)	1/2	3			999432	338.10

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Stub Flute



Outstanding in Graphite!



Reduced Neck Diameter to Avoid Heeling

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity • 4 flutes
- h6 shank tolerance for high precision tool holders • Center cutting • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2 (h6)	L_1	4 FL	PRICE
.015 (1/64)	.023	**.078** (5x)	1/8	2-1/2	61015	153.50
.015 (1/64)	.023	**.125** (8x)	1/8	2-1/2	62015	153.50
.015 (1/64)	.023	**.156** (10x)	1/8	2-1/2	939515	157.40
.015 (1/64)	.023	**.187** (12x)	1/8	2-1/2	65215	157.40
.015 (1/64)	.023	**.225** (15x)	1/8	2-1/2	76015	165.40
.015 (1/64)	.023	**.270** (18x)	1/8	2-1/2	841815	173.20
.020	.030	**.100** (5x)	1/8	2-1/2	61020	153.50
.020	.030	**.160** (8x)	1/8	2-1/2	62020	153.50
.020	.030	**.200** (10x)	1/8	2-1/2	939520	157.40
.020	.030	**.250** (12x)	1/8	2-1/2	65220	157.40
.020	.030	**.300** (15x)	1/8	2-1/2	76020	165.40
.020	.030	**.360** (18x)	1/8	2-1/2	841820	173.20
.025	.038	**.125** (5x)	1/8	2-1/2	61025	153.50
.025	.038	**.203** (8x)	1/8	2-1/2	62025	153.50
.025	.038	**.312** (12x)	1/8	2-1/2	65225	157.40
.025	.038	**.375** (15x)	1/8	2-1/2	76025	165.40
.030	.045	**.250** (8x)	1/8	2-1/2	62030	153.50
.031 (1/32)	.047	**.093** (3x)	1/8	1-1/2	922231	138.10
.031 (1/32)	.047	**.156** (5x)	1/8	2-1/2	61031	153.50
.031 (1/32)	.047	**.187** (6x)	1/8	2-1/2	795131	153.50
.031 (1/32)	.047	**.218** (7x)	1/8	2-1/2	794931	153.50
.031 (1/32)	.047	**.250** (8x)	1/8	2-1/2	62031	153.50
.031 (1/32)	.047	**.312** (10x)	1/8	2-1/2	939531	157.40
.031 (1/32)	.047	**.375** (12x)	1/8	2-1/2	65231	157.40
.031 (1/32)	.047	**.470** (15x)	1/8	2-1/2	76031	165.40
.031 (1/32)	.047	**.565** (18x)	1/8	2-1/2	841831	173.20
.039 (1 mm)	.059	**.203** (5x)	1/8	2-1/2	61039	153.50
.039 (1 mm)	.059	**.325** (8x)	1/8	2-1/2	62039	153.50
.040	.060	**.203** (5x)	1/8	2-1/2	61040	153.50
.040	.060	**.325** (8x)	1/8	2-1/2	62040	153.50
.047 (3/64)	.071	**.250** (5x)	1/8	2-1/2	61047	153.50
.047 (3/64)	.071	**.375** (8x)	1/8	2-1/2	62047	153.50
.047 (3/64)	.071	**.480** (10x)	1/8	2-1/2	939547	157.40
.047 (3/64)	.071	**.570** (12x)	1/8	2-1/2	65247	157.40
.047 (3/64)	.071	**.710** (15x)	1/8	2-1/2	76047	165.40
.047 (3/64)	.071	**.850** (18x)	1/8	2-1/2	841847	173.20
.050	.075	**.250** (5x)	1/8	2-1/2	61050	153.50
.050	.075	**.400** (8x)	1/8	2-1/2	62050	153.50
.060	.090	**.312** (5x)	1/8	2-1/2	61060	153.50
.060	.090	**.500** (8x)	1/8	2-1/2	62060	153.50

continued on next page

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Stub Flute (cont.)

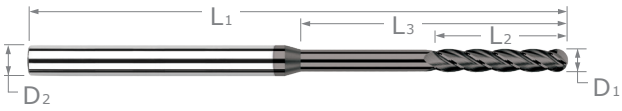
continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000″}_{-.001″}$	L_2 $^{+.010″}_{-.000″}$	L_3 $^{+.010″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE
.062 (1/16)	.093	**.186** (3x)	1/8	1-1/2	922262	121.90
.062 (1/16)	.093	**.312** (5x)	1/8	2-1/2	61062	137.80
.062 (1/16)	.093	**.375** (6x)	1/8	2-1/2	795162	137.80
.062 (1/16)	.093	**.437** (7x)	1/8	2-1/2	794962	137.80
.062 (1/16)	.093	**.500** (8x)	1/8	2-1/2	62062	137.80
.062 (1/16)	.093	**.625** (10x)	1/8	2-1/2	939562	141.90
.062 (1/16)	.093	**.750** (12x)	1/8	2-1/2	65262	141.90
.062 (1/16)	.093	**.950** (15x)	1/8	2-1/2	76062	149.20
.062 (1/16)	.093	**1.125** (18x)	1/8	2-1/2	841862	156.60
.078 (5/64)	.117	**.406** (5x)	1/8	2-1/2	61078	137.80
.078 (5/64)	.117	**.625** (8x)	1/8	2-1/2	62078	137.80
.078 (5/64)	.117	**.800** (10x)	1/8	2-1/2	939578	141.90
.078 (5/64)	.117	**.940** (12x)	1/8	2-1/2	65278	141.90
.078 (5/64)	.117	**1.187** (15x)	1/8	2-1/2	76078	149.20
.078 (5/64)	.117	**1.400** (18x)	1/8	2-1/2	841878	156.60
.093 (3/32)	.140	**.279** (3x)	1/8	1-1/2	922293	121.90
.093 (3/32)	.140	**.500** (5x)	1/8	2-1/2	61093	137.80
.093 (3/32)	.140	**.585** (6x)	1/8	2-1/2	795193	137.80
.093 (3/32)	.140	**.670** (7x)	1/8	2-1/2	794993	137.80
.093 (3/32)	.140	**.750** (8x)	1/8	2-1/2	62093	137.80
.093 (3/32)	.140	**.950** (10x)	1/8	2-1/2	939593	141.90
.093 (3/32)	.140	**1.125** (12x)	1/8	2-1/2	65293	141.90
.093 (3/32)	.140	**1.400** (15x)	1/8	2-1/2	76093	149.20
.093 (3/32)	.140	**1.675** (18x)	1/8	3	841893	156.60
.100	.150	**.800** (8x)	1/8	2-1/2	62100	137.80
.109 (7/64)	.164	**.900** (8x)	1/8	2-1/2	62102	137.80
.118 (3 mm)	.177	**.625** (5x)	1/8	2-1/2	61105	137.80
.118 (3 mm)	.177	**.950** (8x)	1/8	2-1/2	62105	137.80

D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	L_3 $^{+.030″}_{-.000″}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	.187	**.375** (3x)	1/8	1-1/2	64008	134.70
.125 (1/8)	.187	**.625** (5x)	1/8	2-1/2	61108	150.20
.125 (1/8)	.187	**.750** (6x)	1/8	2-1/2	795208	150.20
.125 (1/8)	.187	**.875** (7x)	1/8	2-1/2	795008	150.20
.125 (1/8)	.187	**1.000** (8x)	1/8	2-1/2	62108	150.20
.125 (1/8)	.187	**1.250** (10x)	1/8	2-1/2	939608	154.60
.125 (1/8)	.187	**1.500** (12x)	1/8	3	65308	154.60
.125 (1/8)	.187	**1.875** (15x)	1/8	3	944108	162.70
.125 (1/8)	.187	**2.250** (18x)	1/8	4	841908	172.40
.140 (9/64)	.220	**1.125** (8x)	3/16	3	62109	193.90
.156 (5/32)	.235	**.750** (5x)	3/16	3	61110	193.90
.156 (5/32)	.235	**1.250** (8x)	3/16	3	62110	193.90
.187 (3/16)	.285	**1.000** (5x)	3/16	3	61112	193.90
.187 (3/16)	.285	**1.500** (8x)	3/16	3	62112	193.90
.187 (3/16)	.285	**2.250** (12x)	3/16	4	65312	204.20
.250 (1/4)	.375	**1.250** (5x)	1/4	4	61116	215.40
.250 (1/4)	.375	**2.000** (8x)	1/4	4	62116	215.40
.250 (1/4)	.375	**3.000** (12x)	1/4	6	65316	224.90
.312 (5/16)	.470	**2.500** (8x)	5/16	4	62120	234.80
.375 (3/8)	.570	**1.250** (3x)	3/8	2-1/2	64024	270.60
.500 (1/2)	.750	**1.500** (3x)	1/2	3	64032	402.10

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Long Flute



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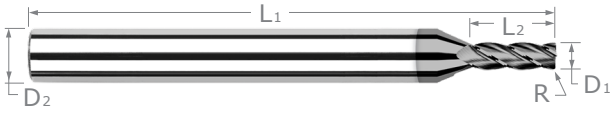
	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
	D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
	.015 (1/64)	**.078**	**.156** (10x)	1/8	2-1/2	36515	180.00
	.020	**.100**	**.200** (10x)	1/8	2-1/2	36520	180.00
	.025	**.125**	**.250** (10x)	1/8	2-1/2	36525	180.00
	.031 (1/32)	**.156**	**.250** (8x)	1/8	2-1/2	745831	176.10
	.031 (1/32)	**.156**	**.312** (10x)	1/8	2-1/2	36531	180.00
NEW	.031 (1/32)	**.156**	**.375** (12x)	1/8	2-1/2	717831	184.00
	.047 (3/64)	**.250**	**.480** (10x)	1/8	2-1/2	36547	180.00
	.062 (1/16)	**.312**	**.500** (8x)	1/8	2-1/2	745862	157.70
	.062 (1/16)	**.312**	**.625** (10x)	1/8	2-1/2	36562	161.50
NEW	.062 (1/16)	**.312**	**.750** (12x)	1/8	2-1/2	717862	184.00
	.078 (5/64)	**.406**	**.800** (10x)	1/8	2-1/2	36578	161.50
	.093 (3/32)	**.500**	**.750** (8x)	1/8	2-1/2	745893	157.70
	.093 (3/32)	**.500**	**.950** (10x)	1/8	2-1/2	36593	161.50
NEW	.093 (3/32)	**.500**	**1.125** (12x)	1/8	2-1/2	717893	184.00

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
.125 (1/8)	**.625**	**1.000** (8x)	1/8	2-1/2	745908	167.80
.125 (1/8)	**.625**	**1.250** (10x)	1/8	2-1/2	36608	171.80
.187 (3/16)	**1.000**	**1.875** (10x)	3/16	3	36612	227.00
.250 (1/4)	**1.250**	**2.500** (10x)	1/4	4	36616	252.00

NEW SIZES!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Corner Radius



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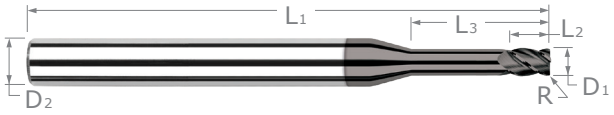
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)		
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	
.015 (1/64)	**.003**	**.023** (1.5x)	1/8	1-1/2	717615	107.00	NEW
.015 (1/64)	**.003**	**.045** (3x)	1/8	1-1/2	942015	106.00	
.020	**.005**	**.060** (3x)	1/8	1-1/2	955420	107.00	
.031 (1/32)	**.005**	**.047** (1.5x)	1/8	1-1/2	746831	107.00	
.031 (1/32)	**.005**	**.093** (3x)	1/8	1-1/2	955431	106.00	
.031 (1/32)	**.005**	**.156** (5x)	1/8	2-1/2	819331	118.60	
.031 (1/32)	**.010**	**.093** (3x)	1/8	1-1/2	977131	107.00	
.047 (3/64)	**.005**	**.141** (3x)	1/8	1-1/2	955447	106.00	
.062 (1/16)	**.005**	**.186** (3x)	1/8	1-1/2	955462	102.60	
.062 (1/16)	**.010**	**.093** (1.5x)	1/8	1-1/2	745062	103.50	
.062 (1/16)	**.010**	**.186** (3x)	1/8	1-1/2	977162	102.60	
.062 (1/16)	**.010**	**.312** (5x)	1/8	2-1/2	820462	115.50	
.062 (1/16)	**.020**	**.186** (3x)	1/8	1-1/2	768262	103.50	
.078 (5/64)	**.010**	**.234** (3x)	1/8	1-1/2	977178	103.50	
.093 (3/32)	**.005**	**.140** (1.5x)	1/8	1-1/2	746893	103.50	
.093 (3/32)	**.005**	**.279** (3x)	1/8	1-1/2	955493	102.60	
.093 (3/32)	**.010**	**.279** (3x)	1/8	1-1/2	977193	102.60	
.093 (3/32)	**.015**	**.279** (3x)	1/8	1-1/2	938593	102.60	
.093 (3/32)	**.030**	**.279** (3x)	1/8	1-1/2	906293	103.50	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	
.125 (1/8)	**.005**	**.187** (1.5x)	1/8	1-1/2	746908	105.20	NEW
.125 (1/8)	**.005**	**.375** (3x)	1/8	1-1/2	955508	104.10	
.125 (1/8)	**.010**	**.375** (3x)	1/8	1-1/2	977208	104.10	
.125 (1/8)	**.015**	**.187** (1.5x)	1/8	1-1/2	748408	105.20	
.125 (1/8)	**.015**	**.375** (3x)	1/8	1-1/2	938608	104.10	
.125 (1/8)	**.015**	**.625** (5x)	1/8	2-1/2	855208	116.20	
.125 (1/8)	**.030**	**.375** (3x)	1/8	1-1/2	906308	104.10	
.156 (5/32)	**.015**	**.470** (3x)	3/16	2	938610	130.40	
.187 (3/16)	**.015**	**.570** (3x)	3/16	2	938612	129.30	
.187 (3/16)	**.030**	**.570** (3x)	3/16	2	906312	129.30	
.250 (1/4)	**.010**	**.750** (3x)	1/4	2-1/2	977216	170.90	
.250 (1/4)	**.030**	**.375** (1.5x)	1/4	2-1/2	747716	172.60	
.250 (1/4)	**.030**	**.750** (3x)	1/4	2-1/2	906316	170.90	
.250 (1/4)	**.030**	**1.250** (5x)	1/4	4	862116	185.00	
.375 (3/8)	**.030**	**1.125** (3x)	3/8	2-1/2	906324	203.50	

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Corner Radius – Long Reach, Stub Flute



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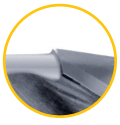


Reduced Neck Diameter to Avoid Heeling

	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
	D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
	.015 (1/64)	**.003**	.023	**.078** (5x)	1/8	2-1/2	61615	153.50
	.015 (1/64)	**.003**	.023	**.125** (8x)	1/8	2-1/2	61915	153.50
	.015 (1/64)	**.003**	.023	**.187** (12x)	1/8	2-1/2	62215	157.40
	.020	**.005**	.030	**.100** (5x)	1/8	2-1/2	62920	153.50
	.020	**.005**	.030	**.160** (8x)	1/8	2-1/2	63220	153.50
	.020	**.005**	.030	**.250** (12x)	1/8	2-1/2	64120	157.40
	.025	**.005**	.038	**.125** (5x)	1/8	2-1/2	62925	153.50
	.025	**.005**	.038	**.203** (8x)	1/8	2-1/2	63225	153.50
	.025	**.005**	.038	**.312** (12x)	1/8	2-1/2	64125	157.40
	.031 (1/32)	**.005**	.047	**.156** (5x)	1/8	2-1/2	62931	153.50
	.031 (1/32)	**.005**	.047	**.250** (8x)	1/8	2-1/2	63231	153.50
	.031 (1/32)	**.005**	.047	**.375** (12x)	1/8	2-1/2	64131	157.40
	.039 (1 mm)	**.005**	.059	**.203** (5x)	1/8	2-1/2	62939	153.50
	.039 (1 mm)	**.005**	.059	**.325** (8x)	1/8	2-1/2	63239	153.50
	.047 (3/64)	**.005**	.071	**.250** (5x)	1/8	2-1/2	62947	153.50
	.047 (3/64)	**.005**	.071	**.375** (8x)	1/8	2-1/2	63247	153.50
	.047 (3/64)	**.005**	.071	**.570** (12x)	1/8	2-1/2	64147	157.40
	.062 (1/16)	**.005**	.093	**.312** (5x)	1/8	2-1/2	62962	137.80
	.062 (1/16)	**.005**	.093	**.500** (8x)	1/8	2-1/2	63262	137.80
	.062 (1/16)	**.010**	.093	**.312** (5x)	1/8	2-1/2	65062	137.80
	.062 (1/16)	**.010**	.093	**.500** (8x)	1/8	2-1/2	66562	137.80
NEW	.062 (1/16)	**.010**	.093	**.625** (10x)	1/8	2-1/2	717462	139.80
	.062 (1/16)	**.010**	.093	**.750** (12x)	1/8	2-1/2	65962	141.90
	.078 (5/64)	**.010**	.117	**.406** (5x)	1/8	2-1/2	65078	137.80
	.078 (5/64)	**.010**	.117	**.625** (8x)	1/8	2-1/2	66578	137.80
	.078 (5/64)	**.010**	.117	**.940** (12x)	1/8	2-1/2	65978	141.90
	.093 (3/32)	**.010**	.140	**.500** (5x)	1/8	2-1/2	65093	137.80
	.093 (3/32)	**.010**	.140	**.750** (8x)	1/8	2-1/2	66593	137.80
NEW	.093 (3/32)	**.010**	.140	**.950** (10x)	1/8	2-1/2	717493	139.80
	.093 (3/32)	**.010**	.140	**1.125** (12x)	1/8	2-1/2	65993	141.90
	.118 (3 mm)	**.010**	.177	**.625** (5x)	1/8	2-1/2	916305	137.80
	.118 (3 mm)	**.010**	.177	**.950** (8x)	1/8	2-1/2	914705	137.80

continued on next page

NEW SIZES!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

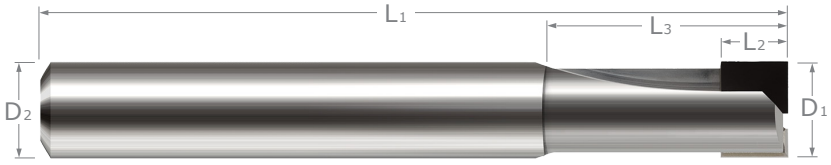
CVD Diamond – Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)		
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	
.125 (1/8)	**.010**	.187	**.625** (5x)	1/8	2-1/2	916308	150.20	
.125 (1/8)	**.010**	.187	**1.000** (8x)	1/8	2-1/2	914708	150.20	
.125 (1/8)	**.015**	.187	**.625** (5x)	1/8	2-1/2	66208	150.20	
.125 (1/8)	**.015**	.187	**1.000** (8x)	1/8	2-1/2	64708	150.20	
.125 (1/8)	**.015**	.187	**1.250** (10x)	1/8	3	717308	152.40	NEW
.125 (1/8)	**.015**	.187	**1.500** (12x)	1/8	3	66408	154.60	
.187 (3/16)	**.030**	.285	**1.000** (5x)	3/16	3	63312	193.90	
.187 (3/16)	**.030**	.285	**1.500** (8x)	3/16	3	65612	193.90	
.250 (1/4)	**.030**	.375	**1.250** (5x)	1/4	4	63316	215.40	
.250 (1/4)	**.030**	.375	**2.000** (8x)	1/4	4	65616	215.40	
.250 (1/4)	**.030**	.375	**2.500** (10x)	1/4	4	717116	217.60	NEW

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Square



- PCD diamond brazed on solid carbide body allows for significant tool lifeimprovement over carbide
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting for 1 and 2 flutes
- End cutting (not center cutting) for 4 flutes

	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
	D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE
	3/32	3/16	**3/8**	1	1/8	1-1/2	12106	284.90
	3 mm	1/4	**1/2**	1	1/8	1-1/2	1213M	284.90
NEW	1/8	1/16	**1/4**	1	1/8	1-1/2	709608	244.50
	1/8	1/8	**5/16**	1	1/8	1-1/2	760008	258.90
	1/8	1/4	**1/2**	1	1/8	1-1/2	12108	284.90
NEW	1/8	3/8	**5/8**	1	1/8	1-1/2	709508	288.90
	5/32	1/4	**1/2**	1	3/16	2	12110	318.30
NEW	3/16	3/16	**3/8**	2	3/16	2	709412	310.10
	3/16	1/4	**5/8**	2	3/16	2	12112	318.30
NEW	3/16	1/2	**7/8**	2	3/16	2-1/2	739212	326.50
	1/4	1/4	**3/4**	2	1/4	2-1/2	12116	345.70
NEW	1/4	1/4	**3/4**	4	1/4	2-1/2	708816	487.80
	1/4	1/2	**1**	2	1/4	2-1/2	739216	420.10
	1/4	1/2	**1**	4	1/4	2-1/2	914116	556.60
	5/16	1/4	**13/16**	2	5/16	2-1/2	12120	378.20
	5/16	1/2	**1-1/16**	4	5/16	2-1/2	914120	615.20
	3/8	1/4	**15/16**	2	3/8	2-1/2	12124	405.60
NEW	3/8	1/2	**1-3/16**	2	3/8	2-1/2	739224	420.00
NEW	3/8	3/4	**1-7/16**	2	3/8	3	708324	635.50
	3/8	3/4	**1-7/16**	4	3/8	3	914124	703.50
	1/2	1/4	**1**	2	1/2	3	12132	517.10
NEW	1/2	1/2	**1-1/4**	4	1/2	3	708732	585.50
NEW	1/2	3/4	**1-1/2**	2	1/2	3	709332	612.20
	1/2	1	**1-3/4**	2	1/2	3	739232	633.90
	1/2	1	**1-3/4**	4	1/2	3	914132	829.80
	5/8	3/8	**1**	2	5/8	3-1/2	12140	638.70
NEW	5/8	5/8	**1-1/4**	2	5/8	3-1/2	739240	745.50
	5/8	1	**1-3/4**	4	5/8	3-1/2	914140	972.30
	3/4	3/8	**1-1/8**	2	3/4	4	12148	777.90
	3/4	1-1/4	**2**	4	3/4	4	914148	1136.40

* End cutting (not center cutting) for 4 flutes

Single Flute designed for smaller diameters

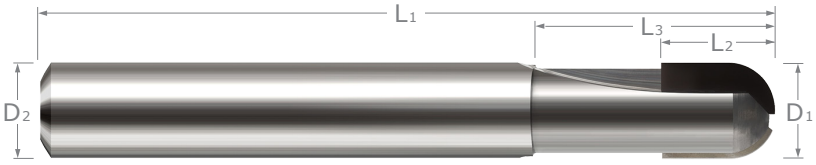
4 Flute ideal for finishing operations

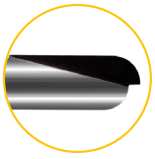
For PCD High Performance Drills, see page 465.

NEW SIZES!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Ball





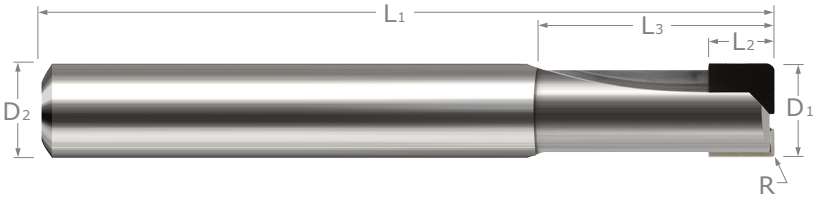
Also Stocked in Single Flute Style

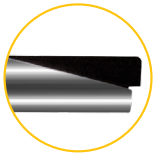
- PCD diamond brazed on solid carbide body allows for significant tool life improvement over carbide.
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND		
D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	
3/32	3/16	**3/8**	1	1/8	1-1/2	12006	345.70	
1/8	1/8	**5/16**	1	1/8	1-1/2	709208	319.70	NEW
1/8	1/4	**1/2**	1	1/8	1-1/2	12008	345.70	
1/8	1/2	**3/4**	1	1/8	2	714108	368.50	NEW
3/16	1/4	**5/8**	2	3/16	2	12012	370.10	
1/4	1/4	**3/4**	2	1/4	2-1/2	708416	375.50	NEW
1/4	5/16	**3/4**	2	1/4	2-1/2	12016	388.30	
1/4	1/2	**1**	2	1/4	2-1/2	714116	440.40	NEW
3/8	7/16	**15/16**	2	3/8	2-1/2	12024	479.80	
1/2	1/2	**1**	2	1/2	3	12032	556.40	
1/2	1/2	**1-1/4**	2	1/2	3	714132	585.00	NEW
1/2	1	**1-1/4**	2	1/2	3	708932	655.00	NEW
5/8	1/2	**1**	2	5/8	3-1/2	12040	677.50	
3/4	5/8	**1-1/8**	2	3/4	4	12048	816.50	

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Corner Radius





Also Stocked in Single Flute Style

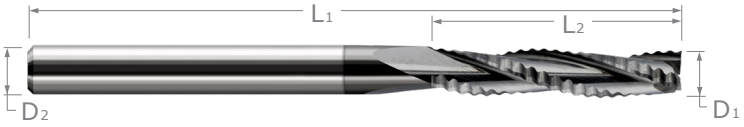
- PCD diamond brazed on solid carbide body allows for significant tool life improvement over carbide.
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
	D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″	R +.001″ −.001″		D_2	L_1	TOOL #	PRICE
	3/32	3/16	**3/8**	**.010**	1	1/8	1-1/2	12206	345.70
NEW	1/8	1/4	**1/2**	**.010**	1	1/8	1-1/2	858908	345.70
	1/8	1/4	**1/2**	**.015**	1	1/8	1-1/2	12208	345.70
	3/16	1/4	**5/8**	**.015**	2	3/16	2	12212	370.10
NEW	1/4	1/8	**5/16**	**.010**	2	1/4	2-1/2	709116	303.60
	1/4	1/4	**3/4**	**.010**	2	1/4	2-1/2	858916	388.30
NEW	1/4	1/8	**5/16**	**.030**	2	1/4	2-1/2	708616	303.60
	1/4	1/4	**3/4**	**.030**	2	1/4	2-1/2	12216	388.30
NEW	1/4	1/8	**5/16**	**.060**	2	1/4	2-1/2	709016	303.60
	1/4	1/4	**3/4**	**.060**	2	1/4	2-1/2	847316	388.30
	3/8	1/4	**15/16**	**.030**	2	3/8	2-1/2	12224	479.80
NEW	1/2	1/4	**1**	**.010**	2	1/2	3	858932	556.40
	1/2	1/4	**1**	**.030**	2	1/2	3	12232	556.40
NEW	1/2	1/2	**1-1/4**	**.030**	2	1/2	3	708532	592.00
NEW	1/2	1/4	**1**	**.060**	2	1/2	3	847332	556.40

For PCD High Performance Drills, see page 479.

END MILLS FOR PLASTICS

Rougher – Square Upcut – 3 Flute (Slow Helix)

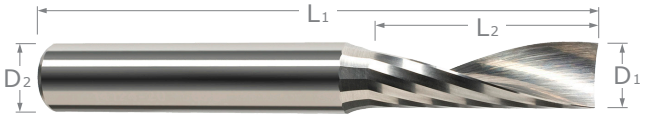


- Optimized for roughing applications in plastics
- Engineered with irregular edge geometry for chip control and minimized cutting forces
- 3 flute design strengthens rigidity of tool
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/16	**.186** (3x)	1/8	1-1/2	798662	35.20	798662-C4	49.00
1/16	**5/16** (5x)	1/8	2	770662	41.40	770662-C4	58.40
3/32	**.279** (3x)	1/8	1-1/2	798693	35.20	798693-C4	49.00
3/32	**1/2** (5x)	1/8	2	770693	41.40	770693-C4	58.40
1/8	**3/8** (3x)	1/8	1-1/2	798708	35.20	798708-C4	49.00
1/8	**5/8** (5x)	1/8	2	770708	41.40	770708-C4	58.40
3/16	**.570** (3x)	3/16	2	798712	54.80	798712-C4	70.30
3/16	**1** (5x)	3/16	3	770712	57.20	770712-C4	73.70
1/4	**3/4** (3x)	1/4	2-1/2	798716	57.20	798716-C4	79.10
1/4	**1-1/4** (5x)	1/4	3	770716	64.70	770716-C4	86.60

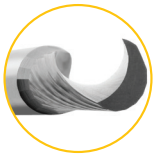
END MILLS FOR PLASTICS

Square Upcut – Single Flute



2x the Material Removal with Improved Finish Over Standard End Mills!

- Design allows for maximum stock removal while maintaining excellent finish
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Large flute valley creates room for the chip and aids in chip evacuation
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Select sizes available with oversized, router-style shanks
- High flute finish resists chip welding • Will ramp or plunge if required
- Right hand spiral, right hand cut • Solid carbide • CNC ground in the USA



Single Spiral Upcut Flute

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	SOFT PLASTICS		HARD PLASTICS		HARD PLASTICS AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
.020	**.060** (3x)	1/8	1-1/2			51420	38.40		
.020	**.100** (5x)	1/8	1-1/2			52420	40.70		
1/32	**3/32** (3x)	1/8	1-1/2			51431	38.40	51431-C4	52.20
1/32	**5/32** (5x)	1/8	1-1/2			52431	47.10		
.039	**.117** (3x)	1/8	1-1/2			51439	37.10		
.040	**.120** (3x)	1/8	1-1/2			51440	37.10		
3/64	**9/64** (3x)	1/8	1-1/2			51447	34.20	51447-C4	48.00
3/64	**1/4** (5x)	1/8	1-1/2			52447	39.70		

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2	51162	28.00	51462	28.00	51462-C4	41.80
1/16	**1/4** (4x)	1/8	1-1/2	878262	28.00	897362	28.00		
1/16*	**1/4** (4x)	1/4*	2	14104-20	39.90	14204-20	39.90		
1/16	**5/16** (5x)	1/8	2	51862	33.10	52462	33.10	52462-C4	50.70
1/16	**1/2** (8x)	1/8	2			722762	35.40		
5/64	**15/64** (3x)	1/8	1-1/2	51178	28.50	51478	28.00	51478-C4	41.80
5/64*	**5/16** (4x)	1/4*	2	14105-20	40.70	14205-20	40.70		
5/64	**13/32** (5x)	1/8	2	51878	33.10	52478	33.70	52478-C4	47.50
3/32	**9/32** (3x)	1/8	1-1/2	51193	28.00	51493	28.00	51493-C4	41.80
3/32	**3/8** (4x)	1/8	1-1/2	878293	28.00	897393	28.00		
3/32*	**3/8** (4x)	1/4*	2	14106-20	39.90	14206-20	39.90		
3/32	**1/2** (5x)	1/8	2	51893	33.10	52493	33.10	52493-C4	50.70
3/32	**3/4** (8x)	1/8	2			722793	35.40		
.118	**.354** (3x)	1/4	2	51205	37.90	51505	37.90		
1/8*	**1/4** (2x)	1/4*	2	14108-10	37.90	14208-10	37.90	892026-C4	54.80
1/8	**3/8** (3x)	1/8	1-1/2	51208	28.00	51508	28.00	51508-C4	41.80
1/8	**1/2** (4x)	1/8	2	878308	28.00	897408	28.00		
1/8*	**1/2** (4x)	1/4*	2	14108-20	37.90	14208-20	37.90	892028-C4	54.80
1/8	**5/8** (5x)	1/8	2	51908	33.10	52508	33.10	52508-C4	48.10
1/8	**1** (8x)	1/8	2			722808	35.40		

*Cutter diameter tolerance is +.000"/-.004". Tools are ground on oversized, router-style shank.

continued on next page

END MILLS FOR PLASTICS

Square Upcut – Single Flute (cont.)

continued from previous page

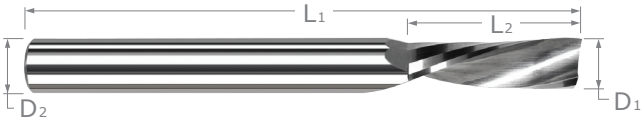
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	SOFT PLASTICS		HARD PLASTICS		HARD PLASTICS AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
9/64	**.422** (3x)	1/4	2	51209	37.90	51509	37.90		
5/32*	**5/8** (4x)	1/4*	2	14110-20	37.90	14210-20	37.90		
5/32	**3/4** (5x)	3/16	3	51910	44.30	52510	44.30		
3/16*	**3/8** (2x)	1/4*	2	14112-10	37.90	14212-10	37.90		
3/16	**9/16** (3x)	3/16	2	51212	35.90	51512	35.90	51512-C4	52.20
3/16*	**5/8** (3x)	1/4*	2	14112-20	37.90	14212-20	37.90	892012-C4	56.60
3/16	**1** (5x)	3/16	3	51912	44.30	52512	44.30	52512-C4	63.40
1/4	**3/8** (1.5x)	1/4	2-1/2	883116	37.90	883816	37.90		
1/4	**3/4** (3x)	1/4	2-1/2	51216	37.90	51516	37.90	51516-C4	59.70
1/4	**1** (4x)	1/4	3	878316	49.10	897416	49.10		
1/4	**1-1/4** (5x)	1/4	3	51916	49.10	52516	49.10	52516-C4	70.90
1/4	**2** (8x)	1/4	4			722816	54.30		
5/16	**1** (3x)	5/16	2-1/2			51520	63.10		
3/8	**9/16** (1.5x)	3/8	2-1/2	883124	77.30	883824	77.30		
3/8	**1-1/8** (3x)	3/8	2-1/2	51224	77.30	51524	77.30	51524-C4	104.70
3/8	**1-1/2** (4x)	3/8	4	878324	87.30	897424	87.30		
3/8	**2** (5x)	3/8	4	51924	85.70	52524	85.70		
1/2	**3/4** (1.5x)	1/2	3	883132	131.70	883832	131.70		
1/2	**1-1/2** (3x)	1/2	3	51232	131.70	51532	131.70	51532-C4	165.20
1/2	**2-5/8** (5x)	1/2	5	51932	217.60	52532	217.60		

*Cutter diameter tolerance is +.000"/-.004". Tools are ground on oversized, router-style shank.

Please See Speeds & Feeds On Page 247

END MILLS FOR PLASTICS

Square Downcut – Single Flute



Prevents Fraying, Chip-Out, and Lifting

- **Prevents fraying and chip-out of top edge of work piece**
- Prevents lifting on vacuum tables
- Left hand spiral, right hand cut
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Resists chip welding • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	SOFT PLASTICS		HARD PLASTICS		HARD PLASTICS AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2			929731	41.50		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	1 FL	PRICE	1 FL	PRICE	1 FL	PRICE
1/16	**3/16** (3x)	1/8	1-1/2			929762	41.50		
1/16	**1/4** (4x)	1/4	2	855862	44.50	44862	43.60		
1/16	**5/16** (5x)	1/8	2			935362	42.60		
5/64	**5/16** (4x)	1/4	2			44878	43.60		
3/32	**9/32** (3x)	1/8	1/2			929793	44.50		
3/32	**3/8** (4x)	1/4	2	855893	44.50	44893	43.60	44893-C4	62.20
3/32	**1/2** (5x)	1/8	2			935393	44.50		
1/8	**3/8** (3x)	1/8	1-1/2			929808	39.70		
1/8	**1/2** (4x)	1/4	2	855908	41.70	44908	41.70	44908-C4	63.50
1/8	**5/8** (5x)	1/8	2			935408	40.90		
5/32	**5/8** (4x)	1/4	2			44910	41.70		
3/16	**9/16** (3x)	3/16	2			929812	39.70		
3/16	**5/8** (3x)	1/4	2			44912	41.70	44912-C4	63.50
3/16	**3/4** (4x)	1/4	2	855912	41.70				
3/16	**1** (5x)	3/16	3			935412	41.70		
1/4	**3/4** (3x)	1/4	2-1/2	855916	41.70	44916	41.70	44916-C4	63.50
1/4	**1-1/4** (5x)	1/4	3			935416	76.50		
3/8	**1-1/8** (3x)	3/8	3			44924	71.70		
3/8	**1-1/8** (4x)	3/8	4	855924	85.50				
3/8	**2** (5x)	3/8	4			935424	125.20		
1/2	**1-1/2** (3x)	1/2	4			44932	168.60		
1/2	**2-5/8** (5x)	1/2	5			935432	264.00		

Please See Speeds & Feeds On Page 247

END MILLS FOR PLASTICS

Ball Upcut – Single Flute

- Design allows for maximum stock removal while maintaining excellent finish
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Large flute valley creates room for the chip and aids in chip evacuation
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- High flute finish resists chip welding
- Will ramp or plunge if required
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	1 FL	PRICE
1/16	**.186** (3x)	1/8	1-1/2	869562	33.20
1/16	**5/16** (5x)	1/8	2	842262	40.50
3/32	**.279** (3x)	1/8	1-1/2	869593	33.20
3/32	**1/2** (5x)	1/8	2	842293	40.50
1/8	**3/8** (3x)	1/8	1-1/2	869608	33.20
1/8	**5/8** (5x)	1/8	2	842308	40.50
3/16	**.570** (3x)	3/16	2	869612	42.80
1/4	**3/4** (3x)	1/4	2-1/2	869616	46.90
1/4	**1-1/4** (5x)	1/4	3	842316	57.50
3/8	**1-1/8** (3x)	3/8	2-1/2	869624	88.90
3/8	**2** (5x)	3/8	4	842324	98.40
1/2	**1-1/2** (3x)	1/2	3	869632	142.20

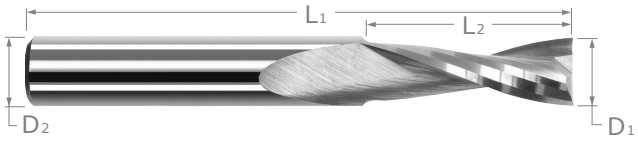
SPEEDS & FEEDS (Single Flute Plastic Cutting End Mills)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce 95%, for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
Filled Plastics	Carbon/ Glass Filled 5% < 20%	600-800	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/ Glass Filled 21% < 40%	500-700	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/ Glass Fiber 5% < 20%	500-700	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/ Glass Fiber 21% < 40%	300-400	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix)



2 Flute Design Improves Bottom Finish and Accuracy

- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping • Solid carbide • CNC ground in the USA

CUTTER DIAMETER		LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	decimal equivalent	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.008	.0080	**.024** (3x)	1/8	1-1/2	48608	68.50		
.008	.0080	**.040** (5x)	1/8	1-1/2	49808	70.40		
.010	.0010	**.030** (3x)	1/8	1-1/2	48610	65.30		
.010	.0010	**.050** (5x)	1/8	1-1/2	49810	74.30		
1/64	.0156	**.023** (1.5x)	1/8	1-1/2	957615	55.90		
1/64	.0156	**3/64** (3x)	1/8	1-1/2	48615	55.90		
1/64	.0156	**5/64** (5x)	1/8	1-1/2	49815	66.10		
1/64	.0156	**1/8** (8x)	1/8	1-1/2	60215	72.90		
.020	.0200	**.030** (1.5x)	1/8	1-1/2	957620	42.60		
.020	.0200	**.060** (3x)	1/8	1-1/2	48620	42.60	48620-C4	56.40
.020	.0200	**.100** (5x)	1/8	1-1/2	49820	51.80		
.020	.0200	**.160** (8x)	1/8	1-1/2	60220	60.90		
.020	.0200	**.200** (10x)	1/8	1-1/2	938920	60.90		
.025	.0250	**.038** (1.5x)	1/8	1-1/2	957625	43.40		
.025	.0250	**.075** (3x)	1/8	1-1/2	48625	42.60		
.025	.0250	**1/8** (5x)	1/8	1-1/2	49825	51.50	49825-C4	65.30
.025	.0250	**13/64** (8x)	1/8	1-1/2	60225	59.80		
.030	.0300	**.090** (3x)	1/8	1-1/2	48630	42.60		
.030	.0300	**.156** (5x)	1/8	1-1/2	49830	52.80		
1/32	.0312	**3/64** (1.5x)	1/8	1-1/2	957631	42.30		
1/32	.0312	**3/32** (3x)	1/8	1-1/2	48631	42.30	48631-C4	56.10
1/32	.0312	**3/32** (3x)	1/4	2	878731	52.40		
1/32	.0312	**5/32** (5x)	1/8	1-1/2	49831	51.50	49831-C4	65.30
1/32	.0312	**1/4** (8x)	1/8	1-1/2	60231	59.00	60231-C4	72.80
1/32	.0312	**5/16** (10x)	1/8	1-1/2	938931	59.00		
.035	.0350	**.105** (3x)	1/8	1-1/2	48635	42.60		
.039 (1 mm)	.0394	**.118** (3x)	1/8	1-1/2	48639	42.80		
.039 (1 mm)	.0394	**13/64** (5x)	1/8	1-1/2	49839	42.80		
.040	.0400	**.060** (1.5x)	1/8	1-1/2	957640	43.40		
.040	.0400	**.120** (3x)	1/8	1-1/2	48640	42.60		
.040	.0400	**13/64** (5x)	1/8	1-1/2	49840	51.80		
.040	.0400	**.325** (8x)	1/8	2	60240	59.80		
.045	.0450	**.135** (3x)	1/8	1-1/2	48645	42.60		
3/64	.0469	**.071** (1.5x)	1/8	1-1/2	957647	35.80		
3/64	.0469	**9/64** (3x)	1/8	1-1/2	48647	35.80	48647-C4	49.60
3/64	.0469	**1/4** (5x)	1/8	1-1/2	49847	41.60	49847-C4	55.40
3/64	.0469	**3/8** (8x)	1/8	2	60247	50.00		
.050	.0500	**.150** (3x)	1/8	1-1/2	48650	36.10		
.050	.0500	**.250** (5x)	1/8	1-1/2	49850	41.90		
.055	.0550	**.165** (3x)	1/8	1-1/2	48655	36.80		
.060	.0600	**.180** (3x)	1/8	1-1/2	48660	36.10		
.060	.0600	**5/16** (5x)	1/8	1-1/2	49860	41.90		

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END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT		SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	+.00mm −.05mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16		.0625	**3/32**	(1.5x)	1/8	1-1/2	957662	31.40		
1/16		.0625	**3/16**	(3x)	1/8	1-1/2	48662	31.40	48662-C4	45.20
1/16		.0625	**3/16**	(3x)	1/4	2	878762	41.50		
1/16		.0625	**1/4**	(4x)	1/8	2	874862	37.10		
1/16		.0625	**5/16**	(5x)	1/8	2	49862	37.10	49862-C4	52.10
1/16		.0625	**3/8**	(6x)	1/8	2	745662	40.70		
1/16		.0625	**1/2**	(8x)	1/8	2	60262	45.70	60262-C4	61.20
1/16		.0625	**5/8**	(10x)	1/8	2	938962	45.70	938962-C4	62.70
5/64		.0781	**.117**	(1.5x)	1/8	1-1/2	957678	31.40		
5/64		.0781	**15/64**	(3x)	1/8	1-1/2	48678	31.40	48678-C4	45.20
5/64		.0781	**13/32**	(5x)	1/8	2	49878	37.10	49878-C4	52.10
5/64		.0781	**5/8**	(8x)	1/8	2	60278	45.70		
5/64		.0781	**.800**	(10x)	1/8	2	938978	45.70		
3/32		.0937	**9/64**	(1.5x)	1/8	1-1/2	957693	31.40	957693-C4	45.20
3/32		.0937	**9/32**	(3x)	1/8	1-1/2	48693	31.40	48693-C4	45.20
3/32		.0937	**9/32**	(3x)	1/4	2	878793	41.50		
3/32		.0937	**3/8**	(4x)	1/8	2	874893	37.10		
3/32		.0937	**1/2**	(5x)	1/8	2	49893	37.10	49893-C4	52.10
3/32		.0937	**9/16**	(6x)	1/8	2	745693	40.70		
3/32		.0937	**3/4**	(8x)	1/8	2	60293	45.70	60293-C4	61.20
3/32		.0937	**.950**	(10x)	1/8	2	938993	45.70		
.100		.1000	**.150**	(1.5x)	1/8	1-1/2	957700	31.50		
.100		.1000	**.300**	(3x)	1/8	1-1/2	48700	32.10		
.100		.1000	**1/2**	(5x)	1/8	2	49900	37.60		
.100		.1000	**.800**	(8x)	1/8	2-1/2	60300	47.20		
7/64		.1090	**21/64**	(3x)	1/8	1-1/2	48707	31.50		
.118 (3 mm)		.1181	**.177**	(1.5x)	1/8	1-1/2	957706	32.10		
.118 (3 mm)		.1181	**.354**	(3x)	1/8	1-1/2	48706	31.50		
.118 (3 mm)		.1181	**.625**	(5x)	1/8	2	49906	38.40		
.118 (3 mm)		.1181	**.950**	(8x)	1/8	2-1/2	60306	47.20		
1/8		.1250	**.100**	(0.8x)	1/8	1-1/2	793208	32.00		
1/8		.1250	**3/16**	(1.5x)	1/8	1-1/2	957708	31.40	957708-C4	45.20
1/8		.1250	**3/8**	(3x)	1/8	1-1/2	48708	31.40	48708-C4	45.20
1/8		.1250	**3/8**	(3x)	1/4	2	878808	41.50		
1/8		.1250	**1/2**	(4x)	1/8	2	874908	37.10		
1/8		.1250	**5/8**	(5x)	1/8	2	49908	37.10	49908-C4	52.10
1/8		.1250	**3/4**	(6x)	1/8	2-1/2	745708	40.70		
1/8		.1250	**1**	(8x)	1/8	2-1/2	60308	45.70	60308-C4	59.60
1/8		.1250	**1-1/4**	(10x)	1/8	2-1/2	939008	45.70	939008-C4	59.60
9/64		.1406	**27/64**	(3x)	3/16	2	48709	41.60		
9/64		.1406	**3/4**	(5x)	3/16	3	49909	41.50		
5/32		.1562	**15/64**	(1.5x)	3/16	2	957710	41.50		
5/32		.1562	**15/32**	(3x)	3/16	2	48710	41.50	48710-C4	57.50
5/32		.1562	**3/4**	(5x)	3/16	3	49910	51.10	49910-C4	70.30
5/32		.1562	**1-1/4**	(8x)	3/16	3	60310	56.20		
3/16		.1875	**9/32**	(1.5x)	3/16	2	957712	41.50	957712-C4	57.50
3/16		.1875	**9/16**	(3x)	3/16	2	48712	41.50	48712-C4	57.50
3/16		.1875	**9/16**	(3x)	1/4	2	878812	51.50		

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END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	+.00mm −.05mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	D_2	L_1	2 FL	PRICE	2 FL	PRICE
3/16		.1875	**3/4** (4x)	3/16	3	874912	51.10		
3/16		.1875	**1** (5x)	3/16	3	49912	51.10	49912-C4	70.30
3/16		.1875	**1-1/2** (8x)	3/16	3	60312	56.20		
3/16		.1875	**1-7/8** (10x)	3/16	3	939012	56.20		
	6.0 mm	.2362	**18 mm** (3x)	6 mm	63 mm	886566	83.70		
1/4		.2500	**.200** (0.8x)	1/4	2-1/2	793216	51.10		
1/4		.2500	**3/8** (1.5x)	1/4	2-1/2	957716	51.10	957716-C4	72.90
1/4		.2500	**3/4** (3x)	1/4	2-1/2	48716	51.10	48716-C4	72.90
1/4		.2500	**1** (4x)	1/4	3	874916	58.60	874916-C4	78.40
1/4		.2500	**1-1/4** (5x)	1/4	3	49916	58.60	49916-C4	80.40
1/4		.2500	**2** (8x)	1/4	4	60316	73.30	60316-C4	95.10
1/4		.2500	**2-1/2** (10x)	1/4	4	939016	73.30		
5/16		.3125	**15/32** (1.5x)	5/16	2-1/2	957720	76.10		
5/16		.3125	**1** (3x)	5/16	2-1/2	48720	76.10		
5/16		.3125	**1-5/8** (5x)	5/16	4	49920	98.40		
	8.0 mm	.3149	**24 mm** (3x)	8 mm	63 mm	886570	112.10		
3/8		.3750	**9/16** (1.5x)	3/8	3	957724	87.90	957724-C4	115.40
3/8		.3750	**1-1/8** (3x)	3/8	3	48724	87.90	48724-C4	115.40
3/8		.3750	**1-1/2** (4x)	3/8	4	874924	101.40		
3/8		.3750	**2** (5x)	3/8	4	49924	101.40		
3/8		.3750	**3** (8x)	3/8	6	60324	114.40		
	10.0 mm	.3937	**30 mm** (3x)	10 mm	75 mm	886573	100.40		
	12.0 mm	.4724	**36 mm** (3x)	12 mm	100 mm	886576	104.40		
1/2		.5000	**3/4** (1.5x)	1/2	4	957732	154.80	957732-C4	188.40
1/2		.5000	**1-1/2** (3x)	1/2	4	48732	154.80	48732-C4	188.40
1/2		.5000	**2** (4x)	1/2	4	874932	167.50		
1/2		.5000	**2-5/8** (5x)	1/2	5	49932	184.40	49932-C4	218.70
1/2		.5000	**4** (8x)	1/2	7	60332	212.20		
5/8		.6250	**15/16** (1.5x)	5/8	4	957740	228.10		
3/4		.7500	**1-1/8** (1.5x)	3/4	4	957748	291.40	957748-C4	348.20
3/4		.7500	**2-1/4** (3x)	3/4	4	48748	291.40		

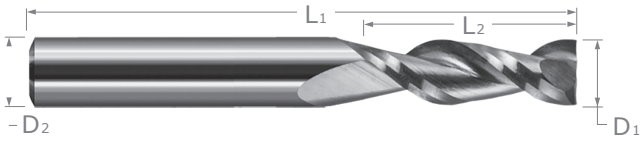
SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills - Slow Helix)

Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase 120%,for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 4x, reduce to 95%; for 5x, reduce to 90%; for 6x, reduce to 80%; for 8x, reduce to 54%; for 10x, reduce to 40%).

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
			Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
			Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0004	.0008	.0012	.0016	.0021	.0024	.0033	.0049	.0066	.0070	.0084	.0112	.0140	.0168	1 x Dia	1 x Dia
			Profile	.0005	.0009	.0014	.0019	.0024	.0028	.0038	.0057	.0076	.0080	.0096	.0129	.0161	.0193	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
			Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0004	.0008	.0012	.0016	.0021	.0024	.0033	.0049	.0066	.0070	.0084	.0112	.0140	.0168	1 x Dia	1 x Dia
			Profile	.0005	.0009	.0014	.0019	.0024	.0028	.0038	.0057	.0076	.0080	.0096	.0129	.0161	.0193	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (High Helix)



2 Flute Design Improves Bottom Finish and Accuracy

- High rake, high relief design with large flute valley maximizes chip removal performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Higher helix (approx. 40°) for faster chip removal and better finish
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2	898131	55.20		
3/64	**9/64** (3x)	1/8	1-1/2	898147	40.20		
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**3/32** (1.5x)	1/8	1-1/2	827662	40.50		
1/16	**3/16** (3x)	1/8	1-1/2	898162	40.20	898162-C4	54.00
1/16	**5/16** (5x)	1/8	2	866262	42.80		
1/16	**1/2** (8x)	1/8	2	732362	43.90		
5/64	**15/64** (3x)	1/8	1-1/2	898178	40.50		
3/32	**9/32** (3x)	1/8	1-1/2	898193	40.20		
1/8	**3/16** (1.5x)	1/8	1-1/2	827708	40.50		
1/8	**3/8** (3x)	1/8	1-1/2	898208	40.20	898208-C4	54.00
1/8	**5/8** (5x)	1/8	2	866308	42.80		
1/8	**1** (8x)	1/8	2-1/2	732408	45.30		
5/32	**15/32** (3x)	3/16	2	898210	57.50		
3/16	**9/16** (3x)	3/16	2	898212	55.30	898212-C4	70.80
3/16	**1** (5x)	3/16	3	866312	59.20		
1/4	**3/8** (1.5x)	1/4	2-1/2	827716	62.30		
1/4	**3/4** (3x)	1/4	2-1/2	898216	62.30	898216-C4	84.20
1/4	**1-1/4** (5x)	1/4	3	866316	66.40		
3/8	**9/16** (1.5x)	3/8	3	827724	95.20		
3/8	**1-1/8** (3x)	3/8	3	898224	94.40	898224-C4	122.60
3/8	**2** (5x)	3/8	4	866324	101.00		
1/2	**3/4** (1.5x)	1/2	4	827732	164.40		
1/2	**1-1/2** (3x)	1/2	4	898232	162.90	898232-C4	204.10
1/2	**2-5/8** (5x)	1/2	5	866332	175.70		

SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills - High Helix)

Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (Slow Helix)

- **Prevents fraying and chip-out on the top of the workpiece**
- Prevents lifting on vacuum tables
- 2 left hand spiral, right hand cut flutes
- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.010	**.030** (3x)	1/8	1-1/2	998510	68.40		
1/64	**.023** (1.5x)	1/8	1-1/2	966215	62.50		
1/64	**3/64** (3x)	1/8	1-1/2	998515	62.50	998515-C4	76.30
1/64	**5/64** (5x)	1/8	1-1/2	999815	72.30		
.020	**.030** (1.5x)	1/8	1-1/2	966220	49.20		
.020	**.060** (3x)	1/8	1-1/2	998520	48.70	998520-C4	62.50
.025	**.075** (3x)	1/8	1-1/2	998525	48.70		
1/32	**3/64** (1.5x)	1/8	1-1/2	966231	48.70		
1/32	**3/32** (3x)	1/8	1-1/2	998531	48.70	998531-C4	62.50
1/32	**5/32** (5x)	1/8	1-1/2	999831	58.60		
.040	**.120** (3x)	1/8	1-1/2	998540	48.70	998540-C4	62.50
.040	**.203** (5x)	1/8	1-1/2	999840	58.60		
3/64	**.071** (1.5x)	1/8	1-1/2	966247	42.40		
3/64	**9/64** (3x)	1/8	1-1/2	998547	41.90		
3/64	**1/4** (5x)	1/8	1-1/2	999847	48.70		
.050	**.150** (3x)	1/8	1-1/2	998550	49.20		
.060	**.180** (3x)	1/8	1-1/2	998560	49.20		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**3/32** (1.5x)	1/8	1-1/2	966262	37.60	966262-C4	51.40
1/16	**3/16** (3x)	1/8	1-1/2	998562	37.60	998562-C4	51.40
1/16	**1/4** (4x)	1/8	2	827462	50.30		
1/16	**5/16** (5x)	1/8	2	999862	50.30	999862-C4	66.80
1/16	**1/2** (8x)	1/8	2	978962	84.10		
5/64	**.117** (1.5x)	1/8	1-1/2	966278	37.60		
5/64	**15/64** (3x)	1/8	1-1/2	998578	37.60		
5/64	**13/32** (5x)	1/8	2	999878	50.30		
5/64	**5/8** (8x)	1/8	2	978978	84.10		

continued on next page

Check Out All of Our Plastic Cutting Solutions!

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
3/32	**9/64** (1.5x)	1/8	1-1/2	966293	37.60		
3/32	**9/32** (3x)	1/8	1-1/2	998593	37.60	998593-C4	51.40
3/32	**3/8** (4x)	1/8	2	827493	50.80		
3/32	**1/2** (5x)	1/8	2	999893	50.30		
3/32	**3/4** (8x)	1/8	2	978993	85.00		
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	998606	37.60		
1/8	**3/16** (1.5x)	1/8	1-1/2	966308	37.60	966308-C4	51.40
1/8	**3/8** (3x)	1/8	1-1/2	998608	37.60	998608-C4	51.40
1/8	**1/2** (4x)	1/8	2	827508	50.30		
1/8	**5/8** (5x)	1/8	2	999908	50.30		
1/8	**1** (8x)	1/8	2-1/2	979008	84.10		
9/64	**.425** (3x)	3/16	2	998609	51.60		
5/32	**15/64** (1.5x)	3/16	2	966310	51.60		
5/32	**15/32** (3x)	3/16	2	998610	51.10	998610-C4	70.40
5/32	**3/4** (5x)	3/16	3	999910	60.70		
3/16	**9/32** (1.5x)	3/16	2	966312	51.10	966312-C4	66.60
3/16	**9/16** (3x)	3/16	2	998612	51.10	998612-C4	70.40
3/16	**1** (5x)	3/16	3	999912	60.70		
3/16	**1-1/2** (8x)	3/16	3	979012	90.20		
1/4	**3/8** (1.5x)	1/4	2-1/2	966316	60.70	966316-C4	82.60
1/4	**3/4** (3x)	1/4	2-1/2	998616	60.70	998616-C4	82.60
1/4	**1** (4x)	1/4	3	827516	66.20		
1/4	**1-1/4** (5x)	1/4	3	999916	66.20	999916-C4	88.10
1/4	**2** (8x)	1/4	4	979016	97.60		
5/16	**1** (3x)	5/16	2-1/2	998620	90.70		
3/8	**9/16** (1.5x)	3/8	3	966324	103.20		
3/8	**1-1/8** (3x)	3/8	3	998624	103.20	998624-C4	130.40
3/8	**2** (5x)	3/8	4	999924	121.00		
1/2	**3/4** (1.5x)	1/2	4	966332	186.00	966332-C4	227.20
1/2	**1-1/2** (3x)	1/2	4	998632	186.00	998632-C4	219.10
1/2	**2-5/8** (5x)	1/2	5	999932	206.10		

Please See Speeds & Feeds On Page 251

Plastic Cutting End Mills vs. Metal Cutting End Mills

Improved Finish - Sharper edge provides for cleaner cut and less plowing action. Chips curl faster, transferring heat to the chip, not the part.

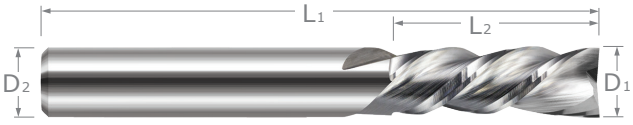
Increased Stock Removal - Large flute opening gives more chip clearance, avoids chip welding, and improves chip evacuation.

Feature	Typical Metal Working End Mills	Plastic Cutting End Mills
Flute Rake	8° – 12°	25° – 32°
Axial/End Gash Rake	2° – 4°	8° – 12°
OD Primary Relief	12° – 18°	18° – 26°
OD Secondary Relief	18° – 26°	35° – 45°
Core Diameter	56% – 60%	40% – 44%
Typical Cross Section	 2 FLUTE STANDARD	 SINGLE FLUTE  2 FLUTE  2 STRAIGHT FLUTE

Data presented is intended to be general guidelines for understanding how plastic end mill geometry compares to metal working tools. Actual values will change based on diameter, application and specific tool.

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (High Helix)



- **Prevents fraying and chip-out on the top of the workpiece**
- Prevents lifing on vacuum tables
- 2 left hand spiral, right hand cut flutes
- High rake, high relief design with large flute valley maximizes chip removal and performance
- Higher helix (approx. 40°) for faster chip removal and better finish
- Solid carbide
- CNC ground in the USA

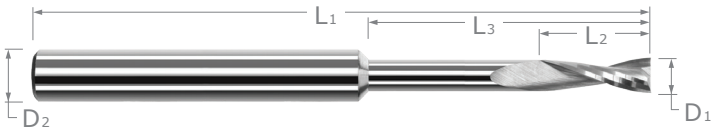
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/32	**3/32** (3x)	1/8	1-1/2	775831	47.40
1/32	**5/32** (5x)	1/8	1-1/2	826331	48.50
3/64	**9/64** (3x)	1/8	1-1/2	775847	48.70
3/64	**1/4** (5x)	1/8	1-1/2	826347	49.70

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/16	**.186** (3x)	1/8	1-1/2	775862	45.00
1/16	**5/16** (5x)	1/8	2	826362	50.30
3/32	**.273** (3x)	1/8	1-1/2	775893	45.00
3/32	**1/2** (5x)	1/8	2	826393	50.30
1/8	**3/8** (3x)	1/8	1-1/2	775908	45.00
1/8	**5/8** (5x)	1/8	2	826408	50.30
3/16	**.570** (3x)	3/16	2	775912	54.30
3/16	**1** (5x)	3/16	3	826412	60.70
1/4	**3/4** (3x)	1/4	2-1/2	775916	59.80
1/4	**1-1/4** (5x)	1/4	3	826416	66.20
3/8	**1-1/8** (3x)	3/8	3	775924	110.20
3/8	**2** (5x)	3/8	4	826424	122.20
1/2	**1-1/2** (3x)	1/2	4	775932	187.60
1/2	**2-5/8** (5x)	1/2	5	826432	206.10

Please See Speeds & Feeds On Page 251

END MILLS FOR PLASTICS

Square Upcut – Long Reach – 2 Flute



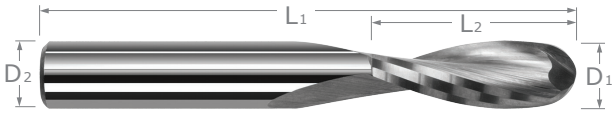
- High rake, high relief design with large flute valley maximizes chip removal and performance
- Center cutting design improves plunging and ramping
- Reduced neck diameter to avoid heeling
- Length of cut = 3x diameter
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/64	3/64	**1/8** (8x)	1/8	1-1/2	989015	72.60		
1/64	3/64	**3/16** (12x)	1/8	1-1/2	994115	76.30		
.020	.060	**.160** (8x)	1/8	1-1/2	989020	58.90		
.020	.060	**1/4** (12x)	1/8	1-1/2	994120	62.30		
1/32	3/32	**5/32** (5x)	1/8	1-1/2	961531	57.20		
1/32	3/32	**1/4** (8x)	1/8	1-1/2	989031	58.90		
1/32	3/32	**3/8** (12x)	1/8	1-1/2	994131	62.30		
1/32	3/32	**.470** (15x)	1/8	1-1/2	979731	66.00		
.040	.120	**.325** (8x)	1/8	1-1/2	989040	58.90		
.040	.120	**.480** (12x)	1/8	1-1/2	994140	62.30		
3/64	9/64	**3/8** (8x)	1/8	1-1/2	989047	52.30		
3/64	9/64	**.570** (12x)	1/8	1-1/2	994147	55.70		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	3/16	**5/16** (5x)	1/8	1-1/2	961562	46.80		
1/16	3/16	**1/2** (8x)	1/8	1-1/2	989062	48.00	989062-C4	61.80
1/16	3/16	**5/8** (10x)	1/8	2	748162	50.10		
1/16	3/16	**3/4** (12x)	1/8	2	994162	51.40		
1/16	3/16	**15/16** (15x)	1/8	2	979762	55.10		
5/64	15/64	**5/8** (8x)	1/8	2	989078	48.40		
5/64	15/64	**15/16** (12x)	1/8	2	994178	51.80		
3/32	9/32	**1/2** (5x)	1/8	1-1/2	961593	46.80		
3/32	9/32	**3/4** (8x)	1/8	2	989093	48.00		
3/32	9/32	**15/16** (10x)	1/8	2	748193	50.10		
3/32	9/32	**1-1/8** (12x)	1/8	2	994193	51.40		
3/32	9/32	**1-13/32** (15x)	1/8	2-1/2	979793	55.10		
1/8	3/8	**5/8** (5x)	1/8	1-1/2	961608	46.80		
1/8	3/8	**1** (8x)	1/8	2	989108	48.00	989108-C4	64.60
1/8	3/8	**1-1/4** (10x)	1/8	3	748108	50.10		
1/8	3/8	**1-1/2** (12x)	1/8	2-1/2	994208	51.40		
1/8	3/8	**1-7/8** (15x)	1/8	3	979808	55.10		
5/32	15/32	**1-1/4** (8x)	3/16	2-1/2	989110	57.90		
5/32	15/32	**1-7/8** (12x)	3/16	4	994210	67.50		
3/16	9/16	**1-1/2** (8x)	3/16	2-1/2	989112	57.90		
3/16	9/16	**2-1/4** (12x)	3/16	4	994212	67.50		
1/4	3/4	**2** (8x)	1/4	4	989116	68.70	989116-C4	90.60
1/4	3/4	**3** (12x)	1/4	6	994216	82.10		
3/8	1-1/8	**3** (8x)	3/8	6	989124	126.50		
1/2	1-1/2	**4** (8x)	1/2	7	989132	230.40		

Please See Speeds & Feeds On Page 259

END MILLS FOR PLASTICS

Ball Upcut – 2 Flute



- Ball end for profiling complex shapes
- Ball end has increased rake and relief for improved cutting action at tip of ball
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/64	**3/64** (3x)	1/8	1-1/2	49515	63.20		
1/64	**5/64** (5x)	1/8	1-1/2	71315	74.50		
.020	**.060** (3x)	1/8	1-1/2	49520	49.60		
.020	**.100** (5x)	1/8	1-1/2	71320	60.70		
.025	**.075** (3x)	1/8	1-1/2	49525	50.00		
.025	**1/8** (5x)	1/8	1-1/2	71325	60.70		
1/32	**3/64** (1.5x)	1/8	1-1/2	962331	49.60		
1/32	**3/32** (3x)	1/8	1-1/2	49531	49.60	49531-C4	63.40
1/32	**5/32** (5x)	1/8	1-1/2	71331	59.80	71331-C4	73.60
1/32	**1/4** (8x)	1/8	1-1/2	955731	71.00		
.039 (1 mm)	**.118** (3x)	1/8	1-1/2	49539	50.10		
3/64	**9/64** (3x)	1/8	1-1/2	49547	42.40		
3/64	**1/4** (5x)	1/8	1-1/2	71347	52.10		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**3/32** (1.5x)	1/8	1-1/2	962362	36.50		
1/16	**3/16** (3x)	1/8	1-1/2	49562	36.50	49562-C4	50.30
1/16	**1/4** (4x)	1/8	1-1/2	784662	40.40		
1/16	**5/16** (5x)	1/8	2	71362	44.50	71362-C4	61.50
1/16	**1/2** (8x)	1/8	2	955762	66.50		
5/64	**15/64** (3x)	1/8	1-1/2	49578	36.50		
5/64	**13/32** (5x)	1/8	2	71378	44.50		
3/32	**9/32** (3x)	1/8	1-1/2	49593	36.50	49593-C4	50.30
3/32	**1/2** (5x)	1/8	2	71393	44.50		
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	49605	36.80		
1/8	**3/16** (1.5x)	1/8	1-1/2	962408	36.50		
1/8	**3/8** (3x)	1/8	1-1/2	49608	36.50	49608-C4	50.30
1/8	**1/2** (4x)	1/8	2	784708	40.40		
1/8	**5/8** (5x)	1/8	2	71408	44.50	71408-C4	61.50
1/8	**1** (8x)	1/8	2-1/2	955808	66.50		
9/64	**.425** (3x)	3/16	2	49609	48.70		
5/32	**15/32** (3x)	3/16	2	49610	48.10		
5/32	**3/4** (5x)	3/16	3	71410	59.20		
3/16	**9/32** (1.5x)	3/16	2	962412	48.10		
3/16	**9/16** (3x)	3/16	2	49612	48.10	49612-C4	63.70
3/16	**1** (5x)	3/16	3	71412	59.50		

continued on next page

END MILLS FOR PLASTICS

Ball Upcut – 2 Flute (cont.)

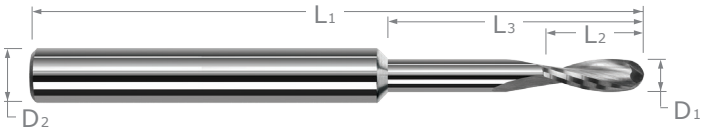
continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/4	**3/8** (1.5x)	1/4	2-1/2	962416	61.60		
1/4	**3/4** (3x)	1/4	2-1/2	49616	61.60	49616-C4	83.30
1/4	**1-1/4** (5x)	1/4	3	71416	70.50	71416-C4	92.30
3/8	**9/16** (1.5x)	3/8	3	962424	98.70		
3/8	**1-1/8** (3x)	3/8	3	49624	98.70	49624-C4	126.30
3/8	**2** (5x)	3/8	4	71424	112.50		
1/2	**3/4** (1.5x)	1/2	4	962432	170.20		
1/2	**1-1/2** (3x)	1/2	4	49632	170.20	49632-C4	204.00
1/2	**2-5/8** (5x)	1/2	5	71432	205.90		

Please See Speeds & Feeds On Page 251

END MILLS FOR PLASTICS

Ball Upcut – Long Reach – 2 Flute



- Ball end has increased rake and relief for improved cutting action at tip of ball
- Reduced neck diameter to avoid heeling
- Ball end for profiling complex shapes
- Length of cut = 3x diameter
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	PRICE
1/32	3/32	**5/32** (5x)	1/8	1-1/2	964531	63.40
1/32	3/32	**1/4** (8x)	1/8	1-1/2	976231	65.50
3/64	9/64	**1/4** (5x)	1/8	1-1/2	964547	56.30
3/64	9/64	**3/8** (8x)	1/8	1-1/2	976247	57.60
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	PRICE
1/16	3/16	**5/16** (5x)	1/8	1-1/2	964562	51.10
1/16	3/16	**1/2** (8x)	1/8	1-1/2	976262	53.00
5/64	15/64	**13/32** (5x)	1/8	1-1/2	964578	51.60
5/64	15/64	**5/8** (8x)	1/8	2	976278	53.00
3/32	9/32	**1/2** (5x)	1/8	1-1/2	964593	51.60
3/32	9/32	**3/4** (8x)	1/8	2	976293	53.00
1/8	3/8	**5/8** (5x)	1/8	1-1/2	964608	51.10
1/8	3/8	**1** (8x)	1/8	2	976308	53.00
3/16	9/16	**1** (5x)	3/16	2	964612	63.10
1/4	3/4	**1-1/4** (5x)	1/4	2-1/2	964616	76.50

SPEEDS & FEEDS (Square & Ball – Long Reach Plastic Cutting End Mills)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 5x, increase to 130%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 89%; for 12x, reduce to 80%; for 15x, reduce to 67%). For complete speed and feed charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0003	.0005	.0008	.0010	.0013	.0016	.0021	.0032	.0042	.0045	.0054	.0072	.0090	.0107	1 x Dia	1 x Dia
			Profile	.0003	.0006	.0009	.0012	.0015	.0018	.0024	.0036	.0048	.0051	.0062	.0082	.0103	.0124	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0003	.0005	.0008	.0010	.0013	.0016	.0021	.0032	.0042	.0045	.0054	.0072	.0090	.0107	1 x Dia	1 x Dia
			Profile	.0003	.0006	.0009	.0012	.0015	.0018	.0024	.0036	.0048	.0051	.0062	.0082	.0103	.0124	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Corner Radius Upcut – 2 Flute

- High rake, high relief design with large flute valley maximizes chip removal and performance
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/32	.005	**3/32** (3x)	1/8	1-1/2	54031	37.10

D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/16	.005	**3/16** (3x)	1/8	1-1/2	54062	36.50
1/16	.010	**3/16** (3x)	1/8	1-1/2	55462	36.50
1/16	.010	**5/16** (5x)	1/8	2	861862	45.50
1/16	.015	**3/16** (3x)	1/8	1-1/2	69362	36.50
1/16	.015	**5/16** (5x)	1/8	2	862462	45.50
3/32	.005	**9/32** (3x)	1/8	1-1/2	54093	36.50
3/32	.010	**9/32** (3x)	1/8	1-1/2	55493	36.50
3/32	.010	**1/2** (5x)	1/8	2	861893	45.50
3/32	.015	**9/32** (3x)	1/8	1-1/2	69393	37.10
3/32	.015	**1/2** (5x)	1/8	2	862493	46.00
3/32	.020	**9/32** (3x)	1/8	1-1/2	69893	36.50
3/32	.030	**9/32** (3x)	1/8	1-1/2	70693	36.50
1/8	.005	**3/16** (1.5x)	1/8	1-1/2	767508	37.10
1/8	.005	**3/8** (3x)	1/8	1-1/2	54108	36.50
1/8	.005	**5/8** (5x)	1/8	2	768908	45.70
1/8	.010	**3/8** (3x)	1/8	1-1/2	55508	36.50
1/8	.010	**5/8** (5x)	1/8	2	861908	46.00
1/8	.015	**3/8** (3x)	1/8	1-1/2	56408	36.50
1/8	.015	**5/8** (5x)	1/8	2	862508	45.50
1/8	.020	**3/8** (3x)	1/8	1-1/2	69908	36.50
1/8	.030	**3/16** (1.5x)	1/8	1-1/2	768708	37.10
1/8	.030	**3/8** (3x)	1/8	1-1/2	70708	36.50
1/8	.030	**5/8** (5x)	1/8	2	863108	45.50
3/16	.005	**9/16** (3x)	3/16	2	54112	48.10
3/16	.010	**9/16** (3x)	3/16	2	55512	48.10
3/16	.015	**9/16** (3x)	3/16	2	56412	49.00
3/16	.020	**9/16** (3x)	3/16	2	69912	48.10
3/16	.030	**9/16** (3x)	3/16	2	70712	49.00
3/16	.030	**1** (5x)	3/16	3	863112	60.30

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END MILLS FOR PLASTICS

Corner Radius Upcut – 2 Flute (cont.)

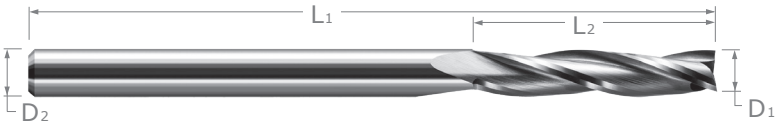
continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE
1/4	.010	**3/4** (3x)	1/4	2-1/2	55516	61.60
1/4	.015	**3/4** (3x)	1/4	2-1/2	56416	61.60
1/4	.020	**3/8** (1.5x)	1/4	2-1/2	767116	61.60
1/4	.020	**3/4** (3x)	1/4	2-1/2	69916	61.60
1/4	.020	**1-1/4** (5x)	1/4	4	767716	72.60
1/4	.030	**3/4** (3x)	1/4	2-1/2	70716	61.60
1/4	.030	**1-1/4** (5x)	1/4	4	863116	71.90
3/8	.015	**1-1/8** (3x)	3/8	3	56424	96.80
3/8	.030	**1-1/8** (3x)	3/8	3	70724	96.80
3/8	.060	**1-1/8** (3x)	3/8	3	739124	98.20
1/2	.015	**1-1/2** (3x)	1/2	4	56432	167.30
1/2	.030	**1-1/2** (3x)	1/2	4	70732	167.30
1/2	.060	**1-1/2** (3x)	1/2	4	739132	169.70

Please See Speeds & Feeds On Page 250

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (Slow Helix)



Wiper Flat Option for an Improved Finish

- 3 flute design strengthens rigidity and improves wall finish
- Choose from two types:
  - Without Wiper Flat (Type I): Standard end geometry designed with a dish angle to a sharp corner
  - With Wiper Flat (Type II): Wiper flat end geometry that enhances bottom finish by reducing traditional circular marks; with a slight chamfer to protect corners
- Slower helix (approx. 22°) reduces lifting forces for fiber-reinforced applications and vacuum table setups
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/32	**3/32** (3x)	II	1/8	1-1/2	915631	55.80		
1/32	**5/32** (5x)	II	1/8	1-1/2	986431	55.30		
1/32	**1/4** (8x)	II	1/8	1-1/2	992331	61.00		
3/64	**1/4** (5x)	II	1/8	1-1/2	986447	42.60		
3/64	**3/8** (8x)	II	1/8	2	992347	47.10		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/16	**3/16** (3x)	I	1/8	1-1/2	770262	35.20		
1/16	**3/16** (3x)	II	1/8	1-1/2	915662	35.20		
1/16	**5/16** (5x)	I	1/8	2	769662	41.40		
1/16	**5/16** (5x)	II	1/8	2	986462	41.00	986462-C4	54.80
1/16	**1/2** (8x)	II	1/8	2	992362	45.70		
1/16	**5/8** (10x)	II	1/8	2	871662	57.90		
5/64	**13/32** (5x)	II	1/8	2	986478	41.40		
5/64	**5/8** (8x)	II	1/8	2	992378	45.70		
3/32	**9/32** (3x)	I	1/8	1-1/2	770293	35.20		
3/32	**9/32** (3x)	II	1/8	1-1/2	915693	34.90		
3/32	**1/2** (5x)	I	1/8	2	769693	41.40		
3/32	**1/2** (5x)	II	1/8	2	986493	41.00	986493-C4	58.00
3/32	**3/4** (8x)	II	1/8	2	992393	45.70		
1/8	**3/8** (3x)	I	1/8	1-1/2	770308	35.20		
1/8	**3/8** (3x)	II	1/8	1-1/2	915708	34.90		
1/8	**5/8** (5x)	I	1/8	2	769708	41.40		
1/8	**5/8** (5x)	II	1/8	2	986508	41.00	986508-C4	54.80
1/8	**1** (8x)	II	1/8	2	992408	45.70		
1/8	**1-1/4** (10x)	II	1/8	2-1/2	871708	57.90		

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TYPE I - WITHOUT WIPER

TYPE II - WITH WIPER FLAT

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (Slow Helix) (cont.)

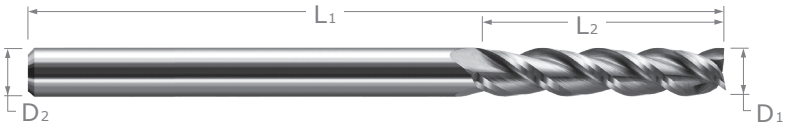
continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	3 FL	PRICE	3 FL	PRICE
5/32	**15/32** (3x)	II	3/16	2	915710	54.80		
5/32	**3/4** (5x)	II	3/16	3	986510	56.70		
3/16	**9/16** (3x)	I	3/16	2	770312	54.80		
3/16	**9/16** (3x)	II	3/16	2	915712	54.20		
3/16	**1** (5x)	I	3/16	3	769712	57.20		
3/16	**1** (5x)	II	3/16	3	986512	56.70	986512-C4	75.90
3/16	**1-1/2** (8x)	II	3/16	3	992412	68.80		
1/4	**3/8** (1.5x)	II	1/4	2-1/2	869316	54.10		
1/4	**3/4** (3x)	I	1/4	2-1/2	770316	57.20		
1/4	**3/4** (3x)	II	1/4	2-1/2	915716	56.70		
1/4	**1-1/4** (5x)	I	1/4	3	769716	64.70		
1/4	**1-1/4** (5x)	II	1/4	3	986516	64.10	986516-C4	86.00
1/4	**2** (8x)	II	1/4	4	992416	85.60		
3/8	**9/16** (1.5x)	II	3/8	3	869324	92.10		
3/8	**1-1/8** (3x)	II	3/8	3	915724	94.60		
3/8	**2** (5x)	II	3/8	4	986524	102.30		
1/2	**3/4** (1.5x)	II	1/2	4	869332	158.40		
1/2	**1-1/2** (3x)	II	1/2	4	915732	164.40		
1/2	**2-5/8** (5x)	II	1/2	5	986532	173.70		

Please See Speeds & Feeds On Page 266

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (High Helix)



Wiper Flat Option for an Improved Finish

- 3 flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Choose from two types:
  - Without Wiper Flat (Type I): Standard end geometry designed with a dish angle to a sharp corner
  - With Wiper Flat (Type II): Wiper flat end geometry that enhances bottom finish by reducing traditional circular marks; with a slight chamfer to protect corners
- Design is ideally suited for thin-walled applications and tightly secured workpieces
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/32	**3/32** (3x)	II	1/8	1-1/2	902131	54.80		
1/32	**5/32** (5x)	II	1/8	1-1/2	941231	57.00		
1/32	**1/4** (8x)	II	1/8	1-1/2	900731	62.80		
3/64	**1/4** (5x)	II	1/8	1-1/2	941247	44.20		

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/16	**3/16** (3x)	I	1/8	1-1/2	736762	40.80		
1/16	**3/16** (3x)	II	1/8	1-1/2	902162	40.40		
1/16	**5/16** (5x)	I	1/8	2	769862	42.90		
1/16	**5/16** (5x)	II	1/8	2	941262	42.60	941262-C4	59.50
1/16	**1/2** (8x)	II	1/8	2	900762	47.10		
1/16	**5/8** (10x)	II	1/8	2	854662	49.90		
5/64	**13/32** (5x)	II	1/8	2	941278	42.60		
3/32	**9/32** (3x)	I	1/8	1-1/2	736793	40.80		
3/32	**9/32** (3x)	II	1/8	1-1/2	902193	40.40		
3/32	**1/2** (5x)	I	1/8	2	769893	42.90		
3/32	**1/2** (5x)	II	1/8	2	941293	42.60	941293-C4	59.50
3/32	**3/4** (8x)	II	1/8	2	900793	47.10		
1/8	**3/8** (3x)	I	1/8	1-1/2	736808	40.80		
1/8	**3/8** (3x)	II	1/8	1-1/2	902208	40.40		
1/8	**5/8** (5x)	I	1/8	2	769908	42.60		
1/8	**5/8** (5x)	II	1/8	2	941308	42.60	941308-C4	59.50
1/8	**1** (8x)	II	1/8	2	900808	47.10		
1/8	**1-1/4** (10x)	II	1/8	2-1/2	854708	49.90		

continued on next page

TYPE I - WITHOUT WIPER

TYPE II - WITH WIPER FLAT

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (High Helix) (cont.)

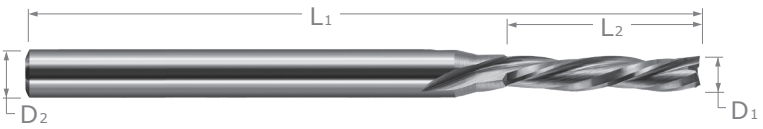
continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	3 FL	PRICE	3 FL	PRICE
5/32	**15/32** (3x)	II	3/16	2	902210	54.50		
5/32	**3/4** (5x)	II	3/16	3	941310	56.70		
3/16	**9/16** (3x)	I	3/16	2	736812	55.10		
3/16	**9/16** (3x)	II	3/16	2	902212	54.50		
3/16	**1** (5x)	I	3/16	3	769912	57.20		
3/16	**1** (5x)	II	3/16	3	941312	56.70	941312-C4	75.90
3/16	**1-1/2** (8x)	II	3/16	3	900812	62.50		
1/4	**3/8** (1.5x)	II	1/4	2-1/2	852016	59.80		
1/4	**3/4** (3x)	I	1/4	2-1/2	736816	62.80		
1/4	**3/4** (3x)	II	1/4	2-1/2	902216	62.30		
1/4	**1-1/4** (5x)	I	1/4	3	769916	64.70		
1/4	**1-1/4** (5x)	II	1/4	3	941316	64.10	941316-C4	86.00
1/4	**2** (8x)	II	1/4	4	900816	85.60		
3/8	**9/16** (1.5x)	II	3/8	3	852024	92.30		
3/8	**1-1/8** (3x)	II	3/8	3	902224	94.60		
3/8	**2** (5x)	II	3/8	4	941324	103.30		
1/2	**3/4** (1.5x)	II	1/2	4	852032	157.10		
1/2	**1-1/2** (3x)	II	1/2	4	902232	163.00		
1/2	**2-5/8** (5x)	II	1/2	5	941332	172.10		

Please See Speeds & Feeds On Page 266

END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (Slow Helix)



- 3 left hand spiral, right hand cut flute design strengthens rigidity and improves wall finish
- Slower helix (approx. 22°) ideal for overhung, less secure parts
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/32	**5/32** (5x)	1/8	1-1/2	880431	55.80

D_1 $^{+.000''}_{-.002''}$	D_1 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/16	**5/16** (5x)	1/8	2	880462	44.70
3/32	**1/2** (5x)	1/8	2	880493	44.70
1/8	**5/8** (5x)	1/8	2	880508	44.70
3/16	**1** (5x)	3/16	3	880512	58.80
1/4	**1-1/4** (5x)	1/4	3	880516	66.30
3/8	**1-1/8** (3x)	3/8	3	878124	96.80
1/2	**1-1/2** (3x)	1/2	4	878132	164.00

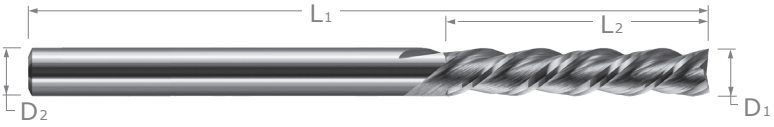
SPEEDS & FEEDS (3 Flute Plastic Finisher – Slow Helix)

Important Note: Values in table are in inches and are based on standard (5x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 120%; for 3x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 8x, reduce to 66%; for 10x, reduce to 55%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00033	.00069	.00104	.00138	.00173	.00207	.00278	.00416	.00556	.00590	.00709	.00945	.01181	.01417	.35 x Dia	1 x Dia
			Finishing	.00011	.00023	.00034	.00045	.00057	.00068	.00091	.00137	.00183	.00194	.00233	.00310	.00388	.00466	.10 x Dia	5 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00033	.00069	.00104	.00138	.00173	.00207	.00278	.00416	.00556	.00590	.00709	.00945	.01181	.01417	.35 x Dia	1 x Dia
			Finishing	.00011	.00023	.00034	.00045	.00057	.00068	.00091	.00137	.00183	.00194	.00233	.00310	.00388	.00466	.10 x Dia	5 x Dia

END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (High Helix)



- 3 left hand spiral, right hand cut flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Design is ideally suited for thin-walled applications
- Solid carbide
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	D_1 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/32	**5/32** (5x)	1/8	1-1/2	864331	62.50
D_1 $^{+.000''}_{-.002''}$	D_1 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/16	**5/16** (5x)	1/8	2	864362	50.60
3/32	**9/32** (3x)	1/8	1-1/2	873793	46.60
3/32	**1/2** (5x)	1/8	2	864393	49.00
3/32	**3/4** (8x)	1/8	2	722593	51.10
1/8	**3/8** (3x)	1/8	1-1/2	873808	39.10
1/8	**5/8** (5x)	1/8	2	864408	43.10
1/8	**1** (8x)	1/8	2	722608	45.20
3/16	**9/16** (3x)	3/16	2	873812	52.70
3/16	**1** (5x)	3/16	3	864412	59.30
1/4	**3/4** (3x)	1/4	2-1/2	873816	60.10
1/4	**1-1/4** (5x)	1/4	3	864416	66.30
1/4	**2** (8x)	1/4	4	722616	87.30
3/8	**1-1/8** (3x)	3/8	3	873824	96.80
1/2	**1-1/2** (3x)	1/2	4	873832	165.30

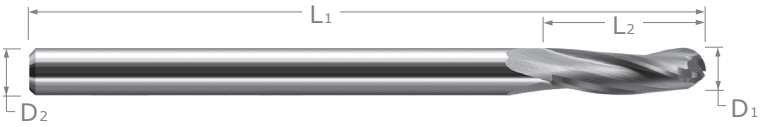
SPEEDS & FEEDS (3 Flute Plastic Finisher – High Helix)

Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia	1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia	3 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia	1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia	3 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00035	.00073	.00110	.00146	.00183	.00218	.00293	.00439	.00587	.00622	.00748	.00997	.01247	.01496	.35 x Dia	1 x Dia
			Finishing	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00240	.00321	.00341	.00410	.00546	.00683	.00820	.10 x Dia	3 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia	1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia	3 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00035	.00073	.00110	.00146	.00183	.00218	.00293	.00439	.00587	.00622	.00748	.00997	.01247	.01496	.35 x Dia	1 x Dia
			Finishing	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00240	.00321	.00341	.00410	.00546	.00683	.00820	.10 x Dia	3 x Dia

END MILLS FOR PLASTICS

Finishers – Ball Upcut – 3 Flute (Slow Helix)



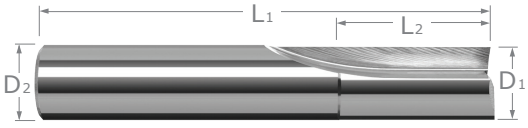
- Ball end has increased rake and relief for improved cutting action at the tip
- 3 flute design strengthens rigidity and improves wall finish
- Slower helix reduces lifting forces for fiber-reinforced applications and vacuum table set ups
- Center cutting
- Ultrafine grain carbide to create a sharp cutting edge
- CNC ground in the USA

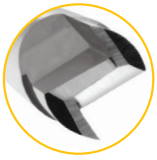
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE
1/16	**.186** (3x)	1/8	1-1/2	808762	40.40
3/32	**.279** (3x)	1/8	1-1/2	808793	40.40
1/8	**3/8** (3x)	1/8	1-1/2	808808	40.10
3/16	**.570** (3x)	3/16	2	808812	61.50
1/4	**3/4** (3x)	1/4	2-1/2	808816	64.70
3/8	**1-1/8** (3x)	3/8	3	808824	103.10
1/2	**1-1/2** (3x)	1/2	4	808832	175.70

Please See Speeds & Feeds On Page 266

END MILLS FOR COMPOSITES

Square – 2 Straight Flutes





2 Straight Flutes
(End View)

- Designed to mill abrasive, glass-filled plastics with reinforcing fiber and other additives
- Straight flute design improves finish and minimizes fraying of fiber-reinforced and layered materials by not "pulling" fibers
- Behind center design with high positive rake for smoother cuts
- Eccentric relief for improved edge life
- Allows shallow ramping, not suited for plunge cutting
- Select sizes available with oversized, router-style shanks
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT		SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/32	**3/32**	(3x)	1/8	1-1/2	69531	56.10	69531-C4	69.90
D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**3/32**	(1.5x)	1/8	1-1/2	825162	37.70	825162-C4	51.50
1/16	**1/8**	(2x)	1/4*	2	14604	41.90	14604-C4	63.70
1/16	**3/16**	(3x)	1/8	1-1/2	69562	37.50	69562-C4	51.30
1/16	**5/16**	(5x)	1/8	2	70462	43.20	70462-C4	58.50
5/64*	**5/32**	(2x)	1/4*	2	14605	42.70	14605-C4	64.50
5/64	**1/4**	(3x)	1/8	1-1/2	69578	37.90	69578-C4	51.70
5/64	**13/32**	(5x)	1/8	2	70478	43.60	70478-C4	59.10
3/32	**9/64**	(1.5x)	1/8	1-1/2	825193	37.70	825193-C4	51.50
3/32*	**3/16**	(2x)	1/4*	2	14606	41.90	14606-C4	60.50
3/32	**5/16**	(3x)	1/8	1-1/2	69593	37.50	69593-C4	51.30
3/32	**1/2**	(5x)	1/8	2	70493	43.20	70493-C4	58.50
1/8	**3/16**	(1.5x)	1/8	1-1/2	825208	37.00	825208-C4	50.80
1/8*	**1/4**	(2x)	1/4*	2	14608	41.90	14608-C4	63.70
1/8	**3/8**	(3x)	1/8	1-1/2	69608	37.50	69608-C4	51.30
1/8	**5/8**	(5x)	1/8	2	70508	43.20	70508-C4	58.50
5/32	**1/2**	(3x)	3/16	2	69610	39.80	69610-C4	55.70
3/16	**5/8**	(3x)	3/16	2	69612	39.80	69612-C4	55.70
3/16*	**5/8**	(3x)	1/4*	2	14612	41.90	14612-C4	60.50
3/16	**1**	(5x)	3/16	3	70512	47.00	70512-C4	66.30
1/4	**3/8**	(1.5x)	1/4	2-1/2	825216	38.90	825216-C4	60.70
1/4*	**3/4**	(3x)	1/4	2-1/2	14616	38.10	14616-C4	59.90
1/4	**1-1/4**	(5x)	1/4	3	70516	53.10	70516-C4	74.90
5/16	**5/8**	(2x)	5/16	2-1/2	14620	73.20	14620-C4	96.90
3/8*	**7/8**	(2x)	3/8	2-1/2	14624	72.50	14624-C4	99.40
3/8	**2**	(5x)	3/8	4	70524	89.20	70524-C4	116.30
1/2*	**1**	(2x)	1/2	3	14632	115.10	14632-C4	147.80
1/2	**2-1/2**	(5x)	1/2	4	70532	142.00		

*Cutter diameter tolerance is +.000/-.004". Tools are ground on oversized, router-style shank.

SPEEDS & FEEDS (2 Straight Flutes)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0004	.0008	.0012	.0016	.0020	.0024	.0032	.0048	.0064	.0068	.0082	.0109	.0137	.0164	1 x Dia	1 x Dia
			Profile	.0004	.0009	.0014	.0018	.0023	.0028	.0037	.0055	.0074	.0079	.0094	.0126	.0157	.0189	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0003	.0007	.0010	.0013	.0016	.0020	.0026	.0039	.0053	.0056	.0067	.0090	.0112	.0134	1 x Dia	1 x Dia
			Profile	.0004	.0008	.0011	.0015	.0019	.0023	.0030	.0045	.0061	.0064	.0077	.0103	.0129	.0154	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0004	.0008	.0012	.0016	.0020	.0024	.0032	.0048	.0064	.0068	.0082	.0109	.0137	.0164	1 x Dia	1 x Dia
			Profile	.0004	.0009	.0014	.0018	.0023	.0028	.0037	.0055	.0074	.0079	.0094	.0126	.0157	.0189	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0003	.0007	.0010	.0013	.0016	.0020	.0026	.0039	.0053	.0056	.0067	.0090	.0112	.0134	1 x Dia	1 x Dia
			Profile	.0004	.0008	.0011	.0015	.0019	.0023	.0030	.0045	.0061	.0064	.0077	.0103	.0129	.0154	.35 x Dia	1 x Dia

END MILLS FOR COMPOSITES

Compression Cutter

Prevents Burrs & Delamination!

- Counteracting flute geometries compress material inwardly to avoid burrs, tear out, and delamination
- Produces enhanced edge finish on top and bottom of workpiece
- Offered in two diamond coatings for increased tool life in a variety of abrasive composite materials
- Stocked in 2, 4, and 6 flute configurations for rough and finish machining
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERLAP CENTER	OVERLAP LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.001''}_{-.001''}$	L_4		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/32	3/32	**1/32**	.006	2	1/8	1-1/2	994331	59.40	994331-C4	72.80	995031	134.50
3/64	9/64	**3/64**	.009	2	1/8	1-1/2	994347	59.40	994347-C4	73.50	995047	133.20
1/16	3/16	**1/16**	.013	2	1/8	1-1/2	994362	56.50	994362-C4	70.00	995062	130.10
5/64	1/4	**5/64**	.016	2	1/8	1-1/2	994378	56.50	994378-C4	70.70	995078	131.30
3/32	9/32	**3/32**	.019	2	1/8	1-1/2	994393	56.50	994393-C4	70.00	995093	131.30
1/8	3/8	**1/8**	.025	2	1/8	1-1/2	994408	54.30	994408-C4	68.20	995108	127.10
1/8	3/8	**1/8**	.028	4	1/8	1-1/2	993708	57.80	993708-C4	71.80	997708	132.80
3/16	9/16	**3/16**	.038	2	3/16	2	994412	60.50	994412-C4	79.80	995112	147.80
3/16	9/16	**3/16**	.041	4	3/16	2	993712	64.90	993712-C4	84.00	997712	155.80
1/4	3/4	**1/4**	.050	2	1/4	2-1/2	994416	72.40	994416-C4	94.10	995116	174.80
1/4	3/4	**1/4**	.055	4	1/4	2-1/2	993716	77.10	993716-C4	98.80	997716	182.60
5/16	1	**5/16**	.075	6	5/16	2-1/2	920120	93.00	920120-C4	119.70	918820	214.10
3/8	1-1/8	**3/8**	.090	6	3/8	2-1/2	920124	115.10	920124-C4	141.40	918824	283.60
1/2	1-1/2	**1/2**	.120	6	1/2	3	920132	207.90	920132-C4	237.80	918832	408.90

Choosing the Right Diamond

AMORPHOUS DIAMOND

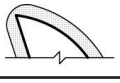
A PVD amorphous diamond coating which improves lubricity and wear resistance. Coating is thin relative to CVD diamond, preventing edge rounding. Sharp edges improve results (performance and finish) over CVD in certain abrasive materials.

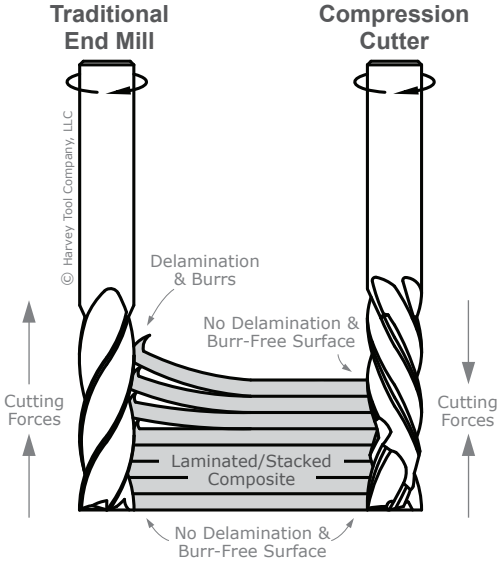
Thin coating maintains sharper edge.

CVD DIAMOND

True Crystalline CVD diamond is grown directly into a carbide end mill. This dramatically improves hardness, which improves abrasion resistance and extends tool life up to 50x, allowing higher feed rates than uncoated carbide. Ideal for machining abrasive composite materials with high fiber or fill concentration (G10, FR4, etc.) Diamond layer is approximately 5 times thicker than Amorphous Diamond, improving wear resistance. Well suited for high production environments.

Thicker diamond layer for increased wear resistance.





Traditional End Mills: Upward lifting force causes burrs and delamination at the top of the part.

Compression Cutters: Counteracting cutting forces compress the material and stabilize the workpiece, creating a superior finish on the top and bottom of the part.

END MILLS FOR COMPOSITES

Chipbreaker Cutter

Type I
Bur-Style End

Type II
Center Cutting

- Optimized geometry with chipbreakers efficiently shears fibers and shortens chips for improved chip removal
- Suited for roughing and profiling in composite materials with high fiber or fill concentration (G10, FR4, etc.)
- Choose from two types:
  - -Type I: Bur-style end allows for shallow ramping (not suited for plunge cutting)
  - -Type II: Center cutting end allows for plunge cutting, reduced flute count prevents chip packing, designed specifically for CFRP
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (9 µm)	
D_1 +.000″ −.001″	L_2 +.010″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/32	**3/32** (3x)	4	I	1/8	1-1/2	969231	57.10	969231-C4	70.90		
3/64	**9/64** (3x)	4	I	1/8	1-1/2	969247	56.60	969247-C4	70.40		
1/16	**.186** (3x)	3	II	1/8	1-1/2	801962	56.50			803762	130.10
1/16	**.186** (3x)	4	I	1/8	1-1/2	969262	54.30	969262-C4	68.10		
5/64	**15/64** (3x)	4	I	1/8	1-1/2	969278	54.80	969278-C4	68.60		
3/32	**.279** (3x)	3	II	1/8	1-1/2	801993	56.50			803793	130.10
3/32	**.279** (3x)	4	I	1/8	1-1/2	969293	54.30	969293-C4	68.10	791593	131.30
D_1 +.000″ −.002″	L_2 +.030″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/8	**3/8** (3x)	5	II	1/8	1-1/2	802008	53.90	802008-C4	67.70	803808	126.80
1/8	**3/8** (3x)	6	I	1/8	1-1/2	969308	52.30	969308-C4	66.10	791608	128.10
1/8	**5/8** (5x)	5	II	1/8	1-1/2	818508	57.80	818508-C4	71.60	803008	130.10
1/8	**5/8** (5x)	6	I	1/8	1-1/2	884908	56.10	884908-C4	69.90		
3/16	**9/16** (3x)	5	II	3/16	2	802012	60.20			803812	146.80
3/16	**9/16** (3x)	6	I	3/16	2	969312	57.80	969312-C4	77.10		
3/16	**1** (3x)	5	II	3/16	2	818512	63.30			803012	151.50
3/16	**1** (5x)	6	I	3/16	2	884912	61.50	884912-C4	80.80		
1/4	**3/4** (3x)	5	II	1/4	2-1/2	802016	71.30	802016-C4	93.30	803816	173.80
1/4	**3/4** (3x)	6	I	1/4	2-1/2	969316	69.30	969316-C4	91.30	791616	173.80
1/4	**1-1/4** (5x)	5	II	1/4	2-1/2	818516	75.50	818516-C4	95.30	803016	182.10
1/4	**1-1/4** (5x)	6	I	1/4	2-1/2	884916	73.30	884916-C4	95.30		
3/8	**1-1/8** (3x)	5	II	3/8	3	802024	118.30			803824	283.00
3/8	**1-1/8** (3x)	8	I	3/8	3	969324	113.70	969324-C4	140.40	791624	285.70
1/2	**1-1/2** (3x)	5	II	1/2	4	802032	206.70			803832	405.70
1/2	**1-1/2** (3x)	8	I	1/2	4	969332	200.60	969332-C4	232.80		

END MILLS FOR COMPOSITES

Diamond Cut – Bur Style

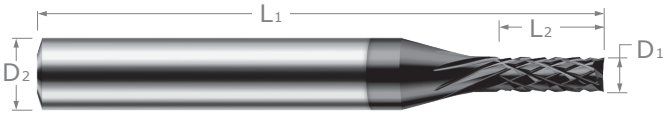
Bur-Style End

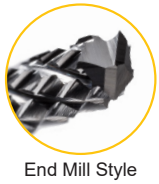
- Diamond cut style and high flute count allows for effective deburring with the outer diameter in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Total flute count on the bur-style end is equal to the amount of right hand teeth
- Downcut geometry on the OD
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.062 (1/16)	**.186** (3x)	6	8	1/8	1-1/2	798462	45.50	798462-C4	59.30
.078 (5/64)	**.234** (3x)	7	9	1/8	1-1/2	798478	45.50	798478-C4	59.30
.093 (3/32)	**.279** (3x)	7	9	1/8	1-1/2	798493	45.50	798493-C4	59.30
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.375** (3x)	8	10	1/8	1-1/2	798508	45.50	798508-C4	59.30
.187 (3/16)	**.563** (3x)	9	11	3/16	2	798512	54.30	798512-C4	73.60
.250 (1/4)	**.750** (3x)	10	12	1/4	2-1/2	798516	75.00	798516-C4	97.00

END MILLS FOR COMPOSITES

Diamond Cut – End Mill Style





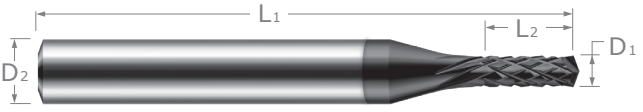
End Mill Style

- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Center cutting (two flutes to center) on end with downcut geometry on OD
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT		RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (4 µm)	
	D_1 $^{+.000″}_{-.001″}$	L_2 $^{+.020″}_{-.000″}$				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	.062 (1/16)	**.186**	(3x)	6	8	1/8	1-1/2	920962	45.50	920962-C4	59.30		
	.078 (5/64)	**.234**	(3x)	7	9	1/8	1-1/2	920978	45.50	920978-C4	59.30		
	.093 (3/32)	**.279**	(3x)	7	9	1/8	1-1/2	920993	45.50	920993-C4	59.30		
	.109 (7/64)	**.327**	(3x)	8	10	1/8	1-1/2	921002	49.20	921002-C4	63.00		
	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
NEW	.125 (1/8)	**.187**	(1.5x)	8	10	1/8	1-1/2	716908	45.00	716908-C4	58.80		
	.125 (1/8)	**.375**	(3x)	8	10	1/8	1-1/2	921008	45.50	921008-C4	59.30	799008	101.30
	.125 (1/8)	**.625**	(5x)	8	10	1/8	1-1/2	894508	49.20	894508-C4	63.00	737308	105.00
	.125 (1/8)	**1.000**	(8x)	8	10	1/8	2-1/2	785208	51.90	785208-C4	65.90		
	.156 (5/32)	**.469**	(3x)	9	11	3/16	2	921010	54.30	921010-C4	73.60		
NEW	.187 (3/16)	**.285**	(1.5x)	9	11	3/16	2	716912	53.80	716912-C4	69.30		
	.187 (3/16)	**.563**	(3x)	9	11	3/16	2	921012	54.30	921012-C4	73.60	799012	120.90
	.187 (3/16)	**1.000**	(5x)	9	11	3/16	2	894512	59.20	894512-C4	78.50		
NEW	.250 (1/4)	**.375**	(1.5x)	10	12	1/4	2-1/2	716916	74.50	716916-C4	94.30		
	.250 (1/4)	**.750**	(3x)	10	12	1/4	2-1/2	921016	75.00	921016-C4	97.00	799016	151.50
	.250 (1/4)	**1.250**	(5x)	10	12	1/4	2-1/2	894516	81.50	894516-C4	103.50		
	.250 (1/4)	**2.000**	(8x)	10	12	1/4	4	785216	101.20	785216-C4	123.20		
	.312 (5/16)	**1.000**	(3x)	10	12	5/16	2-1/2	921020	97.30	921020-C4	123.80		
	.375 (3/8)	**1.125**	(3x)	11	13	3/8	2-1/2	921024	117.90	921024-C4	144.40		
	.375 (3/8)	**2.000**	(5x)	11	13	3/8	4	894524	135.00	894524-C4	161.50		
	.500 (1/2)	**1.500**	(3x)	12	14	1/2	3	921032	199.80	921032-C4	231.80		
	.500 (1/2)	**2.625**	(5x)	12	14	1/2	4	894532	222.10	894532-C4	253.90		

END MILLS FOR COMPOSITES

Diamond Cut – Drill Mill Style



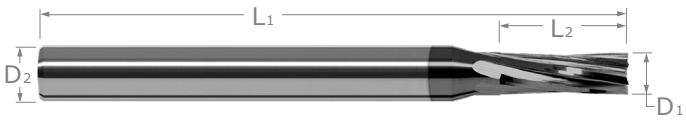
Drill Point

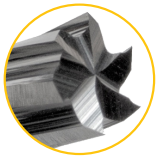
- 140° point angle allows for efficient plunging through composite sheet material
- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Downcut geometry on OD
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.062 (1/16)	**.186** (3x)	6	8	1/8	1-1/2	908062	48.50	908062-C4	62.30
.078 (5/64)	**.234** (3x)	7	9	1/8	1-1/2	908078	48.50	908078-C4	62.30
.093 (3/32)	**.279** (3x)	7	9	1/8	1-1/2	908093	48.50	908093-C4	62.30
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	**.375** (3x)	8	10	1/8	1-1/2	908108	48.50	908108-C4	62.30
.187 (3/16)	**.563** (3x)	9	11	3/16	2	908112	57.20	908112-C4	76.60
.250 (1/4)	**.750** (3x)	10	12	1/4	2-1/2	908116	78.80	908116-C4	100.80
.375 (3/8)	**1.125** (3x)	11	13	3/8	2-1/2	908124	93.50	908124-C4	120.00
.500 (1/2)	**1.500** (3x)	12	14	1/2	3	908132	191.40	908132-C4	223.30

END MILLS FOR COMPOSITES

Finisher





Type I
Bur-Style End

Type II
Center Cutting

- Optimized geometry and high flute count for finishing in composite materials with high fiber or fill concentration
- Slow helix improves finish and minimizes fraying of fiber-reinforced and layered materials by reducing vertical forces on the workpiece
- Choose from two types:
  - -Type I: Bur-style end allows for shallow ramping (not suited for plunge cutting)
  - -Type II: Center cutting end allows for plunge cutting, reduced flute count prevents chip packing, designed specifically for CFRP
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT		TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (9 µm)	
D_1 +.000″ −.001″	L_2 +.010″ −.000″				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/32	**3/32**	(3x)	I	4	1/8	1-1/2	944731	57.20	944731-C4	71.00		
3/64	**9/64**	(3x)	I	4	1/8	1-1/2	944747	57.20	944747-C4	71.00		
1/16	**.186**	(3x)	I	6	1/8	1-1/2	944762	54.60	944762-C4	68.40	798862	130.10
1/16	**5/16**	(5x)	I	6	1/8	1-1/2	889262	57.20	889262-C4	71.00		
5/64	**15/64**	(3x)	I	6	1/8	1-1/2	944778	54.60	944778-C4	68.40		
3/32	**9/64**	(1.5x)	I	6	1/8	1-1/2	794793	55.10	794793-C4	68.90		
3/32	**.279**	(3x)	I	6	1/8	1-1/2	944793	54.60	944793-C4	68.40	798893	130.10
3/32	**1/2**	(5x)	I	6	1/8	1-1/2	889293	57.20	889293-C4	71.00		
3/32	**3/4**	(8x)	I	6	1/8	2	751693	61.60	751693-C4	75.40		
D_1 +.000″ −.002″	L_2 +.030″ −.000″				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/8	**3/16**	(1.5x)	I	8	1/8	1-1/2	794808	53.20	794808-C4	67.00		
1/8	**3/8**	(3x)	I	8	1/8	1-1/2	944808	52.70	944808-C4	66.50	798908	126.80
1/8	**3/8**	(3x)	II	5	1/8	1-1/2	756808	49.60			731208	118.10
1/8	**5/8**	(5x)	I	8	1/8	2	889208	55.30	889208-C4	69.50		
1/8	**1**	(8x)	I	8	1/8	2-1/2	751708	58.60	751708-C4	72.80		
3/16	**9/16**	(3x)	I	8	3/16	2	944812	58.20	944812-C4	77.50	798912	146.50
3/16	**9/16**	(3x)	II	5	3/16	2	756812	54.70			731212	136.60
3/16	**1**	(5x)	I	8	3/16	2-1/2	889212	61.00	889212-C4	80.30		
3/16	**1-1/2**	(8x)	I	8	3/16	3	751712	64.20	751712-C4	80.70		
1/4	**3/8**	(1.5x)	I	8	1/4	2-1/2	794816	69.80	794816-C4	91.80		
1/4	**3/4**	(3x)	I	8	1/4	2-1/2	944816	69.80	944816-C4	91.80	798916	162.30
1/4	**3/4**	(3x)	II	5	1/4	2-1/2	756816	65.70			731216	151.20
1/4	**1-1/4**	(5x)	I	8	1/4	2-1/2	889216	85.00	889216-C4	107.00		
3/8	**1-1/8**	(3x)	I	10	3/8	3	944824	114.80	944824-C4	141.50		
3/8	**1-1/8**	(3x)	II	5	3/8	3	756824	107.80			731224	215.50
1/2	**1-1/2**	(3x)	I	10	1/2	4	944832	202.00	944832-C4	234.20	798932	407.40
1/2	**1-1/2**	(3x)	II	5	1/2	4	756832	189.80			731232	379.40

END MILLS FOR WOOD

Square Upcut

Outstanding in MDF and Plywood!

- Designed for milling natural and engineered woods
- Wedge angle optimized for shearing wood fiber materials without causing tear-out or leaving a fuzzy grain finish
- 2-flute style with deep flute valleys to maximize space for chip evacuation
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**.186** (3x)	1/4	2	809562	41.50	809562-C4	60.10
1/16	**.312** (5x)	1/4	2-1/2	809362	45.50	809362-C4	65.30
5/64	**.234** (3x)	1/4	2	809578	41.50	809578-C4	60.10
5/64	**.406** (5x)	1/4	2-1/2	809378	45.50	809378-C4	65.30
3/32	**.279** (3x)	1/4	2	809593	41.50	809593-C4	60.10
3/32	**.500** (5x)	1/4	2-1/2	809393	45.50	809393-C4	65.30
1/8	**.375** (3x)	1/4	2	809608	41.50	809608-C4	63.30
1/8	**.625** (5x)	1/4	2-1/2	809408	45.50	809408-C4	67.30
3/16	**.563** (3x)	1/4	2	809612	41.50	809612-C4	60.10
3/16	**1.000** (5x)	1/4	3	809412	48.90	809412-C4	70.70
1/4	**.750** (3x)	1/4	2-1/2	809616	51.10	809616-C4	72.90
1/4	**1.250** (5x)	1/4	3	809416	58.60	809416-C4	80.40
3/8	**1.125** (3x)	3/8	3	809624	87.90	809624-C4	115.40
3/8	**1.875** (5x)	3/8	4	809424	103.30	809424-C4	133.60
1/2	**1.500** (3x)	1/2	4	809632	157.80	809632-C4	191.40
1/2	**2.500** (5x)	1/2	5	809432	181.40	809432-C4	215.70

Please See Speeds & Feeds On Page 277

END MILLS FOR WOOD

Square Downcut

Outstanding in MDF and Plywood!

- Designed for milling natural and engineered woods
- Wedge angle optimized for shearing wood fiber materials without causing tear-out or leaving a fuzzy grain finish
- Prevents tear-outs and splintering on the top of the workpiece
- Prevents lifting on vacuum tables
- 2 left hand spiral, right hand cut flutes
- Deep flute valleys to maximize space for chip evacuation
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	PRICE	2 FL	PRICE
1/16	**.186** (3x)	1/4	2	809162	48.80	809162-C4	70.60
1/16	**.312** (5x)	1/4	2-1/2	808962	53.60	808962-C4	73.40
5/64	**.234** (3x)	1/4	2	809178	48.80	809178-C4	67.40
5/64	**.406** (5x)	1/4	2-1/2	808978	54.70	808978-C4	74.50
3/32	**.279** (3x)	1/4	2	809193	48.80	809193-C4	67.40
3/32	**.500** (5x)	1/4	2-1/2	808993	54.70	808993-C4	74.50
1/8	**.375** (3x)	1/4	2	809208	48.80	809208-C4	70.60
1/8	**.625** (5x)	1/4	2-1/2	809008	53.60	809008-C4	73.40
3/16	**.563** (3x)	1/4	2	809212	48.80	809212-C4	67.40
3/16	**1.000** (5x)	1/4	3	809012	57.70	809012-C4	79.40
1/4	**.750** (3x)	1/4	2-1/2	809216	59.80	809216-C4	81.60
1/4	**1.250** (5x)	1/4	3	809016	65.30	809016-C4	87.00
3/8	**1.125** (3x)	3/8	3	809224	101.80	809224-C4	129.40
3/8	**1.875** (5x)	3/8	4	809024	119.30	809024-C4	147.10
1/2	**1.500** (3x)	1/2	4	809232	183.30	809232-C4	217.20
1/2	**2.500** (5x)	1/2	5	809032	207.20	809032-C4	241.80

SPEEDS & FEEDS (Square – End Mills for Wood)

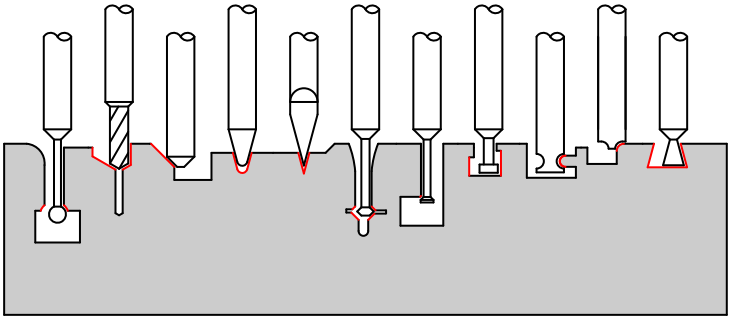
Important Note: Values in table are in inches and are based on (3x Dia) length of cut end mills. For longer length of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material	Janka Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter															Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	1.000	Radial	Axial
Softer Woods White Pine, Sugar Pine, Western Red Cedar, Douglas Fir, Redwood	< 1200	400 - 2000	Slot - Rough	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0088	.0118	.0125	.0150	.0200	.0250	.0300	.0400	1 x Dia	1 x Dia
		800 - 2400	Finishing	.0005	.0011	.0017	.0022	.0028	.0033	.0045	.0067	.0090	.0097	.0116	.0155	.0194	.0233	.0310	.1 x Dia	3 x Dia
Harder Woods Red Oak, Maple, Ash, Hickory, Black Walnut, Cherry, Beech	> 1200	400 - 2000	Slot - Rough	.0006	.0013	.0020	.0026	.0033	.0039	.0053	.0079	.0106	.0112	.0135	.0180	.0225	.0270	.0360	1 x Dia	1 x Dia
		800 - 2400	Finishing	.0005	.0010	.0015	.0020	.0025	.0030	.0041	.0061	.0081	.0087	.0105	.0140	.0174	.0209	.0279	.1 x Dia	3 x Dia
Engineered Woods Medium Density Fiberboard (MDF), Particle Board, Laminated Board	Varies	400 - 2000	Slot - Rough	.0008	.0016	.0024	.0032	.0040	.0048	.0065	.0097	.0129	.0137	.0165	.0220	.0275	.0330	.0440	1 x Dia	1 x Dia
		800 - 2400	Finishing	.0006	.0012	.0019	.0025	.0031	.0037	.0050	.0074	.0099	.0106	.0128	.0171	.0213	.0256	.0341	.1 x Dia	3 x Dia
Phenolic Wood	Varies	400 - 1200	Slot - Rough	.0003	.0006	.0009	.0012	.0015	.0017	.0024	.0035	.0047	.0050	.0060	.0080	.0100	.0120	.0160	1 x Dia	1 x Dia
		800 - 1600	Finishing	.0002	.0004	.0007	.0009	.0011	.0013	.0018	.0027	.0036	.0039	.0047	.0062	.0078	.0093	.0124	.1 x Dia	3 x Dia

SPECIALTY PROFILES

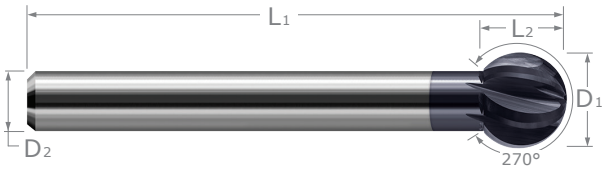
At Harvey Tool, we know the details are critical to your machining processes. With that in mind, we offer a broad range of Specialty Profiles to help you make those difficult cuts. For printer-friendly **Speeds & Feeds** and downloadable **Simulation Files** for all products, visit **www.harveytool.com/technical**.

Machine a Variety of Difficult Profiles!



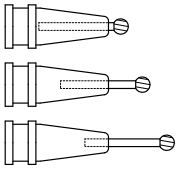
UNDERCUTTING END MILLS

270° Reduced Shank



- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

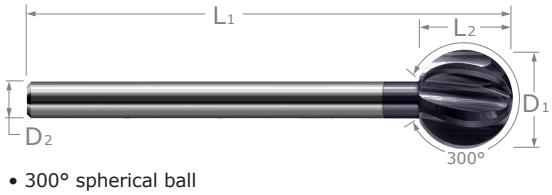
Chuck at Any Depth!



CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		D_2	L_1	6 FL	PRICE	6 FL	PRICE
1/4	.217	6	4 mm	3-1/2	956116	272.50	956116-C3	282.00
5/16	.273	6	3/16	3-1/2	956120	277.80	956120-C3	287.30
3/8	.324	6	6 mm	3-1/2	956124	280.60	956124-C3	291.40
1/2	.432	6	5/16	4	956132	294.90	956132-C3	311.00
5/8	.546	6	3/8	4	956140	338.10	956140-C3	355.50
3/4	.645	6	1/2	5	956148	486.40	956148-C3	495.00
1	.873	6	5/8	5	956164	688.30	956164-C3	717.50

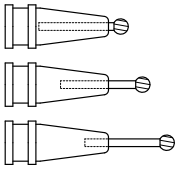
UNDERCUTTING END MILLS

300° Reduced Shank



- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

Chuck at Any Depth!

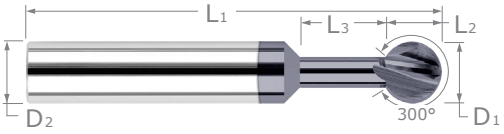


CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		D_2	L_1	6 FL	PRICE	6 FL	PRICE
1/4	.232	6	3 mm	3-1/2	947416	292.00	947416-C3	301.50
5/16	.293	6	9/64	3-1/2	947420	295.50	947420-C3	305.10
3/8	.355	6	4 mm	3-1/2	947424	299.00	947424-C3	309.90
1/2	.472	6	3/16	4	947432	313.20	947432-C3	329.40
5/8	.589	6	1/4	4	947440	356.30	947440-C3	373.80
3/4	.706	6	5/16	5	947448	504.60	947448-C3	523.30
1	.939	6	7/16	5	947464	705.60	947464-C3	734.70

NEW SIZES!

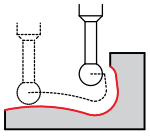
UNDERCUTTING END MILLS

300°



- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA

Ideal for Undercutting, Deburring, and Profiling



Stocked in Multiple Reach Lengths

CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/32	.028	.010	**.031**	2	1/8	1-1/2	983931	77.40	983931-C3	82.90	
1/32	.028	.010	**.062**	2	1/8	1-1/2	979131	77.40	979131-C3	82.90	
.0394 (1 mm)	.036	.014	**.047**	2	1/8	1-1/2	98391M	77.40	98391M-C3	82.90	
.0394 (1 mm)	.036	.014	**.078**	2	1/8	1-1/2	97911M	77.40	97911M-C3	82.90	
3/64	.043	.018	**.062**	2	1/8	1-1/2	983947	77.40	983947-C3	82.90	
3/64	.043	.018	**.093**	2	1/8	1-1/2	979147	77.40	979147-C3	82.90	
3/64	.043	.018	**.125**	2	1/8	1-1/2	940047	77.40	940047-C3	82.90	
1/16	.057	.024	**.031**	2	1/8	1-1/2	989562	54.90	989562-C3	60.40	
1/16	.057	.024	**.062**	2	1/8	1-1/2	875762	54.90	875762-C3	60.40	
1/16	.057	.024	**.078**	2	1/8	1-1/2	983962	54.90	983962-C3	60.40	
1/16	.057	.024	**.125**	2	1/8	1-1/2	979162	54.90	979162-C3	60.40	
1/16	.057	.024	**.187**	2	1/8	1-1/2	940062	54.90	940062-C3	60.40	
1/16	.057	.024	**.250**	2	1/8	1-1/2	767862	54.90	767862-C3	60.40	
5/64	.072	.031	**.047**	2	1/8	1-1/2	989578	54.90	989578-C3	60.40	
5/64	.072	.031	**.093**	2	1/8	1-1/2	983978	54.90	983978-C3	60.40	
5/64	.072	.031	**.156**	2	1/8	1-1/2	979178	54.90	979178-C3	60.40	
5/64	.072	.031	**.218**	2	1/8	1-1/2	940078	54.90	940078-C3	60.40	
3/32	.086	.038	**.062**	2	1/8	1-1/2	989593	54.90	989593-C3	60.40	
3/32	.086	.038	**.093**	2	1/8	1-1/2	875793	54.90	875793-C3	60.40	
3/32	.086	.038	**.125**	2	1/8	1-1/2	983993	54.90	983993-C3	60.40	
3/32	.086	.038	**.156**	2	1/8	1-1/2	926893	54.90	926893-C3	60.40	
3/32	.086	.038	**.218**	2	1/8	1-1/2	979193	54.90	979193-C3	60.40	
3/32	.086	.038	**.250**	2	1/8	1-1/2	794506	54.90	794506-C3	60.40	NEW
3/32	.086	.038	**.281**	2	1/8	1-1/2	940093	54.90	940093-C3	60.40	
3/32	.086	.038	**.375**	2	1/8	1-1/2	766693	54.90	766693-C3	60.40	
7/64	.101	.047	**.156**	2	1/8	1-1/2	984007	55.50	984007-C3	61.00	
7/64	.101	.047	**.250**	2	1/8	1-1/2	979207	55.50	979207-C3	61.00	
.1181 (3 mm)	.110	.051	**.078**	2	1/8	1-1/2	98953M	54.90	98953M-C3	60.40	
.1181 (3 mm)	.110	.051	**.156**	2	1/8	1-1/2	98393M	54.90	98393M-C3	60.40	
.1181 (3 mm)	.110	.051	**.218**	2	1/8	1-1/2	92683M	54.90	92683M-C3	60.40	

D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/8	.116	.053	**.047**	4	1/8	1-1/2	943608	40.70	943608-C3	46.20	
1/8	.116	.053	**.062**	4	1/8	1-1/2	716608	42.80	716608-C3	48.30	NEW
1/8	.116	.053	**.093**	4	1/8	1-1/2	990608	44.80	990608-C3	50.30	
1/8	.116	.053	**.125**	4	1/8	1-1/2	933008	48.20	933008-C3	53.70	
1/8	.116	.053	**.156**	4	1/8	1-1/2	875808	52.30	875808-C3	57.80	
1/8	.116	.053	**.187**	4	1/8	1-1/2	984008	52.30	984008-C3	57.80	

continued on next page

UNDERCUTTING END MILLS

300° (cont.)

continued from previous page

	CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1/8	.116	.053	**.250**	4	1/8	1-1/2	843208	58.40	843208-C3	63.90
	1/8	.116	.053	**.281**	4	1/8	1-1/2	979208	58.40	979208-C3	63.90
	1/8	.116	.053	**.312**	4	1/8	1-1/2	794608	60.70	794608-C3	66.20
	1/8	.116	.053	**.375**	4	1/8	1-1/2	940108	64.40	940108-C3	69.90
	1/8	.116	.053	**.437**	4	1/8	1-1/2	739008	66.70	739008-C3	72.20
	1/8	.116	.053	**.500**	4	1/8	1-1/2	952308	69.00	952308-C3	74.50
	1/8	.116	.053	**.625**	4	1/8	2	911908	93.00	911908-C3	98.50
	1/8	.116	.053	**.750**	4	1/8	3	877908	96.10	877908-C3	101.60
	9/64	.130	.062	**.125**	4	3/16	2	933009	60.60	933009-C3	66.60
	9/64	.130	.062	**.218**	4	3/16	2	984009	63.00	984009-C3	69.00
	9/64	.130	.062	**.312**	4	3/16	2	979209	70.50	979209-C3	76.50
	5/32	.145	.071	**.047**	4	3/16	2	943610	56.50	943610-C3	62.50
	5/32	.145	.071	**.125**	4	3/16	2	990610	56.50	990610-C3	62.50
	5/32	.145	.071	**.187**	4	3/16	2	738810	60.30	738810-C3	66.10
	5/32	.145	.071	**.250**	4	3/16	2	984010	64.10	984010-C3	70.10
	5/32	.145	.071	**.375**	4	3/16	2	979210	74.10	979210-C3	80.10
	5/32	.145	.071	**.500**	4	3/16	2	940110	78.30	940110-C3	84.30
	5/32	.145	.071	**.625**	4	3/16	2	952310	79.90	952310-C3	85.90
	3/16	.174	.082	**.062**	4	3/16	2	943612	56.50	943612-C3	62.50
	3/16	.174	.082	**.125**	4	3/16	2	990612	56.50	990612-C3	62.50
	3/16	.174	.082	**.187**	4	3/16	2	933012	60.30	933012-C3	66.40
	3/16	.174	.082	**.250**	4	3/16	2	984012	64.10	984012-C3	70.10
NEW	3/16	.174	.082	**.281**	4	3/16	2	738612	66.60	738612-C3	72.40
	3/16	.174	.082	**.312**	4	3/16	2	926912	69.00	926912-C3	75.00
	3/16	.174	.082	**.375**	4	3/16	2	843212	71.40	843212-C3	77.50
	3/16	.174	.082	**.437**	4	3/16	2	979212	74.10	979212-C3	80.10
	3/16	.174	.082	**.500**	4	3/16	2	794612	75.50	794612-C3	81.50
	3/16	.174	.082	**.625**	4	3/16	2	940112	76.80	940112-C3	82.80
	3/16	.174	.082	**.750**	4	3/16	2	952312	80.50	952312-C3	86.50
	3/16	.174	.082	**.875**	4	3/16	2-1/2	834612	83.90	834612-C3	89.90
	3/16	.174	.082	**1.000**	4	3/16	2-1/2	911912	85.60	911912-C3	91.70
	3/16	.174	.082	**1.250**	4	3/16	3	877912	89.20	877912-C3	95.20
	.1969 (5 mm)	.182	.086	**.156**	4	1/4	2-1/2	99065M	78.20	99065M-C3	86.30
	.1969 (5 mm)	.182	.086	**.250**	4	1/4	2-1/2	98405M	81.90	98405M-C3	90.10
	7/32	.203	.098	**.156**	4	1/4	2-1/2	990614	78.20	990614-C3	86.30
	7/32	.203	.098	**.312**	4	1/4	2-1/2	984014	86.90	984014-C3	95.10
	.2362 (6 mm)	.220	.106	**.156**	4	1/4	2-1/2	99066M	77.10	99066M-C3	85.30
	.2362 (6 mm)	.220	.106	**.312**	4	1/4	2-1/2	98406M	86.90	98406M-C3	94.40
	.2362 (6 mm)	.220	.106	**.437**	4	1/4	2-1/2	92696M	89.90	92696M-C3	98.10
	.2362 (6 mm)	.220	.106	**.562**	4	1/4	2-1/2	97926M	94.70	97926M-C3	102.90
	1/4	.233	.112	**.093**	4	1/4	2-1/2	943616	75.70	943616-C3	83.90
	1/4	.233	.112	**.187**	4	1/4	2-1/2	990616	75.70	990616-C3	83.90
	1/4	.233	.112	**.250**	4	1/4	2-1/2	933016	79.90	933016-C3	88.00
	1/4	.233	.112	**.375**	4	1/4	2-1/2	984016	83.40	984016-C3	91.50
	1/4	.233	.112	**.437**	4	1/4	2-1/2	738616	87.80	738616-C3	95.90
	1/4	.233	.112	**.500**	4	1/4	2-1/2	926916	92.00	926916-C3	100.20
	1/4	.233	.112	**.625**	4	1/4	2-1/2	979216	101.00	979216-C3	109.20
	1/4	.233	.112	**.750**	4	1/4	2-1/2	940116	107.60	940116-C3	115.80

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NEW SIZES!

UNDERCUTTING END MILLS

300° (cont.)

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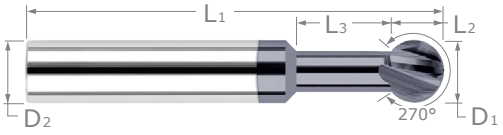
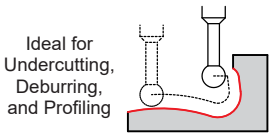
CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/4	.233	.112	**1.000**	4	1/4	2-1/2	952316	115.40	952316-C3	123.60
1/4	.233	.112	**1.250**	4	1/4	3	911916	124.70	911916-C3	132.80
1/4	.233	.112	**1.500**	4	1/4	4	877916	133.90	877916-C3	143.40
9/32	.262	.127	**.187**	4	5/16	2-1/2	990618	106.90	990618-C3	116.40
9/32	.262	.127	**.375**	4	5/16	2-1/2	984018	125.40	984018-C3	134.30
5/16	.291	.143	**.250**	4	5/16	2-1/2	990620	103.30	990620-C3	112.90
5/16	.291	.143	**.437**	4	5/16	2-1/2	984020	122.90	984020-C3	132.40
5/16	.291	.143	**.750**	4	5/16	2-1/2	979220	138.10	979220-C3	147.70
5/16	.291	.143	**1.000**	4	5/16	2-1/2	940120	153.60	940120-C3	163.10
3/8	.349	.172	**.156**	4	3/8	2-1/2	943624	108.50	943624-C3	119.10
3/8	.349	.172	**.250**	4	3/8	2-1/2	990624	110.30	990624-C3	120.90
3/8	.349	.172	**.375**	4	3/8	2-1/2	933024	119.90	933024-C3	130.50
3/8	.349	.172	**.500**	4	3/8	2-1/2	984024	129.50	984024-C3	140.10
3/8	.349	.172	**.687**	4	3/8	2-1/2	926924	139.80	926924-C3	150.40
3/8	.349	.172	**.750**	4	3/8	2-1/2	843224	143.80	843224-C3	154.40
3/8	.349	.172	**1.000**	4	3/8	3	979224	150.40	979224-C3	161.00
3/8	.349	.172	**1.250**	4	3/8	3	940124	157.40	940124-C3	168.00
3/8	.349	.172	**1.500**	4	3/8	4	952324	182.80	952324-C3	197.60
.3937 (10 mm)	.366	.181	**.312**	4	7/16	2-3/4	990625	136.10	990625-C3	149.60
.3937 (10 mm)	.366	.181	**.562**	4	7/16	2-3/4	984025	161.90	984025-C3	174.20
1/2	.466	.230	**.187**	4	1/2	3	943632	167.00	943632-C3	183.20
1/2	.466	.230	**.312**	4	1/2	3	990632	168.30	990632-C3	184.50
1/2	.466	.230	**.750**	4	1/2	3	984032	191.20	984032-C3	207.30
1/2	.466	.230	**1.000**	4	1/2	3	926932	206.80	926932-C3	223.00
1/2	.466	.230	**1.250**	4	1/2	4	979232	232.20	979232-C3	248.40
1/2	.466	.230	**1.625**	4	1/2	4	940132	228.10	940132-C3	244.20
1/2	.466	.230	**2.000**	4	1/2	4	952332	255.00	952332-C3	271.10
5/8	.583	.292	**1.000**	4	5/8	3-1/2	984040	284.40	984040-C3	302.30
5/8	.583	.292	**1.625**	4	5/8	4	979240	290.70	979240-C3	308.10
3/4	.699	.355	**1.500**	4	3/4	4	926948	335.40	926948-C3	356.70
3/4	.699	.355	**2.000**	4	3/4	6	979248	366.80	979248-C3	391.60

Check Out All of Our Undercutting Solutions!

UNDERCUTTING END MILLS

270°





- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Choose from two types:
  - Type I: Straight neck
  - Type II: Tapered neck (1.5° per side)
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		L_3 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.0200	.017	.012	**.016**	I	2	1/8	1-1/2	974220	79.80	974220-C3	85.30		
.0200	.017	.012	**.031**	I	2	1/8	1-1/2	52820	79.80	52820-C3	85.30		
.0200	.017	.012	**.047**	I	2	1/8	1-1/2	23200	85.00	23200-C3	90.50		
.0200	.017	.012	**.062**	I	2	1/8	1-1/2	54620	87.60	54620-C3	93.10		
.0250	.021	.014	**.031**	I	2	1/8	1-1/2	974225	70.30	974225-C3	75.80		
.0250	.021	.014	**.047**	I	2	1/8	1-1/2	52825	70.30	52825-C3	75.80		
.0250	.021	.014	**.062**	I	2	1/8	1-1/2	23201	75.60	23201-C3	81.10		
.0250	.021	.014	**.078**	I	2	1/8	1-1/2	54625	78.30	54625-C3	83.80		
1/32	.027	.016	**.015**	I	2	1/8	1-1/2	931502	64.50	931502-C3	70.00		
1/32	.027	.016	**.031**	I	2	1/8	1-1/2	23102	64.50	23102-C3	70.00		
1/32	.027	.016	**.047**	I	2	1/8	1-1/2	974231	64.50	974231-C3	70.00		
1/32	.027	.016	**.047**	II	2	1/8	1-1/2	758431	65.80	758431-C3	71.30		
1/32	.027	.016	**.062**	I	2	1/8	1-1/2	52831	64.50	52831-C3	70.00		
1/32	.027	.016	**.078**	I	2	1/8	1-1/2	39731	64.50	39731-C3	70.00		
1/32	.027	.016	**.093**	I	2	1/8	1-1/2	23202	66.20	23202-C3	71.70		
1/32	.027	.016	**.125**	I	2	1/8	1-1/2	54631	75.60	54631-C3	81.10		
1/32	.027	.016	**.187**	I	2	1/8	1-1/2	55202	75.60	55202-C3	81.10		
1/32	.027	.016	**.218**	I	2	1/8	1-1/2	867731	64.50	867731-C3	70.00		
.0394 (1 mm)	.033	.024	**.047**	I	2	1/8	1-1/2	2311M	64.50	2311M-C3	70.00		
.0394 (1 mm)	.033	.024	**.062**	I	2	1/8	1-1/2	97421M	64.50	97421M-C3	70.00		
.0394 (1 mm)	.033	.024	**.078**	I	2	1/8	1-1/2	5281M	65.00	5281M-C3	70.50		
.0394 (1 mm)	.033	.024	**.093**	I	2	1/8	1-1/2	3971M	64.50	3971M-C3	70.00		
.0394 (1 mm)	.033	.024	**.125**	I	2	1/8	1-1/2	2321M	73.70	2321M-C3	79.20		
.0394 (1 mm)	.033	.024	**.187**	I	2	1/8	1-1/2	54639	75.60	54639-C3	81.10		
.0394 (1 mm)	.033	.024	**.250**	I	2	1/8	1-1/2	5521M	83.60	5521M-C3	89.10		
.0400	.034	.024	**.093**	I	2	1/8	1-1/2	39771	64.50	39771-C3	70.00		
.0400	.034	.024	**.125**	I	2	1/8	1-1/2	23271	65.00	23271-C3	70.50		
3/64	.040	.029	**.047**	I	2	1/8	1-1/2	23103	64.50	23103-C3	70.00		
3/64	.040	.029	**.062**	I	2	1/8	1-1/2	974247	64.50	974247-C3	70.00		
3/64	.040	.029	**.062**	II	2	1/8	1-1/2	758447	65.80	758447-C3	71.30		
3/64	.040	.029	**.093**	I	2	1/8	1-1/2	52847	64.50	52847-C3	70.00	52847-C4	78.30

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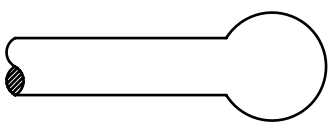
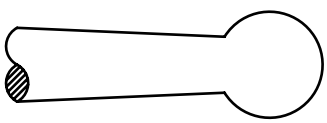
Type I - Straight Neck



Type II - Tapered Neck



UNDERCUTTING END MILLS

270° (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
3/64	.040	.029	**.125**	I	2	1/8	1-1/2	39703	64.50	39703-C3	70.00		
3/64	.040	.029	**.156**	I	2	1/8	1-1/2	23203	75.60	23203-C3	81.10	23203-C4	89.40
3/64	.040	.029	**.187**	I	2	1/8	1-1/2	41303	75.60	41303-C3	81.10		
3/64	.040	.029	**.250**	I	2	1/8	1-1/2	54647	75.60	54647-C3	81.10		
3/64	.040	.029	**.312**	I	2	1/8	1-1/2	909047	80.20	909047-C3	85.70		
3/64	.040	.029	**.375**	I	2	1/8	1-1/2	55203	79.50	55203-C3	85.00		
3/64	.040	.029	**.437**	I	2	1/8	2	867747	87.40	867747-C3	92.90		
.0500	.042	.030	**.093**	I	2	1/8	1-1/2	52850	53.70	52850-C3	59.20		
.0500	.042	.030	**.125**	I	2	1/8	1-1/2	39750	53.70	39750-C3	59.20		
.0500	.042	.030	**.156**	I	2	1/8	1-1/2	23250	64.80	23250-C3	70.30		
1/16	.053	.037	**.031**	I	2	1/8	1-1/2	931504	42.90	931504-C3	48.40		
1/16	.053	.037	**.047**	I	2	1/8	1-1/2	774262	43.30	774262-C3	48.80		
1/16	.053	.037	**.062**	I	2	1/8	1-1/2	23104	42.90	23104-C3	48.40		
1/16	.053	.037	**.078**	I	2	1/8	1-1/2	974262	43.30	974262-C3	48.80		
1/16	.053	.037	**.078**	II	2	1/8	1-1/2	758462	43.70	758462-C3	49.20		
1/16	.053	.037	**.093**	I	2	1/8	1-1/2	52862	42.90	52862-C3	48.40	52862-C4	56.70
1/16	.053	.037	**.125**	I	2	1/8	1-1/2	39704	44.70	39704-C3	50.20		
1/16	.053	.037	**.156**	I	2	1/8	1-1/2	794362	44.70	794362-C3	50.20		
1/16	.053	.037	**.187**	I	2	1/8	1-1/2	23204	44.70	23204-C3	50.20	23204-C4	58.50
1/16	.053	.037	**.218**	I	2	1/8	1-1/2	41304	50.80	41304-C3	56.30		
1/16	.053	.037	**.250**	I	2	1/8	1-1/2	54662	55.20	54662-C3	60.70		
1/16	.053	.037	**.312**	I	2	1/8	1-1/2	909062	55.20	909062-C3	60.70		
1/16	.053	.037	**.375**	I	2	1/8	1-1/2	55204	55.20	55204-C3	60.70		
1/16	.053	.037	**.437**	I	2	1/8	2	867762	63.20	867762-C3	68.70		
1/16	.053	.037	**.500**	I	2	1/8	2	775462	63.20	775462-C3	68.70		
5/64	.067	.045	**.031**	I	2	1/8	1-1/2	931505	44.00	931505-C3	49.50		
5/64	.067	.045	**.062**	I	2	1/8	1-1/2	23105	43.60	23105-C3	49.10		
5/64	.067	.045	**.093**	I	2	1/8	1-1/2	974278	44.00	974278-C3	49.50		
5/64	.067	.045	**.093**	II	2	1/8	1-1/2	758478	44.60	758478-C3	50.10		
5/64	.067	.045	**.125**	I	2	1/8	1-1/2	52878	43.60	52878-C3	49.10	52878-C4	57.40
5/64	.067	.045	**.187**	I	2	1/8	1-1/2	39705	46.10	39705-C3	51.60		
5/64	.067	.045	**.250**	I	2	1/8	1-1/2	23205	46.90	23205-C3	52.40	23205-C4	60.70
5/64	.067	.045	**.312**	I	2	1/8	1-1/2	41305	46.90	41305-C3	52.40		
5/64	.067	.045	**.375**	I	2	1/8	2	54678	56.10	54678-C3	61.60		
5/64	.067	.045	**.500**	I	2	1/8	2	55205	56.10	55205-C3	61.60		
5/64	.067	.045	**.625**	I	2	1/8	2	867778	56.10	867778-C3	61.60		
3/32	.079	.054	**.031**	I	2	1/8	1-1/2	931506	43.60	931506-C3	49.10		
3/32	.079	.054	**.062**	I	2	1/8	1-1/2	23106	43.60	23106-C3	49.10		
3/32	.079	.054	**.093**	I	2	1/8	1-1/2	789893	44.00	789893-C3	49.50		
3/32	.079	.054	**.125**	I	2	1/8	1-1/2	974293	43.60	974293-C3	49.10		
3/32	.079	.054	**.125**	II	2	1/8	1-1/2	758493	44.60	758493-C3	50.10		
3/32	.079	.054	**.187**	I	2	1/8	1-1/2	905106	43.60	905106-C3	49.10		
3/32	.079	.054	**.250**	I	2	1/8	1-1/2	52893	43.60	52893-C3	49.10	52893-C4	57.40
3/32	.079	.054	**.312**	I	2	1/8	1-1/2	39706	48.10	39706-C3	53.60		
3/32	.079	.054	**.375**	I	2	1/8	1-1/2	23206	47.70	23206-C3	53.20	23206-C4	61.50
3/32	.079	.054	**.437**	I	2	1/8	2	41306	56.10	41306-C3	61.60		
3/32	.079	.054	**.500**	I	2	1/8	2	54693	56.10	54693-C3	61.60		
3/32	.079	.054	**.625**	I	2	1/8	2	55206	64.50	55206-C3	70.00		
3/32	.079	.054	**.750**	I	2	1/8	2	867793	65.00	867793-C3	70.50		

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UNDERCUTTING END MILLS

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.1000	.085	.060	**.312**	I	2	1/8	1-1/2	39783	48.10	39783-C3	53.60		
.1000	.085	.060	**.375**	I	2	1/8	1-1/2	23283	48.10	23283-C3	53.60		
7/64	.093	.064	**.187**	I	2	1/8	1-1/2	905107	43.30	905107-C3	48.80		
7/64	.093	.064	**.250**	I	2	1/8	1-1/2	52907	43.30	52907-C3	48.80		
7/64	.093	.064	**.375**	I	2	1/8	1-1/2	39707	47.30	39707-C3	52.80		
7/64	.093	.064	**.500**	I	2	1/8	2	23207	55.20	23207-C3	60.70		
7/64	.093	.064	**1.000**	I	2	1/8	3	29507	63.20	29507-C3	68.70		
.1181 (3 mm)	.100	.070	**.093**	I	2	1/8	1-1/2	2313M	43.30	2313M-C3	48.80		
.1181 (3 mm)	.100	.070	**.156**	II	2	1/8	1-1/2	75843M	43.70	75843M-C3	49.20		
.1181 (3 mm)	.100	.070	**.187**	I	2	1/8	1-1/2	90513M	43.30	90513M-C3	48.80		
.1181 (3 mm)	.100	.070	**.250**	I	2	1/8	1-1/2	5283M	43.30	5283M-C3	48.80		
.1181 (3 mm)	.100	.070	**.375**	I	2	1/8	1-1/2	3973M	47.30	3973M-C3	52.80		
.1181 (3 mm)	.100	.070	**.500**	I	2	1/8	2	2323M	55.20	2323M-C3	60.70		
1/8	.107	.076	**.062**	I	4	1/8	1-1/2	931508	37.80	931508-C3	43.30		
1/8	.107	.076	**.093**	I	4	1/8	1-1/2	787908	38.10	787908-C3	43.60		
1/8	.107	.076	**.125**	I	4	1/8	1-1/2	23108	37.80	23108-C3	43.30		
1/8	.107	.076	**.187**	I	4	1/8	1-1/2	974308	38.70	974308-C3	44.20		
1/8	.107	.076	**.187**	II	4	1/8	1-1/2	758508	39.50	758508-C3	45.00		
1/8	.107	.076	**.250**	I	4	1/8	1-1/2	52908	40.00	52908-C3	45.50	52908-C4	53.80
1/8	.107	.076	**.312**	I	4	1/8	1-1/2	828408	40.40	828408-C3	45.90		
1/8	.107	.076	**.375**	I	4	1/8	1-1/2	39708	40.80	39708-C3	46.30		
1/8	.107	.076	**.437**	I	4	1/8	1-1/2	794408	44.00	794408-C3	49.50		
1/8	.107	.076	**.500**	I	4	1/8	1-1/2	23208	43.60	23208-C3	49.10	23208-C4	57.40
1/8	.107	.076	**.625**	I	4	1/8	2	922908	46.70	922908-C3	52.20		
1/8	.107	.076	**.750**	I	4	1/8	2	41308	46.70	41308-C3	52.20		
1/8	.107	.076	**.875**	I	4	1/8	3	846608	48.60	846608-C3	54.10		
1/8	.107	.076	**1.000**	I	4	1/8	3	29508	50.60	29508-C3	56.10		
1/8	.107	.076	**1.125**	I	4	1/8	3	769508	53.00	769508-C3	58.50		
1/8	.107	.076	**1.250**	I	4	1/8	3	960608	54.20	960608-C3	59.70		
1/8	.107	.076	**1.500**	I	4	1/8	3	55208	57.80	55208-C3	63.30		
1/8	.107	.076	**1.750**	I	4	1/8	3	929608	60.80	929608-C3	66.30		
9/64	.119	.084	**.125**	I	4	3/16	2	23109	45.00	23109-C3	51.00		
9/64	.119	.084	**.250**	I	4	3/16	2	52909	48.70	52909-C3	54.70		
9/64	.119	.084	**.375**	I	4	3/16	2	39709	52.40	39709-C3	58.20		
9/64	.119	.084	**.500**	I	4	3/16	2	23209	55.00	23209-C3	61.00		
9/64	.119	.084	**.750**	I	4	3/16	2	41309	59.00	41309-C3	65.00		
5/32	.133	.098	**.078**	I	4	3/16	2	931510	45.00	931510-C3	51.00		
5/32	.133	.098	**.125**	I	4	3/16	2	23110	45.00	23110-C3	51.00		
5/32	.133	.098	**.187**	I	4	3/16	2	974310	45.80	974310-C3	51.60		
5/32	.133	.098	**.250**	I	4	3/16	2	52910	48.70	52910-C3	54.70		
5/32	.133	.098	**.375**	I	4	3/16	2	39710	51.40	39710-C3	57.30		
5/32	.133	.098	**.500**	I	4	3/16	2	23210	55.00	23210-C3	61.00		
5/32	.133	.098	**.750**	I	4	3/16	2	41310	59.00	41310-C3	65.00		
5/32	.133	.098	**1.000**	I	4	3/16	3	29510	63.80	29510-C3	69.70		
5/32	.133	.098	**1.500**	I	4	3/16	3	55210	67.00	55210-C3	73.00		

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UNDERCUTTING END MILLS

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
3/16	.160	.117	**.078**	I	4	3/16	2	931512	45.00	931512-C3	50.80		
3/16	.160	.117	**.093**	I	4	3/16	2	787912	45.40	787912-C3	51.40		
3/16	.160	.117	**.125**	I	4	3/16	2	23112	45.00	23112-C3	51.00		
3/16	.160	.117	**.187**	I	4	3/16	2	974312	48.70	974312-C3	54.70		
3/16	.160	.117	**.187**	II	4	3/16	2	758512	49.80	758512-C3	55.60		
3/16	.160	.117	**.250**	I	4	3/16	2	52912	48.70	52912-C3	54.70	52912-C4	64.20
3/16	.160	.117	**.375**	I	4	3/16	2	39712	51.40	39712-C3	57.30		
3/16	.160	.117	**.437**	I	4	3/16	2	794412	53.70	794412-C3	59.70		
3/16	.160	.117	**.500**	I	4	3/16	2	23212	53.20	23212-C3	59.10	23212-C4	68.70
3/16	.160	.117	**.625**	I	4	3/16	2	922912	56.20	922912-C3	62.20		
3/16	.160	.117	**.750**	I	4	3/16	2	41312	59.00	41312-C3	65.00		
3/16	.160	.117	**.875**	I	4	3/16	3	846612	61.40	846612-C3	67.40		
3/16	.160	.117	**1.000**	I	4	3/16	3	29512	63.80	29512-C3	69.70		
3/16	.160	.117	**1.250**	I	4	3/16	3	960612	66.30	960612-C3	72.30		
3/16	.160	.117	**1.500**	I	4	3/16	3	55212	68.70	55212-C3	74.70		
3/16	.160	.117	**1.750**	I	4	3/16	3	929612	81.30	929612-C3	87.20		
.1969 (5 mm)	.167	.119	**.250**	I	4	1/4	2-1/2	5295M	63.00	5295M-C3	71.10		
.1969 (5 mm)	.167	.119	**.500**	I	4	1/4	2-1/2	2325M	64.50	2325M-C3	72.60		
.1969 (5 mm)	.167	.119	**1.000**	I	4	1/4	4	2955M	73.90	2955M-C3	83.40		
7/32	.186	.138	**.250**	I	4	1/4	2-1/2	52914	67.70	52914-C3	75.80		
7/32	.186	.138	**.500**	I	4	1/4	2-1/2	23214	70.30	23214-C3	78.40		
7/32	.186	.138	**.750**	I	4	1/4	2-1/2	41314	74.20	41314-C3	82.30		
.2362 (6 mm)	.201	.148	**.250**	I	4	1/4	2-1/2	97436M	62.50	97436M-C3	70.00		
.2362 (6 mm)	.201	.148	**.375**	I	4	1/4	2-1/2	5296M	62.50	5296M-C3	70.60		
.2362 (6 mm)	.201	.148	**.500**	I	4	1/4	2-1/2	3976M	65.80	3976M-C3	73.90		
.2362 (6 mm)	.201	.148	**.750**	I	4	1/4	2-1/2	2326M	69.80	2326M-C3	77.90		
.2362 (6 mm)	.201	.148	**1.250**	I	4	1/4	4	2956M	79.50	2956M-C3	88.90		
.2362 (6 mm)	.201	.148	**2.000**	I	4	1/4	4	96066M	92.70	96066M-C3	102.20		
1/4	.213	.158	**.078**	I	4	1/4	2-1/2	931516	60.60	931516-C3	68.70		
1/4	.213	.158	**.125**	I	4	1/4	2-1/2	23116	60.10	23116-C3	68.20		
1/4	.213	.158	**.187**	I	4	1/4	2-1/2	789916	60.60	789916-C3	68.10		
1/4	.213	.158	**.250**	I	4	1/4	2-1/2	974316	63.00	974316-C3	71.10		
1/4	.213	.158	**.250**	II	4	1/4	2-1/2	758516	64.80	758516-C3	72.30		
1/4	.213	.158	**.312**	I	4	1/4	2-1/2	905116	63.70	905116-C3	71.80		
1/4	.213	.158	**.375**	I	4	1/4	2-1/2	52916	63.80	52916-C3	71.90	52916-C4	85.60
1/4	.213	.158	**.437**	I	4	1/4	2-1/2	828416	65.00	828416-C3	73.10		
1/4	.213	.158	**.500**	I	4	1/4	2-1/2	39716	65.80	39716-C3	73.90		
1/4	.213	.158	**.625**	I	4	1/4	2-1/2	927616	66.30	927616-C3	74.40		
1/4	.213	.158	**.750**	I	4	1/4	2-1/2	23216	69.80	23216-C3	77.90	23216-C4	89.60
1/4	.213	.158	**.875**	I	4	1/4	2-1/2	786916	70.40	786916-C3	78.50		
1/4	.213	.158	**1.000**	I	4	1/4	2-1/2	922916	70.80	922916-C3	78.90		
1/4	.213	.158	**1.125**	I	4	1/4	2-1/2	41316	73.50	41316-C3	81.60		
1/4	.213	.158	**1.250**	I	4	1/4	4	846616	78.90	846616-C3	88.40		
1/4	.213	.158	**1.500**	I	4	1/4	4	29516	80.80	29516-C3	90.30		
1/4	.213	.158	**2.000**	I	4	1/4	4	960616	85.80	960616-C3	95.30		
1/4	.213	.158	**2.250**	I	4	1/4	4	55216	91.00	55216-C3	100.50		
1/4	.213	.158	**2.500**	I	4	1/4	4	929616	119.80	929616-C3	129.30		

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UNDERCUTTING END MILLS

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
9/32	.240	.180	**.375**	I	4	5/16	2-1/2	52918	85.00	52918-C3	94.40		
9/32	.240	.180	**.750**	I	4	5/16	2-1/2	23218	87.40	23218-C3	96.90		
5/16	.266	.201	**.187**	I	4	5/16	2-1/2	23120	80.40	23120-C3	89.90		
5/16	.266	.201	**.375**	I	4	5/16	2-1/2	52920	83.60	52920-C3	93.10		
5/16	.266	.201	**.500**	I	4	5/16	2-1/2	39720	85.60	39720-C3	95.10		
5/16	.266	.201	**.750**	I	4	5/16	2-1/2	23220	90.20	23220-C3	99.60		
5/16	.266	.201	**1.125**	I	4	5/16	4	41320	102.30	41320-C3	113.70		
5/16	.266	.201	**1.500**	I	4	5/16	4	29520	109.40	29520-C3	120.80		
5/16	.266	.201	**2.000**	I	4	5/16	4	960620	116.10	960620-C3	127.50		
5/16	.266	.201	**2.250**	I	4	5/16	4	55220	118.00	55220-C3	129.40		
5/16	.266	.201	**2.500**	I	4	5/16	4	929620	118.00	929620-C3	129.40		
3/8	.320	.241	**.093**	I	4	3/8	2-1/2	931524	86.80	931524-C3	97.40		
3/8	.320	.241	**.187**	I	4	3/8	2-1/2	23124	86.80	23124-C3	97.40		
3/8	.320	.241	**.250**	II	4	3/8	2-1/2	758524	88.50	758524-C3	99.10		
3/8	.320	.241	**.375**	I	4	3/8	2-1/2	52924	88.80	52924-C3	99.40	52924-C4	115.90
3/8	.320	.241	**.500**	I	4	3/8	2-1/2	39724	88.80	39724-C3	99.40		
3/8	.320	.241	**.750**	I	4	3/8	2-1/2	23224	90.20	23224-C3	100.80	23224-C4	118.40
3/8	.320	.241	**1.000**	I	4	3/8	2-1/2	922924	101.90	922924-C3	112.50		
3/8	.320	.241	**1.125**	I	4	3/8	4	41324	111.70	41324-C3	126.40		
3/8	.320	.241	**1.500**	I	4	3/8	4	29524	114.70	29524-C3	129.40		
3/8	.320	.241	**2.000**	I	4	3/8	4	960624	118.80	960624-C3	133.50		
3/8	.320	.241	**2.250**	I	4	3/8	4	55224	123.10	55224-C3	137.80		
3/8	.320	.241	**2.500**	I	4	3/8	4	929624	127.00	929624-C3	141.70		
.3937 (10 mm)	.335	.252	**.375**	I	4	7/16	2-3/4	52925	125.50	52925-C3	138.90		
.3937 (10 mm)	.335	.252	**.750**	I	4	7/16	2-3/4	23225	125.90	23225-C3	139.30		
7/16	.373	.285	**.500**	I	4	7/16	2-3/4	52928	121.70	52928-C3	135.20		
7/16	.373	.285	**1.000**	I	4	7/16	2-3/4	23228	125.90	23228-C3	139.30		
.4724 (12 mm)	.403	.308	**.500**	I	4	1/2	3	52931	158.50	52931-C3	174.60		
.4724 (12 mm)	.403	.308	**1.000**	I	4	1/2	3	23231	167.50	23231-C3	181.90		
1/2	.427	.323	**.187**	I	4	1/2	3	23132	124.50	23132-C3	140.60		
1/2	.427	.323	**.312**	II	4	1/2	3	758532	126.90	758532-C3	141.30		
1/2	.427	.323	**.500**	I	4	1/2	3	52932	125.70	52932-C3	141.70	52932-C4	164.10
1/2	.427	.323	**.750**	I	4	1/2	3	39732	129.00	39732-C3	145.00		
1/2	.427	.323	**1.000**	I	4	1/2	3	23232	129.80	23232-C3	145.90	23232-C4	162.60
1/2	.427	.323	**1.250**	I	4	1/2	3	922932	135.00	922932-C3	151.10		
1/2	.427	.323	**1.500**	I	4	1/2	6	41332	221.10	41332-C3	237.10		
1/2	.427	.323	**2.000**	I	4	1/2	6	29532	226.00	29532-C3	242.10		
1/2	.427	.323	**2.500**	I	4	1/2	6	960632	226.30	960632-C3	242.30		
1/2	.427	.323	**3.000**	I	4	1/2	6	55232	241.60	55232-C3	257.70		
1/2	.427	.323	**3.500**	I	4	1/2	6	929632	254.50	929632-C3	270.50		
5/8	.533	.412	**1.000**	I	4	5/8	3-1/2	39740	260.90	39740-C3	277.00		
5/8	.533	.412	**1.500**	I	4	5/8	3-1/2	23240	260.90	23240-C3	277.00		
3/4	.640	.500	**1.000**	I	4	3/4	4	39748	266.10	39748-C3	287.40		
3/4	.640	.500	**1.500**	I	4	3/4	4	23248	359.30	23248-C3	379.10		

UNDERCUTTING END MILLS

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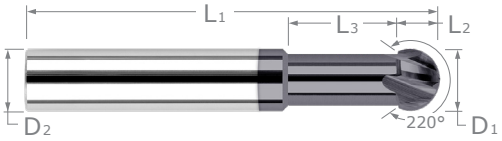
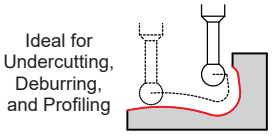




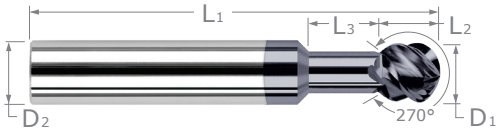
- 220° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.0200	.013	.016	**.031**	2	1/8	1-1/2	722467	65.10	722467-C3	70.60
1/32	.021	.023	**.093**	2	1/8	1-1/2	22802	65.10	22802-C3	70.60
.0394 (1 mm)	.026	.030	**.093**	2	1/8	1-1/2	785839	65.80	785839-C3	71.30
.0394 (1 mm)	.026	.030	**.125**	2	1/8	1-1/2	2281M	72.80	2281M-C3	78.30
3/64	.031	.035	**.156**	2	1/8	1-1/2	22803	65.10	22803-C3	70.60
1/16	.042	.047	**.062**	2	1/8	1-1/2	22704	44.30	22704-C3	49.80
1/16	.042	.047	**.125**	2	1/8	1-1/2	785862	46.20	785862-C3	51.70
1/16	.042	.047	**.187**	2	1/8	1-1/2	22804	46.20	22804-C3	51.70
1/16	.042	.047	**.250**	2	1/8	1-1/2	22904	46.20	22904-C3	51.70
5/64	.052	.059	**.062**	2	1/8	1-1/2	22705	44.30	22705-C3	49.80
5/64	.052	.059	**.250**	2	1/8	1-1/2	22805	46.20	22805-C3	51.70
.0930	.062	.070	**.250**	2	1/8	1-1/2	722406	44.30	722406-C3	49.80
.0930	.062	.070	**.500**	2	1/8	2	22905	48.10	22905-C3	53.60
3/32	.063	.070	**.062**	2	1/8	1-1/2	22706	44.30	22706-C3	49.80
3/32	.063	.070	**.375**	2	1/8	1-1/2	22806	46.90	22806-C3	52.40
.1181 (3 mm)	.079	.090	**.500**	2	1/8	2	2283M	48.10	2283M-C3	53.60

D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.084	.094	**.125**	4	1/8	1-1/2	22708	38.20	22708-C3	43.70
1/8	.084	.094	**.250**	4	1/8	1-1/2	826708	40.00	826708-C3	45.50
1/8	.084	.094	**.500**	4	1/8	1-1/2	22808	43.10	22808-C3	48.60
1/8	.084	.094	**.750**	4	1/8	2	833808	46.40	833808-C3	51.90
1/8	.084	.094	**1.000**	4	1/8	3	22908	49.80	22908-C3	55.30
1/8	.084	.094	**1.500**	4	1/8	3	971608	61.30	971608-C3	66.80
5/32	.105	.125	**.500**	4	3/16	2	22810	54.00	22810-C3	60.00
3/16	.126	.141	**.125**	4	3/16	2	22712	45.40	22712-C3	51.40
3/16	.126	.141	**.250**	4	3/16	2	826712	48.20	826712-C3	54.20
3/16	.126	.141	**.500**	4	3/16	2	22812	54.00	22812-C3	60.00
3/16	.126	.141	**.750**	4	3/16	2	833812	58.10	833812-C3	64.10
3/16	.126	.141	**1.000**	4	3/16	3	22912	62.50	22912-C3	68.50
.2362 (6 mm)	.158	.172	**.750**	4	1/4	2-1/2	2286M	68.30	2286M-C3	76.40
1/4	.168	.188	**.125**	4	1/4	2-1/2	22716	61.00	22716-C3	69.10
1/4	.168	.188	**.375**	4	1/4	2-1/2	826716	63.30	826716-C3	71.40
1/4	.168	.188	**.750**	4	1/4	2-1/2	22816	68.30	22816-C3	76.40
1/4	.168	.188	**1.000**	4	1/4	2-1/2	833816	72.00	833816-C3	80.10
1/4	.168	.188	**1.500**	4	1/4	4	22916	79.50	22916-C3	88.90
1/4	.168	.188	**2.250**	4	1/4	4	971616	103.70	971616-C3	113.20
5/16	.210	.235	**.187**	4	5/16	2-1/2	22720	81.30	22720-C3	90.20
5/16	.210	.235	**.750**	4	5/16	2-1/2	22820	88.80	22820-C3	98.30
5/16	.210	.235	**1.500**	4	5/16	4	22920	107.20	22920-C3	118.60
3/8	.252	.281	**.187**	4	3/8	2-1/2	22724	87.40	22724-C3	98.00
3/8	.252	.281	**.750**	4	3/8	2-1/2	22824	93.00	22824-C3	103.60
3/8	.252	.281	**1.500**	4	3/8	4	22924	112.60	22924-C3	127.30
3/8	.252	.281	**2.250**	4	3/8	4	971624	156.30	971624-C3	167.60
1/2	.336	.375	**.187**	4	1/2	3	22732	126.20	22732-C3	142.30
1/2	.336	.375	**1.000**	4	1/2	3	22832	134.10	22832-C3	150.20
1/2	.336	.375	**2.000**	4	1/2	6	22932	222.20	22932-C3	238.30

UNDERCUTTING END MILLS

270° High Helix



High Helix for Improved Performance!

270° Spherical Ball

- 45° helix for faster chip removal and better finish
- 270° spherical ball • Center cutting
- Designed for undercutting, deburring, and multi-axis machining
- Solid carbide • CNC ground in the USA

CUTTER DIA.	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB2 COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/32	.027	.016	**.062**	2	1/8	1-1/2	951131	74.90	951131-C3	80.40		
1/32	.027	.016	**.093**	2	1/8	1-1/2	966531	74.90	966531-C3	80.40		
.0394 (1 mm)	.033	.024	**.078**	2	1/8	1-1/2	95111M	74.90	95111M-C3	80.40		
.0394 (1 mm)	.033	.024	**.125**	2	1/8	1-1/2	96651M	74.90	96651M-C3	80.40		
3/64	.040	.029	**.093**	2	1/8	1-1/2	951147	74.90	951147-C3	80.40		
3/64	.040	.029	**.156**	2	1/8	1-1/2	966547	74.90	966547-C3	80.40		
1/16	.053	.037	**.093**	2	1/8	1-1/2	951162	54.20	951162-C3	59.70	951162-C8	61.30
1/16	.053	.037	**.125**	2	1/8	1-1/2	773762	56.00	773762-C3	61.50		
1/16	.053	.037	**.187**	2	1/8	1-1/2	966562	56.00	966562-C3	61.50	966562-C8	63.10
1/16	.053	.037	**.250**	2	1/8	1-1/2	970462	68.50	970462-C3	74.00	970462-C8	75.60
1/16	.053	.037	**.375**	2	1/8	1-1/2	722304	73.60	722304-C3	79.10		
5/64	.067	.045	**.125**	2	1/8	1-1/2	951178	54.20	951178-C3	59.70	951178-C8	61.30
5/64	.067	.045	**.250**	2	1/8	1-1/2	966578	56.00	966578-C3	61.50	966578-C8	63.10
5/64	.067	.045	**.375**	2	1/8	2	970478	68.50	970478-C3	74.00	970478-C8	76.60
3/32	.079	.054	**.062**	2	1/8	1-1/2	774493	51.70	774493-C3	57.20		
3/32	.079	.054	**.125**	2	1/8	1-1/2	837393	51.70	837393-C3	57.20	837393-C8	58.80
3/32	.079	.054	**.250**	2	1/8	1-1/2	951193	54.20	951193-C3	59.70	951193-C8	61.30
3/32	.079	.054	**.375**	2	1/8	1-1/2	966593	59.30	966593-C3	64.80	966593-C8	66.40
3/32	.079	.054	**.500**	2	1/8	2	970493	68.50	970493-C3	74.00	970493-C8	76.60
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/8	.107	.076	**.125**	4	1/8	1-1/2	934108	47.40	934108-C3	52.90	934108-C8	55.60
1/8	.107	.076	**.187**	4	1/8	1-1/2	808608	48.40	808608-C3	53.90	808608-C8	56.60
1/8	.107	.076	**.250**	4	1/8	1-1/2	951208	49.50	951208-C3	55.00	951208-C8	57.60
1/8	.107	.076	**.375**	4	1/8	1-1/2	863708	51.90	863708-C3	57.40	863708-C8	60.10
1/8	.107	.076	**.500**	4	1/8	1-1/2	994708	54.20	994708-C3	59.70	994708-C8	62.30
1/8	.107	.076	**.750**	4	1/8	2	897708	61.30	897708-C3	66.80		
1/8	.107	.076	**1.000**	4	1/8	3	997108	61.30	997108-C3	66.80	997108-C8	69.50
1/8	.107	.076	**1.500**	4	1/8	3	928808	65.40	928808-C3	70.90	928808-C8	73.50
5/32	.133	.098	**.250**	4	3/16	2	951210	64.20	951210-C3	70.20	951210-C8	72.20
5/32	.133	.098	**.500**	4	3/16	2	994710	69.00	994710-C3	75.00	994710-C8	77.00
5/32	.133	.098	**1.000**	4	3/16	3	997110	78.80	997110-C3	84.80	997110-C8	87.40
3/16	.160	.117	**.125**	4	3/16	2	934112	59.30	934112-C3	65.30	934112-C8	67.30
3/16	.160	.117	**.250**	4	3/16	2	951212	61.00	951212-C3	67.00	951212-C8	69.00
3/16	.160	.117	**.500**	4	3/16	2	994712	66.00	994712-C3	72.00	994712-C8	74.00
3/16	.160	.117	**.750**	4	3/16	2	897712	69.00	897712-C3	75.00	897712-C8	77.00

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UNDERCUTTING END MILLS

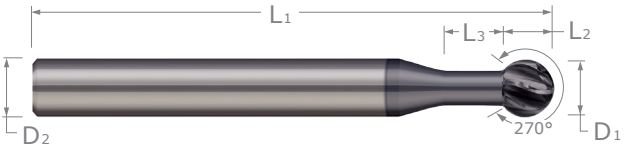
270° High Helix (cont.)

continued from previous page

CUTTER DIA.	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB2 COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
3/16	.160	.117	**1.000**	4	3/16	3	997112	78.80	997112-C3	84.80	997112-C8	87.00
3/16	.160	.117	**1.250**	4	3/16	3	893512	83.00	893512-C3	89.00	893512-C8	91.10
1/4	.213	.158	**.125**	4	1/4	2-1/2	934116	84.90	934116-C3	93.00	934116-C8	93.70
1/4	.213	.158	**.250**	4	1/4	2-1/2	808616	86.80	808616-C3	95.00	808616-C8	95.60
1/4	.213	.158	**.375**	4	1/4	2-1/2	951216	88.80	951216-C3	97.00	951216-C8	97.60
1/4	.213	.158	**.500**	4	1/4	2-1/2	863716	91.60	863716-C3	99.80	863716-C8	100.40
1/4	.213	.158	**.750**	4	1/4	2-1/2	994716	97.30	994716-C3	105.40	994716-C8	106.10
1/4	.213	.158	**1.000**	4	1/4	2-1/2	808516	98.80	808516-C3	106.90	808516-C8	107.60
1/4	.213	.158	**1.125**	4	1/4	2-1/2	897716	100.10	897716-C3	108.30	897716-C8	110.40
1/4	.213	.158	**1.500**	4	1/4	4	997116	107.10	997116-C3	116.60	997116-C8	116.90
1/4	.213	.158	**2.250**	4	1/4	4	928816	118.50	928816-C3	128.00	928816-C8	128.40
5/16	.266	.201	**.750**	4	5/16	2-1/2	994720	113.20	994720-C3	122.70	994720-C8	131.80
5/16	.266	.201	**1.500**	4	5/16	4	997120	134.40	997120-C3	145.90	997120-C8	147.60
3/8	.320	.241	**.375**	4	3/8	2-1/2	951224	126.90	951224-C3	137.50	951224-C8	149.50
3/8	.320	.241	**.750**	4	3/8	2-1/2	994724	128.40	994724-C3	139.00	994724-C8	151.00
3/8	.320	.241	**1.125**	4	3/8	4	897724	137.90	897724-C3	152.70	897724-C8	153.70
3/8	.320	.241	**1.500**	4	3/8	4	997124	141.40	997124-C3	156.20	997124-C8	167.90
1/2	.427	.323	**.500**	4	1/2	3	951232	181.20	951232-C3	197.40	951232-C8	207.70
1/2	.427	.323	**1.000**	4	1/2	3	994732	185.80	994732-C3	202.00	994732-C8	212.30
1/2	.427	.323	**1.500**	4	1/2	6	897732	267.30	897732-C3	283.50	897732-C8	295.10
1/2	.427	.323	**2.000**	4	1/2	6	997132	274.50	997132-C3	290.70	997132-C8	301.80
1/2	.427	.323	**3.000**	4	1/2	6	928832	306.20	928832-C3	322.30	928832-C8	327.40

UNDERCUTTING END MILLS

270° for Hardened Steels



- Optimized for hardened steels 45-68 Rc
- Increased flute count for added strength and tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide • CNC ground in the USA

Stocked in Multiple Reach Lengths

CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		L_3 $^{+.020''}_{-.000''}$		D_2	L_1	TOOL #	PRICE
1/32	.027	.016	**.062**	4	1/8	1-1/2	823231-C6	73.40
1/32	.027	.016	**.078**	4	1/8	1-1/2	819831-C6	73.40
1/32	.027	.016	**.125**	4	1/8	1-1/2	745431-C6	74.00
3/64	.040	.029	**.093**	4	1/8	1-1/2	823247-C6	73.40
3/64	.040	.029	**.125**	4	1/8	1-1/2	819847-C6	73.40
1/16	.053	.037	**.062**	4	1/8	1-1/2	831562-C6	50.50
1/16	.053	.037	**.093**	4	1/8	1-1/2	823262-C6	50.50
1/16	.053	.037	**.125**	4	1/8	1-1/2	819862-C6	52.50
1/16	.053	.037	**.250**	4	1/8	1-1/2	745462-C6	53.10
5/64	.067	.045	**.125**	4	1/8	1-1/2	823278-C6	51.60
5/64	.067	.045	**.187**	4	1/8	1-1/2	819878-C6	53.50
3/32	.080	.054	**.062**	4	1/8	1-1/2	831593-C6	51.60
3/32	.080	.054	**.125**	4	1/8	1-1/2	746493-C6	52.00
3/32	.080	.054	**.250**	4	1/8	1-1/2	823293-C6	51.60
3/32	.080	.054	**.312**	4	1/8	1-1/2	819893-C6	55.70
3/32	.080	.054	**.375**	4	1/8	1-1/2	748893-C6	56.20
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	PRICE
1/8	.107	.076	**.125**	6	1/8	1-1/2	831608-C6	45.20
1/8	.107	.076	**.250**	6	1/8	1-1/2	823308-C6	47.50
1/8	.107	.076	**.375**	6	1/8	1-1/2	819908-C6	48.40
1/8	.107	.076	**.500**	6	1/8	2	748908-C6	50.80
1/8	.107	.076	**.750**	6	1/8	2	725708-C6	51.70
5/32	.133	.098	**.250**	6	3/16	2	823310-C6	57.30
3/16	.160	.117	**.125**	6	3/16	2	831612-C6	53.40
3/16	.160	.117	**.250**	6	3/16	2	823312-C6	57.30
3/16	.160	.117	**.375**	6	3/16	2	819912-C6	60.10
3/16	.160	.117	**.500**	6	3/16	2	748912-C6	63.00
1/4	.213	.158	**.125**	8	1/4	2-1/2	831616-C6	71.50
1/4	.213	.158	**.375**	6	1/4	2-1/2	823316-C6	76.10
1/4	.213	.158	**.500**	6	1/4	2-1/2	819916-C6	77.40
1/4	.213	.158	**.750**	6	1/4	2-1/2	748916-C6	80.70
3/8	.320	.241	**.375**	8	3/8	2-1/2	823324-C6	104.30
3/8	.320	.241	**.500**	8	3/8	2-1/2	819924-C6	104.30
1/2	.427	.323	**.500**	8	1/2	3	823332-C6	148.40
1/2	.427	.323	**.750**	8	1/2	3	819932-C6	152.10

UNDERCUTTING END MILLS

270° Deburring Undercut

High Number of Flutes

Stocked in Multiple Reach Lengths

- 270° spherical ball is ideal for deburring complex shapes and multi-axis machining
- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling-type cutters
- Double cut style flute pattern • Center cutting
- Solid carbide • CNC ground in the USA

CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1	L_2 $^{+.010''}_{-.000''}$		L_3 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.031 (1/32)	.026	.014	**.031**	12	10	1/8	1-1/2	899631	76.30	899631-C3	81.80
.031 (1/32)	.026	.014	**.062**	12	10	1/8	1-1/2	980531	75.60	980531-C3	81.10
.031 (1/32)	.026	.014	**.093**	12	10	1/8	1-1/2	926431	78.00	926431-C3	83.50
.031 (1/32)	.026	.014	**.125**	12	10	1/8	1-1/2	883231	80.50	883231-C3	86.00
.039 (1 mm)	.033	.019	**.047**	12	10	1/8	1-1/2	89961M	75.60	89961M-C3	81.10
.039 (1 mm)	.033	.019	**.125**	12	10	1/8	1/1/2	92641M	80.50	92641M-C3	86.00
.047 (3/64)	.040	.024	**.062**	12	10	1/8	1-1/2	895347	73.50	895347-C3	79.00
.047 (3/64)	.040	.024	**.093**	12	10	1/8	1-1/2	980547	75.60	980547-C3	81.10
.047 (3/64)	.040	.024	**.125**	12	10	1/8	1-1/2	890847	78.00	890847-C3	83.50
.047 (3/64)	.040	.024	**.156**	12	10	1/8	1-1/2	926447	78.00	926447-C3	83.50
.047 (3/64)	.040	.024	**.250**	12	10	1/8	1-1/2	883247	80.50	883247-C3	86.00
.062 (1/16)	.053	.032	**.062**	15	12	1/8	1-1/2	899662	56.80	899662-C3	62.30
.062 (1/16)	.053	.032	**.093**	15	12	1/8	1-1/2	980562	56.80	980562-C3	62.30
.062 (1/16)	.053	.032	**.125**	15	12	1/8	1-1/2	890862	58.70	890862-C3	64.20
.062 (1/16)	.053	.032	**.187**	15	12	1/8	1-1/2	926462	58.70	926462-C3	64.20
.062 (1/16)	.053	.032	**.250**	15	12	1/8	1-1/2	883262	60.80	883262-C3	66.30
.062 (1/16)	.053	.032	**.312**	15	12	1/8	1-1/2	808362	60.80	808362-C3	66.30
.078 (5/64)	.067	.035	**.062**	15	12	1/8	1-1/2	899678	56.80	899678-C3	62.30
.078 (5/64)	.067	.035	**.125**	15	12	1/8	1-1/2	980578	56.80	980578-C3	62.30
.078 (5/64)	.067	.035	**.250**	15	12	1/8	1-1/2	926478	58.70	926478-C3	64.20
.078 (5/64)	.067	.035	**.375**	15	12	1/8	2	883278	59.50	883278-C3	65.00
.093 (3/32)	.079	.038	**.062**	15	12	1/8	1-1/2	899693	60.30	899693-C3	65.80
.093 (3/32)	.079	.038	**.125**	15	12	1/8	1-1/2	895393	60.30	895393-C3	65.80
.093 (3/32)	.079	.038	**.187**	15	12	1/8	1-1/2	809693	60.30	809693-C3	65.80
.093 (3/32)	.079	.038	**.250**	15	12	1/8	1-1/2	980593	60.30	980593-C3	65.80
.093 (3/32)	.079	.038	**.312**	15	12	1/8	1-1/2	890893	62.50	890893-C3	68.00
.093 (3/32)	.079	.038	**.375**	15	12	1/8	1-1/2	926493	61.90	926493-C3	67.40
.093 (3/32)	.079	.038	**.500**	15	12	1/8	2	883293	68.50	883293-C3	74.00
.118 (3 mm)	.101	.056	**.250**	15	12	1/8	1-1/2	98053M	62.80	98053M-C3	68.30
.118 (3 mm)	.101	.056	**.375**	15	12	1/8	1-1/2	89083M	65.00	89083M-C3	70.50
.118 (3 mm)	.101	.056	**.500**	15	12	1/8	2	92643M	66.70	92643M-C3	72.20

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UNDERCUTTING END MILLS

270° Deburring Undercut (cont.)

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CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.107	.059	**.125**	16	13	1/8	1-1/2	899708	58.10	899708-C3	63.60
.125 (1/8)	.107	.059	**.187**	16	13	1/8	1-1/2	809908	58.40	809908-C3	63.90
.125 (1/8)	.107	.059	**.250**	16	13	1/8	1-1/2	980608	60.30	980608-C3	65.80
.125 (1/8)	.107	.059	**.375**	16	13	1/8	1-1/2	890908	61.20	890908-C3	66.70
.125 (1/8)	.107	.059	**.437**	16	13	1/8	2	737108	61.90	737108-C3	67.40
.125 (1/8)	.107	.059	**.500**	16	13	1/8	2	926508	62.50	926508-C3	68.00
.125 (1/8)	.107	.059	**.750**	16	13	1/8	2	886108	65.50	886108-C3	71.00
.125 (1/8)	.107	.059	**1.000**	16	13	1/8	3	883308	69.30	883308-C3	74.80
.156 (5/32)	.133	.078	**.250**	16	13	3/16	2	980610	66.10	980610-C3	72.10
.156 (5/32)	.133	.078	**.500**	16	13	3/16	2	926510	71.20	926510-C3	77.20
.187 (3/16)	.160	.097	**.125**	16	13	3/16	2	899712	61.90	899712-C3	67.80
.187 (3/16)	.160	.097	**.250**	16	13	3/16	2	980612	65.50	980612-C3	71.40
.187 (3/16)	.160	.097	**.375**	16	13	3/16	2	890912	67.70	890912-C3	73.70
.187 (3/16)	.160	.097	**.500**	16	13	3/16	2	926512	71.20	926512-C3	77.20
.187 (3/16)	.160	.097	**.625**	16	13	3/16	2	732612	73.90	732612-C3	79.70
.187 (3/16)	.160	.097	**.750**	16	13	3/16	2	886112	76.80	886112-C3	82.80
.187 (3/16)	.160	.097	**1.000**	16	13	3/16	3	883312	80.80	883312-C3	86.80
.250 (1/4)	.213	.136	**.125**	16	13	1/4	2-1/2	899716	77.40	899716-C3	85.50
.250 (1/4)	.213	.136	**.375**	16	13	1/4	2-1/2	980616	78.30	980616-C3	86.40
.250 (1/4)	.213	.136	**.500**	16	13	1/4	2-1/2	890916	80.40	890916-C3	88.50
.250 (1/4)	.213	.136	**.750**	16	13	1/4	2-1/2	926516	84.10	926516-C3	92.20
.250 (1/4)	.213	.136	**1.000**	16	13	1/4	2-1/2	722216	85.50	722216-C3	93.00
.250 (1/4)	.213	.136	**1.125**	16	13	1/4	2-1/2	886116	86.90	886116-C3	95.00
.375 (3/8)	.320	.200	**.375**	16	13	3/8	2-1/2	980624	104.40	980624-C3	115.00
.375 (3/8)	.320	.200	**.750**	16	13	3/8	3	926524	110.50	926524-C3	121.10

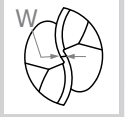
DRILL / END MILLS

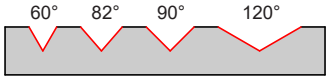
Helical Tip – 2 Flute

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 2 flutes
- Specialized helically fluted tip design for superior performance, surface finish and chip evacuation
- Variable helix design on OD (approx. 35°) reduces chatter and harmonics and increases material removal rates
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials.
- TiB_2 coating for outstanding performance in non-ferrous materials due to its extremely low affinity to aluminum.
- h6 shank tolerance for high precision tool holders • Solid carbide • CNC ground in the USA

HELICAL TIP

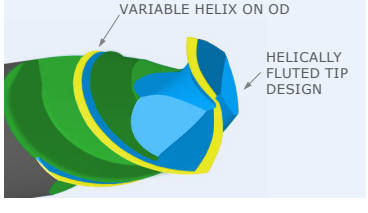
Recommended For	
Chamfering	Yes
O.D. Milling	Yes
Drilling	No
Spotting	Light Duty





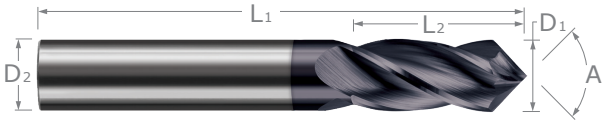
Stocked in Four Included Angles!

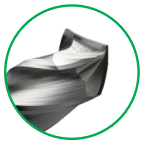
INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		TiB2 COATED	
A +1° −1°	D_1 +.000″ −.002″	L_2 +.030″ −.000″	W	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
60°	1/32	3/32	.003	1/8	1-1/2	872502-C6	56.30	872502-C8	53.80
	1/16	3/16	.005	1/8	1-1/2	872504-C6	55.80	872504-C8	54.30
	1/8	1/2	.008	1/8	1-1/2	872508-C6	55.80	872508-C8	56.30
	3/16	5/8	.009	3/16	2	872512-C6	61.60	872512-C8	62.30
	1/4	3/4	.009	1/4	2-1/2	872516-C6	78.50	872516-C8	79.20
	3/8	7/8	.012	3/8	2-1/2	872524-C6	97.00	872524-C8	97.00
	1/2	1	.012	1/2	3	872532-C6	125.20	872532-C8	125.20
82°	1/8	1/2	.008	1/8	1-1/2	738408-C6	58.80		
	3/16	5/8	.009	3/16	2	738412-C6	58.80		
	1/4	3/4	.009	1/4	2-1/2	738416-C6	58.80		
	3/8	7/8	.012	3/8	2-1/2	738424-C6	58.80		
90°	1/32	3/32	.003	1/8	1-1/2	859602-C6	50.60	859602-C8	48.70
	3/64	9/64	.004	1/8	1-1/2	859603-C6	50.60		
	1/16	3/16	.005	1/8	1-1/2	859604-C6	50.60	859604-C8	49.20
	5/64	1/4	.006	1/8	1-1/2	859605-C6	53.10	859605-C8	51.60
	3/32	3/8	.007	1/8	1-1/2	859606-C6	53.10	859606-C8	51.60
	1/8	1/2	.008	1/8	1-1/2	859608-C6	55.80	859608-C8	55.80
	3/16	5/8	.009	3/16	2	859612-C6	61.60	859612-C8	61.60
	1/4	3/4	.009	1/4	2-1/2	859616-C6	78.50	859616-C8	78.50
	3/8	7/8	.012	3/8	2-1/2	859624-C6	97.00	859624-C8	98.00
	1/2	1	.012	1/2	3	859632-C6	124.10	859632-C8	125.20
120°	1/8	1/2	.008	1/8	1-1/2	847708-C6	56.30	847708-C8	56.30
	3/16	5/8	.009	3/16	2	847712-C6	62.30	847712-C8	62.30
	1/4	3/4	.009	1/4	2-1/2	847716-C6	78.50	847716-C8	79.20
	3/8	7/8	.012	3/8	2-1/2	847724-C6	98.00	847724-C8	98.00
	1/2	1	.012	1/2	3	847732-C6	125.20	847732-C8	125.20



DRILL / END MILLS

Helical Tip – 4 Flute



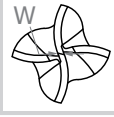


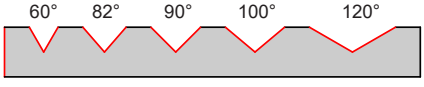
Specialized Helically Fluted Tip Design

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 4 flutes (two flutes to center, two flutes cut back)
- Specialized helically fluted tip design for superior performance, surface finish and chip evacuation
- Variable helix design on OD (approx. 35°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

HELICAL TIP

Recommended For	
Chamfering	Yes
O.D. Milling	Yes
Drilling	No
Spotting	Light Duty





Stocked in Five Included Angles!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2 (h6)	L1	4 FL	PRICE
60°	1/16	3/16	.005	1/8	1-1/2	899204-C6	59.30
	3/32	3/8	.007	1/8	1-1/2	899206-C6	59.30
	1/8	1/2	.008	1/8	1-1/2	899208-C6	58.80
	3/16	5/8	.009	3/16	2	899212-C6	65.00
	1/4	3/4	.009	1/4	2-1/2	899216-C6	82.60
	5/16	13/16	.010	5/16	2-1/2	899220-C6	92.00
	3/8	7/8	.012	3/8	2-1/2	899224-C6	102.00
	1/2	1	.012	1/2	3	899232-C6	130.50
82°	1/8	1/2	.008	1/8	1-1/2	788208-C6	58.80
	3/16	5/8	.009	3/16	2	788212-C6	65.00
	1/4	3/4	.009	1/4	2-1/2	788216-C6	82.60
90°	1/32	3/32	.003	1/8	1-1/2	881102-C6	53.70
	.039	1/8	.003	1/8	1-1/2	88111M-C6	54.10
	3/64	9/64	.004	1/8	1-1/2	881103-C6	54.10
	1/16	3/16	.005	1/8	1-1/2	881104-C6	53.70
	5/64	1/4	.006	1/8	1-1/2	881105-C6	56.10
	3/32	3/8	.007	1/8	1-1/2	881106-C6	56.10
	.118	3/8	.008	1/8	1-1/2	88113M-C6	58.80
	1/8	1/2	.008	1/8	1-1/2	881108-C6	58.80
	9/64	9/16	.009	3/16	2	881109-C6	65.70
	5/32	9/16	.009	3/16	2	881110-C6	65.00
	3/16	5/8	.009	3/16	2	881112-C6	65.00
	1/4	3/4	.009	1/4	2-1/2	881116-C6	82.60
	5/16	13/16	.010	5/16	2-1/2	881120-C6	91.00
	3/8	7/8	.012	3/8	2-1/2	881124-C6	102.00
	1/2	1	.012	1/2	3	881132-C6	130.50
	5/8	1-1/4	.014	5/8	3-1/2	881140-C6	173.60
	3/4	1-1/2	.015	3/4	4	881148-C6	216.90

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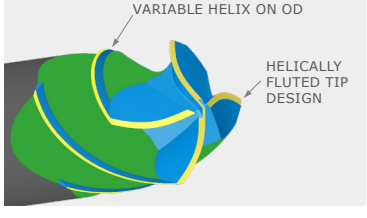

DRILL / END MILLS

Helical Tip – 4 Flute (cont.)

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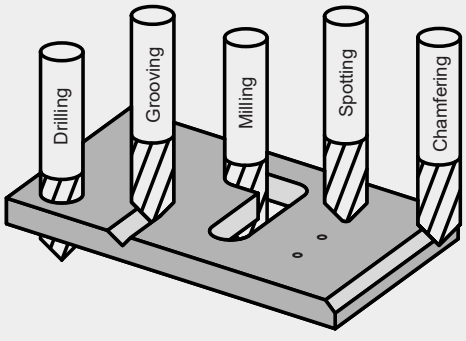
INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2 (h6)	L_1	4 FL	PRICE
100°	1/8	1/2	.008	1/8	1-1/2	826208-C6	58.80
	1/4	3/4	.009	1/4	2-1/2	826216-C6	82.60
	3/8	7/8	.012	3/8	2-1/2	826224-C6	102.00
	1/2	1	.012	1/2	3	826232-C6	130.50
120°	1/8	1/2	.008	1/8	1-1/2	865408-C6	58.80
	3/16	5/8	.009	3/16	2	865412-C6	65.00
	1/4	3/4	.009	1/4	2-1/2	865416-C6	82.60
	3/8	7/8	.012	3/8	2-1/2	865424-C6	102.00
	1/2	1	.012	1/2	3	865432-C6	130.50

Drill / End Mills

Our extensive offering of Drill / End Mills are available in multiple point angles. They allow you to...

- Perform multiple operations with a single tool
- Free up space on your tool carousel
- Improve cycle time with fewer tool changes



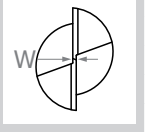
DRILL / END MILLS

Mill Style – 2 Flute

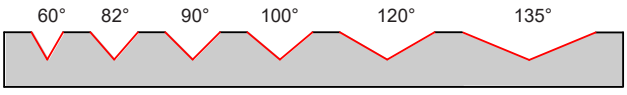
MILL STYLE

Flat relief with end mill style gash to thin web.

Recommended For	Included Angle	
	60°	82°, 90°,100°, 120°, 135°
Chamfering	Yes	Yes
O.D. Milling	Yes	Yes
Drilling	No	Non-Ferrous Only
Spotting	No	Light Duty



- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 2 flutes • Solid carbide
- CNC ground in the USA



Stocked in Six Included Angles!

Outstanding in Aluminum!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB2 COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2	L1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
60°	.020	1/16	.0020	1/8	1-1/2	991767	34.90	991767-C3	40.40		
	1/32	3/32	.0030	1/8	1-1/2	991702	34.20	991702-C3	39.70		
	3/64	9/64	.0040	1/8	1-1/2	991703	34.90	991703-C3	40.40		
	1/16	3/16	.0050	1/8	1-1/2	991704	34.20	991704-C3	39.70		
	5/64	1/4	.0050	1/8	1-1/2	991705	34.90	991705-C3	40.40		
	3/32	3/8	.0050	1/8	1-1/2	991706	34.20	991706-C3	39.70		
	1/8	1/2	.0050	1/8	1-1/2	991708	34.20	991708-C3	39.70	991708-C8	42.30
	5/32	9/16	.0060	3/16	2	991710	35.60	991710-C3	41.60		
	3/16	5/8	.0060	3/16	2	991712	35.60	991712-C3	41.60	991712-C8	43.60
	1/4	3/4	.0060	1/4	2-1/2	991716	50.30	991716-C3	58.30	991716-C8	59.60
	5/16	13/16	.0070	5/16	2-1/2	991720	52.90	991720-C3	62.40		
	3/8	7/8	.0080	3/8	2-1/2	991724	63.40	991724-C3	74.00	991724-C8	81.20
	1/2	1	.0080	1/2	3	991732	100.40	991732-C3	116.40	991732-C8	120.00
	5/8	1-1/4	.0090	5/8	3-1/2	991740	153.60	991740-C3	169.50		
	3/4	1-1/2	.0100	3/4	4	991748	232.80	991748-C3	252.90		
82°	1/16	3/16	.0050	1/8	1-1/2	949404	36.90	949404-C3	42.40		
	3/32	3/8	.0050	1/8	1-1/2	949406	36.90	949406-C3	42.40		
	1/8	1/2	.0050	1/8	1-1/2	949408	36.90	949408-C3	42.40	949408-C8	44.00
	5/32	9/16	.0060	3/16	2	949410	38.00	949410-C3	43.80		
	3/16	5/8	.0060	3/16	2	949412	38.00	949412-C3	44.00		
	1/4	3/4	.0060	1/4	2-1/2	949416	54.00	949416-C3	62.10	949416-C8	63.20
	5/16	13/16	.0070	5/16	2-1/2	949420	56.90	949420-C3	66.40		
	3/8	7/8	.0080	3/8	2-1/2	949424	68.00	949424-C3	78.60		
	1/2	1	.0080	1/2	3	949432	108.60	949432-C3	124.70		
90°	1/64	3/64	.0015	1/8	1-1/2	15301-2	34.20	72201-C3	39.70		
	.020	1/16	.0020	1/8	1-1/2	15367-2	34.20	72220-C3	39.70		
	1/32	3/32	.0030	1/8	1-1/2	15302-2	34.20	72231-C3	39.70	72231-C8	41.30
	1 mm	1/8	.0030	1/8	1-1/2	1531M-2	34.20	72239-C3	39.70		
	.040	1/8	.0030	1/8	1-1/2	15371-2	34.20	72240-C3	39.70		
	3/64	9/64	.0030	1/8	1-1/2	15303-2	34.20	72247-C3	39.70		
	1/16	3/16	.0050	1/8	1-1/2	15304-2	31.90	72262-C3	37.40	72262-C8	39.90

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DRILL / END MILLS

Mill Style – 2 Flute (cont.)

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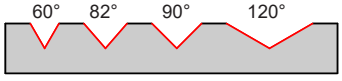
INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB2 COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
90°	5/64	1/4	.0050	1/8	1-1/2	15305-2	31.90	72278-C3	37.40	72278-C8	39.90
	3/32	3/8	.0050	1/8	1-1/2	15306-2	31.90	72293-C3	37.40	72293-C8	39.90
	7/64	3/8	.0050	1/8	1-1/2	15307-2	34.20	72302-C3	39.70		
	3 mm	3/8	.0050	1/8	1-1/2	1533M-2	34.20	72305-C3	39.70		
	1/8	1/2	.0050	1/8	1-1/2	15308-2	31.90	72308-C3	37.40	72308-C8	39.90
	9/64	9/16	.0060	3/16	2	15309-2	35.60	72309-C3	41.60		
	5/32	9/16	.0060	3/16	2	15310-2	35.60	72310-C3	41.60		
	3/16	5/8	.0060	3/16	2	15312-2	33.10	72312-C3	39.00	72312-C8	41.10
	1/4	3/4	.0060	1/4	2-1/2	15316-2	46.90	72316-C3	54.90	72316-C8	56.70
	5/16	13/16	.0070	5/16	2-1/2	15320-2	49.10	72320-C3	58.40	72320-C8	61.40
	3/8	7/8	.0080	3/8	2-1/2	15324-2	58.80	72324-C3	69.40	72324-C8	77.40
	1/2	1	.0080	1/2	3	15332-2	93.40	72332-C3	109.20	72332-C8	114.20
	5/8	1-1/4	.0090	5/8	3-1/2	15340-2	142.60	72340-C3	160.50		
	3/4	1-1/2	.0100	3/4	4	15348-2	216.50	72348-C3	233.60		
100°	1/16	3/16	.0050	1/8	1-1/2	928562	35.00	928562-C3	40.50		
	3/32	3/8	.0050	1/8	1-1/2	928593	35.00	928593-C3	40.50		
	1/8	1/2	.0050	1/8	1-1/2	928508	36.90	928508-C3	42.40	928508-C8	44.00
	3/16	5/8	.0060	3/16	2	928512	38.00	928512-C3	44.00		
	1/4	3/4	.0060	1/4	2-1/2	928516	54.00	928516-C3	62.10	928516-C8	63.20
	5/16	13/16	.0070	5/16	2-1/2	928520	56.90	928520-C3	66.40		
	3/8	7/8	.0080	3/8	2-1/2	928524	68.60	928524-C3	79.20		
	1/2	1	.0080	1/2	3	928532	108.60	928532-C3	124.70		
120°	1/16	3/16	.0050	1/8	1-1/2	985504	37.10	985504-C3	42.60		
	3/32	3/8	.0050	1/8	1-1/2	985506	36.50	985506-C3	42.00		
	1/8	1/2	.0050	1/8	1-1/2	985508	36.50	985508-C3	42.00	985508-C8	43.60
	5/32	9/16	.0060	3/16	2	985510	38.20	985510-C3	44.20		
	3/16	5/8	.0060	3/16	2	985512	37.50	985512-C3	43.50		
	1/4	3/4	.0060	1/4	2-1/2	985516	52.70	985516-C3	60.80	985516-C8	63.00
	5/16	13/16	.0070	5/16	2-1/2	985520	54.90	985520-C3	64.40		
	3/8	7/8	.0080	3/8	2-1/2	985524	65.40	985524-C3	76.00	985524-C8	83.10
	1/2	1	.0080	1/2	3	985532	102.30	985532-C3	118.30		
135°	1/8	1/2	.0050	1/8	1-1/2	756408	36.90	756408-C3	42.40		
	3/16	5/8	.0060	3/16	2	756412	38.00	756412-C3	43.80		
	1/4	3/4	.0060	1/4	2-1/2	756416	54.00	756416-C3	61.50		
	3/8	7/8	.0080	3/8	2-1/2	756424	68.60	756424-C3	79.20		
	1/2	1	.0080	1/2	3	756432	108.60	756432-C3	123.00		

DRILL / END MILLS

Mill Style – 3 Flute



Stocked in Four Included Angles!

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 3 flutes to center
- Solid carbide
- CNC ground in the USA

MILL STYLE

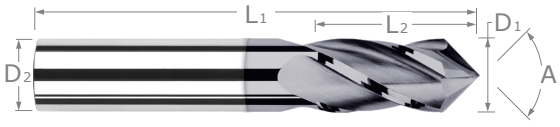
Flat relief with end mill style and 3 flutes to center.

Recommended For	Included Angle
	60°, 82°, 90°, 120°
Chamfering	Yes
O.D. Milling	Yes
Drilling	No
Spotting	Light Duty

	INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	D2	L1	3 FL	PRICE	3 FL	PRICE
	60°	1/8	1/2	1/8	1-1/2	784808	31.90	784808-C3	37.40
NEW		3/16	5/8	3/16	2	784812	33.10	784812-C3	38.90
		1/4	3/4	1/4	2-1/2	784816	46.90	784816-C3	54.90
		3/8	7/8	3/8	2-1/2	784824	59.30	784824-C3	69.90
NEW		1/2	1	1/2	3	784832	89.70	784832-C3	104.10
	82°	1/8	1/2	1/8	1-1/2	725508	31.90	725508-C3	37.40
		1/4	3/4	1/4	2-1/2	725516	46.90	725516-C3	54.40
		3/8	7/8	3/8	2-1/2	725524	58.80	725524-C3	69.40
		1/2	1	1/2	3	725532	89.70	725532-C3	104.10
	90°	1/16	3/16	1/8	1-1/2	823762	32.90	823762-C3	38.40
		3/32	3/8	1/8	1-1/2	823793	31.90	823793-C3	37.40
		1/8	1/2	1/8	1-1/2	823808	31.90	823808-C3	37.90
		5/32	9/16	3/16	2	823810	33.40	823810-C3	39.30
		3/16	5/8	3/16	2	823812	33.10	823812-C3	39.00
		1/4	3/4	1/4	2-1/2	823816	46.90	823816-C3	53.80
		5/16	13/16	5/16	2-1/2	823820	54.60	823820-C3	64.00
		3/8	7/8	3/8	2-1/2	823824	58.80	823824-C3	69.40
		1/2	1	1/2	3	823832	89.70	823832-C3	105.50
	120°	1/8	1/2	1/8	1-1/2	784508	31.90	784508-C3	37.40
		1/4	3/4	1/4	2-1/2	784516	46.90	784516-C3	54.90
		3/8	7/8	3/8	2-1/2	784524	60.50	784524-C3	71.10

DRILL / END MILLS

Mill Style – 4 Flute

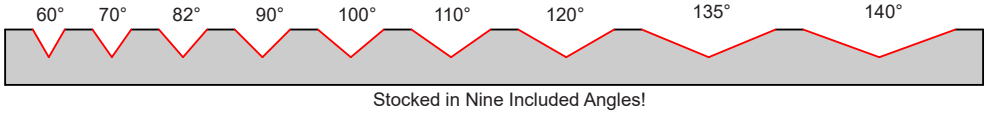


- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 4 flutes (two flutes to center, two flutes cut back)
- Solid carbide • CNC ground in the USA

MILL STYLE

Flat relief with end mill style gash to thin web.

Recommended For	Included Angle	
	60°, 70°	82°, 90°, 100°, 110°, 120°, 135°, 140°
Chamfering	Yes	Yes
O.D. Milling	Yes	Yes
Drilling	No	Non-Ferrous Only
Spotting	No	Light Duty



Stocked in Nine Included Angles!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiN COATED		AlTiN COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2	L1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
60°	1/32	3/32	.003	1/8	1-1/2	15402	34.20			15402-C3	39.70
	3/64	9/64	.004	1/8	1-1/2	15403	34.20			15403-C3	39.70
	1/16	3/16	.005	1/8	1-1/2	15404	34.20			15404-C3	39.70
	5/64	1/4	.005	1/8	1-1/2	15405	34.20			15405-C3	39.70
	3/32	3/8	.005	1/8	1-1/2	15406	34.20			15406-C3	39.70
	7/64	3/8	.005	1/8	1-1/2	15407	36.20			15407-C3	41.70
	3 mm	3/8	.005	1/8	1-1/2	1543M	37.10			1543M-C3	42.60
	1/8	1/2	.005	1/8	1-1/2	15408	34.20			15408-C3	39.70
	9/64	9/16	.006	3/16	2	15409	35.60			15409-C3	41.60
	5/32	9/16	.006	3/16	2	15410	35.60			15410-C3	41.60
	3/16	5/8	.006	3/16	2	15412	35.60			15412-C3	41.60
	1/4	3/4	.006	1/4	2-1/2	15416	50.30			15416-C3	58.30
	5/16	13/16	.007	5/16	2-1/2	15420	52.90			15420-C3	62.40
	3/8	7/8	.008	3/8	2-1/2	15424	63.40			15424-C3	74.00
	7/16	1	.008	7/16	2-3/4	15428	100.00			15428-C3	112.30
	1/2	1	.008	1/2	3	15432	100.40			15432-C3	116.40
	5/8	1-1/4	.009	5/8	3-1/2	15440	153.60			15440-C3	169.50
	3/4	1-1/2	.010	3/4	4	15448	232.80			15448-C3	252.90
	1	2	.010	1	4	15464	350.70			15464-C3	377.00
70°	1/8	1/2	.005	1/8	1-1/2	824608	38.90			824608-C3	44.40
	1/4	3/4	.006	1/4	2-1/2	824616	56.20			824616-C3	64.30
	3/8	7/8	.008	3/8	2-1/2	824624	70.20			824624-C3	80.80
	1/2	1	.008	1/2	3	824632	110.80			824632-C3	126.90

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DRILL / END MILLS

Mill Style – 4 Flute (cont.)

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INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		TiN COATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1		4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
	1/32	3/32	.003	1/8	1-1/2		26502	39.30			26502-C3	44.80
	1/16	3/16	.005	1/8	1-1/2		26504	38.90			26504-C3	44.40
	5/64	1/4	.005	1/8	1-1/2		26505	39.30			26505-C3	44.80
	3/32	3/8	.005	1/8	1-1/2		26506	38.90			26506-C3	44.40
	1/8	1/2	.005	1/8	1-1/2		26508	38.90			26508-C3	44.40
	5/32	9/16	.006	3/16	2		26510	40.30			26510-C3	46.30
82°	3/16	5/8	.006	3/16	2		26512	40.30			26512-C3	46.30
	1/4	3/4	.006	1/4	2-1/2		26516	56.20			26516-C3	64.30
	5/16	13/16	.007	5/16	2-1/2		26520	58.70			26520-C3	68.20
	3/8	7/8	.008	3/8	2-1/2		26524	70.20			26524-C3	80.80
	1/2	1	.008	1/2	3		26532	109.80			26532-C3	125.80
	5/8	1-1/4	.009	5/8	3-1/2		26540	167.70			26540-C3	183.80
	3/4	1-1/2	.010	3/4	4		26548	253.70			26548-C3	272.80
	1/64	3/64	.0015	1/8	1-1/2		15301	34.20			15301-C3	39.70
	.020	1/16	.002	1/8	1-1/2		15367	34.20			15367-C3	39.70
	1/32	3/32	.003	1/8	1-1/2		15302	34.20			15302-C3	39.70
	1 mm	1/8	.003	1/8	1-1/2		1531M	37.10			1531M-C3	42.60
	3/64	9/64	.004	1/8	1-1/2		15303	34.20			15303-C3	39.70
	1/16	3/16	.005	1/8	1-1/2		15304	31.90	15304-C1	35.60	15304-C3	37.40
	1/16	5/16	.005	1/8	2-1/2		823904	35.30			823904-C3	40.80
	5/64	1/4	.005	1/8	1-1/2		15305	31.90	15305-C1	35.60	15305-C3	37.40
	3/32	3/8	.005	1/8	1-1/2		15306	31.90	15306-C1	35.60	15306-C3	37.40
	3/32	1/2	.005	1/8	2-1/2		823993	35.30			823993-C3	40.80
	7/64	3/8	.005	1/8	1-1/2		15307	34.20			15307-C3	39.70
	3 mm	3/8	.005	1/8	1-1/2		1533M	34.20			1533M-C3	39.70
	1/8	1/2	.005	1/8	1-1/2		15308	31.90	15308-C1	35.60	15308-C3	37.40
	1/8	1/2	.005	1/8	3	LONG	824208	36.60			824208-C3	42.20
	1/8	5/8	.005	1/8	2-1/2		824008	35.30			824008-C3	40.80
	9/64	9/16	.006	3/16	2		15309	35.60			15309-C3	41.60
	5/32	9/16	.006	3/16	2		15310	35.60			15310-C3	41.60
	11/64	5/8	.006	3/16	2		15311	35.60			15311-C3	41.60
90°	3/16	5/8	.006	3/16	2		15312	33.10	15312-C1	37.20	15312-C3	39.00
	3/16	1	.006	3/16	3		824012	37.10			824012-C3	43.00
	13/64	3/4	.006	1/4	2-1/2		15313	52.50			15313-C3	60.60
	7/32	3/4	.006	1/4	2-1/2		15314	53.40			15314-C3	61.50
	6 mm	3/4	.006	1/4	2-1/2		1536M	53.10			1536M-C3	61.20
	1/4	3/4	.006	1/4	2-1/2		15316	46.90	15316-C1	51.20	15316-C3	54.90
	1/4	3/4	.006	1/4	4		824216	52.70			824216-C3	59.20
	1/4	1-1/4	.006	1/4	4		824016	55.20			824016-C3	64.70
	5/16	13/16	.007	5/16	2-1/2		15320	49.10	15320-C1	55.20	15320-C3	58.40
	3/8	7/8	.008	3/8	2-1/2		15324	58.80	15324-C1	65.10	15324-C3	69.40
	3/8	2	.008	3/8	4		824024	63.60			824024-C3	78.20
	7/16	1	.008	7/16	2-3/4		15328	98.10			15328-C3	111.40
	1/2	1	.008	1/2	3		15332	93.40	15332-C1	102.60	15332-C3	109.20
	1/2	1	.008	1/2	6	LONG	824032	117.90			824032-C3	135.40
	1/2	2-5/8	.008	1/2	4		739332	104.60			739332-C3	120.00
	5/8	1-1/4	.009	5/8	3-1/2		15340	144.10	15340-C1	153.40	15340-C3	159.90
	3/4	1-1/2	.010	3/4	4		15348	218.60	15348-C1	229.20	15348-C3	235.60
	7/8	2	.010	7/8	4		15356	357.50			15356-C3	383.20
	1	2	.010	1	4		15364	350.70			15364-C3	377.00

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DRILL / END MILLS

Mill Style – 4 Flute (cont.)

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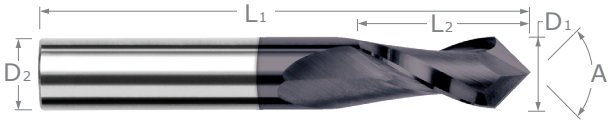
INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiN COATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
100°	1/32	3/32	.003	1/8	1-1/2	27402	39.30			27402-C3	44.80
	1/16	3/16	.005	1/8	1-1/2	27404	38.90			27404-C3	44.40
	5/64	1/4	.005	1/8	1-1/2	27405	39.30			27405-C3	44.80
	3/32	3/8	.005	1/8	1-1/2	27406	38.90			27406-C3	44.40
	1/8	1/2	.005	1/8	1-1/2	27408	38.90			27408-C3	44.40
	5/32	9/16	.006	3/16	2	27410	40.30			27410-C3	46.30
	3/16	5/8	.006	3/16	2	27412	40.30			27412-C3	46.30
	1/4	3/4	.006	1/4	2-1/2	27416	56.20			27416-C3	64.30
	5/16	13/16	.007	5/16	2-1/2	27420	58.70			27420-C3	68.20
	3/8	7/8	.008	3/8	2-1/2	27424	70.20			27424-C3	80.80
	1/2	1	.008	1/2	3	27432	109.80			27432-C3	125.80
	5/8	1-1/4	.009	5/8	3-1/2	27440	167.70			27440-C3	183.80
	3/4	1-1/2	.010	3/4	4	27448	253.70			27448-C3	272.80
110°	1/8	1/2	.005	1/8	1-1/2	824408	38.90			824408-C3	44.40
	1/4	3/4	.006	1/4	2-1/2	824416	56.20			824416-C3	64.30
	3/8	7/8	.008	3/8	2-1/2	824424	70.20			824424-C3	80.80
	1/2	1	.008	1/2	3	824432	109.80			824432-C3	125.80
120°	1/32	3/32	.003	1/8	1-1/2	988102	36.50			988102-C3	42.00
	1/16	3/16	.005	1/8	1-1/2	988104	36.50			988104-C3	42.00
	3/32	3/8	.005	1/8	1-1/2	988106	36.50			988106-C3	42.00
	7/64	3/8	.005	1/8	1-1/2	988107	35.60			988107-C3	41.10
	3 mm	3/8	.005	1/8	1-1/2	98813M	37.10			98813M-C3	42.60
	1/8	1/2	.005	1/8	1-1/2	988108	36.50			988108-C3	42.00
	9/64	9/16	.006	3/16	2	988109	38.20			988109-C3	44.20
	5/32	9/16	.006	3/16	2	988110	37.50			988110-C3	43.50
	3/16	5/8	.006	3/16	2	988112	37.50			988112-C3	43.50
	1/4	3/4	.006	1/4	2-1/2	988116	52.70			988116-C3	60.80
	5/16	13/16	.007	5/16	2-1/2	988120	54.90			988120-C3	64.40
	3/8	7/8	.008	3/8	2-1/2	988124	65.40			988124-C3	76.00
	1/2	1	.008	1/2	3	988132	102.30			988132-C3	118.30
	5/8	1-1/4	.009	5/8	3-1/2	988140	155.10			988140-C3	171.10
	3/4	1-1/2	.010	3/4	4	988148	234.50			988148-C3	254.60
	1	2	.010	1	4	988164	352.50			988164-C3	378.70
135°	1/8	1/2	.005	1/8	1-1/2	870208	38.90			870208-C3	44.40
	3/16	5/8	.006	3/16	2	870212	40.30			870212-C3	46.30
	1/4	3/4	.006	1/4	2-1/2	870216	56.20			870216-C3	64.30
	3/8	7/8	.008	3/8	2-1/2	870224	70.90			870224-C3	81.50
	1/2	1	.008	1/2	3	870232	110.80			870232-C3	126.90
140°	1/8	1/2	.005	1/8	1-1/2	817208	38.90			817208-C3	44.40
	1/4	3/4	.006	1/4	2-1/2	817216	56.20			817216-C3	64.30

DRILL / END MILLS

Drill Style – 2 Flute

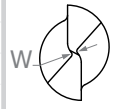


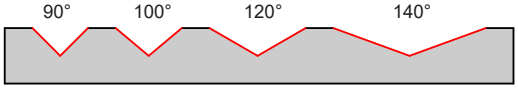
- Designed for drilling and milling applications
- 2 flutes
- Solid carbide
- CNC ground in the USA

DRILL STYLE

Cammed relief with split point with "S" style gash to thin web.

Recommended For	
Chamfering	Light Duty
O.D. Milling	Yes
Drilling	Yes
Spotting	Yes





Stocked in Four Included Angles!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2	L1	2 FL	PRICE	2 FL	PRICE	TOOL #	PRICE
90°	1/32	3/32	.003	1/8	1-1/2	46502	37.10	46502-C3	42.60		
	1 mm	1/8	.003	1/8	1-1/2	4651M	39.90	4651M-C3	45.40		
	3/64	9/64	.004	1/8	1-1/2	46503	37.10	46503-C3	42.60	46503-C8	45.20
	1/16	3/16	.005	1/8	1-1/2	46504	37.10	46504-C3	42.60		
	5/64	1/4	.005	1/8	1-1/2	46505	37.10	46505-C3	42.60		
	3/32	3/8	.005	1/8	1-1/2	46506	37.10	46506-C3	42.60		
	7/64	3/8	.005	1/8	1-1/2	46507	37.10	46507-C3	42.60		
	3 mm	3/8	.005	1/8	1-1/2	4653M	39.90	4653M-C3	45.40		
	1/8	1/2	.005	1/8	1-1/2	46508	37.10	46508-C3	42.60	46508-C8	45.20
	9/64	9/16	.006	3/16	2	46509	37.50	46509-C3	43.50		
	5/32	9/16	.006	3/16	2	46510	37.50	46510-C3	43.50		
	3/16	5/8	.006	3/16	2	46512	37.50	46512-C3	43.50		
	7/32	3/4	.006	1/4	2-1/2	46514	52.70	46514-C3	60.80		
	1/4	3/4	.006	1/4	2-1/2	46516	52.70	46516-C3	60.80	46516-C8	62.10
	5/16	13/16	.007	5/16	2-1/2	46520	54.90	46520-C3	64.40		
	3/8	7/8	.008	3/8	2-1/2	46524	65.40	46524-C3	76.00		
	7/16	1	.008	7/16	2-3/4	46528	100.20	46528-C3	113.50		
	1/2	1	.008	1/2	3	46532	102.30	46532-C3	118.30		
	5/8	1-1/4	.010	5/8	3-1/2	46540	155.10	46540-C3	171.10		
	3/4	1-1/2	.012	3/4	4	46548	234.50	46548-C3	254.60		
	1	2	.015	1	4	46564	347.20	46564-C3	378.00		
100°	1/8	1/2	.005	1/8	1-1/2	849108	39.30	849108-C3	44.80		
	3/16	5/8	.006	3/16	2	849112	40.30	849112-C3	46.30		
	1/4	3/4	.006	1/4	2-1/2	849116	56.20	849116-C3	64.30		
	3/8	7/8	.008	3/8	2-1/2	849124	70.90	849124-C3	81.50		

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DRILL / END MILLS

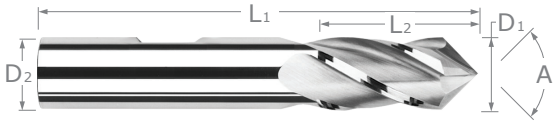
Drill Style – 2 Flute (cont.)

continued from previous page

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	2 FL	PRICE	2 FL	PRICE	TOOL #	PRICE
120°	1/32	3/32	.003	1/8	1-1/2	12902	37.10	12902-C3	42.60		
	1 mm	1/8	.003	1/8	1-1/2	1291M	39.90	1291M-C3	45.40		
	3/64	9/64	.004	1/8	1-1/2	12903	37.10	12903-C3	42.60		
	1/16	3/16	.005	1/8	1-1/2	12904	34.40	12904-C3	39.90		
	5/64	1/4	.005	1/8	1-1/2	12905	34.40	12905-C3	39.90		
	3/32	3/8	.005	1/8	1-1/2	12906	34.40	12906-C3	39.90		
	3 mm	3/8	.005	1/8	1-1/2	1293M	39.90	1293M-C3	45.40		
	1/8	1/2	.005	1/8	1-1/2	12908	34.40	12908-C3	39.90	12908-C8	41.50
	9/64	9/16	.006	3/16	2	12909	37.50	12909-C3	43.50		
	5/32	9/16	.006	3/16	2	12910	37.50	12910-C3	43.50		
	3/16	5/8	.006	3/16	2	12912	35.10	12912-C3	41.00		
	7/32	3/4	.006	1/4	2-1/2	12914	52.70	12914-C3	60.80		
	1/4	3/4	.006	1/4	2-1/2	12916	49.00	12916-C3	57.00	12916-C8	58.80
	5/16	13/16	.007	5/16	2-1/2	12920	51.20	12920-C3	60.50		
	3/8	7/8	.008	3/8	2-1/2	12924	61.40	12924-C3	72.00	12924-C8	76.00
	7/16	1	.008	7/16	2-3/4	12928	100.20	12928-C3	113.50		
	1/2	1	.008	1/2	3	12932	95.90	12932-C3	111.70		
	5/8	1-1/4	.010	5/8	3-1/2	12940	145.60	12940-C3	161.50		
	3/4	1-1/2	.012	3/4	4	12948	220.20	12948-C3	237.30		
	1	2	.015	1	4	12964	347.20	12964-C3	378.00		
140°	1/16	3/16	.005	1/8	1-1/2	950504	38.90	950504-C3	44.40		
	5/64	1/4	.005	1/8	1-1/2	950505	38.90	950505-C3	44.40		
	3/32	3/8	.005	1/8	1-1/2	950506	38.90	950506-C3	44.40		
	1/8	1/2	.005	1/8	1-1/2	950508	38.90	950508-C3	44.40		
	3/16	5/8	.006	3/16	2	950512	40.30	950512-C3	46.30		
	1/4	3/4	.006	1/4	2-1/2	950516	56.20	950516-C3	64.30		
	5/16	13/16	.007	5/16	2-1/2	950520	58.70	950520-C3	68.20		
	3/8	7/8	.008	3/8	2-1/2	950524	70.20	950524-C3	80.80		
	1/2	1	.008	1/2	3	950532	109.80	950532-C3	125.80		
	5/8	1-1/4	.010	5/8	3-1/2	950540	167.70	950540-C3	183.80		
	3/4	1-1/2	.012	3/4	4	950548	253.70	950548-C3	272.80		

DRILL / END MILLS

Cobalt – Mill Style – 2 & 4 Flute



- M-42 steel (8% cobalt)
- 90º included angle point
- Weldon flat
- CNC ground in the USA

MILL STYLE

END VIEW:

Flat Relief with end mill style gash to thin web

Recommended For	
Chamfering	Yes
O.D. Milling	Yes
Drilling	Non-Ferrous Only
Spotting	Light Duty

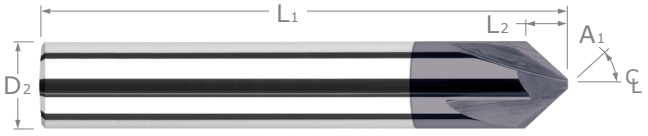
INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES*	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
A +1° −1°	D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	TOOL #	PRICE
90°	1/8	3/8	4	3/8	2-5/16	14308	72.80
	1/8	3/8	2	3/8	2-5/16	14308-2	72.80
	3/16	1/2	4	3/8	2-3/8	14312	72.80
	1/4	5/8	4	3/8	2-1/2	14316	72.80
	1/4	5/8	2	3/8	2-1/2	14316-2	72.80
	5/16	3/4	4	3/8	2-1/2	14320	72.80
	3/8	3/4	4	3/8	2-1/2	14324	72.80
	7/16	1	4	3/8	2-11/16	14328	86.00
	1/2	1-1/4	4	1/2	3-1/4	14332	86.00
	5/8	1-5/8	4	5/8	3 3/4	14340	125.70
	3/4	1-5/8	4	3/4	3-7/8	14348	147.80
	1	1-7/8	4	3/4	4-1/8	14364-A	215.40
	1	2	4	1	4-1/2	14364	215.40

*2 flute style is two flutes to center. 4 flute style is two flutes to center and two flutes cut back.

NEW SIZES!

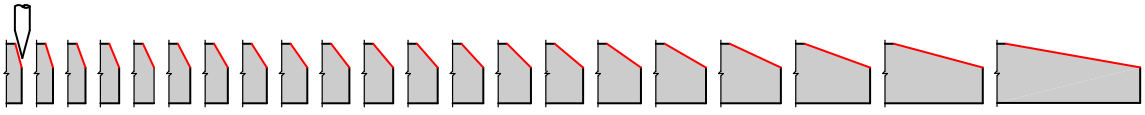
CHAMFER CUTTERS

Pointed & Flat End



Available in 2, 3, 4 & 6 Flutes!

- Choose from three types:
  - Pointed (Type I): Used for deburring and chamfering in narrow grooves, slots, and, small holes
  - Flat End (Type II): (non-cutting) multi-flute design improves tool life and finish for profiling and chamfering larger features
  - End Cutting (Type III): 4 flute center cutting geometry to blend the floor and a chamfered wall in a single pass
- Solid carbide • CNC ground in the USA



Stocked in 21 Angles Per Side, Ranging from 15°-80°!

ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
15°	1/8	2	.010	I	.233		1-1/2	NEW	18715	20.00	18715-C3	25.50	18715-C8	28.00
	1/8	2	.010	I	.233		3	LONG!	50615	26.60	50615-C3	32.10		
	1/8	3	.040	II	.159	.075	1-1/2		968615	21.50	968615-C3	27.00		
	1/8	4	.040	II	.159	.075	1-1/2		866115	22.60	866115-C3	28.10		
	3/16	2	.010	I	.350		2		72415	28.00	72415-C3	34.00		
	3/16	2	.010	I	.350		4	LONG!	986915	42.70	986915-C3	50.90		
	3/16	3	.040	II	.275	.075	2		978115	31.90	978115-C3	37.90		
	3/16	4	.040	II	.275	.075	2		848715	33.50	848715-C3	39.50		
	1/4	2	.010	I	.448		2-1/2		47615	40.10	47615-C3	48.20	47615-C8	49.40
	1/4	3	.060	II	.355	.112	2-1/2		18515	37.40	18515-C3	45.40		
	1/4	3	.060	II	.355	.112	4	LONG!	48515	53.10	48515-C3	58.30		
	1/4	4	.060	II	.355	.112	2-1/2		876415	42.20	876415-C3	50.20		
	1/4	4	.040	III	.391	.075	2-1/2		833115	45.40	833115-C3	53.50		
	5/16	3	.060	II	.471	.112	2-1/2		977015	47.30	977015-C3	56.80		
	3/8	2	.010	I	.700		2-1/2		72515	53.90	72515-C3	64.50		
	3/8	3	.060	II	.588	.112	2-1/2		18415	50.20	18415-C3	60.80	18415-C8	69.20
	3/8	3	.060	II	.588	.112	4	LONG!	981215	80.20	981215-C3	95.00		
	3/8	4	.060	II	.588	.112	2-1/2		895115	56.60	895115-C3	67.20		
	3/8	4	.060	III	.588	.112	2-1/2		827815	60.80	827815-C3	71.40		NEW
	1/2	2	.010	I	.933		3		960415	90.80	960415-C3	106.80		
	1/2	4	.080	II	.784	.149	3		18315	74.50	18315-C3	90.30		
	1/2	4	.080	III	.783	.149	3		820215	79.20	820215-C3	93.60		
	1/2	6	.080	II	.784	.149	3		839215	84.10	839215-C3	100.10		
	5/8	6	.080	II	1.017	.149	3-1/2		952815	132.20	952815-C3	148.20		
	3/4	6	.100	II	1.213	.187	4		949315	198.10	949315-C3	217.80		

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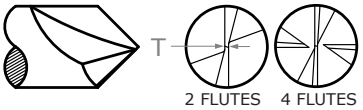
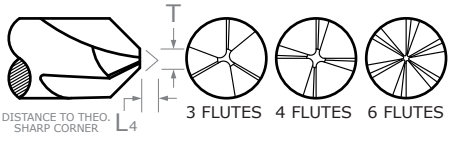
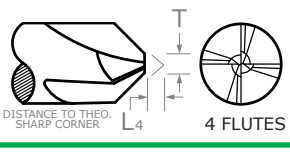
TYPE I - POINTED
Flat relief ground to center, yielding a web thickness at tip (T)



TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



TYPE III - END CUTTING
Flat relief ground to an end cutting tip diameter (T), two flutes to center



CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
17.5°	1/8	2	.010	I	.198		1-1/2		18718	24.30	18718-C3	29.80		
	1/4	2	.010	I	.396		2-1/2		47618	44.30	47618-C3	52.50		
	1/4	3	.060	II	.301	.095	2-1/2		18518	44.30	18518-C3	52.50		
	3/8	3	.060	II	.500	.107	2-1/2		18418	57.80	18418-C3	68.40		
	1/2	4	.080	II	.666	.127	3		18318	88.60	18318-C3	104.80		
20°	1/8	2	.010	I	.172		1-1/2		18720	20.00	18720-C3	25.50	18720-C8	28.00
	1/8	2	.010	I	.172		3	LONG!	50620	26.60	50620-C3	32.10		
	1/8	3	.040	II	.117	.055	1-1/2		968620	21.50	968620-C3	27.00		
	1/8	4	.040	II	.117	.055	1-1/2		866120	22.60	866120-C3	28.10		
	3/16	2	.010	I	.258		2		72420	28.00	72420-C3	34.00	72420-C8	36.00
	3/16	2	.010	I	.258		4	LONG!	986920	42.70	986920-C3	50.90		
	3/16	3	.040	II	.203	.055	2		978120	31.90	978120-C3	37.90		
	3/16	4	.040	II	.203	.055	2		848720	33.50	848720-C3	39.50		
	1/4	2	.010	I	.343		2-1/2		47620	40.10	47620-C3	48.20	47620-C8	49.40
	1/4	3	.060	II	.261	.082	2-1/2		18520	37.40	18520-C3	45.40	18520-C8	46.90
	1/4	3	.060	II	.261	.082	4	LONG!	48520	53.10	48520-C3	62.60		
	1/4	4	.060	II	.261	.082	2-1/2		876420	46.30	876420-C3	54.40		
	1/4	4	.040	III	.288	.055	2-1/2		833120	47.80	833120-C3	55.90		
	5/16	3	.060	II	.347	.082	2-1/2		977020	53.90	977020-C3	63.30		
	3/8	2	.010	I	.515		2-1/2		72520	53.90	72520-C3	64.50		
	3/8	3	.060	II	.433	.082	2-1/2		18420	50.20	18420-C3	60.80		
	3/8	3	.060	II	.433	.082	4	LONG!	981220	80.20	981220-C3	95.00		
	3/8	4	.060	II	.433	.082	2-1/2		895120	62.20	895120-C3	72.80		
	1/2	2	.010	I	.687		3		960420	90.80	960420-C3	106.80		
	1/2	4	.080	II	.577	.110	3		18320	74.50	18320-C3	90.30		
	1/2	6	.080	II	.577	.110	3		839220	84.10	839220-C3	100.10		
NEW	1/2	4	.080	III	.576	.110	3		820220	79.20	820220-C3	93.60		
22.5°	1/8	2	.010	I	.151		1-1/2		18723	23.50	18723-C3	29.00	18723-C8	30.60
	1/8	3	.040	II	.103	.048	1-1/2		968623	23.50	968623-C3	29.00		
	3/16	2	.010	I	.226		2		72423	30.90	72423-C3	36.90		
	3/16	3	.040	II	.178	.048	2		978123	30.90	978123-C3	36.90		
	1/4	2	.010	I	.302		2-1/2		47623	44.30	47623-C3	52.50		
	1/4	3	.060	II	.229	.072	2-1/2		18523	44.30	18523-C3	52.50		
	3/8	2	.010	I	.453		2-1/2		72523	59.60	72523-C3	70.20		
	3/8	3	.060	II	.380	.072	2-1/2		18423	59.60	18423-C3	70.20		
	1/2	2	.010	I	.604		3		960423	94.90	960423-C3	111.10		
	1/2	4	.080	II	.507	.097	3		18323	83.90	18323-C3	100.10		

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NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
25°	1/8	2	.010	I	.134		1-1/2		18725	23.50	18725-C3	29.00	18725-C8	31.70
	1/8	3	.040	II	.091	.043	1-1/2		968625	23.50	968625-C3	29.00		
	3/16	2	.010	I	.201		2		72425	30.70	72425-C3	36.70		
	3/16	3	.040	II	.158	.043	2		978125	30.70	978125-C3	36.70		
	1/4	2	.010	I	.268		2-1/2		47625	44.30	47625-C3	52.50		
	1/4	3	.060	II	.204	.064	2-1/2		18525	44.10	18525-C3	52.30		
	1/4	4	.060	II	.204	.064	2-1/2		876425	46.00	876425-C3	54.20		
	3/8	2	.010	I	.402		2-1/2		72525	59.20	72525-C3	69.80		
	3/8	3	.060	II	.338	.064	2-1/2		18425	59.20	18425-C3	69.80		
	1/2	2	.010	I	.536		3		960425	94.00	960425-C3	110.10		
	1/2	4	.080	II	.450	.086	3		18325	83.00	18325-C3	99.10		
27.5°	1/8	2	.010	I	.120		1-1/2		18728	24.30	18728-C3	29.80		
	3/16	2	.010	I	.180		2		72428	31.50	72428-C3	37.30		
	1/4	2	.010	I	.240		2-1/2		47628	44.30	47628-C3	52.50		
	1/4	3	.060	II	.182	.058	2-1/2		18528	44.30	18528-C3	52.50		
	1/2	4	.080	II	.403	.077	3		18328	83.90	18328-C3	100.10		
30°	3 mm	2	.120 mm	I	2.60 mm		38 mm		900230	22.60	900230-C3	28.10		
	1/8	2	.010	I	.108		1-1/2		18730	20.00	18730-C3	25.50	18730-C8	28.00
	1/8	2	.010	I	.108		3	LONG!	50630	26.60	50630-C3	32.10		
	1/8	3	.040	II	.074	.035	1-1/2		968630	21.50	968630-C3	27.00		
	1/8	4	.040	II	.074	.035	1-1/2		866130	22.60	866130-C3	28.10		
	1/8	4	.040	III	.074	.035	1-1/2		802830	25.40	802830-C3	30.90		
	3/16	2	.010	I	.162		2		72430	28.00	72430-C3	34.00	72430-C8	36.00
	3/16	2	.010	I	.162		4	LONG!	986930	42.70	986930-C3	50.90		
	3/16	3	.040	II	.128	.035	2		978130	34.80	978130-C3	40.70		
	3/16	4	.040	II	.128	.035	2		848730	36.30	848730-C3	42.30		
	1/4	2	.010	I	.217		2-1/2		47630	40.10	47630-C3	48.20	47630-C8	49.40
	1/4	3	.060	II	.165	.052	2-1/2		18530	37.40	18530-C3	45.40	18530-C8	46.90
	1/4	3	.060	II	.165	.052	4	LONG!	48530	53.10	48530-C3	58.30		
	1/4	4	.060	II	.165	.052	2-1/2		876430	42.20	876430-C3	50.20		
	1/4	4	.040	III	.181	.035	2-1/2		833130	45.10	833130-C3	53.20		
	5/16	2	.010	I	.271		2-1/2		880330	48.60	880330-C3	58.00		
	5/16	3	.060	II	.219	.052	2-1/2		977030	47.30	977030-C3	56.80		
	5/16	4	.060	II	.219	.052	2-1/2		873230	50.40	873230-C3	59.80		
	3/8	2	.010	I	.325		2-1/2		72530	53.90	72530-C3	64.50		
	3/8	3	.060	II	.273	.052	2-1/2		18430	50.20	18430-C3	60.80	18430-C8	64.80
	3/8	3	.060	II	.273	.052	4	LONG!	981230	80.20	981230-C3	95.00		
	3/8	4	.060	II	.273	.052	2-1/2		895130	56.60	895130-C3	67.20		
	3/8	4	.060	III	.273	.052	2-1/2		827830	60.80	827830-C3	71.40		
	1/2	2	.010	I	.433		3		960430	85.70	960430-C3	101.70		
	1/2	3	.080	II	.364	.069	3		871830	84.40	871830-C3	100.30		
	1/2	4	.080	II	.364	.069	3		18330	70.30	18330-C3	86.10	18330-C8	92.10
	1/2	4	.080	III	.364	.069	3		820230	79.20	820230-C3	95.30		
	1/2	6	.080	II	.364	.069	3		839230	79.30	839230-C3	95.30		
	5/8	6	.080	II	.472	.069	3-1/2		952830	132.20	952830-C3	148.20		
	3/4	6	.100	II	.563	.087	4		949330	198.10	949330-C3	217.80		

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CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
32.5°	1/8	2	.010	I	.098		1-1/2	18733	24.30	18733-C3	29.80		
	1/4	3	.060	II	.149	.047	2-1/2	18533	44.30	18533-C3	52.50		
	1/2	4	.080	II	.330	.063	3	18333	83.90	18333-C3	100.10		
35°	1/8	2	.010	I	.089		1-1/2	18735	22.40	18735-C3	27.90		
	1/8	3	.040	II	.061	.029	1-1/2	968635	22.60	968635-C3	28.10		
	3/16	2	.010	I	.134		2	72435	29.00	72435-C3	35.00		
	3/16	3	.040	II	.105	.029	2	978135	29.00	978135-C3	35.00		
	1/4	2	.010	I	.179		2-1/2	47635	53.00	47635-C3	61.10		
	1/4	3	.060	II	.136	.043	2-1/2	18535	41.60	18535-C3	49.70		
	3/8	2	.010	I	.268		2-1/2	72535	56.10	72535-C3	66.70		
	3/8	3	.060	II	.225	.043	2-1/2	18435	56.10	18435-C3	66.70		
	1/2	2	.010	I	.357		3	960435	89.10	960435-C3	105.20		
	1/2	4	.080	II	.300	.057	3	18335	78.50	18335-C3	94.60		
37.5°	1/8	2	.010	I	.081		1-1/2	18738	24.30	18738-C3	29.80		
	1/4	2	.010	I	.163		2-1/2	47638	56.50	47638-C3	64.70		
	1/4	3	.060	II	.124	.039	2-1/2	18538	44.30	18538-C3	52.50		
	1/2	4	.080	II	.274	.052	3	18338	83.90	18338-C3	100.10		
40°	1/8	2	.010	I	.074		1-1/2	18740	22.40	18740-C3	27.90		
	1/8	3	.040	II	.051	.024	1-1/2	968640	21.50	968640-C3	27.00		
	1/8	4	.040	II	.051	.024	1-1/2	866140	22.60	866140-C3	28.10		
	3/16	2	.010	I	.112		2	72440	29.00	72440-C3	35.00		
	1/4	2	.010	I	.149		2-1/2	47640	53.00	47640-C3	61.10		
	1/4	3	.060	II	.113	.036	2-1/2	18540	41.60	18540-C3	49.70		
	1/4	4	.040	III	.125	.024	2-1/2	833140	51.60	833140-C3	59.70		
	1/4	4	.060	II	.113	.036	2-1/2	876440	45.20	876440-C3	53.30		
	3/8	3	.060	II	.188	.036	2-1/2	18440	56.10	18440-C3	66.70		
	1/2	4	.080	II	.25	.048	3	18340	78.50	18340-C3	94.60		
41°	1/8	2	.010	I	.072		1-1/2	18741	21.10	18741-C3	26.60	18741-C8	29.10
	1/8	3	.040	II	.049	.023	1-1/2	968641	25.00	968641-C3	30.50		
	3/16	2	.010	I	.108		2	72441	32.40	72441-C3	38.40		
	3/16	3	.040	II	.085	.023	2	978141	30.60	978141-C3	36.60		
	1/4	2	.010	I	.144		2-1/2	47641	45.90	47641-C3	54.10		
	1/4	3	.060	II	.109	.035	2-1/2	18541	39.70	18541-C3	47.70		
	3/8	2	.010	I	.216		2-1/2	72541	62.80	72541-C3	73.40		
	3/8	3	.060	II	.181	.035	2-1/2	18441	62.80	18441-C3	73.40		
	1/2	2	.010	I	.288		3	960441	94.90	960441-C3	111.10		
	1/2	4	.080	II	.242	.046	3	18341	74.50	18341-C3	90.30		
NEW	1/2	4	.080	III	.241	.046	3	820241	79.20	820241-C3	93.60		
42.5°	1/8	2	.010	I	.068		1-1/2	18743	24.30	18743-C3	29.80		
	1/4	3	.060	II	.104	.033	2-1/2	18543	44.30	18543-C3	52.50		
	1/2	4	.080	II	.229	.044	3	18343	83.90	18343-C3	100.10		

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NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
45°	3 mm	2	.25 mm	I	1.50 mm		38 mm		900245	25.00	900245-C3	30.50			
	3 mm	3	1.00 mm	II	1.00 mm	.500 mm	38 mm		899545	25.00	899545-C3	30.50			
	3 mm	4	1.00 mm	III	1.00 mm	.500 mm	38 mm		764845	26.80	764845-C3	32.30			
	1/8	2	.010	I	.063		1-1/2		18745	20.00	18745-C3	25.50	18745-C8	28.00	
	1/8	2	.010	I	.063		3	LONG!	50645	26.60	50645-C3	32.10	50645-C8	34.80	
	1/8	3	.040	II	.043	.020	1-1/2		968645	21.50	968645-C3	27.00	968645-C8	29.50	
	1/8	3	.040	II	.043	.020	3	LONG!	790245	26.90	790245-C3	32.40			
	1/8	4	.010	I	.058		1-1/2		744445	22.60	744445-C3	28.10			
	1/8	4	.040	II	.043	.020	1-1/2		866145	22.60	866145-C3	28.10	866145-C8	30.70	
	1/8	4	.040	III	.042	.020	1-1/2		802845	24.30	802845-C3	29.80			
	4 mm	2	.25 mm	I	2.00 mm		50 mm		878445	31.90	878445-C3	37.80			
	4 mm	3	1.00 mm	II	1.50 mm	.500 mm	50 mm		863845	31.90	863845-C3	37.80			
	3/16	2	.010	I	.094		2		72445	29.30	72445-C3	35.30	72445-C8	37.30	
	3/16	2	.010	I	.094		4	LONG!	986945	42.70	986945-C3	50.90			
	3/16	3	.040	II	.074	.020	2		978145	34.80	978145-C3	40.70	978145-C8	42.80	
	3/16	3	.040	II	.074	.020	3	LONG!	790945	34.80	790945-C3	40.70			
	3/16	4	.010	I	.089		2		743745	36.30	743745-C3	44.00			
	3/16	4	.040	II	.074	.020	2		848745	36.30	848745-C3	42.30			
	3/16	4	.040	III	.073	.020	2		809745	38.00	809745-C3	44.00			
	6 mm	2	.25 mm	I	3.00 mm		63 mm		840045	44.30	840045-C3	52.40	840045-C8	54.60	
	6 mm	3	1.50 mm	II	2.25 mm	.750 mm	63 mm		837745	44.30	837745-C3	52.40			
	6 mm	4	1.50 mm	II	2.25 mm	.750 mm	63 mm		777645	46.30	777645-C3	54.40			
	6 mm	4	1.50 mm	III	2.25 mm	.750 mm	63 mm		764545	49.90	764545-C3	58.00			
	1/4	2	.010	I	.125		2-1/2		47645	40.10	47645-C3	48.20	47645-C8	49.40	
	1/4	2	.010	I	.125		4	LONG!	790345	51.80	790345-C3	61.30			
	1/4	3	.060	II	.095	.030	2-1/2		18545	37.60	18545-C3	45.60	18545-C8	47.20	
	1/4	3	.060	II	.095	.030	4	LONG!	48545	53.10	48545-C3	58.30			
	1/4	4	.010	I	.120		2-1/2		743145	47.30	743145-C3	55.40			
	1/4	4	.060	II	.095	.030	2-1/2		876445	47.30	876445-C3	55.40	876445-C8	56.70	
	1/4	4	.060	II	.095	.030	4	LONG!	771545	61.80	771545-C3	71.40			
	1/4	4	.040	III	.105	.020	2-1/2		833145	51.60	833145-C3	59.70	833145-C8	60.70	
	1/4	4	.060	III	.095	.030	2-1/2		794145	51.60	794145-C3	59.70			
	5/16	2	.010	I	.156		2-1/2		880345	47.30	880345-C3	56.80			
	5/16	3	.060	II	.126	.030	2-1/2		977045	47.30	977045-C3	56.80			
	5/16	4	.060	II	.126	.030	2-1/2		873245	50.40	873245-C3	59.80			
	5/16	4	.060	III	.126	.030	2-1/2		777545	54.30	777545-C3	63.80			
	8 mm	3	1.50 mm	II	3.25 mm	.750 mm	63 mm		868845	58.70	868845-C3	68.60			
	3/8	2	.010	I	.188		2-1/2		72545	56.10	72545-C3	66.70	72545-C8	74.10	
	3/8	2	.010	I	.188		4	LONG!	791745	81.70	791745-C3	96.50			
	3/8	3	.060	II	.158	.030	2-1/2		18445	50.20	18445-C3	60.80	18445-C8	69.20	
	3/8	3	.060	II	.158	.030	4	LONG!	981245	80.20	981245-C3	95.00	981245-C8	96.00	NEW
	3/8	4	.010	I	.183		2-1/2		742745	58.80	742745-C3	69.40			
	3/8	4	.060	II	.158	.030	2-1/2		895145	58.80	895145-C3	69.40			
	3/8	4	.040	III	.167	.020	2-1/2		764245	63.30	764245-C3	73.90			
	3/8	4	.060	III	.158	.030	2-1/2		827845	62.80	827845-C3	73.40			

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CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
45°	10 mm	4	1.50 mm	II	4.25 mm	.750 mm	75 mm		871045	91.90	871045-C3	107.90		
	12 mm	4	1.50 mm	II	5.25 mm	.750 mm	75 mm		881245	91.90	881245-C3	107.90		
	1/2	2	.010	I	.250		3		960445	85.70	960445-C3	101.70	960445-C8	106.10
	1/2	3	.080	II	.210	.040	3		871845	84.40	871845-C3	100.30		
	1/2	4	.010	I	.245		3		742245	71.70	742245-C3	87.70		
	1/2	4	.080	II	.210	.040	3		18345	70.30	18345-C3	86.10	18345-C8	92.10
	1/2	4	.080	II	.210	.040	6	LONG!	982445	134.40	982445-C3	150.60		
	1/2	4	.080	III	.210	.040	3		820245	79.20	820245-C3	95.30		
	1/2	6	.080	II	.210	.040	3		839245	79.30	839245-C3	95.30		
	5/8	4	.080	II	.273	.040	3-1/2		763645	128.60	763645-C3	145.60		
	5/8	4	.080	III	.273	.040	3-1/2		765445	130.10	765445-C3	147.10		
	5/8	6	.080	II	.273	.040	3-1/2		952845	132.20	952845-C3	148.20		
	3/4	4	.100	II	.325	.050	4		764045	195.00	764045-C3	213.70		
	3/4	4	.100	III	.325	.050	4		765145	194.60	765145-C3	213.30		
	3/4	6	.100	II	.325	.050	4		949345	198.10	949345-C3	217.80		
	1	6	.120	II	.440	.060	4		884745	351.80	884745-C3	378.00		
50°	1/8	2	.010	I	.052		1-1/2		18750	22.40	18750-C3	27.90	18750-C8	30.50
	1/8	3	.040	II	.036	.017	1-1/2		968650	22.60	968650-C3	28.10		
	3/16	2	.010	I	.079		2		72450	29.00	72450-C3	35.00		
	3/16	3	.040	II	.062	.017	2		978150	36.00	978150-C3	42.00		
	1/4	2	.010	I	.105		2-1/2		47650	42.00	47650-C3	50.10		
	1/4	3	.060	II	.080	.025	2-1/2		18550	41.60	18550-C3	49.70		
	1/4	4	.060	II	.080	.025	2-1/2		876450	45.20	876450-C3	53.30		
	1/4	4	.040	III	.088	.017	2-1/2		833150	51.60	833150-C3	59.70		
	3/8	2	.010	I	.157		2-1/2		72550	56.10	72550-C3	66.70	72550-C8	74.10
	3/8	3	.060	II	.132	.025	2-1/2		18450	56.10	18450-C3	66.70		
	3/8	4	.060	II	.132	.025	2-1/2		895150	59.50	895150-C3	70.10		
	1/2	2	.010	I	.210		3		960450	89.10	960450-C3	105.20		
	1/2	4	.080	II	.176	.034	3		18350	78.50	18350-C3	94.60		
NEW	1/2	4	.080	III	.176	.034	3		820250	79.20	820250-C3	93.60		
NEW	5/8	6	.080	II	.229	.034	3-1/2		952850	132.20	952850-C3	150.10		
55°	1/8	2	.010	I	.044		1-1/2		18755	25.00	18755-C3	30.50		
	3/16	2	.010	I	.066		2		72455	30.90	72455-C3	36.90		
	1/4	2	.010	I	.088		2-1/2		47655	58.70	47655-C3	66.90		
	1/4	3	.060	II	.067	.021	2-1/2		18555	45.90	18555-C3	54.10		
	3/8	3	.060	II	.110	.021	2-1/2		18455	59.60	18455-C3	70.20		
	1/2	4	.080	II	.147	.028	3		18355	86.20	18355-C3	102.30		

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NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

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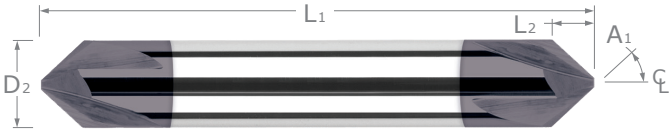
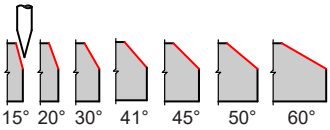
ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
60°	3 mm	2	.120 mm	I	.87 mm		38 mm		900260	22.20	900260-C3	27.70		
	1/8	2	.010	I	.036		1-1/2		18760	20.00	18760-C3	25.50	18760-C8	28.00
	1/8	2	.010	I	.036		3	LONG!	50660	26.60	50660-C3	32.10		
	1/8	3	.040	II	.025	.012	1-1/2		968660	21.50	968660-C3	27.00		
	3/16	2	.010	I	.054		2		72460	28.00	72460-C3	34.00		
	3/16	3	.040	II	.043	.012	2		978160	34.80	978160-C3	40.70		
	1/4	2	.010	I	.072		2-1/2		47660	40.10	47660-C3	48.20		
	1/4	3	.060	II	.055	.017	2-1/2		18560	37.40	18560-C3	45.40		
	1/4	3	.060	II	.055	.017	4	LONG!	48560	53.10	48560-C3	58.30		
	1/4	4	.060	II	.055	.017	2-1/2		876460	42.20	876460-C3	50.20		
	1/4	4	.040	III	.060	.012	2-1/2		833160	44.00	833160-C3	52.10		
	5/16	3	.060	II	.073	.017	2-1/2		977060	47.30	977060-C3	56.80		
	3/8	2	.010	I	.108		2-1/2		72560	53.90	72560-C3	64.50		
	3/8	3	.060	II	.091	.017	2-1/2		18460	50.20	18460-C3	60.80	18460-C8	64.80
	3/8	4	.060	II	.091	.017	2-1/2		895160	55.40	895160-C3	66.00		
	3/8	4	.060	III	.091	.017	2-1/2		827860	61.90	827860-C3	72.50		
	1/2	2	.010	I	.144		3		960460	85.70	960460-C3	101.70		
	1/2	4	.080	II	.121	.023	3		18360	70.30	18360-C3	86.10		
	1/2	4	.080	III	.121	.023	3		820260	76.10	820260-C3	92.10		
	5/8	6	.080	II	.157	.023	3-1/2		952860	132.20	952860-C3	148.20		
	3/4	6	.100	II	.188	.029	4		949360	198.10	949360-C3	217.80		
65°	1/8	2	.010	I	.029		1-1/2		18765	23.50	18765-C3	29.00		
	3/16	2	.010	I	.044		2		72465	30.90	72465-C3	36.90		
	1/4	2	.010	I	.058		2-1/2		47665	56.50	47665-C3	64.70		
	1/4	3	.060	II	.044	.014	2-1/2		18565	44.30	18565-C3	52.50		
	3/8	3	.060	II	.073	.014	2-1/2		18465	59.60	18465-C3	70.20		
	1/2	4	.080	II	.098	.019	3		18365	83.90	18365-C3	100.10		
70°	1/8	2	.010	I	.023		1-1/2		18770	22.40	18770-C3	27.90		
	3/16	2	.010	I	.034		2		72470	29.00	72470-C3	35.00		
	1/4	2	.010	I	.045		2-1/2		47670	53.00	47670-C3	61.10		
	1/4	3	.060	II	.035	.011	2-1/2		18570	41.60	18570-C3	49.70		
	3/8	3	.060	II	.057	.011	2-1/2		18470	60.50	18470-C3	71.10		
	1/2	4	.080	II	.076	.015	3		18370	78.50	18370-C3	94.60		
75°	1/8	2	.010	I	.017		1-1/2		18775	25.00	18775-C3	30.50	18775-C8	33.20
	1/8	3	.040	II	.011	.005	1-1/2		968675	25.00	968675-C3	30.50		
	3/16	2	.010	I	.025		2		72475	32.40	72475-C3	38.40		
	3/16	3	.040	II	.020	.005	2		978175	38.30	978175-C3	43.60		
	1/4	2	.010	I	.033		2-1/2		47675	45.90	47675-C3	54.10		
	1/4	3	.060	II	.025	.008	2-1/2		18575	46.70	18575-C3	54.80		
	1/4	4	.060	II	.025	.008	2-1/2		876475	50.30	876475-C3	58.50		
	3/8	2	.010	I	.050		2-1/2		72575	62.80	72575-C3	73.40		
	3/8	3	.060	II	.042	.008	2-1/2		18475	62.80	18475-C3	73.40		
	3/8	4	.060	III	.042	.008	2-1/2		827875	74.10	827875-C3	84.70		
	1/2	2	.010	I	.067		3		960475	99.60	960475-C3	115.80		
	1/2	4	.080	II	.056	.011	3		18375	88.00	18375-C3	104.10		
80°	1/8	2	.010	I	.011		1-1/2		18780	24.60	18780-C3	30.10		
	1/4	3	.060	II	.017	.005	2-1/2		18580	33.00	18580-C3	41.10		
	1/2	4	.080	II	.037	.007	3		18380	102.60	18380-C3	118.60		

CHAMFER CUTTERS

Pointed & Flat End – Double-Ended





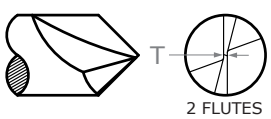
Stocked in Seven Angles Per Side!

- Double-ended
- Choose from three types:
  - Pointed (Type I): 2 flute style for deburring and chamfering in narrow grooves, slots, and small holes
  - Flat End (Type II): (non-cutting) multi-flute design improves tool life and finish for profiling and chamfering larger features
  - End Cutting (Type III): 4 flute center cutting geometry to blend the floor and a chamfered wall in a single pass
- Solid carbide • CNC ground in the USA

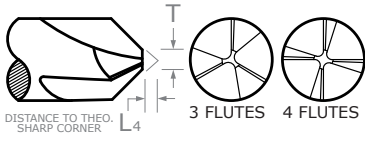
ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1	TOOL #	PRICE	TOOL #	PRICE
15°	1/8	2	.010	I	.233		1-1/2	988415	40.90	988415-C3	47.70
	1/4	2	.010	I	.467		2-1/2	977615	60.10	977615-C3	70.80
	1/4	3	.060	II	.355	.112	2-1/2	891015	66.80	891015-C3	77.50
	3/8	2	.010	I	.700		3	998315	87.10	998315-C3	100.40
	3/8	3	.060	II	.588	.112	2-1/2	934015	100.60	934015-C3	116.60
	1/2	4	.080	II	.784	.149	3	18615	121.30	18615-C3	143.20
20°	1/8	2	.010	I	.172		1-1/2	988420	40.90	988420-C3	47.70
	1/4	2	.010	I	.343		2-1/2	977620	60.10	977620-C3	70.80
	1/4	3	.060	II	.261	.082	2-1/2	891020	66.80	891020-C3	77.50
	3/8	2	.010	I	.515		2-1/2	998320	87.10	998320-C3	103.10
	3/8	3	.060	II	.433	.082	2-1/2	934020	100.60	934020-C3	116.60
	1/2	4	.080	II	.577	.110	3	18620	121.30	18620-C3	143.20
30°	1/8	2	.010	I	.108		1-1/2	988430	34.80	988430-C3	41.60
	3/16	2	.010	I	.162		2	902330	34.80	902330-C3	42.80
	3/16	3	.040	II	.128	.035	2	897130	46.60	897130-C3	54.60
	1/4	2	.010	I	.217		2-1/2	977630	53.60	977630-C3	64.40
	1/4	3	.060	II	.165	.052	2-1/2	891030	62.40	891030-C3	73.00
	3/8	2	.010	I	.325		2-1/2	998330	80.80	998330-C3	91.70
	3/8	3	.060	II	.273	.052	2-1/2	934030	87.60	934030-C3	99.00
	1/2	2	.010	I	.433		3	905830	109.20	905830-C3	124.30
	1/2	4	.080	II	.364	.069	3	18630	110.20	18630-C3	126.20

continued on next page

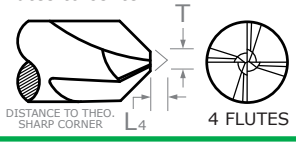
TYPE I - POINTED
Flat relief ground to center, yielding a web thickness at tip (T)



TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



TYPE III - END CUTTING
Flat relief ground to an end cutting tip diameter (T), two flutes to center



CHAMFER CUTTERS

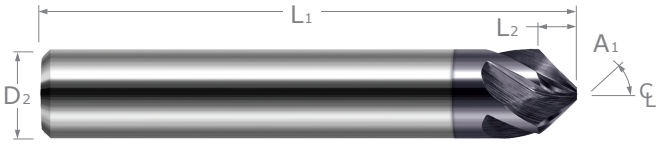
Pointed & Flat End – Double-Ended (cont.)

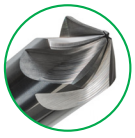
continued from previous page

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1	TOOL #	PRICE	TOOL #	PRICE
41°	1/4	4	.060	II	.109	.035	2-1/2	842441	67.30	842441-C3	74.20
	3/8	4	.060	II	.181	.035	2-1/2	833641	94.20	833641-C3	104.80
	1/2	4	.080	II	.242	.046	3	18641	111.30	18641-C3	125.70
45°	1/8	2	.010	I	.063		1-1/2	988445	34.80	988445-C3	41.60
	1/8	3	.040	II	.043	.020	1-1/2	873945	44.60	873945-C3	51.30
	1/8	4	.040	II	.043	.020	1-1/2	808245	46.70	808245-C3	53.40
	1/8	4	.040	III	.043	.020	1-1/2	794245	49.90	794245-C3	56.70
	3/16	2	.010	I	.094		2	902345	34.80	902345-C3	42.80
	3/16	3	.040	II	.074	.020	2	897145	44.60	897145-C3	52.60
	3/16	4	.040	II	.074	.020	2	808145	47.10	808145-C3	52.80
	3/16	4	.040	III	.073	.020	2	754545	50.00	754545-C3	55.80
	1/4	2	.010	I	.125		2-1/2	977645	53.60	977645-C3	64.40
	1/4	3	.060	II	.095	.030	2-1/2	891045	62.40	891045-C3	73.00
	1/4	4	.060	II	.095	.030	2-1/2	842445	67.30	842445-C3	78.00
	1/4	4	.040	III	.105	.020	2-1/2	790045	68.80	790045-C3	79.50
	5/16	3	.060	II	.126	.030	2-1/2	966645	68.80	966645-C3	78.50
	3/8	2	.010	I	.188		2-1/2	998345	80.80	998345-C3	91.70
	3/8	3	.060	II	.158	.030	2-1/2	934045	87.60	934045-C3	99.00
	3/8	4	.060	II	.158	.030	2-1/2	833645	94.20	833645-C3	110.10
	3/8	4	.040	III	.167	.030	2-1/2	752845	97.50	752845-C3	113.50
	1/2	2	.010	I	.250		3	905845	109.20	905845-C3	124.30
	1/2	4	.080	II	.210	.040	3	18645	110.20	18645-C3	126.20
	1/2	4	.080	III	.210	.040	3	788045	116.50	788045-C3	131.20
	5/8	4	.080	II	.273	.040	3-1/2	976445	159.50	976445-C3	183.10
	3/4	4	.100	II	.325	.050	4	984645	202.70	984645-C3	229.90
50°	1/8	2	.010	I	.052		1-1/2	988450	34.80	988450-C3	41.60
	1/4	2	.010	I	.105		2-1/2	977650	54.70	977650-C3	65.40
	1/4	3	.060	II	.080	.025	2-1/2	891050	65.30	891050-C3	76.00
	3/8	2	.010	I	.157		2-1/2	998350	82.30	998350-C3	93.20
	3/8	3	.060	II	.132	.025	2-1/2	934050	91.40	934050-C3	102.00
	1/2	2	.010	I	.210		3	905850	109.20	905850-C3	124.30
	1/2	4	.080	II	.173	.034	3	18650	115.20	18650-C3	129.90
60°	1/8	2	.010	I	.036		1-1/2	988460	34.80	988460-C3	41.60
	3/16	2	.010	I	.054		2	902360	34.80	902360-C3	42.80
	1/4	2	.010	I	.072		2-1/2	977660	53.60	977660-C3	64.40
	1/4	3	.060	II	.055	.017	2-1/2	891060	62.40	891060-C3	73.00
	3/8	2	.010	I	.108		2-1/2	998360	80.80	998360-C3	91.70
	3/8	3	.060	II	.091	.017	2-1/2	934060	87.60	934060-C3	99.00
	1/2	2	.010	I	.144		3	905860	109.20	905860-C3	124.30
	1/2	4	.080	II	.121	.023	3	18660	110.20	18660-C3	126.20

CHAMFER CUTTERS

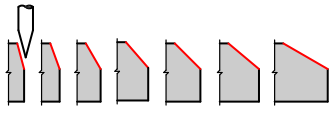
Pointed & Flat End – Helical Flutes





Free Cutting Action for Excellent Surface Finish

- **Specialized helical flute design for superior performance**
- Free cutting action provides excellent surface finish and chip evacuation
- Choose from three types:
  - Pointed (Type I): Used for deburring and chamfering in narrow grooves, slots and small holes
  - Flat End (Type II): (non-cutting) Improves tool life for profiling and chamfering larger features
  - End Cutting (Type III): Center cutting geometry to blend the floor and a chamfered wall in a single pass
- h6 shank tolerance for high precision tool holders • Solid carbide • CNC ground in the USA



Stocked in Seven Angles Per Side!

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT	OAL			UNCOATED		AlTiN COATED	
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE
15°	1/8	3	.040	II	.159	.078	1-1/2		831308	25.70	831308-C3	31.20
	1/4	3	.060	II	.355	.116	2-1/2		831316	43.80	831316-C3	51.20
	1/4	5	.060	II	.355	.116	2-1/2	LONG!	832516	46.30	832516-C3	53.60
	3/8	3	.070	II	.569	.134	2-1/2		831324	59.80	831324-C3	68.50
	3/8	5	.070	II	.569	.134	2-1/2		832524	61.00	832524-C3	70.70
	1/2	3	.080	II	.784	.153	3		831332	83.80	831332-C3	95.60
	1/2	5	.080	II	.784	.153	3		832532	84.70	832532-C3	98.20
20°	1/8	3	.040	II	.117	.085	1-1/2		844608	25.70	844608-C3	31.20
	1/4	3	.060	II	.261	.085	2-1/2		844616	43.80	844616-C3	51.20
	1/4	5	.060	II	.261	.085	2-1/2		851416	47.20	851416-C3	53.60
	3/8	3	.070	II	.419	.099	2-1/2		844624	58.60	844624-C3	68.50
	3/8	5	.070	II	.419	.099	2-1/2		851424	62.20	851424-C3	70.70
NEW	3/8	5	.070	III	.153	.099	2-1/2		713924	64.20	713924-C3	74.80
	1/2	3	.080	II	.577	.113	3		844632	82.20	844632-C3	95.60
	1/2	5	.080	II	.577	.113	3		851432	84.70	851432-C3	98.20

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

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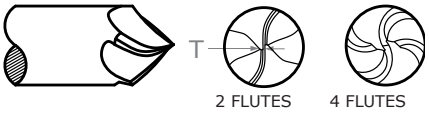
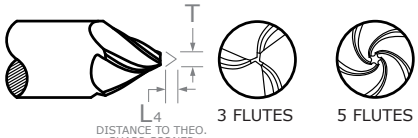
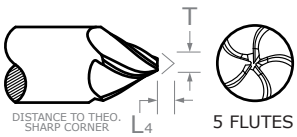
TYPE I - POINTED Flat relief ground to center, yielding a web thickness at tip (T)



TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



TYPE III - END CUTTING
Flat relief ground to an end cutting tip diameter (T), one flute to center



NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End – Helical Flutes (cont.)

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ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OAL		UNCOATED		AlTiN COATED		
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE	
30°	1/8	2	.010	I	.100		1-1/2		900108	25.70	900108-C3	31.00	
	1/8	3	.040	II	.074	.036	1-1/2		916508	26.20	916508-C3	31.50	
	1/8	4	.010	I	.100		1-1/2		889708	28.30	889708-C3	33.80	
	1/8	5	.040	II	.074	.036	1-1/2		899008	28.30	899008-C3	33.40	
	3/16	2	.010	I	.154		2		900112	35.50	900112-C3	40.10	
	3/16	3	.050	II	.119	.045	2		916512	35.50	916512-C3	40.10	
	3/16	4	.010	I	.154		2		889712	37.10	889712-C3	42.60	
	3/16	5	.050	II	.119	.045	2		899012	37.80	899012-C3	42.60	
	1/4	2	.010	I	.208		2-1/2		900116	43.80	900116-C3	51.20	
	1/4	3	.060	II	.164	.054	2-1/2		916516	40.60	916516-C3	47.50	
	1/4	4	.010	I	.208		2-1/2		889716	46.30	889716-C3	53.60	
	1/4	5	.060	II	.164	.054	2-1/2		899016	44.40	899016-C3	49.80	
	1/4	5	.060	III	.165	.054	2-1/2		714016	46.40	714016-C3	51.90	NEW
	3/8	2	.010	I	.316		2-1/2		900124	58.60	900124-C3	68.50	
	3/8	3	.070	II	.264	.062	2-1/2		916524	54.50	916524-C3	63.60	
	3/8	4	.010	I	.316		2-1/2		889724	58.60	889724-C3	68.50	
	3/8	5	.070	II	.264	.062	2-1/2		899024	54.50	899024-C3	63.60	
	1/2	2	.010	I	.424		3		900132	82.20	900132-C3	95.60	
	1/2	3	.080	II	.364	.071	3		916532	76.40	916532-C3	89.00	
	1/2	4	.010	I	.424		3		889732	82.20	889732-C3	95.60	
	1/2	5	.080	II	.364	.071	3		899032	76.40	899032-C3	89.00	
	5/8	3	.090	II	.463	.080	3		916540	78.70	916540-C3	91.40	
	5/8	5	.090	II	.463	.080	3		899040	137.90	899040-C3	147.70	
	3/4	3	.100	II	.562	.088	3		916548	195.40	916548-C3	210.70	
	3/4	4	.015	I	.637		3		889748	204.30	889748-C3	224.50	
	3/4	5	.100	II	.562	.088	3		899048	198.00	899048-C3	207.20	
41°	1/4	5	.060	II	.109	.036	2-1/2		738216	45.80	738216-C3	53.30	
	3/8	5	.070	II	.153	.041	2-1/2		738224	56.10	738224-C3	66.70	
	1/2	5	.080	II	.210	.047	3		738232	78.20	738232-C3	92.60	
45°	1/8	2	.010	I	.058		1-1/2		860508	25.70	860508-C3	28.60	
	1/8	3	.040	II	.043	.021	1-1/2		897208	25.70	897208-C3	31.00	
	1/8	4	.010	I	.058		1-1/2		859708	28.30	859708-C3	33.80	
	1/8	4	.010	I	.058		3	LONG!	765008	31.30	765008-C3	36.80	
	1/8	5	.040	II	.043	.021	1-1/2		908408	28.30	908408-C3	33.40	
	1/8	5	.040	II	.043	.021	3	LONG!	789008	31.30	789008-C3	36.80	
	1/8	5	.040	III	.043	.021	1-1/2		773608	28.30	773608-C3	33.80	
	3/16	2	.010	I	.089		2		860512	34.80	860512-C3	40.10	
	3/16	3	.050	II	.069	.026	2		897212	34.80	897212-C3	40.10	
	3/16	4	.010	I	.089		2		859712	37.10	859712-C3	42.60	
	3/16	5	.050	II	.069	.026	2		908412	37.10	908412-C3	42.60	
	3/16	5	.050	III	.069	.026	2		773612	37.10	773612-C3	42.90	
	1/4	2	.010	I	.120		2-1/2		860516	43.80	860516-C3	51.20	
	1/4	3	.060	II	.095	.031	2-1/2		897216	40.60	897216-C3	47.50	
	1/4	3	.060	II	.095	.031	4	LONG!	765316	53.40	765316-C3	62.90	
	1/4	4	.010	I	.120		2-1/2		859716	46.30	859716-C3	53.60	
	1/4	4	.010	I	.120		4	LONG!	765016	52.50	765016-C3	61.90	
	1/4	5	.060	II	.095	.031	2-1/2		908416	43.10	908416-C3	49.80	
	1/4	5	.060	II	.095	.031	4	LONG!	789016	52.50	789016-C3	61.90	
	1/4	5	.060	III	.095	.031	2-1/2		773616	44.60	773616-C3	52.60	

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

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CHAMFER CUTTERS

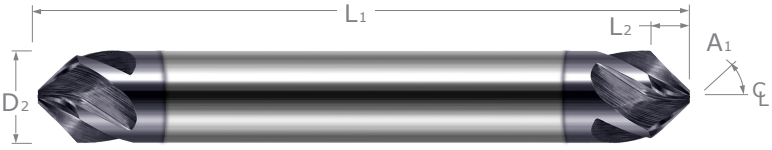
Pointed & Flat End – Helical Flutes (cont.)

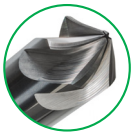
continued from previous page

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT	OAL			UNCOATED		AlTiN COATED	
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1		TOOL #	PRICE	TOOL #	PRICE
45°	5/16	3	.060	II	.126	.031	2-1/2		897220	53.30	897220-C3	62.80
	5/16	5	.060	II	.126	.031	2-1/2		908420	53.30	908420-C3	62.80
	3/8	2	.010	I	.183		2-1/2		860524	58.60	860524-C3	68.50
	3/8	3	.070	II	.153	.036	2-1/2		897224	54.50	897224-C3	63.60
	3/8	4	.010	I	.183		2-1/2		859724	58.60	859724-C3	68.50
	3/8	5	.070	II	.153	.036	2-1/2		908424	54.50	908424-C3	63.60
	3/8	5	.070	II	.153	.036	4	LONG!	789024	52.50	789024-C3	67.10
	3/8	5	.070	III	.153	.036	2-1/2		773624	55.00	773624-C3	65.60
	1/2	2	.010	I	.245		3		860532	82.20	860532-C3	95.60
	1/2	3	.080	II	.210	.041	3		897232	76.40	897232-C3	89.00
	1/2	4	.010	I	.245		3		859732	82.20	859732-C3	95.60
	1/2	5	.080	II	.210	.041	3		908432	76.40	908432-C3	89.00
	1/2	5	.080	III	.210	.041	3		773632	79.00	773632-C3	95.00
	5/8	3	.090	II	.268	.046	3		897240	135.40	897240-C3	145.20
	5/8	5	.090	II	.268	.046	3		908440	134.00	908440-C3	147.70
	3/4	3	.100	II	.325	.051	3		897248	189.80	897248-C3	210.70
	3/4	4	.015	I	.368		3		859748	204.30	859748-C3	220.20
	3/4	5	.100	II	.325	.051	3		908448	192.30	908448-C3	207.20
50°	1/4	3	.060	II	.080	.026	2-1/2		875016	43.80	875016-C3	51.20
	1/4	5	.060	II	.080	.026	2-1/2		871116	47.20	871116-C3	53.60
	3/8	3	.070	II	.128	.030	2-1/2		875024	58.60	875024-C3	68.50
	3/8	5	.070	II	.128	.030	2-1/2		871124	61.00	871124-C3	70.70
	1/2	3	.080	II	.176	.034	3		875032	82.20	875032-C3	95.60
	1/2	5	.080	II	.176	.034	3		871132	86.40	871132-C3	98.20
60°	1/8	2	.010	I	.033		1-1/2		872108	28.30	872108-C3	33.40
	1/8	4	.010	I	.033		1-1/2		888808	28.30	888808-C3	33.80
	1/8	5	.040	II	.025	.012	1-1/2		867608	28.30	867608-C3	33.80
	3/16	2	.010	I	.051		2		872112	35.50	872112-C3	41.00
	3/16	4	.010	I	.051		2		888812	35.50	888812-C3	40.10
	1/4	2	.010	I	.069		2-1/2		872116	43.80	872116-C3	52.30
	1/4	3	.060	II	.057	.018	2-1/2		863416	41.80	863416-C3	47.50
	1/4	4	.010	I	.069		2-1/2		888816	46.30	888816-C3	53.60
	1/4	5	.060	II	.057	.018	2-1/2		867616	44.40	867616-C3	49.80
	3/8	2	.010	I	.105		2-1/2		872124	59.80	872124-C3	69.80
	3/8	3	.070	II	.091	.021	2-1/2		863424	54.50	863424-C3	63.60
	3/8	4	.010	I	.105		2-1/2		888824	62.20	888824-C3	70.70
	3/8	5	.070	II	.091	.021	2-1/2		867624	58.40	867624-C3	65.90
	1/2	2	.010	I	.141		3		872132	82.20	872132-C3	97.50
	1/2	3	.080	II	.126	.024	3		863432	78.60	863432-C3	91.60
	1/2	4	.010	I	.141		3		888832	82.20	888832-C3	95.60
	1/2	5	.080	II	.126	.024	3		867632	81.00	867632-C3	91.40
	5/8	3	.090	II	.157	.027	3		863440	135.40	863440-C3	149.50
	5/8	5	.090	II	.157	.027	3		867640	137.90	867640-C3	147.70
	3/4	3	.100	II	.195	.029	3		863448	195.40	863448-C3	210.70
	3/4	4	.015	I	.212		3		888848	208.20	888848-C3	220.20
	3/4	5	.100	II	.195	.029	3		867648	198.00	867648-C3	213.20

CHAMFER CUTTERS

Pointed & Flat End – Helical Flutes – Double-Ended





Free Cutting Action
for Excellent
Surface Finish

- **Specialized helical flute design for superior performance**
- Double-ended
- Free cutting action provides excellent surface finish and chip evacuation
- Offered in Type I pointed and Type II flat end (non-cutting) styles
- 4 and 5 flute options
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

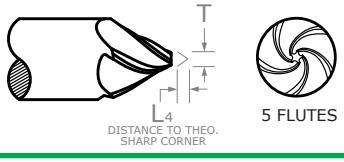
30° 45°
Stocked in Two Angles
Per Side!

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	1/4	5	.060	II	.165	.054	2-1/2	722116	61.20	722116-C3	68.70
	3/8	5	.070	II	.264	.062	2-1/2	722124	74.90	722124-C3	85.50
	1/2	5	.080	II	.364	.071	3	722132	105.20	722132-C3	119.60
45°	1/8	4	.010	I	.058		1-1/2	785008	43.80	785008-C3	49.30
	1/8	5	.040	II	.043	.021	1-1/2	784908	41.30	784908-C3	46.80
	1/4	4	.010	I	.120		2-1/2	785016	64.60	785016-C3	75.40
	1/4	5	.060	II	.095	.031	2-1/2	784916	62.10	784916-C3	72.80
	3/8	4	.010	I	.183		2-1/2	785024	80.70	785024-C3	91.60
	3/8	5	.070	II	.153	.036	2-1/2	784924	74.90	784924-C3	86.80
	1/2	4	.010	I	.245		3	785032	113.20	785032-C3	128.00
	1/2	5	.080	II	.210	.041	3	784932	105.20	784932-C3	121.40

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

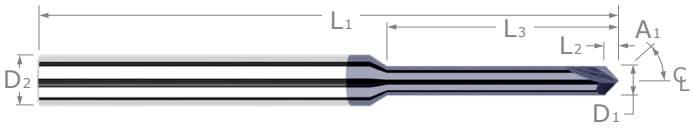
TYPE I - POINTED Flat relief ground to center, yielding a web thickness at tip (T)

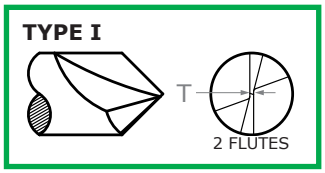
TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)

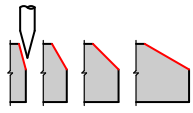


CHAMFER CUTTERS

Pointed – Long Reach







Stocked in Four Angles Per Side!

- **Reduced diameter for clearance along walls and in small features**
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- Available in multiple reaches and reduced diameters
- 2 flutes
- Solid carbide
- CNC ground in the USA

ANGLE PER SIDE	NECK DIAMETER	OVERALL REACH	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_3 $^{+.010"}_{-.000"}$	L_2	T (MAX.)	D_2	L_1	2 FL	PRICE	2 FL	PRICE
15°	.031 (1/32)	.156 (5x)	.058	.005	1/8	2-1/2	56815	30.90	56815-C3	36.40
	.031 (1/32)	.250 (8x)	.058	.005	1/8	2-1/2	57215	33.60	57215-C3	39.10
	.062 (1/16)	.312 (5x)	.116	.006	1/8	2-1/2	54715	30.90	54715-C3	36.40
	.062 (1/16)	.500 (8x)	.116	.006	1/8	2-1/2	55615	33.60	55615-C3	39.10
	.093 (3/32)	.500 (5x)	.174	.006	1/8	2-1/2	52115	31.20	52115-C3	36.70
	.093 (3/32)	.750 (8x)	.174	.006	1/8	2-1/2	53515	33.90	53515-C3	39.40
30°	.031 (1/32)	.093 (3x)	.027	.005	1/8	1-1/2	994830	29.00	994830-C3	34.50
	.031 (1/32)	.156 (5x)	.027	.005	1/8	2-1/2	56830	31.20	56830-C3	36.70
	.031 (1/32)	.250 (8x)	.027	.005	1/8	2-1/2	57230	33.60	57230-C3	39.10
	.047 (3/64)	.140 (3x)	.041	.005	1/8	1-1/2	911030	29.20	911030-C3	34.70
	.047 (3/64)	.250 (5x)	.041	.005	1/8	2-1/2	996830	30.60	996830-C3	36.10
	.047 (3/64)	.375 (8x)	.041	.005	1/8	2-1/2	999230	30.90	999230-C3	36.40
	.062 (1/16)	.187 (3x)	.054	.006	1/8	1-1/2	998930	29.00	998930-C3	34.50
	.062 (1/16)	.312 (5x)	.054	.006	1/8	2-1/2	54730	30.90	54730-C3	36.40
	.062 (1/16)	.500 (8x)	.054	.006	1/8	2-1/2	55630	33.60	55630-C3	39.10
	.078 (5/64)	.406 (5x)	.068	.006	1/8	2-1/2	996930	30.60	996930-C3	36.10
	.093 (3/32)	.279 (3x)	.081	.006	1/8	1-1/2	995330	29.20	995330-C3	34.70
	.093 (3/32)	.500 (5x)	.081	.006	1/8	2-1/2	52130	30.90	52130-C3	36.40
	.093 (3/32)	.750 (8x)	.081	.006	1/8	2-1/2	53530	33.90	53530-C3	39.40
45°	.015 (1/64)	.078 (5x)	.008	.003	1/8	2-1/2	997545	35.30	997545-C3	40.80
	.015 (1/64)	.125 (8x)	.008	.003	1/8	2-1/2	995945	39.30	995945-C3	44.80
	.020	.060 (3x)	.010	.003	1/8	1-1/2	794045	34.60	794045-C3	40.10
	.020	.100 (5x)	.010	.003	1/8	2-1/2	940245	34.60	940245-C3	40.10
	.020	.160 (8x)	.010	.003	1/8	2-1/2	948545	38.70	948545-C3	44.20
	.020	.200 (10x)	.010	.003	1/8	2-1/2	765545	40.60	765545-C3	46.10
	.025	.125 (5x)	.013	.003	1/8	2-1/2	821945	34.60	821945-C3	40.10
	.031 (1/32)	.093 (3x)	.016	.005	1/8	1-1/2	994845	29.40	994845-C3	34.90
	.031 (1/32)	.125 (4x)	.016	.005	1/8	2-1/2	862745	31.20	862745-C3	36.70
	.031 (1/32)	.156 (5x)	.016	.005	1/8	2-1/2	56845	30.90	56845-C3	36.40
	.031 (1/32)	.187 (6x)	.016	.005	1/8	2-1/2	870845	32.50	870845-C3	38.00
	.031 (1/32)	.218 (7x)	.016	.005	1/8	2-1/2	855445	32.50	855445-C3	38.00
	.031 (1/32)	.250 (8x)	.016	.005	1/8	2-1/2	57245	33.60	57245-C3	39.10
	.031 (1/32)	.312 (10x)	.016	.005	1/8	2-1/2	838445	35.40	838445-C3	40.90
	.031 (1/32)	.375 (12x)	.016	.005	1/8	2-1/2	998245	37.40	998245-C3	42.90
	.031 (1/32)	.470 (15x)	.016	.005	1/8	2-1/2	918245	40.30	918245-C3	45.80
	.039	.203 (5x)	.020	.005	1/8	2-1/2	788445	31.10	788445-C3	36.60
	.039	.325 (8x)	.020	.005	1/8	2-1/2	725245	33.60	725245-C3	39.10

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CHAMFER CUTTERS

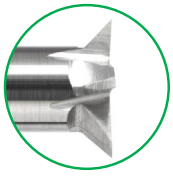
Pointed Long Reach (cont.)

continued from previous page

ANGLE PER SIDE	NECK DIAMETER	OVERALL REACH	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_3 $^{+.010"}_{-.000"}$	L_2	T (MAX.)	D_2	L_1	2 FL	PRICE	2 FL	PRICE
45°	.040	.203 (5x)	.020	.005	1/8	2-1/2	830645	31.10	830645-C3	36.60
	.047 (3/64)	.141 (3x)	.024	.005	1/8	1-1/2	911045	28.70	911045-C3	34.20
	.047 (3/64)	.187 (4x)	.024	.005	1/8	2-1/2	788745	29.80	788745-C3	35.30
	.047 (3/64)	.250 (5x)	.024	.005	1/8	2-1/2	996845	31.10	996845-C3	36.60
	.047 (3/64)	.281 (6x)	.024	.005	1/8	2-1/2	772545	32.60	772545-C3	38.10
	.047 (3/64)	.375 (8x)	.024	.005	1/8	2-1/2	999245	33.60	999245-C3	39.10
	.047 (3/64)	.570 (12x)	.024	.005	1/8	2-1/2	919045	36.60	919045-C3	42.10
	.047 (3/64)	.710 (15x)	.024	.005	1/8	2-1/2	725345	40.30	725345-C3	45.80
	.050	.250 (5x)	.025	.005	1/8	2-1/2	788645	30.90	788645-C3	36.40
	.060	.312 (5x)	.030	.006	1/8	2-1/2	788545	31.20	788545-C3	36.70
	.062 (1/16)	.187 (3x)	.031	.006	1/8	1-1/2	998945	29.40	998945-C3	34.90
	.062 (1/16)	.250 (4x)	.031	.006	1/8	2-1/2	853945	30.90	853945-C3	36.40
	.062 (1/16)	.312 (5x)	.031	.006	1/8	2-1/2	54745	30.90	54745-C3	36.40
	.062 (1/16)	.375 (6x)	.031	.006	1/8	2-1/2	846045	32.20	846045-C3	37.70
	.062 (1/16)	.437 (7x)	.031	.006	1/8	2-1/2	869745	32.20	869745-C3	37.70
	.062 (1/16)	.500 (8x)	.031	.006	1/8	2-1/2	55645	33.60	55645-C3	39.10
	.062 (1/16)	.625 (10x)	.031	.006	1/8	2-1/2	844145	35.40	844145-C3	40.90
	.062 (1/16)	.750 (12x)	.031	.006	1/8	2-1/2	997245	37.40	997245-C3	42.90
	.062 (1/16)	.950 (15x)	.031	.006	1/8	2-1/2	913345	40.30	913345-C3	45.80
	.078 (5/64)	.234 (3x)	.039	.006	1/8	1-1/2	906645	28.70	906645-C3	34.20
	.078 (5/64)	.312 (4x)	.039	.006	1/8	2-1/2	787045	29.80	787045-C3	35.30
	.078 (5/64)	.406 (5x)	.039	.006	1/8	2-1/2	996945	31.10	996945-C3	36.60
	.078 (5/64)	.625 (8x)	.039	.006	1/8	2-1/2	999545	33.60	999545-C3	39.10
	.078 (5/64)	.800 (10x)	.039	.006	1/8	2-1/2	764145	36.30	764145-C3	41.80
	.078 (5/64)	.940 (12x)	.039	.006	1/8	2-1/2	924045	36.60	924045-C3	42.10
	.093 (3/32)	.279 (3x)	.047	.006	1/8	1-1/2	995345	29.40	995345-C3	34.90
	.093 (3/32)	.375 (4x)	.047	.006	1/8	2-1/2	874345	30.90	874345-C3	36.40
	.093 (3/32)	.500 (5x)	.047	.006	1/8	2-1/2	52145	30.90	52145-C3	36.40
	.093 (3/32)	.585 (6x)	.047	.006	1/8	2-1/2	849445	32.50	849445-C3	38.00
	.093 (3/32)	.670 (7x)	.047	.006	1/8	2-1/2	843045	32.50	843045-C3	38.00
	.093 (3/32)	.750 (8x)	.047	.006	1/8	2-1/2	53545	33.60	53545-C3	39.10
	.093 (3/32)	.950 (10x)	.047	.006	1/8	2-1/2	825645	35.40	825645-C3	40.90
	.093 (3/32)	1.125 (12x)	.047	.006	1/8	2-1/2	999645	37.40	999645-C3	42.90
	.093 (3/32)	1.400 (15x)	.047	.006	1/8	2-1/2	902845	40.30	902845-C3	45.80
	.118	.591 (5x)	.059	.006	1/8	2-1/2	788345	31.20	788345-C3	36.70
	.118	.950 (8x)	.059	.006	1/8	2-1/2	725145	33.90	725145-C3	39.40
60°	.031 (1/32)	.156 (5x)	.009	.005	1/8	2-1/2	56860	31.20	56860-C3	36.70
	.031 (1/32)	.250 (8x)	.009	.005	1/8	2-1/2	57260	33.60	57260-C3	39.10
	.062 (1/16)	.312 (5x)	.018	.006	1/8	2-1/2	54760	31.20	54760-C3	36.70
	.062 (1/16)	.500 (8x)	.018	.006	1/8	2-1/2	55660	33.90	55660-C3	39.40
	.093 (3/32)	.500 (5x)	.027	.006	1/8	2-1/2	52160	31.20	52160-C3	36.70
	.093 (3/32)	.750 (8x)	.027	.006	1/8	2-1/2	53560	33.60	53560-C3	39.10

CHAMFER CUTTERS

Back Chamfer Cutters



Left Hand Shear Flute & Right Hand Cut Evacuate Chips Away From Part

- Low profile design and greater radial projection ideal for generating chamfered features on the backside of small holes or slots
- Decrease costs by avoiding time-consuming changes to part set-ups
- Slightly undersized to fit in common hole sizes
- 90° included angle, cutting on angle only
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish • Solid carbide • CNC ground in the USA

HEAD DIAMETER	AXIAL LOC	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000"}_{-.001"}$	L_2	D_3	L_3 $^{+.010"}_{-.000"}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.055	.010	.033	**.093** (1.5x)	4	1/8	1-1/2	943355	73.00	943355-C3	78.50
.055	.010	.033	**.156** (3x)	4	1/8	1-1/2	938155	73.00	938155-C3	78.50
.055	.010	.033	**.250** (4.5x)	4	1/8	1-1/2	910355	72.40	910355-C3	77.90
.080	.014	.047	**.070** (0.8x)	4	1/8	1-1/2	906080	71.70	906080-C3	77.20
.080	.014	.047	**.140** (1.5x)	4	1/8	1-1/2	943380	71.70	943380-C3	77.20
.080	.014	.047	**.250** (4x)	4	1/8	1-1/2	938180	71.70	938180-C3	77.20
.080	.014	.047	**.375** (4.5x)	4	1/8	1-1/2	910380	71.00	910380-C3	76.50
.115	.020	.068	**.109** (0.8x)	4	1/8	1-1/2	906015	70.20	906015-C3	75.70
.115	.020	.068	**.218** (1.5x)	4	1/8	1-1/2	943410	70.20	943410-C3	75.70
.115	.020	.068	**.312** (2.5x)	4	1/8	1-1/2	772010	70.20	772010-C3	75.70
.115	.020	.068	**.375** (3x)	4	1/8	1-1/2	938210	70.20	938210-C3	75.70
.115	.020	.068	**.562** (5x)	4	1/8	2	910410	72.40	910410-C3	77.90
D_1 $^{+.000"}_{-.002"}$	L_2	D_3	L_3 $^{+.030"}_{-.000"}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125	.022	.075	**.218** (3x)	5	1/8	1-1/2	943415	71.40	943415-C3	76.90
.125	.022	.075	**.375** (5x)	5	1/8	1-1/2	938215	73.90	938215-C3	79.40
.135	.024	.081	**.125** (0.8x)	5	3/16	2	906119	81.50	906119-C3	87.50
.135	.024	.081	**.250** (1.5x)	5	3/16	2	943420	81.50	943420-C3	87.50
.135	.024	.081	**.406** (3x)	5	3/16	2	938220	81.50	938220-C3	87.50
.135	.024	.081	**.625** (5x)	5	3/16	2	910420	80.70	910420-C3	86.70
.165	.029	.101	**.156** (0.8x)	5	3/16	2	906130	81.50	906130-C3	87.50
.165	.029	.101	**.312** (2x)	5	3/16	2	943430	81.50	943430-C3	87.50
.165	.029	.101	**.500** (3x)	5	3/16	2	938230	81.50	938230-C3	87.50
.165	.029	.101	**.750** (4.5x)	5	3/16	2	910430	80.70	910430-C3	86.70
.187	.033	.115	**.375** (3x)	5	3/16	2	943435	82.70	943435-C3	88.80
.187	.033	.115	**.562** (5x)	5	3/16	2	938235	82.10	938235-C3	88.10
.210	.037	.130	**.187** (0.8x)	5	1/4	2-1/2	906140	92.40	906140-C3	100.50
.210	.037	.130	**.375** (1.5x)	5	1/4	2-1/2	943440	92.40	943440-C3	100.50
.210	.037	.130	**.500** (2x)	5	1/4	2-1/2	772140	92.40	772140-C3	100.50
.210	.037	.130	**.625** (3x)	5	1/4	2-1/2	938240	92.40	938240-C3	100.50
.210	.037	.130	**1.000** (5x)	5	1/4	2-1/2	910440	91.50	910440-C3	99.70
.250	.044	.156	**.250** (1x)	5	1/4	2-1/2	906116	92.40	906116-C3	100.50
.250	.044	.156	**.437** (2x)	5	1/4	2-1/2	943416	92.40	943416-C3	100.50
.250	.044	.156	**.625** (2.5x)	5	1/4	2-1/2	772116	92.40	772116-C3	100.50
.250	.044	.156	**.750** (3x)	5	1/4	2-1/2	938216	92.40	938216-C3	100.50
.250	.044	.156	**1.250** (5x)	5	1/4	3	910450	94.60	910450-C3	102.80

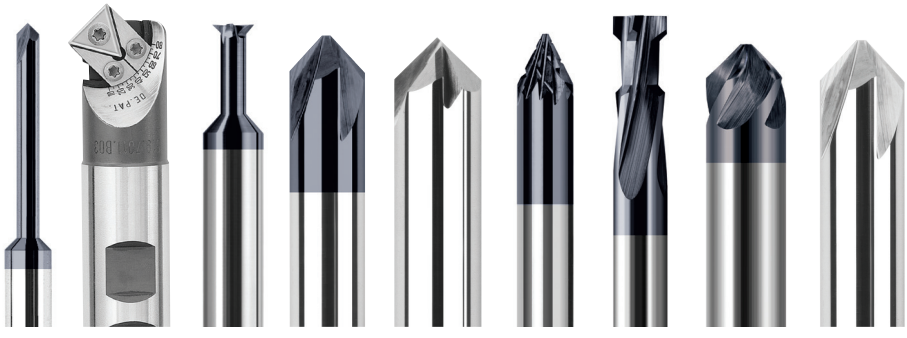
continued on next page

CHAMFER CUTTERS

Back Chamfer Cutters (cont.)

continued from previous page

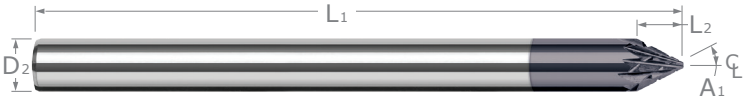
HEAD DIAMETER	AXIAL LOC	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000"}_{-.002"}$	L_2	D_3	L_3 $^{+.030"}_{-.000"}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.312	.055	.196	**.281** (0.8x)	6	5/16	2-1/2	906120	97.60	906120-C3	107.10
.312	.055	.196	**.562** (2x)	6	5/16	2-1/2	943460	97.60	943460-C3	107.10
.312	.055	.196	**1.000** (3x)	6	5/16	2-1/2	938260	97.60	938260-C3	107.10
.312	.055	.196	**1.500** (5x)	6	5/16	3	910460	100.10	910460-C3	109.70
.375	.066	.237	**.375** (1x)	6	3/8	2-1/2	906124	105.30	906124-C3	115.90
.375	.066	.237	**.750** (2x)	6	3/8	2-1/2	943470	105.30	943470-C3	115.90
.375	.066	.237	**1.125** (3x)	6	3/8	2-1/2	938270	105.30	938270-C3	115.90
.375	.066	.237	**1.870** (5x)	6	3/8	4	910470	110.80	910470-C3	119.80
.500	.088	.317	**.500** (1x)	6	1/2	3	906132	145.20	906132-C3	161.30
.500	.088	.317	**1.000** (2x)	6	1/2	3	943480	145.20	943480-C3	161.30
.500	.088	.317	**1.500** (3x)	6	1/2	3	938280	145.20	938280-C3	161.30
.500	.088	.317	**2.500** (5x)	6	1/2	4	910480	150.20	910480-C3	166.30



Check Out All of Our Chamfering Solutions!

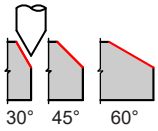
CHAMFER CUTTERS

Deburring Chamfer Cutters



End Mill Tolerances with Bur-Style Geometry!

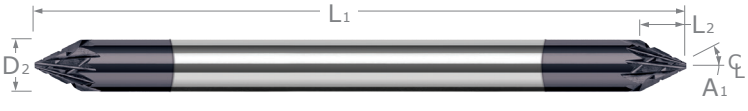
- Deburr in your CNC machine with these high precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Tight end mill tolerances allow use of standard programming and tool paths
- Cone shaped burs are effective in removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Solid carbide
- CNC ground in the USA

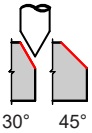


Stocked in Three Angles Per Side!

Single-Ended

ANGLE PER SIDE	LOC	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIA.	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A_1 $^{+0°30'}_{-0°30'}$	L_2				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
30°	.099	12	6	.012 (Max.)	1/8	2-1/2	58130	28.50	58130-C3	34.00		
	.207	12	6	.012 (Max.)	1/4	2-1/2	994030	40.50	994030-C3	48.70		
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	58145	28.50	58145-C3	34.00	58145-C4	42.70
	.088	12	6	.012 (Max.)	3/16	2-1/2	891145	35.70	891145-C3	41.70	891145-C4	54.90
	.120	12	6	.012 (Max.)	1/4	2-1/2	994045	40.50	994045-C3	48.70	994045-C4	62.40
	.181	14	7	.013 (Max.)	3/8	2-1/2	784445	57.40	784445-C3	68.00	784445-C4	84.30
	.235	16	6	.012 (Max.)	1/2	2-1/2	722030	72.70	722030-C3	87.10		
60°	.033	12	6	.012 (Max.)	1/8	2-1/2	58160	28.80	58160-C3	34.30		
	.069	12	3	.012 (Max.)	1/4	2-1/2	994060	40.90	994060-C3	55.30		





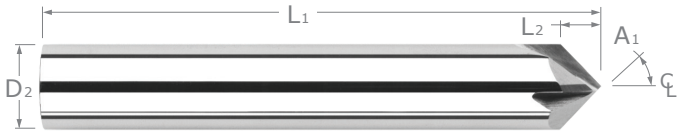
Stocked in Two Angles Per Side!

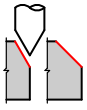
Double-Ended

ANGLE PER SIDE	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	L_2				D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	.099	12	6	.012 (Max.)	1/8	2-1/2	898330	42.90	898330-C3	49.70
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	898345	42.90	898345-C3	49.70
	.088	12	6	.012 (Max.)	3/16	2-1/2	879745	51.60	879745-C3	59.70
	.120	12	6	.012 (Max.)	1/4	2-1/2	867545	61.00	867545-C3	71.80
	.181	14	7	.013 (Max.)	3/8	2-1/2	788145	78.60	788145-C3	89.30

CHAMFER CUTTERS

Cobalt – Pointed

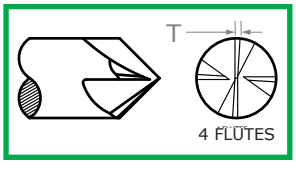




Stocked in Two Angles Per Side!

- 4 flutes (2 flutes to center)
- M-42 steel (8% cobalt)
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- CNC ground in the USA

ANGLE PER SIDE	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
A_1 $^{+0°30'}_{-0°30'}$	L_2	$T_{(MAX.)}$	D_2	L_1	4 FL	PRICE
30°	.217	.010	1/4	2	18116	44.60
	.325	.010	3/8	2-1/2	18124	54.70
	.433	.010	1/2	3	18132	69.30
45°	.125	.010	1/4	2	18016	44.60
	.188	.010	3/8	2-1/2	18024	53.60
	.250	.010	1/2	3	18032	69.30



CHAMFER CUTTERS

Adjustable Chamfer Cutters

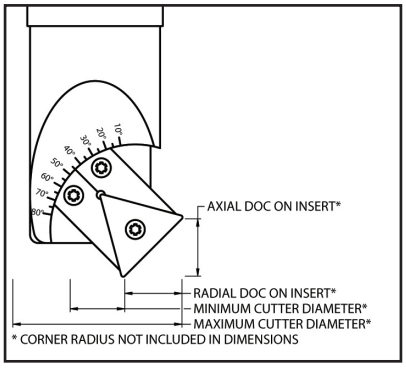
- **Mills any angle from 10° to 80°**
- Change chamfer angle with quick adjustment
- TPET-321 carbide insert (TiN coated) and wrench included
- TPET-321-AL carbide insert has polished face and upsharp relief for optimized performance in non-ferrous materials

SHANK DIAMETER	OVERALL LENGTH	TOOL #	PRICE
3/4	3-3/4	81250	397.10
1	3-3/4	81260	397.10

DESCRIPTION	TOOL #	PRICE	
TPET-321 Insert with TiN Coating	60031	14.80	(Box of 10)
TPET-321-AL Insert for Non-Ferrous Materials	60038	16.40	(Box of 10)
Clamp Plate (Replacement)	81245	23.10	(Each)
Screw (Replacement)	81247	8.50	(Each)
Seat Pocket (Replacement)	81249	84.40	(Each)

SPEEDS & FEEDS (Adjustable Chamfer Cutter)

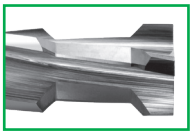
MATERIAL	SPEED (RPM)	FEED (Inches/Min)	DEPTH (Inches)
STEEL	600–2000	1″–4″	1/8″ MAX.
ALUMINUM	1000–6000 MAX.	3″–8″	1/8″ MAX.



Angle Setting on Tool	Minimum Diameter*	Maximum Diameter*	Radial DOC of Insert*	Axial DOC of Insert*
10°	0.0717	1.2466	0.587	0.104
15°	0.1149	1.2672	0.576	0.154
20°	0.1617	1.2828	0.561	0.204
25°	0.2119	1.2931	0.541	0.252
30°	0.2649	1.2981	0.517	0.298
35°	0.3205	1.2977	0.489	0.342
40°	0.3781	1.2920	0.457	0.383
45°	0.4374	1.2810	0.422	0.422
50°	0.4978	1.2647	0.383	0.457
55°	0.5590	1.2433	0.342	0.489
60°	0.6205	1.2170	0.298	0.517
65°	0.6818	1.1860	0.252	0.541
70°	0.7424	1.1504	0.204	0.561
75°	0.8018	1.1106	0.154	0.576
80°	0.8597	1.0669	0.104	0.587

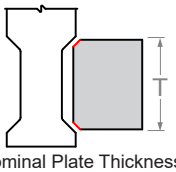
CHAMFER CUTTERS

Plate Chamfer Cutters

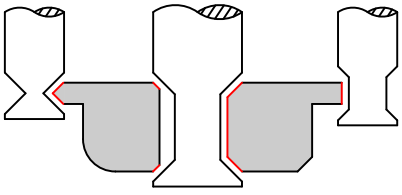


Cutting Along Entirety of Concave Form

- Tool designed to chamfer top and bottom in a single pass
- Cutting along entirety of concave form (L_2) only
- Minor diameter (D_3) relieved for light profiling and trimming edges
- 10° helix
- 4 flutes
- Solid carbide
- CNC ground in the USA



Nominal Plate Thickness

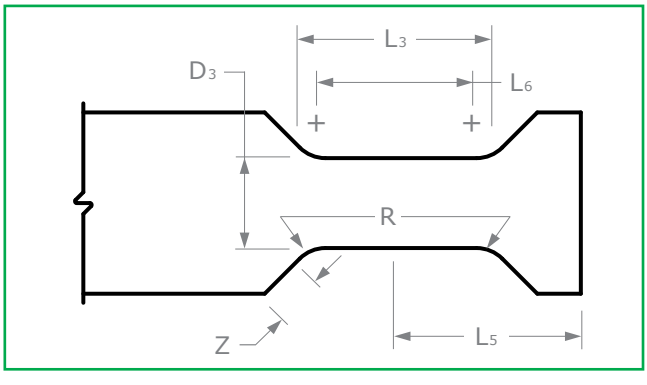


Capable of Performing Full Form Engagement, Light Profiling, & Edge Trimming

MAX OPENING WIDTH	MIN OPENING WIDTH	CHAMFER LENGTH	MINOR DIA.	MINOR DIA. LENGTH	RADIUS	END LENGTH	END TO CENTER	NOMINAL PLATE THICKNESS*	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
L_2 +.001" −.001"	L_3	Z	D_3 +.000" −.002"	L_6	R (MAX.)	L_4	L_5 +.001" −.001"	T	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.037	.010	**.019**	.096	.008	.005	.040	.059	.031	1/8	1-1/2	955202	61.80	955202-C3	67.30
.068	.037	**.022**	.091	.029	.006	.040	.074	.062	1/8	1-1/2	955204	61.80	955204-C3	67.30
.074	.012	**.044**	.184	.001	.008	.060	.097	.068	1/4	2-1/2	971104	68.50	971104-C3	76.00
.099	.037	**.044**	.184	.026	.008	.060	.110	.093	1/4	2-1/2	971106	68.50	971106-C3	76.60
.135	.104	**.022**	.091	.096	.005	.040	.108	.125	1/8	1-1/2	955208	61.80	955208-C3	67.30
.135	.073	**.044**	.184	.062	.008	.060	.128	.125	1/4	2-1/2	971108	68.50	971108-C3	76.60
.197	.135	**.044**	.184	.124	.008	.060	.159	.187	1/4	2-1/2	971112	68.50	971112-C3	76.60
.197	.105	**.065**	.278	.093	.008	.060	.159	.187	3/8	2-1/2	980812	85.60	980812-C3	96.20
.260	.198	**.044**	.184	.187	.008	.060	.190	.250	1/4	2-1/2	971116	68.50	971116-C3	76.60
.260	.137	**.087**	.372	.126	.008	.060	.190	.250	1/2	3	965916	130.60	965916-C3	146.70
.385	.293	**.065**	.278	.281	.008	.060	.253	.375	3/8	2-1/2	980824	85.60	980824-C3	96.20
.385	.262	**.087**	.372	.251	.008	.060	.253	.375	1/2	3	965924	130.60	965924-C3	146.70
.510	.387	**.087**	.372	.376	.008	.060	.315	.500	1/2	3	965932	130.60	965932-C3	146.70

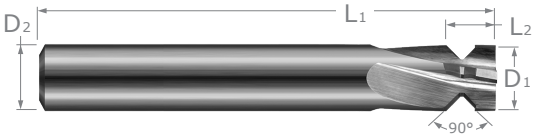
*Nominal Plate Thickness is ideal thickness of plate for chamfering top and bottom simultaneously.

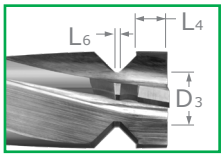
For additional tool dimensions, scan the QR code or visit harveytool.com/resources

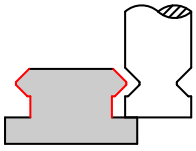


PICATINNY FORM CUTTERS

Picatinny Rail Form Cutters





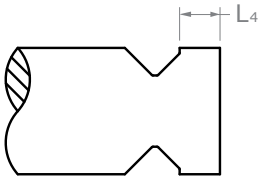


- Designed to the MIL-STD-1913 specifications
- Mill the entire Picatinny Rail in a single pass without tool changes
- Choose from two types:
  - Type I: Slight undercut at end of End Length (L_4)
  - Type II: .005" radius tangent to angle and End Length (L_4)
- Cutting on entirety of concave form and OD flat at end
- 4 helical flutes allow for better cutting action
- .005" max radii for all internal corners
- Solid carbide • CNC ground in the USA

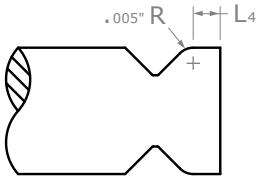
Outstanding in Aluminum!

CUTTER DIAMETER	LENGTH OF CUT	MINOR DIAMETER	MINOR DIA. LENGTH (TSC)	END LENGTH	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB2 COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.008''}_{-.000''}$	D_3 $^{+.001''}_{-.001''}$	L_6	L_4		D_2	L_1	4 FL	PRICE	4 FL	PRICE
.500 (1/2)	.377	.282	.021	.160	I	1/2	3	875632	167.30	875632-C8	193.80
.500 (1/2)	.377	.282	.021	.137	II	1/2	3	830032	167.30	830032-C8	193.80
.625 (5/8)	.377	.407	.021	.160	I	5/8	3-1/2	875640	191.70	875640-C8	230.30
.625 (5/8)	.377	.407	.021	.137	II	5/8	3-1/2	830040	191.70	830040-C8	230.30

Type I - Picatinny Rail Form 1995 Standard

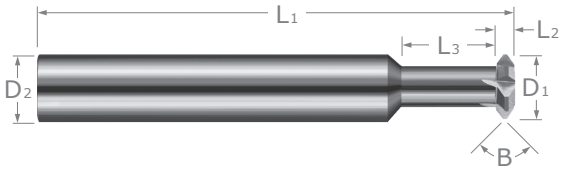


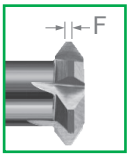
Type II - Picatinny Rail Form 1999 Standard



PICATINNY FORM CUTTERS

Picatinny Attachment Cutters





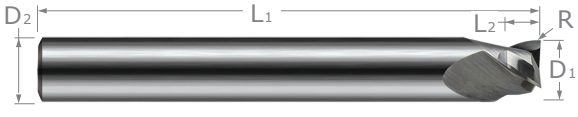
- Mill the inverse form for the Picatinny Rail used for attachments
- Cutting on entirety of angle and flat
- Short reaches for maximum strength
- 6 flutes • Solid carbide • CNC ground in the USA

Outstanding in Aluminum!

INCLUDED ANGLE	CUTTER DIAMETER	TIP FLAT	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB$_2$ COATED	
B $^{+0.5°}_{-0.5°}$	D_1 $^{+.000″}_{-.002″}$	F	L_2 $^{+.002″}_{-.000″}$		L_3 $^{+.030″}_{-.000″}$	D_2	L_1	6 FL	PRICE	6 FL	PRICE
90°	.500 (1/2)	.021	.2075	1/4	.375	1/2	3	859232	150.20	859232-C8	176.70
	.625 (5/8)	.021	.2075	3/8	.500	5/8	3-1/2	859240	195.50	859240-C8	234.10

PICATINNY FORM CUTTERS

Picatinny Recoil Groove End Mills



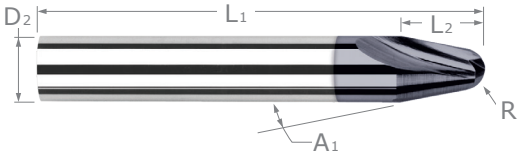
Stocked in sharp corner, .005", or .010" corner radius

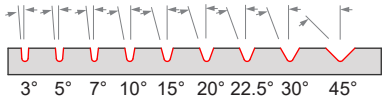
- Optimized for the grooves across the Picatinny Rail
- Diameter allows for a single pass to create the groove
- Stub flute length for improved strength
- Cutting on transition to allow for slight edge break at top of groove
- High helix and optimized geometry for improved performance
- 3 flutes • Center cutting
- Solid carbide • CNC ground in the USA

Outstanding in Aluminum!

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB$_2$ COATED	
D_1 $^{+.002″}_{-.000″}$	R $^{+.001″}_{-.001″}$	L_2 $^{+.008″}_{-.000″}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE
.206	**SHARP!**	.118	1/4	2-1/2	864806	40.20	864806-C8	49.00
.206	.005	.118	1/4	2-1/2	874406	44.10	874406-C8	52.90
.206	.010	.118	1/4	2-1/2	862606	44.10	862606-C8	52.90
.210	**SHARP!**	.118	1/4	2-1/2	864810	40.20	864810-C8	49.00
.210	.005	.118	1/4	2-1/2	874410	44.10	874410-C8	52.90
.210	.010	.118	1/4	2-1/2	862610	44.10	862610-C8	52.90

RUNNER CUTTERS





Stocked in Nine Angles Per Side!

- Designed to mill 3°, 5°, 7°, 10°, 15°, 20°, 22.5°, 30°, or 45° channels in molds
- 2 helical flutes (12° helix)
- AlTiN coating for increased performance in ferrous materials
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials
- Center cutting
- Solid carbide
- CNC ground in the USA

ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005"}_{-.0005"}$	L_2	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
3°	1/64	.921	1/8	1-1/2	843600	50.10	843600-C3	55.60		
	1/32	.631	1/8	1-1/2	843602	50.10	843602-C3	55.60		
	1/16	.666	3/16	2	843604	55.20	843604-C3	61.20		
5°	1/64	.557	1/8	1-1/2	936300	50.10	936300-C3	55.60		
	1/32	.390	1/8	1-1/2	936302	50.10	936302-C3	55.60		
	3/64	.579	3/16	2	936303	55.20	936303-C3	61.20		
	1/16	.422	3/16	2	936304	55.20	936304-C3	61.20		
	3/32	.812	5/16	2-1/2	936306	70.90	936306-C3	80.30		
	1/8	.834	3/8	2-1/2	936308	79.60	936308-C3	90.20		
7°	1/64	.401	1/8	1-1/2	764600	50.60	764600-C3	56.10		
	1/32	.286	1/8	1-1/2	764602	50.60	764602-C3	56.10		
	1/16	.571	1/4	2-1/2	764604	55.20	764604-C3	63.30		
10°	.005	.331	1/8	1-1/2	75050	43.90	75050-C3	49.40		
	.010	.307	1/8	1-1/2	75052	43.90	75052-C3	49.40	75052-C6	52.00
	1/64	.283	1/8	1-1/2	75000	43.90	75000-C3	49.40	75000-C6	52.00
	.020	.259	1/8	1-1/2	75001	43.90	75001-C3	49.40	75001-C6	52.00
	.025	.235	1/8	1-1/2	75054	43.90	75054-C3	49.40		
	1/32	.384	3/16	2	75002	50.10	75002-C3	56.10	75002-C6	58.80
	.040	.341	3/16	2	75062	55.20	75062-C3	61.20		
	3/64	.308	3/16	2	75003	55.20	75003-C3	61.20		
	1/16	.414	1/4	2-1/2	75004	61.90	75004-C3	70.00	75004-C6	73.80
	5/64	.338	1/4	2-1/2	75005	63.40	75005-C3	71.50		
	3/32	.444	5/16	2-1/2	75006	70.90	75006-C3	80.30		
	7/64	.367	5/16	2-1/2	75007	71.20	75007-C3	80.70		
	1/8	.469	3/8	2-1/2	75008	79.60	75008-C3	90.20		
	5/32	.675	1/2	3	75010	93.70	75010-C3	109.70		
15°	.005	.219	1/8	1-1/2	75150	44.80	75150-C3	50.30		
	.010	.205	1/8	1-1/2	75152	43.90	75152-C3	49.40	75152-C6	52.00
	1/64	.190	1/8	1-1/2	75100	43.90	75100-C3	49.40	75100-C6	52.00
	.020	.176	1/8	1-1/2	75101	43.90	75101-C3	49.40	75101-C6	52.00
	.025	.162	1/8	1-1/2	75154	43.90	75154-C3	49.40	75154-C6	50.20
	1/32	.261	3/16	2	75102	50.10	75102-C3	56.10	75102-C6	58.80
	.039	.238	3/16	2	75160	55.20	75160-C3	61.20		
	.040	.235	3/16	2	75162	55.20	75162-C3	61.20		
	3/64	.215	3/16	2	75103	55.20	75103-C3	61.20		

continued on next page

NEW SIZES!

RUNNER CUTTERS

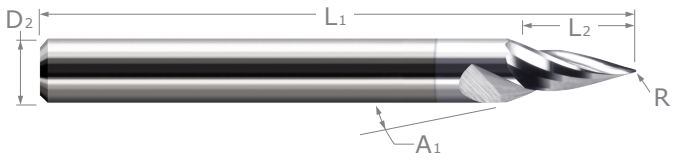
(cont.)

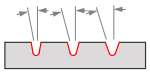
continued from previous page

ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED		
A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005"}_{-.0005"}$	L_2	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE	
15°	.050	.207	3/16	2	75066	55.20	75066-C3	61.00			NEW
	1/16	.289	1/4	2-1/2	75104	61.90	75104-C3	70.00	75104-C6	73.80	
	5/64	.243	1/4	2-1/2	75105	63.40	75105-C3	71.50			
	3/32	.317	5/16	2-1/2	75106	70.90	75106-C3	80.30			
	7/64	.271	5/16	2-1/2	75107	71.20	75107-C3	80.70			
	1/8	.342	3/8	2-1/2	75108	79.60	75108-C3	90.20			
	5/32	.486	1/2	3	75110	93.70	75110-C3	109.70			
	3/16	.398	1/2	3	75112	93.70	75112-C3	108.10			NEW
20°	.005	.162	1/8	1-1/2	979950	46.00	979950-C3	51.50			
	.010	.152	1/8	1-1/2	979952	46.00	979952-C3	51.50			
	1/64	.143	1/8	1-1/2	979900	43.90	979900-C3	49.40	979900-C6	52.00	
	.020	.133	1/8	1-1/2	979901	47.30	979901-C3	52.80	979901-C6	55.40	
	.025	.124	1/8	1-1/2	979954	47.30	979954-C3	52.80			
	1/32	.198	3/16	2	979902	50.10	979902-C3	56.10	979902-C6	58.80	
	3/64	.167	3/16	2	979903	55.20	979903-C3	61.20			
	1/16	.224	1/4	2-1/2	979904	61.90	979904-C3	70.00			
	5/64	.193	1/4	2-1/2	979905	64.10	979905-C3	72.20			
	3/32	.250	5/16	2-1/2	979906	70.90	979906-C3	80.30			
	1/8	.275	3/8	2-1/2	979908	79.60	979908-C3	90.20			
22.5°	.010	.135	1/8	1-1/2	867852	46.00	867852-C3	51.50			
	1/64	.127	1/8	1-1/2	867800	43.90	867800-C3	49.40			
	.020	.194	3/16	2	867801	50.10	867801-C3	56.10			
	1/32	.176	3/16	2	867802	50.10	867802-C3	56.10			
	1/16	.277	5/16	2-1/2	867804	70.90	867804-C3	80.30			
30°	.005	.157	3/16	2	934550	65.50	934550-C3	71.40			
	.010	.152	3/16	2	934552	65.50	934552-C3	71.40	934552-C6	72.60	
	1/64	.147	3/16	2	934500	63.40	934500-C3	69.40	934500-C6	72.20	
	.020	.142	3/16	2	934501	63.40	934501-C3	69.40	934501-C6	70.50	
	.025	.192	1/4	2-1/2	934554	63.40	934554-C3	70.90			
	1/32	.186	1/4	2-1/2	934502	63.40	934502-C3	71.50	934502-C6	75.40	
	3/64	.224	5/16	2-1/2	934503	70.90	934503-C3	80.30			
	1/16	.263	3/8	2-1/2	934504	79.60	934504-C3	90.20	934504-C6	92.50	
45°	.005	.123	1/4	2-1/2	856550	66.70	856550-C3	74.20			
	.010	.121	1/4	2-1/2	856552	66.70	856552-C3	74.80	856552-C6	75.70	
	1/64	.119	1/4	2-1/2	856500	64.70	856500-C3	72.80			
	.020	.148	5/16	2-1/2	856501	64.70	856501-C3	74.20			
	1/32	.143	5/16	2-1/2	856502	72.00	856502-C3	81.50			
	3/64	.168	3/8	2-1/2	856503	81.00	856503-C3	91.60			
	1/16	.224	1/2	3	856504	97.90	856504-C3	114.00			

RUNNER CUTTERS

For Non-Ferrous Materials





Stocked in Three Angles Per Side!

- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Designed to mill 10°, 15°, and 20° channels in molds
- 2 helical flutes (approx. 25° helix)
- Offered with TiB_2 coating to minimize galling
- Center cutting
- Solid carbide
- CNC ground in the USA

	ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
	A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005"}_{-.0005"}$	L_2	D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
	10°	.010	.307	1/8	1-1/2	773452	45.00	773452-C8	53.10
		.015	.283	1/8	1-1/2	773400	45.00	773400-C8	53.10
		.031	.384	3/16	2	773402	51.10	773402-C8	59.10
NEW	**15°**	.005	.219	1/8	1-1/2	772250	45.00	772250-C8	52.10
		.010	.205	1/8	1-1/2	772252	45.00	772252-C8	53.10
		.015	.190	1/8	1-1/2	772200	45.40	772200-C8	53.50
		.031	.261	3/16	2	772202	51.10	772202-C8	59.10
NEW		.047	.215	3/16	2	772203	51.10	772203-C8	59.10
	20°	.010	.152	1/8	1-1/2	771252	45.00	771252-C8	53.10
		.015	.143	1/8	1-1/2	771200	45.00	771200-C8	53.10
		.031	.198	3/16	2	771202	51.10	771202-C8	59.10

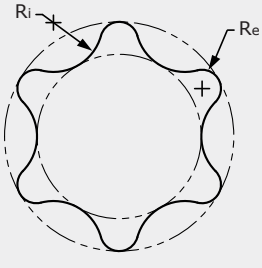
NEW SIZES!

HEXALOBE CUTTERS

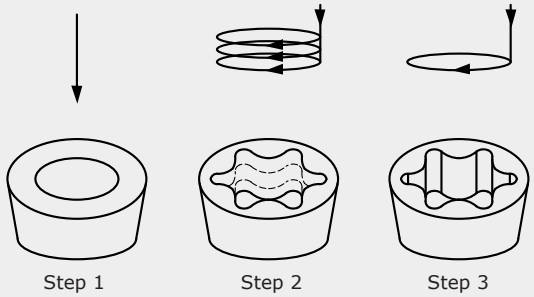
- Optimized for titanium alloys, Inconel, nickel alloys and other high temperature materials with outstanding performance in difficult-to-machine steels, stainless steels and tool steels
- Cutter diameters are slightly undersized common hexalobe sizes, created to contour the radii with ease and maximize the strength of the tool
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

HEXALOBULAR SOCKET NUMBER	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE	
T6	.010	**.060** (6x)	.1575 (4 mm)	1.575 (40 mm)	793310-C6	51.70	
T8	.014	**.084** (6x)	.1575 (4 mm)	1.575 (40 mm)	793314-C6	51.70	
T10	.017	**.102** (6x)	.1575 (4 mm)	1.575 (40 mm)	793317-C6	51.70	
T15	.020	**.120** (6x)	.1575 (4 mm)	1.575 (40 mm)	793320-C6	51.70	
T20	.022	**.132** (6x)	.1575 (4 mm)	1.575 (40 mm)	793322-C6	51.70	
T25	.028	**.168** (6x)	.1575 (4 mm)	1.575 (40 mm)	793328-C6	51.70	
T30	.032	**.192** (6x)	.1575 (4 mm)	1.575 (40 mm)	793332-C6	51.70	
T40	.039	**.240** (6x)	.1575 (4 mm)	1.575 (40 mm)	793339-C6	51.70	NEW
T45	.040	**.240** (6x)	.1575 (4 mm)	1.575 (40 mm)	793340-C6	51.70	NEW
T50 / T55	.055	**.330** (6x)	.1575 (4 mm)	1.575 (40 mm)	793355-C6	51.70	NEW
T60	.075	**.450** (6x)	.1575 (4 mm)	1.575 (40 mm)	793375-C6	51.70	NEW

Hexalobe Order of Operations



There are a few different approaches when machining a hexalobe pattern. In terms of milling, miniature tooling is required to properly contour the multiple radii surfaces to achieve the desired pattern and finish. Harvey Tool supplies multiple sizes to help create the shape and depth for the desired specification.



1. Pre-drill minor diameter and correct chamfer angle at the top of the hole with our compatible **Hexalobe Countersink** tools.
2. Select a **Long Reach Hexalobe Cutter** for either traditional roughing step downs or helical interpolation
(Diameters have undersized radii (Re) to allow for contouring)
3. Finish with a Hexalobe Cutter to remove any witness marks and achieve required finish

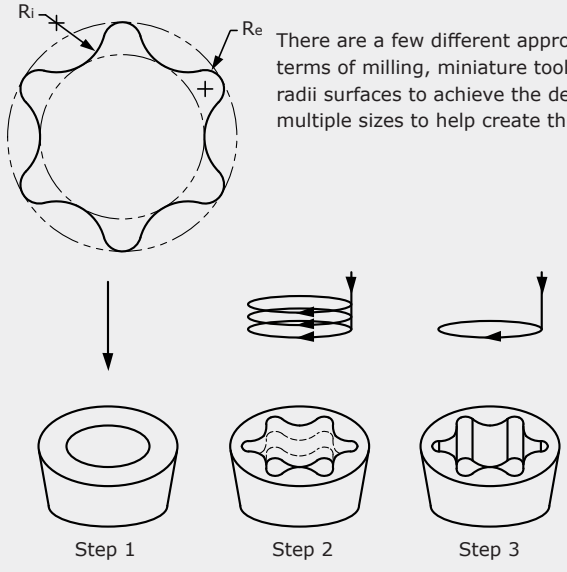
HEXALOBE CUTTERS

Long Reach

- Optimized for titanium alloys, Inconel, nickel alloys and other high temperature materials with outstanding performance in difficult-to-machine steels, stainless steels and tool steels
- Cutter diameters are slightly undersized common hexalobe sizes, created to contour the radii with ease and maximize the strength of the tool
- Reduced neck diameter to avoid heeling
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

HEXALOBULAR SOCKET NUMBER	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	PRICE
T8 / T10	**.014**	.023	**.045** (3x)	.1575 (4 mm)	1.575 (40 mm)	792714-C6	54.40
T8 / T10	**.014**	.023	**.084** (6x)	.1575 (4 mm)	1.575 (40 mm)	791814-C6	58.00
T15 / T20	**.020**	.030	**.060** (3x)	.1575 (4 mm)	1.575 (40 mm)	792720-C6	54.40
T15 / T20	**.020**	.030	**.120** (6x)	.1575 (4 mm)	1.575 (40 mm)	791820-C6	58.00
T25 / T30	**.028**	.042	**.084** (3x)	.1575 (4 mm)	1.575 (40 mm)	792728-C6	54.40
T25 / T30	**.028**	.042	**.168** (6x)	.1575 (4 mm)	1.575 (40 mm)	791828-C6	58.00

Hexalobe Order of Operations



There are a few different approaches when machining a hexalobe pattern. In terms of milling, miniature tooling is required to properly contour the multiple radii surfaces to achieve the desired pattern and finish. Harvey Tool supplies multiple sizes to help create the shape and depth for the desired specification.

1. Pre-drill minor diameter and correct chamfer angle at the top of the hole with our compatible **Hexalobe Countersink** tools.
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   (Diameters have undersized radii (Re) to allow for contouring)
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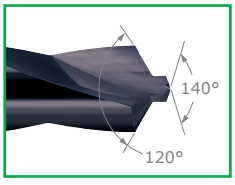
HEXALOBE CUTTERS

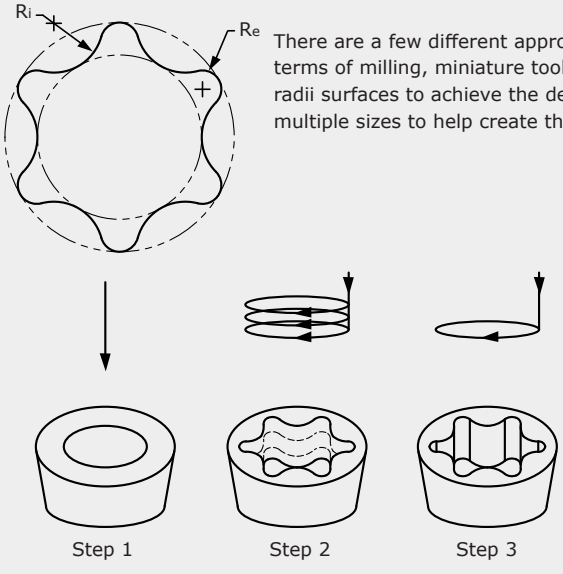
Countersinks



- Designed to be used before a Hexalobe cutter
- 140° included tip angle
- 120° included chamfer angle
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

HEXALOBULAR SOCKET NUMBER	DRILL DIAMETER	PILOT LENGTH	PILOT FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0015''}_{-.0005''}$	L_4 $^{+.005''}_{-.000''}$	L_2	D_2 (h6)	L_1	2 FL	PRICE
T8	**.0630**	.0450	.057	.1575	1.575	741108-C6	53.90
T8	**.0630**	.0840	.096	.1575	1.575	725008-C6	55.30
T10	**.0748**	.0510	.065	.1575	1.575	741110-C6	53.90
T10	**.0748**	.1020	.116	.1575	1.575	725010-C6	55.30
T15	**.0906**	.0600	.077	.1575	1.575	741115-C6	53.90
T15	**.0906**	.1200	.137	.1575	1.575	725015-C6	55.30
T20	**.1063**	.0660	.085	.2360	2.480	741120-C6	71.40
T20	**.1063**	.1320	.151	.2360	2.480	725020-C6	72.80
T25	**.1220**	.0840	.106	.2360	2.480	741125-C6	71.40
T25	**.1220**	.1680	.190	.2360	2.480	725025-C6	72.80
	D_1 $^{+.001''}_{-.001''}$	L_4 $^{+.010''}_{-.000''}$	L_2	D_2 (h6)	L_1	2 FL	PRICE
T30	**.1496**	.0960	.123	.2360	2.480	741130-C6	71.40
T30	**.1496**	.1920	.219	.2360	2.480	725030-C6	72.80

Hexalobe Order of Operations

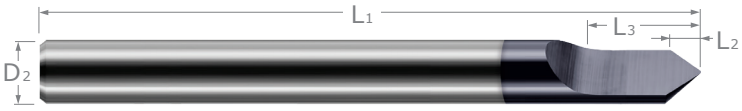


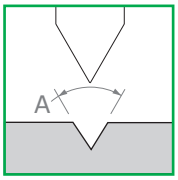
There are a few different approaches when machining a hexalobe pattern. In terms of milling, miniature tooling is required to properly contour the multiple radii surfaces to achieve the desired pattern and finish. Harvey Tool supplies multiple sizes to help create the shape and depth for the desired specification.

1. Pre-drill minor diameter and correct chamfer angle at the top of the hole with our compatible **Hexalobe Countersink** tools.
2. Select a **Long Reach Hexalobe Cutter** for either traditional roughing step downs or helical interpolation
(Diameters have undersized radii (Re) to allow for contouring)
3. Finish with a Hexalobe Cutter to remove any witness marks and achieve required finish

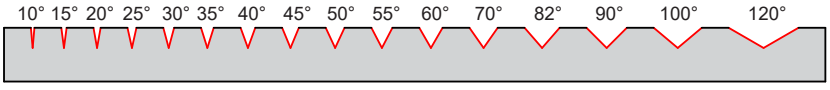
ENGRAVING CUTTERS

Pointed





- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA

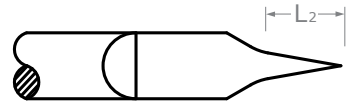


Stocked in Sixteen Included Angles!

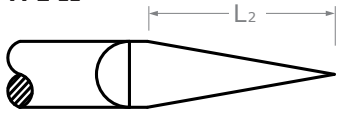
INCL. ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	1/8	.080	I	.200	1-1/2		996508	25.20	996508-C3	30.70		
10°	3/16	.080	I	1/4	2		996512	25.50	996512-C3	31.50		
	1/4	.080	I	5/16	2-1/2		996516	30.90	996516-C3	39.10		
	1/8	.080	I	.200	1-1/2		998108	25.20	998108-C3	30.70		
15°	3/16	.080	I	1/4	2		998112	25.50	998112-C3	31.50		
	1/4	.080	I	5/16	2-1/2		998116	30.90	998116-C3	39.10		
	1/8	.080	I	.200	1-1/2		999708	25.20	999708-C3	30.70	999708-C4	39.00
20°	3/16	.080	I	1/4	2		999712	25.50	999712-C3	31.30		
	1/4	.080	I	5/16	2-1/2		999716	30.90	999716-C3	39.10		
	1/8	.080	I	.200	1-1/2		983808	25.20	983808-C3	30.70		
25°	3/16	.080	I	1/4	2		983812	25.50	983812-C3	31.30		
	1/4	.080	I	5/16	2-1/2		983816	30.90	983816-C3	39.10		
	1/8	.080	I	.200	1-1/2		981508	21.70	981508-C3	27.20		
	1/8	.233	II	3/8	1-1/2		25010	16.60	25010-C3	22.10	25010-C4	30.40
30°	1/8	.233	II	3/8	4	**LONG!**	941708	27.70	941708-C3	33.60		
	3/16	.350	II	3/8	2		25020	21.50	25020-C3	27.40		
	1/4	.466	II	1/2	2-1/2		25030	26.60	25030-C3	34.70	25030-C4	48.40
35°	1/8	.198	II	3/8	1-1/2		853508	20.30	853508-C3	25.80		
	1/8	.080	I	.200	1-1/2		978608	22.70	978608-C3	28.20		
	1/8	.171	II	3/8	1-1/2		25110	17.30	25110-C3	22.80	25110-C4	31.10
40°	1/8	.171	II	3/8	4	**LONG!**	937808	29.20	937808-C3	35.10		
	3/16	.257	II	3/8	2		25120	23.50	25120-C3	29.30		
	1/4	.343	II	3/8	2-1/2		25130	28.00	25130-C3	36.10		
	1/8	.151	II	3/8	1-1/2		997308	18.80	997308-C3	24.30	997308-C4	32.60
45°	3/16	.226	II	3/8	2		997312	24.20	997312-C3	30.20		
	1/4	.302	II	3/8	2-1/2		997316	30.30	997316-C3	38.40		
	1/8	.134	II	3/8	1-1/2		998408	18.90	998408-C3	24.40		
50°	3/16	.201	II	3/8	2		998412	24.70	998412-C3	30.40		
	1/4	.268	II	3/8	2-1/2		998416	30.90	998416-C3	39.10		

continued on next page

TYPE I



TYPE II



ENGRAVING CUTTERS

Pointed (cont.)

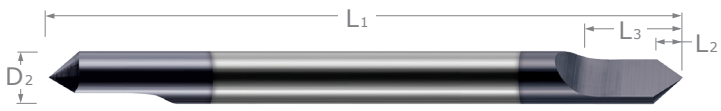
continued from previous page

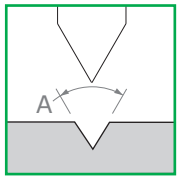
INCL. ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
55°	1/8	.120	II	3/8	1-1/2		855508	20.30	855508-C3	25.80		
60°	3 mm	2.60 mm	II	10 mm	38 mm		898657	18.90	898657-C3	24.40		
	1/8	.108	II	3/8	1-1/2		30010	16.60	30010-C3	22.10	30010-C4	30.40
	1/8	.108	II	3/8	4	**LONG!**	30410	27.70	30410-C3	33.60	30410-C4	41.90
	3/16	.162	II	3/8	2		30020	21.50	30020-C3	27.40	30020-C4	38.50
	3/16	.162	II	3/8	4	**LONG!**	30420	36.60	30420-C3	44.70		
	6 mm	5.20 mm	II	10 mm	63 mm		898666	30.90	898666-C3	38.90		
	1/4	.216	II	3/8	2-1/2		30030	26.60	30030-C3	34.70	30030-C4	48.40
	1/4	.216	II	3/8	6	**LONG!**	30430	52.60	30430-C3	63.40		
	3/8	.325	II	3/8	2-1/2		30040	38.50	30040-C3	49.10		
70°	1/8	.089	II	3/8	1-1/2		937208	18.90	937208-C3	24.40		
	3/16	.134	II	3/8	2		937212	24.70	937212-C3	30.40		
	1/4	.179	II	3/8	2-1/2		937216	30.90	937216-C3	39.10		
82°	1/8	.072	II	3/8	1-1/2		971708	18.90	971708-C3	24.40		
	3/16	.108	II	3/8	2		971712	24.70	971712-C3	30.40		
	1/4	.144	II	3/8	2-1/2		971716	30.90	971716-C3	39.10		
90°	3 mm	1.50 mm	II	10 mm	38 mm		884157	18.90	884157-C3	24.40		
	1/8	.062	II	3/8	1-1/2		30110	16.60	30110-C3	22.10	30110-C4	30.40
	1/8	.062	II	3/8	4	**LONG!**	30510	27.70	30510-C3	33.60		
	3/16	.093	II	3/8	2		30120	21.50	30120-C3	27.40	30120-C4	38.50
	3/16	.093	II	3/8	4	**LONG!**	30520	36.60	30520-C3	43.20		
	6 mm	3.00 mm	II	10 mm	63 mm		884166	30.90	884166-C3	38.40		
	1/4	.125	II	3/8	2-1/2		30130	26.60	30130-C3	34.70	30130-C4	48.40
	1/4	.125	II	3/8	6	**LONG!**	30530	52.60	30530-C3	63.40		
	3/8	.187	II	3/8	2-1/2		30140	38.50	30140-C3	49.10		
100°	1/8	.052	II	3/8	1-1/2		983508	18.90	983508-C3	24.40		
	3/16	.079	II	3/8	2		983512	24.70	983512-C3	30.70		
	1/4	.105	II	3/8	2-1/2		983516	30.90	983516-C3	39.10		
120°	1/8	.036	II	3/8	1-1/2		990508	16.60	990508-C3	22.10		
	3/16	.054	II	3/8	2		990512	21.50	990512-C3	27.30		
	1/4	.072	II	3/8	2-1/2		990516	26.60	990516-C3	34.70		

Check Out All of Our Engraving Solutions!

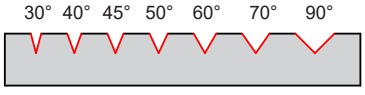
ENGRAVING CUTTERS

Pointed – Double-Ended





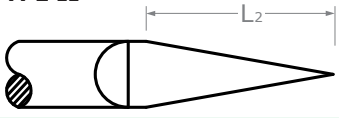
- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



Stocked in Seven Included Angles!

INCLUDED ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	.233	II	3/8	2	938408	28.60	938408-C3	35.40		
	3/16	.350	II	3/8	2	938410	35.60	938410-C3	43.70		
	1/4	.466	II	1/2	2-1/2	938412	42.40	938412-C3	50.30		
40°	1/8	.172	II	3/8	2	854008	31.50	854008-C3	38.40		
	3/16	.258	II	3/8	2	854010	39.00	854010-C3	44.80		
	1/4	.343	II	3/8	2-1/2	854012	46.30	854012-C3	53.80		
45°	1/8	.151	II	3/8	2	854508	31.50	854508-C3	38.40		
	3/16	.226	II	3/8	2	854510	38.60	854510-C3	44.40		
	1/4	.302	II	3/8	2-1/2	854512	46.30	854512-C3	57.00		
50°	1/8	.134	II	3/8	2	855008	31.90	855008-C3	37.40		
	3/16	.201	II	3/8	2	855010	38.60	855010-C3	44.40		
	1/4	.268	II	3/8	2-1/2	855012	46.30	855012-C3	57.00		
60°	1/8	.108	II	3/8	2	954608	28.60	954608-C3	35.40	954608-C4	50.70
	3/16	.162	II	3/8	2	954610	35.60	954610-C3	43.70		
	1/4	.216	II	3/8	2-1/2	954612	42.40	954612-C3	50.30		
70°	1/8	.089	II	3/8	2	857008	31.50	857008-C3	38.40		
	3/16	.134	II	3/8	2	857010	39.00	857010-C3	44.80		
	1/4	.179	II	3/8	2-1/2	857012	46.30	857012-C3	53.80		
90°	1/8	.062	II	3/8	2	975108	28.60	975108-C3	35.40	975108-C4	50.70
	3/16	.093	II	3/8	2	975110	35.60	975110-C3	43.70		
	1/4	.125	II	3/8	2-1/2	975112	42.40	975112-C3	50.30		

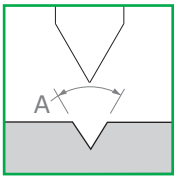
TYPE II



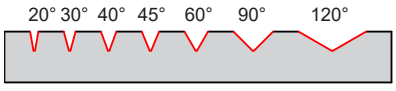
NEW SIZES!

ENGRAVING CUTTERS

Pointed – Pyramid Point



- 3 facet design increases tip strength
- Ground to a point
- Solid carbide
- CNC ground in the USA

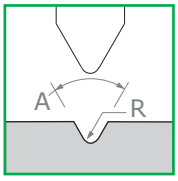


Stocked in Seven Included Angles!

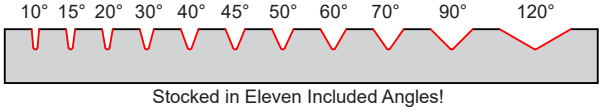
INCLUDED ANGLE	DIAMETER	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED		
A	D_2	L_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
20°	1/8	.354	1-1/2	842810	28.70	842810-C3	34.20	
	1/8	.354	2-1/2	716510	29.90	716510-C3	35.40	NEW
	3/16	.532	2	822010	31.30	822010-C3	37.30	
	1/4	.709	2-1/2	834010	44.70	834010-C3	52.80	
30°	1/8	.233	1-1/2	842815	28.70	842815-C3	34.20	
	1/8	.233	2-1/2	716515	29.90	716515-C3	35.40	NEW
	3/16	.350	2	822015	31.30	822015-C3	37.30	
	1/4	.467	2-1/2	834015	44.70	834015-C3	52.80	
40°	1/8	.172	1-1/2	842820	28.70	842820-C3	34.20	
	1/4	.343	2-1/2	834020	45.10	834020-C3	53.20	
45°	1/8	.151	1-1/2	842823	28.70	842823-C3	34.20	
	1/4	.302	2-1/2	834023	31.30	834023-C3	39.40	
60°	1/8	.108	1-1/2	842830	28.70	842830-C3	34.20	
	1/8	.108	2-1/2	716530	29.90	716530-C3	35.40	NEW
	3/16	.162	2	822030	31.30	822030-C3	37.30	
	1/4	.217	2-1/2	834030	44.70	834030-C3	52.80	
90°	1/8	.063	1-1/2	842845	28.70	842845-C3	34.20	
	1/8	.063	2-1/2	716545	29.90	716545-C3	35.40	NEW
	3/16	.094	2	822045	31.30	822045-C3	37.30	
	1/4	.125	2-1/2	834045	44.70	834045-C3	52.80	
120°	1/8	.036	1-1/2	842860	29.00	842860-C3	34.50	

ENGRAVING CUTTERS

Tip Radius



- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide • CNC ground in the USA



Stocked in Eleven Included Angles!

INCL. ANGLE	DIA.	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	R	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
10°	1/8	.0050	.080	I	.200	1-1/2		940410	27.20	940410-C3	32.70		
	1/8	.0100	.080	I	.200	1-1/2		948010	27.20	948010-C3	32.70		
15°	1/8	.0050	.080	I	.200	1-1/2		952910	27.20	952910-C3	32.70		
	1/8	.0100	.080	I	.200	1-1/2		963510	27.20	963510-C3	32.70		
20°	1/8	.0050	.080	I	.200	1-1/2		989310	27.20	989310-C3	32.70		
	1/8	.0100	.080	I	.200	1-1/2		956010	27.20	956010-C3	32.70		
30°	1/8	.0025	.226	II	3/8	1-1/2		72715	24.60	72715-C3	30.10	72715-C4	38.40
	1/8	.0050	.219	II	3/8	1-1/2		47510	24.60	47510-C3	30.10	47510-C4	38.40
	1/8	.0100	.207	II	3/8	1-1/2		48810	24.60	48810-C3	30.10	48810-C4	38.40
	1/8	.0150	.190	II	3/8	1-1/2		49710	24.60	49710-C3	30.10		
	1/8	.0200	.176	II	3/8	1-1/2		58610	24.60	58610-C3	30.10		
	1/8	.0300	.147	II	3/8	1-1/2		868910	24.60	868910-C3	30.10		
	3/16	.0050	.336	II	3/8	2		47520	30.10	47520-C3	36.10		
	3/16	.0100	.321	II	3/8	2		48820	30.10	48820-C3	36.10		
	1/4	.0050	.452	II	1/2	2-1/2		47530	42.40	47530-C3	50.40		
	1/4	.0100	.438	II	1/2	2-1/2		48830	42.40	48830-C3	50.40		
40°	1/8	.0025	.167	II	3/8	1-1/2		72720	25.80	72720-C3	31.30		
	1/8	.0050	.162	II	3/8	1-1/2		57610	25.80	57610-C3	31.30		
	1/8	.0100	.152	II	3/8	1-1/2		58210	25.80	58210-C3	31.30		
	1/8	.0150	.143	II	3/8	1-1/2		59310	25.80	59310-C3	31.30		
	1/8	.0200	.133	II	3/8	1-1/2		60510	25.80	60510-C3	31.30		
45°	1/8	.0050	.143	II	3/8	1-1/2		946502	26.80	946502-C3	32.30		
	1/8	.0100	.135	II	3/8	1-1/2		957910	26.80	957910-C3	32.30		
50°	1/8	.0050	.127	II	3/8	1-1/2		845010	27.00	845010-C3	32.50		
	1/8	.0100	.120	II	3/8	1-1/2		847210	27.00	847210-C3	32.50		
60°	1/8	.0025	.106	II	3/8	1-1/2		72730	24.60	72730-C3	30.10	72730-C4	38.40
	1/8	.0050	.103	II	3/8	1-1/2		48110	24.60	48110-C3	30.10	48110-C4	38.40
	1/8	.0050	.103	II	3/8	4	LONG!	974910	44.40	974910-C3	50.30		
	1/8	.0075	.101	II	3/8	1-1/2		967310	24.60	967310-C3	30.10		
	1/8	.0100	.098	II	3/8	1-1/2		49410	24.60	49410-C3	30.10	49410-C4	38.40
	1/8	.0125	.096	II	3/8	1-1/2		817110	24.60	817110-C3	30.10		
	1/8	.0150	.093	II	3/8	1-1/2		51710	24.60	51710-C3	30.10		
	1/8	.0200	.088	II	3/8	1-1/2		58910	24.60	58910-C3	30.10		
	1/8	.0300	.078	II	3/8	1-1/2		877010	24.60	877010-C3	30.10		

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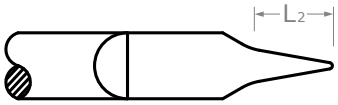
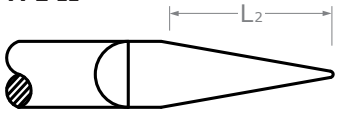
TYPE I



TYPE II



ENGRAVING CUTTERS

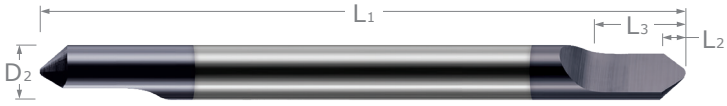
Tip Radius (cont.)

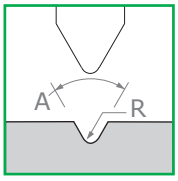
continued from previous page

INCL. ANGLE	DIA.	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	R	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
60°	3/16	.0025	.160	II	3/8	2		964830	30.10	964830-C3	36.10		
	3/16	.0050	.157	II	3/8	2		48120	30.10	48120-C3	36.10		
	3/16	.0075	.155	II	3/8	2		967320	30.10	967320-C3	36.10		
	3/16	.0100	.152	II	3/8	2		49420	30.10	49420-C3	36.10		
	3/16	.0150	.147	II	3/8	2		51720	30.10	51720-C3	35.90		
	3/16	.0200	.142	II	3/8	2		58920	30.10	58920-C3	36.10		
	1/4	.0025	.214	II	3/8	2-1/2		943730	33.10	943730-C3	41.10		
	1/4	.0050	.212	II	3/8	2-1/2		48130	33.10	48130-C3	41.10		
	1/4	.0075	.209	II	3/8	2-1/2		967330	33.10	967330-C3	41.10		
	1/4	.0100	.207	II	3/8	2-1/2		49430	33.10	49430-C3	41.10		
	1/4	.0150	.202	II	3/8	2-1/2		51730	33.10	51730-C3	41.10		
	1/4	.0200	.196	II	3/8	2-1/2		58930	33.10	58930-C3	41.10		
70°	1/8	.0050	.086	II	3/8	1-1/2		843810	26.80	843810-C3	32.30		
	1/8	.0100	.082	II	3/8	1-1/2		844710	27.00	844710-C3	32.50		
90°	1/8	.0025	.061	II	3/8	1-1/2		72745	24.60	72745-C3	30.10	72745-C4	38.40
	1/8	.0050	.060	II	3/8	1-1/2		48410	24.60	48410-C3	30.10	48410-C4	38.40
	1/8	.0050	.060	II	3/8	4	LONG!	986810	44.40	986810-C3	50.30		
	1/8	.0075	.059	II	3/8	1-1/2		959810	24.60	959810-C3	30.10		
	1/8	.0100	.058	II	3/8	1-1/2		49110	24.60	49110-C3	30.10	49110-C4	38.40
	1/8	.0125	.057	II	3/8	1-1/2		817010	25.10	817010-C3	30.60		
	1/8	.0150	.056	II	3/8	1-1/2		50810	24.60	50810-C3	30.10		
	1/8	.0200	.054	II	3/8	1-1/2		59910	24.60	59910-C3	30.10		
	1/8	.0300	.050	II	3/8	1-1/2		891410	24.60	891410-C3	30.10		
	3/16	.0025	.093	II	3/8	2		964845	30.10	964845-C3	36.10		
	3/16	.0050	.092	II	3/8	2		48420	30.10	48420-C3	35.90		
	3/16	.0100	.090	II	3/8	2		49120	30.10	49120-C3	35.90		
	3/16	.0150	.088	II	3/8	2		50820	30.10	50820-C3	36.10		
	3/16	.0200	.085	II	3/8	2		59920	30.10	59920-C3	36.10		
	1/4	.0025	.124	II	3/8	2-1/2		943745	33.10	943745-C3	41.10		
	1/4	.0050	.123	II	3/8	2-1/2		48430	33.10	48430-C3	41.10		
	1/4	.0100	.121	II	3/8	2-1/2		49130	33.10	49130-C3	41.10		
	1/4	.0150	.119	II	3/8	2-1/2		50830	33.10	50830-C3	41.10		
	1/4	.0200	.116	II	3/8	2-1/2		59930	33.10	59930-C3	41.10		
120°	1/8	.0050	.035	II	3/8	1-1/2		947310	25.10	947310-C3	30.60		
	1/8	.0100	.035	II	3/8	1-1/2		939110	24.60	939110-C3	30.10		

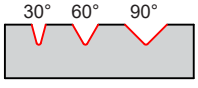
ENGRAVING CUTTERS

Tip Radius – Double-Ended





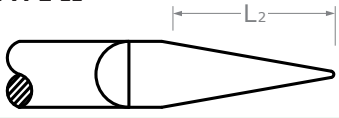
- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide
- CNC ground in the USA



Stocked in Three Included Angles!

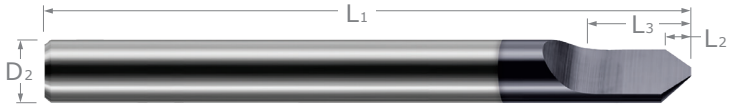
INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	R	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	.0025	.226	II	3/8	2	842008	38.50	842008-C3	45.40
	1/8	.0050	.219	II	3/8	2	834408	38.50	834408-C3	45.40
	1/8	.0100	.205	II	3/8	2	835008	38.50	835008-C3	45.40
	1/8	.0150	.190	II	3/8	2	744508	38.90	744508-C3	45.70
	1/8	.0200	.176	II	3/8	2	836108	38.50	836108-C3	45.40
	1/4	.0050	.452	II	1/2	2-1/2	834416	51.10	834416-C3	58.60
	1/4	.0100	.438	II	1/2	2-1/2	835016	50.60	835016-C3	61.40
60°	1/8	.0025	.106	II	3/8	2	834708	38.50	834708-C3	45.40
	1/8	.0050	.103	II	3/8	2	828208	38.50	828208-C3	45.40
	1/8	.0100	.098	II	3/8	2	828808	38.50	828808-C3	45.40
	1/8	.0150	.093	II	3/8	2	743808	38.90	743808-C3	45.70
	1/8	.0200	.088	II	3/8	2	829908	38.50	829908-C3	45.40
	1/4	.0050	.212	II	3/8	2-1/2	828216	51.10	828216-C3	61.90
	1/4	.0100	.207	II	3/8	2-1/2	828816	50.60	828816-C3	61.40
90°	1/8	.0025	.061	II	3/8	2	828908	38.50	828908-C3	45.40
	1/8	.0050	.060	II	3/8	2	818308	38.50	818308-C3	45.40
	1/8	.0100	.058	II	3/8	2	818908	38.50	818908-C3	45.40
	1/8	.0150	.056	II	3/8	2	743208	38.90	743208-C3	45.70
	1/8	.0200	.054	II	3/8	2	820108	38.50	820108-C3	45.40
	1/4	.0050	.123	II	3/8	2-1/2	818316	50.60	818316-C3	61.40
	1/4	.0100	.121	II	3/8	2-1/2	818916	50.60	818916-C3	61.40

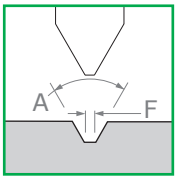
TYPE II



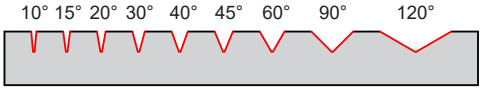
ENGRAVING CUTTERS

Tipped Off





- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



Stocked in Nine Included Angles!

INCL. ANGLE	DIA.	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	F	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	1/8	**.005**	.080	I	.200	1-1/2	993002	26.30	993002-C3	31.80		
10°	1/8	**.010**	.080	I	.200	1-1/2	993010	26.30	993010-C3	31.80		
	1/8	**.020**	.080	I	.200	1-1/2	993052	26.30	993052-C3	31.80		
	1/8	**.005**	.080	I	.200	1-1/2	990002	26.30	990002-C3	31.80		
15°	1/8	**.010**	.080	I	.200	1-1/2	990010	26.30	990010-C3	31.80		
	1/8	**.020**	.080	I	.200	1-1/2	990052	26.70	990052-C3	32.20		
	1/8	**.005**	.080	I	.200	1-1/2	987002	26.30	987002-C3	31.80		
20°	1/8	**.010**	.080	I	.200	1-1/2	987010	26.30	987010-C3	31.80		
	1/8	**.020**	.080	I	.200	1-1/2	987052	26.30	987052-C3	31.80		
	1/8	**.005**	.224	II	3/8	1-1/2	25202	18.80	25202-C3	24.30	25202-C4	32.60
	1/8	**.010**	.215	II	3/8	1-1/2	25210	18.80	25210-C3	24.30	25210-C4	32.60
	1/8	**.015**	.205	II	3/8	1-1/2	25242	18.80	25242-C3	24.30	25242-C4	32.60
	1/8	**.020**	.196	II	3/8	1-1/2	25252	18.80	25252-C3	24.30		
	1/8	**.030**	.177	II	3/8	1-1/2	25256	18.80	25256-C3	24.30		
	3/16	**.010**	.331	II	3/8	2	25220	24.60	25220-C3	30.60		
30°	3/16	**.020**	.313	II	3/8	2	25226	24.60	25226-C3	30.40		
	3/16	**.030**	.294	II	3/8	2	25224	24.60	25224-C3	30.40		
	1/4	**.005**	.457	II	1/2	2-1/2	25228	28.50	25228-C3	36.60		
	1/4	**.010**	.448	II	1/2	2-1/2	25230	28.50	25230-C3	36.60		
	1/4	**.020**	.429	II	1/2	2-1/2	25234	28.50	25234-C3	36.60		
	1/4	**.030**	.411	II	1/2	2-1/2	25236	28.50	25236-C3	37.00		
	1/8	**.005**	.165	II	3/8	1-1/2	25302	19.70	25302-C3	25.20		
	1/8	**.010**	.158	II	3/8	1-1/2	25310	19.70	25310-C3	25.20	25310-C4	33.50
	1/8	**.015**	.151	II	3/8	1-1/2	25342	19.70	25342-C3	25.20		
40°	1/8	**.020**	.144	II	3/8	1-1/2	25352	19.70	25352-C3	25.20		
	3/16	**.010**	.244	II	3/8	2	25320	26.30	25320-C3	32.10		
	1/4	**.005**	.337	II	3/8	2-1/2	25328	30.10	25328-C3	37.60		
	1/4	**.010**	.330	II	3/8	2-1/2	25330	30.10	25330-C3	38.20		

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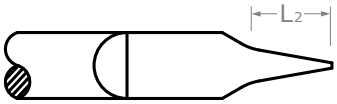
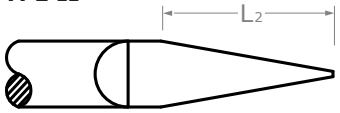
TYPE I



TYPE II



ENGRAVING CUTTERS

Tipped Off (cont.)

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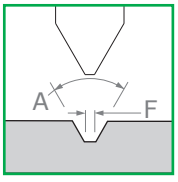
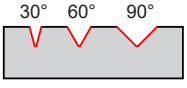
INCL. ANGLE	DIA.	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OAL		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	F	L_2		L_3	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
45°	1/8	.005	.145	II	3/8	1-1/2		955002	20.30	955002-C3	25.80		
	1/8	.010	.139	II	3/8	1-1/2		955010	20.30	955010-C3	25.80		
	3/16	.010	.214	II	3/8	2		955020	27.00	955020-C3	32.80		
	1/4	.010	.290	II	3/8	2-1/2		955030	31.30	955030-C3	38.80		
60°	1/8	.005	.104	II	3/8	1-1/2		50710	18.80	50710-C3	24.30	50710-C4	32.60
	1/8	.005	.104	II	3/8	4	LONG!	823602	18.80	823602-C3	31.40		
	1/8	.010	.099	II	3/8	1-1/2		30210	18.80	30210-C3	24.30	30210-C4	32.60
	1/8	.015	.095	II	3/8	1-1/2		18242	18.80	18242-C3	24.30		
	1/8	.020	.091	II	3/8	1-1/2		26910	18.80	26910-C3	24.30	26910-C4	32.60
	1/8	.025	.087	II	3/8	1-1/2		793055	19.30	793055-C3	24.80		
	1/8	.030	.082	II	3/8	1-1/2		27610	18.80	27610-C3	24.30	27610-C4	32.60
	3/16	.005	.158	II	3/8	2		50720	24.60	50720-C3	30.60		
	3/16	.005	.158	II	3/8	4	LONG!	823618	24.60	823618-C3	30.80		
	3/16	.010	.153	II	3/8	2		30220	24.60	30220-C3	30.60		
	3/16	.020	.145	II	3/8	2		26920	24.60	26920-C3	30.60		
	3/16	.030	.136	II	3/8	2		27620	24.60	27620-C3	30.60		
	1/4	.005	.212	II	3/8	2-1/2		50730	28.50	50730-C3	36.60		
	1/4	.005	.212	II	3/8	6	LONG!	823628	28.50	823628-C3	37.70		
	1/4	.010	.207	II	3/8	2-1/2		30230	28.50	30230-C3	36.60	30230-C4	48.30
	1/4	.015	.204	II	3/8	2-1/2		18232	28.50	18232-C3	36.60		
	1/4	.020	.199	II	3/8	2-1/2		26930	28.50	26930-C3	36.60		
	1/4	.030	.191	II	3/8	2-1/2		27630	28.50	27630-C3	36.60		
90°	1/8	.005	.060	II	3/8	1-1/2		30302	18.80	30302-C3	24.30		
	1/8	.010	.057	II	3/8	1-1/2		30310	18.80	30310-C3	24.30	30310-C4	32.60
	1/8	.015	.055	II	3/8	1-1/2		30342	18.80	30342-C3	24.30		
	1/8	.020	.053	II	3/8	1-1/2		30352	18.80	30352-C3	24.30		
	1/8	.030	.048	II	3/8	1-1/2		30356	18.80	30356-C3	24.30		
	3/16	.010	.088	II	3/8	2		30320	24.60	30320-C3	30.60		
	3/16	.020	.084	II	3/8	2		30324	24.60	30324-C3	30.40		
	3/16	.030	.079	II	3/8	2		30326	24.60	30326-C3	30.40		
	1/4	.005	.123	II	3/8	2-1/2		30328	28.50	30328-C3	36.60	30328-C4	48.30
	1/4	.010	.120	II	3/8	2-1/2		30330	28.50	30330-C3	36.60		
	1/4	.020	.115	II	3/8	2-1/2		30334	29.10	30334-C3	36.60		
	1/4	.030	.110	II	3/8	2-1/2		30336	28.50	30336-C3	34.40		
120°	1/8	.005	.035	II	3/8	1-1/2		954102	18.80	954102-C3	24.30		
	1/8	.010	.033	II	3/8	1-1/2		954110	18.80	954110-C3	24.30		

ENGRAVING CUTTERS

Tipped Off – Double-Ended



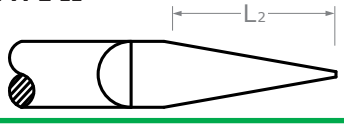
- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



Stocked in Three Included Angles!

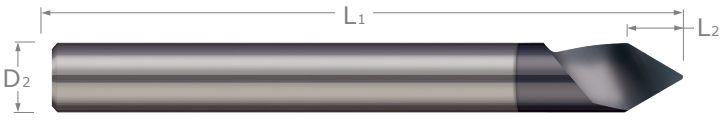
INCLUDED ANGLE	DIAMETER	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	F	L_2		L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	**.005**	.224	II	3/8	2	834308	32.60	834308-C3	39.40
	1/8	**.010**	.215	II	3/8	2	834908	32.60	834908-C3	39.40
	1/8	**.015**	.205	II	3/8	2	835508	32.60	835508-C3	38.10
	1/8	**.020**	.196	II	3/8	2	836208	32.60	836208-C3	39.40
	1/4	**.010**	.448	II	1/2	2-1/2	834916	46.60	834916-C3	54.10
60°	1/8	**.005**	.104	II	3/8	2	828108	32.60	828108-C3	39.40
	1/8	**.010**	.100	II	3/8	2	828708	32.60	828708-C3	39.40
	1/8	**.015**	.095	II	3/8	2	829308	32.60	829308-C3	39.40
	1/8	**.020**	.091	II	3/8	2	829808	32.90	829808-C3	38.40
	1/4	**.010**	.208	II	3/8	2-1/2	828716	46.20	828716-C3	56.90
90°	1/8	**.005**	.060	II	3/8	2	818208	32.60	818208-C3	39.40
	1/8	**.010**	.058	II	3/8	2	818808	32.60	818808-C3	39.40
	1/8	**.015**	.055	II	3/8	2	819408	32.90	819408-C3	38.40
	1/8	**.020**	.053	II	3/8	2	820008	32.90	820008-C3	39.80
	1/4	**.010**	.120	II	3/8	2-1/2	818816	46.20	818816-C3	56.90

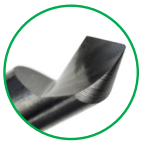
TYPE II



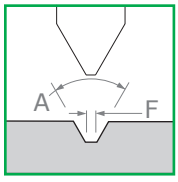
ENGRAVING CUTTERS

Tipped Off – Helical Flute

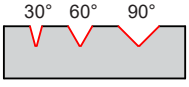




Spiral flute for soft materials



- Optimized geometry for superior engraving in softer materials such as plastics and aluminum
- Also excellent for stainless steel, Inconel, titanium, and other high temp alloys
- Free cutting action provides excellent surface finish and chip evacuation
- Tipped-off end diameter for improved cutting action
- AlTiN coating for increased performance in ferrous materials
- TiB_2 coating for outstanding performance in non-ferrous materials due to its extremely low affinity to aluminum
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA

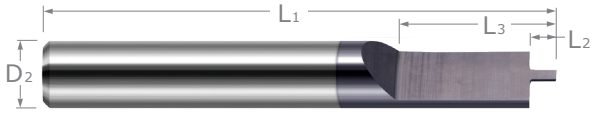


Stocked in Three Included Angles!

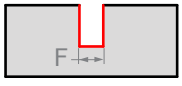
INCLUDED ANGLE	DIAMETER	FLAT ON PART	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A	D_2	F	L_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
30°	1/8	**.010**	.215	2	779008	20.20	779008-C3	25.70	779008-C8	28.30
	1/4	**.010**	.448	2-1/2	779016	30.90	779016-C3	39.00	779016-C8	39.90
60°	1/8	**.005**	.104	1-1/2	764708	20.20	764708-C3	25.70	764708-C8	28.30
	1/8	**.010**	.100	1-1/2	824708	20.20	824708-C3	25.70	824708-C8	28.30
	3/16	**.010**	.154	2	824712	26.20	824712-C3	31.80	824712-C8	34.20
	1/4	**.010**	.208	2-1/2	824716	30.90	824716-C3	36.60	824716-C8	39.90
90°	1/8	**.010**	.058	1-1/2	814708	20.20	814708-C3	25.70	814708-C8	28.30
	3/16	**.010**	.089	2	814712	26.60	814712-C3	32.40	814712-C8	34.60
	1/4	**.010**	.120	2-1/2	814716	30.90	814716-C3	39.00	814716-C8	41.20

ENGRAVING CUTTERS

Parallel – Square



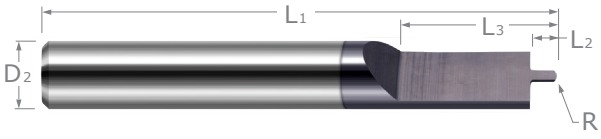
- Engraves a 90° vertical wall
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Non-cutting transition radius at end of length of cut
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



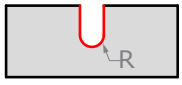
DIAMETER	FLAT ON PART	LENGTH OF CUT	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_2	F	L_2	L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	**.030**	.044	3/8	1-1/2	844230	20.90	844230-C3	26.40
1/8	**.060**	.090	3/8	1-1/2	844260	21.20	844260-C3	26.70
1/8	**.090**	.135	3/8	1-1/2	844290	21.20	844290-C3	26.70
3/16	**.060**	.090	3/8	2	827260	27.20	827260-C3	33.00
3/16	**.090**	.135	3/8	2	827290	27.20	827290-C3	33.00
3/16	**.125**	.190	1/2	2	827308	27.20	827308-C3	33.00
1/4	**.060**	.090	3/8	2-1/2	838960	31.60	838960-C3	39.80
1/4	**.090**	.135	3/8	2-1/2	838990	31.60	838990-C3	39.10
1/4	**.125**	.190	1/2	2-1/2	839008	31.60	839008-C3	39.80

ENGRAVING CUTTERS

Parallel – Ball



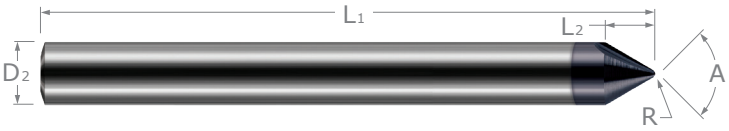
- Engraves a 90° vertical wall
- Radius on tip creates radius in the bottom of groove and improves strength
- Half-round drill style
- Non-cutting transition radius at end of length of cut
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



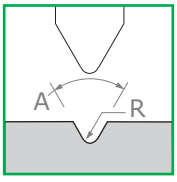
DIAMETER	RADIUS	LENGTH OF CUT	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_2	R	L_2	L_3	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	**.0150**	.044	3/8	1-1/2	828530	23.50	828530-C3	29.00
1/8	**.0300**	.090	3/8	1-1/2	828560	23.50	828560-C3	29.00
1/8	**.0450**	.135	3/8	1-1/2	828590	23.70	828590-C3	29.20
3/16	**.0300**	.090	3/8	2	832660	29.70	832660-C3	35.50
3/16	**.0450**	.135	3/8	2	832690	29.70	832690-C3	35.50
3/16	**.0625**	.190	1/2	2	832708	29.70	832708-C3	35.50
1/4	**.0300**	.090	3/8	2-1/2	841360	34.30	841360-C3	41.80
1/4	**.0450**	.135	3/8	2-1/2	841390	34.30	841390-C3	41.80
1/4	**.0625**	.190	1/2	2-1/2	841408	34.30	841408-C3	41.80

ENGRAVING CUTTERS

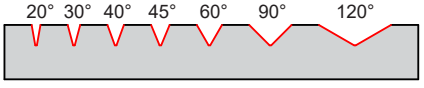
Tip Radius – 2 Flute – For Hardened Steels




2 Shallow Flute Design



- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tip radius end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA



Stocked in Seven Included Angles!

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A +0°30' −0°30'	D_2	R	L_2		L_1	2 FL	PRICE
20°	1/8	**.0050**	.080	I	1-1/2	873308-C6	34.10
	1/8	**.0075**	.080	I	1-1/2	724908-C6	34.10
	1/8	**.0100**	.080	I	1-1/2	857508-C6	34.10
	1/8	**.0150**	.080	I	1-1/2	763308-C6	34.10
	1/8	**.0200**	.080	I	1-1/2	724708-C6	34.10
	1/4	**.0100**	.080	I	2-1/2	857516-C6	52.60
30°	1/8	**.0050**	.218	II	1-1/2	858308-C6	32.80
	1/8	**.0075**	.211	II	1-1/2	825508-C6	32.80
	1/8	**.0100**	.204	II	1-1/2	851208-C6	32.80
	1/8	**.0150**	.190	II	1-1/2	821208-C6	32.80
	1/8	**.0200**	.175	II	1-1/2	843708-C6	32.80
	1/8	**.0250**	.161	II	1-1/2	821008-C6	32.80
	3/16	**.0050**	.335	II	2	858312-C6	40.10
	3/16	**.0100**	.331	II	2	851212-C6	40.10
	1/4	**.0050**	.452	II	2-1/2	858316-C6	50.40
	1/4	**.0100**	.437	II	2-1/2	851216-C6	50.40
	1/4	**.0200**	.409	II	2-1/2	843716-C6	50.40
40°	1/8	**.0050**	.162	II	1-1/2	837508-C6	34.10
	1/8	**.0100**	.152	II	1-1/2	859308-C6	34.10
	1/4	**.0100**	.324	II	2-1/2	859316-C6	52.60
45°	1/8	**.0050**	.142	II	1-1/2	825808-C6	34.10
	1/8	**.0100**	.152	II	1-1/2	825708-C6	34.10
	1/8	**.0150**	.126	II	1-1/2	756608-C6	34.40
	1/4	**.0100**	.285	II	2-1/2	825716-C6	53.20

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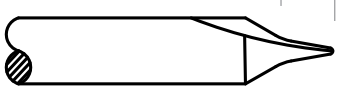
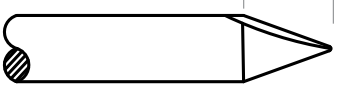
TYPE I



TYPE II



ENGRAVING CUTTERS

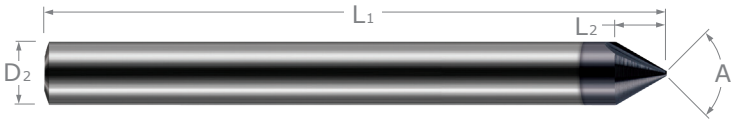
Tip Radius – 2 Flute – For Hardened Steels (cont.)

continued from previous page

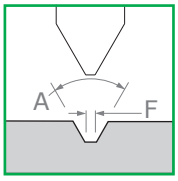
INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A $^{+0°30'}_{-0°30'}$	D_2	R	L_2		L_1	2 FL	PRICE
60°	1/8	**.0050**	.103	II	1-1/2	860008-C6	32.80
	1/8	**.0075**	.100	II	1-1/2	838108-C6	32.80
	1/8	**.0100**	.098	II	1-1/2	877308-C6	32.80
	1/8	**.0150**	.093	II	1-1/2	849008-C6	32.80
	1/8	**.0200**	.088	II	1-1/2	845808-C6	33.10
	1/8	**.0250**	.083	II	1-1/2	820908-C6	33.10
	3/16	**.0050**	.157	II	2	860012-C6	40.10
	3/16	**.0100**	.152	II	2	877312-C6	40.40
	3/16	**.0150**	.147	II	2	849012-C6	40.40
	1/4	**.0050**	.211	II	2-1/2	860016-C6	50.40
	1/4	**.0075**	.209	II	2-1/2	838116-C6	50.90
	1/4	**.0100**	.206	II	2-1/2	877316-C6	50.40
	1/4	**.0150**	.201	II	2-1/2	849016-C6	50.40
	1/4	**.0200**	.196	II	2-1/2	845816-C6	50.40
90°	1/8	**.0050**	.060	II	1-1/2	853108-C6	32.80
	1/8	**.0075**	.058	II	1-1/2	825908-C6	32.80
	1/8	**.0100**	.058	II	1-1/2	869408-C6	32.80
	1/8	**.0150**	.056	II	1-1/2	821108-C6	32.80
	1/8	**.0200**	.054	II	1-1/2	837108-C6	33.10
	1/8	**.0250**	.052	II	1-1/2	820808-C6	32.80
	3/16	**.0050**	.091	II	2	853112-C6	40.10
	3/16	**.0100**	.089	II	2	869412-C6	40.10
	1/4	**.0050**	.122	II	2-1/2	853116-C6	50.40
	1/4	**.0100**	.120	II	2-1/2	869416-C6	50.40
	1/4	**.0200**	.116	II	2-1/2	837116-C6	50.40
120°	1/8	**.0050**	.035	II	1-1/2	762908-C6	33.10
	1/8	**.0100**	.034	II	1-1/2	762408-C6	32.80

ENGRAVING CUTTERS

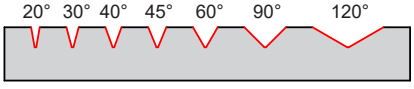
Tipped Off – 2 Flute – For Hardened Steels



2 Shallow Flute Design



- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tipped off end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA

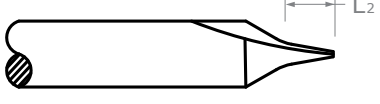


Stocked in Seven Included Angles!

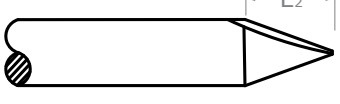
INCLUDED ANGLE	DIAMETER	TIP FLAT	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A +0°30' −0°30'	D_2	F	L_2		L_1	2 FL	PRICE
20°	1/8	**.005**	.080	I	1-1/2	775008-C6	27.70
	1/8	**.010**	.080	I	1-1/2	892508-C6	27.70
	1/4	**.010**	.080	I	2-1/2	892516-C6	44.70
30°	1/8	**.005**	.223	II	1-1/2	896708-C6	26.30
	1/8	**.008**	.218	II	1-1/2	763908-C6	26.70
	1/8	**.010**	.214	II	1-1/2	882008-C6	26.30
	1/8	**.015**	.205	II	1-1/2	817908-C6	26.30
	1/8	**.020**	.195	II	1-1/2	879608-C6	26.30
	1/8	**.030**	.177	II	1-1/2	817608-C6	26.30
	3/16	**.010**	.331	II	2	882012-C6	32.00
	1/4	**.010**	.447	II	2-1/2	882016-C6	42.60
40°	1/8	**.005**	.164	I	1-1/2	811708-C6	28.00
	1/8	**.010**	.157	II	1-1/2	875108-C6	27.70
	1/4	**.010**	.329	II	2-1/2	875116-C6	44.70
45°	1/8	**.005**	.144	II	1-1/2	811608-C6	28.00
	1/8	**.010**	.138	II	1-1/2	811508-C6	28.00
60°	1/8	**.005**	.103	II	1-1/2	866708-C6	26.30
	1/8	**.008**	.101	II	1-1/2	762508-C6	26.70
	1/8	**.010**	.099	II	1-1/2	889608-C6	26.30
	1/8	**.015**	.095	II	1-1/2	868108-C6	26.30
	1/8	**.020**	.090	II	1-1/2	892308-C6	26.30
	1/8	**.030**	.082	II	1-1/2	817508-C6	26.30
	3/16	**.005**	.158	II	2	866712-C6	32.30
	3/16	**.010**	.153	II	2	889612-C6	32.30
	1/4	**.005**	.212	II	2-1/2	866716-C6	42.60
	1/4	**.010**	.207	II	2-1/2	889616-C6	42.60
	1/4	**.020**	.199	II	2-1/2	892316-C6	42.60
	1/4	**.030**	.190	II	2-1/2	817516-C6	42.60

continued on next page

TYPE I



TYPE II



ENGRAVING CUTTERS

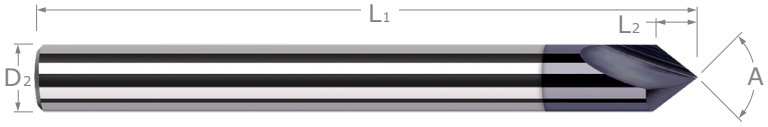
Tipped Off – 2 Flute – For Hardened Steels (cont.)

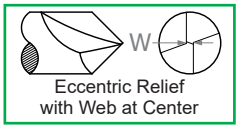
continued from previous page

INCLUDED ANGLE	DIAMETER	TIP FLAT	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A $^{+0°30'}_{-0°30'}$	D_2	F	L_2		L_1	2 FL	PRICE
90°	1/8	**.005**	.060	II	1-1/2	880908-C6	26.30
	1/8	**.010**	.057	II	1-1/2	876508-C6	26.30
	1/8	**.015**	.055	II	1-1/2	817708-C6	26.30
	1/8	**.020**	.052	II	1-1/2	868408-C6	26.30
	1/8	**.030**	.047	II	1-1/2	817408-C6	26.70
	3/16	**.005**	.091	II	2	880912-C6	32.30
	3/16	**.010**	.088	II	2	876512-C6	32.00
	1/4	**.005**	.122	II	2-1/2	880916-C6	42.90
	1/4	**.010**	.120	II	2-1/2	876516-C6	42.60
120°	1/8	**.010**	.033	II	1-1/2	865308-C6	26.30
	1/4	**.010**	.069	II	2-1/2	865316-C6	42.90

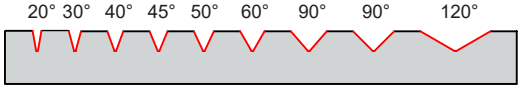
ENGRAVING CUTTERS

Marking Cutters for Ferrous Materials





- **Designed for milling legible part numbers in difficult-to-machine materials**
- Burr-free, two flute cutting design has improved strength over single point engravers
- Produces flat in bottom of groove
- Eccentric relief improves durability over half-round style engravers
- Requires less RPM than half-round engravers
- Solid carbide
- CNC ground in the USA



Stocked in Nine Included Angles

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	TYPE	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A $^{+1°}_{-1°}$	D_2	W	L_2		L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
20°	1/8	.005	.171	I	1-1/2	744608	22.60	744608-C3	28.10		
	1/8	.010	.171	I	1-1/2	743308	22.60	743308-C3	28.10		
30°	1/8	.003	.228	II	1-1/2	923908	20.60	923908-C3	26.10		
	1/8	.005	.224	II	1-1/2	47708	20.60	47708-C3	26.10	47708-C4	34.40
	1/8	.010	.215	II	1-1/2	996108	20.60	996108-C3	26.10		
	1/8	.015	.205	II	1-1/2	954008	20.60	954008-C3	26.10		
	3/16	.003	.344	II	2	923912	25.70	923912-C3	31.60		
	3/16	.005	.341	II	2	47712	25.70	47712-C3	31.60		
	3/16	.010	.331	II	2	996112	25.70	996112-C3	31.60		
	1/4	.003	.461	II	2-1/2	923916	36.00	923916-C3	44.10		
	1/4	.005	.457	II	2-1/2	47716	36.00	47716-C3	44.10		
	1/4	.010	.448	II	2-1/2	996116	36.00	996116-C3	44.10		
40°	1/8	.005	.165	II	1-1/2	995508	22.40	995508-C3	27.90	995508-C4	36.20
	1/8	.010	.158	II	1-1/2	996708	22.40	996708-C3	27.90		
	3/16	.005	.251	II	2	995512	28.40	995512-C3	34.30		
	3/16	.010	.244	II	2	996712	28.40	996712-C3	34.30		
	1/4	.005	.337	II	2-1/2	995516	39.70	995516-C3	47.80		
	1/4	.010	.330	II	2-1/2	996716	40.10	996716-C3	48.20		
45°	1/8	.005	.145	II	1-1/2	987408	22.00	987408-C3	27.50		
	3/16	.005	.220	II	2	987412	28.40	987412-C3	34.30		
	1/4	.005	.296	II	2-1/2	987416	39.70	987416-C3	47.80		
50°	1/8	.005	.129	II	1-1/2	976608	22.40	976608-C3	27.90		
	3/16	.005	.196	II	2	976612	28.50	976612-C3	34.50		
	1/4	.005	.263	II	2-1/2	976616	39.60	976616-C3	47.70		

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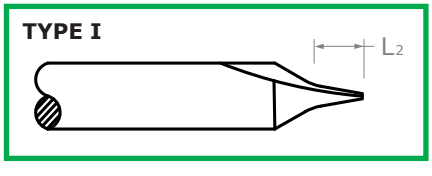
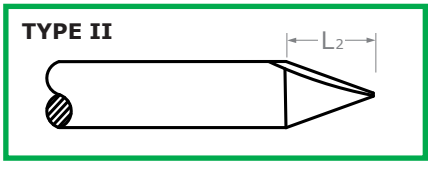




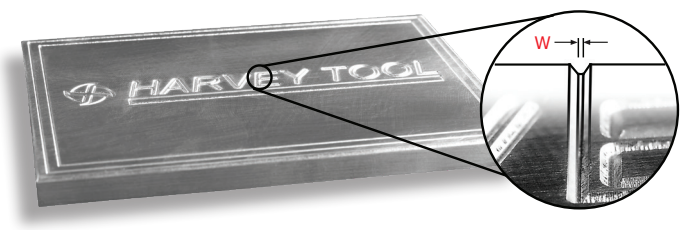
ENGRAVING CUTTERS

Marking Cutters for Ferrous Materials (cont.)

continued from previous page

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	TYPE	OAL		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A $^{+1°}_{-1°}$	D_2	W	L_2		L_1		2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
	1/8	.003	.106	II	1-1/2		905708	20.60	905708-C3	26.10		
	1/8	.005	.104	II	1-1/2		29608	20.60	29608-C3	26.10	29608-C4	34.40
	1/8	.005	.104	II	3	LONG!	957808	25.30	957808-C3	30.80		
	1/8	.010	.100	II	1-1/2		48308	20.60	48308-C3	26.10	48308-C4	34.40
60°	1/8	.015	.095	II	1-1/2		948108	20.60	948108-C3	26.10		
	3/16	.003	.160	II	2		905712	25.70	905712-C3	31.60		
	3/16	.005	.158	II	2		29612	25.70	29612-C3	31.60	29612-C4	41.20
	3/16	.010	.154	II	2		48312	25.70	48312-C3	31.60		
	3/16	.015	.149	II	2		948112	25.70	948112-C3	31.60		
	1/4	.003	.214	II	2-1/2		905716	36.00	905716-C3	44.10		
	1/4	.005	.212	II	2-1/2		29616	36.00	29616-C3	44.10	29616-C4	57.80
60°	1/4	.010	.208	II	2-1/2		48316	36.00	48316-C3	44.10		
	1/4	.015	.204	II	2-1/2		948116	36.00	948116-C3	44.10		
	3/8	.005	.320	II	2-1/2		29624	45.60	29624-C3	56.20		
82°	1/8	.005	.069	II	1-1/2		974108	22.40	974108-C3	27.90		
	1/8	.003	.061	II	1-1/2		914608	20.60	914608-C3	26.10		
	1/8	.005	.060	II	1-1/2		23608	20.60	23608-C3	26.10	23608-C4	34.40
	1/8	.005	.060	II	3	LONG!	968108	25.30	968108-C3	30.80		
	1/8	.010	.058	II	1-1/2		50408	20.60	50408-C3	26.10	50408-C4	34.40
	1/8	.015	.055	II	1-1/2		939708	20.60	939708-C3	26.10		
	3/16	.003	.092	II	2		914612	25.70	914612-C3	31.60		
90°	3/16	.005	.091	II	2		23612	25.70	23612-C3	31.60	23612-C4	42.50
	3/16	.010	.089	II	2		50412	25.70	50412-C3	31.60		
	3/16	.015	.086	II	2		939712	25.70	939712-C3	31.60		
	1/4	.003	.124	II	2-1/2		914616	36.00	914616-C3	44.10		
	1/4	.005	.123	II	2-1/2		23616	36.00	23616-C3	44.10	23616-C4	57.80
	1/4	.010	.120	II	2-1/2		50416	36.00	50416-C3	44.10		
	1/4	.015	.118	II	2-1/2		939716	36.00	939716-C3	44.10		
	3/8	.005	.185	II	2-1/2		23600	45.60	23600-C3	56.20		
	1/8	.003	.035	II	1-1/2		844808	20.60	844808-C3	26.10		
	1/8	.005	.035	II	1-1/2		23708	20.60	23708-C3	26.10	23708-C4	34.40
	1/8	.010	.033	II	1-1/2		998808	21.10	998808-C3	26.60		
120°	3/16	.005	.053	II	2		23712	25.70	23712-C3	31.60		
	3/16	.010	.051	II	2		998812	25.70	998812-C3	31.60		
	1/4	.005	.071	II	2-1/2		23716	36.00	23716-C3	44.10		
	1/4	.010	.069	II	2-1/2		998816	36.00	998816-C3	44.10		

For Marking Cutters for Non-Ferrous Materials, please see page 356.

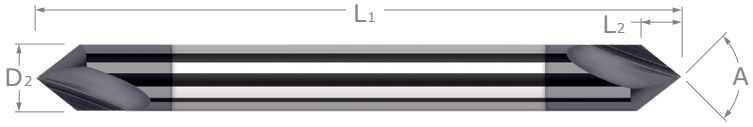


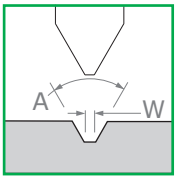
Produces Flat in Bottom of Groove

NEW!

ENGRAVING CUTTERS

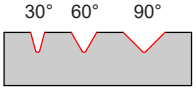
Marking Cutters – Double-Ended





- Double-ended
- Designed for milling legible part numbers in difficult-to-machine materials
- Burr free 2 flute cutting design has improved strength over single point engravers
- Produces flat in bottom of groove
- Eccentric relief improves durability over half round style engravers
- Requires less RPM than half round engravers
- Solid carbide
- CNC ground in the USA

Flat Relief with Web at Center

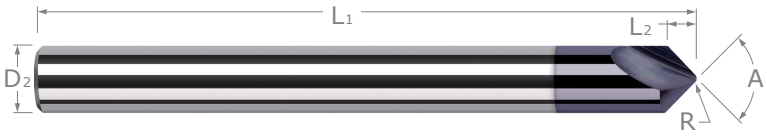


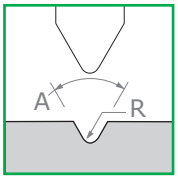
Stocked in Three Included Angles!

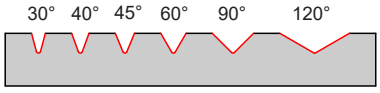
INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OAL	UNCOATED		AlTiN COATED		
A $^{+1°}_{-1°}$	D_2	W	L_2	L_1	2 FL	PRICE	2 FL	PRICE	
30°	1/8	.005	.224	1-1/2	713808	35.50	713808-C3	41.00	NEW
	1/8	.010	.215	1-1/2	713508	35.50	713508-C3	41.00	NEW
60°	1/8	.005	.104	1-1/2	713708	35.50	713708-C3	41.00	NEW
	1/8	.010	.100	1-1/2	713408	35.50	713408-C3	41.00	NEW
90°	1/8	.005	.060	1-1/2	713608	35.50	713608-C3	41.00	NEW
	1/8	.010	.058	1-1/2	713308	35.50	713308-C3	41.00	NEW

ENGRAVING CUTTERS

Marking Cutters – Tip Radius







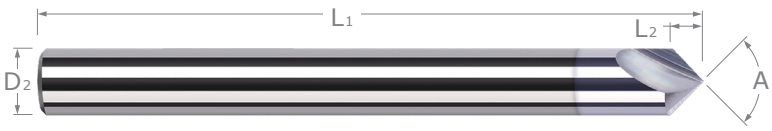
Stocked in Six Included Angles!

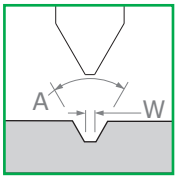
- **Designed for milling legible part numbers in difficult-to-machine materials**
- Radiused tip design for improved strength
- 2 flute cutting design has improved strength over single point engravers
- Produces radius in bottom of groove
- Solid carbide • CNC ground in the USA

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_2	R	L_2	L_1	2 FL	PRICE	2 FL	PRICE
30°	1/8	.0050	.218	1-1/2	987615	25.50	987615-C3	31.00
	1/8	.0100	.204	1-1/2	961915	25.50	961915-C3	31.00
	1/8	.0150	.190	1-1/2	981815	25.50	981815-C3	31.00
	3/16	.0050	.335	2	958715	31.70	958715-C3	37.70
	3/16	.0100	.321	2	947215	31.10	947215-C3	37.00
	1/4	.0050	.452	2-1/2	966815	41.70	966815-C3	49.80
	1/4	.0100	.437	2-1/2	954915	41.70	954915-C3	49.80
40°	1/8	.0050	.162	1-1/2	987640	28.10	987640-C3	33.60
	1/8	.0100	.152	1-1/2	961940	28.10	961940-C3	33.60
	1/8	.0150	.142	1-1/2	981820	28.10	981820-C3	33.60
45°	1/8	.0050	.143	1-1/2	987622	28.10	987622-C3	33.60
	1/8	.0100	.135	1-1/2	961922	28.10	961922-C3	33.60
60°	1/8	.0050	.103	1-1/2	987630	25.50	987630-C3	31.00
	1/8	.0075	.100	1-1/2	926330	25.50	926330-C3	31.00
	1/8	.0100	.098	1-1/2	961930	25.50	961930-C3	31.00
	1/8	.0150	.093	1-1/2	981830	25.50	981830-C3	31.00
	1/8	.0200	.088	1-1/2	918430	25.50	918430-C3	31.00
	3/16	.0050	.157	2	958730	31.10	958730-C3	37.00
	3/16	.0100	.152	2	947230	31.10	947230-C3	37.00
	3/16	.0150	.147	2	914330	31.10	914330-C3	37.00
	1/4	.0050	.211	2-1/2	966830	41.70	966830-C3	49.80
	1/4	.0100	.206	2-1/2	954930	41.70	954930-C3	49.80
	1/4	.0150	.201	2-1/2	909730	41.70	909730-C3	49.80
	1/4	.0200	.197	2-1/2	831430	41.70	831430-C3	49.80
90°	1/8	.0050	.060	1-1/2	987645	25.50	987645-C3	31.00
	1/8	.0075	.059	1-1/2	926345	25.50	926345-C3	31.00
	1/8	.0100	.058	1-1/2	961945	25.50	961945-C3	31.00
	1/8	.0150	.056	1-1/2	981845	25.50	981845-C3	31.00
	1/8	.0200	.054	1-1/2	918445	25.50	918445-C3	31.00
	3/16	.0050	.091	2	958745	31.10	958745-C3	37.00
	3/16	.0100	.089	2	947245	31.10	947245-C3	37.00
	3/16	.0150	.087	2	914345	31.10	914345-C3	36.90
	1/4	.0050	.122	2-1/2	966845	41.70	966845-C3	49.80
	1/4	.0075	.122	2-1/2	830745	42.50	830745-C3	50.50
	1/4	.0100	.120	2-1/2	954945	41.70	954945-C3	49.80
	1/4	.0150	.118	2-1/2	909745	41.70	909745-C3	49.80
	1/4	.0200	.117	2-1/2	831445	41.70	831445-C3	49.80
120°	1/8	.0050	.035	1-1/2	987660	25.50	987660-C3	31.00
	1/8	.0100	.034	1-1/2	961960	25.90	961960-C3	31.40

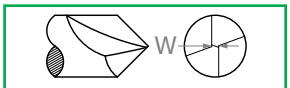
ENGRAVING CUTTERS

Marking Cutters for Non-Ferrous Materials

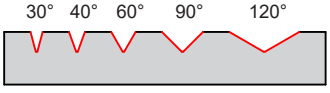




- **Designed for milling legible part numbers in non-ferrous and easy-to-machine materials**
- 2 flute cutting design has improved strength over single point engravers
- Flat relief design for improved results in aluminum and other non-ferrous applications
- Produces flat in bottom of groove
- Solid carbide
- CNC ground in the USA



Flat Relief with Web at Center

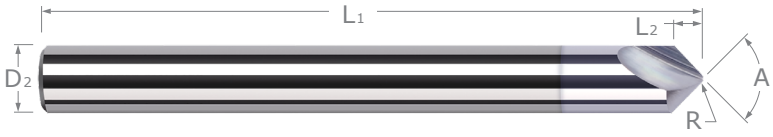


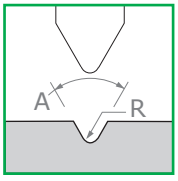
Stocked in Five Included Angles!

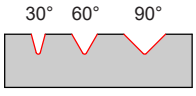
INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_2	W	L_2	L_1	2 FL	PRICE	2 FL	PRICE
30°	1/8	.005	.230	1-1/2	993215	20.60	993215-C8	28.70
	1/8	.010	.228	1-1/2	963215	20.60	963215-C8	28.70
	1/8	.015	.225	1-1/2	902915	20.60	902915-C8	27.70
	3/16	.005	.347	2	987815	25.70	987815-C8	33.70
	1/4	.005	.461	2-1/2	967415	36.00	967415-C8	45.20
40°	1/8	.005	.170	1-1/2	993220	22.40	993220-C8	30.50
	1/8	.010	.168	1-1/2	963220	22.40	963220-C8	29.50
	3/16	.005	.255	2	987820	26.30	987820-C8	34.30
	1/4	.005	.339	2-1/2	967420	36.60	967420-C8	45.70
60°	1/8	.005	.107	1-1/2	993230	20.60	993230-C8	28.70
	1/8	.010	.106	1-1/2	963230	20.60	963230-C8	27.70
	1/8	.015	.104	1-1/2	902930	20.60	902930-C8	28.70
	3/16	.005	.161	2	987830	25.70	987830-C8	33.70
	3/16	.010	.160	2	921230	25.70	921230-C8	33.70
	1/4	.005	.215	2-1/2	967430	36.00	967430-C8	45.20
	1/4	.010	.214	2-1/2	918630	36.00	918630-C8	45.20
90°	1/8	.005	.062	1-1/2	993245	20.60	993245-C8	28.70
	1/8	.010	.061	1-1/2	963245	20.60	963245-C8	28.70
	1/8	.015	.060	1-1/2	902945	20.60	902945-C8	27.70
	3/16	.005	.093	2	987845	25.70	987845-C8	33.70
	3/16	.010	.092	2	921245	26.20	921245-C8	34.20
	1/4	.005	.124	2-1/2	967445	36.00	967445-C8	45.20
	1/4	.010	.123	2-1/2	918645	36.00	918645-C8	45.20
120°	1/8	.005	.036	1-1/2	993260	20.60	993260-C8	28.70
	1/8	.010	.035	1-1/2	963260	21.10	963260-C8	28.20

ENGRAVING CUTTERS

Marking Cutters – Tip Radius for Non-Ferrous Materials







Stocked in Three Included Angles!

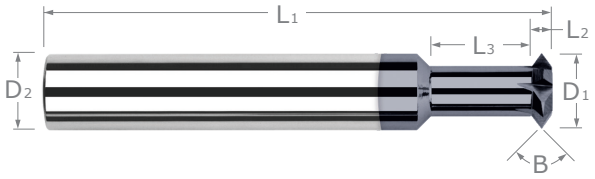
- **Designed for milling legible part numbers in non-ferrous and easy-to-machine materials**
- Radiused tip design for improved strength
- Flat relief design for improved results
- Solid carbide
- CNC ground in the USA

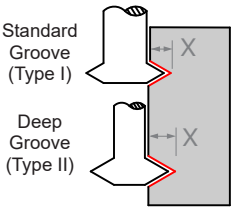
INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_2	R	L_2	L_1	2 FL	PRICE	2 FL	PRICE
30°	1/8	**.005**	.219	1-1/2	847115	25.50	847115-C8	33.50
	1/8	**.010**	.205	1-1/2	854415	25.50	854415-C8	33.50
	1/8	**.015**	.190	1-1/2	738115	25.50	738115-C8	33.50
	1/4	**.005**	.452	2-1/2	774915	38.10	774915-C8	48.40
60°	1/8	**.005**	.103	1-1/2	847130	25.50	847130-C8	33.50
	1/8	**.010**	.098	1-1/2	854430	25.50	854430-C8	33.50
	1/8	**.015**	.093	1-1/2	738130	25.50	738130-C8	33.50
	3/16	**.005**	.336	2	724430	31.40	724430-C8	39.40
	3/16	**.010**	.321	2	724330	31.40	724330-C8	39.40
	1/4	**.005**	.212	2-1/2	774930	37.20	774930-C8	46.40
90°	1/8	**.005**	.060	1-1/2	847145	25.50	847145-C8	33.50
	1/8	**.010**	.058	1-1/2	854445	25.50	854445-C8	33.50
	1/8	**.015**	.056	1-1/2	738145	25.50	738145-C8	33.50
	1/4	**.005**	.123	2-1/2	774945	37.20	774945-C8	46.40

NEW SIZES!

DOUBLE ANGLE SHANK CUTTERS

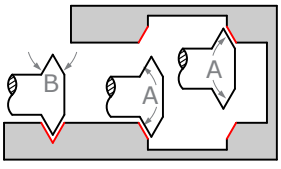
Pointed





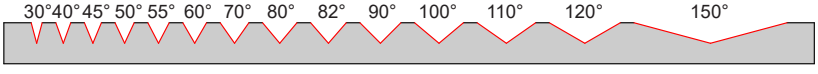
- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced neck for long reach machining
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide
- CNC ground in the USA

Great for Chamfering and Deburring



Included Angle Conversion

A = 180 - B	150°	140°	135°	130°	125°	120°	110°	100°	98°	90°	80°	70°	60°	30°
B = 180 - A	30°	40°	45°	50°	55°	60°	70°	80°	82°	90°	100°	110°	120°	150°



Included Angle (B) | Stocked in Fourteen Included Angles!

INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B +1° −1°	D1 +.000″ −.002″	L2		L3 +.020″ −.000″			D2	L1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
30°	1/16	.008	1/32	**.093**	I	2	1/8	1-1/2	66062	55.30	66062-C3	60.80		
	5/64	.010	.039	**.118**	I	2	1/8	1-1/2	66078	55.30	66078-C3	60.80		
	3/32	.012	3/64	**.141**	I	2	1/8	1-1/2	66093	55.30	66093-C3	60.80		
	1/8	.017	1/16	**.187**	I	4	1/8	1-1/2	66108	54.00	66108-C3	59.50		
	1/8	.017	1/16	**.500**	I	4	1/8	1-1/2	934308	55.30	934308-C3	60.80		
	3/16	.025	3/32	**.312**	I	4	3/16	2	66112	56.00	66112-C3	61.90		
	1/4	.033	1/8	**.312**	I	4	1/4	2	66116	71.10	66116-C3	79.10		
	1/4	.033	1/8	**.625**	I	4	1/4	2	921716	83.80	921716-C3	91.90		
	3/8	.033	1/4	**.500**	I	6	3/8	2-1/2	66105	95.40	66105-C3	106.00		
	3/8	.033	1/4	**1.500**	I	6	3/8	3-1/2	934324	111.40	934324-C3	122.10		
	1/2	.050	5/16	**.500**	I	6	1/2	3	66110	129.00	66110-C3	145.00		
	1/2	.050	5/16	**1.500**	I	6	1/2	4	934332	164.50	934332-C3	180.50		
40°	1/4	.045	1/8	**.312**	I	4	1/4	2	29720	71.60	29720-C3	79.70		
	1/4	.045	1/8	**.625**	I	4	1/4	2	918116	84.90	918116-C3	92.90		
	3/8	.045	1/4	**.500**	I	6	3/8	2-1/2	909924	92.30	909924-C3	102.90		
	3/8	.045	1/4	**1.500**	I	6	3/8	3-1/2	967505	114.60	967505-C3	125.90		
	1/2	.068	5/16	**.500**	I	6	1/2	3	909932	123.40	909932-C3	139.40		
	1/2	.068	5/16	**1.500**	I	6	1/2	4	967510	160.40	967510-C3	176.40		
45°	1/8	.026	1/16	**.187**	I	4	1/8	1-1/2	905608	55.30	905608-C3	60.80		
	3/16	.039	3/32	**.312**	I	4	3/16	2	905612	56.00	905612-C3	61.90		
	3/16	.039	3/32	**.750**	I	4	3/16	2-1/2	984902	65.30	984902-C3	71.20		
	1/4	.052	1/8	**.312**	I	4	1/4	2	29723	71.10	29723-C3	79.10		
	1/4	.052	1/8	**.625**	I	4	1/4	2	917016	83.80	917016-C3	91.90		
	1/4	.052	1/8	**1.000**	I	4	1/4	3	984903	87.10	984903-C3	95.20		
	3/8	.052	1/4	**.500**	I	6	3/8	2-1/2	905624	90.00	905624-C3	100.60		
	3/8	.052	1/4	**1.000**	I	6	3/8	2-1/2	917024	102.70	917024-C3	113.30		
	3/8	.052	1/4	**1.500**	I	6	3/8	3-1/2	984905	111.90	984905-C3	122.60		
	1/2	.078	5/16	**.500**	I	6	1/2	3	905632	122.80	905632-C3	138.70		
	1/2	.078	5/16	**1.500**	I	6	1/2	4	984910	159.70	984910-C3	175.70		

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DOUBLE ANGLE SHANK CUTTERS

Pointed (cont.)

continued from previous page

	INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
	B +1° −1°	D1 +.000″ −.002″	L2		L3 +.020″ −.000″			D2	L1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	50°	1/8	.029	1/16	**.187**	I	4	1/8	1-1/2	985801	54.50	985801-C3	60.00		
		1/8	.029	1/16	**.500**	I	4	1/8	1-1/2	974401	65.00	974401-C3	70.50		
		3/16	.044	3/32	**.312**	I	4	3/16	2	985802	57.00	985802-C3	63.00		
		3/16	.044	3/32	**.750**	I	4	3/16	2-1/2	974402	66.30	974402-C3	72.50		
		1/4	.058	1/8	**.312**	I	4	1/4	2	29725	75.60	29725-C3	83.70		
		1/4	.058	1/8	**1.000**	I	4	1/4	3	974403	89.20	974403-C3	97.30		
		3/8	.058	1/4	**.500**	I	6	3/8	2-1/2	985805	94.80	985805-C3	105.40		
		3/8	.058	1/4	**1.500**	I	6	3/8	3-1/2	974405	116.30	974405-C3	127.60		
		1/2	.088	5/16	**.500**	I	6	1/2	3	985810	129.30	985810-C3	145.30		
		1/2	.088	5/16	**1.500**	I	6	1/2	4	974410	162.70	974410-C3	178.10		
	55°	1/4	.065	1/8	**.312**	I	4	1/4	2	29728	76.00	29728-C3	84.10		
	60°	1/16	.018	1/32	**.093**	I	2	1/8	1-1/2	47362	53.60	47362-C3	59.10		
		1/16	.018	1/32	**.156**	I	2	1/8	1-1/2	965562	53.60	965562-C3	59.10		
		5/64	.023	.039	**.118**	I	2	1/8	1-1/2	47378	53.60	47378-C3	59.10		
		3/32	.027	3/64	**.141**	I	2	1/8	1-1/2	47393	53.60	47393-C3	59.10		
		3/32	.027	3/64	**.250**	I	2	1/8	1-1/2	965593	53.60	965593-C3	59.10		
		1/8	.036	1/16	**.125**	I	4	1/8	1-1/2	937501	49.50	937501-C3	55.00		
		1/8	.036	1/16	**.187**	I	4	1/8	1-1/2	16201	49.50	16201-C3	55.00		
		1/8	.036	1/16	**.312**	I	4	1/8	1-1/2	984401	55.70	984401-C3	61.20		
		1/8	.036	1/16	**.500**	I	4	1/8	2	27501	60.60	27501-C3	66.10		
		1/8	.036	1/16	**.875**	I	4	1/8	2	981001	66.20	981001-C3	71.70		
		5/32	.045	5/64	**.250**	I	4	3/16	2	16256	53.60	16256-C3	59.60		
		5/32	.045	5/64	**.625**	I	4	3/16	2-1/2	27556	60.60	27556-C3	66.60		
		3/16	.055	3/32	**.187**	I	4	3/16	2	937502	52.70	937502-C3	58.50		
		3/16	.055	3/32	**.312**	I	4	3/16	2	16202	52.70	16202-C3	58.70		
		3/16	.055	3/32	**.500**	I	4	3/16	2	984402	61.00	984402-C3	67.00		
		3/16	.055	3/32	**.750**	I	4	3/16	2-1/2	27502	64.80	27502-C3	70.80		
		3/16	.055	3/32	**1.000**	I	4	3/16	2-1/2	925502	67.80	925502-C3	73.70		
		1/4	.072	1/8	**.187**	I	4	1/4	2	937503	71.10	937503-C3	79.10		
NEW		1/4	.072	1/8	**.312**	I	4	1/4	2	16203	71.10	16203-C3	79.10	16203-C6	79.60
		1/4	.072	1/8	**.312**	I	6	1/4	2	808016	76.20	808016-C3	84.30		
		1/4	.072	1/8	**.625**	I	4	1/4	2-1/2	984403	79.80	984403-C3	87.90		
		1/4	.072	1/8	**1.000**	I	4	1/4	3	27503	85.20	27503-C3	93.30		
		1/4	.072	1/8	**1.312**	I	4	1/4	3	925503	85.60	925503-C3	93.10		
		1/4	.072	1/8	**1.750**	I	4	1/4	3	981003	86.80	981003-C3	94.80		
		5/16	.072	3/16	**.375**	I	6	5/16	2-1/2	16272	86.20	16272-C3	95.70		
		5/16	.072	3/16	**.875**	I	6	5/16	2-1/2	984472	88.80	984472-C3	98.20		
		3/8	.072	1/4	**.312**	I	6	3/8	2-1/2	937505	90.80	937505-C3	101.40		
NEW		3/8	.072	1/4	**.500**	I	6	3/8	2-1/2	16205	90.80	16205-C3	101.40	16205-C6	103.70
		3/8	.072	1/4	**.750**	I	6	3/8	2-1/2	773305	96.50	773305-C3	107.10		
NEW		3/8	.072	1/4	**1.000**	I	6	3/8	2-1/2	984405	102.30	984405-C3	112.90	984405-C6	115.20
		3/8	.072	1/4	**1.500**	I	6	3/8	3-1/2	27505	113.70	27505-C3	124.40		
		3/8	.072	1/4	**2.000**	I	6	3/8	3-1/2	925505	119.10	925505-C3	129.80		
		1/2	.109	5/16	**.500**	I	6	1/2	3	16210	124.30	16210-C3	140.30		
		1/2	.109	5/16	**.750**	I	6	1/2	3	773310	129.20	773310-C3	145.20		
		1/2	.109	5/16	**1.000**	I	6	1/2	3	984410	135.40	984410-C3	151.40		
		1/2	.109	5/16	**1.250**	I	6	1/2	3-1/2	762310	146.90	762310-C3	162.90		
NEW		1/2	.109	5/16	**1.500**	I	6	1/2	4	27510	158.40	27510-C3	174.40	27510-C6	177.20
		1/2	.109	5/16	**2.000**	I	6	1/2	4	925510	162.50	925510-C3	178.50		
		1/2	.109	5/16	**2.625**	I	6	1/2	4	981010	166.70	981010-C3	182.70		
		5/8	.144	3/8	**.750**	I	6	5/8	3-1/2	16215	223.80	16215-C3	239.80		

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NEW SIZES!

DOUBLE ANGLE SHANK CUTTERS

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		L_3 $^{+.020″}_{-.000″}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
70°	1/4	.088	1/8	**.312**	I	4	1/4	2	871903	76.00	871903-C3	84.10		
	3/8	.088	1/4	**1.500**	I	6	3/8	3-1/2	791005	120.00	791005-C3	130.70		
80°	1/4	.105	1/8	**.312**	I	4	1/4	2	29740	76.00	29740-C3	84.10		
	3/8	.105	1/4	**1.500**	I	6	3/8	3-1/2	792005	122.30	792005-C3	133.00		
82°	1/4	.109	1/8	**.312**	I	4	1/4	2	29741	76.00	29741-C3	84.10		
	3/8	.109	1/4	**1.500**	I	6	3/8	3-1/2	920805	122.30	920805-C3	133.00		
	1/2	.163	5/16	**1.500**	I	6	1/2	4	920810	167.30	920810-C3	183.30		
90°	1/32	.015	.016	**.062**	I	2	1/8	1-1/2	807002	49.20	807002-C3	54.70		
	1/32	.015	.016	**.093**	I	2	1/8	1-1/2	45131	48.30	45131-C3	53.80		
	1/32	.015	.016	**.125**	I	2	1/8	1-1/2	71604	49.20	71604-C3	54.70		
	1/16	.031	1/32	**.062**	I	2	1/8	1-1/2	946862	48.30	946862-C3	53.80		
	1/16	.031	1/32	**.093**	I	2	1/8	1-1/2	19162	48.30	19162-C3	53.80		
	1/16	.031	1/32	**.093**	I	4	1/8	1-1/2	838804	48.30	838804-C3	53.80		
	1/16	.031	1/32	**.125**	I	2	1/8	1-1/2	807662	48.30	807662-C3	53.80		
	1/16	.031	1/32	**.156**	I	2	1/8	1-1/2	45162	53.60	45162-C3	59.10		
	1/16	.031	1/32	**.156**	I	4	1/8	1-1/2	832404	56.40	832404-C3	61.90		
	1/16	.031	1/32	**.187**	I	2	1/8	1-1/2	822104	58.80	822104-C3	64.30		
	1/16	.031	1/32	**.250**	I	2	1/8	1-1/2	71662	58.80	71662-C3	64.30		
	1/16	.031	1/32	**.250**	I	4	1/8	1-1/2	792962	60.00	792962-C3	65.50		
	1/16	.031	1/32	**.312**	I	2	1/8	1-1/2	857862	58.80	857862-C3	64.30		
	1/16	.031	1/32	**.375**	I	2	1/8	1-1/2	963662	58.80	963662-C3	64.30		
	1/16	.031	1/32	**.437**	I	2	1/8	1-1/2	855762	60.00	855762-C3	65.50		
	5/64	.039	.039	**.078**	I	2	1/8	1-1/2	946878	48.30	946878-C3	53.80		
	5/64	.039	.039	**.093**	I	2	1/8	1-1/2	807105	48.30	807105-C3	53.80		
	5/64	.039	.039	**.118**	I	2	1/8	1-1/2	19178	48.30	19178-C3	53.80		
	5/64	.039	.039	**.125**	I	2	1/8	1-1/2	807005	48.30	807005-C3	53.80		
	5/64	.039	.039	**.187**	I	2	1/8	1-1/2	45178	53.60	45178-C3	59.10		
	5/64	.039	.039	**.187**	I	4	1/8	1-1/2	832405	56.40	832405-C3	61.90		
	5/64	.039	.039	**.250**	I	2	1/8	1-1/2	822178	56.40	822178-C3	63.40		
	5/64	.039	.039	**.312**	I	2	1/8	1-1/2	71678	58.80	71678-C3	64.30		
	5/64	.039	.039	**.312**	I	4	1/8	1-1/2	792978	60.00	792978-C3	65.50		
	5/64	.039	.039	**.375**	I	2	1/8	1-1/2	771978	60.00	771978-C3	65.50		
	5/64	.039	.039	**.500**	I	2	1/8	1-1/2	963678	58.80	963678-C3	64.30		
	3/32	.047	3/64	**.093**	I	2	1/8	1-1/2	946893	48.30	946893-C3	53.80		
	3/32	.047	3/64	**.125**	I	2	1/8	1-1/2	807106	48.30	807106-C3	53.80		
	3/32	.047	3/64	**.141**	I	2	1/8	1-1/2	19193	48.30	19193-C3	53.80		
	3/32	.047	3/64	**.141**	I	4	1/8	1-1/2	838806	48.30	838806-C3	53.80		
	3/32	.047	3/64	**.187**	I	2	1/8	1-1/2	807693	48.30	807693-C3	53.80		
	3/32	.047	3/64	**.250**	I	2	1/8	1-1/2	45193	53.60	45193-C3	59.10		
	3/32	.047	3/64	**.250**	I	4	1/8	1-1/2	832406	56.40	832406-C3	61.90		
	3/32	.047	3/64	**.312**	I	2	1/8	1-1/2	807493	58.80	807493-C3	64.30		
	3/32	.047	3/64	**.375**	I	2	1/8	1-1/2	71693	58.80	71693-C3	64.30		
	3/32	.047	3/64	**.375**	I	4	1/8	1-1/2	792906	58.80	792906-C3	64.30		
	3/32	.047	3/64	**.500**	I	2	1/8	1-1/2	857893	58.80	857893-C3	64.30		
	3/32	.047	3/64	**.625**	I	2	1/8	2	963693	61.00	963693-C3	66.50		
	3/32	.047	3/64	**.750**	I	2	1/8	2	855793	63.60	855793-C3	69.10		
	3 mm	.059	.059	**.187**	I	2	1/8	1-1/2	1913M	49.00	1913M-C3	54.50		
	3 mm	.059	.059	**.250**	I	2	1/8	1-1/2	80763M	57.40	80763M-C3	62.90		
	3 mm	.059	.059	**.312**	I	2	1/8	1-1/2	4513M	56.40	4513M-C3	61.90		
	3 mm	.059	.059	**.438**	I	2	1/8	1-1/2	82213M	64.60	82213M-C3	70.10		

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DOUBLE ANGLE SHANK CUTTERS

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		L_3 $^{+.020″}_{-.000″}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
	1/8	.062	1/16	**.125**	I	4	1/8	1-1/2	946901	48.30	946901-C3	53.80		
	1/8	.062	1/16	**.125**	I	6	1/8	1-1/2	791908	48.30	791908-C3	53.80		
	1/8	.062	1/16	**.187**	I	4	1/8	1-1/2	19201	48.30	19201-C3	53.80	19201-C6	56.30
	1/8	.083	.042	**.187**	II	4	1/8	1-1/2	759908	53.50	759908-C3	59.00		
	1/8	.062	1/16	**.187**	I	6	1/8	1-1/2	838808	50.60	838808-C3	56.10	838808-C6	58.70
	1/8	.062	1/16	**.250**	I	4	1/8	1-1/2	807308	51.20	807308-C3	56.70		
	1/8	.062	1/16	**.312**	I	4	1/8	1-1/2	72601	54.20	72601-C3	59.70		
	1/8	.062	1/16	**.312**	I	6	1/8	1-1/2	847408	56.90	847408-C3	62.40		
	1/8	.062	1/16	**.375**	I	4	1/8	1-1/2	806908	54.20	806908-C3	59.70		
	1/8	.062	1/16	**.500**	I	4	1/8	2	19501	62.60	19501-C3	68.10		
	1/8	.062	1/16	**.500**	I	6	1/8	2	807908	65.40	807908-C3	70.90		
	1/8	.062	1/16	**.625**	I	4	1/8	2	71701	64.80	71701-C3	70.30		
	1/8	.062	1/16	**.750**	I	4	1/8	2	821808	66.40	821808-C3	71.90		
	1/8	.062	1/16	**.875**	I	4	1/8	2	26801	68.20	26801-C3	73.70		
	1/8	.062	1/16	**1.000**	I	4	1/8	2	772301	71.50	772301-C3	77.00		
	1/8	.062	1/16	**1.125**	I	4	1/8	2-1/2	963701	75.00	963701-C3	80.50		
	5/32	.078	5/64	**.125**	I	4	3/16	2	771056	48.80	771056-C3	54.80		
	5/32	.078	5/64	**.156**	I	4	3/16	2	946956	48.80	946956-C3	54.80		
	5/32	.078	5/64	**.187**	I	4	3/16	2	807157	48.80	807157-C3	54.80		
	5/32	.078	5/64	**.250**	I	4	3/16	2	19256	51.30	19256-C3	57.30		
	5/32	.078	5/64	**.250**	I	6	3/16	2	838810	52.90	838810-C3	58.90		
	5/32	.078	5/64	**.375**	I	4	3/16	2	807310	55.00	807310-C3	61.00		
	5/32	.078	5/64	**.437**	I	4	3/16	2	72656	58.80	72656-C3	64.80		
	5/32	.078	5/64	**.500**	I	4	3/16	2	807210	58.80	807210-C3	64.80		
	5/32	.078	5/64	**.625**	I	4	3/16	2-1/2	19556	63.40	19556-C3	69.30		
	5/32	.078	5/64	**.875**	I	4	3/16	2-1/2	71756	68.30	71756-C3	74.30		
90°	5/32	.078	5/64	**1.125**	I	4	3/16	2-1/2	26856	70.70	26856-C3	76.70		
	3/16	.095	3/32	**.156**	I	4	3/16	2	771002	49.40	771002-C3	55.40		
	3/16	.095	3/32	**.187**	I	4	3/16	2	946902	49.40	946902-C3	55.40		
	3/16	.095	3/32	**.187**	I	6	3/16	2	807812	52.10	807812-C3	58.00		
	3/16	.095	3/32	**.250**	I	4	3/16	2	807112	50.30	807112-C3	56.20		
	3/16	.095	3/32	**.312**	I	4	3/16	2	19202	50.30	19202-C3	56.20	19202-C6	59.00
	3/16	.125	1/16	**.312**	II	4	3/16	2	759912	57.40	759912-C3	63.40		
	3/16	.095	3/32	**.312**	I	6	3/16	2	838812	53.00	838812-C3	59.00	838812-C6	61.70
	3/16	.095	3/32	**.375**	I	4	3/16	2	807312	55.00	807312-C3	61.00		
	3/16	.095	3/32	**.500**	I	4	3/16	2	72602	59.90	72602-C3	65.80		
	3/16	.095	3/32	**.500**	I	6	3/16	2	847412	62.70	847412-C3	68.70		
	3/16	.095	3/32	**.625**	I	4	3/16	2	807212	63.60	807212-C3	69.50		
	3/16	.095	3/32	**.750**	I	4	3/16	2-1/2	19502	63.60	19502-C3	69.50		
	3/16	.095	3/32	**.750**	I	6	3/16	2-1/2	822612	65.00	822612-C3	71.00		
	3/16	.095	3/32	**1.000**	I	4	3/16	2-1/2	71702	69.50	71702-C3	75.40		
	3/16	.095	3/32	**1.000**	I	6	3/16	2-1/2	755912	76.40	755912-C3	82.40		
	3/16	.095	3/32	**1.312**	I	4	3/16	2-1/2	26802	71.10	26802-C3	77.00		
	3/16	.095	3/32	**1.625**	I	4	3/16	3	963702	79.00	963702-C3	84.90		
	6 mm	.118	.118	**.312**	I	4	1/4	2	19262	78.70	19262-C3	86.70		
	6 mm	.118	.118	**.625**	I	4	1/4	2	72662	81.30	72662-C3	89.40		
	6 mm	.118	.118	**1.000**	I	4	1/4	2-1/2	19562	83.90	19562-C3	92.00		
	1/4	.125	1/8	**.187**	I	4	1/4	2	946903	60.60	946903-C3	68.70		
	1/4	.125	1/8	**.250**	I	4	1/4	2	807116	61.70	807116-C3	69.70		
	1/4	.125	1/8	**.312**	I	4	1/4	2	19203	61.70	19203-C3	69.70	19203-C6	73.50
	1/4	.167	.083	**.312**	II	4	1/4	2	759916	64.00	759916-C3	72.10		
	1/4	.125	1/8	**.312**	I	6	1/4	2	838816	64.80	838816-C3	72.90	838816-C6	76.70
	1/4	.125	1/8	**.375**	I	4	1/4	2-1/2	807016	68.20	807016-C3	76.30		

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NEW SIZES!

DOUBLE ANGLE SHANK CUTTERS

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B +1° −1°	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
90°	1/4	.125	1/8	**.500**	I	4	1/4	2	807316	62.40	807316-C3	70.50		
	1/4	.125	1/8	**.625**	I	4	1/4	2-1/2	72603	68.50	72603-C3	76.60		
	1/4	.125	1/8	**.625**	I	6	1/4	2-1/2	847416	72.00	847416-C3	80.10		
	1/4	.125	1/8	**.750**	I	4	1/4	2-1/2	807216	68.50	807216-C3	76.60		
	1/4	.125	1/8	**1.000**	I	4	1/4	3	19503	75.00	19503-C3	83.00		
	1/4	.125	1/8	**1.000**	I	6	1/4	3	822616	78.40	822616-C3	84.80		
	1/4	.125	1/8	**1.250**	I	4	1/4	3	822216	80.10	822216-C3	88.20		
	1/4	.125	1/8	**1.312**	I	4	1/4	3	71703	80.10	71703-C3	88.20		
	1/4	.125	1/8	**1.500**	I	4	1/4	3	821816	82.60	821816-C3	90.60		
	1/4	.125	1/8	**1.750**	I	4	1/4	3	26803	82.60	26803-C3	90.60		
	1/4	.125	1/8	**2.125**	I	4	1/4	4	963703	89.30	963703-C3	98.70		
	5/16	.125	3/16	**.250**	I	6	5/16	2-1/2	946904	83.50	946904-C3	92.90		
	5/16	.125	3/16	**.375**	I	6	5/16	2-1/2	19272	86.20	19272-C3	95.70		
	5/16	.125	3/16	**.375**	I	8	5/16	2-1/2	838820	95.40	838820-C3	104.90		
	5/16	.125	3/16	**.625**	I	6	5/16	2-1/2	833572	87.40	833572-C3	96.80		
	5/16	.125	3/16	**.625**	I	8	5/16	2-1/2	754920	94.50	754920-C3	103.90		
	5/16	.125	3/16	**.875**	I	6	5/16	2-1/2	72672	87.40	72672-C3	96.80		
	5/16	.125	3/16	**.875**	I	8	5/16	2-1/2	847420	96.30	847420-C3	105.70		
	5/16	.125	3/16	**1.000**	I	6	5/16	3	807220	93.60	807220-C3	103.10		
	5/16	.125	3/16	**1.250**	I	6	5/16	3	19572	93.60	19572-C3	103.10		
	5/16	.125	3/16	**1.250**	I	8	5/16	3	822620	98.10	822620-C3	107.00		
	5/16	.125	3/16	**1.500**	I	6	5/16	3	772873	95.20	772873-C3	104.70		
	5/16	.125	3/16	**1.625**	I	6	5/16	3	71772	97.20	71772-C3	106.70		
	5/16	.125	3/16	**2.125**	I	6	5/16	3	26872	100.70	26872-C3	110.10		
	3/8	.125	1/4	**.312**	I	6	3/8	2-1/2	946905	83.80	946905-C3	94.40		
	3/8	.125	1/4	**.375**	I	6	3/8	2-1/2	807124	86.60	807124-C3	97.20		
	3/8	.125	1/4	**.500**	I	6	3/8	2-1/2	19205	88.10	19205-C3	97.30	19205-C6	101.50
	3/8	.250	1/8	**.500**	II	6	3/8	2-1/2	759924	95.70	759924-C3	106.30		
	3/8	.125	1/4	**.500**	I	8	3/8	2-1/2	838824	92.60	838824-C3	103.20	838824-C6	105.90
	3/8	.125	1/4	**.750**	I	6	3/8	2-1/2	807324	93.20	807324-C3	103.80		
	3/8	.125	1/4	**1.000**	I	6	3/8	2-1/2	72605	98.10	72605-C3	108.70		
	3/8	.125	1/4	**1.000**	I	8	3/8	2-1/2	847424	108.30	847424-C3	118.90		
	3/8	.125	1/4	**1.250**	I	6	3/8	3	807224	109.70	807224-C3	120.30		
	3/8	.125	1/4	**1.500**	I	6	3/8	3-1/2	19505	110.90	19505-C3	121.60		
	3/8	.125	1/4	**1.500**	I	8	3/8	3-1/2	822624	115.40	822624-C3	122.10		
	3/8	.125	1/4	**1.750**	I	6	3/8	3-1/2	822224	116.30	822224-C3	127.00		
	3/8	.125	1/4	**2.000**	I	6	3/8	3-1/2	71705	116.30	71705-C3	127.00		
	3/8	.125	1/4	**2.312**	I	6	3/8	3-1/2	26805	119.40	26805-C3	130.10		
	3/8	.125	1/4	**2.625**	I	6	3/8	4	963705	126.40	963705-C3	141.10		
	.393	.133	.260	**.500**	I	6	7/16	2-3/4	19279	132.70	19279-C3	145.00		
	.393	.133	.260	**1.500**	I	6	7/16	3-1/2	19579	153.70	19579-C3	169.60		
	7/16	.157	9/32	**.500**	I	6	7/16	2-3/4	19208	130.10	19208-C3	143.50		
	7/16	.157	9/32	**1.500**	I	6	7/16	3-1/2	19508	150.80	19508-C3	166.80		
	1/2	.187	5/16	**.312**	I	6	1/2	3	946910	114.10	946910-C3	130.10		
	1/2	.187	5/16	**.500**	I	6	1/2	3	19210	117.90	19210-C3	133.90	19210-C6	135.40
	1/2	.187	5/16	**.500**	I	8	1/2	3	838832	123.70	838832-C3	139.70	838832-C6	140.90
	1/2	.187	5/16	**.750**	I	6	1/2	3	807332	121.20	807332-C3	137.20		
	1/2	.187	5/16	**1.000**	I	6	1/2	3	72610	128.40	72610-C3	144.40		
	1/2	.187	5/16	**1.000**	I	8	1/2	3	847432	130.60	847432-C3	146.50		
	1/2	.187	5/16	**1.250**	I	6	1/2	3-1/2	822432	131.70	822432-C3	142.40		

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DOUBLE ANGLE SHANK CUTTERS

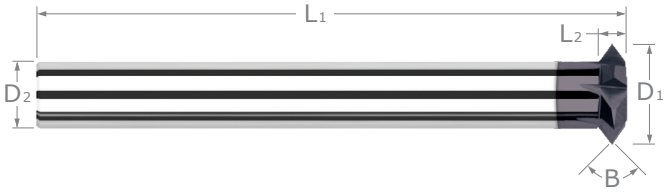
Pointed (cont.)

continued from previous page

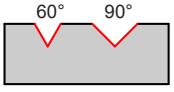
INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B +1° −1°	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
90°	1/2	.187	5/16	**1.500**	I	6	1/2	4	19510	150.80	19510-C3	166.80		
	1/2	.187	5/16	**1.500**	I	8	1/2	4	807932	156.70	807932-C3	172.70		
	1/2	.187	5/16	**1.750**	I	6	1/2	4	822232	153.70	822232-C3	169.60		
	1/2	.187	5/16	**2.000**	I	6	1/2	4	71710	156.10	71710-C3	172.10		
	1/2	.187	5/16	**2.312**	I	6	1/2	4	821810	157.50	821810-C3	173.40		
	1/2	.187	5/16	**2.625**	I	6	1/2	4	26810	160.30	26810-C3	176.30		
	1/2	.187	5/16	**3.125**	I	6	1/2	6	963710	167.70	963710-C3	183.70		
	1/2	.333	.167	**.500**	II	6	1/2	3	759932	121.50	759932-C3	137.50		
	5/8	.250	3/8	**.750**	I	6	5/8	3-1/2	19215	224.30	19215-C3	240.30		
	5/8	.250	3/8	**1.250**	I	6	5/8	3-1/2	72615	230.60	72615-C3	246.60		
100°	1/8	.075	1/16	**.187**	I	4	1/8	1-1/2	983401	53.20	983401-C3	58.70		
	1/8	.075	1/16	**.500**	I	4	1/8	1-1/2	969901	64.10	969901-C3	69.60		
	3/16	.113	3/32	**.312**	I	4	3/16	2	983402	54.90	983402-C3	60.90		
	3/16	.113	3/32	**.750**	I	4	3/16	2-1/2	969902	66.60	969902-C3	72.80		
	1/4	.149	1/8	**.312**	I	4	1/4	2	29750	76.50	29750-C3	83.40		
	1/4	.149	1/8	**1.000**	I	4	1/4	3	969903	89.40	969903-C3	97.50		
	3/8	.149	1/4	**.500**	I	6	3/8	2-1/2	983405	90.50	983405-C3	101.10		
	3/8	.149	1/4	**1.500**	I	6	3/8	3-1/2	969905	116.80	969905-C3	128.10		
	1/2	.224	5/16	**.500**	I	6	1/2	3	983410	120.30	983410-C3	136.30		
	1/2	.224	5/16	**1.500**	I	6	1/2	4	969910	155.80	969910-C3	171.80		
110°	1/4	.179	1/8	**.312**	I	4	1/4	2	830503	80.20	830503-C3	88.30		
120°	1/8	.109	1/16	**.125**	I	4	1/8	1-1/2	903608	49.50	903608-C3	55.00		
	1/8	.109	1/16	**.187**	I	4	1/8	1-1/2	39108	49.50	39108-C3	55.00		
	1/8	.109	1/16	**.500**	I	4	1/8	2	989401	58.80	989401-C3	64.30		
	3/16	.163	3/32	**.187**	I	4	3/16	2	903612	53.20	903612-C3	59.20		
	3/16	.163	3/32	**.312**	I	4	3/16	2	39112	54.00	39112-C3	59.90		
	3/16	.163	3/32	**.750**	I	4	3/16	2-1/2	989402	63.40	989402-C3	69.30		
	1/4	.216	1/8	**.187**	I	4	1/4	2	903616	70.30	903616-C3	78.40		
	1/4	.216	1/8	**.312**	I	4	1/4	2	39116	71.10	39116-C3	79.10		
	1/4	.216	1/8	**.625**	I	4	1/4	2-1/2	910716	68.50	910716-C3	76.60		
	1/4	.216	1/8	**1.000**	I	4	1/4	3	989403	80.80	989403-C3	88.80		
	3/8	.216	1/4	**.500**	I	6	3/8	2-1/2	39124	93.00	39124-C3	103.60		
	3/8	.216	1/4	**1.000**	I	6	3/8	2-1/2	910724	103.10	910724-C3	113.70		
	3/8	.216	1/4	**1.500**	I	6	3/8	3-1/2	989405	116.30	989405-C3	127.00		
	1/2	.325	5/16	**.500**	I	6	1/2	3	39132	123.70	39132-C3	139.70		
	1/2	.325	5/16	**1.000**	I	6	1/2	3	910732	134.40	910732-C3	150.30		
	1/2	.325	5/16	**1.500**	I	6	1/2	4	989410	157.90	989410-C3	173.90		
150°	1/4	.467	1/8	**.312**	I	4	1/4	2	826003	80.20	826003-C3	88.30		
	3/8	.467	1/4	**.500**	I	6	3/8	2-1/2	826005	104.20	826005-C3	114.80		

DOUBLE ANGLE SHANK CUTTERS

Pointed - Reduced Shank



- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced straight shank allows any chucking depth
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide head brazed onto steel shank
- CNC ground in the USA

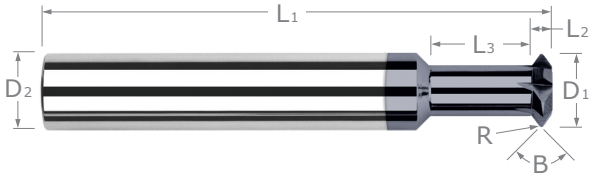


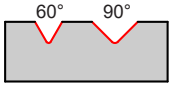
Included Angle (B)
Stocked in Two Included Angles!

INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
60°	1/4	.072	6	1/8	2.572	866403	100.50	866403-C3	108.10
	3/8	.108	8	3/16	3.108	866405	141.10	866405-C3	151.20
	1/2	.144	8	1/4	3.144	866410	159.00	866410-C3	175.00
	3/4	.144	8	1/2	3.644	16220	167.90	16220-C3	187.30
	3/4	.144	8	1/2	6.144	27520	175.80	27520-C3	200.80
	1	.217	8	5/8	4.217	16230	184.80	16230-C3	213.40
90°	1/4	.125	6	1/8	2.625	875503	100.50	875503-C3	108.60
	1/4	.125	6	1/8	4.125	777903	101.70	777903-C3	110.20
	5/16	.155	8	4 mm	3.155	877572	121.80	877572-C3	131.20
	3/8	.188	8	3/16	3.188	875505	141.10	875505-C3	158.40
	7/16	.201	8	15/64	3.201	877508	150.10	877508-C3	163.20
	1/2	.250	8	1/4	3.250	875510	159.00	875510-C3	175.00
	1/2	.250	8	1/4	6.250	777910	166.60	777910-C3	186.90
	5/8	.313	8	5/16	3.313	875515	161.40	875515-C3	178.60
	3/4	.250	8	1/2	3.750	19220	167.40	19220-C3	186.70
	3/4	.250	8	1/2	6.250	19520	175.10	19520-C3	200.00
	1	.375	8	5/8	4.375	19230	185.10	19230-C3	213.70
	1-1/4	.500	8	3/4	4.500	875520	229.00	875520-C3	265.50

DOUBLE ANGLE SHANK CUTTERS

Tip Radius





Included Angle (B)

Stocked in Two Included Angles!

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Radius on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

INCL. ANGLE	CUTTER DIA.	RADIUS	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	R $^{+.001″}_{-.001″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
60°	1/8	**.005**	.042	1/16	**.187**	4	1/8	1-1/2	922508	62.50	922508-C3	68.00
	3/16	**.005**	.060	3/32	**.312**	4	3/16	2	922512	65.90	922512-C3	71.80
	1/4	**.005**	.078	1/8	**.312**	4	1/4	2	922516	84.40	922516-C3	92.40
	1/4	**.010**	.084	1/8	**.312**	4	1/4	2	934716	84.40	934716-C3	92.40
	1/4	**.010**	.084	1/8	**1.000**	4	1/4	3	930516	94.70	930516-C3	102.80
	3/8	**.010**	.084	1/4	**.500**	6	3/8	2-1/2	934724	113.30	934724-C3	123.90
	3/8	**.015**	.089	1/4	**.500**	6	3/8	2-1/2	911224	113.30	911224-C3	123.90
	1/2	**.010**	.120	5/16	**.500**	6	1/2	3	934732	140.60	934732-C3	156.60
	1/2	**.015**	.126	5/16	**.500**	6	1/2	3	911232	140.60	911232-C3	156.60
90°	1/16	**.005**	.035	1/32	**.093**	2	1/8	1-1/2	45804	64.70	45804-C3	70.20
	5/64	**.005**	.043	.039	**.118**	2	1/8	1-1/2	45805	64.70	45805-C3	70.20
	3/32	**.005**	.050	3/64	**.141**	2	1/8	1-1/2	45806	64.70	45806-C3	70.20
	1/8	**.005**	.067	1/16	**.187**	4	1/8	1-1/2	45808	64.70	45808-C3	70.20
	1/8	**.005**	.067	1/16	**.312**	4	1/8	1-1/2	898408	72.80	898408-C3	78.30
	1/8	**.005**	.067	1/16	**.500**	4	1/8	1-1/2	928708	79.80	928708-C3	85.30
	1/8	**.010**	.071	1/16	**.187**	4	1/8	1-1/2	46608	65.20	46608-C3	70.70
	5/32	**.005**	.082	5/64	**.250**	4	3/16	2	45810	68.10	45810-C3	74.10
	5/32	**.005**	.082	5/64	**.625**	4	3/16	2-1/2	928710	76.30	928710-C3	82.30
	3/16	**.005**	.099	3/32	**.187**	4	3/16	2	755212	68.70	755212-C3	74.70
	3/16	**.005**	.099	3/32	**.312**	4	3/16	2	45812	68.10	45812-C3	74.10
	3/16	**.005**	.099	3/32	**.500**	4	3/16	2	898412	72.20	898412-C3	78.20
	3/16	**.005**	.099	3/32	**.750**	4	3/16	2-1/2	928712	76.30	928712-C3	82.30
	3/16	**.010**	.103	3/32	**.312**	4	3/16	2	46612	68.10	46612-C3	74.10
	1/4	**.005**	.129	1/8	**.312**	4	1/4	2	45816	78.50	45816-C3	86.60
	1/4	**.005**	.129	1/8	**.625**	4	1/4	2-1/2	898416	84.10	898416-C3	92.20
	1/4	**.005**	.129	1/8	**1.000**	4	1/4	3	928716	91.60	928716-C3	99.70
	1/4	**.010**	.133	1/8	**.312**	4	1/4	2	46616	78.50	46616-C3	86.60
	1/4	**.010**	.133	1/8	**.625**	4	1/4	2-1/2	890716	84.10	890716-C3	92.20
	1/4	**.010**	.133	1/8	**1.000**	4	1/4	3	931916	91.60	931916-C3	99.70
	1/4	**.015**	.137	1/8	**.312**	4	1/4	2	988616	79.20	988616-C3	86.10
	1/4	**.020**	.142	1/8	**.312**	4	1/4	2	831016	78.50	831016-C3	86.60
	5/16	**.005**	.130	3/16	**1.250**	6	5/16	3	928720	97.00	928720-C3	106.50
	5/16	**.010**	.134	3/16	**.375**	6	5/16	2-1/2	46620	98.70	46620-C3	108.20
	5/16	**.010**	.134	3/16	**.875**	6	5/16	2-1/2	890720	100.10	890720-C3	109.60
	5/16	**.010**	.134	3/16	**1.250**	6	5/16	3	931920	99.70	931920-C3	109.20

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DOUBLE ANGLE SHANK CUTTERS

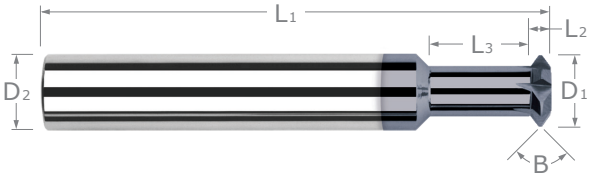
Tip Radius (cont.)

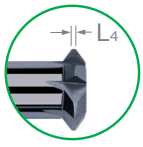
continued from previous page

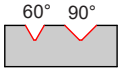
INCL. ANGLE	CUTTER DIA.	RADIUS	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	R $^{+.001″}_{-.001″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
90°	3/8	**.010**	.133	1/4	**.500**	6	3/8	2-1/2	46624	106.30	46624-C3	116.90
	3/8	**.010**	.133	1/4	**1.000**	6	3/8	2-1/2	890724	108.10	890724-C3	118.70
	3/8	**.010**	.133	1/4	**1.500**	6	3/8	3-1/2	931924	128.20	931924-C3	139.00
	3/8	**.015**	.137	1/4	**.500**	6	3/8	2-1/2	988624	105.30	988624-C3	115.90
	3/8	**.015**	.137	1/4	**1.000**	6	3/8	2-1/2	894124	108.10	894124-C3	118.70
	3/8	**.015**	.137	1/4	**1.500**	6	3/8	3-1/2	923524	128.20	923524-C3	139.00
	3/8	**.020**	.142	1/4	**.500**	6	3/8	2-1/2	831024	105.30	831024-C3	115.90
	1/2	**.010**	.196	5/16	**.500**	6	1/2	3	46632	136.40	46632-C3	152.40
	1/2	**.010**	.196	5/16	**1.000**	6	1/2	3	890732	139.00	890732-C3	155.10
	1/2	**.010**	.196	5/16	**1.500**	6	1/2	4	931932	167.60	931932-C3	183.00
	1/2	**.015**	.200	5/16	**.500**	6	1/2	3	988632	136.40	988632-C3	152.40
	1/2	**.015**	.200	5/16	**1.000**	6	1/2	3	894132	139.00	894132-C3	155.10
	1/2	**.015**	.200	5/16	**1.500**	6	1/2	4	923532	167.60	923532-C3	183.70

DOUBLE ANGLE SHANK CUTTERS

Tip Flat





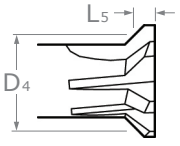


Included Angle (B)
Stocked in Two Included Angles!

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Flat on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

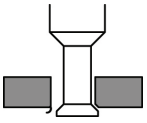
INCL. ANGLE	CUTTER DIA.	TIP FLAT	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_4 $^{+.001″}_{-.001″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
60°	1/8	**.010**	.046	1/16	**.187**	4	1/8	1-1/2	778008	52.00	778008-C3	57.50
	3/16	**.010**	.065	3/32	**.312**	4	3/16	2	778012	55.30	778012-C3	61.30
	1/4	**.010**	.082	1/8	**.312**	4	1/4	2	778016	73.90	778016-C3	82.00
	3/8	**.010**	.082	1/4	**.500**	6	3/8	2-1/2	778024	94.40	778024-C3	105.00
	1/2	**.010**	.119	5/16	**.500**	6	1/2	3	778032	129.30	778032-C3	145.30
90°	1/8	**.010**	.073	1/16	**.187**	4	1/8	1-1/2	776608	50.10	776608-C3	55.60
	1/8	**.010**	.073	1/16	**.500**	4	1/8	1-1/2	775108	65.10	775108-C3	70.60
	3/16	**.010**	.105	3/32	**.312**	4	3/16	2	776612	52.30	776612-C3	58.30
	3/16	**.010**	.105	3/32	**.750**	4	3/16	2-1/2	775112	66.10	775112-C3	72.10
	1/4	**.010**	.135	1/8	**.312**	4	1/4	2	776616	64.10	776616-C3	72.20
	1/4	**.010**	.135	1/8	**1.000**	4	1/4	3	775116	78.00	775116-C3	86.10
	3/8	**.010**	.135	1/4	**.500**	6	3/8	2-1/2	776624	91.60	776624-C3	102.20
	3/8	**.010**	.135	1/4	**1.500**	6	3/8	3-1/2	775124	115.30	775124-C3	126.00
	1/2	**.010**	.198	5/16	**.500**	6	1/2	3	776632	122.60	776632-C3	138.60
	1/2	**.010**	.198	5/16	**1.500**	6	1/2	4	775132	156.80	775132-C3	172.90

BACK DEBURRING MILLS



- **Ideal for deburring on backside of small holes and tight pockets**
- Slightly undersized to fit in common hole sizes
- 90° included angle, cutting on angle only
- Design has smaller radial projection than double angle shank cutters and back chamfer cutters, which results in increased neck diameter and improved strength
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish
- Solid carbide • CNC ground in the USA

Reach Through Miniature Holes and Slots to Remove Burr on Backside of Part

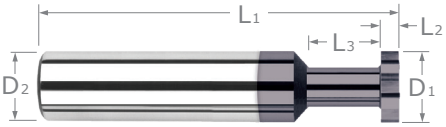


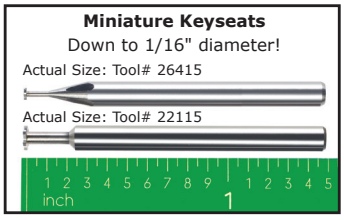
HEAD DIA.	AXIAL LOC	NECK DIA.	NECK LENGTH	CHAMFER CENTER LENGTH	CHAMFER CENTER DIAMETER	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.001″	L_2	D_3	L_3 +.010″ −.000″	L_5 +.0005″ −.0005″	D_4 (Max.)		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.028	.0029	.021	**.093**	.0215	.0261	3	1/8	2	846328	72.80	846328-C3	78.30
.028	.0029	.021	**.125**	.0215	.0261	3	1/8	2	65728	72.80	65728-C3	78.30
.028	.0029	.021	**.250**	.0215	.0261	3	1/8	2	57028	72.80	57028-C3	78.30
.040	.0048	.028	**.125**	.0324	.0362	4	1/8	2	846340	67.70	846340-C3	73.20
.040	.0048	.028	**.187**	.0324	.0362	4	1/8	2	65740	67.70	65740-C3	73.20
.040	.0048	.028	**.312**	.0324	.0362	4	1/8	2	57040	67.70	57040-C3	73.20
.055	.0045	.043	**.187**	.0423	.0515	4	1/8	2	846355	67.70	846355-C3	73.20
.055	.0045	.043	**.281**	.0423	.0515	4	1/8	2	65755	67.70	65755-C3	73.20
.055	.0045	.043	**.437**	.0423	.0515	4	1/8	2	57055	67.70	57055-C3	73.20
.080	.0077	.060	**.250**	.0638	.0733	5	1/8	2	846380	61.20	846380-C3	66.70
.080	.0077	.060	**.375**	.0638	.0733	5	1/8	2	65780	61.20	65780-C3	66.70
.080	.0077	.060	**.625**	.0638	.0733	5	1/8	2	57080	61.20	57080-C3	66.70
.115	.0111	.087	**.375**	.0655	.1049	5	1/8	2	846410	61.20	846410-C3	66.70
.115	.0111	.087	**.562**	.0655	.1049	5	1/8	2	65810	61.20	65810-C3	66.70
.115	.0111	.087	**1.000**	.0655	.1049	5	1/8	2	57110	61.20	57110-C3	66.70

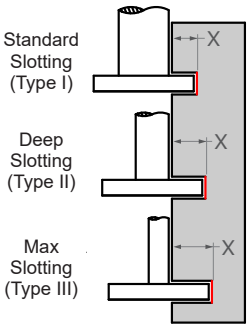
D_1 +.000″ −.002″	L_2	D_3	L_3 +.010″ −.000″	L_5 +.0005″ −.0005″	D_4 (Max.)		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.125	.0111	.097	**.375**	.0655	.1139	6	1/8	2	846425	61.20	846425-C3	66.70
.135	.0111	.107	**.437**	.0655	.1249	5	3/16	2	846420	62.10	846420-C3	68.10
.135	.0111	.107	**.625**	.0655	.1249	5	3/16	2-1/2	65820	63.00	65820-C3	69.00
.135	.0111	.107	**1.125**	.0655	.1249	5	3/16	2-1/2	57120	63.00	57120-C3	69.00
.165	.0191	.121	**.500**	.0695	.1469	6	3/16	2	846430	62.10	846430-C3	68.10
.165	.0191	.121	**.750**	.0695	.1469	6	3/16	2-1/2	65830	63.00	65830-C3	69.00
.165	.0191	.121	**1.375**	.0695	.1469	6	3/16	2-1/2	57130	63.00	57130-C3	69.00
.187	.0191	.143	**.563**	.0695	.1679	6	3/16	2	846435	62.10	846435-C3	68.10
.210	.0191	.166	**.625**	.0695	.1919	6	1/4	2-1/2	846440	66.30	846440-C3	74.40
.210	.0191	.166	**1.000**	.0695	.1919	6	1/4	3	65840	67.70	65840-C3	75.80
.210	.0191	.166	**1.750**	.0695	.1919	6	1/4	3	57140	67.70	57140-C3	75.80
.262	.0251	.206	**1.375**	.0925	.2379	8	5/16	3	65850	68.70	65850-C3	78.20
.262	.0251	.206	**2.125**	.0925	.2379	8	5/16	4	57150	79.20	57150-C3	88.80
.315	.0251	.259	**1.625**	.0925	.2909	8	3/8	3	65860	85.00	65860-C3	95.60
.315	.0251	.259	**2.500**	.0925	.2909	8	3/8	4	57160	95.70	57160-C3	110.30
.420	.0321	.350	**2.125**	.1160	.3889	10	7/16	4	65870	107.60	65870-C3	123.70
.420	.0321	.350	**3.375**	.1160	.3889	10	7/16	6	57170	124.90	57170-C3	142.90

KEYSEAT CUTTERS

Square







- **Keyseat cutters down to 1/16″ diameter**
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

Stocked in Multiple Radial Depths of Cut!

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.010	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26410	54.00	26410-C3	59.50
	.015 (1/64)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26415	51.10	26415-C3	56.60
	.015 (1/64)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955115	59.90	955115-C3	65.40
	.020	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26420	51.10	26420-C3	56.60
	.020	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955120	52.20	955120-C3	57.70
	.025	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26425	51.10	26425-C3	56.60
1/16	.030	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26430	51.10	26430-C3	56.60
	.031 (1/32)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26431	51.10	26431-C3	56.60
	.031 (1/32)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955131	59.90	955131-C3	65.40
	.039 (1 mm)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26439	51.10	26439-C3	56.60
	.047 (3/64)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26447	51.10	26447-C3	56.60
	.062 (1/16)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26462	51.10	26462-C3	56.60
	.062 (1/16)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955162	59.90	955162-C3	65.40
	.010	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27310	53.20	27310-C3	58.70
	.015 (1/64)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27315	50.30	27315-C3	55.80
	.020	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27320	50.30	27320-C3	55.80
	.025	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27325	50.30	27325-C3	55.80
5/64	.031 (1/32)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27331	50.30	27331-C3	55.80
	.031 (1/32)	1 mm	6 mm (3x)	.018	I	4	1/8	1-1/2	922031	58.90	922031-C3	64.40
	.039 (1 mm)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27339	50.30	27339-C3	55.80
	.047 (3/64)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27347	50.30	27347-C3	55.80
	.062 (1/16)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27362	50.30	27362-C3	55.80
	.010	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28210	52.70	28210-C3	58.20
	.015 (1/64)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28215	49.50	28215-C3	55.00
	.020	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28220	49.50	28220-C3	55.00
	.020	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967720	49.50	967720-C3	55.00
	.025	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28225	49.50	28225-C3	55.00
	.030	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28230	49.50	28230-C3	55.00
	.031 (1/32)	1/32	3/64 (.5x)	**.031**	II	4	1/8	1-1/2	901131	53.00	901131-C3	58.50
	.031 (1/32)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28231	49.50	28231-C3	55.00
3/32	.031 (1/32)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967731	58.20	967731-C3	63.70
	.039 (1 mm)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28239	49.50	28239-C3	55.00
	.040	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28240	49.50	28240-C3	55.00
	.047 (3/64)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28247	49.50	28247-C3	55.00
	.047 (3/64)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967747	58.20	967747-C3	63.70
	.062 (1/16)	1/32	3/64 (.5x)	**.031**	II	4	1/8	1-1/2	901162	53.00	901162-C3	58.50
	.062 (1/16)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28262	49.50	28262-C3	55.00
	.062 (1/16)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967762	58.20	967762-C3	63.70
	.093 (3/32)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28293	49.50	28293-C3	55.00
	.015 (1/64)	.059	3/16 (1.5x)	.019	I	4	1/8	1-1/2	777415	52.20	777415-C3	57.70
3 mm	.031 (1/32)	.059	3/16 (1.5x)	.019	I	4	1/8	1-1/2	777431	51.80	777431-C3	57.30
	.047 (3/64)	.059	3/16 (1.5x)	.019	I	4	1/8	1-1/2	777447	51.80	777447-C3	57.30

*Radial DOC accounts for max transition radius at neck

continued on next page

NEW SIZES!

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22110	50.60	22110-C3	56.10
	.010	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43510	60.10	43510-C3	65.60
	.015 (1/64)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982515	60.80	982515-C3	66.30
	.015 (1/64)	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893315	62.00	893315-C3	67.50
	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22115	47.80	22115-C3	53.30
	.015 (1/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43515	56.20	43515-C3	61.70
	.020	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982520	60.80	982520-C3	66.30
	.020	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893320	62.00	893320-C3	67.50
	.020	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22120	47.80	22120-C3	53.30
	.020	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43520	56.20	43520-C3	61.70
	.025	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982525	60.80	982525-C3	66.30
	.025	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893325	62.00	893325-C3	67.50
	.025	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22125	47.80	22125-C3	53.30
	.025	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43525	56.20	43525-C3	61.70
	.030	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22130	47.80	22130-C3	53.30
	.030	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43530	56.20	43530-C3	61.70
	.031 (1/32)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982531	60.80	982531-C3	66.30
	.031 (1/32)	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893331	62.00	893331-C3	67.50
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22131	47.80	22131-C3	53.30
	.031 (1/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43531	56.20	43531-C3	61.70
	.035	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22135	47.80	22135-C3	53.30
	.035	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43535	56.20	43535-C3	61.70
	.039 (1 mm)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22139	47.80	22139-C3	53.30
	.039 (1 mm)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43539	57.20	43539-C3	62.70
	.040	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982540	60.80	982540-C3	66.30
	.040	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22140	47.80	22140-C3	53.30
	.040	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43540	56.20	43540-C3	61.70
	.045	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22145	47.80	22145-C3	53.30
	.047 (3/64)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982547	60.80	982547-C3	66.30
	.047 (3/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22147	47.80	22147-C3	53.30
	.047 (3/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43547	56.20	43547-C3	61.70
	.050	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22150	47.80	22150-C3	53.30
	.055	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22155	47.80	22155-C3	53.30
	.060	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22160	47.80	22160-C3	53.30
	.062 (1/16)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982562	60.80	982562-C3	66.30
	.062 (1/16)	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893362	62.00	893362-C3	67.50
	.062 (1/16)	1/16	1/8 (1x)	.022	I	6	1/8	1-1/2	806662	47.80	806662-C3	53.30
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22162	47.80	22162-C3	53.30
	.062 (1/16)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43562	56.20	43562-C3	61.70
	.062 (1/16)	1/16	1/2 (4x)	.022	I	6	1/8	1-1/2	749762	59.30	749762-C3	64.80
	.078 (5/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22178	47.80	22178-C3	53.30
	.078 (5/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43578	56.20	43578-C3	61.70
	.093 (3/32)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982593	61.30	982593-C3	66.80
	.093 (3/32)	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893393	62.00	893393-C3	67.50
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22193	47.80	22193-C3	53.30
	.093 (3/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43593	56.20	43593-C3	61.70
	.100	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22182	47.80	22182-C3	53.30
	.118	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22157	48.80	22157-C3	54.30
	.125 (1/8)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22195	47.80	22195-C3	53.30
	.125 (1/8)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43595	56.20	43595-C3	61.70

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
NEW	9/64	.031 (1/32)	.070	13/64 (1.5x)	.035	I	6	3/16	2	716310	50.20	716310-C3	56.00
NEW		.062 (1/16)	.070	13/64 (1.5x)	.035	I	6	3/16	2	716330	50.20	716330-C3	56.00
NEW		.093 (3/32)	.070	13/64 (1.5x)	.035	I	6	3/16	2	716350	50.20	716350-C3	56.00
NEW		.125 (1/8)	.070	13/64 (1.5x)	.035	I	6	3/16	2	716360	50.20	716360-C3	56.00
	5/32	.010	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69410	52.90	69410-C3	58.90
		.015 (1/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69415	50.20	69415-C3	56.10
		.015 (1/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956215	58.40	956215-C3	64.20
		.020	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69420	50.20	69420-C3	56.10
		.020	5/64	1/2 (3x)	.029	I	6	3/16	2	956220	58.40	956220-C3	64.40
		.025	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69425	50.20	69425-C3	56.10
		.025	5/64	1/2 (3x)	.029	I	6	3/16	2	956225	58.40	956225-C3	64.40
		.031 (1/32)	.050	5/64 (.5x)	**.043**	II	6	3/16	2	900331	63.00	900331-C3	69.00
		.031 (1/32)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69431	50.20	69431-C3	56.10
		.031 (1/32)	5/64	1/2 (3x)	.029	I	6	3/16	2	956231	58.40	956231-C3	64.40
		.039 (1 mm)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69439	50.20	69439-C3	56.10
		.040	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69440	50.20	69440-C3	56.10
		.047 (3/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69447	50.20	69447-C3	56.10
		.047 (3/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956247	58.40	956247-C3	64.40
		.050	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69450	50.20	69450-C3	56.10
		.060	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69460	50.20	69460-C3	56.10
		.062 (1/16)	.050	5/64 (.5x)	**.043**	II	6	3/16	2	900362	63.00	900362-C3	69.00
		.062 (1/16)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69462	50.20	69462-C3	56.10
		.062 (1/16)	5/64	1/2 (3x)	.029	I	6	3/16	2	956262	58.40	956262-C3	64.40
		.078 (5/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69478	50.20	69478-C3	56.10
		.078 (5/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956278	58.40	956278-C3	64.40
		.093 (3/32)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69493	50.20	69493-C3	56.10
		.093 (3/32)	5/64	1/2 (3x)	.029	I	6	3/16	2	956293	58.40	956293-C3	64.40
		.125 (1/8)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69495	50.20	69495-C3	56.10
		.125 (1/8)	5/64	1/2 (3x)	.029	I	6	3/16	2	956295	58.40	956295-C3	64.40
	3/16	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22210	52.70	22210-C3	58.70
		.015 (1/64)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980015	62.10	980015-C3	68.10
		.015 (1/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22215	49.40	22215-C3	55.40
		.015 (1/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43715	62.10	43715-C3	68.00
		.018	Please see page 386 for Retaining Ring sizes.										
		.020	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980020	62.10	980020-C3	68.10
		.020	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22220	49.40	22220-C3	55.40
		.020	3/32	9/16 (3x)	.037	I	6	3/16	2	43720	62.10	43720-C3	68.00
		.025	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980025	62.10	980025-C3	67.90
		.025	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22225	49.40	22225-C3	55.40
		.025	3/32	9/16 (3x)	.037	I	6	3/16	2	43725	62.10	43725-C3	68.00
		.029	Please see page 386 for Retaining Ring sizes.										
		.030	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22230	49.40	22230-C3	55.40
		.030	3/32	9/16 (3x)	.037	I	6	3/16	2	43730	62.10	43730-C3	68.00
		.031 (1/32)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980031	62.10	980031-C3	68.10
		.031 (1/32)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928931	62.10	928931-C3	68.10
		.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22231	49.40	22231-C3	55.40
		.031 (1/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	43731	62.10	43731-C3	67.90
		.035	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22235	49.40	22235-C3	55.40

*Radial DOC accounts for max transition radius at neck

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NEW SIZES!

KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/16	.035	3/32	9/16 (3x)	.037	I	6	3/16	2	43735	62.10	43735-C3	68.00
	.039 (1 mm)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22239	49.40	22239-C3	55.40
	.039 (1 mm)	3/32	9/16 (3x)	.037	I	6	3/16	2	43739	62.10	43739-C3	68.00
	.040	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980040	62.10	980040-C3	68.10
	.040	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928940	62.10	928940-C3	68.10
	.040	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22240	49.40	22240-C3	55.40
	.040	3/32	9/16 (3x)	.037	I	6	3/16	2	43740	62.10	43740-C3	68.00
	.045	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22246	49.40	22246-C3	55.40
	.045	3/32	9/16 (3x)	.037	I	6	3/16	2	43745	62.10	43745-C3	68.00
	.047 (3/64)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980047	62.10	980047-C3	68.10
	.047 (3/64)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928947	62.10	928947-C3	68.10
	.047 (3/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22247	49.40	22247-C3	55.40
	.047 (3/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43747	62.10	43747-C3	67.90
	.050	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22250	49.40	22250-C3	55.40
	.050	3/32	9/16 (3x)	.037	I	6	3/16	2	43750	62.10	43750-C3	68.00
	.055	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22255	49.40	22255-C3	55.40
	.055	3/32	9/16 (3x)	.037	I	6	3/16	2	43755	62.10	43755-C3	68.00
	.060	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22261	49.40	22261-C3	55.40
	.060	3/32	9/16 (3x)	.037	I	6	3/16	2	43760	62.10	43760-C3	68.00
	.062 (1/16)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980062	62.10	980062-C3	68.10
	.062 (1/16)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928962	62.10	928962-C3	68.10
	.062 (1/16)	3/32	3/16 (1x)	.037	I	6	3/16	2	806562	49.40	806562-C3	55.40
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22262	49.40	22262-C3	55.40
	.062 (1/16)	3/32	9/16 (3x)	.037	I	6	3/16	2	43762	62.10	43762-C3	68.00
	.078 (5/64)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980078	62.10	980078-C3	68.10
	.078 (5/64)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928978	62.10	928978-C3	68.10
	.078 (5/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22278	49.40	22278-C3	55.40
	.078 (5/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43778	62.10	43778-C3	68.00
	.093 (3/32)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980093	62.10	980093-C3	68.10
	.093 (3/32)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928993	62.10	928993-C3	68.10
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22293	49.40	22293-C3	55.40
	.093 (3/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	43793	62.10	43793-C3	68.00
	.118	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22257	53.10	22257-C3	58.90
	.125 (1/8)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980095	62.10	980095-C3	68.10
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22295	49.40	22295-C3	55.40
	.125 (1/8)	3/32	9/16 (3x)	.037	I	6	3/16	2	43795	62.10	43795-C3	68.00
	.156 (5/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22297	49.40	22297-C3	55.40
6 mm	.031 (1/32)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947531	57.80	947531-C3	65.90
	.039 (1 mm)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947539	57.80	947539-C3	65.90
	.062 (1/16)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947562	57.80	947562-C3	65.90
	.093 (3/32)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947593	57.80	947593-C3	65.90
	.118 (3 mm)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947588	57.80	947588-C3	65.90
	.125 (1/8)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947595	57.80	947595-C3	65.90
1/4	.010	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22310	59.30	22310-C3	67.40
	.010	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43910	71.10	43910-C3	79.10
	.015 (1/64)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70815	68.70	70815-C3	76.80
	.015 (1/64)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986115	71.00	986115-C3	79.10
	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22315	56.00	22315-C3	64.00
	.015 (1/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43915	68.20	43915-C3	76.30

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.020	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70820	60.10	70820-C3	68.20
	.020	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986120	62.10	986120-C3	70.20
	.020	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22320	56.00	22320-C3	64.00
	.020	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43920	68.20	43920-C3	76.30
	.025	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70825	60.60	70825-C3	68.70
	.025	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986125	62.10	986125-C3	70.20
	.025	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22325	56.00	22325-C3	64.00
	.025	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43925	68.20	43925-C3	76.30
	.030	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70830	60.60	70830-C3	68.70
	.030	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22330	56.00	22330-C3	64.00
	.030	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43930	68.20	43930-C3	76.30
	.031 (1/32)	.050	5/64 (.3x)	**.092**	III	8	1/4	2-1/2	964731	101.30	964731-C3	109.50
	.031 (1/32)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70831	60.10	70831-C3	68.20
	.031 (1/32)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986131	78.50	986131-C3	86.60
	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22331	56.00	22331-C3	64.00
	.031 (1/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43931	68.20	43931-C3	76.30
	.035	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22335	56.00	22335-C3	64.00
	.035	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43935	69.60	43935-C3	77.10
	.039 (1 mm)	Please see page 386 for Retaining Ring sizes.										
	.039 (1 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22339	56.00	22339-C3	64.00
	.040	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70840	60.10	70840-C3	68.20
	.040	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22340	56.00	22340-C3	64.00
	.040	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43940	68.20	43940-C3	76.30
	.045	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22346	56.00	22346-C3	64.00
1/4	.046	Please see page 386 for Retaining Ring sizes.										
	.047 (3/64)	.050	5/64 (.3x)	**.092**	III	8	1/4	2-1/2	964747	98.80	964747-C3	107.00
	.047 (3/64)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70847	60.10	70847-C3	68.20
	.047 (3/64)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986147	78.50	986147-C3	86.60
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22347	56.00	22347-C3	64.00
	.047 (3/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43947	68.20	43947-C3	76.30
	.050	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70850	60.10	70850-C3	68.20
	.050	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22350	56.00	22350-C3	64.00
	.050	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43950	68.20	43950-C3	76.30
	.055	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22355	56.00	22355-C3	64.00
	.055	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43955	68.20	43955-C3	76.30
	.060	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70860	60.60	70860-C3	68.70
	.060	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22361	56.00	22361-C3	64.00
	.060	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43961	68.20	43961-C3	76.30
	.062 (1/16)	.050	5/64 (.3x)	**.092**	III	8	1/4	2-1/2	964762	101.30	964762-C3	109.50
	.062 (1/16)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70862	60.10	70862-C3	68.20
	.062 (1/16)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986162	78.50	986162-C3	86.60
	.062 (1/16)	1/8	1/4 (1x)	.053	I	6	1/4	2-1/2	806462	56.00	806462-C3	64.00
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22362	56.00	22362-C3	64.00
	.062 (1/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43962	68.20	43962-C3	76.30
	.062 (1/16)	1/8	1 (4x)	.053	I	6	1/4	2-1/2	984262	79.00	984262-C3	87.00
	.078 (5/64)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70878	60.10	70878-C3	68.20
	.078 (5/64)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986178	78.50	986178-C3	86.60
	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22378	56.00	22378-C3	64.00
	.078 (5/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43978	68.20	43978-C3	76.30

*Radial DOC accounts for max transition radius at neck

continued on next page

NEW SIZES!

KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	
1/4	.080	1/8	3/8 (1.5x)	**.053**	I	6	1/4	2-1/2	22380	56.00	22380-C3	63.50	NEW
	.090	1/8	3/8 (1.5x)	**.053**	I	6	1/4	2-1/2	22390	56.00	22390-C3	63.50	NEW
	.093 (3/32)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70893	60.10	70893-C3	68.20	
	.093 (3/32)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986193	78.50	986193-C3	86.60	
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22393	56.00	22393-C3	64.00	
	.093 (3/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43993	68.20	43993-C3	76.30	
	.100	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22382	56.00	22382-C3	64.00	
	.100	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43982	68.20	43982-C3	76.30	
	.109 (7/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22384	56.00	22384-C3	64.00	
	.118 (3 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22388	56.00	22388-C3	64.00	
	.125 (1/8)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70895	60.10	70895-C3	68.20	
	.125 (1/8)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986195	78.50	986195-C3	86.60	
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22395	56.00	22395-C3	64.00	
	.125 (1/8)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43995	68.20	43995-C3	76.30	
	.125 (1/8)	1/8	1 (4x)	.053	I	6	1/4	2-1/2	984295	79.00	984295-C3	87.00	
	.156 (5/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22397	56.00	22397-C3	64.00	
	.156 (5/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43997	68.20	43997-C3	76.30	
	.187 (3/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22398	56.00	22398-C3	64.00	
	.187 (3/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43998	68.20	43998-C3	76.30	
	.250 (1/4)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22399	56.00	22399-C3	64.00	
5/16	.010	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22401	78.30	22401-C3	87.80	
	.015 (1/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22403	75.40	22403-C3	84.80	
	.020	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22405	74.00	22405-C3	83.50	
	.025	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22407	74.00	22407-C3	83.50	
	.030	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22409	74.00	22409-C3	83.50	
	.031 (1/32)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973410	83.60	973410-C3	93.10	
	.031 (1/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22410	74.00	22410-C3	83.50	
	.031 (1/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69710	87.40	69710-C3	96.80	
	.039 (1 mm)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22414	74.00	22414-C3	83.50	
	.039 (1 mm)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69714	87.40	69714-C3	96.80	
	.040	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22415	74.00	22415-C3	83.50	
	.047 (3/64)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973420	83.60	973420-C3	93.10	
	.047 (3/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22420	74.00	22420-C3	83.50	
	.050	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22422	74.00	22422-C3	83.50	
	.056	Please see page 386 for Retaining Ring sizes.											
	.060	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22428	74.00	22428-C3	83.50	
	.062 (1/16)	.063	3/32 (.3x)	**.116**	III	10	5/16	2-1/2	959430	114.80	959430-C3	124.30	
	.062 (1/16)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973430	83.60	973430-C3	93.10	
	.062 (1/16)	7/64	3/8 (1x)	**.091**	II	6	5/16	2-1/2	907930	101.70	907930-C3	111.20	
	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22430	74.00	22430-C3	83.50	
	.062 (1/16)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69730	87.40	69730-C3	96.80	
	.078 (5/64)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973440	83.60	973440-C3	93.10	
	.078 (5/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22440	74.00	22440-C3	83.50	
	.078 (5/64)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69740	87.40	69740-C3	96.80	
	.093 (3/32)	.063	3/32 (.3x)	**.116**	III	10	5/16	2-1/2	959450	114.80	959450-C3	124.30	
	.093 (3/32)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973450	83.60	973450-C3	93.10	
	.093 (3/32)	7/64	3/8 (1x)	**.091**	II	6	5/16	2-1/2	907950	101.70	907950-C3	111.20	
	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22450	74.00	22450-C3	83.50	

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
5/16	.093 (3/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69750	87.40	69750-C3	96.80
	.100	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22452	74.00	22452-C3	83.50
	.125 (1/8)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973460	83.60	973460-C3	93.10
	.125 (1/8)	7/64	3/8 (1x)	**.091**	II	6	5/16	2-1/2	907960	101.70	907960-C3	111.20
	.125 (1/8)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22455	74.00	22455-C3	83.50
	.125 (1/8)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69760	87.40	69760-C3	96.80
	.156 (5/32)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973465	83.60	973465-C3	93.10
	.156 (5/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22465	74.00	22465-C3	83.50
	.156 (5/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69765	87.40	69765-C3	96.30
	.187 (3/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22470	74.00	22470-C3	83.50
	.187 (3/16)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69770	87.40	69770-C3	96.80
	.250 (1/4)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22480	74.00	22480-C3	83.50
3/8	.015 (1/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22503	86.40	22503-C3	97.00
	.020	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71105	89.60	71105-C3	100.20
	.020	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22505	86.40	22505-C3	97.00
	.020	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70305	97.60	70305-C3	108.20
	.025	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22507	86.40	22507-C3	97.00
	.025	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70307	97.60	70307-C3	108.20
	.030	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22509	86.40	22509-C3	97.00
	.031 (1/32)	.075	7/64 (.3x)	**.142**	III	10	3/8	2-1/2	991310	118.90	991310-C3	129.50
	.031 (1/32)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71110	89.60	71110-C3	100.20
	.031 (1/32)	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958910	108.10	958910-C3	118.70
	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22510	83.40	22510-C3	94.00
	.031 (1/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70310	97.60	70310-C3	108.20
	.035	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22512	83.40	22512-C3	94.00
	.035	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70312	99.50	70312-C3	110.10
	.039 (1 mm)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71114	89.60	71114-C3	100.20
	.039 (1 mm)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22514	83.40	22514-C3	94.00
	.039 (1 mm)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70314	97.60	70314-C3	108.20
	.040	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71115	88.80	71115-C3	99.40
	.040	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22515	83.40	22515-C3	94.00
	.040	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70315	97.60	70315-C3	108.20
	.045	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22518	83.40	22518-C3	94.00
	.047 (3/64)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71120	89.60	71120-C3	100.20
	.047 (3/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22520	83.40	22520-C3	94.00
	.047 (3/64)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70320	97.60	70320-C3	108.20
	.050	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958922	89.60	958922-C3	100.20
	.050	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22522	83.40	22522-C3	94.00
	.055	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958925	89.60	958925-C3	100.20
	.055	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22525	83.40	22525-C3	94.00
	.060	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22528	83.40	22528-C3	94.00
	.060	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70328	97.60	70328-C3	108.20
	.062 (1/16)	.075	7/64 (.3x)	**.142**	III	10	3/8	2-1/2	991330	118.90	991330-C3	129.50
	.062 (1/16)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71130	89.60	71130-C3	100.20
	.062 (1/16)	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958930	108.10	958930-C3	118.70
	.062 (1/16)	3/16	3/8 (1x)	.084	I	8	3/8	2-1/2	806330	83.40	806330-C3	94.00
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22530	83.40	22530-C3	94.00
	.062 (1/16)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70330	97.60	70330-C3	108.20
	.068	Please see page 385 for Retaining Ring sizes.										

*Radial DOC accounts for max transition radius at neck

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NEW SIZES!

KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.078 (5/64)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71140	89.60	71140-C3	100.20
	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22540	83.40	22540-C3	94.00
	.078 (5/64)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70340	83.40	70340-C3	94.00
	.086	Please see page 386 for Retaining Ring sizes.										
	.093 (3/32)	.075	7/64 (.3x)	**.142**	III	10	3/8	2-1/2	991350	118.90	991350-C3	129.50
	.093 (3/32)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71150	89.60	71150-C3	100.20
	.093 (3/32)	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958950	108.10	958950-C3	118.70
	.093 (3/32)	3/16	3/8 (1x)	.084	I	8	3/8	2-1/2	806350	83.40	806350-C3	94.00
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22550	83.40	22550-C3	94.00
	.093 (3/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70350	97.60	70350-C3	108.20
	.100	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71152	87.50	71152-C3	98.10
	.100	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22552	83.40	22552-C3	94.00
	.100	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70352	97.60	70352-C3	108.20
3/8	.125 (1/8)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71160	89.60	71160-C3	100.20
	.125 (1/8)	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958960	108.10	958960-C3	118.70
	.125 (1/8)	3/16	3/8 (1x)	.084	I	8	3/8	2-1/2	806360	83.40	806360-C3	94.00
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22560	83.40	22560-C3	94.00
	.125 (1/8)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70360	97.60	70360-C3	108.20
	.156 (5/32)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71165	89.60	71165-C3	100.20
	.156 (5/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22565	83.40	22565-C3	94.00
	.156 (5/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70365	97.60	70365-C3	108.20
	.187 (3/16)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71170	89.60	71170-C3	100.20
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22570	83.40	22570-C3	94.00
	.187 (3/16)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70370	97.60	70370-C3	108.20
	.250 (1/4)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71180	89.60	71180-C3	100.20
	.250 (1/4)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22580	83.40	22580-C3	94.00
	.250 (1/4)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70380	97.60	70380-C3	108.20
	.312 (5/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22585	83.40	22585-C3	94.00
	.031 (1/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71810	113.50	71810-C3	125.80
	.047 (3/64)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71820	111.40	71820-C3	124.70
	.062 (1/16)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71830	111.40	71830-C3	124.70
	.078 (5/64)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71840	111.40	71840-C3	124.70
	.093 (3/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71850	111.40	71850-C3	124.70
7/16	.125 (1/8)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71860	111.40	71860-C3	124.70
	.125 (1/8)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892960	125.90	892960-C3	139.30
	.156 (5/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71865	111.40	71865-C3	124.70
	.187 (3/16)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71870	111.40	71870-C3	124.70
	.187 (3/16)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892970	125.90	892970-C3	139.30
	.250 (1/4)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71880	111.40	71880-C3	124.70
	.250 (1/4)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892980	125.90	892980-C3	139.30
	.015 (1/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22603	113.40	22603-C3	129.30
	.020	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71205	120.60	71205-C3	136.60
	.020	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22605	113.40	22605-C3	129.30
	.025	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22607	113.40	22607-C3	129.30
1/2	.025	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71507	127.40	71507-C3	143.40
	.030	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22609	113.40	22609-C3	129.30
	.031 (1/32)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71210	116.90	71210-C3	132.90
	.031 (1/32)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975710	118.50	975710-C3	134.50
	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22610	109.70	22610-C3	125.70

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.031 (1/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71510	123.90	71510-C3	139.90
	.035	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22612	109.70	22612-C3	125.70
	.039 (1 mm)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22614	109.70	22614-C3	125.70
	.040	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71215	116.90	71215-C3	132.90
	.040	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22615	109.70	22615-C3	125.70
	.040	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71515	123.90	71515-C3	139.90
	.045	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22618	109.70	22618-C3	125.70
	.045	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71518	123.90	71518-C3	139.90
	.047 (3/64)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71220	116.90	71220-C3	132.90
	.047 (3/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22620	109.70	22620-C3	125.70
	.047 (3/64)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71520	123.90	71520-C3	139.90
	.050	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22622	109.70	22622-C3	125.70
	.050	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71522	123.90	71522-C3	139.90
	.055	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22625	109.70	22625-C3	125.70
	.055	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71525	123.90	71525-C3	139.90
	.060	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71228	116.90	71228-C3	132.90
	.060	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22628	109.70	22628-C3	125.70
	.062 (1/16)	.100	5/32 (.3x)	**.192**	III	12	1/2	3	985230	148.60	985230-C3	164.70
	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71230	116.90	71230-C3	132.90
	.062 (1/16)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975730	138.60	975730-C3	154.70
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22630	109.70	22630-C3	125.70
	.062 (1/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71530	123.90	71530-C3	139.90
	.070	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22635	109.70	22635-C3	125.70
	.078 (5/64)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71240	116.90	71240-C3	132.90
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22640	109.70	22640-C3	125.70
1/2	.078 (5/64)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71540	123.90	71540-C3	139.90
	.080	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22642	109.70	22642-C3	125.70
	.090	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22647	109.70	22647-C3	125.70
	.093 (3/32)	.100	5/32 (.3x)	**.192**	III	12	1/2	3	985250	148.60	985250-C3	164.70
	.093 (3/32)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71250	116.90	71250-C3	132.90
	.093 (3/32)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975750	138.60	975750-C3	154.70
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22650	109.70	22650-C3	125.70
	.093 (3/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71550	123.90	71550-C3	139.90
	.100	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71252	116.90	71252-C3	132.90
	.100	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22652	109.70	22652-C3	125.70
	.100	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71552	123.90	71552-C3	139.90
	.103	Please see page 386 for Retaining Ring sizes.										
	.109 (7/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22654	109.70	22654-C3	125.70
	.118 (3 mm)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22657	109.70	22657-C3	125.70
	.118 (3 mm)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71557	123.90	71557-C3	139.90
	.120	Please see page 386 for Retaining Ring sizes.										
	.125 (1/8)	.100	5/32 (.3x)	**.192**	III	12	1/2	3	985260	148.60	985260-C3	164.70
	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71260	116.90	71260-C3	132.90
	.125 (1/8)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975760	138.60	975760-C3	154.70
	.125 (1/8)	1/4	1/2 (1x)	.115	I	8	1/2	3	806260	109.70	806260-C3	125.70
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22660	109.70	22660-C3	125.70
	.125 (1/8)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71560	123.90	71560-C3	139.90
	.125 (1/8)	1/4	2 (4x)	.115	I	8	1/2	4	933160	185.10	933160-C3	201.10
	.140 (9/64)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975762	138.60	975762-C3	154.70

*Radial DOC accounts for max transition radius at neck

continued on next page

NEW SIZES!

KEYSEAT CUTTERS

Square (cont.)

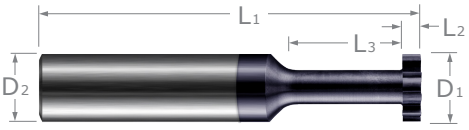
continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/2	.140 (9/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22662	109.70	22662-C3	125.70
	.156 (5/32)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71265	116.90	71265-C3	132.90
	.156 (5/32)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975765	138.60	975765-C3	154.70
	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22665	109.70	22665-C3	125.70
	.156 (5/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71565	123.90	71565-C3	139.90
	.187 (3/16)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71270	116.90	71270-C3	132.90
	.187 (3/16)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975770	138.60	975770-C3	154.70
	.187 (3/16)	1/4	1/2 (1x)	.115	I	8	1/2	3	806270	111.80	806270-C3	127.80
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22670	109.70	22670-C3	125.70
	.187 (3/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71570	123.90	71570-C3	139.90
	.250 (1/4)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71280	116.90	71280-C3	132.90
	.250 (1/4)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975780	138.60	975780-C3	154.70
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22680	109.70	22680-C3	125.70
	.250 (1/4)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71580	123.90	71580-C3	139.90
	.312 (5/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22685	109.70	22685-C3	125.70
	.312 (5/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71585	123.90	71585-C3	139.30
	.375 (3/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22687	109.70	22687-C3	125.70
5/8	.031 (1/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70910	171.80	70910-C3	187.80
	.031 (1/32)	5/16	2 (3x)	.146	I	8	5/8	3-1/2	972910	222.30	972910-C3	240.20
	.047 (3/64)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70920	171.80	70920-C3	187.80
	.062 (1/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70930	171.80	70930-C3	187.80
	.078 (5/64)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70940	171.80	70940-C3	187.80
	.093 (3/32)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950650	234.70	950650-C3	250.80
	.093 (3/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70950	171.80	70950-C3	187.80
	.093 (3/32)	5/16	2 (3x)	.146	I	8	5/8	4	972950	222.30	972950-C3	239.60
	.120	Please see page 386 for Retaining Ring sizes.										
	.125 (1/8)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950660	234.70	950660-C3	250.80
	.125 (1/8)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70960	171.80	70960-C3	187.80
	.125 (1/8)	5/16	2 (3x)	.146	I	8	5/8	4	972960	222.30	972960-C3	239.60
	.139	Please see page 386 for Retaining Ring sizes.										
	.156 (5/32)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950665	234.70	950665-C3	250.80
	.156 (5/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70965	171.80	70965-C3	187.80
	.156 (5/32)	5/16	2 (3x)	.146	I	8	5/8	4	972965	222.30	972965-C3	239.60
	.187 (3/16)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950670	234.70	950670-C3	250.80
	.187 (3/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70970	171.80	70970-C3	187.80
	.187 (3/16)	5/16	2 (3x)	.146	I	8	5/8	4	972970	222.30	972970-C3	239.60
	.250 (1/4)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950680	234.70	950680-C3	250.80
	.250 (1/4)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70980	171.80	70980-C3	187.80
	.250 (1/4)	5/16	2 (3x)	.146	I	8	5/8	4	972980	222.30	972980-C3	239.60
	.312 (5/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70985	171.80	70985-C3	187.80
	.375 (3/8)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70987	171.80	70987-C3	187.80

For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 383, 391, 394, 399.

KEYSEAT CUTTERS

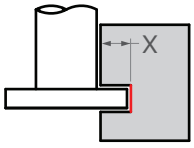
Square for Hardened Steels



- Optimized for hardened steels 45-68Rc with high flute count and specialized internal geometry
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

High Flute Count and Specialized Internal Geometry

Standard Slotting (Type I)



CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE
	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867415-C6	62.30
	.020	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867420-C6	62.30
1/8	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867431-C6	62.30
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867462-C6	62.30
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867493-C6	62.30
5/32	.031 (1/32)	5/64	1/4 (1.5x)	.029	I	8	3/16	2	746631-C6	64.60
	.062 (1/16)	5/64	1/4 (1.5x)	.029	I	8	3/16	2	746662-C6	64.60
	.020	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875920-C6	64.60
	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875931-C6	64.60
3/16	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875962-C6	64.60
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875993-C6	64.60
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875995-C6	64.60
	.015 (1/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860115-C6	72.90
	.020	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860120-C6	72.90
	.031 (1/32)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860131-C6	72.90
	.040	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860140-C6	72.90
	.047 (3/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860147-C6	72.90
1/4	.062 (1/16)	1/8	1/4 (1x)	.048	I	8	1/4	2-1/2	743962-C6	72.90
	.062 (1/16)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860162-C6	72.90
	.062 (1/16)	1/8	3/4 (3x)	.048	I	8	1/4	2-1/2	742830-C6	76.20
	.078 (5/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860178-C6	72.90
	.093 (3/32)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860193-C6	72.90
	.125 (1/8)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860195-C6	72.90
	.031 (1/32)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855610-C6	96.60
	.062 (1/16)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855630-C6	96.60
5/16	.093 (3/32)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855650-C6	96.60
	.125 (1/8)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855660-C6	96.60
	.156 (5/32)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855665-C6	96.60
	.031 (1/32)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894710-C6	108.80
	.062 (1/16)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894730-C6	108.80
	.093 (3/32)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894750-C6	108.80
3/8	.100	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894752-C6	108.80
	.125 (1/8)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894760-C6	108.80
	.187 (3/16)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894770-C6	108.80
	.250 (1/4)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894780-C6	108.80

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square for Hardened Steels (cont.)

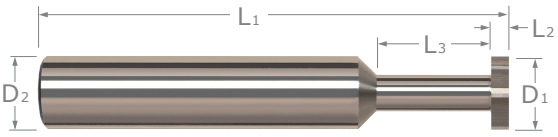
continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE
1/2	.031 (1/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891310-C6	147.80
	.047 (3/64)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891320-C6	147.80
	.062 (1/16)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891330-C6	147.80
	.078 (5/64)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891340-C6	147.80
	.093 (3/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891350-C6	147.80
	.125 (1/8)	1/4	1/2 (1x)	.105	I	10	1/2	3	744760-C6	147.80
	.125 (1/8)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891360-C6	147.80
	.125 (1/8)	1/4	1-1/2 (3x)	.105	I	10	1/2	3	748260-C6	151.10
	.156 (5/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891365-C6	147.80
	.187 (3/16)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891370-C6	147.80
	.250 (1/4)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891380-C6	147.80
5/8	.125 (1/8)	5/16	1 (1.5x)	.137	I	10	5/8	3-1/2	744360-C6	224.60
	.187 (3/16)	5/16	1 (1.5x)	.137	I	10	5/8	3-1/2	744370-C6	224.60
	.250 (1/4)	5/16	1 (1.5x)	.137	I	10	5/8	3-1/2	744380-C6	224.60

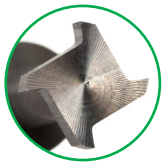
*Radial DOC accounts for max transition radius at neck

KEYSEAT CUTTERS

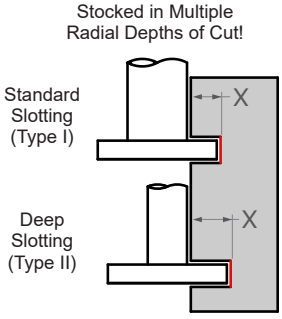
Square for Non-Ferrous Materials



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Large flute opening and sharper cutting edge
- Offered with TiB_2 coating to minimize galling
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA



Large Flute Opening & Sharper Cutting Edge



CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/32	.015 (1/64)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849815	54.00	849815-C8	62.00
	.031 (1/32)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849831	54.00	849831-C8	62.00
	.062 (1/16)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849862	55.00	849862-C8	63.10
1/8	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962915	54.00	962915-C8	61.10
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962931	54.00	962931-C8	62.00
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962962	54.00	962962-C8	62.00
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962993	54.00	962993-C8	62.00
5/32	.031 (1/32)	5/64	1/4 (1.5x)	.029	I	4	3/16	2	744031	57.00	744031-C8	65.00
	.062 (1/16)	5/64	1/4 (1.5x)	.029	I	4	3/16	2	744062	57.00	744062-C8	65.00
3/16	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998031	56.00	998031-C8	64.00
	.047 (3/64)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998047	56.00	998047-C8	64.00
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998062	56.00	998062-C8	64.00
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998095	56.00	998095-C8	64.00
1/4	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970315	62.10	970315-C8	71.60
	.020	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970320	62.10	970320-C8	71.60
	.025	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970325	62.10	970325-C8	71.60
	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970331	62.10	970331-C8	71.60
	.040	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970340	62.10	970340-C8	71.60
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970347	62.10	970347-C8	71.60
	.060	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970360	62.10	970360-C8	71.60
	.062 (1/16)	5/64	1/8 (.5x)	**.076**	II	4	1/4	2-1/2	909262	66.30	909262-C8	75.50
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970362	62.10	970362-C8	71.60
	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970378	62.10	970378-C8	71.60
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970393	62.10	970393-C8	71.60
	.125 (1/8)	5/64	1/8 (.5x)	**.076**	II	4	1/4	2-1/2	909295	66.30	909295-C8	75.50
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970395	62.10	970395-C8	71.60

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square for Non-Ferrous Materials (cont.)

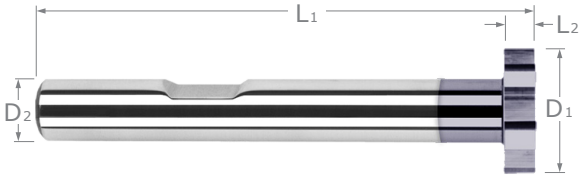
continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
5/16	.031 (1/32)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984310	85.20	984310-C8	98.20
	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984330	85.20	984330-C8	98.20
	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984350	85.20	984350-C8	98.20
	.125 (1/8)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984360	85.20	984360-C8	97.50
3/8	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975210	95.20	975210-C8	111.40
	.047 (3/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975220	95.20	975220-C8	109.80
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975230	95.20	975230-C8	111.40
	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975240	95.20	975240-C8	111.40
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975250	95.20	975250-C8	111.40
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975260	95.20	975260-C8	111.40
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975270	95.20	975270-C8	111.40
1/2	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988910	125.50	988910-C8	143.80
	.047 (3/64)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988920	125.50	988920-C8	143.80
	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	917530	132.10	917530-C8	149.50
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988930	125.50	988930-C8	143.80
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988940	125.50	988940-C8	143.80
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988950	125.50	988950-C8	143.80
	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	917560	132.10	917560-C8	149.50
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988960	125.50	988960-C8	143.80
	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988965	125.50	988965-C8	142.50
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988970	125.50	988970-C8	143.80
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988980	125.50	988980-C8	143.80
5/8	.062 (1/16)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891730	179.90	891730-C8	204.60
	.078 (5/64)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891740	179.90	891740-C8	206.70
	.093 (3/32)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891750	183.40	891750-C8	210.00
	.125 (1/8)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891760	179.90	891760-C8	206.70
	.187 (3/16)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891770	179.90	891770-C8	206.70
	.250 (1/4)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891780	179.90	891780-C8	206.70

*Radial DOC accounts for max transition radius at neck

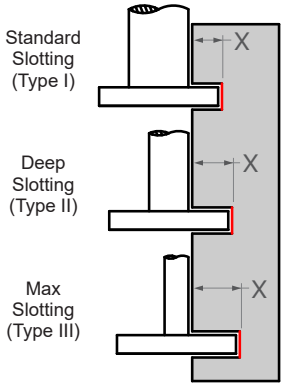
KEYSEAT CUTTERS

Square – Reduced Shank



- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Weldon flat
- CNC ground in the USA

Stocked in Multiple Radial Depths of Cut!



	CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC**	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.000″ −.002″	L_2 +.001″ −.001″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1/2	.031 (1/32)	.115	I	8	1/4*	3-1/32	849305	97.50	849305-C3	112.90
		.047 (3/64)	.115	I	8	1/4*	3-3/64	849310	97.50	849310-C3	112.90
NEW		.062 (1/16)	**.146**	II	8	3/16*	3-1/16	713162	105.50	713162-C3	120.90
		.062 (1/16)	.115	I	8	1/4*	3-1/16	849320	97.50	849320-C3	113.50
		.078 (5/64)	.115	I	8	1/4*	3-5/64	849330	97.50	849330-C3	113.50
NEW		.093 (3/32)	**.146**	II	8	3/16*	3-3/32	713193	105.50	713193-C3	120.90
		.093 (3/32)	.115	I	8	1/4*	3-3/32	849340	97.50	849340-C3	113.50
NEW		.125 (1/8)	**.146**	II	8	3/16*	3-1/8	713195	105.50	713195-C3	120.90
		.125 (1/8)	.115	I	8	1/4*	3-1/8	849350	97.50	849350-C3	113.50
		.156 (5/32)	.115	I	8	1/4*	3-5/32	849355	97.50	849355-C3	112.90
		.187 (3/16)	.115	I	8	1/4*	3-3/16	849360	97.50	849360-C3	113.50
		.250 (1/4)	.115	I	8	1/4*	3-1/4	849370	97.50	849370-C3	113.50
	3/4	.031 (1/32)	**.240**	III	10	1/4*	3-1/32	899805	133.20	899805-C3	150.70
		.031 (1/32)	**.177**	II	10	3/8	3-1/32	984505	122.80	984505-C3	141.10
		.031 (1/32)	.115	I	10	1/2	3-1/32	52005	117.40	52005-C3	136.10
		.040	**.177**	II	10	3/8	3.040	984508	122.80	984508-C3	141.10
		.040	.115	I	10	1/2	3.040	52008	117.40	52008-C3	136.10
		.047 (3/64)	**.240**	III	10	1/4*	3-3/64	899810	133.20	899810-C3	150.70
		.047 (3/64)	**.177**	II	10	3/8	3-3/64	984510	122.80	984510-C3	141.10
		.047 (3/64)	.115	I	10	1/2	3-3/64	52010	117.40	52010-C3	136.10
		.050	.115	I	10	1/2	3.050	52011	117.40	52011-C3	136.10
		.060	.115	I	10	1/2	3.060	52019	117.40	52019-C3	136.10
		.062 (1/16)	**.240**	III	10	1/4*	3-1/16	899820	133.20	899820-C3	150.70
		.062 (1/16)	**.177**	II	10	3/8	3-1/16	984520	122.80	984520-C3	141.10
		.062 (1/16)	.115	I	10	1/2	3-1/16	52020	117.40	52020-C3	136.10
		.078 (5/64)	**.177**	II	10	3/8	3-5/64	984530	122.80	984530-C3	141.10
		.078 (5/64)	.115	I	10	1/2	3-5/64	52030	117.40	52030-C3	136.10
		.093 (3/32)	**.240**	III	10	1/4*	3-3/32	899840	133.20	899840-C3	150.70
		.093 (3/32)	**.177**	II	10	3/8	3-3/32	984540	122.80	984540-C3	141.10
		.093 (3/32)	.115	I	10	1/2	3-3/32	52040	117.40	52040-C3	136.10
		.100	.115	I	10	1/2	3.100	52045	117.40	52045-C3	136.10
		.118 (3 mm)	.115	I	10	1/2	3.118	52048	117.40	52048-C3	136.10
		.125 (1/8)	**.177**	II	10	3/8	3-1/8	984550	122.80	984550-C3	141.10
		.125 (1/8)	.115	I	10	1/2	3-1/8	52050	117.40	52050-C3	136.10

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

continued on next page

NEW SIZES!

KEYSEAT CUTTERS

Square – Reduced Shank (cont.)

continued from previous page

CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC**	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.001''}_{-.001''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/4	.156 (5/32)	**.177**	II	10	3/8	3-5/32	984555	122.80	984555-C3	141.10
	.156 (5/32)	.115	I	10	1/2	3-5/32	52055	117.40	52055-C3	136.10
	.174	Please see page 386 for Retaining Ring sizes.								
	.187 (3/16)	**.177**	II	10	3/8	3-3/16	984560	122.80	984560-C3	141.10
	.187 (3/16)	.115	I	10	1/2	3-3/16	52060	117.40	52060-C3	136.10
	.236 (6 mm)	.115	I	10	1/2	3.236	52066	127.40	52066-C3	148.70
	.250 (1/4)	**.177**	II	10	3/8	3-1/4	984570	137.80	984570-C3	156.10
	.250 (1/4)	.115	I	10	1/2	3-1/4	52070	132.50	52070-C3	151.40
	.312 (5/16)	.115	I	10	1/2	3-5/16	52080	156.10	52080-C3	182.30
	.375 (3/8)	.115	I	10	1/2	3-3/8	52090	162.70	52090-C3	189.00
7/8	.062 (1/16)	.177	I	12	1/2	3-1/16	961020	125.50	961020-C3	144.40
	.093 (3/32)	.177	I	12	1/2	3-3/32	961040	125.50	961040-C3	144.40
	.125 (1/8)	**.240**	II	12	3/8	3-1/8	890650	130.40	890650-C3	148.70
	.125 (1/8)	.177	I	12	1/2	3-1/8	961050	125.50	961050-C3	144.40
	.187 (3/16)	**.240**	II	12	3/8	3-3/16	890660	130.40	890660-C3	148.70
	.187 (3/16)	.177	I	12	1/2	3-3/16	961060	125.50	961060-C3	151.20
	.250 (1/4)	**.240**	II	12	3/8	3-1/4	890670	145.20	890670-C3	163.60
	.250 (1/4)	.177	I	12	1/2	3-1/4	961070	139.60	961070-C3	158.70
	.312 (5/16)	.177	I	12	1/2	3-5/16	961080	156.10	961080-C3	175.30
	.375 (3/8)	.177	I	12	1/2	3-3/8	961090	162.70	961090-C3	182.00
1	.031 (1/32)	**.365**	III	12	1/4*	3-1/32	914905	155.30	914905-C3	181.80
	.031 (1/32)	**.302**	II	12	3/8	3-1/32	982005	137.20	982005-C3	164.60
	.031 (1/32)	.240	I	12	1/2	3-1/32	55905	132.00	55905-C3	160.10
	.040	.240	I	12	1/2	3.040	55908	132.00	55908-C3	160.10
	.047 (3/64)	**.365**	III	12	1/4*	3-3/64	914910	155.30	914910-C3	181.80
	.047 (3/64)	**.302**	II	12	3/8	3-3/64	982010	137.20	982010-C3	164.60
	.047 (3/64)	.240	I	12	1/2	3-3/64	55910	132.00	55910-C3	160.10
	.062 (1/16)	**.365**	III	12	1/4*	3-1/16	914920	155.30	914920-C3	181.80
	.062 (1/16)	**.302**	II	12	3/8	3-1/16	982020	137.20	982020-C3	164.60
	.062 (1/16)	.240	I	12	1/2	3-1/16	55920	132.00	55920-C3	160.10
	.078 (5/64)	**.365**	III	12	1/4*	3-5/64	914930	155.30	914930-C3	181.80
	.078 (5/64)	**.302**	II	12	3/8	3-5/64	982030	137.20	982030-C3	164.60
	.078 (5/64)	.240	I	12	1/2	3-5/64	55930	132.00	55930-C3	160.10
	.093 (3/32)	**.365**	III	12	1/4*	3-3/32	914940	155.30	914940-C3	181.80
	.093 (3/32)	**.302**	II	12	3/8	3-3/32	982040	137.20	982040-C3	164.60
	.093 (3/32)	.240	I	12	1/2	3-3/32	55940	132.00	55940-C3	160.10
	.125 (1/8)	**.365**	III	12	1/4*	3-1/8	914950	155.30	914950-C3	181.80
	.125 (1/8)	**.302**	II	12	3/8	3-1/8	982050	137.20	982050-C3	164.60
	.125 (1/8)	.240	I	12	1/2	3-1/8	55950	132.00	55950-C3	160.10
	.156 (5/32)	**.302**	II	12	3/8	3-5/32	982055	137.20	982055-C3	164.60
	.156 (5/32)	.240	I	12	1/2	3-5/32	55955	132.00	55955-C3	160.10
	.187 (3/16)	**.302**	II	12	3/8	3-3/16	982060	137.20	982060-C3	164.60
	.187 (3/16)	.240	I	12	1/2	3-3/16	55960	132.00	55960-C3	160.10
	.209	Please see page 386 for Retaining Ring sizes.								
	.250 (1/4)	**.302**	II	12	3/8	3-1/4	982070	152.30	982070-C3	179.80
	.250 (1/4)	.240	I	12	1/2	3-1/4	55970	146.50	55970-C3	174.70
	.312 (5/16)	**.302**	II	12	3/8	3-5/16	982080	162.40	982080-C3	190.00
	.312 (5/16)	.240	I	12	1/2	3-5/16	55980	156.10	55980-C3	184.40
	.375 (3/8)	**.302**	II	12	3/8	3-3/8	982090	153.80	982090-C3	181.30
	.375 (3/8)	.240	I	12	1/2	3-3/8	55990	162.70	55990-C3	191.10

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

continued on next page

KEYSEAT CUTTERS

Square – Reduced Shank (cont.)

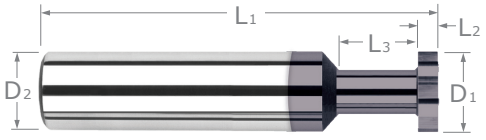
continued from previous page

	CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC**	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.000″ −.002″	L_2 +.001″ −.001″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	1-1/8	.500 (1/2)	.240	I	12	1/2	3-1/2	55995	169.30	55995-C3	197.70
		.125 (1/8)	.177	I	14	3/4	3-3/8	741750	154.20	741750-C3	190.50
		.250 (1/4)	.177	I	14	3/4	3-1/2	741770	172.50	741770-C3	208.80
	1-1/4	.093 (3/32)	.240	I	14	3/4	3-11/32	973940	167.20	973940-C3	203.50
		.125 (1/8)	**.365**	II	14	1/2	3-1/8	879950	170.50	879950-C3	199.60
		.125 (1/8)	.240	I	14	3/4	3-3/8	973950	164.00	973950-C3	191.70
		.250 (1/4)	**.365**	II	14	1/2	3-1/4	879970	172.10	879970-C3	199.60
		.250 (1/4)	.240	I	14	3/4	3-1/2	973970	182.50	973970-C3	201.70
		.375 (3/8)	.240	I	14	3/4	3-5/8	973990	196.70	973990-C3	232.20
		.500 (1/2)	.240	I	14	3/4	3-3/4	973995	196.70	973995-C3	232.20
NEW	1-3/8	.062 (1/16)	**.428**	II	14	1/2	3-1/16	713262	182.20	713262-C3	226.30
NEW		.125 (1/8)	**.428**	II	14	1/2	3-1/8	713295	182.20	713295-C3	226.30
NEW		.250 (1/4)	**.428**	II	14	1/2	3-1/4	713299	182.20	713299-C3	226.30
	1-1/2	.062 (1/16)	**.490**	II	16	1/2	3-1/16	887020	181.40	887020-C3	215.90
		.062 (1/16)	.365	I	16	3/4	3-5/16	962020	174.70	962020-C3	209.90
		.093 (3/32)	.365	I	16	3/4	3-11/32	962040	174.70	962040-C3	209.90
		.125 (1/8)	**.552**	III	16	3/8	3-1/8	868750	191.70	868750-C3	224.90
		.125 (1/8)	**.490**	II	16	1/2	3-1/8	887050	181.40	887050-C3	215.90
		.125 (1/8)	.365	I	16	3/4	3-3/8	962050	174.70	962050-C3	209.90
		.187 (3/16)	**.552**	III	16	3/8	3-3/16	868760	191.70	868760-C3	224.90
		.187 (3/16)	**.490**	II	16	1/2	3-3/16	887060	181.40	887060-C3	215.90
		.187 (3/16)	.365	I	16	3/4	3-7/16	962060	174.70	962060-C3	209.90
		.250 (1/4)	**.490**	II	16	1/2	3-1/4	887070	195.20	887070-C3	229.70
		.250 (1/4)	.365	I	16	3/4	3-1/2	962070	187.80	962070-C3	223.20
		.312 (5/16)	.365	I	16	3/4	3-9/16	962080	216.00	962080-C3	251.70
		.375 (3/8)	.365	I	16	3/4	3-5/8	962090	242.60	962090-C3	278.60
		.437 (7/16)	.365	I	16	3/4	3-11/16	962093	267.60	962093-C3	303.90
		.500 (1/2)	.365	I	16	3/4	3-3/4	962095	282.10	962095-C3	318.50

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

KEYSEAT CUTTERS

Retaining Ring Keyseats



Designed for Milling Retaining / Snap Ring Grooves

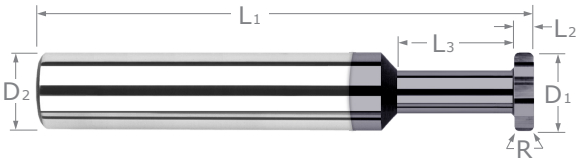
- Designed to mill proper slot widths for common retaining ring sizes
- Cutter diameter, neck length, radial, and axial depths of cut optimized for internal retaining ring grooves per ANSI standards
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

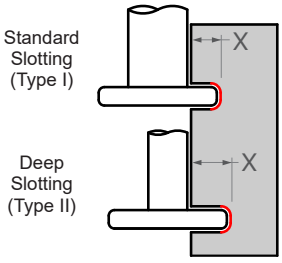
CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC**	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.002''}_{-.000''}$		L_3 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/16	.018	1/8	1/8	.021	6	3/16	2	23504	52.90	23504-C3	58.90
	.029	1/8	1/8	.021	6	3/16	2	23508	52.90	23508-C3	58.90
1/4	.039	5/32	5/32	.037	6	1/4	2-1/2	23512	62.60	23512-C3	70.70
	.046	5/32	5/32	.037	6	1/4	2-1/2	23516	62.60	23516-C3	70.70
5/16	.056	3/16	3/16	.052	6	5/16	2-1/2	23520	75.00	23520-C3	84.40
3/8	.068	3/16	1/4	.084	8	3/8	2-1/2	23524	87.40	23524-C3	98.00
	.086	3/16	1/4	.084	8	3/8	2-1/2	23528	87.40	23528-C3	98.00
1/2	.103	1/4	5/16	.115	8	1/2	3	23532	96.30	23532-C3	112.30
	.120	1/4	3/8	.115	8	1/2	3	23536	96.30	23536-C3	112.30
5/8	.120	5/16	1/2	.146	8	5/8	3-1/2	23540	179.20	23540-C3	197.10
	.139	5/16	1/2	.146	8	5/8	3-1/2	23544	179.20	23544-C3	195.20
3/4	.174	-	-	.177	10	3/8	3.174	23548*	129.40	23548-C3*	148.30
1	.209	-	-	.240	12	1/2	3.209	23564*	154.90	23564-C3*	183.20

*Carbide head with reduced steel shank **Radial DOC accounts for max transition at neck

KEYSEAT CUTTERS

Corner Radius





- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.015 (1/64)	**.005**	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910615	62.60	910615-C3	68.10
1/16	.020	**.005**	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910620	62.60	910620-C3	68.10
	.031 (1/32)	**.005**	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910631	62.60	910631-C3	68.10
	.031 (1/32)	**.005**	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	902531	61.00	902531-C3	66.50
3/32	.031 (1/32)	**.010**	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	909131	61.00	909131-C3	66.50
	.062 (1/16)	**.005**	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	902562	61.00	902562-C3	66.50
	.062 (1/16)	**.010**	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	909162	61.00	909162-C3	66.50
	.015 (1/64)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965115	59.30	965115-C3	64.80
	.020	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965120	59.30	965120-C3	64.80
	.025	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965125	59.30	965125-C3	64.80
	.031 (1/32)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965131	59.30	965131-C3	64.80
	.031 (1/32)	**.005**	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	732231	68.30	732231-C3	73.80
	.031 (1/32)	**.010**	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	837631	70.90	837631-C3	76.40
1/8	.040	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965140	59.30	965140-C3	64.80
	.047 (3/64)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965147	59.30	965147-C3	64.80
	.062 (1/16)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965162	59.30	965162-C3	64.80
	.062 (1/16)	**.010**	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	837662	70.90	837662-C3	76.40
	.062 (1/16)	**.010**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985962	59.30	985962-C3	64.80
	.078 (5/64)	**.010**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985978	60.50	985978-C3	66.00
	.093 (3/32)	**.010**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985993	59.30	985993-C3	64.80
	.093 (3/32)	**.015**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	960793	60.50	960793-C3	66.00
	.015 (1/64)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954715	61.40	954715-C3	67.30
	.020	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954720	61.40	954720-C3	67.30
	.025	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954725	61.40	954725-C3	67.30
	.031 (1/32)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954731	61.40	954731-C3	67.30
	.040	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954740	61.40	954740-C3	67.30
	.047 (3/64)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954747	61.40	954747-C3	67.30
	.062 (1/16)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954762	61.40	954762-C3	67.30
3/16	.062 (1/16)	**.010**	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	837262	73.50	837262-C3	79.50
	.062 (1/16)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949962	61.40	949962-C3	67.30
	.062 (1/16)	**.015**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937762	61.40	937762-C3	67.30
	.078 (5/64)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949978	61.40	949978-C3	67.30
	.093 (3/32)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949993	61.40	949993-C3	67.30
	.093 (3/32)	**.015**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937793	61.40	937793-C3	67.30
	.125 (1/8)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949995	61.40	949995-C3	67.30
	.125 (1/8)	**.015**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937795	61.40	937795-C3	67.30

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/4	.015 (1/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981115	67.80	981115-C3	75.90
	.020	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981120	67.80	981120-C3	75.90
	.025	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981125	67.80	981125-C3	75.90
	.031 (1/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981131	67.80	981131-C3	75.90
	.031 (1/32)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	916631	80.10	916631-C3	88.20
	.031 (1/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972631	67.80	972631-C3	75.90
	.040	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981140	67.80	981140-C3	75.90
	.047 (3/64)	**.005**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	777147	79.80	777147-C3	87.90
	.047 (3/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981147	67.80	981147-C3	75.90
	.047 (3/64)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	916647	80.10	916647-C3	87.60
	.047 (3/64)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972647	67.80	972647-C3	75.90
	.047 (3/64)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968447	67.80	968447-C3	75.90
	.050	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981150	67.80	981150-C3	75.90
	.060	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972660	67.80	972660-C3	75.90
	.062 (1/16)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981162	66.50	981162-C3	74.60
	.062 (1/16)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911762	79.80	911762-C3	87.90
	.062 (1/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972662	66.50	972662-C3	74.60
	.062 (1/16)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900062	78.90	900062-C3	86.90
	.062 (1/16)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968462	66.50	968462-C3	74.60
	.062 (1/16)	**.020**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	776762	66.50	776762-C3	74.60
	.078 (5/64)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972678	67.80	972678-C3	75.90
	.093 (3/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981193	66.50	981193-C3	74.60
	.093 (3/32)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911793	79.80	911793-C3	87.90
	.093 (3/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972693	66.50	972693-C3	74.60
	.093 (3/32)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900093	78.90	900093-C3	86.90
	.093 (3/32)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968493	66.50	968493-C3	74.60
	.093 (3/32)	**.030**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	904593	66.50	904593-C3	74.60
	.125 (1/8)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981195	66.50	981195-C3	74.60
	.125 (1/8)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911795	79.80	911795-C3	87.90
	.125 (1/8)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972695	66.50	972695-C3	74.60
	.125 (1/8)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900095	78.90	900095-C3	86.90
	.125 (1/8)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968495	66.50	968495-C3	74.60
	.125 (1/8)	**.020**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	776795	66.50	776795-C3	74.60
	.125 (1/8)	**.030**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	904595	66.50	904595-C3	74.60
	.187 (3/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972697	66.50	972697-C3	74.60
	.187 (3/16)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968497	66.50	968497-C3	74.60
5/16	.031 (1/32)	**.005**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	931610	97.60	931610-C3	107.10
	.031 (1/32)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921110	97.60	921110-C3	107.10
	.062 (1/16)	**.005**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	931630	97.60	931630-C3	107.10
	.062 (1/16)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921130	97.60	921130-C3	107.10
	.062 (1/16)	**.020**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	776562	97.60	776562-C3	107.10
	.093 (3/32)	**.010**	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	776850	101.60	776850-C3	111.10
	.093 (3/32)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921150	97.60	921150-C3	107.10
	.093 (3/32)	**.015**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	927750	97.60	927750-C3	107.10
	.093 (3/32)	**.020**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	776550	97.60	776550-C3	107.10

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/8	.031 (1/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987210	100.40	987210-C3	111.00
	.047 (3/64)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987220	100.40	987220-C3	111.00
	.062 (1/16)	**.005**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	836830	104.60	836830-C3	115.20
	.062 (1/16)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987230	98.40	987230-C3	109.00
	.062 (1/16)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916830	105.50	916830-C3	116.10
	.062 (1/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981630	98.40	981630-C3	109.00
	.062 (1/16)	**.010**	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	793730	99.90	793730-C3	110.50
	.062 (1/16)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903330	105.50	903330-C3	116.10
	.062 (1/16)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970030	98.40	970030-C3	109.00
	.062 (1/16)	**.020**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	776462	98.40	776462-C3	109.00
	.078 (5/64)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981640	100.40	981640-C3	111.00
	.093 (3/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987250	98.40	987250-C3	109.00
	.093 (3/32)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916850	105.50	916850-C3	116.10
	.093 (3/32)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981650	98.40	981650-C3	109.00
	.093 (3/32)	**.010**	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	793750	99.90	793750-C3	110.50
	.093 (3/32)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903350	105.50	903350-C3	116.10
	.093 (3/32)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970050	98.40	970050-C3	109.00
	.093 (3/32)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905950	98.40	905950-C3	109.00
	.125 (1/8)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987260	98.40	987260-C3	109.00
	.125 (1/8)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916860	105.50	916860-C3	116.10
	.125 (1/8)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981660	98.40	981660-C3	109.00
	.125 (1/8)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903360	105.50	903360-C3	116.10
	.125 (1/8)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970060	98.40	970060-C3	109.00
	.125 (1/8)	**.020**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	776460	98.40	776460-C3	109.00
	.125 (1/8)	**.030**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	857960	105.50	857960-C3	116.10
	.125 (1/8)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905960	98.40	905960-C3	109.00
	.156 (5/32)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970065	102.30	970065-C3	112.90
	.156 (5/32)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905965	102.30	905965-C3	112.90
	.187 (3/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981670	100.40	981670-C3	111.00
	.187 (3/16)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970070	100.40	970070-C3	111.00
	.187 (3/16)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905970	100.40	905970-C3	111.00
	.250 (1/4)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970080	100.40	970080-C3	111.00
	.250 (1/4)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905980	100.40	905980-C3	111.00
1/2	.020	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976005	129.60	976005-C3	145.60
	.025	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976007	127.20	976007-C3	143.20
	.031 (1/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976010	127.20	976010-C3	143.20
	.031 (1/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987710	127.20	987710-C3	143.20
	.040	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976015	127.20	976015-C3	143.20
	.047 (3/64)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976020	127.20	976020-C3	143.20
	.047 (3/64)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987720	127.20	987720-C3	143.20
	.062 (1/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976030	125.00	976030-C3	140.90
	.062 (1/16)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901030	131.60	901030-C3	147.70
	.062 (1/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987730	125.00	987730-C3	140.90
	.062 (1/16)	**.015**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	913430	131.60	913430-C3	147.70
	.062 (1/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990330	125.00	990330-C3	140.90
	.062 (1/16)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933730	125.00	933730-C3	140.90

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius (cont.)

continued from previous page

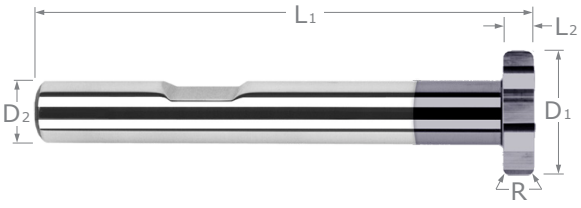
CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/2	.078 (5/64)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901040	134.00	901040-C3	150.10
	.078 (5/64)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987740	127.20	987740-C3	143.20
	.078 (5/64)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990340	127.20	990340-C3	143.20
	.093 (3/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976050	125.00	976050-C3	140.90
	.093 (3/32)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901050	131.60	901050-C3	147.70
	.093 (3/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987750	125.00	987750-C3	140.90
	.093 (3/32)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990350	125.00	990350-C3	140.90
	.093 (3/32)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933750	125.00	933750-C3	140.90
	.093 (3/32)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969150	127.20	969150-C3	143.20
	.125 (1/8)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976060	125.00	976060-C3	140.90
	.125 (1/8)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901060	131.60	901060-C3	147.70
	.125 (1/8)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987760	125.00	987760-C3	140.90
	.125 (1/8)	**.010**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	793960	126.30	793960-C3	142.30
	.125 (1/8)	**.015**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	913460	131.60	913460-C3	147.70
	.125 (1/8)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990360	125.00	990360-C3	140.90
	.125 (1/8)	**.020**	5/32	1/4 (.5x)	.162	II	8	1/2	3	777060	131.60	777060-C3	147.70
	.125 (1/8)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933760	125.00	933760-C3	140.90
	.125 (1/8)	**.030**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	926660	131.60	926660-C3	147.70
	.125 (1/8)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969160	127.20	969160-C3	143.20
	.125 (1/8)	**.040**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	838060	127.20	838060-C3	143.20
	.156 (5/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987765	130.50	987765-C3	146.40
	.156 (5/32)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990365	130.50	990365-C3	146.40
	.187 (3/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987770	127.20	987770-C3	143.20
	.187 (3/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990370	127.20	990370-C3	143.20
	.187 (3/16)	**.015**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	792870	128.40	792870-C3	144.40
	.187 (3/16)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933770	127.20	933770-C3	143.20
	.187 (3/16)	**.030**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	926670	152.40	926670-C3	168.40
	.187 (3/16)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969170	127.20	969170-C3	143.20
	.187 (3/16)	**.060**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	926170	129.50	926170-C3	145.50
	.250 (1/4)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987780	125.00	987780-C3	140.90
	.250 (1/4)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990380	125.00	990380-C3	140.90
	.250 (1/4)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933780	125.00	933780-C3	140.90
	.250 (1/4)	**.030**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	926680	131.60	926680-C3	147.70
	.250 (1/4)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969180	125.00	969180-C3	140.90
	.250 (1/4)	**.045**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	929580	125.00	929580-C3	140.90
	.250 (1/4)	**.060**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	926180	125.00	926180-C3	140.90
5/8	.125 (1/8)	**.010**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903960	187.10	903960-C3	203.10
	.125 (1/8)	**.015**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911160	187.10	911160-C3	203.10
	.125 (1/8)	**.020**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	731060	187.10	731060-C3	205.00
	.125 (1/8)	**.030**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908560	187.10	908560-C3	203.10
	.187 (3/16)	**.010**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903970	187.10	903970-C3	203.10
	.187 (3/16)	**.015**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911170	187.10	911170-C3	203.10
	.187 (3/16)	**.030**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908570	187.10	908570-C3	203.10
	.250 (1/4)	**.010**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903980	187.10	903980-C3	203.10
	.250 (1/4)	**.015**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911180	187.10	911180-C3	203.10
	.250 (1/4)	**.030**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908580	187.10	908580-C3	203.10

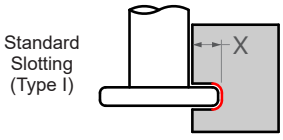
*Radial DOC accounts for max transition radius at neck

For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 383, 391, 394, 399.

KEYSEAT CUTTERS

Corner Radius – Reduced Shank





- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Weldon flat
- CNC ground in the USA

CUTTER DIAMETER	CUTTER WIDTH	CORNER RADIUS	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.001″ −.001″	R +.001″ −.001″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/2	.031 (1/32)	**.010**	.115	I	8	1/4	3-1/32	721910	102.10	721910-C3	117.50
	.062 (1/16)	**.010**	.115	I	8	1/4	3-1/16	721930	102.10	721930-C3	117.50
	.093 (3/32)	**.010**	.115	I	8	1/4	3-3/32	721950	102.10	721950-C3	117.50
	.125 (1/8)	**.010**	.115	I	8	1/4	3-1/8	721960	102.10	721960-C3	117.50
	.187 (3/16)	**.010**	.115	I	8	1/4	3-3/16	721970	102.10	721970-C3	117.50
	.250 (1/4)	**.010**	.115	I	8	1/4	3-1/4	721980	102.10	721980-C3	117.50
3/4	.031 (1/32)	**.005**	.177	I	10	3/8	3-1/32	841505	133.00	841505-C3	151.90
	.062 (1/16)	**.005**	.177	I	10	3/8	3-1/16	841520	133.00	841520-C3	151.90
	.062 (1/16)	**.010**	.177	I	10	3/8	3-1/16	923820	133.00	923820-C3	151.90
	.078 (5/64)	**.005**	.177	I	10	3/8	3-5/64	841530	135.50	841530-C3	154.50
	.078 (5/64)	**.010**	.177	I	10	3/8	3-5/64	923830	133.00	923830-C3	151.90
	.093 (3/32)	**.005**	.177	I	10	3/8	3-3/32	841540	133.00	841540-C3	151.90
	.093 (3/32)	**.010**	.177	I	10	3/8	3-3/32	923840	133.00	923840-C3	151.90
	.093 (3/32)	**.030**	.177	I	10	3/8	3-3/32	905240	133.00	905240-C3	151.90
	.125 (1/8)	**.005**	.177	I	10	3/8	3-1/8	841550	133.00	841550-C3	151.90
	.125 (1/8)	**.010**	.177	I	10	3/8	3-1/8	923850	133.00	923850-C3	151.90
	.125 (1/8)	**.015**	.177	I	10	3/8	3-1/8	840950	133.00	840950-C3	151.90
	.125 (1/8)	**.030**	.177	I	10	3/8	3-1/8	905250	133.00	905250-C3	151.90
	.187 (3/16)	**.010**	.177	I	10	3/8	3-3/16	923860	140.90	923860-C3	159.90
	.187 (3/16)	**.015**	.177	I	10	3/8	3-3/16	840960	140.90	840960-C3	159.90
	.187 (3/16)	**.030**	.177	I	10	3/8	3-3/16	905260	140.90	905260-C3	159.90
	.250 (1/4)	**.010**	.177	I	10	3/8	3-1/4	923870	148.30	923870-C3	167.40
	.250 (1/4)	**.015**	.177	I	10	3/8	3-1/4	840970	148.30	840970-C3	167.40
	.250 (1/4)	**.030**	.177	I	10	3/8	3-1/4	905270	148.30	905270-C3	167.40
	.250 (1/4)	**.060**	.177	I	10	3/8	3-1/4	894070	154.00	894070-C3	172.40
1	.031 (1/32)	**.005**	.240	I	12	1/2	3-1/32	840305	150.30	840305-C3	181.10
	.062 (1/16)	**.005**	.240	I	12	1/2	3-1/16	840320	147.40	840320-C3	175.60
	.062 (1/16)	**.010**	.240	I	12	1/2	3-1/16	918520	147.40	918520-C3	175.60
	.078 (5/64)	**.005**	.240	I	12	1/2	3-5/64	840330	150.30	840330-C3	178.50
	.078 (5/64)	**.010**	.240	I	12	1/2	3-5/64	918530	147.40	918530-C3	175.60
	.093 (3/32)	**.005**	.240	I	12	1/2	3-3/32	840340	150.30	840340-C3	178.50
	.093 (3/32)	**.010**	.240	I	12	1/2	3-3/32	918540	147.40	918540-C3	175.60
	.093 (3/32)	**.030**	.240	I	12	1/2	3-3/32	910040	147.40	910040-C3	175.60
	.125 (1/8)	**.005**	.240	I	12	1/2	3-1/8	840350	147.40	840350-C3	175.60
	.125 (1/8)	**.010**	.240	I	12	1/2	3-1/8	918550	147.40	918550-C3	175.60
	.125 (1/8)	**.015**	.240	I	12	1/2	3-1/8	839750	147.40	839750-C3	175.60
	.125 (1/8)	**.030**	.240	I	12	1/2	3-1/8	910050	147.40	910050-C3	175.60

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius – Reduced Shank (cont.)

continued from previous page

CUTTER DIAMETER	CUTTER WIDTH	CORNER RADIUS	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.001″ −.001″	R +.001″ −.001″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1	.187 (3/16)	**.010**	.240	I	12	1/2	3-3/16	918560	155.60	918560-C3	183.80
	.187 (3/16)	**.015**	.240	I	12	1/2	3-3/16	839760	155.60	839760-C3	183.80
	.187 (3/16)	**.030**	.240	I	12	1/2	3-3/16	910060	155.60	910060-C3	183.80
	.250 (1/4)	**.010**	.240	I	12	1/2	3-1/4	918570	161.90	918570-C3	190.20
	.250 (1/4)	**.015**	.240	I	12	1/2	3-1/4	839770	161.90	839770-C3	190.20
	.250 (1/4)	**.030**	.240	I	12	1/2	3-1/4	910070	161.90	910070-C3	190.20
	.250 (1/4)	**.060**	.240	I	12	1/2	3-1/4	897570	161.90	897570-C3	190.20
	.375 (3/8)	**.010**	.240	I	12	1/2	3-3/8	918590	169.70	918590-C3	198.10
	.375 (3/8)	**.015**	.240	I	12	1/2	3-3/8	839790	169.70	839790-C3	198.10
	.375 (3/8)	**.030**	.240	I	12	1/2	3-3/8	910090	169.70	910090-C3	198.10
1-1/2	.125 (1/8)	**.010**	.365	I	16	3/4	3-3/8	839150	190.30	839150-C3	225.70
	.125 (1/8)	**.030**	.365	I	16	3/4	3-3/8	838550	190.30	838550-C3	225.70
	.187 (3/16)	**.010**	.365	I	16	3/4	3-7/16	839160	190.30	839160-C3	225.70
	.187 (3/16)	**.030**	.365	I	16	3/4	3-7/16	838560	190.30	838560-C3	225.70
	.250 (1/4)	**.010**	.365	I	16	3/4	3-1/2	839170	203.80	839170-C3	239.30
	.250 (1/4)	**.030**	.365	I	16	3/4	3-1/2	838570	203.80	838570-C3	239.30
	.375 (3/8)	**.010**	.365	I	16	3/4	3-5/8	839190	258.30	839190-C3	294.50
	.375 (3/8)	**.030**	.365	I	16	3/4	3-5/8	838590	258.30	838590-C3	294.50
	.500 (1/2)	**.010**	.365	I	16	3/4	3-3/4	839195	297.90	839195-C3	334.50
	.500 (1/2)	**.030**	.365	I	16	3/4	3-3/4	838595	297.90	838595-C3	334.50

*Radial DOC accounts for max transition radius at neck

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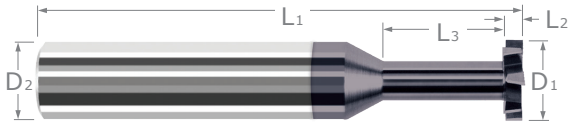
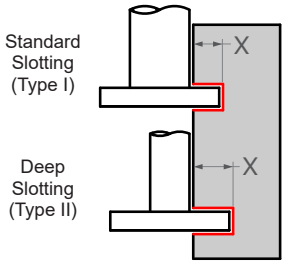
KEYSEAT CUTTERS

Staggered Tooth – Square



Stocked in Multiple Radial Depths of Cut!



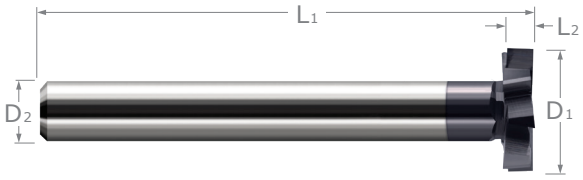
- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Relieved to allow cutting on both sides of head
- Design improves shearing action and finish while minimizing chip dragging and recutting and decreasing vibration
- Tool can be offset to increase width of groove
- Solid carbide • CNC ground in the USA

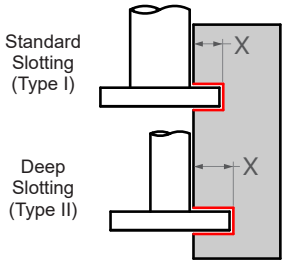
CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000" −.002"	L_2 +.0005" −.0005"		L_3 +.020" −.000"	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969815	67.50	969815-C3	73.00
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969831	67.50	969831-C3	73.00
1/8	.047 (3/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969847	67.50	969847-C3	73.00
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969862	67.50	969862-C3	73.00
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969893	68.70	969893-C3	74.20
	.031 (1/32)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	744831	80.30	744831-C3	86.30
5/32	.062 (1/16)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	744862	80.30	744862-C3	86.30
	.093 (3/32)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	744893	80.30	744893-C3	86.10
	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907031	81.60	907031-C3	87.60
3/16	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907062	80.10	907062-C3	86.10
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907093	80.10	907093-C3	86.10
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907095	80.10	907095-C3	86.10
	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972131	93.40	972131-C3	101.50
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972147	93.40	972147-C3	101.50
	.062 (1/16)	5/64	1/8 (0.5x)	**.076**	II	6	1/4	2-1/2	878962	103.10	878962-C3	110.60
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972162	93.40	972162-C3	101.50
1/4	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972178	93.40	972178-C3	100.90
	.093 (3/32)	5/64	1/8 (0.5x)	.076	II	6	1/4	2-1/2	878993	103.10	878993-C3	110.60
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972193	93.40	972193-C3	101.50
	.125 (1/8)	5/64	1/8 (0.5x)	**.076**	II	6	1/4	2-1/2	878995	105.30	878995-C3	113.40
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972195	93.40	972195-C3	101.50
	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	759530	115.40	759530-C3	124.80
5/16	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	759550	117.60	759550-C3	127.00
	.156 (5/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	759565	117.60	759565-C3	127.00
	.062 (1/16)	1/8	3/16 (0.5x)	**.115**	II	8	3/8	2-1/2	867330	125.70	867330-C3	136.30
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915830	115.40	915830-C3	126.00
	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915878	115.40	915878-C3	126.00
3/8	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915850	115.40	915850-C3	126.00
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915860	115.40	915860-C3	126.00
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915870	115.40	915870-C3	126.00
	.250 (1/4)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915880	115.40	915880-C3	126.00
	.062 (1/16)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895030	164.00	895030-C3	180.10
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955630	150.20	955630-C3	166.20
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955640	150.20	955640-C3	166.20
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955650	150.20	955650-C3	166.20
1/2	.125 (1/8)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895060	164.00	895060-C3	180.10
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955660	150.20	955660-C3	166.20
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955670	150.20	955670-C3	166.20
	.250 (1/4)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895080	164.00	895080-C3	180.10
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955680	150.20	955680-C3	166.20
	.093 (3/32)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904993	212.40	904993-C3	230.30
5/8	.125 (1/8)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904960	212.40	904960-C3	228.40
	.187 (3/16)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904970	212.40	904970-C3	228.40
	.250 (1/4)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904980	212.40	904980-C3	228.40

*Radial DOC accounts for max transition radius at neck

KEYSEAT CUTTERS

Staggered Tooth – Square – Reduced Shank





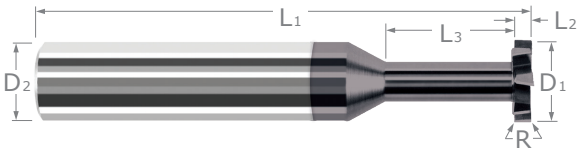
- Staggered tooth design with alternating right-hand/left-hand shear flutes, right-hand cut
- Relieved to allow cutting on both sides of head
- Tool can be offset to increase width of groove
- Solid carbide construction for maximum rigidity
- CNC ground in the USA

CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.001''}_{-.001''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
3/4	.062 (1/16)	.178	II	10	3/8	3	773530	347.80	773530-C3	367.60
	.078 (5/64)	.178	II	10	3/8	3	773540	347.80	773540-C3	367.60
	.093 (3/32)	.178	II	10	3/8	3	773550	347.80	773550-C3	365.20
	.125 (1/8)	.178	II	10	3/8	3	773560	347.80	773560-C3	365.20
	.187 (3/16)	.178	II	10	3/8	3	773570	347.80	773570-C3	365.20
	.250 (1/4)	.178	II	10	3/8	3	773580	347.80	773580-C3	365.20
1	.062 (1/16)	.240	I	12	1/2	3-1/2	772430	396.10	772430-C3	426.90
	.078 (5/64)	.240	I	12	1/2	3-1/2	772440	396.10	772440-C3	426.90
	.093 (3/32)	.240	I	12	1/2	3-1/2	772450	396.10	772450-C3	422.60
	.125 (1/8)	.240	I	12	1/2	3-1/2	772460	396.10	772460-C3	422.60
	.187 (3/16)	.240	I	12	1/2	3-1/2	772470	396.10	772470-C3	422.60
	.250 (1/4)	.240	I	12	1/2	3-1/2	772480	396.10	772480-C3	422.60
1-1/2	.062 (1/16)	.365	I	16	3/4	3-1/2	771130	501.10	771130-C3	537.70
	.078 (5/64)	.365	I	16	3/4	3-1/2	771140	501.10	771140-C3	545.20
	.093 (3/32)	.365	I	16	3/4	3-1/2	771150	501.10	771150-C3	545.20
	.125 (1/8)	.365	I	16	3/4	3-1/2	771160	501.10	771160-C3	537.70
	.187 (3/16)	.365	I	16	3/4	3-1/2	771170	501.10	771170-C3	537.70
	.250 (1/4)	.365	I	16	3/4	3-1/2	771180	501.10	771180-C3	537.70

*Radial DOC Accounts for max transition radius at neck

KEYSEAT CUTTERS

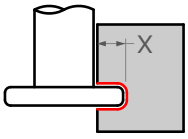
Staggered Tooth – Corner Radius

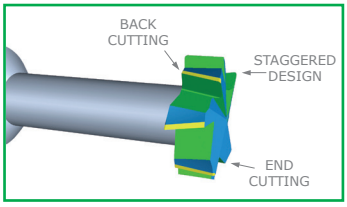


Staggered Tooth Design for Optimal Performance

- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Design improves shearing action, minimizes chip dragging and recutting, decreases vibration, and improves side wall finish
- Relieved to allow cutting on both sides of head
- Tool can be offset to increase width of groove
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

Standard Slotting (Type I)





CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/8	.031 (1/32)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	43631	70.20	43631-C3	75.70
	.031 (1/32)	**.005**	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	989931	85.30	989931-C3	90.80
	.047 (3/64)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	43647	70.90	43647-C3	76.40
	.062 (1/16)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	43662	70.20	43662-C3	75.70
	.062 (1/16)	**.005**	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	989962	84.50	989962-C3	90.00
	.062 (1/16)	**.010**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	44462	70.20	44462-C3	75.70
3/16	.031 (1/32)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	943531	77.90	943531-C3	83.80
	.047 (3/64)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	943547	77.90	943547-C3	83.80
	.062 (1/16)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	943562	77.90	943562-C3	83.80
	.062 (1/16)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	951762	77.90	951762-C3	83.80
1/4	.031 (1/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43831	97.00	43831-C3	105.20
	.031 (1/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	44531	98.00	44531-C3	105.50
	.047 (3/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43847	97.00	43847-C3	105.20
	.047 (3/64)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	958047	112.30	958047-C3	120.40
	.062 (1/16)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43862	97.00	43862-C3	105.20
	.062 (1/16)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	958062	112.30	958062-C3	120.40
	.062 (1/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	44562	97.00	44562-C3	105.20
	.093 (3/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43893	97.00	43893-C3	104.50
	.093 (3/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	44593	98.00	44593-C3	106.10
	.125 (1/8)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43895	97.00	43895-C3	105.20
	.125 (1/8)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	44595	97.00	44595-C3	105.20
3/8	.031 (1/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	967210	125.90	967210-C3	136.50
	.062 (1/16)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	967230	125.90	967230-C3	136.50
	.062 (1/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970930	125.90	970930-C3	136.50
	.093 (3/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	967250	125.90	967250-C3	136.50
	.093 (3/32)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970950	125.90	970950-C3	136.50
	.125 (1/8)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	967260	125.90	967260-C3	136.50
	.125 (1/8)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970960	125.90	970960-C3	136.50

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Staggered Tooth – Corner Radius (cont.)

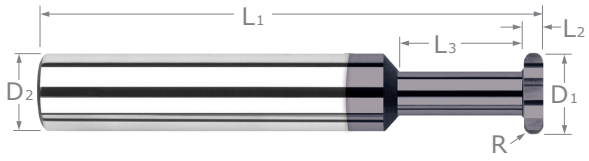
continued from previous page

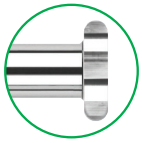
CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/2	.062 (1/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44330	156.00	44330-C3	172.00
	.062 (1/16)	**.005**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	976730	172.60	976730-C3	188.70
	.062 (1/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44630	156.00	44630-C3	172.00
	.062 (1/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921330	156.00	921330-C3	172.00
	.093 (3/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44350	156.00	44350-C3	172.00
	.093 (3/32)	**.005**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	976750	172.60	976750-C3	188.70
	.093 (3/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44650	156.00	44650-C3	172.00
	.093 (3/32)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921350	156.00	921350-C3	172.00
	.125 (1/8)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44360	156.00	44360-C3	172.00
	.125 (1/8)	**.005**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	976760	172.60	976760-C3	188.70
	.125 (1/8)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44660	156.00	44660-C3	172.00
	.125 (1/8)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921360	156.00	921360-C3	172.00
	.187 (3/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44370	156.00	44370-C3	172.00
	.187 (3/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44670	156.00	44670-C3	172.00
	.250 (1/4)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44380	156.00	44380-C3	172.00
	.250 (1/4)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44680	156.00	44680-C3	172.00
	.250 (1/4)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921380	156.00	921380-C3	172.00
5/8	.125 (1/8)	**.005**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	860460	220.40	860460-C3	236.50
	.125 (1/8)	**.010**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	872960	220.40	872960-C3	236.50
	.187 (3/16)	**.005**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	860470	220.40	860470-C3	238.30
	.187 (3/16)	**.010**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	872970	220.40	872970-C3	236.50
	.250 (1/4)	**.005**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	860480	220.40	860480-C3	236.50
	.250 (1/4)	**.010**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	872980	220.40	872980-C3	236.50

*Radial DOC accounts for max transition radius at neck

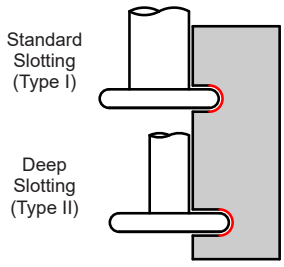
KEYSEAT CUTTERS

Full Radius





Full Radius



- Ground form relieved (can be reground without losing radius)
- Both sides of cutter are dished for clearance
- Solid carbide • CNC ground in the USA

RADIUS	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
R +.001" −.001"	D1 +.000" −.002"	L2		L3 +.020" −.000"	X			D2	L1	TOOL #	PRICE	TOOL #	PRICE
.0075	**3/32**	.015 (1/64)	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976907	86.10	976907-C3	91.60
.0075	**1/8**	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67507	89.40	67507-C3	94.90
.0075	**1/4**	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67707	110.60	67707-C3	118.70
.0075	**3/8**	.015 (1/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43303	126.70	43303-C3	137.30
.0100	**3/32**	.020	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976910	82.60	976910-C3	88.10
.0100	**1/8**	.020	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67510	85.70	67510-C3	91.20
.0100	**5/32**	.020	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965310	90.00	965310-C3	96.00
.0100	**3/16**	.020	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68310	99.00	68310-C3	105.00
.0100	**1/4**	.020	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67710	106.50	67710-C3	114.60
.0100	**5/16**	.020	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944410	117.90	944410-C3	127.30
.0100	**3/8**	.020	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68410	126.70	68410-C3	137.30
.0156 (1/64)	**3/32**	.031 (1/32)	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976915	73.60	976915-C3	79.10
.0156 (1/64)	**1/8**	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67515	76.20	67515-C3	81.70
.0156 (1/64)	**1/8**	.031 (1/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	895215	81.30	895215-C3	86.80
.0156 (1/64)	**5/32**	.031 (1/32)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965315	90.00	965315-C3	96.00
.0156 (1/64)	**3/16**	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68315	90.30	68315-C3	96.20
.0156 (1/64)	**3/16**	.031 (1/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	924415	105.60	924415-C3	111.50
.0156 (1/64)	**1/4**	.031 (1/32)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953915	102.30	953915-C3	110.50
.0156 (1/64)	**1/4**	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43315	97.10	43315-C3	105.20
.0156 (1/64)	**1/4**	.031 (1/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971415	112.50	971415-C3	120.60
.0156 (1/64)	**5/16**	.031 (1/32)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944415	108.00	944415-C3	117.40
.0156 (1/64)	**3/8**	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68415	117.10	68415-C3	127.70
.0156 (1/64)	**1/2**	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67915	120.70	67915-C3	136.70
.0200	**1/8**	.040	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67520	76.20	67520-C3	81.70
.0200	**5/32**	.040	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965320	90.00	965320-C3	96.00
.0200	**3/16**	.040	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68320	90.30	68320-C3	96.20
.0200	**3/16**	.040	3/32	9/16 (3x)	.037	I	6	3/16	2	924420	105.60	924420-C3	111.50
.0200	**1/4**	.040	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953920	102.30	953920-C3	110.50
.0200	**1/4**	.040	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67720	98.10	67720-C3	106.10
.0200	**1/4**	.040	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971420	112.50	971420-C3	120.60
.0200	**5/16**	.040	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944420	108.00	944420-C3	117.40
.0200	**3/8**	.040	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68420	118.20	68420-C3	128.80
.0200	**3/8**	.040	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968520	133.00	968520-C3	143.60
.0200	**1/2**	.040	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67920	121.30	67920-C3	137.30
.0250	**3/16**	.050	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68325	90.30	68325-C3	96.20
.0250	**1/4**	.050	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67725	98.10	67725-C3	106.10
.0250	**3/8**	.050	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68425	118.20	68425-C3	128.80
.0300	**5/32**	.060	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965330	90.00	965330-C3	96.00
.0300	**3/16**	.060	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68330	90.30	68330-C3	96.20
.0300	**1/4**	.060	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67730	98.10	67730-C3	106.10

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Full Radius (cont.)

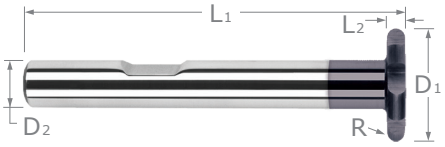
continued from previous page

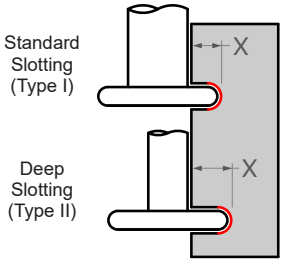
RADIUS	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.0312 (1/32)	**3/16**	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68331	90.30	68331-C3	96.20
.0312 (1/32)	**3/16**	.062 (1/16)	3/32	9/16 (3x)	.037	I	6	3/16	2	924431	105.60	924431-C3	111.50
.0312 (1/32)	**1/4**	.062 (1/16)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953931	102.30	953931-C3	110.50
.0312 (1/32)	**1/4**	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43331	97.10	43331-C3	105.20
.0312 (1/32)	**1/4**	.062 (1/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971431	112.50	971431-C3	120.60
.0312 (1/32)	**5/16**	.062 (1/16)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944431	108.00	944431-C3	117.40
.0312 (1/32)	**3/8**	.062 (1/16)	1/8	3/16 (.5x)	.115	II	6	3/8	2-1/2	949231	122.40	949231-C3	133.00
.0312 (1/32)	**3/8**	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68431	117.10	68431-C3	127.70
.0312 (1/32)	**1/2**	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898531	127.60	898531-C3	143.60
.0312 (1/32)	**1/2**	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67931	120.70	67931-C3	136.70
.0312 (1/32)	**1/2**	.062 (1/16)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942731	131.70	942731-C3	147.70
.0312 (1/32)	**5/8**	.062 (1/16)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43431	197.80	43431-C3	213.70
.0394 (1 mm)	**1/4**	.078 (2 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67739	98.10	67739-C3	106.10
.0394 (1 mm)	**5/16**	.078 (2 mm)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944439	109.40	944439-C3	118.80
.0394 (1 mm)	**3/8**	.078 (2 mm)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43339	118.20	43339-C3	128.80
.0394 (1 mm)	**3/8**	.078 (2 mm)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968539	133.00	968539-C3	143.60
.0394 (1 mm)	**1/2**	.078 (2 mm)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67939	121.30	67939-C3	137.30
.0469 (3/64)	**1/4**	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67747	97.10	67747-C3	105.20
.0469 (3/64)	**5/16**	.093 (3/32)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944447	108.00	944447-C3	117.40
.0469 (3/64)	**3/8**	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43347	117.10	43347-C3	127.70
.0469 (3/64)	**3/8**	.093 (3/32)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968547	133.00	968547-C3	143.60
.0469 (3/64)	**1/2**	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67947	120.70	67947-C3	136.70
.0469 (3/64)	**5/8**	.093 (3/32)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43447	197.80	43447-C3	213.70
.0500	**3/8**	.100	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68450	122.80	68450-C3	133.40
.0500	**1/2**	.100	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67950	138.90	67950-C3	155.00
.0590 (1.5 mm)	**5/16**	.118 (3 mm)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944459	109.40	944459-C3	118.80
.0590 (1.5 mm)	**3/8**	.118 (3 mm)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68459	118.20	68459-C3	128.80
.0590 (1.5 mm)	**1/2**	.118 (3 mm)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67959	121.30	67959-C3	137.30
.0625 (1/16)	**5/16**	.125 (1/8)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944462	108.00	944462-C3	117.40
.0625 (1/16)	**3/8**	.125 (1/8)	1/8	3/16 (.5x)	**.115**	II	6	3/8	2-1/2	949262	123.30	949262-C3	133.90
.0625 (1/16)	**3/8**	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43362	117.10	43362-C3	127.70
.0625 (1/16)	**3/8**	.125 (1/8)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968562	133.00	968562-C3	143.60
.0625 (1/16)	**1/2**	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898562	127.60	898562-C3	143.60
.0625 (1/16)	**1/2**	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67962	120.70	67962-C3	136.70
.0625 (1/16)	**1/2**	.125 (1/8)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942762	167.90	942762-C3	183.90
.0625 (1/16)	**5/8**	.125 (1/8)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43462	197.80	43462-C3	213.70
.0781 (5/64)	**3/8**	.156 (5/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68478	117.10	68478-C3	127.70
.0781 (5/64)	**1/2**	.156 (5/32)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898578	128.20	898578-C3	144.30
.0781 (5/64)	**1/2**	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	43378	121.30	43378-C3	137.30
.0781 (5/64)	**5/8**	.156 (5/32)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43478	197.80	43478-C3	213.70
.0937 (3/32)	**1/2**	.187 (3/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898593	128.20	898593-C3	144.30
.0937 (3/32)	**1/2**	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	43393	121.30	43393-C3	137.30
.0937 (3/32)	**1/2**	.187 (3/16)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942793	141.60	942793-C3	157.60
.0937 (3/32)	**5/8**	.187 (3/16)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43493	197.80	43493-C3	213.70
.1181 (3 mm)	**5/8**	.236 (6 mm)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	4343M	197.80	4343M-C3	213.70
.1250 (1/8)	**5/8**	.250 (1/4)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43408	197.80	43408-C3	213.70
.1250 (1/8)	**5/8**	.250 (1/4)	.300	2 (3x)	.152	I	6	5/8	4	983008	223.20	983008-C3	240.40

*Radial DOC accounts for max transition radius at neck

KEYSEAT CUTTERS

Full Radius – Reduced Shank



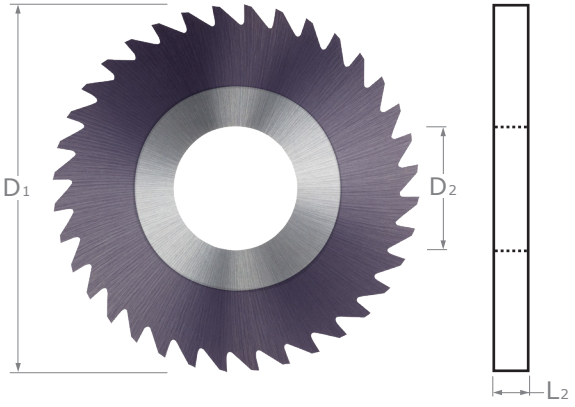


- Ground form relieved (can be reground without losing radius)
- 6 flutes • Both sides of cutter are dished for clearance
- Solid carbide head with steel shank
- Weldon flat • CNC ground in the USA

RADIUS	CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC*	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
R +.001″ −.001″	D1 +.010″ −.000″	L2	X		D2	L1	6 FL	PRICE	6 FL	PRICE
.0156 (1/64)	3/4	.031 (1/32)	**.177**	II	3/8	3-1/32	965415	169.30	965415-C3	187.90
.0156 (1/64)	3/4	.031 (1/32)	.115	I	1/2	3-1/32	32901	151.00	32901-C3	170.20
.0156 (1/64)	1	.031 (1/32)	.240	I	1/2	3-1/32	942615	165.80	942615-C3	194.20
.0200	3/4	.040	.115	I	1/2	3.040	959720	151.00	959720-C3	170.20
.0200	1	.040	.240	I	1/2	3.040	942620	165.80	942620-C3	194.20
.0300	3/4	.060	**.177**	II	3/8	3.060	965430	169.30	965430-C3	187.90
.0312 (1/32)	3/4	.062 (1/16)	**.177**	II	3/8	3-1/16	965431	169.30	965431-C3	187.90
.0312 (1/32)	3/4	.062 (1/16)	.115	I	1/2	3-1/16	32902	151.00	32902-C3	170.20
.0312 (1/32)	1	.062 (1/16)	.240	I	1/2	3-1/16	942631	165.80	942631-C3	194.20
.0394 (1 mm)	3/4	.078 (2 mm)	.115	I	1/2	3.078	3291M	151.00	3291M-C3	170.20
.0394 (1 mm)	1	.078 (2 mm)	.240	I	1/2	3.078	94261M	165.80	94261M-C3	194.20
.0469 (3/64)	3/4	.093 (3/32)	**.177**	II	3/8	3-3/32	965447	169.30	965447-C3	187.90
.0469 (3/64)	3/4	.093 (3/32)	.115	I	1/2	3-3/32	32903	151.00	32903-C3	170.20
.0469 (3/64)	1	.093 (3/32)	.240	I	1/2	3-3/32	942647	165.80	942647-C3	194.20
.0590 (1.5 mm)	3/4	.118 (3 mm)	**.177**	II	3/8	3.118	965459	169.30	965459-C3	187.90
.0625 (1/16)	3/4	.125 (1/8)	**.177**	II	3/8	3-1/8	965462	169.30	965462-C3	187.90
.0625 (1/16)	3/4	.125 (1/8)	.115	I	1/2	3-1/8	32904	151.00	32904-C3	170.20
.0625 (1/16)	1	.125 (1/8)	**.302**	II	3/8	3-1/8	937362	169.30	937362-C3	197.00
.0625 (1/16)	1	.125 (1/8)	.240	I	1/2	3-1/8	942662	165.80	942662-C3	194.20
.0781 (5/64)	3/4	.156 (5/32)	.115	I	1/2	3-5/32	959778	151.00	959778-C3	170.20
.0781 (5/64)	1	.156 (5/32)	**.302**	II	3/8	3-5/32	937378	172.20	937378-C3	199.80
.0781 (5/64)	1	.156 (5/32)	.240	I	1/2	3-5/32	32905	177.10	32905-C3	205.60
.0787 (2 mm)	3/4	.157 (4 mm)	**.177**	II	3/8	3.157	96542M	169.30	96542M-C3	187.90
.0787 (2 mm)	1	.157 (4 mm)	.240	I	1/2	3.157	3292M	177.10	3292M-C3	205.60
.0937 (3/32)	3/4	.187 (3/16)	.115	I	1/2	3-3/16	959793	151.00	959793-C3	170.20
.0937 (3/32)	1	.187 (3/16)	**.302**	II	3/8	3-3/16	937393	169.30	937393-C3	197.00
.0937 (3/32)	1	.187 (3/16)	.240	I	1/2	3-3/16	32906	177.10	32906-C3	205.60
.0937 (3/32)	1-1/2	.187 (3/16)	.365	I	3/4	3-11/16	850493	189.40	850493-C3	224.80
.1181 (3 mm)	1	.236 (6 mm)	.240	I	1/2	3.236	942694	177.10	942694-C3	201.30
.1250 (1/8)	1	.250 (1/4)	**.302**	II	3/8	3-1/4	937395	169.30	937395-C3	197.00
.1250 (1/8)	1	.250 (1/4)	.240	I	1/2	3-1/4	942695	177.10	942695-C3	205.60
.1250 (1/8)	1-1/4	.250 (1/4)	**.365**	II	1/2	3-1/4	848695	198.60	848695-C3	233.10
.1250 (1/8)	1-1/4	.250 (1/4)	.240	I	3/4	3-1/2	32908	198.90	32908-C3	234.40
.1250 (1/8)	1-1/2	.250 (1/4)	.365	I	3/4	3-3/4	850495	201.70	850495-C3	237.20
.1562 (5/32)	1-1/2	.312 (5/16)	.365	I	3/4	3-13/16	32910	243.80	32910-C3	279.80
.1875 (3/16)	1-3/8	.375 (3/8)	.302	I	3/4	3-5/8	32912	243.80	32912-C3	279.80
.2500 (1/4)	1-1/2	.500 (1/2)	.365	I	3/4	4	32916	269.90	32916-C3	306.20

*Radial DOC accounts for max transition radius at neck

SLITTING SAWS



◀ **Fully stocked uncoated or AlTiN coated**

- Sides of saw are dished for clearance
- Cutting on OD only • No keyway or hub
- For use with standard saw arbors
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED		AlTiN COATED	
D_1 +.005″ −.000″	L_2 +.00025″ −.00025″	D_2 +.0005″ +.0001″		TOOL #	PRICE	TOOL #	PRICE
3/4	.0100	1/4	18	SAG0100	66.80	SAG0100-C3	85.90
	.0156 (1/64)	1/4	18	SAG0156	66.80	SAG0156-C3	85.90
	.0200	1/4	18	SAG0200	66.80	SAG0200-C3	85.90
	.0312 (1/32)	1/4	18	SAG0312	66.80	SAG0312-C3	85.90
	.0400	1/4	18	SAG0400	66.80	SAG0400-C3	85.90
	.0625 (1/16)	1/4	18	SAG0625	59.30	SAG0625-C3	78.40
1	.0100	3/8	20	SAA0100	69.60	SAA0100-C3	93.60
	.0120	3/8	20	SAA0120	69.60	SAA0120-C3	93.60
	.0156 (1/64)	3/8	20	SAA0156	69.60	SAA0156-C3	93.60
	.0180	3/8	20	SAA0180	69.60	SAA0180-C3	93.60
	.0200	3/8	20	SAA0200	70.00	SAA0200-C3	94.00
	.0250	3/8	20	SAA0250	70.00	SAA0250-C3	94.00
	.0312 (1/32)	3/8	20	SAA0312	70.00	SAA0312-C3	94.00
	.0400	3/8	20	SAA0400	70.00	SAA0400-C3	94.00
	.0468 (3/64)	3/8	20	SAA0468	62.20	SAA0468-C3	86.10
	.0625 (1/16)	3/8	20	SAA0625	62.20	SAA0625-C3	86.10
1-1/4	.0100	3/8	24	SAB0100	82.90	SAB0100-C3	118.40
	.0156 (1/64)	3/8	24	SAB0156	82.90	SAB0156-C3	118.40
	.0200	3/8	24	SAB0200	77.60	SAB0200-C3	113.10
	.0312 (1/32)	3/8	24	SAB0312	77.60	SAB0312-C3	113.10
	.0625 (1/16)	3/8	24	SAB0625	77.60	SAB0625-C3	113.10
1-1/2	.0100	1/2	36	SAC0100	89.00	SAC0100-C3	125.90
	.0120	1/2	36	SAC0120	90.70	SAC0120-C3	129.40
	.0156 (1/64)	1/2	36	SAC0156	89.00	SAC0156-C3	125.90
	.0180	1/2	36	SAC0180	90.70	SAC0180-C3	129.40
	.0200	1/2	36	SAC0200	80.10	SAC0200-C3	116.90
	.0250	1/2	36	SAC0250	80.10	SAC0250-C3	116.90
	.0312 (1/32)	1/2	36	SAC0312	80.10	SAC0312-C3	116.90
	.0400	1/2	36	SAC0400	80.10	SAC0400-C3	116.90
	.0468 (3/64)	1/2	36	SAC0468	78.00	SAC0468-C3	114.80
	.0625 (1/16)	1/2	36	SAC0625	78.00	SAC0625-C3	114.80

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SLITTING SAWS

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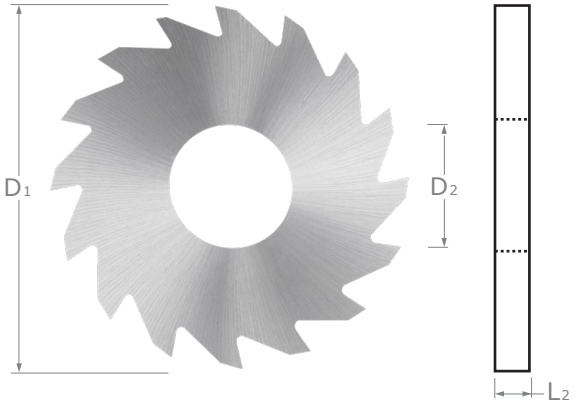
CUTTER DIAMETER	THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED		AlTiN COATED	
D_1 $^{+.005''}_{-.000''}$	L_2 $^{+.00025''}_{-.00025''}$	D_2 $^{+.0005''}_{+.0001''}$		TOOL #	PRICE	TOOL #	PRICE
1-3/4	.0100	1/2	38	SAD0100	108.50	SAD0100-C3	147.20
	.0156 (1/64)	1/2	38	SAD0156	108.50	SAD0156-C3	147.20
	.0200	1/2	38	SAD0200	95.30	SAD0200-C3	132.30
	.0312 (1/32)	1/2	38	SAD0312	95.30	SAD0312-C3	132.30
	.0625 (1/16)	1/2	38	SAD0625	103.90	SAD0625-C3	141.00
2	.0100	1/2	40	SAW0100	125.50	SAW0100-C3	162.80
	.0120	1/2	40	SAW0120	125.50	SAW0120-C3	162.80
	.0156 (1/64)	1/2	40	SAW0156	125.50	SAW0156-C3	164.20
	.0180	1/2	40	SAW0180	127.90	SAW0180-C3	166.60
	.0200	1/2	40	SAW0200	125.50	SAW0200-C3	162.80
	.0250	1/2	40	SAW0250	125.50	SAW0250-C3	162.80
	.0312 (1/32)	1/2	40	SAW0312	125.50	SAW0312-C3	162.80
	.0400	1/2	40	SAW0400	125.50	SAW0400-C3	162.80
	.0468 (3/64)	1/2	40	SAW0468	125.50	SAW0468-C3	162.80
	.0625 (1/16)	1/2	40	SAW0625	125.50	SAW0625-C3	162.80
	.0937 (3/32)	1/2	40	SAW0937	125.50	SAW0937-C3	162.80
	.1250 (1/8)	1/2	40	SAW1250	157.80	SAW1250-C3	195.50
3	.0200	1	72	SAE0200	194.90	SAE0200-C3	243.10
	.0312 (1/32)	1	72	SAE0312	194.90	SAE0312-C3	243.10
	.0625 (1/16)	1	72	SAE0625	219.50	SAE0625-C3	267.70
	.0937 (3/32)	1	72	SAE0937	280.80	SAE0937-C3	328.90
	.1250 (1/8)	1	72	SAE1250	320.10	SAE1250-C3	368.30
	.1875 (3/16)	1	72	SAE1875	407.40	SAE1875-C3	446.10
	.2500 (1/4)	1	72	SAE2500	481.10	SAE2500-C3	519.80
4	.0312 (1/32)	1	80	SAF0312	279.00	SAF0312-C3	323.20
	.0625 (1/16)	1	80	SAF0625	285.40	SAF0625-C3	329.30
	.0937 (3/32)	1	80	SAF0937	329.70	SAF0937-C3	371.30
	.1250 (1/8)	1	80	SAF1250	398.20	SAF1250-C3	460.20
	.1875 (3/16)	1	80	SAF1875	516.30	SAF1875-C3	555.00
	.2500 (1/4)	1	80	SAF2500	641.30	SAF2500-C3	680.00

For Saw Arbors, see page 538.

SLITTING SAWS

For Non-Ferrous Materials



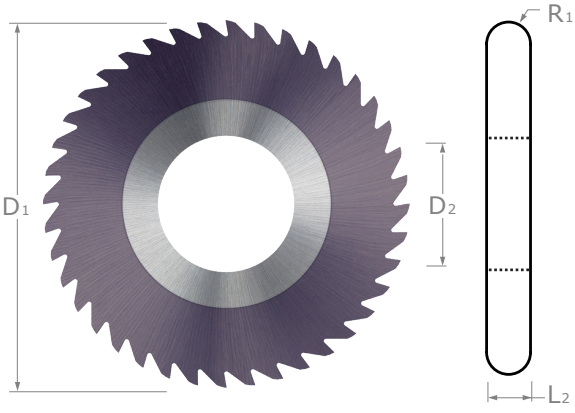
- Sides of saw have increased dish to minimize part contact
- Polished sides lessen saw binding in cut • Cutting on OD only • No keyway or hub
- For use with standard saw arbors • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED	
D_1 $^{+.005''}_{-.000''}$	L_2 $^{+.00025''}_{-.00025''}$	D_2 $^{+.0005''}_{+.0001''}$		TOOL #	PRICE
1	.0100	3/8	12	SNA0100	71.30
	.0156 (1/64)	3/8	12	SNA0156	70.50
	.0200	3/8	12	SNA0200	71.00
	.0312 (1/32)	3/8	12	SNA0312	71.00
	.0625 (1/16)	3/8	12	SNA0625	62.20
1-1/4	.0156 (1/64)	1/2	16	SNB0156	82.90
	.0200	1/2	16	SNB0200	77.60
	.0312 (1/32)	1/2	16	SNB0312	77.60
	.0625 (1/16)	1/2	16	SNB0625	79.10
1-1/2	.0120	1/2	16	SNC0120	90.70
	.0156 (1/64)	1/2	16	SNC0156	90.70
	.0200	1/2	16	SNC0200	80.10
	.0312 (1/32)	1/2	16	SNC0312	80.10
	.0400	1/2	16	SNC0400	80.10
	.0625 (1/16)	1/2	16	SNC0625	80.10
1-3/4	.0200	1/2	24	SND0200	97.20
	.0312 (1/32)	1/2	24	SND0312	97.20
	.0625 (1/16)	1/2	24	SND0625	103.90
2	.0200	1/2	24	SNE0200	127.90
	.0312 (1/32)	1/2	24	SNE0312	125.50
	.0400	1/2	24	SNE0400	125.50
	.0625 (1/16)	1/2	24	SNE0625	125.50
	.0937 (3/32)	1/2	24	SNE0937	125.50
	.1250 (1/8)	1/2	24	SNE1250	160.80
3	.0312 (1/32)	1	30	SNF0312	194.90
	.0625 (1/16)	1	30	SNF0625	219.50
	.0937 (3/32)	1	30	SNF0937	280.80
	.1250 (1/8)	1	30	SNF1250	320.10
4	.0312 (1/32)	1	36	SNG0312	284.40
	.0625 (1/16)	1	36	SNG0625	285.40
	.0937 (3/32)	1	36	SNG0937	336.10
	.1250 (1/8)	1	36	SNG1250	405.80

For Saw Arbors, see page 538.

SLITTING SAWS

Full Radius

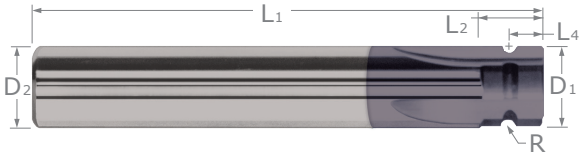


- Full radius profile
- Sides of saw are dished for clearance
- Cutting on radius only • No keyway or hub
- For use with standard saw arbors • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	RADIUS	THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.005''}$	R_1 $^{+.002''}_{-.000''}$	L_2 $^{+.0005''}_{-.0005''}$	D_2 $^{+.0005''}_{+.0001''}$		TOOL #	PRICE	TOOL #	PRICE
1	.0100	.0200	3/8	20	SFR0200	168.60	SFR0200-C3	195.70
	.0156 (1/64)	.0312 (1/32)	3/8	20	SFR0312	168.60	SFR0312-C3	195.70
	.0234	.0468 (3/64)	3/8	20	SFR0468	168.60	SFR0468-C3	195.70
	.0312 (1/32)	.0625 (1/16)	3/8	20	SFR0625	168.60	SFR0625-C3	195.70
2	.0156 (1/64)	.0312 (1/32)	1/2	40	SAK0312	263.60	SAK0312-C3	302.30
	.0234	.0468 (3/64)	1/2	40	SAK0468	263.60	SAK0468-C3	302.30
	.0312 (1/32)	.0625 (1/16)	1/2	40	SAK0625	263.60	SAK0625-C3	302.30
	.0468 (3/64)	.0937 (3/32)	1/2	40	SAK0937	263.60	SAK0937-C3	302.30
	.0625 (1/16)	.1250 (1/8)	1/2	40	SAK1250	274.10	SAK1250-C3	312.80
3	.0156 (1/64)	.0312 (1/32)	1	72	SAH0312	369.10	SAH0312-C3	407.80
	.0234	.0468 (3/64)	1	72	SAH0468	369.10	SAH0468-C3	407.80
	.0312 (1/32)	.0625 (1/16)	1	72	SAH0625	369.10	SAH0625-C3	407.80
	.0468 (3/64)	.0937 (3/32)	1	72	SAH0937	421.80	SAH0937-C3	460.50
	.0625 (1/16)	.1250 (1/8)	1	72	SAH1250	480.90	SAH1250-C3	519.60
4	.0234	.0468 (3/64)	1	80	SAJ0468	428.20	SAJ0468-C3	466.90
	.0312 (1/32)	.0625 (1/16)	1	80	SAJ0625	428.20	SAJ0625-C3	466.90
	.0468 (3/64)	.0937 (3/32)	1	80	SAJ0937	494.60	SAJ0937-C3	533.30
	.0625 (1/16)	.1250 (1/8)	1	80	SAJ1250	598.00	SAJ1250-C3	636.70

For Saw Arbors, see page 538.

CONCAVE RADIUS END MILLS



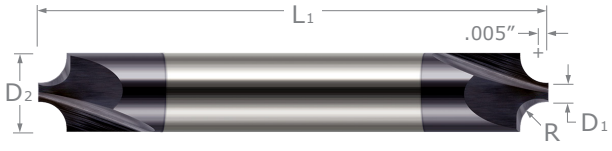
- Ground form relieved (can be re-ground without losing radius)
- 4 flutes
- Cutting on OD and radius only (non-end cutting)
- Solid carbide
- CNC ground in the USA

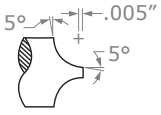
RADIUS	CUTTER DIAMETER	LENGTH OF CUT	RADIUS CENTER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D_1 +.000″ −.002″	L_2 +.060″ −.000″	L_4 +.001″ −.001″	D_2	L_1	4 FL	PRICE	4 FL	PRICE
1/64	1/4	.281	.1406	1/4	2-1/2	45915	65.00	45915-C3	73.10
1/64	1/2	.281	.1406	1/2	3	32801	127.60	32801-C3	143.60
.020	1/4	.281	.1450	1/4	2-1/2	45920	63.90	45920-C3	72.00
1/32	1/4	.312	.1562	1/4	2-1/2	45931	65.00	45931-C3	73.10
1/32	1/2	.312	.1562	1/2	3	32802	125.20	32802-C3	141.20
1 mm	1/4	.329	.1644	1/4	2-1/2	4591M	66.20	4591M-C3	74.30
1 mm	1/2	.329	.1644	1/2	3	3281M	132.30	3281M-C3	146.70
3/64	1/4	.344	.1719	1/4	2-1/2	45947	65.00	45947-C3	73.10
3/64	1/2	.344	.1719	1/2	3	32803	127.40	32803-C3	143.40
1/16	3/8	.375	.1875	3/8	2-1/2	45962	81.00	45962-C3	91.60
1/16	1/2	.375	.1875	1/2	3	32804	125.20	32804-C3	141.20
5/64	1/2	.407	.2034	1/2	3	32805	125.20	32805-C3	141.20
2 mm	1/2	.407	.2044	1/2	3	3282M	132.30	3282M-C3	148.40
3/32	1/2	.437	.2187	1/2	3	32806	127.40	32806-C3	143.40
7/64	5/8	.469	.2344	5/8	3-1/2	32807	163.20	32807-C3	179.10
1/8	5/8	.500	.2500	5/8	3-1/2	32808	160.30	32808-C3	176.30
5/32	3/4	.562	.2812	3/4	4	32810	270.10	32810-C3	287.40
3/16	1	.624	.3120	3/4	3-1/2	32812*	219.00	32812-C3*	238.90
1/4	1-1/4	.750	.3750	3/4	4	32816*	257.30	32816-C3*	277.30

*Solid carbide head with steel shank

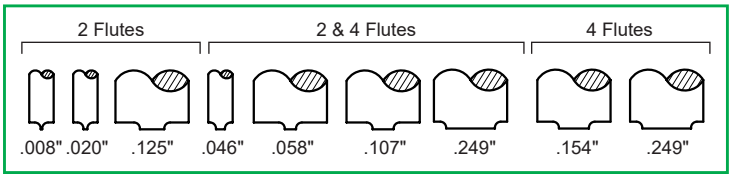
CORNER ROUNDING END MILLS

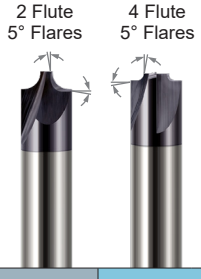
2 & 4 Flute – Flared





- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Double-ended
- Axial depth of cut ≈ radius plus .005″
- End cutting
- Solid carbide • CNC ground in the USA





RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1		D2	L1		TOOL #	PRICE	TOOL #	PRICE
.003	**.046**	2	1/8	1-1/2		17003	46.70	17003-C3	53.50
.004	**.046**	2	1/8	1-1/2		17004	46.70	17004-C3	53.50
.005	**.008**	2	1/8	1-1/2		67405	58.70	67405-C3	65.50
.005	**.020**	2	1/8	1-1/2		45305	50.40	45305-C3	57.20
.005	**.046**	2	1/8	1-1/2		17005	46.70	17005-C3	53.50
.005	**.046**	2	3/16	4	**LONG!**	31605	83.40	31605-C3	90.00
.005	**.046**	4	1/8	1-1/2		806105	63.40	806105-C3	70.30
.005	**.058**	4	1/8	1-1/2		67605	63.40	67605-C3	70.30
.005	**.107**	4	1/8	1-1/2		68005	63.40	68005-C3	70.30
.005	**.249**	4	3/8	2-1/2		21005	74.00	21005-C3	85.00
.006	**.020**	2	1/8	1-1/2		45306	50.40	45306-C3	57.20
.006	**.046**	2	1/8	1-1/2		17006	46.70	17006-C3	53.50
.006	**.058**	4	1/8	1-1/2		67606	64.10	67606-C3	70.90
.006	**.107**	4	1/8	1-1/2		68006	64.10	68006-C3	70.90
.007	**.020**	2	1/8	1-1/2		45307	50.40	45307-C3	57.20
.007	**.046**	2	1/8	1-1/2		17007	46.70	17007-C3	53.50
.007	**.058**	4	1/8	1-1/2		67607	63.40	67607-C3	70.30
.007	**.107**	4	1/8	1-1/2		68007	63.40	68007-C3	70.30
.008	**.008**	2	1/8	1-1/2		67408	58.70	67408-C3	65.50
.008	**.020**	2	1/8	1-1/2		45308	50.40	45308-C3	57.20
.008	**.046**	2	1/8	1-1/2		17008	46.70	17008-C3	53.50
.008	**.046**	2	3/16	4	**LONG!**	31608	83.40	31608-C3	92.90
.008	**.058**	4	1/8	1-1/2		67608	63.40	67608-C3	70.30
.008	**.249**	4	3/8	2-1/2		21008	74.00	21008-C3	85.00
.009	**.020**	2	1/8	1-1/2		45309	50.90	45309-C3	56.40
.009	**.046**	2	1/8	1-1/2		17009	46.70	17009-C3	53.50
.010	**.008**	2	1/8	1-1/2		67410	58.70	67410-C3	65.50
.010	**.020**	2	1/8	1-1/2		45310	50.40	45310-C3	57.20
.010	**.046**	2	1/8	1-1/2		17010	46.70	17010-C3	53.50
.010	**.046**	2	3/16	4	**LONG!**	31610	83.40	31610-C3	92.90

continued on next page

CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

continued from previous page

RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.010	**.046**	4	1/8	1-1/2		806110	63.60	806110-C3	70.40
.010	**.058**	4	1/8	1-1/2		67610	63.40	67610-C3	70.30
.010	**.107**	4	3/16	2		68010	68.70	68010-C3	76.80
.010	**.125**	2	3/16	2		941510	68.70	941510-C3	76.80
.010	**.249**	4	3/8	2-1/2		21010	74.00	21010-C3	85.00
.011	**.020**	2	1/8	1-1/2		45311	50.90	45311-C3	57.80
.011	**.046**	2	1/8	1-1/2		17011	46.70	17011-C3	53.50
.012	**.020**	2	1/8	1-1/2		45312	50.40	45312-C3	57.20
.012	**.046**	2	1/8	1-1/2		17012	46.70	17012-C3	53.50
.012	**.107**	4	3/16	2		68012	68.70	68012-C3	76.80
.013	**.020**	2	1/8	1-1/2		45313	50.40	45313-C3	57.20
.013	**.046**	2	1/8	1-1/2		17013	46.70	17013-C3	53.50
.014	**.020**	2	1/8	1-1/2		45314	50.40	45314-C3	57.20
.014	**.046**	2	1/8	1-1/2		17014	46.70	17014-C3	53.50
.015 (1/64)	**.008**	2	1/8	1-1/2		67415	58.70	67415-C3	65.50
.015 (1/64)	**.020**	2	1/8	1-1/2		45315	50.40	45315-C3	57.20
.015 (1/64)	**.046**	2	1/8	1-1/2		17015	46.70	17015-C3	53.50
.015 (1/64)	**.046**	2	3/16	4	**LONG!**	31615	83.40	31615-C3	92.90
.015 (1/64)	**.046**	4	1/8	1-1/2		806115	63.40	806115-C3	70.30
.015 (1/64)	**.058**	2	1/8	1-1/2		770515	46.70	770515-C3	53.50
.015 (1/64)	**.058**	4	1/8	1-1/2		67615	63.40	67615-C3	70.30
.015 (1/64)	**.107**	4	3/16	2		68015	68.70	68015-C3	76.80
.015 (1/64)	**.125**	2	3/16	2		941515	68.70	941515-C3	76.80
.015 (1/64)	**.249**	2	3/8	2		749015	70.90	749015-C3	80.90
.015 (1/64)	**.249**	4	3/8	2-1/2		21015	74.00	21015-C3	85.00
.018	**.020**	2	1/8	1-1/2		45318	50.40	45318-C3	57.20
.018	**.046**	2	1/8	1-1/2		17018	46.70	17018-C3	53.50
.018	**.107**	4	3/16	2		68018	68.70	68018-C3	76.80
.020	**.008**	2	1/8	1-1/2		67420	58.70	67420-C3	65.50
.020	**.020**	2	1/8	1-1/2		45320	50.40	45320-C3	57.20
.020	**.046**	2	1/8	1-1/2		17020	46.70	17020-C3	53.50
.020	**.046**	2	3/16	4	**LONG!**	31620	83.40	31620-C3	92.90
.020	**.046**	4	1/8	1-1/2		806120	63.40	806120-C3	70.30
.020	**.058**	2	1/8	1-1/2		770520	46.70	770520-C3	53.50
.020	**.058**	4	1/8	1-1/2		67620	63.40	67620-C3	70.30
.020	**.107**	2	3/16	2		748620	69.50	748620-C3	77.60
.020	**.107**	4	3/16	2		68020	68.70	68020-C3	75.60
.020	**.125**	2	3/16	2		941520	68.70	941520-C3	76.80
.020	**.249**	4	3/8	2-1/2		21020	74.00	21020-C3	85.00

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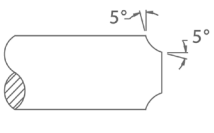
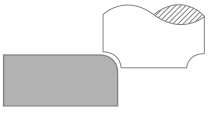
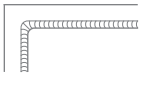


5° Flares at Shoulder and Pilot to Avoid Steps in Workpiece



Large Pilots for Profiling, Increasing Strength and Requiring Less Speed

Small Pilots for Narrow Slots and Holes



Small Pilots Allow Milling of Tight Inside Corners

CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

continued from previous page

RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R $^{+.0005''}_{-.0005''}$	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.022	**.020**	2	1/8	1-1/2		45322	50.40	45322-C3	57.20
.022	**.046**	2	1/8	1-1/2		17022	46.70	17022-C3	53.50
.022	**.107**	4	3/16	2		68022	68.70	68022-C3	76.80
.025	**.008**	2	1/8	1-1/2		67425	59.20	67425-C3	66.00
.025	**.020**	2	1/8	1-1/2		45325	50.40	45325-C3	57.20
.025	**.046**	2	1/8	1-1/2		17025	46.70	17025-C3	53.50
.025	**.046**	2	3/16	4	**LONG!**	31625	83.40	31625-C3	90.00
.025	**.058**	4	1/8	1-1/2		67625	63.40	67625-C3	70.30
.025	**.107**	4	3/16	2		68025	68.70	68025-C3	75.60
.025	**.125**	2	3/16	2		941525	68.70	941525-C3	76.80
.025	**.249**	4	3/8	2-1/2		21025	74.00	21025-C3	85.00
.027	**.046**	2	1/8	1-1/2		17027	46.70	17027-C3	53.50
.027	**.107**	4	3/16	2		68027	68.70	68027-C3	76.80
.030	**.008**	2	1/8	1-1/2		67430	58.70	67430-C3	65.50
.030	**.020**	2	1/8	1-1/2		45330	50.40	45330-C3	57.20
.030	**.046**	2	1/8	1-1/2		17030	46.70	17030-C3	53.50
.030	**.046**	2	3/16	4	**LONG!**	31630	83.40	31630-C3	92.90
.030	**.046**	4	1/8	1-1/2		806130	63.40	806130-C3	70.30
.030	**.058**	2	1/8	1-1/2		756930	64.10	756930-C3	70.90
.030	**.058**	4	1/8	1-1/2		67630	63.40	67630-C3	70.30
.030	**.107**	2	3/16	2		748630	69.50	748630-C3	75.30
.030	**.107**	4	3/16	2		68030	68.70	68030-C3	75.60
.030	**.125**	2	3/16	2		941530	68.70	941530-C3	76.80
.030	**.249**	2	3/8	2		749030	78.10	749030-C3	92.20
.030	**.249**	4	3/8	2-1/2		21030	81.50	21030-C3	97.50
.031 (1/32)	**.008**	2	1/8	1-1/2		67431	58.70	67431-C3	65.50
.031 (1/32)	**.020**	2	1/8	1-1/2		45331	50.40	45331-C3	57.20
.031 (1/32)	**.046**	2	1/8	1-1/2		17031	46.70	17031-C3	53.50
.031 (1/32)	**.046**	2	3/16	4	**LONG!**	31631	83.40	31631-C3	92.90
.031 (1/32)	**.046**	4	1/8	1-1/2		806131	63.40	806131-C3	70.30
.031 (1/32)	**.058**	4	1/8	1-1/2		67631	63.40	67631-C3	70.30
.031 (1/32)	**.107**	4	3/16	2		68031	68.70	68031-C3	76.80
.031 (1/32)	**.125**	2	3/16	2		941531	76.80	941531-C3	84.90
.031 (1/32)	**.154**	4	1/4	2		946631	90.20	946631-C3	101.20
.031 (1/32)	**.249**	4	3/8	2-1/2		21031	81.50	21031-C3	97.50
.032	**.046**	2	1/8	1-1/2		17032	46.70	17032-C3	53.50
.032	**.249**	4	3/8	2-1/2		21032	81.50	21032-C3	97.50
.035	**.020**	2	1/8	1-1/2		67835	50.40	67835-C3	55.90
.035	**.046**	2	1/8	1-1/2		17035	46.70	17035-C3	53.50
.035	**.046**	2	3/16	4	**LONG!**	31635	83.40	31635-C3	92.90
.035	**.058**	4	3/16	2		67635	71.20	67635-C3	79.30
.035	**.125**	2	1/4	2		941535	70.50	941535-C3	78.70
.035	**.249**	4	3/8	2-1/2		21035	81.50	21035-C3	97.50
.037	**.107**	4	3/16	2		68037	69.50	68037-C3	77.60

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CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

continued from previous page

RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.039 (1 mm)	**.020**	2	1/8	1-1/2		67839	50.40	67839-C3	57.20
.039 (1 mm)	**.046**	2	1/8	1-1/2		17039	46.70	17039-C3	53.50
.039 (1 mm)	**.046**	2	3/16	4	**LONG!**	31639	83.40	31639-C3	92.90
.039 (1 mm)	**.046**	4	1/8	1-1/2		806139	63.40	806139-C3	70.30
.039 (1 mm)	**.058**	4	3/16	2		67639	71.20	67639-C3	79.30
.039 (1 mm)	**.100**	2	3/16	2		45339	61.30	45339-C3	69.40
.039 (1 mm)	**.107**	4	3/16	2		68039	61.30	68039-C3	69.40
.039 (1 mm)	**.154**	4	1/4	2		946639	90.20	946639-C3	101.20
.039 (1 mm)	**.249**	4	3/8	2-1/2		21039	81.50	21039-C3	97.50
.040	**.020**	2	1/8	1-1/2		45340	50.40	45340-C3	57.20
.040	**.046**	2	3/16	2		17040	59.50	17040-C3	67.60
.040	**.107**	4	1/4	2		68040	90.20	68040-C3	101.20
.040	**.249**	4	3/8	2-1/2		21040	98.70	21040-C3	114.80
.043	**.046**	2	3/16	2		17043	59.50	17043-C3	67.60
.043	**.058**	4	3/16	2		67643	71.20	67643-C3	79.30
.043	**.249**	4	3/8	2-1/2		21043	99.70	21043-C3	110.30
.045	**.046**	2	3/16	2		17045	59.50	17045-C3	67.60
.045	**.058**	4	3/16	2		67645	71.20	67645-C3	79.30
.047 (3/64)	**.020**	2	1/8	1-1/2		67847	50.40	67847-C3	57.20
.047 (3/64)	**.046**	2	3/16	2		17047	59.50	17047-C3	67.60
.047 (3/64)	**.046**	2	3/16	4	**LONG!**	31647	83.40	31647-C3	92.90
.047 (3/64)	**.058**	4	3/16	2		67647	71.20	67647-C3	79.30
.047 (3/64)	**.107**	4	1/4	2		68047	90.20	68047-C3	101.20
.047 (3/64)	**.125**	2	1/4	2		45347	70.50	45347-C3	81.60
.047 (3/64)	**.249**	4	3/8	2-1/2		21047	98.70	21047-C3	114.80
.050	**.020**	2	1/8	1-1/2		67850	50.40	67850-C3	57.20
.050	**.046**	2	3/16	2		17050	59.50	17050-C3	67.60
.050	**.046**	2	1/4	4	**LONG!**	31650	99.10	31650-C3	107.10
.050	**.058**	4	3/16	2		67650	71.20	67650-C3	79.30
.050	**.107**	4	1/4	2		68050	90.20	68050-C3	101.20
.050	**.125**	2	1/4	2		45350	70.50	45350-C3	81.60
.050	**.249**	4	3/8	2-1/2		21050	98.70	21050-C3	114.80
.052	**.107**	4	1/4	2		68052	91.00	68052-C3	102.10
.055	**.046**	2	3/16	2		17055	59.50	17055-C3	67.60
.055	**.058**	4	3/16	2		67655	71.20	67655-C3	79.30
.055	**.107**	4	1/4	2		68055	90.20	68055-C3	101.20
.058	**.107**	4	1/4	2		68058	90.20	68058-C3	101.20
.060	**.020**	2	3/16	2		67860	61.90	67860-C3	70.00
.060	**.046**	2	3/16	2		17060	59.50	17060-C3	67.60
.060	**.046**	2	1/4	4	**LONG!**	31660	99.10	31660-C3	108.50
.060	**.046**	4	3/16	2		806060	67.90	806060-C3	76.00
.060	**.058**	2	3/16	2		756960	60.20	756960-C3	68.30
.060	**.058**	4	3/16	2		67660	71.20	67660-C3	79.30
.060	**.107**	2	1/4	2		748660	71.30	748660-C3	82.40
.060	**.107**	4	1/4	2		68060	90.20	68060-C3	101.20
.060	**.125**	2	1/4	2		45360	70.50	45360-C3	81.60
.060	**.154**	4	5/16	2-1/2		946660	104.00	946660-C3	117.40
.060	**.249**	4	1/2	3		21060	110.10	21060-C3	126.70

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RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.062 (1/16)	**.020**	2	3/16	2		67862	61.90	67862-C3	70.00
.062 (1/16)	**.046**	2	3/16	2		17062	59.50	17062-C3	67.60
.062 (1/16)	**.046**	2	1/4	4	**LONG!**	31662	99.10	31662-C3	108.50
.062 (1/16)	**.046**	4	3/16	2		806062	71.20	806062-C3	77.20
.062 (1/16)	**.058**	2	3/16	2		770562	59.50	770562-C3	67.60
.062 (1/16)	**.058**	4	3/16	2		67662	71.20	67662-C3	79.30
.062 (1/16)	**.107**	2	1/4	2		748662	71.30	748662-C3	82.40
.062 (1/16)	**.107**	4	1/4	2		68062	90.20	68062-C3	101.20
.062 (1/16)	**.125**	2	1/4	2		45362	70.50	45362-C3	81.60
.062 (1/16)	**.154**	4	5/16	2-1/2		946662	104.00	946662-C3	117.40
.062 (1/16)	**.249**	4	1/2	3		21062	110.10	21062-C3	124.60
.065	**.046**	2	3/16	2		17065	59.50	17065-C3	67.60
.070	**.046**	2	3/16	2		17070	59.50	17070-C3	67.60
.070	**.058**	4	1/4	2		67670	90.20	67670-C3	101.20
.070	**.107**	4	1/4	2		68070	90.20	68070-C3	101.20
.072	**.046**	2	1/4	2		17072	68.30	17072-C3	79.40
.072	**.249**	4	1/2	3		21072	115.30	21072-C3	137.30
.075	**.046**	2	1/4	2		17075	68.30	17075-C3	79.40
.078 (5/64)	**.020**	2	3/16	2		67878	68.70	67878-C3	76.80
.078 (5/64)	**.046**	2	1/4	2		17078	68.30	17078-C3	79.40
.078 (5/64)	**.046**	2	1/4	4	**LONG!**	31678	99.10	31678-C3	107.10
.078 (5/64)	**.046**	4	1/4	2		806078	90.20	806078-C3	101.20
.078 (5/64)	**.058**	4	1/4	2		67678	90.20	67678-C3	101.20
.078 (5/64)	**.107**	4	5/16	2-1/2		68078	104.00	68078-C3	117.40
.078 (5/64)	**.125**	2	5/16	2-1/2		941578	104.00	941578-C3	112.90
.078 (5/64)	**.154**	4	5/16	2-1/2		946678	104.00	946678-C3	117.40
.078 (5/64)	**.249**	4	1/2	3		21078	115.30	21078-C3	137.30
.080	**.046**	2	1/4	2		17080	68.30	17080-C3	79.40
.080	**.058**	4	1/4	2		67680	90.20	67680-C3	101.20
.080	**.107**	4	5/16	2-1/2		68080	104.00	68080-C3	117.40
.085	**.046**	2	1/4	2		17085	68.30	17085-C3	79.40
.089	**.045**	2	1/4	2		17089	68.30	17089-C3	79.40
.089	**.107**	4	5/16	2-1/2		68089	105.10	68089-C3	118.50
.089	**.248**	4	1/2	3		21089	116.40	21089-C3	138.40
.090	**.045**	2	1/4	2		17090	68.30	17090-C3	79.40
.090	**.058**	4	1/4	2		67690	90.20	67690-C3	101.20
.090	**.107**	4	5/16	2-1/2		68090	104.00	68090-C3	117.40
.093 (3/32)	**.045**	2	1/4	2		17093	68.30	17093-C3	79.40
.093 (3/32)	**.045**	2	5/16	4	**LONG!**	31693	130.60	31693-C3	145.60
.093 (3/32)	**.046**	4	1/4	2		806093	90.20	806093-C3	101.20
.093 (3/32)	**.058**	4	1/4	2		67693	90.20	67693-C3	101.20
.093 (3/32)	**.107**	4	5/16	2-1/2		68093	104.00	68093-C3	117.40
.093 (3/32)	**.125**	2	5/16	2-1/2		941593	105.10	941593-C3	118.50
.093 (3/32)	**.154**	4	3/8	2-1/2		946693	127.60	946693-C3	143.60
.093 (3/32)	**.248**	4	1/2	3		21093	117.40	21093-C3	139.40
.095	**.045**	2	1/4	2		17095	68.30	17095-C3	79.40

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CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

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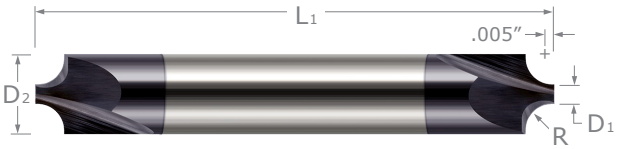
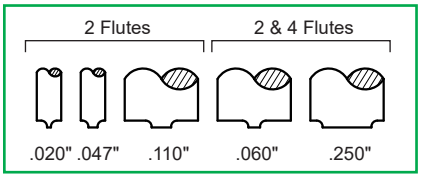
RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE
.100	**.045**	2	1/4	2		17100	68.30	17100-C3	79.40
.100	**.045**	2	5/16	4	**LONG!**	31700	130.60	31700-C3	145.60
.100	**.058**	4	5/16	2-1/2		77800	104.60	77800-C3	118.00
.100	**.107**	4	5/16	2-1/2		68100	104.60	68100-C3	118.00
.100	**.125**	2	3/8	2-1/2		941600	125.50	941600-C3	136.10
.100	**.248**	4	1/2	3		21100	117.40	21100-C3	139.40
.109 (7/64)	**.058**	2	5/16	2-1/2		17109	104.60	17109-C3	118.00
.109 (7/64)	**.107**	4	3/8	2-1/2		68109	127.60	68109-C3	143.60
.118 (3 mm)	**.058**	2	5/16	2-1/2		17118	104.60	17118-C3	118.00
.118 (3 mm)	**.107**	4	3/8	2-1/2		68118	127.60	68118-C3	143.60
.118 (3 mm)	**.125**	2	3/8	2-1/2		941618	125.50	941618-C3	136.10
.118 (3 mm)	**.248**	4	1/2	3		21118	148.90	21118-C3	170.90
.125 (1/8)	**.046**	2	5/16	2-1/2		948425	101.50	948425-C3	114.90
.125 (1/8)	**.046**	4	5/16	2-1/2		805908	105.50	805908-C3	115.00
.125 (1/8)	**.058**	2	5/16	2-1/2		17125	104.60	17125-C3	118.00
.125 (1/8)	**.058**	2	3/8	4	**LONG!**	31725	155.90	31725-C3	164.50
.125 (1/8)	**.058**	4	5/16	2-1/2		67708	104.60	67708-C3	118.00
.125 (1/8)	**.107**	4	3/8	2-1/2		68125	127.60	68125-C3	143.60
.125 (1/8)	**.125**	2	7/16	2-1/2		941608	170.10	941608-C3	190.40
.125 (1/8)	**.154**	4	7/16	2-1/2		946725	170.10	946725-C3	190.40
.125 (1/8)	**.248**	4	5/8	3-1/2		21125	189.30	21125-C3	213.20
.140 (9/64)	**.058**	2	3/8	2-1/2		17140	125.50	17140-C3	141.50
.140 (9/64)	**.107**	4	7/16	2-1/2		68140	170.10	68140-C3	190.40
.156 (5/32)	**.058**	2	3/8	2-1/2		17156	125.50	17156-C3	141.50
.156 (5/32)	**.107**	4	7/16	2-1/2		68156	170.10	68156-C3	190.40
.156 (5/32)	**.248**	4	5/8	3-1/2		21156	208.30	21156-C3	232.20
.172 (11/64)	**.058**	2	7/16	2-1/2		17172	189.30	17172-C3	209.60
.187 (3/16)	**.058**	2	7/16	2-1/2		17187	189.30	17187-C3	209.60
.187 (3/16)	**.107**	4	1/2	3		68187	198.60	68187-C3	220.60
.187 (3/16)	**.125**	2	5/8	3-1/2		941612	228.50	941612-C3	244.50
.187 (3/16)	**.248**	4	5/8	3-1/2		21187	223.30	21187-C3	247.20
.197 (5 mm)	**.058**	2	1/2	3		17197	198.60	17197-C3	220.60
.197 (5 mm)	**.107**	4	5/8	3-1/2		68197	298.00	68197-C3	321.90
.219 (7/32)	**.058**	2	1/2	3		17219	200.40	17219-C3	222.40
.219 (7/32)	**.107**	4	5/8	3-1/2		68219	298.00	68219-C3	321.90
.236 (6 mm)	**.107**	2	5/8	3-1/2		17236	301.10	17236-C3	325.00
.236 (6 mm)	**.107**	4	5/8	3-1/2		68236	298.00	68236-C3	321.90
.250 (1/4)	**.058**	2	5/8	3-1/2		17199	301.10	17199-C3	325.00
.250 (1/4)	**.107**	2	5/8	3-1/2		17250	298.00	17250-C3	321.90
.250 (1/4)	**.107**	4	5/8	3-1/2		68250	298.00	68250-C3	321.90
.250 (1/4)	**.154**	4	3/4	4		946750	331.80	946750-C3	359.40
.250 (1/4)	**.247**	4	3/4	4		21250	331.80	21250-C3	359.40
.312 (5/16)	**.247**	4	1	4		21312	468.70	21312-C3	508.20
.375 (3/8)	**.246**	4	1	4		21375	511.70	21375-C3	551.20

CORNER ROUNDING END MILLS

2 & 4 Flute – Unflared





- Unflared shoulder and pilot for full radius form
- Double-ended
- Axial depth of cut = radius plus .005″
- End cutting
- Solid carbide
- CNC ground in the USA

RADIUS	PILOT DIA.	FLUTES	SHANK DIA.	OAL		UNCOATED		TiN COATED		AlTiN COATED		AMORPHOUS DIAMOND	
R +.0005″ −.0005″	D1		D2	L1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.005	**.020**	2	1/8	1-1/2		932205	47.80			932205-C3	54.60		
.005	**.047**	2	1/8	1-1/2		46005	36.90	46005-C1	41.40	46005-C3	43.70	46005-C4	54.30
.008	**.047**	2	1/8	1-1/2		46008	36.90	46008-C1	41.40	46008-C3	43.70		
.010	**.020**	2	1/8	1-1/2		932210	47.80			932210-C3	54.60		
.010	**.047**	2	1/8	1-1/2		46010	36.20	46010-C1	40.80	46010-C3	43.00	46010-C4	53.70
.010	**.060**	4	1/8	1-1/2		929910	57.90			929910-C3	64.70		
.010	**.250**	4	3/8	2-1/2		44010	63.60			44010-C3	75.40		
.012	**.047**	2	1/8	1-1/2		46012	36.90	46012-C1	41.40	46012-C3	43.70		
.015 (1/64)	**.020**	2	1/8	1-1/2		932215	47.80			932215-C3	54.60		
.015 (1/64)	**.047**	2	1/8	1-1/2		46015	36.20	46015-C1	40.80	46015-C3	43.00	46015-C4	53.70
.015 (1/64)	**.047**	2	3/16	4	**LONG!**	928015	75.10			928015-C3	81.70		
.015 (1/64)	**.060**	4	1/8	1-1/2		929915	57.90			929915-C3	64.70		
.015 (1/64)	**.250**	4	3/8	2-1/2		44015	63.60			44015-C3	75.40		
.018	**.047**	2	1/8	1-1/2		46018	36.90	46018-C1	40.60	46018-C3	43.70		
.020	**.020**	2	1/8	1-1/2		932220	47.80			932220-C3	54.60		
.020	**.047**	2	1/8	1-1/2		46020	36.20	46020-C1	40.80	46020-C3	43.00	46020-C4	53.70
.020	**.047**	2	3/16	4	**LONG!**	928020	73.60			928020-C3	80.20		
.020	**.060**	4	1/8	1-1/2		929920	58.90			929920-C3	65.70		
.020	**.250**	4	3/8	2-1/2		44020	63.60			44020-C3	75.40		
.022	**.047**	2	1/8	1-1/2		46022	36.90	46022-C1	40.60	46022-C3	42.40		
.025	**.020**	2	1/8	1-1/2		932225	47.80			932225-C3	53.30		
.025	**.047**	2	1/8	1-1/2		46025	36.20	46025-C1	39.90	46025-C3	43.00	46025-C4	53.70
.025	**.250**	4	3/8	2-1/2		44025	63.60			44025-C3	75.40		
.027	**.047**	2	1/8	1-1/2		46027	36.90	46027-C1	40.60	46027-C3	43.70		
.030	**.047**	2	1/8	1-1/2		46030	36.90	46030-C1	41.40	46030-C3	43.70	46030-C4	54.30
.030	**.250**	4	3/8	2-1/2		44030	69.70			44030-C3	81.20		
.031 (1/32)	**.020**	2	1/8	1-1/2		932231	47.80			932231-C3	54.60		
.031 (1/32)	**.047**	2	1/8	1-1/2		46031	36.20	46031-C1	40.80	46031-C3	43.00	46031-C4	53.70
.031 (1/32)	**.047**	2	3/16	4	**LONG!**	928031	73.60			928031-C3	83.00		
.031 (1/32)	**.060**	4	1/8	1-1/2		929931	57.90			929931-C3	64.70		
.031 (1/32)	**.250**	4	3/8	2-1/2		44031	69.70			44031-C3	81.20		
.032	**.047**	2	1/8	1-1/2		46032	40.90	46032-C1	45.20	46032-C3	47.70		
.035	**.047**	2	1/8	1-1/2		46035	40.90	46035-C1	44.60	46035-C3	47.70		
.039 (1 mm)	**.020**	2	1/8	1-1/2		932239	41.70			932239-C3	48.50		
.039 (1 mm)	**.047**	2	1/8	1-1/2		46039	40.90	46039-C1	45.20	46039-C3	47.70	46039-C4	58.10
.039 (1 mm)	**.060**	4	3/16	2		929939	58.90			929939-C3	67.00		
.039 (1 mm)	**.250**	4	3/8	2-1/2		44039	69.70			44039-C3	81.20		

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CORNER ROUNDING END MILLS

2 & 4 Flute – Unflared (cont.)

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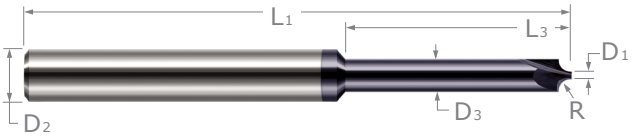
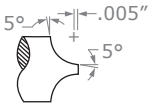
RADIUS	PILOT DIA.	FLUTES	SHANK DIA.	OAL		UNCOATED		TiN COATED		AlTiN COATED		AMORPHOUS DIAMOND	
R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.043	**.047**	2	3/16	2		46043	48.60	46043-C1	52.70	46043-C3	54.40		
.047 (3/64)	**.047**	2	3/16	2		46047	47.80	46047-C1	51.90	46047-C3	55.90	46047-C4	72.10
.047 (3/64)	**.250**	4	3/8	2-1/2		44047	71.10			44047-C3	82.50		
.050	**.047**	2	3/16	2		46050	47.80	46050-C1	53.00	46050-C3	55.90	46050-C4	63.30
.050	**.250**	4	3/8	2-1/2		44050	69.70			44050-C3	81.20		
.055	**.047**	2	3/16	2		46055	47.80	46055-C1	53.00	46055-C3	55.90		
.060	**.047**	2	3/16	2		46060	49.40	46060-C1	54.50	46060-C3	57.50	46060-C4	73.60
.060	**.250**	4	1/2	3		44060	98.40			44060-C3	114.00		
.062 (1/16)	**.047**	2	3/16	2		46062	48.60	46062-C1	53.70	46062-C3	56.70	46062-C4	72.80
.062 (1/16)	**.047**	2	1/4	4	**LONG!**	928062	87.90			928062-C3	98.70		
.062 (1/16)	**.060**	4	3/16	2		929962	65.00			929962-C3	73.10		
.062 (1/16)	**.110**	2	1/4	2		793462	56.00			793462-C3	63.50		
.062 (1/16)	**.250**	4	1/2	3		44062	98.40			44062-C3	114.00		
.067	**.047**	2	3/16	2		46067	49.40	46067-C1	53.50	46067-C3	57.50		
.072	**.047**	2	1/4	2		46072	56.80	46072-C1	61.70	46072-C3	64.30		
.078 (5/64)	**.047**	2	1/4	2		46078	56.00	46078-C1	63.20	46078-C3	63.50	46078-C4	83.50
.078 (5/64)	**.060**	4	1/4	2		929978	80.80			929978-C3	87.70		
.078 (5/64)	**.250**	4	1/2	3		44078	98.40			44078-C3	114.00		
.089	**.047**	2	1/4	2		46089	56.80	46089-C1	64.00	46089-C3	64.30		
.093 (3/32)	**.047**	2	1/4	2		46093	56.80	46093-C1	64.00	46093-C3	64.30	46093-C4	84.30
.093 (3/32)	**.047**	2	5/16	4	**LONG!**	928093	105.00			928093-C3	120.00		
.093 (3/32)	**.060**	4	1/4	2		929993	80.80			929993-C3	91.80		
.093 (3/32)	**.110**	2	5/16	2-1/2		793493	86.90			793493-C3	95.80		
.093 (3/32)	**.250**	4	1/2	3		44093	110.80			44093-C3	125.80		
.100	**.047**	2	1/4	2		46100	56.00	46100-C1	63.20	46100-C3	63.50	46100-C4	74.60
.104	**.060**	2	5/16	2-1/2		46104	79.00	46104-C1	85.30	46104-C3	92.30		
.109 (7/64)	**.060**	2	5/16	2-1/2		46109	77.70	46109-C1	86.30	46109-C3	91.00		
.118 (3 mm)	**.060**	2	5/16	2-1/2		46118	79.00	46118-C1	85.30	46118-C3	92.30	46118-C4	105.30
.118 (3 mm)	**.250**	4	1/2	3		44118	110.80			44118-C3	125.80		
.125 (1/8)	**.060**	2	5/16	2-1/2		46125	79.00	46125-C1	87.50	46125-C3	92.30	46125-C4	105.30
.125 (1/8)	**.060**	2	3/8	4	**LONG!**	928125	156.70			928125-C3	174.00		
.125 (1/8)	**.110**	2	3/8	3		793508	129.60			793508-C3	143.00		
.125 (1/8)	**.250**	4	5/8	3-1/2		44125	162.50			44125-C3	186.30		
.140 (9/64)	**.060**	2	3/8	2-1/2		46140	90.80	46140-C1	98.30	46140-C3	106.80		
.156 (5/32)	**.060**	2	3/8	2-1/2		46156	98.10	46156-C1	108.10	46156-C3	114.00		
.156 (5/32)	**.250**	4	5/8	3-1/2		44156	174.70			44156-C3	198.40		
.172 (11/64)	**.060**	2	7/16	2-1/2		46172	161.30	46172-C1	170.00	46172-C3	181.50		
.187 (3/16)	**.060**	2	7/16	2-1/2		46187	166.20	46187-C1	176.40	46187-C3	186.40		
.187 (3/16)	**.250**	4	5/8	3-1/2		44187	191.10			44187-C3	214.90		
.197 (5 mm)	**.060**	2	1/2	3		46197	230.80	46197-C1	251.90	46197-C3	252.70		
.219 (7/32)	**.060**	2	1/2	3		46219	221.50	46219-C1	231.70	46219-C3	235.90		
.236 (6 mm)	**.110**	2	5/8	3-1/2		46236	295.80	46236-C1	308.40	46236-C3	319.60		
.250 (1/4)	**.060**	4	5/8	3-1/2		930016	311.70			930016-C3	335.50		
.250 (1/4)	**.110**	2	5/8	3-1/2		46250	295.80	46250-C1	319.60	46250-C3	319.60		
.250 (1/4)	**.250**	4	3/4	4		44250	310.20			44250-C3	337.70		
.312 (5/16)	**.250**	2	1	4		46312	459.50	46312-C1	481.20	46312-C3	498.80		
.375 (3/8)	**.250**	2	1	4		46375	500.80	46375-C1	540.10	46375-C3	540.10		

CORNER ROUNDING END MILLS

Long Reach – Flared



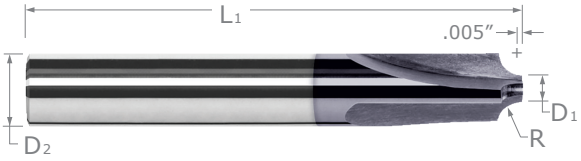


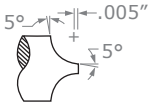
- **Reduced diameter for clearance along walls and in small features**
- Small pilot design for miniature holes, narrow slots and small inside corners
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Axial depth of cut = radius plus .005″ • 2 flutes • Solid carbide
- CNC ground in the USA

	RADIUS	PILOT DIAMETER	NECK DIAMETER	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	R +.0005″ −.0005″	D1 +.000″ −.001″	D3	L3 +.010″ −.000″	D2	L1	2 FL	PRICE	2 FL	PRICE
NEW	.005	.010	.031	.156	1/8	1-1/2	994605	43.60	994605-C3	49.10
		.010	.031	.250	1/8	1-1/2	56905	43.60	56905-C3	49.10
		.010	.031	.375	1/8	1-1/2	57305	45.00		
		.020	.031	.156	1/8	1-1/2	992205	43.60	992205-C3	49.10
		.020	.031	.250	1/8	1-1/2	55705	43.60	55705-C3	49.10
		.020	.031	.375	1/8	1-1/2	56005	45.40		
		.020	.062	.312	1/8	1-1/2	990905	43.60	990905-C3	49.10
		.020	.062	.500	1/8	1-1/2	57505	43.60	57505-C3	49.10
		.020	.062	.750	1/8	2	55305	45.00		
		.020	.093	.750	1/8	2	57405	50.10		
		.020	.093	1.125	1/8	2	54305	50.60		
	.008	.010	.031	.156	1/8	1-1/2	994608	43.60	994608-C3	49.10
		.010	.031	.250	1/8	1-1/2	56908	43.60		
		.010	.031	.375	1/8	1-1/2	57308	45.00	57308-C3	50.50
	.010	.010	.031	.156	1/8	1-1/2	994610	43.60	994610-C3	49.10
		.010	.031	.250	1/8	1-1/2	56910	43.60	56910-C3	49.10
		.010	.031	.375	1/8	1-1/2	57310	45.00		
		.020	.062	.312	1/8	1-1/2	990910	43.60	990910-C3	49.10
		.020	.062	.500	1/8	1-1/2	57510	43.60	57510-C3	49.10
		.020	.062	.750	1/8	2	55310	45.00		
		.020	.093	.750	1/8	2	57410	50.10		
		.020	.093	1.125	1/8	2	54310	50.10		
	.015	.020	.062	.312	1/8	1-1/2	990915	43.60	990915-C3	49.10
		.020	.062	.500	1/8	1-1/2	57515	43.60	57515-C3	49.10
NEW		.020	.062	.750	1/8	2	55315	45.00	55315-C3	50.50
NEW		.020	.093	.750	1/8	2	57415	50.10	57415-C3	55.60
		.020	.093	1.125	1/8	2	54315	50.60		
	.020	.020	.062	.312	1/8	1-1/2	990920	43.60	990920-C3	49.10
		.020	.062	.500	1/8	1-1/2	57520	43.60	57520-C3	49.10
		.020	.062	.750	1/8	2	55320	45.00		
		.020	.093	.750	1/8	2	57420	50.10	57420-C3	55.60
		.020	.093	1.125	1/8	2	54320	50.10		
NEW	.025	.020	.093	.750	1/8	2	57425	50.10	57425-C3	55.60
		.020	.093	1.125	1/8	2	54325	50.10		
	.030	.020	.093	.750	1/8	2	57430	50.10	57430-C3	55.60
		.020	.093	1.125	1/8	2	54330	50.10	54330-C3	55.60
	.031	.020	.093	.750	1/8	2	57431	50.10	57431-C3	55.60
		.020	.093	1.125	1/8	2	54331	50.60		

CORNER ROUNDING END MILLS

3 Flute – Flared



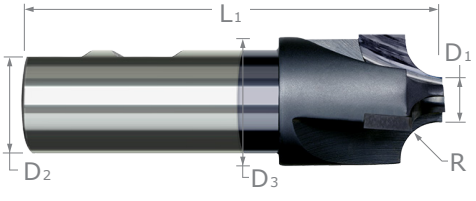


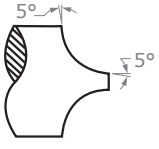
- Single end • Cutting on radius, flares, and end only (not center cutting)
- 5° flares tangent at pilot and shoulder to avoid steps
- Axial depth of cut ≈ radius plus .005″ • 3 flutes • Solid carbide • CNC ground in the USA

RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1	D2	L1	3 FL	PRICE	3 FL	PRICE
.015 (1/64)	.046	1/8	1-1/2	760215	36.00	760215-C3	41.50
.015 (1/64)	.058	1/8	1-1/2	933415	36.00	933415-C3	41.50
.020	.046	1/8	1-1/2	760220	36.00	760220-C3	41.50
.020	.058	1/8	1-1/2	933420	36.00	933420-C3	41.50
.031 (1/32)	.046	1/8	1-1/2	760231	36.00	760231-C3	41.50
.031 (1/32)	.058	1/8	1-1/2	933431	36.00	933431-C3	41.50
.062 (1/16)	.058	3/16	2	933462	46.00	933462-C3	51.90
.062 (1/16)	.154	5/16	2-1/2	928262	78.80	928262-C3	88.30
.093 (3/32)	.058	1/4	2	933493	67.70	933493-C3	75.80
.093 (3/32)	.154	3/8	2-1/2	928293	89.90	928293-C3	100.50
.125 (1/8)	.058	5/16	2-1/2	933508	78.80	933508-C3	88.30
.125 (1/8)	.248	5/8	3-1/2	973008	131.80	973008-C3	148.80
.187 (3/16)	.058	7/16	2-1/2	933512	129.30	933512-C3	142.70
.187 (3/16)	.248	5/8	3-1/2	973012	149.50	973012-C3	167.40

CORNER ROUNDING END MILLS

3 Flute – Flared – Carbide Tipped



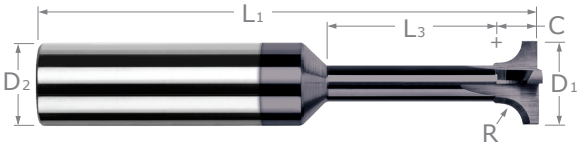


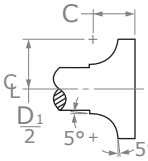
- Carbide tipped - cutting on radius and flares only
- 5° flares tangent to radius at pilot and shoulder to avoid steps
- 3 flutes • Weldon flat • CNC ground in the USA

RADIUS	PILOT DIAMETER	HEAD DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R	D1	D3	D2	L1	3 FL	PRICE	3 FL	PRICE
1/4	13/32	1	3/4	3-1/4	45016	246.10	45016-C3	272.60
5/16	13/32	1-1/8	7/8	3-1/2	45020	252.20	45020-C3	273.60
3/8	13/32	1-1/4	7/8	3-3/4	45024	261.20	45024-C3	283.60
7/16	13/32	1-3/8	1	4	45028	292.60	45028-C3	319.10
1/2	13/32	1-1/2	1	4	45032	323.70	45032-C3	350.30
5/8	21/32	2	1-1/4	4-1/4	45040	401.60	45040-C3	434.80

CORNER ROUNDING END MILLS

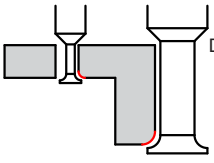
Back Corner Rounding End Mills – Flared





5° Flares at Shoulder & Pilot to Avoid Steps in Workpiece

- Designed to mill radius on backside of workpiece
- 5° flares at neck and shoulder to avoid steps
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Cutting on radius and flares only
- Solid carbide
- CNC ground in the USA



Larger Head Diameter for Outside Profiling
Miniature Head Diameter for Small Holes & Slots

RADIUS	HEAD DIAMETER	NECK DIAMETER	NECK LENGTH	RADIUS CENTER	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1 +.000″ −.002″		L3	C +.003″ −.001″*		D2	L1	TOOL #	PRICE	TOOL #	PRICE
.005	.030	.017	.062	.025	3	1/8	1-1/2	57705	70.50	57705-C3	76.00
.005	.060	.047	.250	.025	3	1/8	1-1/2	58005	70.50	58005-C3	76.00
.005	.115	.102	.875	.025	3	1/8	2	59805	73.50	59805-C3	79.00
.008	.075	.056	.312	.028	3	1/8	1-1/2	58708	70.50	58708-C3	76.00
.008	.187	.144	.500	.070	3	3/16	2	16008	74.90	16008-C3	80.90
.010	.045	.022	.078	.030	3	1/8	1-1/2	60910	70.50	60910-C3	76.00
.010	.075	.052	.281	.030	3	1/8	1-1/2	58710	70.50	58710-C3	76.00
.010	.187	.140	.500	.072	3	3/16	2	16010	74.90	16010-C3	80.90
.012	.075	.048	.250	.032	3	1/8	1-1/2	58712	70.50	58712-C3	76.00
.015 (1/64)	.060	.027	.093	.035	3	1/8	1-1/2	58515	70.50	58515-C3	76.00
.015 (1/64)	.090	.057	.312	.035	3	1/8	1-1/2	59715	70.50	59715-C3	76.00
.015 (1/64)	.187	.130	.500	.077	3	3/16	2	16015	74.90	16015-C3	80.90
.015 (1/64)	.187	.130	1.000	.077	3	3/16	2-1/2	992815	76.10	992815-C3	82.00
.020	.075	.032	.109	.040	3	1/8	1-1/2	59220	70.50	59220-C3	76.00
.020	.115	.072	.375	.040	3	1/8	1-1/2	60420	70.50	60420-C3	76.00
.020	.187	.120	.500	.082	3	3/16	2	16020	74.90	16020-C3	80.90
.022	.187	.116	.500	.084	3	3/16	2	16022	74.90	16022-C3	80.90
.025	.090	.037	.125	.055	3	1/8	1-1/2	60125	70.50	60125-C3	76.00
.025	.187	.110	.500	.087	3	3/16	2	16025	74.90	16025-C3	80.90
.027	.187	.106	.500	.089	3	3/16	2	16027	74.90	16027-C3	80.90
.030	.115	.052	.187	.060	3	1/8	1-1/2	60630	70.50	60630-C3	76.00
.030	.187	.100	.500	.092	3	3/16	2	16030	74.90	16030-C3	80.90
.030	.187	.100	1.000	.092	3	3/16	2-1/2	992830	76.10	992830-C3	82.00
.031 (1/32)	.115	.050	.156	.061	3	1/8	1-1/2	60631	70.50	60631-C3	76.00
.031 (1/32)	.187	.098	.500	.093	3	3/16	2	16031	74.90	16031-C3	80.90
.031 (1/32)	.187	.098	1.000	.093	3	3/16	2-1/2	992831	76.10	992831-C3	82.00
.035	.250	.153	.500	.097	3	1/4	2-1/2	16035	81.50	16035-C3	89.60
.039 (1 mm)	.250	.145	.500	.101	3	1/4	2-1/2	16039	81.50	16039-C3	89.60
.039 (1 mm)	.250	.145	1.000	.101	3	1/4	2-1/2	992839	81.50	992839-C3	89.60
.040	.250	.143	.500	.102	3	1/4	2-1/2	16040	81.50	16040-C3	89.60
.045	.250	.133	.500	.107	3	1/4	2-1/2	16045	81.50	16045-C3	89.60

*Radius center is in the same plane as cutter OD (radial component of radius center = D1/2, see above drawing).

continued on next page

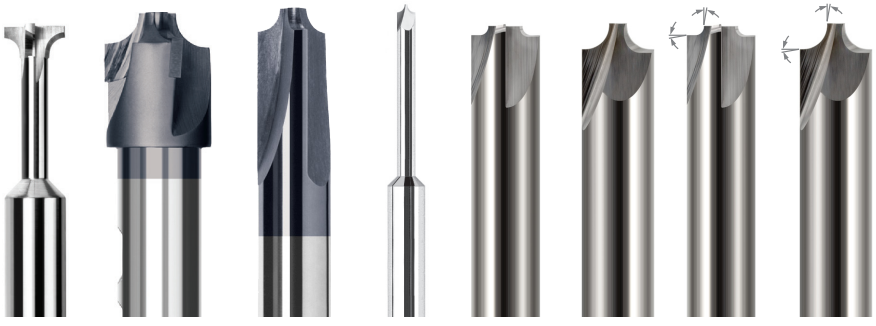
CORNER ROUNDING END MILLS

Back Corner Rounding End Mills – Flared (cont.)

continued from previous page

RADIUS	HEAD DIAMETER	NECK DIAMETER	NECK LENGTH	RADIUS CENTER	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R $^{+.0005''}_{-.0005''}$	D_1 $^{+.000''}_{-.002''}$		L_3	C $^{+.003''}_{-.001''}$*		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.047 (3/64)	.250	.128	.625	.109	3	1/4	2-1/2	16047	81.50	16047-C3	89.60
.047 (3/64)	.250	.128	1.250	.109	3	1/4	3	992847	89.90	992847-C3	97.40
.050	.250	.122	.375	.112	3	1/4	2-1/2	985050	81.50	985050-C3	89.60
.050	.250	.122	.625	.112	3	1/4	2-1/2	16050	81.50	16050-C3	89.60
.050	.250	.122	1.250	.112	3	1/4	3	992850	89.10	992850-C3	97.20
.055	.250	.113	.625	.117	3	1/4	2-1/2	16055	81.50	16055-C3	89.60
.060	.312	.164	.437	.122	3	5/16	2-1/2	985060	111.70	985060-C3	121.20
.060	.312	.165	.875	.122	3	5/16	2-1/2	16060	111.70	16060-C3	121.20
.062 (1/16)	.312	.160	.437	.124	3	5/16	2-1/2	985062	111.70	985062-C3	121.20
.062 (1/16)	.312	.161	.875	.124	3	5/16	2-1/2	16062	111.70	16062-C3	121.20
.062 (1/16)	.312	.160	1.250	.124	3	5/16	3	992862	118.00	992862-C3	127.50
.070	.375	.207	.875	.132	3	3/8	2-1/2	16070	127.90	16070-C3	138.50
.078 (5/64)	.375	.191	.500	.171	3	3/8	2-1/2	985078	127.90	985078-C3	138.50
.078 (5/64)	.375	.191	1.000	.171	3	3/8	2-1/2	16078	127.90	16078-C3	138.50
.078 (5/64)	.375	.191	1.500	.171	3	3/8	3	992878	138.80	992878-C3	149.40
.080	.375	.187	1.000	.173	3	3/8	2-1/2	16080	127.90	16080-C3	138.50
.090	.375	.167	1.000	.183	3	3/8	2-1/2	16090	129.20	16090-C3	139.80
.093 (3/32)	.375	.161	.500	.186	3	3/8	2-1/2	985093	127.90	985093-C3	138.50
.093 (3/32)	.375	.161	1.000	.186	3	3/8	2-1/2	16093	127.90	16093-C3	138.50
.093 (3/32)	.375	.161	1.500	.186	3	3/8	3	992893	138.80	992893-C3	149.40
.100	.500	.272	.500	.193	4	1/2	3	985100	184.30	985100-C3	200.30
.100	.500	.272	1.000	.193	4	1/2	3	16100	184.30	16100-C3	200.30
.118 (3 mm)	.500	.236	1.000	.211	4	1/2	3	1613M	184.30	1613M-C3	200.30
.125 (1/8)	.500	.222	.500	.218	4	1/2	3	985108	184.30	985108-C3	200.30
.125 (1/8)	.500	.222	1.000	.218	4	1/2	3	16108	184.30	16108-C3	200.30
.125 (1/8)	.500	.222	1.500	.218	4	1/2	3-1/2	992908	191.40	992908-C3	207.40
.156 (5/32)	.625	.284	1.000	.250	4	5/8	3-1/2	16110	249.80	16110-C3	265.80
.187 (3/16)	.625	.222	1.000	.281	4	5/8	3-1/2	16112	249.80	16112-C3	265.80
.250 (1/4)	1.000	.471	1.500	.376	4	1	4	16116	375.10	16116-C3	404.10

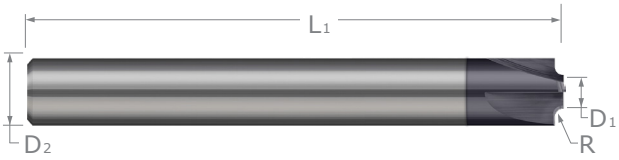
*Radius center is in the same plane as cutter OD (radial component of radius center = D1/2, see above drawing).

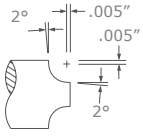


Check Out All of Our Corner Rounding Solutions!

CORNER ROUNDING END MILLS

4 Flute – Flared – High Performance

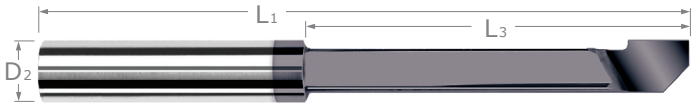


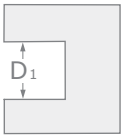


- Helically ground with positive rake for high performance and excellent part finish
- 2° flares for smooth transitions
- Radius center is offset .005″ from end of tool
- AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

	RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
	$R^{+.0005″}_{-.0005″}$	D_1	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
NEW	.020	.058	1/8	1-1/2	728620	38.20	728620-C6	44.50
NEW	.031 (1/32)	.058	1/8	1-1/2	728631	38.20	728631-C6	44.50
NEW	.031 (1/32)	.107	3/16	2	712931	43.40	712931-C6	50.50
NEW	.031 (1/32)	.125	1/4	2-1/2	712731	51.50	712731-C6	60.50
NEW	.039 (1 mm)	.058	3/16	2	728639	43.40	728639-C6	50.50
NEW	.047 (3/64)	.107	1/4	2	712947	51.00	712947-C6	59.50
NEW	.047 (3/64)	.125	1/4	2-1/2	712747	51.50	712747-C6	60.50
NEW	.062 (1/16)	.107	1/4	2	712962	51.00	712962-C6	59.50
NEW	.062 (1/16)	.125	1/4	2-1/2	712762	51.50	712762-C6	60.50
NEW	.078 (5/64)	.125	5/16	2-1/2	712778	92.60	712778-C6	103.50
NEW	.078 (5/64)	.249	7/16	2-1/2	712578	93.50	712578-C6	108.50
NEW	.093 (3/32)	.249	7/16	2-1/2	712593	97.50	712593-C6	112.50
NEW	.100	.249	1/2	3	712600	98.00	712600-C6	115.50
NEW	.125 (1/8)	.249	1/2	3	712608	109.00	712608-C6	126.50

BORING BARS





- Helical back rake flute improves accuracy and chip flow
- Square neck improves rigidity and has less deflection
- Tip is ground to sharp corner
- 70% stronger than round neck design
- Solid carbide
- CNC ground in the USA

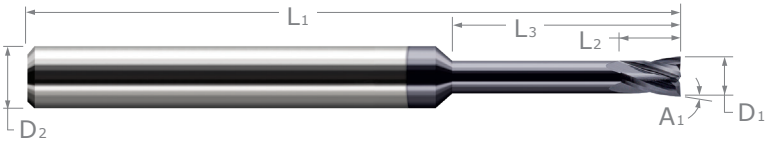
Helical Back Rake Design!

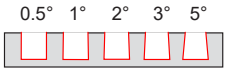
MIN. BORE DIAMETER	MAX BORE DEPTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1	L_3	D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
.031	**5/32**	1/8	1-1/2	29030	38.00	29030-C3	43.50
.036	**5/32**	1/8	1-1/2	29035	38.80		
.042	**1/4**	1/8	1-1/2	29040	34.80	29040-C3	40.30
.052	**5/16**	1/8	1-1/2	29050	33.70	29050-C3	39.20
.057	**5/16**	1/8	1-1/2	29055	33.70		
.062	**3/8**	1/8	1-1/2	29060	33.70	29060-C3	39.20
.062	**1/2**	1/8	1-1/2	29060L	35.60	29060L-C3	41.10
.072	**7/16**	1/8	1-1/2	29070	33.70	29070-C3	39.20
.082	**1/2**	1/8	1-1/2	29080	33.70		
.087	**1/2**	1/8	1-1/2	29085	33.70		
.087	**5/8**	1/8	2	29085L	39.70	29085L-C3	45.20
.092	**1/2**	1/8	1-1/2	29090	33.70	29090-C3	39.20
.092	**5/8**	1/8	2	29090L	39.70	29090L-C3	45.20
.102	**9/16**	1/8	1-1/2	29100	33.70	29100-C3	39.20
.102	**5/8**	1/8	2	29100L	40.50	29100L-C3	46.00
.112	**9/16**	1/8	1-1/2	29110	33.70	29110-C3	39.20
.112	**5/8**	1/8	2	29110L	39.70	29110L-C3	45.20
.120	**5/8**	1/8	1-1/2	29120	33.70	29120-C3	39.20
.120	**3/4**	1/8	2	29120L	39.70	29120L-C3	45.20
.135	**3/4**	5/32	2	29135	37.70	29135-C3	43.70
.150	**3/4**	3/16	2	29150	38.80	29150-C3	44.70
.150	**1**	3/16	2	29150L	46.30	29150L-C3	52.20
.150	**1-1/2**	3/16	2-1/2	29150XL	49.40	29150XL-C3	55.40
.180	**1**	3/16	2	29180	38.80	29180-C3	44.70
.180	**1-1/2**	3/16	2-1/2	29180L	47.00	29180L-C3	53.00
.180	**2**	3/16	3	29180XL	61.40	29180XL-C3	67.30
.210	**1**	1/4	2	29210	40.40	29210-C3	48.40
.210	**1-1/2**	1/4	2-1/2	29210L	47.60	29210L-C3	55.70
.210	**2**	1/4	3	29210XL	58.60	29210XL-C3	66.70
.240	**1**	1/4	2	29240	40.40	29240-C3	48.40
.240	**1-1/2**	1/4	2-1/2	29240L	47.60	29240L-C3	55.70
.240	**2**	1/4	3	29240XL	70.30	29240XL-C3	78.40
.300	**1**	5/16	2-1/2	29300	97.90	29300-C3	107.30
.360	**2**	3/8	3	29360	128.40	29360-C3	139.00

NEW SIZES!

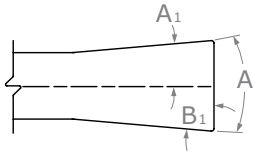
BACKDRAFT CUTTERS

Square





- Designed to clean up bottom corner of pockets while backdraft angle minimizes rubbing
- 4 helical flutes (20° helix)
- Center cutting
- Solid carbide
- CNC ground in the USA



A = 180 - 2B1
B1 = 90 - (A/2)
B1= 90 - A1
A1= 90 - B1
A1= A/2
A= 2A1

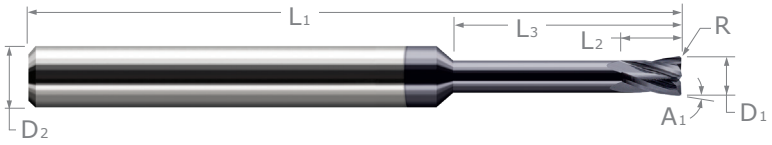
	ANGLES PER SIDE	CUTTER DIA.	LOC	NECK DIA.	OVERALL REACH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
	A_1 +0°15' −0°15'	D_1 +.0005" −.0005"	L_2 +.010" −.000"		L_3 +.010" −.000"	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
	0.5°	**.062**	.093	.058	.312 (5x)	1/8	2-1/2	781362	57.20	781362-C3	62.70
		.093	.139	.088	.500 (5x)	1/8	2-1/2	781393	57.20	781393-C3	62.70
	1°	**.062**	.093	.056	.312 (5x)	1/8	2-1/2	780762	57.20	780762-C3	62.70
		.093	.139	.086	.500 (5x)	1/8	2-1/2	780793	57.20	780793-C3	62.70
	2°	**.062**	.093	.053	.312 (5x)	1/8	2-1/2	780162	57.20	780162-C3	62.70
		.093	.139	.081	.500 (5x)	1/8	2-1/2	780193	56.70	780193-C3	62.20
	3°	**.062**	.093	.049	.312 (5x)	1/8	2-1/2	779562	56.70	779562-C3	62.20
		.093	.139	.075	.500 (5x)	1/8	2-1/2	779593	56.70	779593-C3	62.20
NEW	**5°**	**.062**	.093	.042	.312 (5x)	1/8	2-1/2	716162	56.70	716162-C3	62.20
NEW		**.093**	.139	.065	.500 (5x)	1/8	2-1/2	716193	56.70	716193-C3	62.20

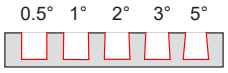
	A_1 +0°15' −0°15'	D_1 +.000" −.002"	L_2 +.030" −.000"		L_3 +.030" −.000"	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE
	0.5°	**.125**	.187	.117	.625 (5x)	1/8	2-1/2	781408	57.20	781408-C3	62.70
		.187	.285	.177	1.000 (5x)	3/16	2-1/2	781412	61.90	781412-C3	68.10
		.250	.375	.238	1.250 (5x)	1/4	2-1/2	781416	68.70	781416-C3	76.80
	1°	**.125**	.187	.113	.625 (5x)	1/8	2-1/2	780808	57.20	780808-C3	62.70
		.187	.285	.172	1.000 (5x)	3/16	2-1/2	780812	61.90	780812-C3	68.10
		.250	.375	.231	1.250 (5x)	1/4	2-1/2	780816	68.70	780816-C3	76.80
	2°	**.125**	.187	.105	.625 (5x)	1/8	2-1/2	780208	56.70	780208-C3	62.20
		.187	.285	.160	1.000 (5x)	3/16	2-1/2	780212	61.90	780212-C3	67.80
		.250	.375	.217	1.250 (5x)	1/4	2-1/2	780216	68.70	780216-C3	76.80
	3°	**.125**	.187	.098	.625 (5x)	1/8	2-1/2	779608	56.70	779608-C3	62.20
		.187	.285	.149	1.000 (5x)	3/16	2-1/2	779612	61.20	779612-C3	67.20
		.250	.375	.203	1.250 (5x)	1/4	2-1/2	779616	68.70	779616-C3	76.80
NEW	**5°**	**.125**	.187	.083	.625 (5x)	1/8	2-1/2	716208	56.70	716208-C3	62.20
NEW		**.187**	.285	.127	1.000 (5x)	3/16	2-1/2	716212	61.20	716212-C3	67.40
NEW		**.250**	.375	.175	1.250 (5x)	1/4	2-1/2	716216	68.70	716216-C3	76.20

NEW SIZES!

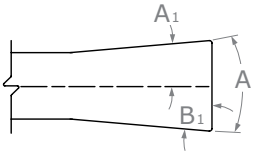
BACKDRAFT CUTTERS

Corner Radius





- Designed to clean up bottom corner of pockets while backdraft angle minimizes rubbing
- Corner radius for improved strength and wear resistance
- 4 helical flutes (20° helix)
- Center cutting
- Solid carbide
- CNC ground in the USA

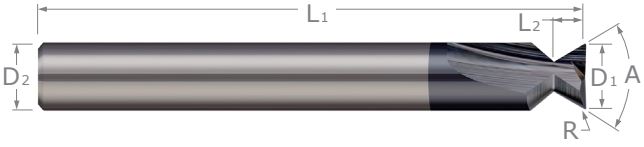


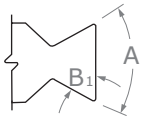
A = 180 - 2B1
B1 = 90 - (A/2)
B1= 90 - A1
A1= 90 - B1
A1= A/2
A= 2A1

ANGLES PER SIDE	CUTTER DIA.	CORNER RADIUS	LOC	NECK DIA.	OVERALL REACH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		
A_1 +0°15' −0°15'	D_1 +.0005″ −.0005″	R +001″ −001″	L_2 +.010″ −.000″		L_3 +.010″ −.000″	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE	
0.5°	**.062**	.005	.093	.058	.312 (5x)	1/8	2-1/2	780962	58.30	780962-C3	63.80	
	.093	.005	.139	.088	.500 (5x)	1/8	2-1/2	780993	56.90	780993-C3	62.40	
1°	**.062**	.005	.093	.056	.312 (5x)	1/8	2-1/2	780362	58.60	780362-C3	64.10	
	.093	.005	.139	.086	.500 (5x)	1/8	2-1/2	780393	58.00	780393-C3	63.50	
2°	**.062**	.005	.093	.053	.312 (5x)	1/8	2-1/2	779762	58.60	779762-C3	64.10	
	.093	.005	.139	.081	.500 (5x)	1/8	2-1/2	779793	58.60	779793-C3	64.10	
3°	**.062**	.005	.093	.049	.312 (5x)	1/8	2-1/2	779162	58.00	779162-C3	63.50	
	.093	.005	.139	.075	.500 (5x)	1/8	2-1/2	779193	58.00	779193-C3	63.50	
5°	**.062**	.005	.093	.042	.312 (5x)	1/8	2-1/2	715962	58.00	715962-C3	63.50	NEW
	.093	.005	.139	.065	.500 (5x)	1/8	2-1/2	715993	58.00	715993-C3	63.50	NEW

A_1 +0°15' −0°15'	D_1 +.000″ −.002″	R +001″ −001″	L_2 +.030″ −.000″		L_3 +.030″ −.000″	D_2 (h6)	L_1	4 FL	PRICE	4 FL	PRICE	
0.5°	**.125**	.010	.187	.117	.625 (5x)	1/8	2-1/2	781208	58.60	781208-C3	64.10	
	.187	.010	.285	.177	1.000 (5x)	3/16	2-1/2	781212	63.20	781212-C3	69.40	
	.250	.010	.375	.238	1.250 (5x)	1/4	2-1/2	781216	71.30	781216-C3	78.80	
1°	**.125**	.010	.187	.113	.625 (5x)	1/8	2-1/2	780608	58.60	780608-C3	64.10	
	.187	.010	.285	.172	1.000 (5x)	3/16	2-1/2	780612	63.20	780612-C3	69.40	
	.250	.010	.375	.231	1.250 (5x)	1/4	2-1/2	780616	71.30	780616-C3	79.40	
2°	**.125**	.010	.187	.105	.625 (5x)	1/8	2-1/2	780008	58.60	780008-C3	64.10	
	.187	.010	.285	.160	1.000 (5x)	3/16	2-1/2	780012	62.70	780012-C3	68.70	
	.250	.010	.375	.217	1.250 (5x)	1/4	2-1/2	780016	71.30	780016-C3	79.40	
3°	**.125**	.010	.187	.098	.625 (5x)	1/8	2-1/2	779408	58.00	779408-C3	63.50	
	.187	.010	.285	.149	1.000 (5x)	3/16	2-1/2	779412	62.70	779412-C3	68.70	
	.250	.010	.375	.203	1.250 (5x)	1/4	2-1/2	779416	70.50	779416-C3	78.70	
5°	**.125**	.010	.187	.083	.625 (5x)	1/8	2-1/2	715808	58.00	715808-C3	63.50	NEW
	.187	.010	.285	.127	1.000 (5x)	3/16	2-1/2	715812	62.70	715812-C3	68.90	NEW
	.250	.010	.375	.175	1.250 (5x)	1/4	2-1/2	715816	70.50	715816-C3	78.00	NEW

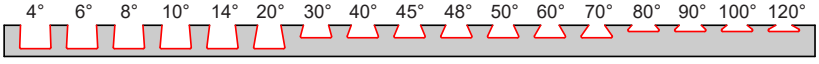
DOVETAIL CUTTERS





B1 = 90 - (A / 2)
A = 180 - 2B1

- Offered with sharp corner, .003", .005", .010", .015", or .030" Corner Radius
- Solid carbide
- CNC ground in the USA



Stocked in Seventeen Included Angles!

INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000"}_{-.002"}$	L_2 $^{+.020"}_{-.000"}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
4°	1/16	.125	.054	.005	2	1/8	1-1/2	930004	108.30	930004-C3	113.80
	3/32	.187	.081	.010	2	1/8	1-1/2	991406	104.90	991406-C3	110.40
	1/8	.250	.108	**SHARP!**	2	1/8	1-1/2	883608	108.30	883608-C3	113.80
	1/8	.250	.108	.010	2	1/8	1-1/2	991408	110.10	991408-C3	115.60
	3/16	.375	.161	**SHARP!**	2	3/16	2	883612	111.50	883612-C3	117.50
	3/16	.375	.162	.010	2	3/16	2	991412	113.30	991412-C3	119.30
	1/4	.500	.215	**SHARP!**	2	1/4	2	883616	139.50	883616-C3	147.70
	1/4	.500	.216	.010	2	1/4	2	991416	142.00	991416-C3	150.10
	3/8	.750	.323	**SHARP!**	3	3/8	2-1/2	883624	161.50	883624-C3	172.10
	3/8	.750	.323	.010	3	3/8	2-1/2	991424	164.10	991424-C3	174.70
	1/2	1.000	.431	.010	3	1/2	3	991432	222.40	991432-C3	238.60
6°	1/16	.125	.049	.005	2	1/8	1-1/2	932304	108.30	932304-C3	113.80
	3/32	.187	.074	.010	2	1/8	1-1/2	989206	104.90	989206-C3	110.40
	1/8	.250	.099	**SHARP!**	2	1/8	1-1/2	891208	106.40	891208-C3	111.90
	1/8	.250	.100	.010	2	1/8	1-1/2	989208	108.30	989208-C3	113.80
	3/16	.375	.148	**SHARP!**	2	3/16	2	891212	109.40	891212-C3	115.20
	3/16	.375	.149	.010	2	3/16	2	989212	111.20	989212-C3	117.30
	1/4	.500	.198	**SHARP!**	2	1/4	2	891216	138.10	891216-C3	146.30
	1/4	.500	.199	.010	2	1/4	2	989216	140.40	989216-C3	148.50
	3/8	.750	.296	**SHARP!**	3	3/8	2-1/2	891224	159.40	891224-C3	170.00
	3/8	.750	.297	.010	3	3/8	2-1/2	989224	161.90	989224-C3	172.50
	1/2	1.000	.396	.010	3	1/2	3	989232	219.40	989232-C3	235.60
8°	1/8	.218	.096	.010	2	1/8	1-1/2	984808	104.90	984808-C3	110.40
	3/16	.281	.150	.010	2	3/16	2	984812	108.10	984812-C3	114.20
	1/4	.375	.199	.010	2	1/4	2	984816	137.20	984816-C3	145.30
10°	1/32	.047	.023	**SHARP!**	2	1/8	1-1/2	990102	99.80	990102-C3	105.30
	1/16	.093	.046	**SHARP!**	2	1/8	1-1/2	990104	99.80	990104-C3	105.30
	1/16	.093	.047	.005	2	1/8	1-1/2	61504	101.70	61504-C3	107.20
	5/64	.109	.060	.005	2	1/8	1-1/2	61505	101.70	61505-C3	107.20
	3/32	.125	.071	**SHARP!**	2	1/8	1-1/2	990106	96.60	990106-C3	102.10
	3/32	.125	.073	.010	2	1/8	1-1/2	27006	98.40	27006-C3	103.90

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
10°	1/8	.187	.092	SHARP!	2	1/8	1-1/2	990108	96.60	990108-C3	102.10
	1/8	.187	.094	.010	2	1/8	1-1/2	27008	98.40	27008-C3	103.90
	3/16	.250	.144	SHARP!	2	3/16	2	990112	99.50	990112-C3	105.50
	3/16	.250	.146	.010	2	3/16	2	27012	101.50	27012-C3	107.50
	1/4	.312	.195	SHARP!	2	1/4	2	990116	126.30	990116-C3	134.40
	1/4	.312	.197	.010	2	1/4	2	27016	128.80	27016-C3	137.00
	5/16	.375	.247	SHARP!	3	5/16	2-1/2	990120	133.70	990120-C3	142.60
	5/16	.375	.249	.010	3	5/16	2-1/2	27020	135.90	27020-C3	145.40
	3/8	.500	.288	SHARP!	3	3/8	2-1/2	990124	143.80	990124-C3	154.40
	3/8	.500	.289	.010	3	3/8	2-1/2	27024	146.30	27024-C3	156.90
	1/2	.625	.391	SHARP!	3	1/2	3	990132	199.40	990132-C3	215.50
	1/2	.625	.392	.010	3	1/2	3	27032	202.80	27032-C3	218.90
14°	1/16	.093	.040	.005	2	1/8	1-1/2	873404	101.70	873404-C3	107.20
	3/32	.125	.065	.010	2	1/8	1-1/2	979406	98.40	979406-C3	103.90
	1/8	.187	.082	.010	2	1/8	1-1/2	979408	98.40	979408-C3	103.90
	3/16	.250	.129	.010	2	3/16	2	979412	101.50	979412-C3	107.50
	1/4	.312	.176	.010	2	1/4	2	979416	128.80	979416-C3	137.00
	5/16	.375	.223	.010	3	5/16	2-1/2	979420	137.20	979420-C3	146.70
	3/8	.500	.255	.010	3	3/8	2-1/2	979424	146.30	979424-C3	156.90
	1/2	.625	.349	.010	3	1/2	3	979432	202.80	979432-C3	218.90
20°	1/32	.031	.020	SHARP!	2	1/8	1-1/2	986002	83.00	986002-C3	88.50
	1/16	.062	.040	SHARP!	2	1/8	1-1/2	986004	83.00	986004-C3	88.50
	1/16	.062	.042	.005	2	1/8	1-1/2	62304	84.60	62304-C3	90.10
	5/64	.078	.052	.005	2	1/8	1-1/2	62305	84.60	62305-C3	90.10
	3/32	.093	.060	SHARP!	2	1/8	1-1/2	986006	79.50	986006-C3	85.00
	3/32	.093	.064	.010	2	1/8	1-1/2	16406	81.30	16406-C3	86.80
	1/8	.125	.081	SHARP!	2	1/8	1-1/2	986008	79.80	986008-C3	85.30
	1/8	.125	.085	.010	2	1/8	1-1/2	16408	81.30	16408-C3	86.80
	3/16	.187	.122	SHARP!	2	3/16	2	986012	82.90	986012-C3	88.80
	3/16	.187	.125	.010	2	3/16	2	16412	84.10	16412-C3	90.10
	1/4	.250	.162	SHARP!	2	1/4	2	986016	104.40	986016-C3	112.50
	1/4	.250	.163	.005	2	1/4	2	62316	106.30	62316-C3	114.40
	1/4	.250	.166	.010	2	1/4	2	16416	106.30	16416-C3	114.40
	5/16	.312	.202	SHARP!	3	5/16	2-1/2	986020	114.10	986020-C3	123.50
	5/16	.312	.206	.010	3	5/16	2-1/2	16420	116.30	16420-C3	125.80
	3/8	.375	.243	SHARP!	3	3/8	2-1/2	986024	120.20	986024-C3	130.80
	3/8	.375	.247	.010	3	3/8	2-1/2	16424	122.20	16424-C3	132.80
	1/2	.500	.324	SHARP!	3	1/2	3	986032	165.40	986032-C3	181.40
	1/2	.500	.328	.010	3	1/2	3	16432	168.50	16432-C3	184.50
	5/8	.625	.409	.010	4	5/8	3	16440	193.00	16440-C3	209.00
	3/4	.750	.489	.010	4	3/4	3	16448	203.80	16448-C3	221.00

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
30°	1/32	.020	.020	SHARP!	2	1/8	1-1/2	983302	84.60	983302-C3	90.10
	1/16	.040	.041	SHARP!	2	1/8	1-1/2	983304	83.00	983304-C3	88.50
	1/16	.045	.041	.005	2	1/8	1-1/2	63404	84.60	63404-C3	90.10
	5/64	.055	.052	.005	2	1/8	1-1/2	63405	84.60	63405-C3	90.10
	3/32	.062	.060	SHARP!	2	1/8	1-1/2	983306	79.50	983306-C3	85.00
	3/32	.078	.057	.010	2	1/8	1-1/2	16506	81.30	16506-C3	86.80
	1/8	.082	.081	SHARP!	2	1/8	1-1/2	983308	79.80	983308-C3	85.30
	1/8	.093	.081	.010	2	1/8	1-1/2	16508	81.30	16508-C3	86.80
	3/16	.125	.121	SHARP!	2	3/16	2	983312	81.00	983312-C3	86.90
	3/16	.125	.127	.010	2	3/16	2	16512	82.60	16512-C3	88.50
	1/4	.156	.166	SHARP!	2	1/4	2	983316	102.60	983316-C3	110.70
	1/4	.156	.172	.010	2	1/4	2	16516	104.40	16516-C3	112.50
	5/16	.218	.196	SHARP!	3	5/16	2-1/2	983320	114.20	983320-C3	123.60
	5/16	.187	.218	.010	3	5/16	2-1/2	16520	114.20	16520-C3	123.60
	3/8	.250	.241	SHARP!	3	3/8	2-1/2	983324	118.00	983324-C3	128.60
	3/8	.250	.243	.005	3	3/8	2-1/2	63424	120.20	63424-C3	130.80
	3/8	.250	.247	.010	3	3/8	2-1/2	16524	120.20	16524-C3	130.80
	1/2	.312	.333	SHARP!	3	1/2	3	983332	162.50	983332-C3	178.50
	1/2	.312	.339	.010	3	1/2	3	16532	165.40	16532-C3	181.40
	5/8	.375	.430	.010	4	5/8	3	16540	190.00	16540-C3	205.90
	3/4	.500	.488	.010	4	3/4	3	16548	200.90	16548-C3	218.20
40°	1/16	.035	.037	SHARP!	2	1/8	1-1/2	977804	83.00	977804-C3	88.50
	1/16	.040	.037	.005	2	1/8	1-1/2	64604	84.60	64604-C3	90.10
	5/64	.050	.046	.005	2	1/8	1-1/2	64605	84.60	64605-C3	90.10
	3/32	.062	.056	.010	2	1/8	1-1/2	28506	81.30	28506-C3	86.80
	1/8	.078	.068	SHARP!	2	1/8	1-1/2	977808	79.80	977808-C3	85.30
	1/8	.093	.066	.010	2	1/8	1-1/2	28508	81.30	28508-C3	86.80
	3/16	.109	.108	SHARP!	2	3/16	2	977812	82.90	977812-C3	88.80
	3/16	.125	.101	.005	2	3/16	2	64612	84.10	64612-C3	90.10
	3/16	.125	.105	.010	2	3/16	2	28512	84.10	28512-C3	90.10
	1/4	.156	.136	SHARP!	2	1/4	2	977816	104.40	977816-C3	112.50
	1/4	.156	.145	.010	2	1/4	2	28516	106.30	28516-C3	114.40
	5/16	.187	.176	SHARP!	3	5/16	2-1/2	977820	114.10	977820-C3	123.50
	5/16	.187	.185	.010	3	5/16	2-1/2	28520	116.30	28520-C3	125.80
	3/8	.218	.216	SHARP!	3	3/8	2-1/2	977824	120.20	977824-C3	130.80
	3/8	.250	.202	.010	3	3/8	2-1/2	28524	122.20	28524-C3	132.80
	1/2	.312	.273	SHARP!	3	1/2	3	977832	165.40	977832-C3	181.40
	1/2	.312	.281	.010	3	1/2	3	28532	168.50	28532-C3	184.50
	5/8	.375	.361	.010	4	5/8	3	28540	193.00	28540-C3	209.00
	3/4	.500	.395	.010	4	3/4	3	28548	203.80	28548-C3	221.00
45°	1/8	.093	.058	.010	2	1/8	1-1/2	928408	89.70	928408-C3	95.20
	3/16	.125	.094	.010	2	3/16	2	928412	92.70	928412-C3	98.70
	1/4	.156	.121	SHARP!	2	1/4	2	874516	114.00	874516-C3	122.10
	1/4	.156	.131	.010	2	1/4	2	928416	115.80	928416-C3	123.90
	3/8	.250	.168	SHARP!	3	3/8	2-1/2	874524	131.90	874524-C3	142.50
	3/8	.250	.178	.010	3	3/8	2-1/2	928424	133.70	928424-C3	144.30
	1/2	.312	.242	SHARP!	3	1/2	3	874532	180.90	874532-C3	196.90
	1/2	.312	.251	.010	3	1/2	3	928432	183.80	928432-C3	199.80

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
48°	1/16	.035	.036	.005	2	1/8	1-1/2	896504	82.60	896504-C3	88.10
	5/64	.045	.043	.005	2	1/8	1-1/2	896505	82.60	896505-C3	88.10
	3/32	.050	.059	.010	2	1/8	1-1/2	16606	78.50	16606-C3	84.00
	1/8	.070	.063	**SHARP!**	2	1/8	1-1/2	973108	76.90	973108-C3	82.40
	1/8	.093	.053	.010	2	1/8	1-1/2	16608	78.50	16608-C3	84.00
	3/16	.109	.090	**SHARP!**	2	3/16	2	973112	80.80	973112-C3	86.70
	3/16	.125	.087	.010	2	3/16	2	16612	82.30	16612-C3	88.30
	1/4	.156	.111	**SHARP!**	2	1/4	2	973116	101.70	973116-C3	109.70
	1/4	.156	.122	.010	2	1/4	2	16616	103.60	16616-C3	111.60
	5/16	.187	.157	.010	3	5/16	2-1/2	16620	113.70	16620-C3	123.10
48°	3/8	.250	.152	**SHARP!**	3	3/8	2-1/2	973124	119.70	973124-C3	130.30
	3/8	.250	.163	.010	3	3/8	2-1/2	16624	119.40	16624-C3	130.00
	1/2	.312	.222	**SHARP!**	3	1/2	3	973132	165.00	973132-C3	179.40
	1/2	.312	.233	.010	3	1/2	3	16632	164.60	16632-C3	180.60
50°	1/8	.093	.050	.010	2	1/8	1-1/2	926208	81.50	926208-C3	87.00
	3/16	.125	.082	.010	2	3/16	2	926212	85.60	926212-C3	91.60
	1/4	.156	.116	.010	2	1/4	2	926216	110.90	926216-C3	119.00
	3/8	.250	.153	.010	3	3/8	2-1/2	926224	127.00	926224-C3	137.60
	1/2	.312	.220	.010	3	1/2	3	926232	176.40	926232-C3	192.50
60°	1/32	.014	.015	**SHARP!**	2	1/8	1-1/2	995202	79.20	995202-C3	84.70
	1/16	.028	.030	**SHARP!**	2	1/8	1-1/2	995204	81.00	995204-C3	86.50
	1/16	.032	.028	.003	2	1/8	1-1/2	811404	84.10	811404-C3	89.60
	1/16	.032	.032	.005	2	1/8	1-1/2	65104	82.60	65104-C3	88.10
	5/64	.035	.038	**SHARP!**	2	1/8	1-1/2	995205	81.00	995205-C3	86.50
	5/64	.040	.039	.005	2	1/8	1-1/2	65105	82.60	65105-C3	88.10
	3/32	.040	.047	**SHARP!**	2	1/8	1-1/2	995206	76.90	995206-C3	82.40
	3/32	.045	.056	.010	2	1/8	1-1/2	16706	78.50	16706-C3	84.00
	.118 (3 mm)	.053	.057	**SHARP!**	2	1/8	1-1/2	995296	80.70	995296-C3	86.20
	.118 (3 mm)	.059	.065	.010	2	1/8	1-1/2	16796	82.50	16796-C3	88.00
	1/8	.056	.060	**SHARP!**	2	1/8	1-1/2	995208	76.90	995208-C3	82.40
	1/8	.062	.056	.003	2	1/8	1-1/2	811408	78.50	811408-C3	84.00
	1/8	.062	.061	**.005**	2	1/8	1-1/2	65108	78.50	65108-C3	84.00
	1/8	.062	.068	.010	2	1/8	1-1/2	16708	78.50	16708-C3	84.00
	9/64	.063	.063	**SHARP!**	2	3/16	2	995209	84.50	995209-C3	90.30
	9/64	.070	.074	.010	2	3/16	2	16709	86.20	16709-C3	92.00
	5/32	.070	.075	**SHARP!**	2	3/16	2	995210	80.80	995210-C3	86.70
	5/32	.078	.073	.005	2	3/16	2	65110	83.90	65110-C3	89.90
	5/32	.078	.081	.010	2	3/16	2	16710	82.30	16710-C3	88.30
	3/16	.085	.089	**SHARP!**	2	3/16	2	995212	80.80	995212-C3	86.70
	3/16	.093	.083	.003	2	3/16	2	811412	82.30	811412-C3	88.30
	3/16	.093	.087	.005	2	3/16	2	65112	82.30	65112-C3	88.30
	3/16	.093	.095	.010	2	3/16	2	16712	82.30	16712-C3	88.30
	3/16	.109	.104	.030	2	3/16	2	845112	82.30	845112-C3	88.30

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

(cont.)

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
60°	1/4	.118	.114	SHARP!	2	1/4	2	995216	99.90	995216-C3	107.90
	1/4	.125	.109	.003	2	1/4	2	811416	101.70	811416-C3	109.70
	1/4	.125	.113	.005	2	1/4	2	65116	101.70	65116-C3	109.70
	1/4	.125	.120	.010	2	1/4	2	16716	101.70	16716-C3	109.70
	1/4	.125	.126	.015	2	1/4	2	738016	101.70	738016-C3	109.70
	1/4	.140	.131	.030	2	1/4	2	845116	101.70	845116-C3	109.70
	5/16	.141	.150	SHARP!	3	5/16	2-1/2	995220	109.40	995220-C3	118.80
	5/16	.156	.138	.005	3	5/16	2-1/2	65120	111.40	65120-C3	120.30
	5/16	.156	.147	.010	3	5/16	2-1/2	16720	111.40	16720-C3	120.80
	3/8	.156	.195	SHARP!	3	3/8	2-1/2	995224	114.20	995224-C3	124.80
	3/8	.187	.166	.005	3	3/8	2-1/2	65124	116.60	65124-C3	127.20
	3/8	.187	.174	.010	3	3/8	2-1/2	16724	116.60	16724-C3	127.20
	3/8	.187	.181	.015	3	3/8	2-1/2	738024	116.60	738024-C3	127.20
	3/8	.187	.203	.030	3	3/8	2-1/2	845124	116.40	845124-C3	127.00
	7/16	.187	.222	SHARP!	3	7/16	2-3/4	995228	123.50	995228-C3	135.80
	7/16	.218	.200	.010	3	7/16	2-3/4	16728	126.40	16728-C3	139.80
	1/2	.218	.248	SHARP!	3	1/2	3	995232	158.80	995232-C3	174.80
	1/2	.250	.219	.005	3	1/2	3	65132	161.90	65132-C3	175.10
	1/2	.250	.226	.010	3	1/2	3	16732	161.90	16732-C3	177.90
	1/2	.250	.233	.015	3	1/2	3	738032	161.90	738032-C3	177.90
	1/2	.250	.255	.030	3	1/2	3	845132	159.50	845132-C3	172.70
	5/8	.281	.301	SHARP!	4	5/8	3	995240	237.40	995240-C3	253.40
	5/8	.312	.279	.010	4	5/8	3	16740	240.40	16740-C3	256.40
	3/4	.343	.354	SHARP!	4	3/4	3	995248	285.30	995248-C3	305.10
	3/4	.375	.332	.010	4	3/4	3	16748	288.30	16748-C3	305.50
	1	.500	.437	.010	4	1	4	16764	521.00	16764-C3	547.20
70°	1/4	.109	.116	.010	2	1/4	2	832316	110.90	832316-C3	119.00
	1/2	.218	.213	.010	3	1/2	3	832332	176.40	832332-C3	192.50
80°	1/4	.093	.117	.010	2	1/4	2	827916	110.90	827916-C3	119.00
	1/2	.187	.209	.010	3	1/2	3	827932	176.40	827932-C3	192.50
90°	1/32	.008	.015	SHARP!	2	1/8	1-1/2	992002	82.60	992002-C3	88.10
	1/16	.023	.030	.005	2	1/8	1-1/2	66304	82.60	66304-C3	88.10
	5/64	.027	.038	.005	2	1/8	1-1/2	66305	82.60	66305-C3	88.10
	3/32	.025	.043	SHARP!	2	1/8	1-1/2	992006	76.90	992006-C3	82.40
	3/32	.031	.059	.010	2	1/8	1-1/2	16806	78.50	16806-C3	84.00
	1/8	.034	.057	SHARP!	2	1/8	1-1/2	992008	75.60	992008-C3	81.10
	1/8	.040	.059	.005	2	1/8	1-1/2	66308	77.30	66308-C3	82.80
	1/8	.040	.073	.010	2	1/8	1-1/2	16808	77.30	16808-C3	82.80
	5/32	.047	.090	.010	2	3/16	2	16810	82.30	16810-C3	88.30
	3/16	.052	.084	SHARP!	2	3/16	2	992012	80.80	992012-C3	86.70
	3/16	.047	.122	.010	2	3/16	2	16812	82.30	16812-C3	88.30
	1/4	.068	.114	SHARP!	2	1/4	2	992016	99.90	992016-C3	107.90
	1/4	.062	.140	.005	2	1/4	2	66316	101.70	66316-C3	109.70
	1/4	.063	.154	.010	2	1/4	2	16816	101.70	16816-C3	109.70
	5/16	.085	.143	SHARP!	3	5/16	2-1/2	992020	109.40	992020-C3	118.80
	5/16	.093	.155	.010	3	5/16	2-1/2	16820	111.40	16820-C3	120.80

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

(cont.)

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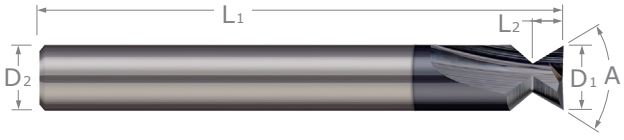
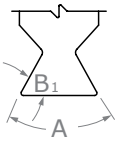
INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
90°	3/8	.105	.165	**SHARP!**	3	3/8	2-1/2	992024	114.20	992024-C3	124.80
	3/8	.109	.171	.005	3	3/8	2-1/2	66324	116.60	66324-C3	127.20
	3/8	.125	.153	.010	3	3/8	2-1/2	16824	116.60	16824-C3	127.20
	3/8	.125	.164	.015	3	3/8	2-1/2	737924	116.60	737924-C3	127.20
	7/16	.141	.185	.010	3	7/16	2-3/4	16828	126.40	16828-C3	139.80
	1/2	.141	.218	**SHARP!**	3	1/2	3	992032	158.80	992032-C3	174.80
	1/2	.156	.202	.005	3	1/2	3	66332	161.90	66332-C3	175.10
	1/2	.156	.216	.010	3	1/2	3	16832	161.90	16832-C3	177.90
	1/2	.156	.227	.015	3	1/2	3	737932	161.90	737932-C3	177.90
	1/2	.172	.241	.030	3	1/2	3	833932	161.90	833932-C3	175.10
	5/8	.187	.279	.010	4	5/8	3	16840	240.40	16840-C3	256.40
	3/4	.218	.342	.010	4	3/4	3	16848	288.30	16848-C3	305.50
100°	1/8	.040	.065	.010	2	1/8	1-1/2	964408	84.60	964408-C3	90.10
	3/16	.047	.110	.010	2	3/16	2	964412	88.90	964412-C3	94.70
	1/4	.062	.137	.010	2	1/4	2	964416	110.90	964416-C3	119.00
	3/8	.093	.188	.010	3	3/8	2-1/2	964424	126.80	964424-C3	137.40
	1/2	.125	.237	.010	3	1/2	3	964432	177.90	964432-C3	194.00
120°	1/8	.031	.042	**SHARP!**	2	1/8	1-1/2	721708	81.80	721708-C3	87.30
	1/8	.039	.045	.010	2	1/8	1-1/2	959908	83.80	959908-C3	89.30
	3/16	.047	.079	.010	2	3/16	2	959912	88.00	959912-C3	94.00
	1/4	.062	.090	.010	2	1/4	2	959916	110.90	959916-C3	119.00
	3/8	.082	.104	**SHARP!**	3	3/8	2-1/2	721724	124.80	721724-C3	135.40
	3/8	.093	.107	.010	3	3/8	2-1/2	959924	126.80	959924-C3	137.40
	1/2	.100	.174	**SHARP!**	3	1/2	3	721732	174.20	721732-C3	188.60
	1/2	.109	.177	.010	3	1/2	3	959932	176.20	959932-C3	192.30

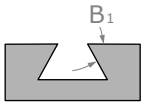
*Diameter measured over radii (not to theoretical sharp corner).

DOVETAIL CUTTERS

Sight Groove Dovetail Cutters

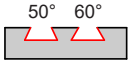






Off the Shoulder Angle
$B_1 = 90 - (A / 2)$
$A = 180 - 2B_1$

- Designed for milling dovetail grooves for Sight Attachments
- Diameters match common brand standards
- Offered with sharp corner
- Solid carbide
- CNC ground in the USA

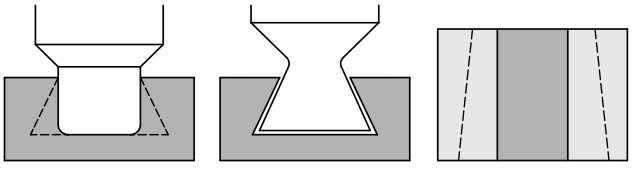


Stocked in Two Included Angles!

INCL. ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$			D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
50°	.330	.093	.242	3	3/8	2-1/2	806833	125.80	806833-C3	136.40
	.344	.125	.226	3	3/8	2-1/2	806834	124.60	806834-C3	135.20
	.495	.250	.261	3	1/2	3	806849	175.60	806849-C3	191.60
60°	.300	.093	.191	3	5/16	2-1/2	806730	110.90	806730-C3	120.40
	.359	.125	.213	3	3/8	2-1/2	806735	115.90	806735-C3	126.50

RECOMMENDED SIGHT GROOVE DOVETAIL MILLING TECHNIQUES

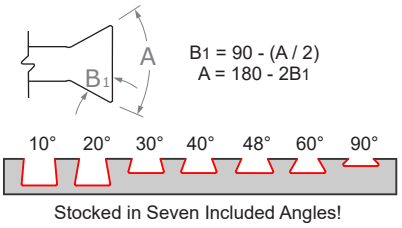
- Use an endmill that is smaller than the top of the groove width to slot.
- With required dovetail, mill groove down the centerline of slot to shape the rest of the dovetail groove
- Since most sights are press fitted, filing or additional adjustments may be required to ensure proper sight fit.
  - Angle the dovetail cutter slightly to create a slightly larger width on one side of the groove.
  - Dovetail should finish on same location on other side of the groove to create a trapezoidal shaped slot.
  - The sight itself can be adjusted by using an appropriate file to shape male dovetail until desired fitting.



Mill Slot | Mill on Center | Angle Dovetail to Widen One Side

DOVETAIL CUTTERS

Long Reach



Stocked in Seven Included Angles!

- Reduced neck for long reach machining
- Corner radius for improved strength
- Solid carbide • CNC ground in the USA

INCL. ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	NECK LENGTH	CORNER RADIUS	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		L_3 $^{+.030″}_{-.000″}$	R		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
10°	1/8	.187	.094	.125	.010	2	1/8	1-1/2	899108	112.30	899108-C3	117.80
	1/4	.312	.197	.250	.010	2	1/4	2	899116	142.90	899116-C3	151.10
	1/2	.625	.392	.250	.010	3	1/2	3	899132	216.90	899132-C3	233.00
20°	1/8	.125	.085	.125	.010	2	1/8	1-1/2	877408	98.30	877408-C3	103.80
	1/4	.250	.166	.250	.010	2	1/4	2	877416	124.60	877416-C3	132.70
	1/2	.500	.328	.250	.010	3	1/2	3	877432	191.10	877432-C3	207.10
30°	1/16	.045	.041	.062	.005	2	1/8	1-1/2	849904	101.70	849904-C3	107.20
	3/32	.078	.057	.093	.010	2	1/8	1-1/2	914806	98.30	914806-C3	103.80
	1/8	.093	.081	.125	.010	2	1/8	1-1/2	914808	98.30	914808-C3	103.80
	3/16	.125	.127	.187	.010	2	3/16	2	914812	101.90	914812-C3	107.90
	1/4	.156	.172	.250	.010	2	1/4	2	914816	122.50	914816-C3	130.60
	3/8	.250	.247	.250	.010	3	3/8	2-1/2	914824	183.20	914824-C3	193.80
	1/2	.312	.339	.250	.010	3	1/2	3	914832	186.20	914832-C3	202.20
40°	1/8	.093	.066	.125	.010	2	1/8	1-1/2	864008	101.70	864008-C3	107.20
	1/4	.156	.145	.250	.010	2	1/4	2	864016	122.50	864016-C3	130.60
	1/2	.312	.281	.250	.010	3	1/2	3	864032	186.20	864032-C3	202.20
48°	1/8	.093	.053	.125	.010	2	1/8	1-1/2	760108	102.70	760108-C3	108.20
60°	1/16	.032	.032	.062	.005	2	1/8	1-1/2	865504	98.70	865504-C3	104.20
	3/32	.045	.056	.093	.010	2	1/8	1-1/2	925306	95.20	925306-C3	100.70
	1/8	.056	.060	.125	**SHARP!**	2	1/8	1-1/2	865908	93.70	865908-C3	99.20
	1/8	.062	.068	.125	.010	2	1/8	1-1/2	925308	95.20	925308-C3	100.70
	3/16	.093	.095	.187	.010	2	3/16	2	925312	99.40	925312-C3	105.40
	1/4	.118	.114	.250	**SHARP!**	2	1/4	2	865916	118.00	865916-C3	126.10
	1/4	.125	.120	.250	.010	2	1/4	2	925316	119.80	925316-C3	127.90
	3/8	.156	.194	.250	**SHARP!**	3	3/8	2-1/2	721624	131.90	721624-C3	142.50
	3/8	.187	.174	.250	.010	3	3/8	2-1/2	925324	133.70	925324-C3	144.30
	1/2	.218	.248	.250	**SHARP!**	3	1/2	3	865932	178.90	865932-C3	194.90
	1/2	.250	.226	.250	.010	3	1/2	3	925332	181.70	925332-C3	197.80
90°	1/16	.023	.030	.062	.005	2	1/8	1-1/2	885704	98.70	885704-C3	104.20
	3/32	.031	.059	.093	.010	2	1/8	1-1/2	931006	95.20	931006-C3	100.70
	1/8	.034	.057	.125	**SHARP!**	2	1/8	1-1/2	884608	93.70	884608-C3	99.20
	1/8	.040	.073	.125	.010	2	1/8	1-1/2	931008	93.90	931008-C3	99.40
	3/16	.052	.084	.187	**SHARP!**	2	3/16	2	884612	97.60	884612-C3	103.60
	3/16	.047	.122	.187	.010	2	3/16	2	931012	99.40	931012-C3	105.40
	1/4	.068	.114	.250	**SHARP!**	2	1/4	2	884616	118.00	884616-C3	126.10
	1/4	.062	.154	.250	.010	2	1/4	2	931016	119.80	931016-C3	127.90
	1/4	.068	.111	.375	**SHARP!**	2	1/4	2	721416	120.70	721416-C3	127.60
	3/8	.105	.165	.250	**SHARP!**	3	3/8	2-1/2	884624	131.90	884624-C3	142.50
	3/8	.125	.153	.250	.010	3	3/8	2-1/2	931024	133.70	931024-C3	144.30
	1/2	.141	.218	.250	**SHARP!**	3	1/2	3	884632	178.90	884632-C3	194.90
	1/2	.156	.216	.250	.010	3	1/2	3	931032	181.70	931032-C3	197.80
	1/2	.156	.216	.375	.010	3	1/2	3	721532	182.60	721532-C3	197.00

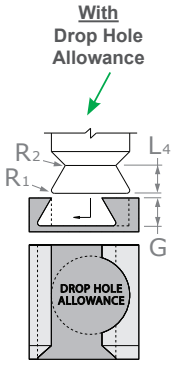
*Diameter measured over radii (not to theoretical sharp corner).

Designed to Parker Hannifin O-Ring Standards

DOVETAIL CUTTERS

Parker Hannifin O-Ring Dovetail Cutters

With Drop Hole Allowance



- **Designed for milling full dovetail grooves with drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (ORD 5700/USA, ORD 5700)
- Undersized cutter design allows climb milling on both faces of groove for improved finish
- Mills both top and bottom radii
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

O-RING X-SECTION	CUTTER DIA.*	GLAND DEPTH	CORNER RADIUS	NECK DIA.*	NECK RADIUS	RADIUS CENTER	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 $^{+.000''}_{-.002''}$	G	R_1 $^{+.001''}_{-.001''}$		R_2 $^{+.001''}_{-.001''}$	L_4 $^{+.001''}_{-.001''}$	D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.070	.079	.051	.015	.054	.005	.047	1/8	1-1/2	23807†	80.60	23807-C3†	86.10	23807-C8†	88.60
.070	.084	.054	.015	.056	.005	.050	1/8	1-1/2	56307Δ	80.60	56307-C3Δ	86.10	56307-C8Δ	88.60
.103	.135	.082	.015	.088	.010	.073	3/16	2	23814	83.80	23814-C3	89.80	23814-C8	91.80
.139	.172	.112	.031	.116	.010	.103	3/16	2	23821	83.80	23821-C3	89.80	23821-C8	91.80
.210	.284	.172	.031	.179	.015	.158	5/16	2-1/2	23828	110.90	23828-C3	120.40	23828-C8	129.30
.275	.362	.232	.062	.237	.015	.219	3/8	2-1/2	23835	128.40	23835-C3	139.00	23835-C8	150.80
.375	.488	.317	.093	.327	.020	.299	1/2	3	23842	164.60	23842-C3	180.60	23842-C8	181.60

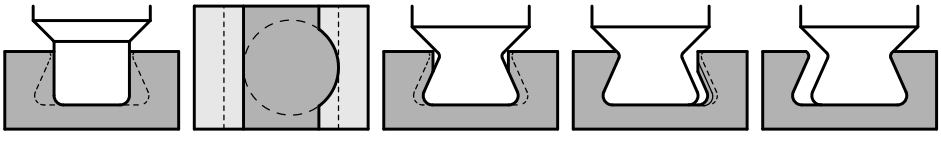
*Diameter measured over radii (not to theoretical sharp corner). †Meets ORD 5700/USA spec. ΔMeets ORD 5700 spec. All other tools meet BOTH specifications.

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

With Drop Hole Allowance

- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Mill off-center drop hole.
- Insert O-Ring Cutter through drop hole at full axial depth and mill single pass down center of groove. Please note that cutter is contacting both sides of part and it may be necessary to reduce the feed rate (up to 40%).
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.

For Radial Calculations, scan the QR code or visit harveytool.com/resources



O-Ring Slotting End Mills

See page 431

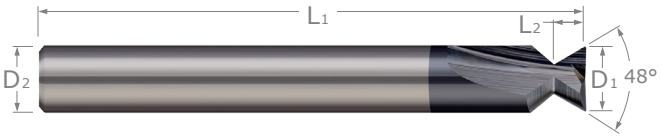
- Ideal for slotting o-ring dovetail grooves!
- Achieve the right slot width and shape without radial stepovers!

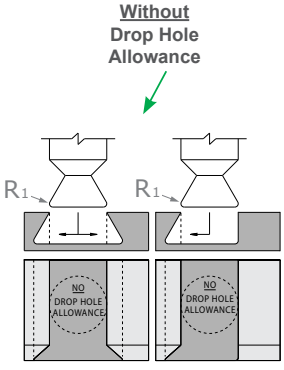
DOVETAIL CUTTERS

Parker Hannifin O-Ring Dovetail Cutters

Designed to Parker Hannifin O-Ring Standards

Without Drop Hole Allowance





- **Designed for milling half dovetails or full dovetails with no drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (tools meet both specs: ORD 5700/USA, ORD 5700)
- Mills bottom radius only
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

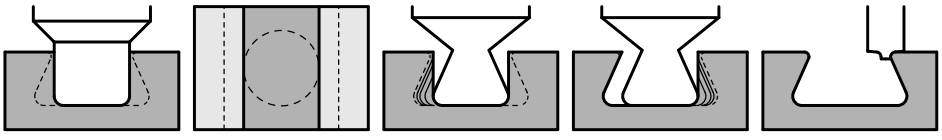
O-RING X-SECTION	CUTTER DIA.*	LOC	CORNER RADIUS	NECK DIA.**	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 +.000″ −.002″	L_2 +.020″ −.000″	R_1 +.001″ −.001″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
.070	.055	.054	.015	.023	1/8	1-1/2	23907	78.70	23907-C3	84.20	23907-C8	86.70
.103	.083	.085	.015	.024	1/8	1-1/2	23914	78.70	23914-C3	84.20	23914-C8	86.70
.139	.113	.115	.031	.044	1/8	1-1/2	23921	78.70	23921-C3	84.20	23921-C8	86.70
.210	.171	.176	.031	.048	3/16	2	23928	81.90	23928-C3	87.90	23928-C8	89.90
.275	.231	.238	.062	.086	1/4	2	23935	107.50	23935-C3	115.50	23935-C8	116.20
.375	.315	.323	.093	.128	3/8	2-1/2	23942	125.50	23942-C3	136.10	23942-C8	140.10

*Diameter measured over radii (not to theoretical sharp corner). **Diameter at length of cut.

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

Without Drop Hole Allowance

- **Tools are very fragile. Reduced neck profile and small o-ring groove size result in weakened tool for this difficult application. Always reconsider the potential to use the WITH drop hole allowance.**
- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Insert O-Ring Cutter into slot at full axial depth.
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.
- These tools are able to mill both Full and Half O-Ring grooves. As such, a corner radius at the top of the part must be machined for final groove form (see series 170xx).



O-Ring Corner Rounding End Mills

See page 431

- Ideal for creating radius on top part of o-ring dovetail groove!
- Design ensures smooth, blended form on part!

For Radial Calculations, scan the QR code or visit harveytool.com/resources

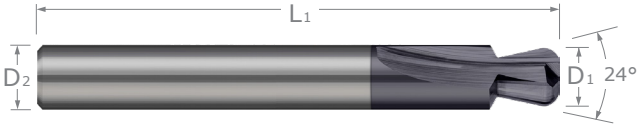
NEW!

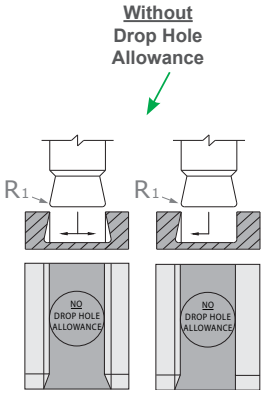
Designed to Parker Hannifin O-Ring Standards

DOVETAIL CUTTERS

Parker Hannifin O-Ring Dovetail Roughers

Without Drop Hole Allowance





- **Designed for partial milling of half dovetails or full dovetails with no drop hole allowance**
- Designed to reduce stress and minimize breakage when milling O-Ring grooves without drop hole allowance
- Over 90% increase in neck diameter thickness compared to standard O-Ring Dovetails
- 12° per side, 24° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

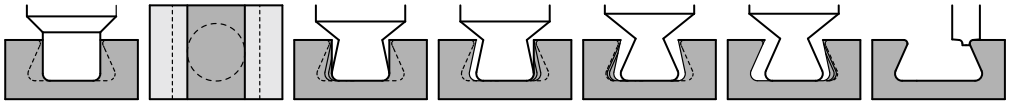
O-RING X-SECTION	CUTTER DIA.*	LENGTH OF CUT	CORNER RADIUS	NECK DIA.**	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED		
	D_1 $^{+.000"}_{-.002"}$	L_2 $^{+.020"}_{-.001"}$	R_1 $^{+.001"}_{-.001"}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
.070	.055	.054	.015	.039	1/8	1-1/2	715207	79.90	715207-C3	85.40	715207-C8	87.00	NEW
.103	.083	.085	.015	.054	1/8	1-1/2	715214	79.90	715214-C3	85.40	715214-C8	87.00	NEW
.139	.113	.115	.031	.079	1/8	1-1/2	715221	79.90	715221-C3	85.40	715221-C8	87.00	NEW
.210	.171	.176	.031	.111	3/16	2	715228	83.10	715228-C3	88.90	715228-C8	91.10	NEW
.275	.231	.238	.062	.159	1/4	2	715235	109.10	715235-C3	116.00	715235-C8	118.80	NEW
.375	.315	.323	.093	.221	3/8	2-1/2	715242	127.40	715242-C3	138.00	715242-C8	142.00	NEW

*Diameter measured over radii (not to theoretical sharp corner). ** Diameter at Length of Cut

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

Without Drop Hole Allowance

- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Insert O-Ring Rougher into slot at full axial depth.
- Mill multiple passes with descending radial stepover on both sides of part.
- Insert O-Ring Cutter (see series 239xx) into roughed out slot at full axial depth.
- Proceed with standard O-Ring milling technique.



O-Ring Slotting End Mills

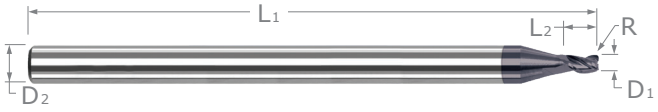
See page 431

- Ideal for slotting o-ring dovetail grooves!
- Achieve the right slot width and shape without radial stepovers!

For Radial Calculations, scan the QR code or visit harveytool.com/resources

DOVETAIL CUTTERS

O-Ring Slotting End Mills



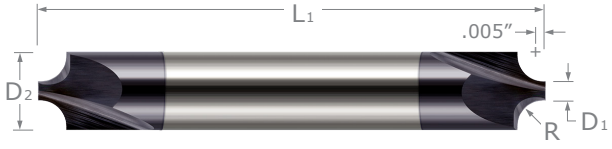
Ideal for Slotting O-Ring Dovetail Grooves!

- Optimized for O-Ring grooves
- Diameters designed to gland width opening
- Stub flute length for improved strength
- Corner radius to match Parker Hannifin standards
- High helix and optimized geometry for improved performance
- 3 Flutes • Center cutting
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.055	.015	.065	1/8	1-1/2	56510	28.60	56510-C3	34.10	56510-C8	36.90
.085	.015	.100	1/8	1-1/2	56520	28.60	56520-C3	34.10	56520-C8	36.90
.115	.031	.140	1/8	1-1/2	56530	28.60	56530-C3	34.10	56530-C8	36.90
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE	3 FL	PRICE
.176	.031	.210	3/16	2	56540	31.90	56540-C3	37.90	56540-C8	40.10
.236	.062	.280	1/4	2-1/2	56550	42.30	56550-C3	50.30	56550-C8	52.60
.323	.093	.380	3/8	2-1/2	56560	60.30	56560-C3	70.90	56560-C8	74.90

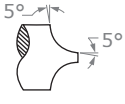
DOVETAIL CUTTERS

O-Ring Corner Rounding End Mills



For Creating Radius on Top Part of O-Ring Dovetail Groove

- Radius matches Parker Hannifin standards
- Double-ended
- Flares are tangent to radius
- Design ensures smooth, blended form on part
- Depth of cut = radius plus .005"
- 2 flutes
- Solid carbide
- CNC ground in the USA

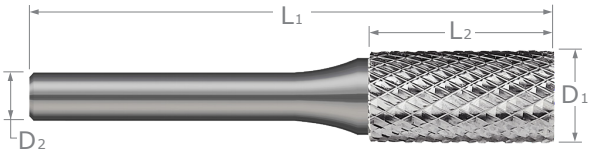


5° Flares At Shoulder and Pilot to Avoid Steps in Workpiece

O-RING X-SECTION	RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	R $^{+.0005''}_{-.0005''}$	D_1	D_2	L_1	2 FL	PRICE	2 FL	PRICE
.070	.005	.046	1/8	1-1/2	17005	46.70	17005-C3	53.50
.103	.010	.046	1/8	1-1/2	17010	46.70	17010-C3	53.50
.139	.010	.046	1/8	1-1/2	17010	46.70	17010-C3	53.50
.210	.015	.046	1/8	1-1/2	17015	46.70	17015-C3	53.50
.275	.015	.046	1/8	1-1/2	17015	46.70	17015-C3	53.50
.375	.020	.046	1/8	1-1/2	17020	46.70	17020-C3	53.50

BURS

Cylindrical – SA Double Cut

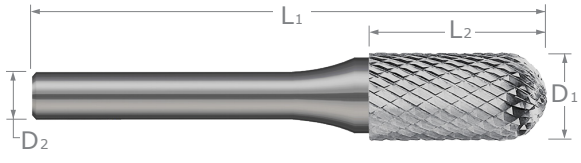


- General purpose cylindrical shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

	STANDARD SIZE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
		D_1 $^{+.010''}_{-.010''}$	L_2 $^{+.060''}_{-.060''}$	D_2	L_1	TOOL #	PRICE
NEW	SA-41	.062 (1/16)	1/4	1/8	1-1/2	710704	7.20
NEW	SA-11	.125 (1/8)	1/2	1/4	2	710708	14.10
NEW	SA-43	.125 (1/8)	9/16	1/8	1-1/2	710608	7.20
NEW	SA-14	.187 (3/16)	5/8	1/4	2	710712	16.90
NEW	SA-51	.250 (1/4)	1/2	1/8	2	710816	10.50
NEW	SA-1	.250 (1/4)	5/8	1/4	2	710716	12.00
NEW	SA-2	.312 (5/16)	3/4	1/4	2-1/2	710720	22.10
NEW	SA-3	.375 (3/8)	3/4	1/4	2-1/2	710824	14.80
NEW	SA-5	.500 (1/2)	1	1/4	2-3/4	710832	23.60
NEW	SA-6	.625 (5/8)	1	1/4	2-3/4	710840	34.00

BURS

Cylindrical Ball Nose – SC Double Cut



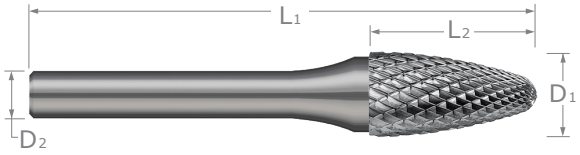
- General purpose cylindrical ball nose shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

	STANDARD SIZE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
		D_1 $^{+.010''}_{-.010''}$	L_2 $^{+.060''}_{-.060''}$	D_2	L_1	TOOL #	PRICE
NEW	SC-42	.125 (1/8)	9/16	1/8	1-1/2	708008	7.20
NEW	SC-53	.187 (3/16)	1/2	1/8	2	708112	15.60
NEW	SC-14	.187 (3/16)	5/8	1/4	2	708012	19.60
NEW	SC-51	.250 (1/4)	1/2	1/8	2	708216	10.70
NEW	SC-1	.250 (1/4)	5/8	1/4	1-3/4	708116	14.30
NEW	SC-2	.312 (5/16)	3/4	1/4	2-1/2	708120	23.80
NEW	SC-3	.375 (3/8)	3/4	1/4	2-1/2	708224	17.10
NEW	SC-3L	.375 (3/8)	1	1/4	2-1/2	708124	24.90
NEW	SC-5	.500 (1/2)	1	1/4	2-3/4	708232	26.80
NEW	SC-6	.625 (5/8)	1	1/4	2-3/4	708240	39.80

NEW!

BURS

Round Nose Tree – SF Double Cut

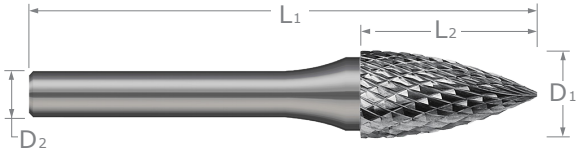


- General purpose round nose tree shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

STANDARD SIZE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		
	D_1 $^{+.010''}_{-.010''}$	L_2 $^{+.060''}_{-.060''}$	D_2	L_1	TOOL #	PRICE	
SF-42	.125 (1/8)	1/2	1/8	1-1/2	707708	7.20	NEW
SF-53	.187 (3/16)	1/2	1/8	2	707812	15.60	NEW
SF-51	.250 (1/4)	1/2	1/8	2	707816	10.50	NEW
SF-1	.250 (1/4)	5/8	1/4	2	707716	15.40	NEW
SF-3	.375 (3/8)	3/4	1/4	2-1/2	707824	17.10	NEW
SF-13	.500 (1/2)	3/4	1/4	2-1/2	707932	38.20	NEW
SF-5	.500 (1/2)	1	1/4	2-3/4	707832	25.90	NEW

BURS

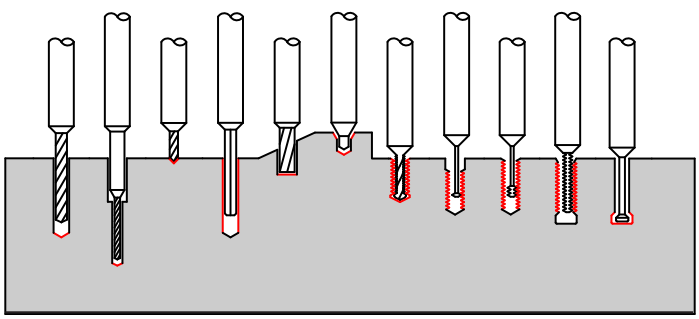
Pointed Tree – SG Double Cut



- General purpose pointed tree shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

STANDARD SIZE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		
	D_1 $^{+.010''}_{-.010''}$	L_2 $^{+.060''}_{-.060''}$	D_2	L_1	TOOL #	PRICE	
SG-43	.125 (1/8)	3/8	1/8	1-1/2	707408	7.20	NEW
SG-44	.125 (1/8)	1/2	1/8	1-1/2	707308	9.90	NEW
SG-51	.250 (1/4)	1/2	1/8	2	707516	10.50	NEW
SG-1	.250 (1/4)	5/8	1/4	2	707416	15.70	NEW
SG-2	.312 (5/16)	3/4	1/4	2-1/2	707520	24.90	NEW
SG-3	.375 (3/8)	3/4	1/4	2-1/2	707524	17.60	NEW
SG-13	.500 (1/2)	3/4	1/4	2-1/2	707632	37.70	NEW
SG-5	.500 (1/2)	1	1/4	2-3/4	707532	25.90	NEW

HOLEMAKING & THREADING



Dozens of Solutions from Spotting to Threading!

MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels

Available for 3x, 5x, 8x Hole Depths!

- Optimized for drilling hardened tool, die, and mold steels 46Rc to 68Rc with outstanding performance in high temperature alloys and difficult-to-machine steels
- Specialized flute shape for improved chip evacuation and maximum rigidity
- Double margin design for exceptional hole accuracy and finish
- 140° point angle
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Double Margin Design for Exceptional Hole Accuracy

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0100	#87	.254 mm		1.20 mm	(3x)	3 mm	50 mm	CSG0100-C6	44.00
.0100	#87	.254 mm	.048		(3x)	1/8	1-1/2	FDW0100-C6	44.00
.0100	#87	.254 mm		1.70 mm	(5x)	3 mm	50 mm	BGN0100-C6	46.90
.0100	#87	.254 mm	.068		(5x)	1/8	1-1/2	GBS0100-C6	46.90
.0100	#87	.254 mm	.096		(8x)	1/8	2	HGD0100-C6	48.90
.0110	#85	.279 mm		1.35 mm	(3x)	3 mm	50 mm	CSG0110-C6	44.00
.0120	#83	.304 mm		1.45 mm	(3x)	3 mm	50 mm	CSG0120-C6	44.00
.0130	#81	.330 mm		1.55 mm	(3x)	3 mm	50 mm	CSG0130-C6	44.00
.0144	#79	.368 mm		1.75 mm	(3x)	3 mm	50 mm	CSG0144-C6	44.00
.0150		.381 mm		1.80 mm	(3x)	3 mm	50 mm	CSG0150-C6	44.00
.0150		.381 mm		2.60 mm	(5x)	3 mm	50 mm	BGN0150-C6	46.90
.0150		.381 mm		3.70 mm	(8x)	3 mm	50 mm	ARY0150-C6	48.90
.0156 (1/64)		.396 mm	.074		(3x)	1/8	1-1/2	FDW0156-C6	44.00
.0156 (1/64)		.396 mm		1.90 mm	(3x)	3 mm	50 mm	CSG0156-C6	44.00
.0156 (1/64)		.396 mm	.104		(5x)	1/8	2	GBS0156-C6	46.90
.0156 (1/64)		.396 mm		2.70 mm	(5x)	3 mm	50 mm	BGN0156-C6	46.90
.0156 (1/64)		.396 mm	.152		(8x)	1/8	2	HGD0156-C6	48.90
.0156 (1/64)		.396 mm		3.90 mm	(8x)	3 mm	50 mm	ARY0156-C6	48.90
.0156 (1/64)		.396 mm		4.70 mm	(10x)	3 mm	50 mm	DXT0156-C6	51.70
.0156 (1/64)		.396 mm		5.40 mm	(12x)	3 mm	50 mm	EFG0156-C6	54.70
.0160	#78	.406 mm		2.00 mm	(3x)	3 mm	50 mm	CSG0160-C6	44.00
.0160	#78	.406 mm		2.70 mm	(5x)	3 mm	50 mm	BGN0160-C6	46.90
.0160	#78	.406 mm		4.00 mm	(8x)	3 mm	50 mm	ARY0160-C6	48.90
.0160	#78	.406 mm		5.60 mm	(12x)	3 mm	50 mm	EFG0160-C6	54.70
.0170		.431 mm		2.10 mm	(3x)	3 mm	50 mm	CSG0170-C6	44.00
.0170		.431 mm		4.20 mm	(8x)	3 mm	50 mm	ARY0170-C6	48.90
.0180	#77	.457 mm		2.20 mm	(3x)	3 mm	50 mm	CSG0180-C6	44.00
.0180	#77	.457 mm		3.10 mm	(5x)	3 mm	50 mm	BGN0180-C6	46.90
.0180	#77	.457 mm		4.50 mm	(8x)	3 mm	50 mm	ARY0180-C6	48.90
.0180	#77	.457 mm		6.20 mm	(12x)	3 mm	50 mm	EFG0180-C6	54.70
.0190		.482 mm		2.30 mm	(3x)	3 mm	50 mm	CSG0190-C6	42.60
.0190		.482 mm		4.70 mm	(8x)	3 mm	50 mm	ARY0190-C6	47.30

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.005" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.0196		.500 mm		2.40 mm	(3x)	3 mm	50 mm	CSG0196-C6	42.60
.0196		.500 mm		3.40 mm	(5x)	3 mm	50 mm	BGN0196-C6	44.80
.0196		.500 mm		4.90 mm	(8x)	3 mm	50 mm	ARY0196-C6	47.30
.0196		.500 mm		5.80 mm	(10x)	3 mm	50 mm	DXT0196-C6	50.10
.0196		.500 mm		6.80 mm	(12x)	3 mm	50 mm	EFG0196-C6	53.00
.0200	#76	.508 mm		2.40 mm	(3x)	3 mm	50 mm	CSG0200-C6	42.60
.0200	#76	.508 mm	.096		(3x)	1/8	2	FDW0200-C6	42.60
.0200	#76	.508 mm		3.40 mm	(5x)	3 mm	50 mm	BGN0200-C6	44.80
.0200	#76	.508 mm	.136		(5x)	1/8	2	GBS0200-C6	44.80
.0200	#76	.508 mm	.192		(8x)	1/8	2	HGD0200-C6	47.30
.0200	#76	.508 mm		5.00 mm	(8x)	3 mm	50 mm	ARY0200-C6	47.30
.0200	#76	.508 mm		6.00 mm	(10x)	3 mm	50 mm	DXT0200-C6	50.10
.0200	#76	.508 mm		7.00 mm	(12x)	3 mm	50 mm	EFG0200-C6	53.00
.0210	#75	.533 mm		2.50 mm	(3x)	3 mm	50 mm	CSG0210-C6	42.60
.0210	#75	.533 mm		3.60 mm	(5x)	3 mm	50 mm	BGN0210-C6	44.80
.0210	#75	.533 mm		5.20 mm	(8x)	3 mm	50 mm	ARY0210-C6	47.30
.0210	#75	.533 mm		7.40 mm	(12x)	3 mm	50 mm	EFG0210-C6	53.00
.0220		.558 mm		2.70 mm	(3x)	3 mm	50 mm	CSG0220-C6	42.60
.0220		.558 mm		5.40 mm	(8x)	3 mm	50 mm	ARY0220-C6	47.30
.0225	#74	.571 mm		2.70 mm	(3x)	3 mm	50 mm	CSG0225-C6	42.60
.0225	#74	.571 mm	.108		(3x)	1/8	2	FDW0225-C6	42.60
.0225	#74	.571 mm	.152		(5x)	1/8	2	GBS0225-C6	44.80
.0225	#74	.571 mm		3.90 mm	(5x)	3 mm	50 mm	BGN0225-C6	44.80
.0225	#74	.571 mm	.216		(8x)	1/8	2	HGD0225-C6	47.30
.0225	#74	.571 mm		5.60 mm	(8x)	3 mm	50 mm	ARY0225-C6	47.30
.0225	#74	.571 mm		7.80 mm	(12x)	3 mm	50 mm	EFG0225-C6	53.00
.0230		.584 mm		2.80 mm	(3x)	3 mm	50 mm	CSG0230-C6	42.60
.0230		.584 mm		5.60 mm	(8x)	3 mm	50 mm	ARY0230-C6	47.30
.0236		.600 mm		2.90 mm	(3x)	3 mm	50 mm	CSG0236-C6	42.60
.0236		.600 mm		5.80 mm	(8x)	3 mm	50 mm	ARY0236-C6	47.30
.0240	#73	.609 mm		2.90 mm	(3x)	3 mm	50 mm	CSG0240-C6	42.60
.0240	#73	.609 mm		4.20 mm	(5x)	3 mm	50 mm	BGN0240-C6	44.80
.0240	#73	.609 mm		6.00 mm	(8x)	3 mm	50 mm	ARY0240-C6	47.30
.0240	#73	.609 mm		8.40 mm	(12x)	3 mm	50 mm	EFG0240-C6	53.00
.0250	#72	.635 mm		3.00 mm	(3x)	3 mm	50 mm	CSG0250-C6	42.60
.0250	#72	.635 mm	.120		(3x)	1/8	2	FDW0250-C6	42.60
.0250	#72	.635 mm		4.20 mm	(5x)	3 mm	50 mm	BGN0250-C6	44.80
.0250	#72	.635 mm	.168		(5x)	1/8	2	GBS0250-C6	44.80
.0250	#72	.635 mm	.240		(8x)	1/8	2	HGD0250-C6	47.30
.0250	#72	.635 mm		6.20 mm	(8x)	3 mm	50 mm	ARY0250-C6	47.30
.0250	#72	.635 mm		8.80 mm	(12x)	3 mm	50 mm	EFG0250-C6	53.00

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0260	#71	.660 mm		3.10 mm	(3x)	3 mm	50 mm	CSG0260-C6	42.60
.0260	#71	.660 mm	.124		(3x)	1/8	2	FDW0260-C6	42.60
.0260	#71	.660 mm		4.40 mm	(5x)	3 mm	50 mm	BGN0260-C6	44.80
.0260	#71	.660 mm	.176		(5x)	1/8	2	GBS0260-C6	44.80
.0260	#71	.660 mm		6.40 mm	(8x)	3 mm	50 mm	ARY0260-C6	47.30
.0260	#71	.660 mm	.256		(8x)	1/8	2	HGD0260-C6	47.30
.0260	#71	.660 mm		9.00 mm	(12x)	3 mm	50 mm	EFG0260-C6	53.00
.0270		.685 mm		3.30 mm	(3x)	3 mm	50 mm	CSG0270-C6	42.60
.0270		.685 mm		6.60 mm	(8x)	3 mm	50 mm	ARY0270-C6	47.30
.0275		.700 mm		3.30 mm	(3x)	3 mm	50 mm	CSG0275-C6	42.60
.0275		.700 mm		6.80 mm	(8x)	3 mm	50 mm	ARY0275-C6	47.30
.0280	#70	.711 mm		3.40 mm	(3x)	3 mm	50 mm	CSG0280-C6	42.60
.0280	#70	.711 mm		4.80 mm	(5x)	3 mm	50 mm	BGN0280-C6	44.80
.0280	#70	.711 mm		7.00 mm	(8x)	3 mm	50 mm	ARY0280-C6	47.30
.0280	#70	.711 mm		9.80 mm	(12x)	3 mm	50 mm	EFG0280-C6	53.00
.0292	#69	.741 mm		3.50 mm	(3x)	3 mm	50 mm	CSG0292-C6	42.60
.0292	#69	.741 mm		5.00 mm	(5x)	3 mm	50 mm	BGN0292-C6	44.80
.0292	#69	.741 mm		7.20 mm	(8x)	3 mm	50 mm	ARY0292-C6	47.30
.0292	#69	.741 mm		10.00 mm	(12x)	3 mm	50 mm	EFG0292-C6	53.00
.0300		.762 mm		3.60 mm	(3x)	3 mm	50 mm	CSG0300-C6	43.20
.0300		.762 mm		5.20 mm	(5x)	3 mm	50 mm	BGN0300-C6	45.50
.0300		.762 mm		7.40 mm	(8x)	3 mm	50 mm	ARY0300-C6	47.30
.0300		.762 mm		9.00 mm	(10x)	3 mm	50 mm	DXT0300-C6	50.10
.0310	#68	.787 mm		3.70 mm	(3x)	3 mm	50 mm	CSG0310-C6	43.20
.0310	#68	.787 mm		5.40 mm	(5x)	3 mm	50 mm	BGN0310-C6	45.50
.0310	#68	.787 mm		7.60 mm	(8x)	3 mm	50 mm	ARY0310-C6	47.30
.0310	#68	.787 mm		11.00 mm	(12x)	3 mm	50 mm	EFG0310-C6	54.10
.0312 (1/32)		.793 mm	.148		(3x)	1/8	2	FDW0312-C6	43.20
.0312 (1/32)		.793 mm		3.80 mm	(3x)	3 mm	50 mm	CSG0312-C6	43.20
.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	GBS0312-C6	45.50
.0312 (1/32)		.793 mm		5.40 mm	(5x)	3 mm	50 mm	BGN0312-C6	45.50
.0312 (1/32)		.793 mm	.304		(8x)	1/8	2	HGD0312-C6	48.20
.0312 (1/32)		.793 mm		7.80 mm	(8x)	3 mm	50 mm	ARY0312-C6	48.20
.0312 (1/32)		.793 mm		9.40 mm	(10x)	3 mm	50 mm	DXT0312-C6	51.10
.0312 (1/32)		.793 mm		11.00 mm	(12x)	3 mm	50 mm	EFG0312-C6	54.10
.0315		.800 mm		3.80 mm	(3x)	3 mm	50 mm	CSG0315-C6	43.20
.0315		.800 mm		7.80 mm	(8x)	3 mm	50 mm	ARY0315-C6	48.20
.0320	#67	.812 mm	.152		(3x)	1/8	2	FDW0320-C6	43.20
.0320	#67	.812 mm		3.90 mm	(3x)	3 mm	50 mm	CSG0320-C6	43.20
.0320	#67	.812 mm		5.40 mm	(5x)	3 mm	50 mm	BGN0320-C6	45.50
.0320	#67	.812 mm	.216		(5x)	1/8	2	GBS0320-C6	45.50
.0320	#67	.812 mm	.312		(8x)	1/8	2	HGD0320-C6	48.20
.0320	#67	.812 mm		8.00 mm	(8x)	3 mm	50 mm	ARY0320-C6	48.20
.0320	#67	.812 mm		11.00 mm	(12x)	3 mm	50 mm	EFG0320-C6	54.10

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0330	#66	.838 mm		4.00 mm	(3x)	3 mm	50 mm	CSG0330-C6	43.20
.0330	#66	.838 mm		5.60 mm	(5x)	3 mm	50 mm	BGN0330-C6	45.50
.0330	#66	.838 mm		8.20 mm	(8x)	3 mm	50 mm	ARY0330-C6	48.20
.0330	#66	.838 mm		11.50 mm	(12x)	3 mm	50 mm	EFG0330-C6	54.10
.0350	#65	.889 mm		4.20 mm	(3x)	3 mm	50 mm	CSG0350-C6	43.20
.0350	#65	.889 mm	.168		(3x)	1/8	2	FDW0350-C6	43.20
.0350	#65	.889 mm		6.00 mm	(5x)	3 mm	50 mm	BGN0350-C6	45.50
.0350	#65	.889 mm	.240		(5x)	1/8	2	GBS0350-C6	45.50
.0350	#65	.889 mm		8.60 mm	(8x)	3 mm	50 mm	ARY0350-C6	48.20
.0350	#65	.889 mm	.340		(8x)	1/8	2	HGD0350-C6	48.20
.0350	#65	.889 mm		10.50 mm	(10x)	3 mm	50 mm	DXT0350-C6	51.10
.0350	#65	.889 mm		12.00 mm	(12x)	3 mm	50 mm	EFG0350-C6	54.10
.0354		.900 mm		4.20 mm	(3x)	3 mm	50 mm	CSG0354-C6	43.20
.0354		.900 mm		6.00 mm	(5x)	3 mm	50 mm	BGN0354-C6	45.50
.0354		.900 mm		8.80 mm	(8x)	3 mm	50 mm	ARY0354-C6	48.20
.0360	#64	.914 mm		4.40 mm	(3x)	3 mm	50 mm	CSG0360-C6	43.20
.0360	#64	.914 mm		6.20 mm	(5x)	3 mm	50 mm	BGN0360-C6	45.50
.0360	#64	.914 mm		9.00 mm	(8x)	3 mm	50 mm	ARY0360-C6	48.20
.0360	#64	.914 mm		12.50 mm	(12x)	3 mm	50 mm	EFG0360-C6	54.10
.0370	#63	.939 mm		4.40 mm	(3x)	3 mm	50 mm	CSG0370-C6	43.20
.0370	#63	.939 mm		6.40 mm	(5x)	3 mm	50 mm	BGN0370-C6	45.50
.0370	#63	.939 mm		9.20 mm	(8x)	3 mm	50 mm	ARY0370-C6	48.20
.0370	#63	.939 mm		13.00 mm	(12x)	3 mm	50 mm	EFG0370-C6	54.10
.0380	#62	.965 mm		4.60 mm	(3x)	3 mm	50 mm	CSG0380-C6	43.20
.0380	#62	.965 mm		6.60 mm	(5x)	3 mm	50 mm	BGN0380-C6	45.50
.0380	#62	.965 mm		9.40 mm	(8x)	3 mm	50 mm	ARY0380-C6	48.20
.0380	#62	.965 mm		13.50 mm	(12x)	3 mm	50 mm	EFG0380-C6	54.10
.0390	#61	.990 mm		4.80 mm	(3x)	3 mm	50 mm	CSG0390-C6	43.20
.0390	#61	.990 mm		6.60 mm	(5x)	3 mm	50 mm	BGN0390-C6	45.50
.0390	#61	.990 mm		9.60 mm	(8x)	3 mm	50 mm	ARY0390-C6	48.20
.0390	#61	.990 mm		13.50 mm	(12x)	3 mm	50 mm	EFG0390-C6	54.10
.0393		1.000 mm		4.80 mm	(3x)	3 mm	50 mm	CSG0393-C6	47.00
.0393		1.000 mm		6.80 mm	(5x)	3 mm	50 mm	BGN0393-C6	49.50
.0393		1.000 mm		9.80 mm	(8x)	3 mm	50 mm	ARY0393-C6	51.60
.0393		1.000 mm		12.00 mm	(10x)	3 mm	50 mm	DXT0393-C6	54.90
.0393		1.000 mm		14.00 mm	(12x)	3 mm	50 mm	EFG0393-C6	58.10
.0400	#60	1.016 mm		4.80 mm	(3x)	3 mm	50 mm	CSG0400-C6	47.00
.0400	#60	1.016 mm	.192		(3x)	1/8	2	FDW0400-C6	47.00
.0400	#60	1.016 mm		6.80 mm	(5x)	3 mm	50 mm	BGN0400-C6	49.50
.0400	#60	1.016 mm	.272		(5x)	1/8	2	GBS0400-C6	49.50
.0400	#60	1.016 mm		10.00 mm	(8x)	3 mm	50 mm	ARY0400-C6	51.60
.0400	#60	1.016 mm	.400		(8x)	1/8	2	HGD0400-C6	51.60
.0400	#60	1.016 mm		14.00 mm	(12x)	3 mm	50 mm	EFG0400-C6	58.10
.0410	#59	1.041 mm		5.00 mm	(3x)	3 mm	50 mm	CSG0410-C6	47.00
.0410	#59	1.041 mm		7.00 mm	(5x)	3 mm	50 mm	BGN0410-C6	49.50
.0410	#59	1.041 mm		10.00 mm	(8x)	3 mm	50 mm	ARY0410-C6	51.60
.0410	#59	1.041 mm		14.50 mm	(12x)	3 mm	50 mm	EFG0410-C6	58.10

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0420	#58	1.066 mm		5.00 mm	(3x)	3 mm	50 mm	CSG0420-C6	47.00
.0420	#58	1.066 mm		7.20 mm	(5x)	3 mm	50 mm	BGN0420-C6	49.50
.0420	#58	1.066 mm		10.50 mm	(8x)	3 mm	50 mm	ARY0420-C6	51.60
.0420	#58	1.066 mm		14.50 mm	(12x)	3 mm	50 mm	EFG0420-C6	58.10
.0430	#57	1.092 mm		5.20 mm	(3x)	3 mm	50 mm	CSG0430-C6	47.00
.0430	#57	1.092 mm		7.40 mm	(5x)	3 mm	50 mm	BGN0430-C6	49.50
.0430	#57	1.092 mm		10.50 mm	(8x)	3 mm	50 mm	ARY0430-C6	51.60
.0430	#57	1.092 mm		15.00 mm	(12x)	3 mm	50 mm	EFG0430-C6	58.10
.0450		1.143 mm		5.40 mm	(3x)	3 mm	50 mm	CSG0450-C6	47.00
.0450		1.143 mm		7.80 mm	(5x)	3 mm	50 mm	BGN0450-C6	49.50
.0450		1.143 mm		11.00 mm	(8x)	3 mm	50 mm	ARY0450-C6	51.60
.0465	#56	1.181 mm		5.60 mm	(3x)	3 mm	50 mm	CSG0465-C6	47.00
.0465	#56	1.181 mm	.224		(3x)	1/8	2	FDW0465-C6	47.00
.0465	#56	1.181 mm	.312		(5x)	1/8	2	GBS0465-C6	49.50
.0465	#56	1.181 mm		8.00 mm	(5x)	3 mm	50 mm	BGN0465-C6	49.50
.0465	#56	1.181 mm		11.50 mm	(8x)	3 mm	50 mm	ARY0465-C6	51.60
.0465	#56	1.181 mm	.460		(8x)	1/8	2	HGD0465-C6	51.60
.0465	#56	1.181 mm		14.00 mm	(10x)	3 mm	50 mm	DXT0465-C6	54.90
.0465	#56	1.181 mm		16.00 mm	(12x)	3 mm	63 mm	EFG0465-C6	58.10
.0468 (3/64)		1.190 mm		5.60 mm	(3x)	3 mm	50 mm	CSG0468-C6	47.00
.0468 (3/64)		1.190 mm	.224		(3x)	1/8	2	FDW0468-C6	47.00
.0468 (3/64)		1.190 mm		8.00 mm	(5x)	3 mm	50 mm	BGN0468-C6	49.50
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	GBS0468-C6	49.50
.0468 (3/64)		1.190 mm		11.50 mm	(8x)	3 mm	50 mm	ARY0468-C6	51.60
.0468 (3/64)		1.190 mm	.460		(8x)	1/8	2	HGD0468-C6	51.60
.0468 (3/64)		1.190 mm		14.00 mm	(10x)	3 mm	50 mm	DXT0468-C6	54.90
.0468 (3/64)		1.190 mm		16.50 mm	(12x)	3 mm	63 mm	EFG0468-C6	58.10
.0492		1.250 mm		6.00 mm	(3x)	3 mm	50 mm	CSG0492-C6	47.00
.0492		1.250 mm		12.00 mm	(8x)	3 mm	50 mm	ARY0492-C6	55.30
.0492		1.250 mm		17.00 mm	(12x)	3 mm	63 mm	EFG0492-C6	59.50
.0500		1.270 mm		6.00 mm	(3x)	3 mm	50 mm	CSG0500-C6	47.00
.0500		1.270 mm	.240		(3x)	1/8	2	FDW0500-C6	47.00
.0500		1.270 mm		8.50 mm	(5x)	3 mm	50 mm	BGN0500-C6	49.50
.0500		1.270 mm	.340		(5x)	1/8	2	GBS0500-C6	49.50
.0500		1.270 mm	.480		(8x)	1/8	2	HGD0500-C6	51.60
.0500		1.270 mm		12.50 mm	(8x)	3 mm	50 mm	ARY0500-C6	51.60
.0500		1.270 mm		17.50 mm	(12x)	3 mm	63 mm	EFG0500-C6	58.10
.0520	#55	1.320 mm		6.20 mm	(3x)	3 mm	50 mm	CSG0520-C6	47.00
.0520	#55	1.320 mm	.248		(3x)	1/8	2	FDW0520-C6	47.00
.0520	#55	1.320 mm		9.00 mm	(5x)	3 mm	50 mm	BGN0520-C6	49.50
.0520	#55	1.320 mm	.360		(5x)	1/8	2	GBS0520-C6	49.50
.0520	#55	1.320 mm	.500		(8x)	1/8	2	HGD0520-C6	51.60
.0520	#55	1.320 mm		13.00 mm	(8x)	3 mm	50 mm	ARY0520-C6	51.60
.0520	#55	1.320 mm		18.00 mm	(12x)	3 mm	63 mm	EFG0520-C6	58.10

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.005" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.0550	#54	1.397 mm		6.60 mm	(3x)	3 mm	50 mm	CSG0550-C6	47.00
.0550	#54	1.397 mm	.264		(3x)	1/8	2	FDW0550-C6	47.00
.0550	#54	1.397 mm		9.50 mm	(5x)	3 mm	50 mm	BGN0550-C6	49.50
.0550	#54	1.397 mm	.380		(5x)	1/8	2	GBS0550-C6	49.50
.0550	#54	1.397 mm		13.50 mm	(8x)	3 mm	50 mm	ARY0550-C6	51.60
.0550	#54	1.397 mm	.540		(8x)	1/8	2	HGD0550-C6	51.60
.0550	#54	1.397 mm		16.50 mm	(10x)	3 mm	63 mm	DXT0550-C6	56.60
.0550	#54	1.397 mm		19.00 mm	(12x)	3 mm	63 mm	EFG0550-C6	58.10
.0590		1.500 mm		7.20 mm	(3x)	3 mm	50 mm	CSG0590-C6	50.60
.0590		1.500 mm		10.00 mm	(5x)	3 mm	50 mm	BGN0590-C6	53.10
.0590		1.500 mm		14.50 mm	(8x)	3 mm	50 mm	ARY0590-C6	55.30
.0590		1.500 mm		17.50 mm	(10x)	3 mm	63 mm	DXT0590-C6	58.50
.0590		1.500 mm		21.00 mm	(12x)	3 mm	63 mm	EFG0590-C6	61.80
.0595	#53	1.511 mm		7.20 mm	(3x)	3 mm	50 mm	CSG0595-C6	50.60
.0595	#53	1.511 mm		10.00 mm	(5x)	3 mm	50 mm	BGN0595-C6	53.10
.0595	#53	1.511 mm		14.50 mm	(8x)	3 mm	50 mm	ARY0595-C6	55.30
.0595	#53	1.511 mm		21.00 mm	(12x)	3 mm	63 mm	EFG0595-C6	61.80
.0600		1.524 mm		7.20 mm	(3x)	3 mm	50 mm	CSG0600-C6	50.60
.0600		1.524 mm		15.00 mm	(8x)	3 mm	50 mm	ARY0600-C6	55.30
.0625 (1/16)		1.587 mm	.296		(3x)	1/8	2	FDW0625-C6	50.60
.0625 (1/16)		1.587 mm		7.60 mm	(3x)	3 mm	50 mm	CSG0625-C6	50.60
.0625 (1/16)		1.587 mm		10.50 mm	(5x)	3 mm	50 mm	BGN0625-C6	53.10
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	GBS0625-C6	53.10
.0625 (1/16)		1.587 mm	.600		(8x)	1/8	2	HGD0625-C6	55.30
.0625 (1/16)		1.587 mm		15.50 mm	(8x)	3 mm	50 mm	ARY0625-C6	55.30
.0625 (1/16)		1.587 mm		18.50 mm	(10x)	3 mm	63 mm	DXT0625-C6	58.50
.0625 (1/16)		1.587 mm		22.00 mm	(12x)	3 mm	63 mm	EFG0625-C6	61.80
.0635	#52	1.612 mm		7.60 mm	(3x)	3 mm	50 mm	CSG0635-C6	50.60
.0635	#52	1.612 mm		11.00 mm	(5x)	3 mm	50 mm	BGN0635-C6	53.10
.0635	#52	1.612 mm		15.50 mm	(8x)	3 mm	50 mm	ARY0635-C6	55.30
.0635	#52	1.612 mm		22.00 mm	(12x)	3 mm	63 mm	EFG0635-C6	61.80
.0670	#51	1.701 mm		8.00 mm	(3x)	3 mm	50 mm	CSG0670-C6	50.60
.0670	#51	1.701 mm		11.50 mm	(5x)	3 mm	50 mm	BGN0670-C6	53.10
.0670	#51	1.701 mm		16.50 mm	(8x)	3 mm	63 mm	ARY0670-C6	55.30
.0670	#51	1.701 mm		23.00 mm	(12x)	3 mm	63 mm	EFG0670-C6	61.80
.0700	#50	1.778 mm		8.50 mm	(3x)	3 mm	50 mm	CSG0700-C6	50.60
.0700	#50	1.778 mm	.340		(3x)	1/8	2	FDW0700-C6	50.60
.0700	#50	1.778 mm		12.00 mm	(5x)	3 mm	50 mm	BGN0700-C6	53.10
.0700	#50	1.778 mm	.480		(5x)	1/8	2	GBS0700-C6	53.10
.0700	#50	1.778 mm	.680		(8x)	1/8	2-1/2	HGD0700-C6	55.30
.0700	#50	1.778 mm		17.50 mm	(8x)	3 mm	63 mm	ARY0700-C6	55.30
.0700	#50	1.778 mm		21.00 mm	(10x)	3 mm	63 mm	DXT0700-C6	58.60
.0700	#50	1.778 mm		24.00 mm	(12x)	3 mm	63 mm	EFG0700-C6	61.80
.0730	#49	1.854 mm		9.00 mm	(3x)	3 mm	50 mm	CSG0730-C6	50.60
.0730	#49	1.854 mm		12.50 mm	(5x)	3 mm	50 mm	BGN0730-C6	53.10
.0730	#49	1.854 mm		18.00 mm	(8x)	3 mm	63 mm	ARY0730-C6	55.30
.0730	#49	1.854 mm		25.00 mm	(12x)	3 mm	63 mm	EFG0730-C6	61.80

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0760	#48	1.930 mm		9.00 mm	(3x)	3 mm	50 mm	CSG0760-C6	50.60
.0760	#48	1.930 mm		13.00 mm	(5x)	3 mm	50 mm	BGN0760-C6	53.10
.0760	#48	1.930 mm		19.00 mm	(8x)	3 mm	63 mm	ARY0760-C6	55.30
.0760	#48	1.930 mm		27.00 mm	(12x)	3 mm	63 mm	EFG0760-C6	61.80
.0781 (5/64)		1.984 mm		9.50 mm	(3x)	3 mm	50 mm	CSG0781-C6	50.60
.0781 (5/64)		1.984 mm	.380		(3x)	1/8	2	FDW0781-C6	50.60
.0781 (5/64)		1.984 mm	.520		(5x)	1/8	2	GBS0781-C6	53.10
.0781 (5/64)		1.984 mm		13.50 mm	(5x)	3 mm	50 mm	BGN0781-C6	53.10
.0781 (5/64)		1.984 mm	.760		(8x)	1/8	2-1/2	HGD0781-C6	55.30
.0781 (5/64)		1.984 mm		19.50 mm	(8x)	3 mm	63 mm	ARY0781-C6	55.30
.0781 (5/64)		1.984 mm		23.00 mm	(10x)	3 mm	63 mm	DXT0781-C6	58.50
.0781 (5/64)		1.984 mm		27.00 mm	(12x)	3 mm	63 mm	EFG0781-C6	61.80
.0785	#47	1.993 mm		9.50 mm	(3x)	3 mm	50 mm	CSG0785-C6	54.20
.0785	#47	1.993 mm		13.50 mm	(5x)	3 mm	50 mm	BGN0785-C6	57.30
.0785	#47	1.993 mm		19.50 mm	(8x)	3 mm	63 mm	ARY0785-C6	55.30
.0785	#47	1.993 mm		27.00 mm	(12x)	3 mm	63 mm	EFG0785-C6	66.90
.0787		2.000 mm		9.50 mm	(3x)	4 mm	50 mm	CSG0787-C6	54.20
.0787		2.000 mm		13.50 mm	(5x)	4 mm	50 mm	BGN0787-C6	57.30
.0787		2.000 mm		19.50 mm	(8x)	4 mm	63 mm	ARY0787-C6	60.20
.0787		2.000 mm		24.00 mm	(10x)	4 mm	63 mm	DXT0787-C6	63.60
.0787		2.000 mm		28.00 mm	(12x)	4 mm	63 mm	EFG0787-C6	66.90
.0800		2.032 mm		9.50 mm	(3x)	4 mm	50 mm	CSG0800-C6	54.20
.0800		2.032 mm	.380		(3x)	3/16	2	FDW0800-C6	54.20
.0800		2.032 mm	.540		(5x)	3/16	2	GBS0800-C6	57.30
.0800		2.032 mm		20.00 mm	(8x)	4 mm	63 mm	ARY0800-C6	60.20
.0800		2.032 mm	.800		(8x)	3/16	2-1/2	HGD0800-C6	60.20
.0810	#46	2.057 mm		10.00 mm	(3x)	4 mm	50 mm	CSG0810-C6	54.20
.0810	#46	2.057 mm		14.00 mm	(5x)	4 mm	50 mm	BGN0810-C6	57.30
.0810	#46	2.057 mm		20.00 mm	(8x)	4 mm	63 mm	ARY0810-C6	60.20
.0810	#46	2.057 mm		28.00 mm	(12x)	4 mm	63 mm	EFG0810-C6	66.90
.0820	#45	2.082 mm		10.00 mm	(3x)	4 mm	50 mm	CSG0820-C6	54.20
.0820	#45	2.082 mm		14.00 mm	(5x)	4 mm	50 mm	BGN0820-C6	57.30
.0820	#45	2.082 mm		20.00 mm	(8x)	4 mm	63 mm	ARY0820-C6	60.20
.0820	#45	2.082 mm		29.00 mm	(12x)	4 mm	75 mm	EFG0820-C6	66.90
.0860	#44	2.184 mm	.400		(3x)	3/16	2	FDW0860-C6	54.20
.0860	#44	2.184 mm		10.50 mm	(3x)	4 mm	50 mm	CSG0860-C6	54.20
.0860	#44	2.184 mm		14.50 mm	(5x)	4 mm	50 mm	BGN0860-C6	57.30
.0860	#44	2.184 mm	.580		(5x)	3/16	2-1/2	GBS0860-C6	57.30
.0860	#44	2.184 mm		21.00 mm	(8x)	4 mm	63 mm	ARY0860-C6	60.20
.0860	#44	2.184 mm	.840		(8x)	3/16	2-1/2	HGD0860-C6	60.20
.0860	#44	2.184 mm		30.00 mm	(12x)	4 mm	75 mm	EFG0860-C6	66.90

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0890	#43	2.260 mm		10.50 mm	(3x)	4 mm	50 mm	CSG0890-C6	54.20
.0890	#43	2.260 mm	.420		(3x)	3/16	2	FDW0890-C6	54.20
.0890	#43	2.260 mm		15.00 mm	(5x)	4 mm	50 mm	BGN0890-C6	57.30
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	GBS0890-C6	57.30
.0890	#43	2.260 mm		22.00 mm	(8x)	4 mm	63 mm	ARY0890-C6	60.20
.0890	#43	2.260 mm	.880		(8x)	3/16	2-1/2	HGD0890-C6	60.20
.0890	#43	2.260 mm		31.00 mm	(12x)	4 mm	75 mm	EFG0890-C6	66.90
.0900		2.286 mm		11.00 mm	(3x)	4 mm	50 mm	CSG0900-C6	54.20
.0900		2.286 mm		15.00 mm	(5x)	4 mm	50 mm	BGN0900-C6	57.30
.0900		2.286 mm		22.00 mm	(8x)	4 mm	63 mm	ARY0900-C6	60.20
.0935	#42	2.374 mm		11.50 mm	(3x)	4 mm	50 mm	CSG0935-C6	54.20
.0935	#42	2.374 mm		16.00 mm	(5x)	4 mm	63 mm	BGN0935-C6	57.30
.0935	#42	2.374 mm		23.00 mm	(8x)	4 mm	63 mm	ARY0935-C6	60.20
.0935	#42	2.374 mm		33.00 mm	(12x)	4 mm	75 mm	EFG0935-C6	66.90
.0937 (3/32)		2.381 mm	.440		(3x)	3/16	2	FDW0937-C6	54.20
.0937 (3/32)		2.381 mm		11.50 mm	(3x)	4 mm	50 mm	CSG0937-C6	54.20
.0937 (3/32)		2.381 mm		16.00 mm	(5x)	4 mm	63 mm	BGN0937-C6	57.30
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	GBS0937-C6	57.30
.0937 (3/32)		2.381 mm		23.00 mm	(8x)	4 mm	63 mm	ARY0937-C6	60.20
.0937 (3/32)		2.381 mm	.920		(8x)	3/16	2-1/2	HGD0937-C6	60.20
.0937 (3/32)		2.381 mm		28.00 mm	(10x)	4 mm	63 mm	DXT0937-C6	63.60
.0937 (3/32)		2.381 mm		33.00 mm	(12x)	4 mm	75 mm	EFG0937-C6	66.90
.0960	#41	2.438 mm		11.50 mm	(3x)	4 mm	50 mm	CSG0960-C6	54.20
.0960	#41	2.438 mm	.460		(3x)	3/16	2	FDW0960-C6	54.20
.0960	#41	2.438 mm		16.00 mm	(5x)	4 mm	63 mm	BGN0960-C6	57.30
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	GBS0960-C6	57.30
.0960	#41	2.438 mm	.920		(8x)	3/16	2-1/2	HGD0960-C6	60.20
.0960	#41	2.438 mm		24.00 mm	(8x)	4 mm	63 mm	ARY0960-C6	60.20
.0960	#41	2.438 mm		34.00 mm	(12x)	4 mm	75 mm	EFG0960-C6	66.90
.0980	#40	2.489 mm		12.00 mm	(3x)	4 mm	50 mm	CSG0980-C6	54.20
.0980	#40	2.489 mm		17.00 mm	(5x)	4 mm	63 mm	BGN0980-C6	57.30
.0980	#40	2.489 mm		24.00 mm	(8x)	4 mm	63 mm	ARY0980-C6	60.20
.0980	#40	2.489 mm		34.00 mm	(12x)	4 mm	75 mm	EFG0980-C6	66.90
.0984		2.500 mm		12.00 mm	(3x)	4 mm	50 mm	CSG0984-C6	57.40
.0984		2.500 mm		17.00 mm	(5x)	4 mm	63 mm	BGN0984-C6	60.90
.0984		2.500 mm		24.00 mm	(8x)	4 mm	63 mm	ARY0984-C6	64.10
.0984		2.500 mm		34.00 mm	(12x)	4 mm	75 mm	EFG0984-C6	69.20
.0995	#39	2.527 mm		12.00 mm	(3x)	4 mm	50 mm	CSG0995-C6	57.40
.0995	#39	2.527 mm	.480		(3x)	3/16	2	FDW0995-C6	57.40
.0995	#39	2.527 mm		17.00 mm	(5x)	4 mm	63 mm	BGN0995-C6	60.90
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	GBS0995-C6	60.90
.0995	#39	2.527 mm	.960		(8x)	3/16	2-1/2	HGD0995-C6	64.10
.0995	#39	2.527 mm		25.00 mm	(8x)	4 mm	63 mm	ARY0995-C6	64.10
.0995	#39	2.527 mm		35.00 mm	(12x)	4 mm	75 mm	EFG0995-C6	71.00
.1000		2.540 mm		12.00 mm	(3x)	4 mm	50 mm	CSG1000-C6	57.40
.1000		2.540 mm		17.00 mm	(5x)	4 mm	63 mm	BGN1000-C6	60.90
.1000		2.540 mm		25.00 mm	(8x)	4 mm	63 mm	ARY1000-C6	64.10

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.1015	#38	2.578 mm		12.00 mm	(3x)	4 mm	50 mm	CSG1015-C6	57.40
.1015	#38	2.578 mm		17.00 mm	(5x)	4 mm	63 mm	BGN1015-C6	60.90
.1015	#38	2.578 mm		25.00 mm	(8x)	4 mm	63 mm	ARY1015-C6	64.10
.1015	#38	2.578 mm		35.00 mm	(12x)	4 mm	75 mm	EFG1015-C6	71.00
.1040	#37	2.641 mm		12.50 mm	(3x)	4 mm	50 mm	CSG1040-C6	57.40
.1040	#37	2.641 mm		18.00 mm	(5x)	4 mm	63 mm	BGN1040-C6	60.90
.1040	#37	2.641 mm		26.00 mm	(8x)	4 mm	63 mm	ARY1040-C6	64.10
.1040	#37	2.641 mm		36.00 mm	(12x)	4 mm	75 mm	EFG1040-C6	71.00
.1065	#36	2.705 mm		13.00 mm	(3x)	4 mm	50 mm	CSG1065-C6	57.40
.1065	#36	2.705 mm		18.00 mm	(5x)	4 mm	63 mm	BGN1065-C6	60.90
.1065	#36	2.705 mm		26.00 mm	(8x)	4 mm	63 mm	ARY1065-C6	64.10
.1065	#36	2.705 mm		37.00 mm	(12x)	4 mm	75 mm	EFG1065-C6	71.00
.1093 (7/64)		2.778 mm		13.00 mm	(3x)	4 mm	50 mm	CSG1093-C6	57.40
.1093 (7/64)		2.778 mm		19.00 mm	(5x)	4 mm	63 mm	BGN1093-C6	60.90
.1093 (7/64)		2.778 mm		27.00 mm	(8x)	4 mm	63 mm	ARY1093-C6	64.10
.1093 (7/64)		2.778 mm		33.00 mm	(10x)	4 mm	75 mm	DXT1093-C6	67.50
.1093 (7/64)		2.778 mm		38.00 mm	(12x)	4 mm	75 mm	EFG1093-C6	71.00
.1100	#35	2.794 mm	.520		(3x)	3/16	2	FDW1100-C6	57.40
.1100	#35	2.794 mm		13.50 mm	(3x)	4 mm	50 mm	CSG1100-C6	57.40
.1100	#35	2.794 mm		19.00 mm	(5x)	4 mm	63 mm	BGN1100-C6	60.90
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	GBS1100-C6	60.90
.1100	#35	2.794 mm	1.040		(8x)	3/16	2-1/2	HGD1100-C6	64.10
.1100	#35	2.794 mm		27.00 mm	(8x)	4 mm	63 mm	ARY1100-C6	64.10
.1100	#35	2.794 mm		38.00 mm	(12x)	4 mm	75 mm	EFG1100-C6	71.00
.1110	#34	2.819 mm		13.50 mm	(3x)	4 mm	50 mm	CSG1110-C6	57.40
.1110	#34	2.819 mm		19.00 mm	(5x)	4 mm	63 mm	BGN1110-C6	60.90
.1110	#34	2.819 mm		27.00 mm	(8x)	4 mm	63 mm	ARY1110-C6	64.10
.1110	#34	2.819 mm		39.00 mm	(12x)	4 mm	75 mm	EFG1110-C6	71.00
.1130	#33	2.870 mm		13.50 mm	(3x)	4 mm	50 mm	CSG1130-C6	57.40
.1130	#33	2.870 mm		19.00 mm	(5x)	4 mm	63 mm	BGN1130-C6	60.90
.1130	#33	2.870 mm		28.00 mm	(8x)	4 mm	63 mm	ARY1130-C6	64.10
.1130	#33	2.870 mm		39.00 mm	(12x)	4 mm	75 mm	EFG1130-C6	71.00
.1160	#32	2.946 mm		14.00 mm	(3x)	4 mm	50 mm	CSG1160-C6	57.40
.1160	#32	2.946 mm	.560		(3x)	3/16	2	FDW1160-C6	57.40
.1160	#32	2.946 mm		20.00 mm	(5x)	4 mm	63 mm	BGN1160-C6	60.90
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	GBS1160-C6	60.90
.1160	#32	2.946 mm	1.120		(8x)	3/16	3	HGD1160-C6	64.10
.1160	#32	2.946 mm		29.00 mm	(8x)	4 mm	63 mm	ARY1160-C6	64.10
.1160	#32	2.946 mm		40.00 mm	(12x)	4 mm	75 mm	EFG1160-C6	71.00
.1181		3.000 mm		14.50 mm	(3x)	4 mm	50 mm	CSG1181-C6	58.80
.1181		3.000 mm		20.00 mm	(5x)	4 mm	63 mm	BGN1181-C6	61.90
.1181		3.000 mm		29.00 mm	(8x)	4 mm	63 mm	ARY1181-C6	65.40
.1181		3.000 mm		35.00 mm	(10x)	4 mm	75 mm	DXT1181-C6	68.60
.1181		3.000 mm		42.00 mm	(12x)	4 mm	100 mm	EFG1181-C6	72.30

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.1200	#31	3.048 mm		14.50 mm	(3x)	6 mm	63 mm	CSG1200-C6	65.90
.1200	#31	3.048 mm	.580		(3x)	3/16	2-1/2	FDW1200-C6	65.90
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	GBS1200-C6	57.20
.1200	#31	3.048 mm		21.00 mm	(5x)	6 mm	63 mm	BGN1200-C6	57.20
.1200	#31	3.048 mm		30.00 mm	(8x)	6 mm	75 mm	ARY1200-C6	73.40
.1200	#31	3.048 mm	1.200		(8x)	3/16	3	HGD1200-C6	73.40
.1200	#31	3.048 mm		42.00 mm	(12x)	6 mm	100 mm	EFG1200-C6	80.50
.1250 (1/8)		3.175 mm		15.00 mm	(3x)	6 mm	63 mm	CSG1250-C6	65.90
.1250 (1/8)		3.175 mm	.600		(3x)	3/16	2-1/2	FDW1250-C6	65.90
.1250 (1/8)		3.175 mm		21.00 mm	(5x)	6 mm	63 mm	BGN1250-C6	69.20
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	GBS1250-C6	69.20
.1250 (1/8)		3.175 mm	1.200		(8x)	3/16	3	HGD1250-C6	73.40
.1250 (1/8)		3.175 mm		31.00 mm	(8x)	6 mm	75 mm	ARY1250-C6	73.40
.1250 (1/8)		3.175 mm		37.00 mm	(10x)	6 mm	100 mm	DXT1250-C6	76.90
.1250 (1/8)		3.175 mm		44.00 mm	(12x)	6 mm	100 mm	EFG1250-C6	80.50
.1285	#30	3.263 mm	.610		(3x)	1/4	2-1/2	FDW1285-C6	65.90
.1285	#30	3.263 mm		16.00 mm	(3x)	6 mm	63 mm	CSG1285-C6	65.90
.1285	#30	3.263 mm	.880		(5x)	1/4	2-1/2	GBS1285-C6	69.20
.1285	#30	3.263 mm		32.00 mm	(8x)	6 mm	75 mm	ARY1285-C6	73.40
.1285	#30	3.263 mm	1.280		(8x)	1/4	3	HGD1285-C6	73.40
.1360	#29	3.454 mm		16.00 mm	(3x)	6 mm	63 mm	CSG1360-C6	65.90
.1360	#29	3.454 mm		23.00 mm	(5x)	6 mm	63 mm	BGN1360-C6	69.20
.1360	#29	3.454 mm		34.00 mm	(8x)	6 mm	75 mm	ARY1360-C6	73.40
.1360	#29	3.454 mm		48.00 mm	(12x)	6 mm	100 mm	EFG1360-C6	80.50
.1405	#28	3.568 mm		17.00 mm	(3x)	6 mm	63 mm	CSG1405-C6	65.90
.1405	#28	3.568 mm		35.00 mm	(8x)	6 mm	75 mm	ARY1405-C6	73.40
.1406 (9/64)		3.571 mm		17.00 mm	(3x)	6 mm	63 mm	CSG1406-C6	65.90
.1406 (9/64)		3.571 mm		24.00 mm	(5x)	6 mm	75 mm	BGN1406-C6	69.20
.1406 (9/64)		3.571 mm		35.00 mm	(8x)	6 mm	75 mm	ARY1406-C6	73.40
.1406 (9/64)		3.571 mm		50.00 mm	(12x)	6 mm	100 mm	EFG1406-C6	80.50
.1440	#27	3.657 mm		17.00 mm	(3x)	6 mm	63 mm	CSG1440-C6	65.90
.1440	#27	3.657 mm		36.00 mm	(8x)	6 mm	100 mm	ARY1440-C6	73.40
.1470	#26	3.733 mm		18.00 mm	(3x)	6 mm	63 mm	CSG1470-C6	65.90
.1470	#26	3.733 mm		26.00 mm	(5x)	6 mm	75 mm	BGN1470-C6	69.20
.1470	#26	3.733 mm		36.00 mm	(8x)	6 mm	100 mm	ARY1470-C6	73.40
.1470	#26	3.733 mm		52.00 mm	(12x)	6 mm	100 mm	EFG1470-C6	80.50
.1495	#25	3.797 mm		18.00 mm	(3x)	6 mm	63 mm	CSG1495-C6	65.90
.1495	#25	3.797 mm		37.00 mm	(8x)	6 mm	100 mm	ARY1495-C6	73.40
.1520	#24	3.860 mm		18.00 mm	(3x)	6 mm	63 mm	CSG1520-C6	65.90
.1520	#24	3.860 mm		38.00 mm	(8x)	6 mm	100 mm	ARY1520-C6	73.40
.1540	#23	3.911 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1540-C6	65.90
.1540	#23	3.911 mm		38.00 mm	(8x)	6 mm	100 mm	ARY1540-C6	73.40
.1562 (5/32)		3.968 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1562-C6	65.90
.1562 (5/32)		3.968 mm		26.00 mm	(5x)	6 mm	75 mm	BGN1562-C6	69.20
.1562 (5/32)		3.968 mm		39.00 mm	(8x)	6 mm	100 mm	ARY1562-C6	73.40
.1562 (5/32)		3.968 mm		54.00 mm	(12x)	6 mm	100 mm	EFG1562-C6	80.50

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.1570	#22	3.987 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1570-C6	65.90
.1570	#22	3.987 mm		39.00 mm	(8x)	6 mm	100 mm	ARY1570-C6	73.40
.1574		4.000 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1574-C6	65.90
.1574		4.000 mm		28.00 mm	(5x)	6 mm	75 mm	BGN1574-C6	69.20
.1574		4.000 mm		39.00 mm	(8x)	6 mm	100 mm	ARY1574-C6	73.40
.1590	#21	4.038 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1590-C6	65.90
.1590	#21	4.038 mm		28.00 mm	(5x)	6 mm	75 mm	BGN1590-C6	69.20
.1590	#21	4.038 mm		39.00 mm	(8x)	6 mm	100 mm	ARY1590-C6	73.40
.1590	#21	4.038 mm		56.00 mm	(12x)	6 mm	100 mm	EFG1590-C6	80.50
.1610	#20	4.089 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1610-C6	65.90
.1610	#20	4.089 mm		40.00 mm	(8x)	6 mm	100 mm	ARY1610-C6	73.40
.1660	#19	4.216 mm		20.00 mm	(3x)	6 mm	63 mm	CSG1660-C6	65.90
.1660	#19	4.216 mm		42.00 mm	(8x)	6 mm	100 mm	ARY1660-C6	73.40
.1695	#18	4.305 mm		20.00 mm	(3x)	6 mm	63 mm	CSG1695-C6	65.90
.1695	#18	4.305 mm		42.00 mm	(8x)	6 mm	100 mm	ARY1695-C6	73.40
.1718 (11/64)		4.365 mm		21.00 mm	(3x)	6 mm	63 mm	CSG1718-C6	65.90
.1718 (11/64)		4.365 mm		30.00 mm	(5x)	6 mm	75 mm	BGN1718-C6	69.20
.1718 (11/64)		4.365 mm		42.00 mm	(8x)	6 mm	100 mm	ARY1718-C6	73.40
.1730	#17	4.394 mm		21.00 mm	(3x)	6 mm	63 mm	CSG1730-C6	65.90
.1730	#17	4.394 mm		42.00 mm	(8x)	6 mm	100 mm	ARY1730-C6	73.40
.1770	#16	4.495 mm		21.00 mm	(3x)	6 mm	63 mm	CSG1770-C6	65.90
.1770	#16	4.495 mm		30.00 mm	(5x)	6 mm	75 mm	BGN1770-C6	69.20
.1770	#16	4.495 mm		44.00 mm	(8x)	6 mm	100 mm	ARY1770-C6	73.40
.1770	#16	4.495 mm		62.00 mm	(12x)	6 mm	125 mm	EFG1770-C6	80.50
.1800	#15	4.572 mm		22.00 mm	(3x)	6 mm	63 mm	CSG1800-C6	65.90
.1800	#15	4.572 mm		30.00 mm	(5x)	6 mm	75 mm	BGN1800-C6	69.20
.1800	#15	4.572 mm		44.00 mm	(8x)	6 mm	100 mm	ARY1800-C6	73.40
.1800	#15	4.572 mm		62.00 mm	(12x)	6 mm	125 mm	EFG1800-C6	80.50
.1820	#14	4.622 mm		22.00 mm	(3x)	6 mm	63 mm	CSG1820-C6	65.90
.1820	#14	4.622 mm		46.00 mm	(8x)	6 mm	100 mm	ARY1820-C6	73.40
.1850	#13	4.700 mm		22.00 mm	(3x)	6 mm	63 mm	CSG1850-C6	65.90
.1850	#13	4.700 mm		46.00 mm	(8x)	6 mm	100 mm	ARY1850-C6	73.40
.1875 (3/16)		4.762 mm	.890		(3x)	1/4	2-1/2	FDW1875-C6	65.90
.1875 (3/16)		4.762 mm		23.00 mm	(3x)	6 mm	63 mm	CSG1875-C6	65.90
.1875 (3/16)		4.762 mm		32.00 mm	(5x)	6 mm	75 mm	BGN1875-C6	69.20
.1875 (3/16)		4.762 mm	1.280		(5x)	1/4	3	GBS1875-C6	69.20
.1875 (3/16)		4.762 mm		46.00 mm	(8x)	6 mm	100 mm	ARY1875-C6	73.40
.1875 (3/16)		4.762 mm	1.840		(8x)	1/4	3-1/2	HGD1875-C6	73.40
.1875 (3/16)		4.762 mm		66.00 mm	(12x)	6 mm	125 mm	EFG1875-C6	80.50
.1890	#12	4.800 mm		23.00 mm	(3x)	6 mm	63 mm	CSG1890-C6	65.90
.1890	#12	4.800 mm		46.00 mm	(8x)	6 mm	100 mm	ARY1890-C6	73.40
.1910	#11	4.851 mm		23.00 mm	(3x)	6 mm	63 mm	CSG1910-C6	65.90
.1910	#11	4.851 mm		48.00 mm	(8x)	6 mm	100 mm	ARY1910-C6	73.40
.1935	#10	4.914 mm		23.00 mm	(3x)	6 mm	63 mm	CSG1935-C6	65.90
.1935	#10	4.914 mm		48.00 mm	(8x)	6 mm	100 mm	ARY1935-C6	73.40

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.1960	#9	4.978 mm		24.00 mm	(3x)	6 mm	63 mm	CSG1960-C6	65.90
.1960	#9	4.978 mm		48.00 mm	(8x)	6 mm	100 mm	ARY1960-C6	73.40
.1968		5.000 mm		24.00 mm	(3x)	6 mm	63 mm	CSG1968-C6	65.90
.1968		5.000 mm		34.00 mm	(5x)	6 mm	75 mm	BGN1968-C6	69.20
.1968		5.000 mm		48.00 mm	(8x)	6 mm	100 mm	ARY1968-C6	73.40
.1990	#8	5.054 mm		24.00 mm	(3x)	6 mm	63 mm	CSG1990-C6	65.90
.1990	#8	5.054 mm		50.00 mm	(8x)	6 mm	100 mm	ARY1990-C6	73.40
.2009	#7	5.105 mm		24.00 mm	(3x)	6 mm	63 mm	CSG2009-C6	65.90
.2009	#7	5.105 mm		34.00 mm	(5x)	6 mm	75 mm	BGN2009-C6	69.20
.2009	#7	5.105 mm		50.00 mm	(8x)	6 mm	100 mm	ARY2009-C6	73.40
.2031 (13/64)		5.159 mm		24.00 mm	(3x)	6 mm	63 mm	CSG2031-C6	65.90
.2031 (13/64)		5.159 mm		34.00 mm	(5x)	6 mm	75 mm	BGN2031-C6	69.20
.2031 (13/64)		5.159 mm		50.00 mm	(8x)	6 mm	100 mm	ARY2031-C6	73.40
.2040	#6	5.181 mm		24.00 mm	(3x)	6 mm	63 mm	CSG2040-C6	65.90
.2040	#6	5.181 mm		50.00 mm	(8x)	6 mm	100 mm	ARY2040-C6	73.40
.2055	#5	5.219 mm		24.00 mm	(3x)	6 mm	63 mm	CSG2055-C6	65.90
.2055	#5	5.219 mm		50.00 mm	(8x)	6 mm	100 mm	ARY2055-C6	73.40
.2090	#4	5.308 mm		26.00 mm	(3x)	6 mm	75 mm	CSG2090-C6	65.90
.2090	#4	5.308 mm		52.00 mm	(8x)	6 mm	100 mm	ARY2090-C6	73.40
.2129	#3	5.410 mm		26.00 mm	(3x)	6 mm	75 mm	CSG2129-C6	65.90
.2129	#3	5.410 mm		36.00 mm	(5x)	6 mm	75 mm	BGN2129-C6	69.20
.2129	#3	5.410 mm		52.00 mm	(8x)	6 mm	100 mm	ARY2129-C6	73.40
.2187 (7/32)		5.556 mm		26.00 mm	(3x)	6 mm	75 mm	CSG2187-C6	65.90
.2187 (7/32)		5.556 mm		38.00 mm	(5x)	6 mm	100 mm	BGN2187-C6	69.20
.2187 (7/32)		5.556 mm		54.00 mm	(8x)	6 mm	100 mm	ARY2187-C6	73.40
.2210	#2	5.613 mm		26.00 mm	(3x)	6 mm	75 mm	CSG2210-C6	65.90
.2210	#2	5.613 mm		54.00 mm	(8x)	6 mm	100 mm	ARY2210-C6	73.40
.2280	#1	5.791 mm		28.00 mm	(3x)	6 mm	75 mm	CSG2280-C6	65.90
.2280	#1	5.791 mm		56.00 mm	(8x)	6 mm	100 mm	ARY2280-C6	73.40
.2340	A	5.943 mm		28.00 mm	(3x)	6 mm	75 mm	CSG2340-C6	65.90
.2340	A	5.943 mm		58.00 mm	(8x)	6 mm	100 mm	ARY2340-C6	73.40
.2343 (15/64)		5.953 mm		28.00 mm	(3x)	6 mm	75 mm	CSG2343-C6	65.90
.2343 (15/64)		5.953 mm		40.00 mm	(5x)	6 mm	100 mm	BGN2343-C6	69.20
.2343 (15/64)		5.953 mm		58.00 mm	(8x)	6 mm	100 mm	ARY2343-C6	73.40
.2362		6.000 mm		28.00 mm	(3x)	6 mm	75 mm	CSG2362-C6	65.90
.2362		6.000 mm		40.00 mm	(5x)	6 mm	100 mm	BGN2362-C6	69.20
.2362		6.000 mm		58.00 mm	(8x)	6 mm	100 mm	ARY2362-C6	73.40
.2380	B	6.045 mm		28.00 mm	(3x)	8 mm	75 mm	CSG2380-C6	68.20
.2380	B	6.045 mm		58.00 mm	(8x)	8 mm	100 mm	ARY2380-C6	75.50
.2420	C	6.146 mm		30.00 mm	(3x)	8 mm	75 mm	CSG2420-C6	68.20
.2420	C	6.146 mm		60.00 mm	(8x)	8 mm	100 mm	ARY2420-C6	75.50
.2460	D	6.248 mm		30.00 mm	(3x)	8 mm	75 mm	CSG2460-C6	68.20
.2460	D	6.248 mm		60.00 mm	(8x)	8 mm	100 mm	ARY2460-C6	75.50

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
							L1	2 FL	PRICE
.2500 (1/4)	E	6.350 mm		30.00 mm	(3x)	8 mm	75 mm	CSG2500-C6	68.20
.2500 (1/4)	E	6.350 mm	1.188		(3x)	1/4	3	FDW2500-C6	68.20
.2500 (1/4)	E	6.350 mm		42.00 mm	(5x)	8 mm	100 mm	BGN2500-C6	71.40
.2500 (1/4)	E	6.350 mm	1.680		(5x)	1/4	3-1/2	GBS2500-C6	71.40
.2500 (1/4)	E	6.350 mm	2.400		(8x)	1/4	4	HGD2500-C6	75.50
.2500 (1/4)	E	6.350 mm		62.00 mm	(8x)	8 mm	125 mm	ARY2500-C6	75.50
.2570	F	6.528 mm		32.00 mm	(3x)	8 mm	75 mm	CSG2570-C6	75.80
.2812		7.142 mm		34.00 mm	(3x)	8 mm	75 mm	CSG2812-C6	75.80
.3125 (5/16)		7.937 mm		38.00 mm	(3x)	8 mm	100 mm	CSG3125-C6	75.80
.3150		8.000 mm		38.00 mm	(3x)	8 mm	100 mm	CSG3150-C6	75.80
.3750 (3/8)		9.525 mm		46.00 mm	(3x)	10 mm	100 mm	CSG3750-C6	124.90

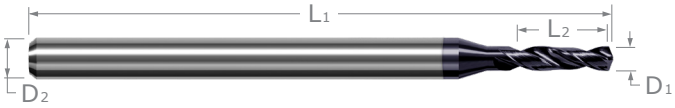
SPEEDS & FEEDS (Miniature High Performance Drills – Hardened Steels)

Important Note: Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%. For 12x, reduce to 65%). Pecking cycles are recommended to avoid chip pacing and breakage. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For higher hardness materials, peck depths should be .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material	Hardness	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter									
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.375
Hardened Steels	38-45 Rc	150	.00029	.00060	.00090	.00119	.00150	.00179	.00240	.00359	.00480	.00720
	46-55 Rc	90	.00022	.00045	.00068	.00089	.00112	.00134	.00180	.00269	.00360	.00540
	56-68 Rc	40	.00014	.00030	.00045	.00060	.00075	.00089	.00120	.00180	.00240	.00360

MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels



Available for 3x, 5x, 8x 10x, and 12x Hole Depths!

- Optimized for drilling prehardened medium alloy steels, stainless steels, and tool steels up to 45Rc
- Specialized flute shape for improved chip evacuation and maximum rigidity
- 140° point angle
- AlTiN coating for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Specialized Flute Shape for Improved Chip Evacuation

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.0078		.200 mm		.95 mm	(3x)	3 mm	50 mm	DHE0078-C3	44.00
.0078		.200 mm		1.35 mm	(5x)	3 mm	50 mm	BVT0078-C3	46.70
.0079	#92	.201 mm		1.35 mm	(5x)	3 mm	50 mm	BVT0079-C3	46.70
.0083	#91	.210 mm		1.00 mm	(3x)	3 mm	50 mm	DHE0083-C3	44.00
.0083	#91	.210 mm		1.40 mm	(5x)	3 mm	50 mm	BVT0083-C3	46.70
.0087	#90	.221 mm		1.05 mm	(3x)	3 mm	50 mm	DHE0087-C3	44.00
.0087	#90	.221 mm		1.50 mm	(5x)	3 mm	50 mm	BVT0087-C3	46.70
.0091	#89	.231 mm		1.10 mm	(3x)	3 mm	50 mm	DHE0091-C3	44.00
.0091	#89	.231 mm		1.55 mm	(5x)	3 mm	50 mm	BVT0091-C3	46.70
.0095	#88	.241 mm		1.15 mm	(3x)	3 mm	50 mm	DHE0095-C3	44.00
.0095	#88	.241 mm		1.65 mm	(5x)	3 mm	50 mm	BVT0095-C3	46.70
.0100	#87	.254 mm		1.20 mm	(3x)	3 mm	50 mm	DHE0100-C3	43.00
.0100	#87	.254 mm	.048		(3x)	1/8	2	FKB0100-C3	43.00
.0100	#87	.254 mm		1.70 mm	(5x)	3 mm	50 mm	BVT0100-C3	45.30
.0100	#87	.254 mm	.068		(5x)	1/8	1-1/2	GKT0100-C3	45.30
.0100	#87	.254 mm	.096		(8x)	1/8	2	HDV0100-C3	50.00
.0100	#87	.254 mm		2.50 mm	(8x)	3 mm	50 mm	ADS0100-C3	50.00
.0100	#87	.254 mm		3.00 mm	(10x)	3 mm	50 mm	EXP0100-C3	53.00
.0100	#87	.254 mm		3.50 mm	(12x)	3 mm	50 mm	CHT0100-C3	56.40
.0105	#86	.266 mm		1.25 mm	(3x)	3 mm	50 mm	DHE0105-C3	43.00
.0105	#86	.266 mm		1.80 mm	(5x)	3 mm	50 mm	BVT0105-C3	45.30
.0105	#86	.266 mm		2.60 mm	(8x)	3 mm	50 mm	ADS0105-C3	50.00
.0105	#86	.266 mm		3.70 mm	(12x)	3 mm	50 mm	CHT0105-C3	56.40
.0110	#85	.279 mm		1.35 mm	(3x)	3 mm	50 mm	DHE0110-C3	43.00
.0110	#85	.279 mm		1.90 mm	(5x)	3 mm	50 mm	BVT0110-C3	45.30
.0110	#85	.279 mm		2.70 mm	(8x)	3 mm	50 mm	ADS0110-C3	50.00
.0110	#85	.279 mm		3.30 mm	(10x)	3 mm	50 mm	EXP0110-C3	53.00
.0110	#85	.279 mm		3.80 mm	(12x)	3 mm	50 mm	CHT0110-C3	56.40
.0115	#84	.292 mm		1.40 mm	(3x)	3 mm	50 mm	DHE0115-C3	43.00
.0115	#84	.292 mm		2.00 mm	(5x)	3 mm	50 mm	BVT0115-C3	45.30
.0115	#84	.292 mm		2.80 mm	(8x)	3 mm	50 mm	ADS0115-C3	50.00
.0115	#84	.292 mm		4.00 mm	(12x)	3 mm	50 mm	CHT0115-C3	56.40
.0118		.300 mm		2.00 mm	(5x)	3 mm	50 mm	BVT0118-C3	45.30
.0118		.300 mm		4.10 mm	(12x)	3 mm	50 mm	CHT0118-C3	56.40

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.0120	#83	.304 mm		1.45 mm	(3x)	3 mm	50 mm	DHE0120-C3	43.00
.0120	#83	.304 mm		2.10 mm	(5x)	3 mm	50 mm	BVT0120-C3	45.30
.0120	#83	.304 mm		3.00 mm	(8x)	3 mm	50 mm	ADS0120-C3	50.00
.0120	#83	.304 mm		3.60 mm	(10x)	3 mm	50 mm	EXP0120-C3	53.00
.0120	#83	.304 mm		4.20 mm	(12x)	3 mm	50 mm	CHT0120-C3	56.40
.0125	#82	.317 mm		1.50 mm	(3x)	3 mm	50 mm	DHE0125-C3	43.00
.0125	#82	.317 mm		2.10 mm	(5x)	3 mm	50 mm	BVT0125-C3	45.30
.0125	#82	.317 mm		3.10 mm	(8x)	3 mm	50 mm	ADS0125-C3	50.00
.0125	#82	.317 mm		4.40 mm	(12x)	3 mm	50 mm	CHT0125-C3	56.40
.0130	#81	.330 mm		1.55 mm	(3x)	3 mm	50 mm	DHE0130-C3	43.00
.0130	#81	.330 mm		2.20 mm	(5x)	3 mm	50 mm	BVT0130-C3	45.30
.0130	#81	.330 mm		3.20 mm	(8x)	3 mm	50 mm	ADS0130-C3	50.00
.0130	#81	.330 mm		3.90 mm	(10x)	3 mm	50 mm	EXP0130-C3	53.00
.0130	#81	.330 mm		4.50 mm	(12x)	3 mm	50 mm	CHT0130-C3	56.40
.0135	#80	.342 mm		1.65 mm	(3x)	3 mm	50 mm	DHE0135-C3	43.00
.0135	#80	.342 mm		2.30 mm	(5x)	3 mm	50 mm	BVT0135-C3	45.30
.0135	#80	.342 mm		3.30 mm	(8x)	3 mm	50 mm	ADS0135-C3	50.00
.0135	#80	.342 mm		4.70 mm	(12x)	3 mm	50 mm	CHT0135-C3	56.40
.0140		.355 mm		1.70 mm	(3x)	3 mm	50 mm	DHE0140-C3	43.00
.0140		.355 mm		2.40 mm	(5x)	3 mm	50 mm	BVT0140-C3	45.30
.0140		.355 mm		3.50 mm	(8x)	3 mm	50 mm	ADS0140-C3	50.00
.0140		.355 mm		4.90 mm	(12x)	3 mm	50 mm	CHT0140-C3	56.40
.0144	#79	.368 mm		1.75 mm	(3x)	3 mm	50 mm	DHE0144-C3	43.00
.0144	#79	.368 mm		2.50 mm	(5x)	3 mm	50 mm	BVT0144-C3	45.30
.0144	#79	.368 mm		3.60 mm	(8x)	3 mm	50 mm	ADS0144-C3	50.00
.0144	#79	.368 mm		4.30 mm	(10x)	3 mm	50 mm	EXP0144-C3	53.00
.0144	#79	.368 mm		5.00 mm	(12x)	3 mm	50 mm	CHT0144-C3	56.40
.0150		.381 mm		1.80 mm	(3x)	3 mm	50 mm	DHE0150-C3	43.00
.0150		.381 mm		2.60 mm	(5x)	3 mm	50 mm	BVT0150-C3	45.30
.0150		.381 mm		3.70 mm	(8x)	3 mm	50 mm	ADS0150-C3	50.00
.0150		.381 mm		5.20 mm	(12x)	3 mm	50 mm	CHT0150-C3	56.40
.0156 (1/64)		.396 mm	.074		(3x)	1/8	1-1/2	FKB0156-C3	43.00
.0156 (1/64)		.396 mm		1.90 mm	(3x)	3 mm	50 mm	DHE0156-C3	43.00
.0156 (1/64)		.396 mm	.104		(5x)	1/8	2	GKT0156-C3	45.30
.0156 (1/64)		.396 mm		2.70 mm	(5x)	3 mm	50 mm	BVT0156-C3	45.30
.0156 (1/64)		.396 mm	.152		(8x)	1/8	2	HDV0156-C3	50.00
.0156 (1/64)		.396 mm		3.90 mm	(8x)	3 mm	50 mm	ADS0156-C3	50.00
.0156 (1/64)		.396 mm		4.70 mm	(10x)	3 mm	50 mm	EXP0156-C3	53.00
.0156 (1/64)		.396 mm		5.40 mm	(12x)	3 mm	50 mm	CHT0156-C3	56.40
.0157		.400 mm		2.70 mm	(5x)	3 mm	50 mm	BVT0157-C3	45.30
.0157		.400 mm		5.60 mm	(12x)	3 mm	50 mm	CHT0157-C3	56.40
.0160	#78	.406 mm		2.00 mm	(3x)	3 mm	50 mm	DHE0160-C3	43.00
.0160	#78	.406 mm		2.70 mm	(5x)	3 mm	50 mm	BVT0160-C3	45.30
.0160	#78	.406 mm		4.00 mm	(8x)	3 mm	50 mm	ADS0160-C3	50.00
.0160	#78	.406 mm		4.80 mm	(10x)	3 mm	50 mm	EXP0160-C3	53.00
.0160	#78	.406 mm		5.60 mm	(12x)	3 mm	50 mm	CHT0160-C3	56.40

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.0170		.431 mm		2.10 mm	(3x)	3 mm	50 mm	DHE0170-C3	43.00
.0170		.431 mm		2.90 mm	(5x)	3 mm	50 mm	BVT0170-C3	45.30
.0170		.431 mm		4.20 mm	(8x)	3 mm	50 mm	ADS0170-C3	50.00
.0170		.431 mm		6.00 mm	(12x)	3 mm	50 mm	CHT0170-C3	56.40
.0180	#77	.457 mm		2.20 mm	(3x)	3 mm	50 mm	DHE0180-C3	43.00
.0180	#77	.457 mm		3.10 mm	(5x)	3 mm	50 mm	BVT0180-C3	45.30
.0180	#77	.457 mm		4.50 mm	(8x)	3 mm	50 mm	ADS0180-C3	50.40
.0180	#77	.457 mm		5.40 mm	(10x)	3 mm	50 mm	EXP0180-C3	53.00
.0180	#77	.457 mm		6.20 mm	(12x)	3 mm	50 mm	CHT0180-C3	56.40
.0190		.482 mm		2.30 mm	(3x)	3 mm	50 mm	DHE0190-C3	43.00
.0190		.482 mm		3.30 mm	(5x)	3 mm	50 mm	BVT0190-C3	45.30
.0190		.482 mm		4.70 mm	(8x)	3 mm	50 mm	ADS0190-C3	50.00
.0190		.482 mm		6.60 mm	(12x)	3 mm	50 mm	CHT0190-C3	56.40
.0196		.500 mm		2.40 mm	(3x)	3 mm	50 mm	DHE0196-C3	42.40
.0196		.500 mm		3.40 mm	(5x)	3 mm	50 mm	BVT0196-C3	44.70
.0196		.500 mm		4.90 mm	(8x)	3 mm	50 mm	ADS0196-C3	50.40
.0196		.500 mm		5.80 mm	(10x)	3 mm	50 mm	EXP0196-C3	53.20
.0196		.500 mm		6.80 mm	(12x)	3 mm	50 mm	CHT0196-C3	55.00
.0200	#76	.508 mm		2.40 mm	(3x)	3 mm	50 mm	DHE0200-C3	42.40
.0200	#76	.508 mm	.096		(3x)	1/8	2	FKB0200-C3	42.40
.0200	#76	.508 mm		3.40 mm	(5x)	3 mm	50 mm	BVT0200-C3	44.70
.0200	#76	.508 mm	.136		(5x)	1/8	2	GKT0200-C3	44.70
.0200	#76	.508 mm	.192		(8x)	1/8	2	HDV0200-C3	50.40
.0200	#76	.508 mm		5.00 mm	(8x)	3 mm	50 mm	ADS0200-C3	50.40
.0200	#76	.508 mm		6.00 mm	(10x)	3 mm	50 mm	EXP0200-C3	53.20
.0200	#76	.508 mm		7.00 mm	(12x)	3 mm	50 mm	CHT0200-C3	55.00
.0210	#75	.533 mm		2.50 mm	(3x)	3 mm	50 mm	DHE0210-C3	42.40
.0210	#75	.533 mm		3.60 mm	(5x)	3 mm	50 mm	BVT0210-C3	44.70
.0210	#75	.533 mm		5.20 mm	(8x)	3 mm	50 mm	ADS0210-C3	50.40
.0210	#75	.533 mm		6.20 mm	(10x)	3 mm	50 mm	EXP0210-C3	53.20
.0210	#75	.533 mm		7.40 mm	(12x)	3 mm	50 mm	CHT0210-C3	55.00
.0220		.558 mm		2.70 mm	(3x)	3 mm	50 mm	DHE0220-C3	42.40
.0220		.558 mm		3.80 mm	(5x)	3 mm	50 mm	BVT0220-C3	44.70
.0220		.558 mm		5.40 mm	(8x)	3 mm	50 mm	ADS0220-C3	50.40
.0220		.558 mm		7.60 mm	(12x)	3 mm	50 mm	CHT0220-C3	55.00
.0225	#74	.571 mm		2.70 mm	(3x)	3 mm	50 mm	DHE0225-C3	42.40
.0225	#74	.571 mm	.108		(3x)	1/8	2	FKB0225-C3	42.40
.0225	#74	.571 mm	.152		(5x)	1/8	2	GKT0225-C3	44.70
.0225	#74	.571 mm		3.90 mm	(5x)	3 mm	50 mm	BVT0225-C3	44.70
.0225	#74	.571 mm	.216		(8x)	1/8	2	HDV0225-C3	50.40
.0225	#74	.571 mm		5.60 mm	(8x)	3 mm	50 mm	ADS0225-C3	50.40
.0225	#74	.571 mm		6.80 mm	(10x)	3 mm	50 mm	EXP0225-C3	53.20
.0225	#74	.571 mm		7.80 mm	(12x)	3 mm	50 mm	CHT0225-C3	55.00
.0230		.584 mm		2.80 mm	(3x)	3 mm	50 mm	DHE0230-C3	42.40
.0230		.584 mm		3.90 mm	(5x)	3 mm	50 mm	BVT0230-C3	44.70
.0230		.584 mm		5.60 mm	(8x)	3 mm	50 mm	ADS0230-C3	50.40
.0230		.584 mm		8.00 mm	(12x)	3 mm	50 mm	CHT0230-C3	55.00

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0236		.600 mm		4.00 mm	(5x)	3 mm	50 mm	BVT0236-C3	44.70
.0236		.600 mm		8.20 mm	(12x)	3 mm	50 mm	CHT0236-C3	55.00
.0240	#73	.609 mm		2.90 mm	(3x)	3 mm	50 mm	DHE0240-C3	42.40
.0240	#73	.609 mm		4.20 mm	(5x)	3 mm	50 mm	BVT0240-C3	44.70
.0240	#73	.609 mm		6.00 mm	(8x)	3 mm	50 mm	ADS0240-C3	50.40
.0240	#73	.609 mm		7.20 mm	(10x)	3 mm	50 mm	EXP0240-C3	53.20
.0240	#73	.609 mm		8.40 mm	(12x)	3 mm	50 mm	CHT0240-C3	55.00
.0250	#72	.635 mm		3.00 mm	(3x)	3 mm	50 mm	DHE0250-C3	42.40
.0250	#72	.635 mm	.120		(3x)	1/8	2	FKB0250-C3	42.40
.0250	#72	.635 mm		4.20 mm	(5x)	3 mm	50 mm	BVT0250-C3	44.70
.0250	#72	.635 mm	.168		(5x)	1/8	2	GKT0250-C3	44.70
.0250	#72	.635 mm	.240		(8x)	1/8	2	HDV0250-C3	50.40
.0250	#72	.635 mm		6.20 mm	(8x)	3 mm	50 mm	ADS0250-C3	50.40
.0250	#72	.635 mm		7.40 mm	(10x)	3 mm	50 mm	EXP0250-C3	53.20
.0250	#72	.635 mm		8.80 mm	(12x)	3 mm	50 mm	CHT0250-C3	55.00
.0260	#71	.660 mm		3.10 mm	(3x)	3 mm	50 mm	DHE0260-C3	42.40
.0260	#71	.660 mm	.124		(3x)	1/8	2	FKB0260-C3	42.40
.0260	#71	.660 mm		4.40 mm	(5x)	3 mm	50 mm	BVT0260-C3	44.70
.0260	#71	.660 mm	.176		(5x)	1/8	2	GKT0260-C3	44.70
.0260	#71	.660 mm		6.40 mm	(8x)	3 mm	50 mm	ADS0260-C3	50.40
.0260	#71	.660 mm	.256		(8x)	1/8	2	HDV0260-C3	50.40
.0260	#71	.660 mm		7.80 mm	(10x)	3 mm	50 mm	EXP0260-C3	53.20
.0260	#71	.660 mm		9.00 mm	(12x)	3 mm	50 mm	CHT0260-C3	55.00
.0270		.685 mm		3.30 mm	(3x)	3 mm	50 mm	DHE0270-C3	42.40
.0270		.685 mm		4.60 mm	(5x)	3 mm	50 mm	BVT0270-C3	44.70
.0270		.685 mm		6.60 mm	(8x)	3 mm	50 mm	ADS0270-C3	50.40
.0270		.685 mm		9.40 mm	(12x)	3 mm	50 mm	CHT0270-C3	55.00
.0275		.700 mm		4.80 mm	(5x)	3 mm	50 mm	BVT0275-C3	44.70
.0275		.700 mm		9.60 mm	(12x)	3 mm	50 mm	CHT0275-C3	55.00
.0280	#70	.711 mm		3.40 mm	(3x)	3 mm	50 mm	DHE0280-C3	42.40
.0280	#70	.711 mm		4.80 mm	(5x)	3 mm	50 mm	BVT0280-C3	44.70
.0280	#70	.711 mm		7.00 mm	(8x)	3 mm	50 mm	ADS0280-C3	50.40
.0280	#70	.711 mm		8.40 mm	(10x)	3 mm	50 mm	EXP0280-C3	53.20
.0280	#70	.711 mm		9.80 mm	(12x)	3 mm	50 mm	CHT0280-C3	55.00
.0292	#69	.741 mm		3.50 mm	(3x)	3 mm	50 mm	DHE0292-C3	42.40
.0292	#69	.741 mm		5.00 mm	(5x)	3 mm	50 mm	BVT0292-C3	44.70
.0292	#69	.741 mm		7.20 mm	(8x)	3 mm	50 mm	ADS0292-C3	50.40
.0292	#69	.741 mm		8.80 mm	(10x)	3 mm	50 mm	EXP0292-C3	53.20
.0292	#69	.741 mm		10.00 mm	(12x)	3 mm	50 mm	CHT0292-C3	55.00
.0300		.762 mm		3.60 mm	(3x)	3 mm	50 mm	DHE0300-C3	42.40
.0300		.762 mm		5.20 mm	(5x)	3 mm	50 mm	BVT0300-C3	44.70
.0300		.762 mm		7.40 mm	(8x)	3 mm	50 mm	ADS0300-C3	50.40
.0300		.762 mm		10.50 mm	(12x)	3 mm	50 mm	CHT0300-C3	55.00

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.0310	#68	.787 mm		3.70 mm	(3x)	3 mm	50 mm	DHE0310-C3	43.00
.0310	#68	.787 mm		5.40 mm	(5x)	3 mm	50 mm	BVT0310-C3	45.10
.0310	#68	.787 mm		7.60 mm	(8x)	3 mm	50 mm	ADS0310-C3	50.40
.0310	#68	.787 mm		9.20 mm	(10x)	3 mm	50 mm	EXP0310-C3	53.20
.0310	#68	.787 mm		11.00 mm	(12x)	3 mm	50 mm	CHT0310-C3	56.50
.0312 (1/32)		.793 mm	.148		(3x)	1/8	2	FKB0312-C3	43.00
.0312 (1/32)		.793 mm		3.80 mm	(3x)	3 mm	50 mm	DHE0312-C3	43.00
.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	GKT0312-C3	45.10
.0312 (1/32)		.793 mm		5.40 mm	(5x)	3 mm	50 mm	BVT0312-C3	45.10
.0312 (1/32)		.793 mm	.304		(8x)	1/8	2	HDV0312-C3	50.40
.0312 (1/32)		.793 mm		7.80 mm	(8x)	3 mm	50 mm	ADS0312-C3	50.40
.0312 (1/32)		.793 mm		9.40 mm	(10x)	3 mm	50 mm	EXP0312-C3	53.20
.0312 (1/32)		.793 mm		11.00 mm	(12x)	3 mm	50 mm	CHT0312-C3	56.50
.0315		.800 mm		5.40 mm	(5x)	3 mm	50 mm	BVT0315-C3	45.10
.0315		.800 mm		11.00 mm	(12x)	3 mm	50 mm	CHT0315-C3	56.50
.0320	#67	.812 mm	.152		(3x)	1/8	2	FKB0320-C3	43.00
.0320	#67	.812 mm		3.90 mm	(3x)	3 mm	50 mm	DHE0320-C3	43.00
.0320	#67	.812 mm		5.40 mm	(5x)	3 mm	50 mm	BVT0320-C3	45.10
.0320	#67	.812 mm	.216		(5x)	1/8	2	GKT0320-C3	45.10
.0320	#67	.812 mm	.312		(8x)	1/8	2	HDV0320-C3	50.40
.0320	#67	.812 mm		8.00 mm	(8x)	3 mm	50 mm	ADS0320-C3	50.40
.0320	#67	.812 mm		9.60 mm	(10x)	3 mm	50 mm	EXP0320-C3	53.20
.0320	#67	.812 mm		11.00 mm	(12x)	3 mm	50 mm	CHT0320-C3	56.50
.0330	#66	.838 mm		4.00 mm	(3x)	3 mm	50 mm	DHE0330-C3	43.00
.0330	#66	.838 mm		5.60 mm	(5x)	3 mm	50 mm	BVT0330-C3	45.10
.0330	#66	.838 mm		8.20 mm	(8x)	3 mm	50 mm	ADS0330-C3	50.40
.0330	#66	.838 mm		9.80 mm	(10x)	3 mm	50 mm	EXP0330-C3	53.20
.0330	#66	.838 mm		11.50 mm	(12x)	3 mm	50 mm	CHT0330-C3	56.50
.0350	#65	.889 mm		4.20 mm	(3x)	3 mm	50 mm	DHE0350-C3	43.00
.0350	#65	.889 mm	.168		(3x)	1/8	2	FKB0350-C3	43.00
.0350	#65	.889 mm		6.00 mm	(5x)	3 mm	50 mm	BVT0350-C3	45.10
.0350	#65	.889 mm	.240		(5x)	1/8	2	GKT0350-C3	45.10
.0350	#65	.889 mm		8.60 mm	(8x)	3 mm	50 mm	ADS0350-C3	50.40
.0350	#65	.889 mm	.340		(8x)	1/8	2	HDV0350-C3	50.40
.0350	#65	.889 mm		10.50 mm	(10x)	3 mm	50 mm	EXP0350-C3	53.20
.0350	#65	.889 mm		12.00 mm	(12x)	3 mm	50 mm	CHT0350-C3	56.50
.0354		.900 mm		6.00 mm	(5x)	3 mm	50 mm	BVT0354-C3	43.00
.0354		.900 mm		12.50 mm	(12x)	3 mm	50 mm	CHT0354-C3	56.50
.0360	#64	.914 mm		4.40 mm	(3x)	3 mm	50 mm	DHE0360-C3	43.00
.0360	#64	.914 mm		6.20 mm	(5x)	3 mm	50 mm	BVT0360-C3	45.10
.0360	#64	.914 mm		9.00 mm	(8x)	3 mm	50 mm	ADS0360-C3	50.40
.0360	#64	.914 mm		10.50 mm	(10x)	3 mm	50 mm	EXP0360-C3	53.20
.0360	#64	.914 mm		12.50 mm	(12x)	3 mm	50 mm	CHT0360-C3	56.50

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0370	#63	.939 mm		4.40 mm	(3x)	3 mm	50 mm	DHE0370-C3	43.00
.0370	#63	.939 mm		6.40 mm	(5x)	3 mm	50 mm	BVT0370-C3	45.10
.0370	#63	.939 mm		9.20 mm	(8x)	3 mm	50 mm	ADS0370-C3	50.40
.0370	#63	.939 mm		11.00 mm	(10x)	3 mm	50 mm	EXP0370-C3	53.20
.0370	#63	.939 mm		13.00 mm	(12x)	3 mm	50 mm	CHT0370-C3	56.50
.0380	#62	.965 mm		4.60 mm	(3x)	3 mm	50 mm	DHE0380-C3	43.00
.0380	#62	.965 mm		6.60 mm	(5x)	3 mm	50 mm	BVT0380-C3	45.10
.0380	#62	.965 mm		9.40 mm	(8x)	3 mm	50 mm	ADS0380-C3	50.40
.0380	#62	.965 mm		11.50 mm	(10x)	3 mm	50 mm	EXP0380-C3	53.20
.0380	#62	.965 mm		13.50 mm	(12x)	3 mm	50 mm	CHT0380-C3	56.50
.0390	#61	.990 mm		4.80 mm	(3x)	3 mm	50 mm	DHE0390-C3	43.00
.0390	#61	.990 mm		6.60 mm	(5x)	3 mm	50 mm	BVT0390-C3	45.10
.0390	#61	.990 mm		9.60 mm	(8x)	3 mm	50 mm	ADS0390-C3	50.40
.0390	#61	.990 mm		11.50 mm	(10x)	3 mm	50 mm	EXP0390-C3	53.20
.0390	#61	.990 mm		13.50 mm	(12x)	3 mm	50 mm	CHT0390-C3	56.50
.0393		1.000 mm		4.80 mm	(3x)	3 mm	50 mm	DHE0393-C3	47.00
.0393		1.000 mm		6.80 mm	(5x)	3 mm	50 mm	BVT0393-C3	49.50
.0393		1.000 mm		9.80 mm	(8x)	3 mm	50 mm	ADS0393-C3	54.00
.0393		1.000 mm		12.00 mm	(10x)	3 mm	50 mm	EXP0393-C3	57.10
.0393		1.000 mm		14.00 mm	(12x)	3 mm	50 mm	CHT0393-C3	60.50
.0400	#60	1.016 mm		4.80 mm	(3x)	3 mm	50 mm	DHE0400-C3	47.00
.0400	#60	1.016 mm	.192		(3x)	1/8	2	FKB0400-C3	47.00
.0400	#60	1.016 mm		6.80 mm	(5x)	3 mm	50 mm	BVT0400-C3	49.50
.0400	#60	1.016 mm	.272		(5x)	1/8	2	GKT0400-C3	49.50
.0400	#60	1.016 mm		10.00 mm	(8x)	3 mm	50 mm	ADS0400-C3	54.00
.0400	#60	1.016 mm	.400		(8x)	1/8	2	HDV0400-C3	54.00
.0400	#60	1.016 mm		12.00 mm	(10x)	3 mm	50 mm	EXP0400-C3	57.10
.0400	#60	1.016 mm		14.00 mm	(12x)	3 mm	50 mm	CHT0400-C3	60.50
.0410	#59	1.041 mm		5.00 mm	(3x)	3 mm	50 mm	DHE0410-C3	47.00
.0410	#59	1.041 mm		7.00 mm	(5x)	3 mm	50 mm	BVT0410-C3	49.50
.0410	#59	1.041 mm		10.00 mm	(8x)	3 mm	50 mm	ADS0410-C3	54.00
.0410	#59	1.041 mm		12.00 mm	(10x)	3 mm	50 mm	EXP0410-C3	57.10
.0410	#59	1.041 mm		14.50 mm	(12x)	3 mm	50 mm	CHT0410-C3	60.50
.0420	#58	1.066 mm		5.00 mm	(3x)	3 mm	50 mm	DHE0420-C3	47.00
.0420	#58	1.066 mm		7.20 mm	(5x)	3 mm	50 mm	BVT0420-C3	49.50
.0420	#58	1.066 mm		10.50 mm	(8x)	3 mm	50 mm	ADS0420-C3	54.00
.0420	#58	1.066 mm		12.50 mm	(10x)	3 mm	50 mm	EXP0420-C3	57.10
.0420	#58	1.066 mm		14.50 mm	(12x)	3 mm	50 mm	CHT0420-C3	60.50
.0430	#57	1.092 mm		5.20 mm	(3x)	3 mm	50 mm	DHE0430-C3	47.00
.0430	#57	1.092 mm		7.40 mm	(5x)	3 mm	50 mm	BVT0430-C3	49.50
.0430	#57	1.092 mm		10.50 mm	(8x)	3 mm	50 mm	ADS0430-C3	54.00
.0430	#57	1.092 mm		13.00 mm	(10x)	3 mm	50 mm	EXP0430-C3	57.10
.0430	#57	1.092 mm		15.00 mm	(12x)	3 mm	50 mm	CHT0430-C3	60.50
.0450		1.143 mm		7.80 mm	(5x)	3 mm	50 mm	BVT0450-C3	49.50
.0450		1.143 mm		15.50 mm	(12x)	3 mm	50 mm	CHT0450-C3	60.50

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.0465	#56	1.181 mm		5.60 mm	(3x)	3 mm	50 mm	DHE0465-C3	47.00
.0465	#56	1.181 mm	.224		(3x)	1/8	2	FKB0465-C3	47.00
.0465	#56	1.181 mm	.312		(5x)	1/8	2	GKT0465-C3	49.50
.0465	#56	1.181 mm		8.00 mm	(5x)	3 mm	50 mm	BVT0465-C3	49.50
.0465	#56	1.181 mm		11.50 mm	(8x)	3 mm	50 mm	ADS0465-C3	54.00
.0465	#56	1.181 mm	.460		(8x)	1/8	2	HDV0465-C3	54.00
.0465	#56	1.181 mm		14.00 mm	(10x)	3 mm	50 mm	EXP0465-C3	57.10
.0465	#56	1.181 mm		16.00 mm	(12x)	3 mm	63 mm	CHT0465-C3	60.50
.0468 (3/64)		1.190 mm		5.60 mm	(3x)	3 mm	50 mm	DHE0468-C3	47.00
.0468 (3/64)		1.190 mm	.224		(3x)	1/8	2	FKB0468-C3	47.00
.0468 (3/64)		1.190 mm		8.00 mm	(5x)	3 mm	50 mm	BVT0468-C3	49.50
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	GKT0468-C3	49.50
.0468 (3/64)		1.190 mm		11.50 mm	(8x)	3 mm	50 mm	ADS0468-C3	54.00
.0468 (3/64)		1.190 mm	.460		(8x)	1/8	2	HDV0468-C3	54.00
.0468 (3/64)		1.190 mm		14.00 mm	(10x)	3 mm	50 mm	EXP0468-C3	57.10
.0468 (3/64)		1.190 mm		16.50 mm	(12x)	3 mm	63 mm	CHT0468-C3	60.50
.0492		1.250 mm		8.50 mm	(5x)	3 mm	50 mm	BVT0492-C3	49.50
.0492		1.250 mm		12.00 mm	(8x)	3 mm	50 mm	ADS0492-C3	54.00
.0492		1.250 mm		17.00 mm	(12x)	3 mm	63 mm	CHT0492-C3	60.50
.0500		1.270 mm		6.00 mm	(3x)	3 mm	50 mm	DHE0500-C3	47.00
.0500		1.270 mm	.240		(3x)	1/8	2	FKB0500-C3	47.00
.0500		1.270 mm		8.50 mm	(5x)	3 mm	50 mm	BVT0500-C3	49.50
.0500		1.270 mm	.340		(5x)	1/8	2	GKT0500-C3	49.50
.0500		1.270 mm	.480		(8x)	1/8	2	HDV0500-C3	54.00
.0500		1.270 mm		12.50 mm	(8x)	3 mm	50 mm	ADS0500-C3	54.00
.0500		1.270 mm		15.00 mm	(10x)	3 mm	50 mm	EXP0500-C3	57.10
.0500		1.270 mm		17.50 mm	(12x)	3 mm	63 mm	CHT0500-C3	60.50
.0520	#55	1.320 mm		6.20 mm	(3x)	3 mm	50 mm	DHE0520-C3	47.00
.0520	#55	1.320 mm	.248		(3x)	1/8	2	FKB0520-C3	47.00
.0520	#55	1.320 mm		9.00 mm	(5x)	3 mm	50 mm	BVT0520-C3	49.50
.0520	#55	1.320 mm	.360		(5x)	1/8	2	GKT0520-C3	49.50
.0520	#55	1.320 mm	.500		(8x)	1/8	2	HDV0520-C3	54.00
.0520	#55	1.320 mm		13.00 mm	(8x)	3 mm	50 mm	ADS0520-C3	54.00
.0520	#55	1.320 mm		15.50 mm	(10x)	3 mm	50 mm	EXP0520-C3	57.10
.0520	#55	1.320 mm		18.00 mm	(12x)	3 mm	63 mm	CHT0520-C3	60.50
.0550	#54	1.397 mm		6.60 mm	(3x)	3 mm	50 mm	DHE0550-C3	47.00
.0550	#54	1.397 mm	.264		(3x)	1/8	2	FKB0550-C3	47.00
.0550	#54	1.397 mm		9.50 mm	(5x)	3 mm	50 mm	BVT0550-C3	49.50
.0550	#54	1.397 mm	.380		(5x)	1/8	2	GKT0550-C3	49.50
.0550	#54	1.397 mm		13.50 mm	(8x)	3 mm	50 mm	ADS0550-C3	54.00
.0550	#54	1.397 mm	.540		(8x)	1/8	2	HDV0550-C3	54.00
.0550	#54	1.397 mm		16.50 mm	(10x)	3 mm	63 mm	EXP0550-C3	57.10
.0550	#54	1.397 mm		19.00 mm	(12x)	3 mm	63 mm	CHT0550-C3	60.50

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0590		1.500 mm		7.20 mm	(3x)	3 mm	50 mm	DHE0590-C3	50.90
.0590		1.500 mm		10.00 mm	(5x)	3 mm	50 mm	BVT0590-C3	53.20
.0590		1.500 mm		14.50 mm	(8x)	3 mm	50 mm	ADS0590-C3	57.90
.0590		1.500 mm		17.50 mm	(10x)	3 mm	63 mm	EXP0590-C3	61.40
.0590		1.500 mm		21.00 mm	(12x)	3 mm	63 mm	CHT0590-C3	64.80
.0595	#53	1.511 mm		7.20 mm	(3x)	3 mm	50 mm	DHE0595-C3	50.90
.0595	#53	1.511 mm		10.00 mm	(5x)	3 mm	50 mm	BVT0595-C3	53.20
.0595	#53	1.511 mm		14.50 mm	(8x)	3 mm	50 mm	ADS0595-C3	57.90
.0595	#53	1.511 mm		18.00 mm	(10x)	3 mm	63 mm	EXP0595-C3	61.40
.0595	#53	1.511 mm		21.00 mm	(12x)	3 mm	63 mm	CHT0595-C3	64.80
.0600		1.524 mm		10.50 mm	(5x)	3 mm	50 mm	BVT0600-C3	53.20
.0600		1.524 mm		21.00 mm	(12x)	3 mm	63 mm	CHT0600-C3	64.80
.0625 (1/16)		1.587 mm	.296		(3x)	1/8	2	FKB0625-C3	50.90
.0625 (1/16)		1.587 mm		7.60 mm	(3x)	3 mm	50 mm	DHE0625-C3	50.90
.0625 (1/16)		1.587 mm		10.50 mm	(5x)	3 mm	50 mm	BVT0625-C3	53.20
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	GKT0625-C3	53.20
.0625 (1/16)		1.587 mm	.600		(8x)	1/8	2	HDV0625-C3	57.90
.0625 (1/16)		1.587 mm		15.50 mm	(8x)	3 mm	50 mm	ADS0625-C3	57.90
.0625 (1/16)		1.587 mm		18.50 mm	(10x)	3 mm	63 mm	EXP0625-C3	61.40
.0625 (1/16)		1.587 mm		22.00 mm	(12x)	3 mm	63 mm	CHT0625-C3	64.80
.0635	#52	1.612 mm		7.60 mm	(3x)	3 mm	50 mm	DHE0635-C3	50.90
.0635	#52	1.612 mm		11.00 mm	(5x)	3 mm	50 mm	BVT0635-C3	53.20
.0635	#52	1.612 mm		15.50 mm	(8x)	3 mm	50 mm	ADS0635-C3	57.90
.0635	#52	1.612 mm		19.00 mm	(10x)	3 mm	63 mm	EXP0635-C3	61.40
.0635	#52	1.612 mm		22.00 mm	(12x)	3 mm	63 mm	CHT0635-C3	64.80
.0670	#51	1.701 mm		8.00 mm	(3x)	3 mm	50 mm	DHE0670-C3	50.90
.0670	#51	1.701 mm		11.50 mm	(5x)	3 mm	50 mm	BVT0670-C3	53.20
.0670	#51	1.701 mm		16.50 mm	(8x)	3 mm	63 mm	ADS0670-C3	57.90
.0670	#51	1.701 mm		20.00 mm	(10x)	3 mm	63 mm	EXP0670-C3	61.40
.0670	#51	1.701 mm		23.00 mm	(12x)	3 mm	63 mm	CHT0670-C3	64.80
.0700	#50	1.778 mm		8.50 mm	(3x)	3 mm	50 mm	DHE0700-C3	50.90
.0700	#50	1.778 mm	.340		(3x)	1/8	2	FKB0700-C3	50.90
.0700	#50	1.778 mm		12.00 mm	(5x)	3 mm	50 mm	BVT0700-C3	53.20
.0700	#50	1.778 mm	.480		(5x)	1/8	2	GKT0700-C3	53.20
.0700	#50	1.778 mm	.680		(8x)	1/8	2-1/2	HDV0700-C3	57.90
.0700	#50	1.778 mm		17.50 mm	(8x)	3 mm	63 mm	ADS0700-C3	57.90
.0700	#50	1.778 mm		21.00 mm	(10x)	3 mm	63 mm	EXP0700-C3	61.40
.0700	#50	1.778 mm		24.00 mm	(12x)	3 mm	63 mm	CHT0700-C3	64.80
.0730	#49	1.854 mm		9.00 mm	(3x)	3 mm	50 mm	DHE0730-C3	50.90
.0730	#49	1.854 mm		12.50 mm	(5x)	3 mm	50 mm	BVT0730-C3	53.20
.0730	#49	1.854 mm		18.00 mm	(8x)	3 mm	63 mm	ADS0730-C3	57.90
.0730	#49	1.854 mm		22.00 mm	(10x)	3 mm	63 mm	EXP0730-C3	61.40
.0730	#49	1.854 mm		25.00 mm	(12x)	3 mm	63 mm	CHT0730-C3	64.80

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.0760	#48	1.930 mm		9.00 mm	(3x)	3 mm	50 mm	DHE0760-C3	50.90
.0760	#48	1.930 mm		13.00 mm	(5x)	3 mm	50 mm	BVT0760-C3	53.20
.0760	#48	1.930 mm		19.00 mm	(8x)	3 mm	63 mm	ADS0760-C3	57.90
.0760	#48	1.930 mm		23.00 mm	(10x)	3 mm	63 mm	EXP0760-C3	61.40
.0760	#48	1.930 mm		27.00 mm	(12x)	3 mm	63 mm	CHT0760-C3	64.80
.0781 (5/64)		1.984 mm		9.50 mm	(3x)	3 mm	50 mm	DHE0781-C3	50.90
.0781 (5/64)		1.984 mm	.380		(3x)	1/8	2	FKB0781-C3	50.90
.0781 (5/64)		1.984 mm	.520		(5x)	1/8	2	GKT0781-C3	53.20
.0781 (5/64)		1.984 mm		13.50 mm	(5x)	3 mm	50 mm	BVT0781-C3	53.20
.0781 (5/64)		1.984 mm	.760		(8x)	1/8	2-1/2	HDV0781-C3	57.90
.0781 (5/64)		1.984 mm		19.50 mm	(8x)	3 mm	63 mm	ADS0781-C3	57.90
.0781 (5/64)		1.984 mm		23.00 mm	(10x)	3 mm	63 mm	EXP0781-C3	59.80
.0781 (5/64)		1.984 mm		27.00 mm	(12x)	3 mm	63 mm	CHT0781-C3	64.80
.0785	#47	1.993 mm		9.50 mm	(3x)	3 mm	50 mm	DHE0785-C3	50.90
.0785	#47	1.993 mm		13.50 mm	(5x)	3 mm	50 mm	BVT0785-C3	53.20
.0785	#47	1.993 mm		19.50 mm	(8x)	3 mm	63 mm	ADS0785-C3	57.90
.0785	#47	1.993 mm		23.00 mm	(10x)	3 mm	63 mm	EXP0785-C3	61.40
.0785	#47	1.993 mm		27.00 mm	(12x)	3 mm	63 mm	CHT0785-C3	64.80
.0787		2.000 mm		9.50 mm	(3x)	4 mm	50 mm	DHE0787-C3	50.90
.0787		2.000 mm		13.50 mm	(5x)	4 mm	50 mm	BVT0787-C3	57.50
.0787		2.000 mm		19.50 mm	(8x)	4 mm	63 mm	ADS0787-C3	62.20
.0787		2.000 mm		24.00 mm	(10x)	4 mm	63 mm	EXP0787-C3	65.90
.0787		2.000 mm		28.00 mm	(12x)	4 mm	63 mm	CHT0787-C3	69.40
.0800		2.032 mm		9.50 mm	(3x)	4 mm	50 mm	DHE0800-C3	50.90
.0800		2.032 mm	.380		(3x)	3/16	2	FKB0800-C3	50.90
.0800		2.032 mm		13.50 mm	(5x)	4 mm	50 mm	BVT0800-C3	57.50
.0800		2.032 mm	.540		(5x)	3/16	2	GKT0800-C3	57.50
.0800		2.032 mm	.800		(8x)	3/16	2-1/2	HDV0800-C3	62.20
.0800		2.032 mm		28.00 mm	(12x)	4 mm	63 mm	CHT0800-C3	69.40
.0810	#46	2.057 mm		10.00 mm	(3x)	4 mm	50 mm	DHE0810-C3	50.90
.0810	#46	2.057 mm		14.00 mm	(5x)	4 mm	50 mm	BVT0810-C3	57.50
.0810	#46	2.057 mm		20.00 mm	(8x)	4 mm	63 mm	ADS0810-C3	62.20
.0810	#46	2.057 mm		24.00 mm	(10x)	4 mm	63 mm	EXP0810-C3	65.90
.0810	#46	2.057 mm		28.00 mm	(12x)	4 mm	63 mm	CHT0810-C3	69.40
.0820	#45	2.082 mm		10.00 mm	(3x)	4 mm	50 mm	DHE0820-C3	50.90
.0820	#45	2.082 mm		14.00 mm	(5x)	4 mm	50 mm	BVT0820-C3	57.50
.0820	#45	2.082 mm		20.00 mm	(8x)	4 mm	63 mm	ADS0820-C3	62.20
.0820	#45	2.082 mm		24.00 mm	(10x)	4 mm	63 mm	EXP0820-C3	65.90
.0820	#45	2.082 mm		29.00 mm	(12x)	4 mm	75 mm	CHT0820-C3	69.40
.0860	#44	2.184 mm	.400		(3x)	3/16	2	FKB0860-C3	50.90
.0860	#44	2.184 mm		10.50 mm	(3x)	4 mm	50 mm	DHE0860-C3	50.90
.0860	#44	2.184 mm		14.50 mm	(5x)	4 mm	50 mm	BVT0860-C3	57.50
.0860	#44	2.184 mm	.580		(5x)	3/16	2-1/2	GKT0860-C3	57.50
.0860	#44	2.184 mm		21.00 mm	(8x)	4 mm	63 mm	ADS0860-C3	62.20
.0860	#44	2.184 mm	.840		(8x)	3/16	2-1/2	HDV0860-C3	62.20
.0860	#44	2.184 mm		26.00 mm	(10x)	4 mm	63 mm	EXP0860-C3	65.90
.0860	#44	2.184 mm		30.00 mm	(12x)	4 mm	75 mm	CHT0860-C3	69.40

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.0890	#43	2.260 mm		10.50 mm	(3x)	4 mm	50 mm	DHE0890-C3	50.90
.0890	#43	2.260 mm	.420		(3x)	3/16	2	FKB0890-C3	50.90
.0890	#43	2.260 mm		15.00 mm	(5x)	4 mm	50 mm	BVT0890-C3	57.50
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	GKT0890-C3	57.50
.0890	#43	2.260 mm		22.00 mm	(8x)	4 mm	63 mm	ADS0890-C3	62.20
.0890	#43	2.260 mm	.880		(8x)	3/16	2-1/2	HDV0890-C3	62.20
.0890	#43	2.260 mm		27.00 mm	(10x)	4 mm	63 mm	EXP0890-C3	65.90
.0890	#43	2.260 mm		31.00 mm	(12x)	4 mm	75 mm	CHT0890-C3	69.40
.0900		2.286 mm		15.00 mm	(5x)	4 mm	50 mm	BVT0900-C3	57.50
.0900		2.286 mm		31.00 mm	(12x)	4 mm	75 mm	CHT0900-C3	69.40
.0935	#42	2.374 mm		11.50 mm	(3x)	4 mm	50 mm	DHE0935-C3	50.90
.0935	#42	2.374 mm		16.00 mm	(5x)	4 mm	63 mm	BVT0935-C3	57.50
.0935	#42	2.374 mm		23.00 mm	(8x)	4 mm	63 mm	ADS0935-C3	62.20
.0935	#42	2.374 mm		28.00 mm	(10x)	4 mm	63 mm	EXP0935-C3	65.90
.0935	#42	2.374 mm		33.00 mm	(12x)	4 mm	75 mm	CHT0935-C3	69.40
.0937 (3/32)		2.381 mm	.440		(3x)	3/16	2	FKB0937-C3	54.50
.0937 (3/32)		2.381 mm		11.50 mm	(3x)	4 mm	50 mm	DHE0937-C3	54.50
.0937 (3/32)		2.381 mm		16.00 mm	(5x)	4 mm	63 mm	BVT0937-C3	57.50
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	GKT0937-C3	57.50
.0937 (3/32)		2.381 mm		23.00 mm	(8x)	4 mm	63 mm	ADS0937-C3	62.20
.0937 (3/32)		2.381 mm	.920		(8x)	3/16	2-1/2	HDV0937-C3	62.20
.0937 (3/32)		2.381 mm		28.00 mm	(10x)	4 mm	63 mm	EXP0937-C3	65.90
.0937 (3/32)		2.381 mm		33.00 mm	(12x)	4 mm	75 mm	CHT0937-C3	69.20
.0960	#41	2.438 mm		11.50 mm	(3x)	4 mm	50 mm	DHE0960-C3	54.50
.0960	#41	2.438 mm	.460		(3x)	3/16	2	FKB0960-C3	54.50
.0960	#41	2.438 mm		16.00 mm	(5x)	4 mm	63 mm	BVT0960-C3	57.50
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	GKT0960-C3	57.50
.0960	#41	2.438 mm	.920		(8x)	3/16	2-1/2	HDV0960-C3	62.20
.0960	#41	2.438 mm		24.00 mm	(8x)	4 mm	63 mm	ADS0960-C3	62.20
.0960	#41	2.438 mm		29.00 mm	(10x)	4 mm	75 mm	EXP0960-C3	65.90
.0960	#41	2.438 mm		34.00 mm	(12x)	4 mm	75 mm	CHT0960-C3	69.20
.0980	#40	2.489 mm		12.00 mm	(3x)	4 mm	50 mm	DHE0980-C3	54.50
.0980	#40	2.489 mm		17.00 mm	(5x)	4 mm	63 mm	BVT0980-C3	57.50
.0980	#40	2.489 mm		24.00 mm	(8x)	4 mm	63 mm	ADS0980-C3	62.20
.0980	#40	2.489 mm		29.00 mm	(10x)	4 mm	75 mm	EXP0980-C3	65.90
.0980	#40	2.489 mm		34.00 mm	(12x)	4 mm	75 mm	CHT0980-C3	69.20
.0984		2.500 mm		12.00 mm	(3x)	4 mm	50 mm	DHE0984-C3	57.60
.0984		2.500 mm		17.00 mm	(5x)	4 mm	63 mm	BVT0984-C3	61.20
.0984		2.500 mm		24.00 mm	(8x)	4 mm	63 mm	ADS0984-C3	66.00
.0984		2.500 mm		29.00 mm	(10x)	4 mm	75 mm	EXP0984-C3	69.40
.0984		2.500 mm		34.00 mm	(12x)	4 mm	75 mm	CHT0984-C3	73.00
.0995	#39	2.527 mm		12.00 mm	(3x)	4 mm	50 mm	DHE0995-C3	57.60
.0995	#39	2.527 mm	.480		(3x)	3/16	2	FKB0995-C3	57.60
.0995	#39	2.527 mm		17.00 mm	(5x)	4 mm	63 mm	BVT0995-C3	61.20
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	GKT0995-C3	61.20
.0995	#39	2.527 mm	.960		(8x)	3/16	2-1/2	HDV0995-C3	66.00

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.0995	#39	2.527 mm		25.00 mm	(8x)	4 mm	63 mm	ADS0995-C3	66.00
.0995	#39	2.527 mm		30.00 mm	(10x)	4 mm	75 mm	EXP0995-C3	69.40
.0995	#39	2.527 mm		35.00 mm	(12x)	4 mm	75 mm	CHT0995-C3	73.00
.1000		2.540 mm		12.00 mm	(3x)	4 mm	50 mm	DHE1000-C3	57.60
.1000		2.540 mm		17.00 mm	(5x)	4 mm	63 mm	BVT1000-C3	61.20
.1000		2.540 mm		25.00 mm	(8x)	4 mm	63 mm	ADS1000-C3	66.00
.1000		2.540 mm		30.00 mm	(10x)	4 mm	75 mm	EXP1000-C3	69.40
.1000		2.540 mm		35.00 mm	(12x)	4 mm	75 mm	CHT1000-C3	73.00
.1015	#38	2.578 mm		12.00 mm	(3x)	4 mm	50 mm	DHE1015-C3	57.60
.1015	#38	2.578 mm		17.00 mm	(5x)	4 mm	63 mm	BVT1015-C3	61.20
.1015	#38	2.578 mm		25.00 mm	(8x)	4 mm	63 mm	ADS1015-C3	66.00
.1015	#38	2.578 mm		30.00 mm	(10x)	4 mm	75 mm	EXP1015-C3	69.40
.1015	#38	2.578 mm		35.00 mm	(12x)	4 mm	75 mm	CHT1015-C3	73.00
.1040	#37	2.641 mm		12.50 mm	(3x)	4 mm	50 mm	DHE1040-C3	57.60
.1040	#37	2.641 mm		18.00 mm	(5x)	4 mm	63 mm	BVT1040-C3	61.20
.1040	#37	2.641 mm		26.00 mm	(8x)	4 mm	63 mm	ADS1040-C3	66.00
.1040	#37	2.641 mm		31.00 mm	(10x)	4 mm	75 mm	EXP1040-C3	69.40
.1040	#37	2.641 mm		36.00 mm	(12x)	4 mm	75 mm	CHT1040-C3	73.00
.1065	#36	2.705 mm		13.00 mm	(3x)	4 mm	50 mm	DHE1065-C3	57.60
.1065	#36	2.705 mm		18.00 mm	(5x)	4 mm	63 mm	BVT1065-C3	61.20
.1065	#36	2.705 mm		26.00 mm	(8x)	4 mm	63 mm	ADS1065-C3	66.00
.1065	#36	2.705 mm		32.00 mm	(10x)	4 mm	75 mm	EXP1065-C3	69.40
.1065	#36	2.705 mm		37.00 mm	(12x)	4 mm	75 mm	CHT1065-C3	73.00
.1093 (7/64)		2.778 mm		13.00 mm	(3x)	4 mm	50 mm	DHE1093-C3	57.60
.1093 (7/64)		2.778 mm		19.00 mm	(5x)	4 mm	63 mm	BVT1093-C3	61.20
.1093 (7/64)		2.778 mm		27.00 mm	(8x)	4 mm	63 mm	ADS1093-C3	66.00
.1093 (7/64)		2.778 mm		33.00 mm	(10x)	4 mm	75 mm	EXP1093-C3	69.40
.1093 (7/64)		2.778 mm		38.00 mm	(12x)	4 mm	75 mm	CHT1093-C3	73.00
.1100	#35	2.794 mm	.520		(3x)	3/16	2	FKB1100-C3	57.60
.1100	#35	2.794 mm		13.50 mm	(3x)	4 mm	50 mm	DHE1100-C3	57.60
.1100	#35	2.794 mm		19.00 mm	(5x)	4 mm	63 mm	BVT1100-C3	61.20
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	GKT1100-C3	61.20
.1100	#35	2.794 mm	1.040		(8x)	3/16	2-1/2	HDV1100-C3	66.00
.1100	#35	2.794 mm		27.00 mm	(8x)	4 mm	63 mm	ADS1100-C3	66.00
.1100	#35	2.794 mm		33.00 mm	(10x)	4 mm	75 mm	EXP1100-C3	69.40
.1100	#35	2.794 mm		38.00 mm	(12x)	4 mm	75 mm	CHT1100-C3	73.00
.1110	#34	2.819 mm		13.50 mm	(3x)	4 mm	50 mm	DHE1110-C3	57.60
.1110	#34	2.819 mm		19.00 mm	(5x)	4 mm	63 mm	BVT1110-C3	61.20
.1110	#34	2.819 mm		27.00 mm	(8x)	4 mm	63 mm	ADS1110-C3	66.00
.1110	#34	2.819 mm		33.00 mm	(10x)	4 mm	75 mm	EXP1110-C3	69.40
.1110	#34	2.819 mm		39.00 mm	(12x)	4 mm	75 mm	CHT1110-C3	73.00
.1130	#33	2.870 mm		13.50 mm	(3x)	4 mm	50 mm	DHE1130-C3	57.60
.1130	#33	2.870 mm		19.00 mm	(5x)	4 mm	63 mm	BVT1130-C3	61.20
.1130	#33	2.870 mm		28.00 mm	(8x)	4 mm	63 mm	ADS1130-C3	66.00
.1130	#33	2.870 mm		34.00 mm	(10x)	4 mm	75 mm	EXP1130-C3	69.40
.1130	#33	2.870 mm		39.00 mm	(12x)	4 mm	75 mm	CHT1130-C3	73.00

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.1160	#32	2.946 mm		14.00 mm	(3x)	4 mm	50 mm	DHE1160-C3	57.60
.1160	#32	2.946 mm	.560		(3x)	3/16	2	FKB1160-C3	57.60
.1160	#32	2.946 mm		20.00 mm	(5x)	4 mm	63 mm	BVT1160-C3	61.20
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	GKT1160-C3	61.20
.1160	#32	2.946 mm	1.120		(8x)	3/16	3	HDV1160-C3	73.50
.1160	#32	2.946 mm		40.00 mm	(12x)	4 mm	75 mm	CHT1160-C3	73.00
.1181		3.000 mm		14.50 mm	(3x)	4 mm	50 mm	DHE1181-C3	57.60
.1181		3.000 mm		20.00 mm	(5x)	4 mm	63 mm	BVT1181-C3	61.20
.1181		3.000 mm		29.00 mm	(8x)	4 mm	63 mm	ADS1181-C3	66.00
.1181		3.000 mm		35.00 mm	(10x)	4 mm	75 mm	EXP1181-C3	69.40
.1181		3.000 mm		42.00 mm	(12x)	4 mm	100 mm	CHT1181-C3	73.00
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.1200	#31	3.048 mm		14.50 mm	(3x)	6 mm	63 mm	DHE1200-C3	64.60
.1200	#31	3.048 mm	.580		(3x)	3/16	2-1/2	FKB1200-C3	64.60
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	GKT1200-C3	68.40
.1200	#31	3.048 mm		21.00 mm	(5x)	6 mm	63 mm	BVT1200-C3	68.40
.1200	#31	3.048 mm		30.00 mm	(8x)	6 mm	75 mm	ADS1200-C3	73.50
.1200	#31	3.048 mm	1.200		(8x)	3/16	3	HDV1200-C3	73.50
.1200	#31	3.048 mm		36.00 mm	(10x)	6 mm	100 mm	EXP1200-C3	77.10
.1200	#31	3.048 mm		42.00 mm	(12x)	6 mm	100 mm	CHT1200-C3	80.60
.1240		3.149 mm		21.00 mm	(5x)	6 mm	63 mm	BVT1240-C3	68.40
.1240		3.149 mm		44.00 mm	(12x)	6 mm	100 mm	CHT1240-C3	80.60
.1250 (1/8)		3.175 mm		15.00 mm	(3x)	6 mm	63 mm	DHE1250-C3	64.60
.1250 (1/8)		3.175 mm	.600		(3x)	3/16	2-1/2	FKB1250-C3	64.60
.1250 (1/8)		3.175 mm		21.00 mm	(5x)	6 mm	63 mm	BVT1250-C3	68.40
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	GKT1250-C3	68.40
.1250 (1/8)		3.175 mm	1.200		(8x)	3/16	3	HDV1250-C3	73.50
.1250 (1/8)		3.175 mm		31.00 mm	(8x)	6 mm	75 mm	ADS1250-C3	73.50
.1250 (1/8)		3.175 mm		37.00 mm	(10x)	6 mm	100 mm	EXP1250-C3	77.10
.1250 (1/8)		3.175 mm		44.00 mm	(12x)	6 mm	100 mm	CHT1250-C3	80.60
.1260		3.200 mm		22.00 mm	(5x)	6 mm	63 mm	BVT1260-C3	68.40
.1260		3.200 mm		44.00 mm	(12x)	6 mm	100 mm	CHT1260-C3	80.60
.1285	#30	3.263 mm	.610		(3x)	1/4	2-1/2	FKB1285-C3	64.60
.1285	#30	3.263 mm		22.00 mm	(5x)	6 mm	63 mm	BVT1285-C3	68.40
.1285	#30	3.263 mm	.880		(5x)	1/4	2-1/2	GKT1285-C3	68.40
.1285	#30	3.263 mm	1.280		(8x)	1/4	3	HDV1285-C3	73.50
.1285	#30	3.263 mm		44.00 mm	(12x)	6 mm	100 mm	CHT1285-C3	80.60
.1360	#29	3.454 mm		16.00 mm	(3x)	6 mm	63 mm	DHE1360-C3	64.60
.1360	#29	3.454 mm		23.00 mm	(5x)	6 mm	63 mm	BVT1360-C3	68.40
.1360	#29	3.454 mm		34.00 mm	(8x)	6 mm	75 mm	ADS1360-C3	73.50
.1360	#29	3.454 mm		40.00 mm	(10x)	6 mm	100 mm	EXP1360-C3	77.10
.1360	#29	3.454 mm		48.00 mm	(12x)	6 mm	100 mm	CHT1360-C3	80.60
.1405	#28	3.568 mm		24.00 mm	(5x)	6 mm	75 mm	BVT1405-C3	68.40
.1405	#28	3.568 mm		50.00 mm	(12x)	6 mm	100 mm	CHT1405-C3	80.60

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.1406 (9/64)		3.571 mm		17.00 mm	(3x)	6 mm	63 mm	DHE1406-C3	64.60
.1406 (9/64)		3.571 mm		24.00 mm	(5x)	6 mm	75 mm	BVT1406-C3	68.40
.1406 (9/64)		3.571 mm		35.00 mm	(8x)	6 mm	75 mm	ADS1406-C3	73.50
.1406 (9/64)		3.571 mm		42.00 mm	(10x)	6 mm	100 mm	EXP1406-C3	77.10
.1406 (9/64)		3.571 mm		50.00 mm	(12x)	6 mm	100 mm	CHT1406-C3	80.60
.1417		3.600 mm		24.00 mm	(5x)	6 mm	75 mm	BVT1417-C3	68.40
.1417		3.600 mm		50.00 mm	(12x)	6 mm	100 mm	CHT1417-C3	80.60
.1440	#27	3.657 mm		24.00 mm	(5x)	6 mm	75 mm	BVT1440-C3	68.40
.1440	#27	3.657 mm		50.00 mm	(12x)	6 mm	100 mm	CHT1440-C3	80.60
.1470	#26	3.733 mm		18.00 mm	(3x)	6 mm	63 mm	DHE1470-C3	64.60
.1470	#26	3.733 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1470-C3	68.40
.1470	#26	3.733 mm		36.00 mm	(8x)	6 mm	100 mm	ADS1470-C3	73.50
.1470	#26	3.733 mm		44.00 mm	(10x)	6 mm	100 mm	EXP1470-C3	77.10
.1470	#26	3.733 mm		52.00 mm	(12x)	6 mm	100 mm	CHT1470-C3	80.60
.1495	#25	3.797 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1495-C3	68.40
.1495	#25	3.797 mm		52.00 mm	(12x)	6 mm	100 mm	CHT1495-C3	80.60
.1520	#24	3.860 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1520-C3	68.40
.1520	#24	3.860 mm		54.00 mm	(12x)	6 mm	100 mm	CHT1520-C3	80.60
.1540	#23	3.911 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1540-C3	68.40
.1540	#23	3.911 mm		54.00 mm	(12x)	6 mm	100 mm	CHT1540-C3	80.60
.1562 (5/32)		3.968 mm		19.00 mm	(3x)	6 mm	63 mm	DHE1562-C3	64.60
.1562 (5/32)		3.968 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1562-C3	68.40
.1562 (5/32)		3.968 mm		39.00 mm	(8x)	6 mm	100 mm	ADS1562-C3	73.50
.1562 (5/32)		3.968 mm		46.00 mm	(10x)	6 mm	100 mm	EXP1562-C3	77.10
.1562 (5/32)		3.968 mm		54.00 mm	(12x)	6 mm	100 mm	CHT1562-C3	80.60
.1570	#22	3.987 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1570-C3	68.40
.1570	#22	3.987 mm		54.00 mm	(12x)	6 mm	100 mm	CHT1570-C3	80.60
.1574		4.000 mm		19.00 mm	(3x)	6 mm	63 mm	DHE1574-C3	64.60
.1574		4.000 mm		28.00 mm	(5x)	6 mm	75 mm	BVT1574-C3	68.40
.1574		4.000 mm		39.00 mm	(8x)	6 mm	100 mm	ADS1574-C3	73.50
.1574		4.000 mm		48.00 mm	(10x)	6 mm	100 mm	EXP1574-C3	77.10
.1574		4.000 mm		56.00 mm	(12x)	6 mm	100 mm	CHT1574-C3	80.60
.1590	#21	4.038 mm		19.00 mm	(3x)	6 mm	63 mm	DHE1590-C3	64.60
.1590	#21	4.038 mm		28.00 mm	(5x)	6 mm	75 mm	BVT1590-C3	68.40
.1590	#21	4.038 mm		39.00 mm	(8x)	6 mm	100 mm	ADS1590-C3	73.50
.1590	#21	4.038 mm		48.00 mm	(10x)	6 mm	100 mm	EXP1590-C3	77.10
.1590	#21	4.038 mm		56.00 mm	(12x)	6 mm	100 mm	CHT1590-C3	80.60
.1610	#20	4.089 mm		28.00 mm	(5x)	6 mm	75 mm	BVT1610-C3	68.40
.1610	#20	4.089 mm		56.00 mm	(12x)	6 mm	100 mm	CHT1610-C3	80.60
.1660	#19	4.216 mm		28.00 mm	(5x)	6 mm	75 mm	BVT1660-C3	68.40
.1660	#19	4.216 mm		58.00 mm	(12x)	6 mm	100 mm	CHT1660-C3	80.60
.1695	#18	4.305 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1695-C3	68.40
.1695	#18	4.305 mm		60.00 mm	(12x)	6 mm	100 mm	CHT1695-C3	80.60

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.1718 (11/64)		4.365 mm		21.00 mm	(3x)	6 mm	63 mm	DHE1718-C3	64.60
.1718 (11/64)		4.365 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1718-C3	68.40
.1718 (11/64)		4.365 mm		42.00 mm	(8x)	6 mm	100 mm	ADS1718-C3	73.50
.1718 (11/64)		4.365 mm		52.00 mm	(10x)	6 mm	100 mm	EXP1718-C3	77.10
.1718 (11/64)		4.365 mm		60.00 mm	(12x)	6 mm	100 mm	CHT1718-C3	80.60
.1730	#17	4.394 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1730-C3	68.40
.1730	#17	4.394 mm		60.00 mm	(12x)	6 mm	100 mm	CHT1730-C3	80.60
.1770	#16	4.495 mm		21.00 mm	(3x)	6 mm	63 mm	DHE1770-C3	64.60
.1770	#16	4.495 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1770-C3	68.40
.1770	#16	4.495 mm		44.00 mm	(8x)	6 mm	100 mm	ADS1770-C3	73.50
.1770	#16	4.495 mm		52.00 mm	(10x)	6 mm	100 mm	EXP1770-C3	77.10
.1770	#16	4.495 mm		62.00 mm	(12x)	6 mm	125 mm	CHT1770-C3	80.60
.1800	#15	4.572 mm		22.00 mm	(3x)	6 mm	63 mm	DHE1800-C3	64.60
.1800	#15	4.572 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1800-C3	68.40
.1800	#15	4.572 mm		44.00 mm	(8x)	6 mm	100 mm	ADS1800-C3	73.50
.1800	#15	4.572 mm		54.00 mm	(10x)	6 mm	100 mm	EXP1800-C3	77.10
.1800	#15	4.572 mm		62.00 mm	(12x)	6 mm	125 mm	CHT1800-C3	80.60
.1820	#14	4.622 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1820-C3	68.40
.1820	#14	4.622 mm		64.00 mm	(12x)	6 mm	125 mm	CHT1820-C3	80.60
.1850	#13	4.700 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1850-C3	68.40
.1850	#13	4.700 mm		64.00 mm	(12x)	6 mm	125 mm	CHT1850-C3	80.60
.1875 (3/16)		4.762 mm	.890		(3x)	1/4	2-1/2	FKB1875-C3	64.60
.1875 (3/16)		4.762 mm		23.00 mm	(3x)	6 mm	63 mm	DHE1875-C3	64.60
.1875 (3/16)		4.762 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1875-C3	68.40
.1875 (3/16)		4.762 mm	1.280		(5x)	1/4	3	GKT1875-C3	68.40
.1875 (3/16)		4.762 mm		46.00 mm	(8x)	6 mm	100 mm	ADS1875-C3	73.50
.1875 (3/16)		4.762 mm	1.840		(8x)	1/4	3-1/2	HDV1875-C3	73.50
.1875 (3/16)		4.762 mm		56.00 mm	(10x)	6 mm	100 mm	EXP1875-C3	77.10
.1875 (3/16)		4.762 mm		66.00 mm	(12x)	6 mm	125 mm	CHT1875-C3	80.60
.1890	#12	4.800 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1890-C3	68.40
.1890	#12	4.800 mm		66.00 mm	(12x)	6 mm	125 mm	CHT1890-C3	80.60
.1910	#11	4.851 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1910-C3	68.40
.1910	#11	4.851 mm		66.00 mm	(12x)	6 mm	125 mm	CHT1910-C3	80.60
.1935	#10	4.914 mm		34.00 mm	(5x)	6 mm	75 mm	BVT1935-C3	68.40
.1935	#10	4.914 mm		68.00 mm	(12x)	6 mm	125 mm	CHT1935-C3	80.60
.1960	#9	4.978 mm		34.00 mm	(5x)	6 mm	75 mm	BVT1960-C3	68.40
.1960	#9	4.978 mm		68.00 mm	(12x)	6 mm	125 mm	CHT1960-C3	80.60
.1968		5.000 mm		24.00 mm	(3x)	6 mm	63 mm	DHE1968-C3	64.60
.1968		5.000 mm		34.00 mm	(5x)	6 mm	75 mm	BVT1968-C3	68.40
.1968		5.000 mm		48.00 mm	(8x)	6 mm	100 mm	ADS1968-C3	73.50
.1968		5.000 mm		58.00 mm	(10x)	6 mm	100 mm	EXP1968-C3	77.10
.1968		5.000 mm		68.00 mm	(12x)	6 mm	125 mm	CHT1968-C3	80.60
.1990	#8	5.054 mm		34.00 mm	(5x)	6 mm	75 mm	BVT1990-C3	68.40
.1990	#8	5.054 mm		70.00 mm	(12x)	6 mm	125 mm	CHT1990-C3	80.60

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	PRICE
.2009	#7	5.105 mm		24.00 mm	(3x)	6 mm	63 mm	DHE2009-C3	64.60
.2009	#7	5.105 mm		34.00 mm	(5x)	6 mm	75 mm	BVT2009-C3	68.40
.2009	#7	5.105 mm		50.00 mm	(8x)	6 mm	100 mm	ADS2009-C3	73.50
.2009	#7	5.105 mm		60.00 mm	(10x)	6 mm	100 mm	EXP2009-C3	77.10
.2009	#7	5.105 mm		70.00 mm	(12x)	6 mm	125 mm	CHT2009-C3	80.60
.2031 (13/64)		5.159 mm		24.00 mm	(3x)	6 mm	63 mm	DHE2031-C3	64.60
.2031 (13/64)		5.159 mm		34.00 mm	(5x)	6 mm	75 mm	BVT2031-C3	68.40
.2031 (13/64)		5.159 mm		50.00 mm	(8x)	6 mm	100 mm	ADS2031-C3	73.50
.2031 (13/64)		5.159 mm		60.00 mm	(10x)	6 mm	100 mm	EXP2031-C3	77.10
.2031 (13/64)		5.159 mm		70.00 mm	(12x)	6 mm	125 mm	CHT2031-C3	80.60
.2040	#6	5.181 mm		34.00 mm	(5x)	6 mm	75 mm	BVT2040-C3	68.40
.2040	#6	5.181 mm		72.00 mm	(12x)	6 mm	125 mm	CHT2040-C3	80.60
.2055	#5	5.219 mm		36.00 mm	(5x)	6 mm	75 mm	BVT2055-C3	68.40
.2055	#5	5.219 mm		72.00 mm	(12x)	6 mm	125 mm	CHT2055-C3	80.60
.2090	#4	5.308 mm		36.00 mm	(5x)	6 mm	75 mm	BVT2090-C3	68.40
.2090	#4	5.308 mm		72.00 mm	(12x)	6 mm	125 mm	CHT2090-C3	80.60
.2129	#3	5.410 mm		26.00 mm	(3x)	6 mm	75 mm	DHE2129-C3	64.60
.2129	#3	5.410 mm		36.00 mm	(5x)	6 mm	75 mm	BVT2129-C3	68.40
.2129	#3	5.410 mm		52.00 mm	(8x)	6 mm	100 mm	ADS2129-C3	73.50
.2129	#3	5.410 mm		64.00 mm	(10x)	6 mm	125 mm	EXP2129-C3	77.10
.2129	#3	5.410 mm		74.00 mm	(12x)	6 mm	125 mm	CHT2129-C3	80.60
.2165		5.500 mm		38.00 mm	(5x)	6 mm	100 mm	BVT2165-C3	68.40
.2165		5.500 mm		76.00 mm	(12x)	6 mm	125 mm	CHT2165-C3	80.60
.2187 (7/32)		5.556 mm		26.00 mm	(3x)	6 mm	75 mm	DHE2187-C3	64.60
.2187 (7/32)		5.556 mm		38.00 mm	(5x)	6 mm	100 mm	BVT2187-C3	68.40
.2187 (7/32)		5.556 mm		54.00 mm	(8x)	6 mm	100 mm	ADS2187-C3	73.50
.2187 (7/32)		5.556 mm		66.00 mm	(10x)	6 mm	125 mm	EXP2187-C3	77.10
.2187 (7/32)		5.556 mm		76.00 mm	(12x)	6 mm	125 mm	CHT2187-C3	80.60
.2205		5.600 mm		38.00 mm	(5x)	6 mm	100 mm	BVT2205-C3	68.40
.2205		5.600 mm		78.00 mm	(12x)	6 mm	125 mm	CHT2205-C3	80.60
.2210	#2	5.613 mm		38.00 mm	(5x)	6 mm	100 mm	BVT2210-C3	68.40
.2210	#2	5.613 mm		78.00 mm	(12x)	6 mm	125 mm	CHT2210-C3	80.60
.2280	#1	5.791 mm		40.00 mm	(5x)	6 mm	100 mm	BVT2280-C3	68.40
.2280	#1	5.791 mm		80.00 mm	(12x)	6 mm	125 mm	CHT2280-C3	80.60
.2340	A	5.943 mm		40.00 mm	(5x)	6 mm	100 mm	BVT2340-C3	68.40
.2340	A	5.943 mm		82.00 mm	(12x)	6 mm	125 mm	CHT2340-C3	80.60
.2343 (15/64)		5.953 mm		28.00 mm	(3x)	6 mm	75 mm	DHE2343-C3	64.60
.2343 (15/64)		5.953 mm		40.00 mm	(5x)	6 mm	100 mm	BVT2343-C3	68.40
.2343 (15/64)		5.953 mm		58.00 mm	(8x)	6 mm	100 mm	ADS2343-C3	73.50
.2343 (15/64)		5.953 mm		70.00 mm	(10x)	6 mm	125 mm	EXP2343-C3	77.10
.2343 (15/64)		5.953 mm		82.00 mm	(12x)	6 mm	125 mm	CHT2343-C3	80.60
.2362		6.000 mm		28.00 mm	(3x)	6 mm	75 mm	DHE2362-C3	64.60
.2362		6.000 mm		40.00 mm	(5x)	6 mm	100 mm	BVT2362-C3	68.40
.2362		6.000 mm		58.00 mm	(8x)	6 mm	100 mm	ADS2362-C3	73.50
.2362		6.000 mm		70.00 mm	(10x)	6 mm	125 mm	EXP2362-C3	77.10
.2362		6.000 mm		82.00 mm	(12x)	6 mm	125 mm	CHT2362-C3	80.60

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	PRICE
.2380	B	6.045 mm		40.00 mm	(5x)	8 mm	100 mm	BVT2380-C3	70.80
.2380	B	6.045 mm		84.00 mm	(12x)	8 mm	125 mm	CHT2380-C3	83.30
.2420	C	6.146 mm		42.00 mm	(5x)	8 mm	100 mm	BVT2420-C3	70.80
.2420	C	6.146 mm		84.00 mm	(12x)	8 mm	125 mm	CHT2420-C3	83.30
.2460	D	6.248 mm		42.00 mm	(5x)	8 mm	100 mm	BVT2460-C3	70.80
.2460	D	6.248 mm		86.00 mm	(12x)	8 mm	150 mm	CHT2460-C3	83.30
.2500 (1/4)	E	6.350 mm		30.00 mm	(3x)	8 mm	75 mm	DHE2500-C3	64.60
.2500 (1/4)	E	6.350 mm	1.188		(3x)	1/4	3	FKB2500-C3	64.60
.2500 (1/4)	E	6.350 mm		42.00 mm	(5x)	8 mm	100 mm	BVT2500-C3	68.40
.2500 (1/4)	E	6.350 mm	1.680		(5x)	1/4	3-1/2	GKT2500-C3	68.40
.2500 (1/4)	E	6.350 mm	2.400		(8x)	1/4	4	HDV2500-C3	73.50
.2500 (1/4)	E	6.350 mm		62.00 mm	(8x)	8 mm	125 mm	ADS2500-C3	73.50
.2500 (1/4)	E	6.350 mm		74.00 mm	(10x)	8 mm	125 mm	EXP2500-C3	77.10
.2500 (1/4)	E	6.350 mm		88.00 mm	(12x)	8 mm	150 mm	CHT2500-C3	80.60
.2570	F	6.528 mm		32.00 mm	(3x)	8 mm	75 mm	DHE2570-C3	64.60
.2812 (9/32)		7.142 mm		34.00 mm	(3x)	8 mm	75 mm	DHE2812-C3	64.60
.3125 (5/16)		7.937 mm		38.00 mm	(3x)	8 mm	100 mm	DHE3125-C3	66.40
.3150		8.000 mm		38.00 mm	(3x)	8 mm	100 mm	DHE3150-C3	66.40
.3750 (3/8)		9.525 mm		46.00 mm	(3x)	10 mm	100 mm	DHE3750-C3	80.00

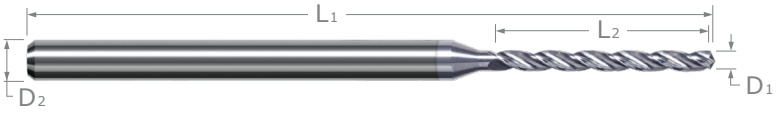
SPEEDS & FEEDS (Miniature High Performance Drills – Prehardened Steels)

Important Note: Values in table are in inches and are based on 3x and 5x drill lengths and a material hardness of 29-37 Rc. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%; for 12x, reduce to 65%). For ferrous materials at 38-45 Rc, reduce IPR (for 3x and 5x, reduce to 80%; for 8x and 10x, reduce to 60%; for 12x, reduce to 52%). Pecking cycles are recommended to avoid chip packing and breakage. For materials at 29-37 Rc, initial peck depth should be 2-3x Diameter with each subsequent peck at 1-2x Diameter. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material (Hardness: 29-37 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter									
		.015	.031	.047	.062	.078	.093	.125	.187	.250	.375
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050	.01575
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960	.01440
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050	.01575
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960	.01440
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600	.00900
Tool Steels A, L, O, P, W series	125	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960	.01440
D, H, M, T, S series	90	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600	.00900
Titanium Alloys	100	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600	.00900
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600	.00900

MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys



Available for 3x, 5x, 8x 10x, and 12x Hole Depths!

- Optimized for drilling aluminum and aluminum alloys with excellent performance in unfilled plastics, copper, brass, and bronze alloys
- Specialized 3 flute design for maximized chip flow, hole accuracy, and finish
- 130° point angle
- Polished flute valleys and TiB2 coating prevent built-up edge and extend tool life
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Special 3 Flute Design to Maximize Chip Flow, Hole Accuracy, and Finish

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	3 FL	PRICE
.0150		.381 mm		1.80 mm	(3x)	3 mm	50 mm	AVA0150-C8	46.60
.0150		.381 mm		2.60 mm	(5x)	3 mm	50 mm	BAF0150-C8	50.40
.0150		.381 mm		5.20 mm	(12x)	3 mm	50 mm	DQW0150-C8	61.70
.0156 (1/64)		.396 mm		1.90 mm	(3x)	3 mm	50 mm	AVA0156-C8	46.60
.0156 (1/64)		.396 mm		2.70 mm	(5x)	3 mm	50 mm	BAF0156-C8	50.40
.0156 (1/64)		.396 mm		3.90 mm	(8x)	3 mm	50 mm	CBG0156-C8	55.30
.0156 (1/64)		.396 mm		4.70 mm	(10x)	3 mm	50 mm	ERY0156-C8	58.50
.0156 (1/64)		.396 mm		5.40 mm	(12x)	3 mm	50 mm	DQW0156-C8	61.70
.0160	#78	.406 mm		2.00 mm	(3x)	3 mm	50 mm	AVA0160-C8	46.60
.0160	#78	.406 mm		2.70 mm	(5x)	3 mm	50 mm	BAF0160-C8	50.40
.0160	#78	.406 mm		4.00 mm	(8x)	3 mm	50 mm	CBG0160-C8	55.30
.0160	#78	.406 mm		4.80 mm	(10x)	3 mm	50 mm	ERY0160-C8	58.50
.0160	#78	.406 mm		5.60 mm	(12x)	3 mm	50 mm	DQW0160-C8	61.70
.0170		.431 mm		2.90 mm	(5x)	3 mm	50 mm	BAF0170-C8	50.40
.0170		.431 mm		6.00 mm	(12x)	3 mm	50 mm	DQW0170-C8	61.70
.0180	#77	.457 mm		2.20 mm	(3x)	3 mm	50 mm	AVA0180-C8	46.60
.0180	#77	.457 mm		3.10 mm	(5x)	3 mm	50 mm	BAF0180-C8	50.40
.0180	#77	.457 mm		4.50 mm	(8x)	3 mm	50 mm	CBG0180-C8	55.30
.0180	#77	.457 mm		5.40 mm	(10x)	3 mm	50 mm	ERY0180-C8	58.50
.0180	#77	.457 mm		6.20 mm	(12x)	3 mm	50 mm	DQW0180-C8	61.70
.0190		.482 mm		3.30 mm	(5x)	3 mm	50 mm	BAF0190-C8	50.40
.0190		.482 mm		6.60 mm	(12x)	3 mm	50 mm	DQW0190-C8	61.70
.0196		.500 mm		2.40 mm	(3x)	3 mm	50 mm	AVA0196-C8	45.90
.0196		.500 mm		3.40 mm	(5x)	3 mm	50 mm	BAF0196-C8	49.90
.0196		.500 mm		4.90 mm	(8x)	3 mm	50 mm	CBG0196-C8	54.80
.0196		.500 mm		5.80 mm	(10x)	3 mm	50 mm	ERY0196-C8	57.60
.0196		.500 mm		6.80 mm	(12x)	3 mm	50 mm	DQW0196-C8	60.90
.0200	#76	.508 mm		2.40 mm	(3x)	3 mm	50 mm	AVA0200-C8	45.90
.0200	#76	.508 mm		3.40 mm	(5x)	3 mm	50 mm	BAF0200-C8	49.90
.0200	#76	.508 mm		5.00 mm	(8x)	3 mm	50 mm	CBG0200-C8	54.80
.0200	#76	.508 mm		6.00 mm	(10x)	3 mm	50 mm	ERY0200-C8	57.60
.0200	#76	.508 mm		7.00 mm	(12x)	3 mm	50 mm	DQW0200-C8	60.90

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Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.0210	#75	.533 mm		2.50 mm	(3x)	3 mm	50 mm	AVA0210-C8	45.90
.0210	#75	.533 mm		3.60 mm	(5x)	3 mm	50 mm	BAF0210-C8	49.90
.0210	#75	.533 mm		5.20 mm	(8x)	3 mm	50 mm	CBG0210-C8	54.80
.0210	#75	.533 mm		6.20 mm	(10x)	3 mm	50 mm	ERY0210-C8	57.60
.0210	#75	.533 mm		7.40 mm	(12x)	3 mm	50 mm	DQW0210-C8	60.90
.0220		.558 mm		3.80 mm	(5x)	3 mm	50 mm	BAF0220-C8	49.90
.0220		.558 mm		7.60 mm	(12x)	3 mm	50 mm	DQW0220-C8	60.90
.0225	#74	.571 mm		2.70 mm	(3x)	3 mm	50 mm	AVA0225-C8	47.30
.0225	#74	.571 mm		3.90 mm	(5x)	3 mm	50 mm	BAF0225-C8	49.90
.0225	#74	.571 mm		5.60 mm	(8x)	3 mm	50 mm	CBG0225-C8	54.80
.0225	#74	.571 mm		6.80 mm	(10x)	3 mm	50 mm	ERY0225-C8	57.60
.0225	#74	.571 mm		7.80 mm	(12x)	3 mm	50 mm	DQW0225-C8	60.90
.0230		.584 mm		3.90 mm	(5x)	3 mm	50 mm	BAF0230-C8	49.90
.0230		.584 mm		8.00 mm	(12x)	3 mm	50 mm	DQW0230-C8	60.90
.0236		.600 mm		4.00 mm	(5x)	3 mm	50 mm	BAF0236-C8	49.90
.0236		.600 mm		8.20 mm	(12x)	3 mm	50 mm	DQW0236-C8	60.90
.0236		.600 mm		10.00 mm	(15x)	3 mm	50 mm	FAE0236-C8	71.80
.0240	#73	.609 mm		2.90 mm	(3x)	3 mm	50 mm	AVA0240-C8	45.90
.0240	#73	.609 mm		4.20 mm	(5x)	3 mm	50 mm	BAF0240-C8	49.90
.0240	#73	.609 mm		6.00 mm	(8x)	3 mm	50 mm	CBG0240-C8	54.80
.0240	#73	.609 mm		7.20 mm	(10x)	3 mm	50 mm	ERY0240-C8	57.60
.0240	#73	.609 mm		8.40 mm	(12x)	3 mm	50 mm	DQW0240-C8	60.90
.0250	#72	.635 mm		3.00 mm	(3x)	3 mm	50 mm	AVA0250-C8	45.90
.0250	#72	.635 mm		4.20 mm	(5x)	3 mm	50 mm	BAF0250-C8	49.90
.0250	#72	.635 mm		6.20 mm	(8x)	3 mm	50 mm	CBG0250-C8	54.80
.0250	#72	.635 mm		7.40 mm	(10x)	3 mm	50 mm	ERY0250-C8	57.60
.0250	#72	.635 mm		8.80 mm	(12x)	3 mm	50 mm	DQW0250-C8	60.90
.0260	#71	.660 mm		3.10 mm	(3x)	3 mm	50 mm	AVA0260-C8	45.90
.0260	#71	.660 mm		4.40 mm	(5x)	3 mm	50 mm	BAF0260-C8	49.90
.0260	#71	.660 mm		6.40 mm	(8x)	3 mm	50 mm	CBG0260-C8	54.80
.0260	#71	.660 mm		7.80 mm	(10x)	3 mm	50 mm	ERY0260-C8	57.60
.0260	#71	.660 mm		9.00 mm	(12x)	3 mm	50 mm	DQW0260-C8	60.90
.0270		.685 mm		4.60 mm	(5x)	3 mm	50 mm	BAF0270-C8	49.90
.0270		.685 mm		9.40 mm	(12x)	3 mm	50 mm	DQW0270-C8	60.90
.0270		.685 mm		11.40 mm	(15x)	3 mm	50 mm	FAE0270-C8	71.80
.0275		.700 mm		4.80 mm	(5x)	3 mm	50 mm	BAF0275-C8	49.90
.0275		.700 mm		9.60 mm	(12x)	3 mm	50 mm	DQW0275-C8	60.90
.0280	#70	.711 mm		3.40 mm	(3x)	3 mm	50 mm	AVA0280-C8	45.90
.0280	#70	.711 mm		4.80 mm	(5x)	3 mm	50 mm	BAF0280-C8	49.90
.0280	#70	.711 mm		7.00 mm	(8x)	3 mm	50 mm	CBG0280-C8	54.80
.0280	#70	.711 mm		8.40 mm	(10x)	3 mm	50 mm	ERY0280-C8	57.60
.0280	#70	.711 mm		9.80 mm	(12x)	3 mm	50 mm	DQW0280-C8	60.90

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Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.0292	#69	.741 mm		3.50 mm	(3x)	3 mm	50 mm	AVA0292-C8	47.30
.0292	#69	.741 mm		5.00 mm	(5x)	3 mm	50 mm	BAF0292-C8	49.90
.0292	#69	.741 mm		7.20 mm	(8x)	3 mm	50 mm	CBG0292-C8	54.80
.0292	#69	.741 mm		8.80 mm	(10x)	3 mm	50 mm	ERY0292-C8	57.60
.0292	#69	.741 mm		10.00 mm	(12x)	3 mm	50 mm	DQW0292-C8	60.90
.0300		.762 mm		5.20 mm	(5x)	3 mm	50 mm	BAF0300-C8	49.90
.0300		.762 mm		10.50 mm	(12x)	3 mm	50 mm	DQW0300-C8	60.90
.0310	#68	.787 mm		3.70 mm	(3x)	3 mm	50 mm	AVA0310-C8	45.90
.0310	#68	.787 mm		5.40 mm	(5x)	3 mm	50 mm	BAF0310-C8	49.90
.0310	#68	.787 mm		7.60 mm	(8x)	3 mm	50 mm	CBG0310-C8	54.80
.0310	#68	.787 mm		9.20 mm	(10x)	3 mm	50 mm	ERY0310-C8	58.20
.0310	#68	.787 mm		11.00 mm	(12x)	3 mm	50 mm	DQW0310-C8	61.70
.0310	#68	.787 mm		13.20 mm	(15x)	3 mm	50 mm	FAE0310-C8	72.20
.0312 (1/32)		.793 mm	.148		(3x)	1/8	2	FSD0312-C8	45.90
.0312 (1/32)		.793 mm		3.80 mm	(3x)	3 mm	50 mm	AVA0312-C8	45.90
.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	GNB0312-C8	49.90
.0312 (1/32)		.793 mm		5.40 mm	(5x)	3 mm	50 mm	BAF0312-C8	49.90
.0312 (1/32)		.793 mm	.304		(8x)	1/8	2	HYX0312-C8	54.80
.0312 (1/32)		.793 mm		7.80 mm	(8x)	3 mm	50 mm	CBG0312-C8	54.80
.0312 (1/32)		.793 mm		9.40 mm	(10x)	3 mm	50 mm	ERY0312-C8	58.20
.0312 (1/32)		.793 mm		11.00 mm	(12x)	3 mm	50 mm	DQW0312-C8	61.70
.0315		.800 mm		5.40 mm	(5x)	3 mm	50 mm	BAF0315-C8	49.90
.0315		.800 mm		11.00 mm	(12x)	3 mm	50 mm	DQW0315-C8	61.70
.0320	#67	.812 mm	.152		(3x)	1/8	2	FSD0320-C8	45.90
.0320	#67	.812 mm		3.90 mm	(3x)	3 mm	50 mm	AVA0320-C8	45.90
.0320	#67	.812 mm		5.40 mm	(5x)	3 mm	50 mm	BAF0320-C8	49.90
.0320	#67	.812 mm	.216		(5x)	1/8	2	GNB0320-C8	49.90
.0320	#67	.812 mm	.312		(8x)	1/8	2	HYX0320-C8	54.80
.0320	#67	.812 mm		8.00 mm	(8x)	3 mm	50 mm	CBG0320-C8	54.80
.0320	#67	.812 mm		9.60 mm	(10x)	3 mm	50 mm	ERY0320-C8	58.20
.0320	#67	.812 mm		11.00 mm	(12x)	3 mm	50 mm	DQW0320-C8	61.70
.0330	#66	.838 mm		4.00 mm	(3x)	3 mm	50 mm	AVA0330-C8	45.90
.0330	#66	.838 mm		5.60 mm	(5x)	3 mm	50 mm	BAF0330-C8	49.90
.0330	#66	.838 mm		8.20 mm	(8x)	3 mm	50 mm	CBG0330-C8	54.80
.0330	#66	.838 mm		9.80 mm	(10x)	3 mm	50 mm	ERY0330-C8	58.20
.0330	#66	.838 mm		11.50 mm	(12x)	3 mm	50 mm	DQW0330-C8	61.70
.0350	#65	.889 mm		4.20 mm	(3x)	3 mm	50 mm	AVA0350-C8	45.90
.0350	#65	.889 mm	.168		(3x)	1/8	2	FSD0350-C8	45.90
.0350	#65	.889 mm		6.00 mm	(5x)	3 mm	50 mm	BAF0350-C8	49.90
.0350	#65	.889 mm	.240		(5x)	1/8	2	GNB0350-C8	49.90
.0350	#65	.889 mm		8.60 mm	(8x)	3 mm	50 mm	CBG0350-C8	54.80
.0350	#65	.889 mm	.340		(8x)	1/8	2	HYX0350-C8	54.80
.0350	#65	.889 mm		10.50 mm	(10x)	3 mm	50 mm	ERY0350-C8	58.20
.0350	#65	.889 mm		12.00 mm	(12x)	3 mm	50 mm	DQW0350-C8	61.70

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.0354		.900 mm		6.00 mm	(5x)	3 mm	50 mm	BAF0354-C8	49.90
.0354		.900 mm		12.50 mm	(12x)	3 mm	50 mm	DQW0354-C8	61.70
.0360	#64	.914 mm		4.40 mm	(3x)	3 mm	50 mm	AVA0360-C8	45.90
.0360	#64	.914 mm		6.20 mm	(5x)	3 mm	50 mm	BAF0360-C8	49.90
.0360	#64	.914 mm		9.00 mm	(8x)	3 mm	50 mm	CBG0360-C8	54.80
.0360	#64	.914 mm		10.50 mm	(10x)	3 mm	50 mm	ERY0360-C8	58.20
.0360	#64	.914 mm		12.50 mm	(12x)	3 mm	50 mm	DQW0360-C8	61.70
.0370	#63	.939 mm		4.40 mm	(3x)	3 mm	50 mm	AVA0370-C8	47.30
.0370	#63	.939 mm		6.40 mm	(5x)	3 mm	50 mm	BAF0370-C8	49.90
.0370	#63	.939 mm		9.20 mm	(8x)	3 mm	50 mm	CBG0370-C8	54.80
.0370	#63	.939 mm		11.00 mm	(10x)	3 mm	50 mm	ERY0370-C8	58.20
.0370	#63	.939 mm		13.00 mm	(12x)	3 mm	50 mm	DQW0370-C8	61.70
.0380	#62	.965 mm		4.60 mm	(3x)	3 mm	50 mm	AVA0380-C8	45.90
.0380	#62	.965 mm		6.60 mm	(5x)	3 mm	50 mm	BAF0380-C8	49.90
.0380	#62	.965 mm		9.40 mm	(8x)	3 mm	50 mm	CBG0380-C8	54.80
.0380	#62	.965 mm		11.50 mm	(10x)	3 mm	50 mm	ERY0380-C8	58.20
.0380	#62	.965 mm		13.50 mm	(12x)	3 mm	50 mm	DQW0380-C8	61.70
.0390	#61	.990 mm		4.80 mm	(3x)	3 mm	50 mm	AVA0390-C8	45.90
.0390	#61	.990 mm		6.60 mm	(5x)	3 mm	50 mm	BAF0390-C8	49.90
.0390	#61	.990 mm		9.60 mm	(8x)	3 mm	50 mm	CBG0390-C8	54.80
.0390	#61	.990 mm		11.50 mm	(10x)	3 mm	50 mm	ERY0390-C8	58.20
.0390	#61	.990 mm		13.50 mm	(12x)	3 mm	50 mm	DQW0390-C8	61.70
.0393		1.000 mm		4.80 mm	(3x)	3 mm	50 mm	AVA0393-C8	49.30
.0393		1.000 mm		6.80 mm	(5x)	3 mm	50 mm	BAF0393-C8	52.00
.0393		1.000 mm		9.80 mm	(8x)	3 mm	50 mm	CBG0393-C8	56.20
.0393		1.000 mm		12.00 mm	(10x)	3 mm	50 mm	ERY0393-C8	59.60
.0393		1.000 mm		14.00 mm	(12x)	3 mm	50 mm	DQW0393-C8	62.90
.0400	#60	1.016 mm		4.80 mm	(3x)	3 mm	50 mm	AVA0400-C8	47.90
.0400	#60	1.016 mm	.192		(3x)	1/8	2	FSD0400-C8	47.90
.0400	#60	1.016 mm		6.80 mm	(5x)	3 mm	50 mm	BAF0400-C8	52.00
.0400	#60	1.016 mm	.272		(5x)	1/8	2	GNB0400-C8	52.00
.0400	#60	1.016 mm		10.00 mm	(8x)	3 mm	50 mm	CBG0400-C8	56.20
.0400	#60	1.016 mm	.400		(8x)	1/8	2	HYX0400-C8	56.20
.0400	#60	1.016 mm		12.00 mm	(10x)	3 mm	50 mm	ERY0400-C8	59.60
.0400	#60	1.016 mm		14.00 mm	(12x)	3 mm	50 mm	DQW0400-C8	62.90
.0410	#59	1.041 mm		5.00 mm	(3x)	3 mm	50 mm	AVA0410-C8	47.90
.0410	#59	1.041 mm		7.00 mm	(5x)	3 mm	50 mm	BAF0410-C8	52.00
.0410	#59	1.041 mm		10.00 mm	(8x)	3 mm	50 mm	CBG0410-C8	56.20
.0410	#59	1.041 mm		12.00 mm	(10x)	3 mm	50 mm	ERY0410-C8	59.60
.0410	#59	1.041 mm		14.50 mm	(12x)	3 mm	50 mm	DQW0410-C8	62.90
.0420	#58	1.066 mm		5.00 mm	(3x)	3 mm	50 mm	AVA0420-C8	47.90
.0420	#58	1.066 mm		7.20 mm	(5x)	3 mm	50 mm	BAF0420-C8	52.00
.0420	#58	1.066 mm		10.50 mm	(8x)	3 mm	50 mm	CBG0420-C8	56.20
.0420	#58	1.066 mm		12.50 mm	(10x)	3 mm	50 mm	ERY0420-C8	59.60
.0420	#58	1.066 mm		14.50 mm	(12x)	3 mm	50 mm	DQW0420-C8	62.90

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Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.0430	#57	1.092 mm		5.20 mm	(3x)	3 mm	50 mm	AVA0430-C8	47.90
.0430	#57	1.092 mm		7.40 mm	(5x)	3 mm	50 mm	BAF0430-C8	52.00
.0430	#57	1.092 mm		10.50 mm	(8x)	3 mm	50 mm	CBG0430-C8	56.20
.0430	#57	1.092 mm		13.00 mm	(10x)	3 mm	50 mm	ERY0430-C8	59.60
.0430	#57	1.092 mm		15.00 mm	(12x)	3 mm	50 mm	DQW0430-C8	62.90
.0450		1.143 mm		7.80 mm	(5x)	3 mm	50 mm	BAF0450-C8	52.00
.0450		1.143 mm		15.50 mm	(12x)	3 mm	50 mm	DQW0450-C8	62.90
.0465	#56	1.181 mm		5.60 mm	(3x)	3 mm	50 mm	AVA0465-C8	49.30
.0465	#56	1.181 mm	.224		(3x)	1/8	2	FSD0465-C8	49.30
.0465	#56	1.181 mm	.312		(5x)	1/8	2	GNB0465-C8	52.00
.0465	#56	1.181 mm		8.00 mm	(5x)	3 mm	50 mm	BAF0465-C8	52.00
.0465	#56	1.181 mm		11.50 mm	(8x)	3 mm	50 mm	CBG0465-C8	56.20
.0465	#56	1.181 mm	.460		(8x)	1/8	2	HYX0465-C8	56.20
.0465	#56	1.181 mm		14.00 mm	(10x)	3 mm	50 mm	ERY0465-C8	59.60
.0465	#56	1.181 mm		16.00 mm	(12x)	3 mm	63 mm	DQW0465-C8	62.90
.0468 (3/64)		1.190 mm		5.60 mm	(3x)	3 mm	50 mm	AVA0468-C8	47.90
.0468 (3/64)		1.190 mm	.224		(3x)	1/8	2	FSD0468-C8	47.90
.0468 (3/64)		1.190 mm		8.00 mm	(5x)	3 mm	50 mm	BAF0468-C8	52.00
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	GNB0468-C8	52.00
.0468 (3/64)		1.190 mm		11.50 mm	(8x)	3 mm	50 mm	CBG0468-C8	56.20
.0468 (3/64)		1.190 mm	.460		(8x)	1/8	2	HYX0468-C8	56.20
.0468 (3/64)		1.190 mm		14.00 mm	(10x)	3 mm	50 mm	ERY0468-C8	59.60
.0468 (3/64)		1.190 mm		16.50 mm	(12x)	3 mm	63 mm	DQW0468-C8	62.90
.0492		1.250 mm		8.50 mm	(5x)	3 mm	50 mm	BAF0492-C8	52.00
.0492		1.250 mm		17.00 mm	(12x)	3 mm	63 mm	DQW0492-C8	62.90
.0500		1.270 mm		6.00 mm	(3x)	3 mm	50 mm	AVA0500-C8	47.90
.0500		1.270 mm	.240		(3x)	1/8	2	FSD0500-C8	47.90
.0500		1.270 mm		8.50 mm	(5x)	3 mm	50 mm	BAF0500-C8	52.00
.0500		1.270 mm	.340		(5x)	1/8	2	GNB0500-C8	52.00
.0500		1.270 mm	.480		(8x)	1/8	2	HYX0500-C8	56.20
.0500		1.270 mm		12.50 mm	(8x)	3 mm	50 mm	CBG0500-C8	56.20
.0500		1.270 mm		15.00 mm	(10x)	3 mm	50 mm	ERY0500-C8	59.60
.0500		1.270 mm		17.50 mm	(12x)	3 mm	63 mm	DQW0500-C8	62.90
.0520	#55	1.320 mm		6.20 mm	(3x)	3 mm	50 mm	AVA0520-C8	49.30
.0520	#55	1.320 mm	.248		(3x)	1/8	2	FSD0520-C8	49.30
.0520	#55	1.320 mm		9.00 mm	(5x)	3 mm	50 mm	BAF0520-C8	52.00
.0520	#55	1.320 mm	.360		(5x)	1/8	2	GNB0520-C8	52.00
.0520	#55	1.320 mm	.500		(8x)	1/8	2	HYX0520-C8	56.20
.0520	#55	1.320 mm		13.00 mm	(8x)	3 mm	50 mm	CBG0520-C8	56.20
.0520	#55	1.320 mm		15.50 mm	(10x)	3 mm	50 mm	ERY0520-C8	59.60
.0520	#55	1.320 mm		18.00 mm	(12x)	3 mm	63 mm	DQW0520-C8	62.90

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Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	3 FL	PRICE
.0550	#54	1.397 mm		6.60 mm	(3x)	3 mm	50 mm	AVA0550-C8	49.30
.0550	#54	1.397 mm	.264		(3x)	1/8	2	FSD0550-C8	49.30
.0550	#54	1.397 mm		9.50 mm	(5x)	3 mm	50 mm	BAF0550-C8	52.00
.0550	#54	1.397 mm	.380		(5x)	1/8	2	GNB0550-C8	52.00
.0550	#54	1.397 mm		13.50 mm	(8x)	3 mm	50 mm	CBG0550-C8	56.20
.0550	#54	1.397 mm	.540		(8x)	1/8	2	HYX0550-C8	56.20
.0550	#54	1.397 mm		16.50 mm	(10x)	3 mm	63 mm	ERY0550-C8	59.60
.0550	#54	1.397 mm		19.00 mm	(12x)	3 mm	63 mm	DQW0550-C8	62.90
.0590		1.500 mm		7.20 mm	(3x)	3 mm	50 mm	AVA0590-C8	48.40
.0590		1.500 mm		10.00 mm	(5x)	3 mm	50 mm	BAF0590-C8	52.50
.0590		1.500 mm		14.50 mm	(8x)	3 mm	50 mm	CBG0590-C8	56.20
.0590		1.500 mm		17.50 mm	(10x)	3 mm	63 mm	ERY0590-C8	60.10
.0590		1.500 mm		21.00 mm	(12x)	3 mm	63 mm	DQW0590-C8	64.10
.0595	#53	1.511 mm		7.20 mm	(3x)	3 mm	50 mm	AVA0595-C8	48.40
.0595	#53	1.511 mm		10.00 mm	(5x)	3 mm	50 mm	BAF0595-C8	52.50
.0595	#53	1.511 mm		14.50 mm	(8x)	3 mm	50 mm	CBG0595-C8	56.20
.0595	#53	1.511 mm		18.00 mm	(10x)	3 mm	63 mm	ERY0595-C8	60.10
.0595	#53	1.511 mm		21.00 mm	(12x)	3 mm	63 mm	DQW0595-C8	64.10
.0600		1.524 mm		10.50 mm	(5x)	3 mm	50 mm	BAF0600-C8	52.50
.0600		1.524 mm		21.00 mm	(12x)	3 mm	63 mm	DQW0600-C8	64.10
.0625 (1/16)		1.587 mm	.296		(3x)	1/8	2	FSD0625-C8	48.40
.0625 (1/16)		1.587 mm		7.60 mm	(3x)	3 mm	50 mm	AVA0625-C8	48.40
.0625 (1/16)		1.587 mm		10.50 mm	(5x)	3 mm	50 mm	BAF0625-C8	52.50
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	GNB0625-C8	52.50
.0625 (1/16)		1.587 mm	.600		(8x)	1/8	2	HYX0625-C8	57.30
.0625 (1/16)		1.587 mm		15.50 mm	(8x)	3 mm	50 mm	CBG0625-C8	57.30
.0625 (1/16)		1.587 mm		18.50 mm	(10x)	3 mm	63 mm	ERY0625-C8	60.60
.0625 (1/16)		1.587 mm		22.00 mm	(12x)	3 mm	63 mm	DQW0625-C8	64.10
.0625 (1/16)		1.587 mm		26.50 mm	(15x)	3 mm	63 mm	FAE0625-C8	72.90
.0635	#52	1.612 mm		7.60 mm	(3x)	3 mm	50 mm	AVA0635-C8	49.80
.0635	#52	1.612 mm		11.00 mm	(5x)	3 mm	50 mm	BAF0635-C8	52.50
.0635	#52	1.612 mm		15.50 mm	(8x)	3 mm	50 mm	CBG0635-C8	57.30
.0635	#52	1.612 mm		19.00 mm	(10x)	3 mm	63 mm	ERY0635-C8	60.60
.0635	#52	1.612 mm		22.00 mm	(12x)	3 mm	63 mm	DQW0635-C8	64.10
.0670	#51	1.701 mm		8.00 mm	(3x)	3 mm	50 mm	AVA0670-C8	48.40
.0670	#51	1.701 mm		11.50 mm	(5x)	3 mm	50 mm	BAF0670-C8	52.50
.0670	#51	1.701 mm		16.50 mm	(8x)	3 mm	63 mm	CBG0670-C8	57.30
.0670	#51	1.701 mm		20.00 mm	(10x)	3 mm	63 mm	ERY0670-C8	60.60
.0670	#51	1.701 mm		23.00 mm	(12x)	3 mm	63 mm	DQW0670-C8	64.10
.0700	#50	1.778 mm		8.50 mm	(3x)	3 mm	50 mm	AVA0700-C8	48.40
.0700	#50	1.778 mm	.340		(3x)	1/8	2	FSD0700-C8	48.40
.0700	#50	1.778 mm		12.00 mm	(5x)	3 mm	50 mm	BAF0700-C8	52.50
.0700	#50	1.778 mm	.480		(5x)	1/8	2	GNB0700-C8	52.50
.0700	#50	1.778 mm	.680		(8x)	1/8	2-1/2	HYX0700-C8	57.30
.0700	#50	1.778 mm		17.50 mm	(8x)	3 mm	63 mm	CBG0700-C8	57.30
.0700	#50	1.778 mm		21.00 mm	(10x)	3 mm	63 mm	ERY0700-C8	60.60
.0700	#50	1.778 mm		24.00 mm	(12x)	3 mm	63 mm	DQW0700-C8	64.10

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.0730	#49	1.854 mm		9.00 mm	(3x)	3 mm	50 mm	AVA0730-C8	48.40
.0730	#49	1.854 mm		12.50 mm	(5x)	3 mm	50 mm	BAF0730-C8	52.50
.0730	#49	1.854 mm		18.00 mm	(8x)	3 mm	63 mm	CBG0730-C8	57.30
.0730	#49	1.854 mm		22.00 mm	(10x)	3 mm	63 mm	ERY0730-C8	60.60
.0730	#49	1.854 mm		25.00 mm	(12x)	3 mm	63 mm	DQW0730-C8	64.10
.0760	#48	1.930 mm		9.00 mm	(3x)	3 mm	50 mm	AVA0760-C8	48.40
.0760	#48	1.930 mm		13.00 mm	(5x)	3 mm	50 mm	BAF0760-C8	52.50
.0760	#48	1.930 mm		19.00 mm	(8x)	3 mm	63 mm	CBG0760-C8	57.30
.0760	#48	1.930 mm		23.00 mm	(10x)	3 mm	63 mm	ERY0760-C8	60.60
.0760	#48	1.930 mm		27.00 mm	(12x)	3 mm	63 mm	DQW0760-C8	64.10
.0781 (5/64)		1.984 mm		9.50 mm	(3x)	3 mm	50 mm	AVA0781-C8	48.40
.0781 (5/64)		1.984 mm	.380		(3x)	1/8	2	FSD0781-C8	48.40
.0781 (5/64)		1.984 mm	.520		(5x)	1/8	2	GNB0781-C8	52.50
.0781 (5/64)		1.984 mm		13.50 mm	(5x)	3 mm	50 mm	BAF0781-C8	52.50
.0781 (5/64)		1.984 mm	.760		(8x)	1/8	2-1/2	HYX0781-C8	57.30
.0781 (5/64)		1.984 mm		19.50 mm	(8x)	3 mm	63 mm	CBG0781-C8	57.30
.0781 (5/64)		1.984 mm		23.00 mm	(10x)	3 mm	63 mm	ERY0781-C8	60.60
.0781 (5/64)		1.984 mm		27.00 mm	(12x)	3 mm	63 mm	DQW0781-C8	64.10
.0785	#47	1.993 mm		9.50 mm	(3x)	3 mm	50 mm	AVA0785-C8	48.40
.0785	#47	1.993 mm		13.50 mm	(5x)	3 mm	50 mm	BAF0785-C8	52.50
.0785	#47	1.993 mm		19.50 mm	(8x)	3 mm	63 mm	CBG0785-C8	57.30
.0785	#47	1.993 mm		27.00 mm	(12x)	3 mm	63 mm	DQW0785-C8	64.10
.0787		2.000 mm		9.50 mm	(3x)	4 mm	50 mm	AVA0787-C8	49.80
.0787		2.000 mm		13.50 mm	(5x)	4 mm	50 mm	BAF0787-C8	53.90
.0787		2.000 mm		19.50 mm	(8x)	4 mm	63 mm	CBG0787-C8	58.60
.0787		2.000 mm		24.00 mm	(10x)	4 mm	63 mm	ERY0787-C8	61.80
.0787		2.000 mm		28.00 mm	(12x)	4 mm	63 mm	DQW0787-C8	65.30
.0800		2.032 mm		9.50 mm	(3x)	4 mm	50 mm	AVA0800-C8	49.80
.0800		2.032 mm	.380		(3x)	3/16	2	FSD0800-C8	49.80
.0800		2.032 mm		13.50 mm	(5x)	4 mm	50 mm	BAF0800-C8	53.90
.0800		2.032 mm	.540		(5x)	3/16	2	GNB0800-C8	53.90
.0800		2.032 mm		20.00 mm	(8x)	4 mm	63 mm	CBG0800-C8	58.60
.0800		2.032 mm	.800		(8x)	3/16	2-1/2	HYX0800-C8	58.60
.0800		2.032 mm		28.00 mm	(12x)	4 mm	63 mm	DQW0800-C8	65.30
.0810	#46	2.057 mm		10.00 mm	(3x)	4 mm	50 mm	AVA0810-C8	49.80
.0810	#46	2.057 mm		14.00 mm	(5x)	4 mm	50 mm	BAF0810-C8	53.90
.0810	#46	2.057 mm		20.00 mm	(8x)	4 mm	63 mm	CBG0810-C8	58.60
.0810	#46	2.057 mm		24.00 mm	(10x)	4 mm	63 mm	ERY0810-C8	61.80
.0810	#46	2.057 mm		28.00 mm	(12x)	4 mm	63 mm	DQW0810-C8	65.30
.0820	#45	2.082 mm		10.00 mm	(3x)	4 mm	50 mm	AVA0820-C8	49.80
.0820	#45	2.082 mm		14.00 mm	(5x)	4 mm	50 mm	BAF0820-C8	53.90
.0820	#45	2.082 mm		20.00 mm	(8x)	4 mm	63 mm	CBG0820-C8	58.60
.0820	#45	2.082 mm		29.00 mm	(12x)	4 mm	75 mm	DQW0820-C8	65.30

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.0860	#44	2.184 mm	.400		(3x)	3/16	2	FSD0860-C8	49.80
.0860	#44	2.184 mm		10.50 mm	(3x)	4 mm	50 mm	AVA0860-C8	49.80
.0860	#44	2.184 mm		14.50 mm	(5x)	4 mm	50 mm	BAF0860-C8	53.90
.0860	#44	2.184 mm	.580		(5x)	3/16	2-1/2	GNB0860-C8	53.90
.0860	#44	2.184 mm		21.00 mm	(8x)	4 mm	63 mm	CBG0860-C8	58.60
.0860	#44	2.184 mm	.840		(8x)	3/16	2-1/2	HYX0860-C8	58.60
.0860	#44	2.184 mm		26.00 mm	(10x)	4 mm	63 mm	ERY0860-C8	61.80
.0860	#44	2.184 mm		30.00 mm	(12x)	4 mm	75 mm	DQW0860-C8	65.30
.0890	#43	2.260 mm		10.50 mm	(3x)	4 mm	50 mm	AVA0890-C8	51.30
.0890	#43	2.260 mm	.420		(3x)	3/16	2	FSD0890-C8	51.30
.0890	#43	2.260 mm		15.00 mm	(5x)	4 mm	50 mm	BAF0890-C8	53.90
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	GNB0890-C8	53.90
.0890	#43	2.260 mm		22.00 mm	(8x)	4 mm	63 mm	CBG0890-C8	58.60
.0890	#43	2.260 mm	.880		(8x)	3/16	2-1/2	HYX0890-C8	58.60
.0890	#43	2.260 mm		27.00 mm	(10x)	4 mm	63 mm	ERY0890-C8	61.80
.0890	#43	2.260 mm		31.00 mm	(12x)	4 mm	75 mm	DQW0890-C8	65.30
.0900		2.286 mm		11.00 mm	(3x)	4 mm	50 mm	AVA0900-C8	49.80
.0900		2.286 mm		15.00 mm	(5x)	4 mm	50 mm	BAF0900-C8	53.90
.0900		2.286 mm		22.00 mm	(8x)	4 mm	63 mm	CBG0900-C8	58.60
.0900		2.286 mm		31.00 mm	(12x)	4 mm	75 mm	DQW0900-C8	65.30
.0935	#42	2.374 mm		11.50 mm	(3x)	4 mm	50 mm	AVA0935-C8	49.80
.0935	#42	2.374 mm		16.00 mm	(5x)	4 mm	63 mm	BAF0935-C8	53.90
.0935	#42	2.374 mm		23.00 mm	(8x)	4 mm	63 mm	CBG0935-C8	58.60
.0935	#42	2.374 mm		28.00 mm	(10x)	4 mm	63 mm	ERY0935-C8	61.80
.0935	#42	2.374 mm		33.00 mm	(12x)	4 mm	75 mm	DQW0935-C8	65.30
.0937 (3/32)		2.381 mm	.440		(3x)	3/16	2	FSD0937-C8	49.80
.0937 (3/32)		2.381 mm		11.50 mm	(3x)	4 mm	50 mm	AVA0937-C8	49.80
.0937 (3/32)		2.381 mm		16.00 mm	(5x)	4 mm	63 mm	BAF0937-C8	53.90
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	GNB0937-C8	53.90
.0937 (3/32)		2.381 mm		23.00 mm	(8x)	4 mm	63 mm	CBG0937-C8	58.60
.0937 (3/32)		2.381 mm	.920		(8x)	3/16	2-1/2	HYX0937-C8	58.60
.0937 (3/32)		2.381 mm		28.00 mm	(10x)	4 mm	63 mm	ERY0937-C8	61.80
.0937 (3/32)		2.381 mm		33.00 mm	(12x)	4 mm	75 mm	DQW0937-C8	65.30
.0960	#41	2.438 mm		11.50 mm	(3x)	4 mm	50 mm	AVA0960-C8	49.80
.0960	#41	2.438 mm	.460		(3x)	3/16	2	FSD0960-C8	49.80
.0960	#41	2.438 mm		16.00 mm	(5x)	4 mm	63 mm	BAF0960-C8	53.90
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	GNB0960-C8	53.90
.0960	#41	2.438 mm	.920		(8x)	3/16	2-1/2	HYX0960-C8	58.60
.0960	#41	2.438 mm		24.00 mm	(8x)	4 mm	63 mm	CBG0960-C8	58.60
.0960	#41	2.438 mm		29.00 mm	(10x)	4 mm	75 mm	ERY0960-C8	61.80
.0960	#41	2.438 mm		34.00 mm	(12x)	4 mm	75 mm	DQW0960-C8	65.30
.0980	#40	2.489 mm		12.00 mm	(3x)	4 mm	50 mm	AVA0980-C8	49.80
.0980	#40	2.489 mm		17.00 mm	(5x)	4 mm	63 mm	BAF0980-C8	53.90
.0980	#40	2.489 mm		24.00 mm	(8x)	4 mm	63 mm	CBG0980-C8	58.60
.0980	#40	2.489 mm		29.00 mm	(10x)	4 mm	75 mm	ERY0980-C8	61.80
.0980	#40	2.489 mm		34.00 mm	(12x)	4 mm	75 mm	DQW0980-C8	65.30

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.0984		2.500 mm		12.00 mm	(3x)	4 mm	50 mm	AVA0984-C8	50.20
.0984		2.500 mm		17.00 mm	(5x)	4 mm	63 mm	BAF0984-C8	54.30
.0984		2.500 mm		24.00 mm	(8x)	4 mm	63 mm	CBG0984-C8	59.00
.0984		2.500 mm		29.00 mm	(10x)	4 mm	75 mm	ERY0984-C8	62.40
.0984		2.500 mm		34.00 mm	(12x)	4 mm	75 mm	DQW0984-C8	65.70
.0995	#39	2.527 mm		12.00 mm	(3x)	4 mm	50 mm	AVA0995-C8	50.20
.0995	#39	2.527 mm	.480		(3x)	3/16	2	FSD0995-C8	50.20
.0995	#39	2.527 mm		17.00 mm	(5x)	4 mm	63 mm	BAF0995-C8	54.30
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	GNB0995-C8	54.30
.0995	#39	2.527 mm	.960		(8x)	3/16	2-1/2	HYX0995-C8	59.00
.0995	#39	2.527 mm		25.00 mm	(8x)	4 mm	63 mm	CBG0995-C8	59.00
.0995	#39	2.527 mm		30.00 mm	(10x)	4 mm	75 mm	ERY0995-C8	62.40
.0995	#39	2.527 mm		35.00 mm	(12x)	4 mm	75 mm	DQW0995-C8	65.70
.1000		2.540 mm		12.00 mm	(3x)	4 mm	50 mm	AVA1000-C8	50.20
.1000		2.540 mm		17.00 mm	(5x)	4 mm	63 mm	BAF1000-C8	54.30
.1000		2.540 mm		25.00 mm	(8x)	4 mm	63 mm	CBG1000-C8	59.00
.1000		2.540 mm		35.00 mm	(12x)	4 mm	75 mm	DQW1000-C8	65.70
.1015	#38	2.578 mm		12.00 mm	(3x)	4 mm	50 mm	AVA1015-C8	50.20
.1015	#38	2.578 mm		17.00 mm	(5x)	4 mm	63 mm	BAF1015-C8	54.30
.1015	#38	2.578 mm		25.00 mm	(8x)	4 mm	63 mm	CBG1015-C8	59.00
.1015	#38	2.578 mm		30.00 mm	(10x)	4 mm	75 mm	ERY1015-C8	62.40
.1015	#38	2.578 mm		35.00 mm	(12x)	4 mm	75 mm	DQW1015-C8	65.70
.1040	#37	2.641 mm		12.50 mm	(3x)	4 mm	50 mm	AVA1040-C8	50.20
.1040	#37	2.641 mm		18.00 mm	(5x)	4 mm	63 mm	BAF1040-C8	54.30
.1040	#37	2.641 mm		26.00 mm	(8x)	4 mm	63 mm	CBG1040-C8	59.00
.1040	#37	2.641 mm		31.00 mm	(10x)	4 mm	75 mm	ERY1040-C8	62.40
.1040	#37	2.641 mm		36.00 mm	(12x)	4 mm	75 mm	DQW1040-C8	65.70
.1065	#36	2.705 mm		13.00 mm	(3x)	4 mm	50 mm	AVA1065-C8	50.20
.1065	#36	2.705 mm		18.00 mm	(5x)	4 mm	63 mm	BAF1065-C8	54.30
.1065	#36	2.705 mm		26.00 mm	(8x)	4 mm	63 mm	CBG1065-C8	59.00
.1065	#36	2.705 mm		32.00 mm	(10x)	4 mm	75 mm	ERY1065-C8	62.40
.1065	#36	2.705 mm		37.00 mm	(12x)	4 mm	75 mm	DQW1065-C8	65.70
.1093 (7/64)		2.778 mm		13.00 mm	(3x)	4 mm	50 mm	AVA1093-C8	50.20
.1093 (7/64)		2.778 mm		19.00 mm	(5x)	4 mm	63 mm	BAF1093-C8	54.30
.1093 (7/64)		2.778 mm		27.00 mm	(8x)	4 mm	63 mm	CBG1093-C8	59.00
.1093 (7/64)		2.778 mm		33.00 mm	(10x)	4 mm	75 mm	ERY1093-C8	62.40
.1093 (7/64)		2.778 mm		38.00 mm	(12x)	4 mm	75 mm	DQW1093-C8	65.70
.1100	#35	2.794 mm	.520		(3x)	3/16	2	FSD1100-C8	50.20
.1100	#35	2.794 mm		13.50 mm	(3x)	4 mm	50 mm	AVA1100-C8	50.20
.1100	#35	2.794 mm		19.00 mm	(5x)	4 mm	63 mm	BAF1100-C8	54.30
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	GNB1100-C8	54.30
.1100	#35	2.794 mm	1.040		(8x)	3/16	2-1/2	HYX1100-C8	59.00
.1100	#35	2.794 mm		27.00 mm	(8x)	4 mm	63 mm	CBG1100-C8	59.00
.1100	#35	2.794 mm		33.00 mm	(10x)	4 mm	75 mm	ERY1100-C8	62.40
.1100	#35	2.794 mm		38.00 mm	(12x)	4 mm	75 mm	DQW1100-C8	65.70
.1110	#34	2.819 mm		13.50 mm	(3x)	4 mm	50 mm	AVA1110-C8	50.20

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.1110	#34	2.819 mm		19.00 mm	(5x)	4 mm	63 mm	BAF1110-C8	54.30
.1110	#34	2.819 mm		27.00 mm	(8x)	4 mm	63 mm	CBG1110-C8	59.00
.1110	#34	2.819 mm		33.00 mm	(10x)	4 mm	75 mm	ERY1110-C8	62.40
.1110	#34	2.819 mm		39.00 mm	(12x)	4 mm	75 mm	DQW1110-C8	65.70
.1130	#33	2.870 mm		13.50 mm	(3x)	4 mm	50 mm	AVA1130-C8	50.20
.1130	#33	2.870 mm		19.00 mm	(5x)	4 mm	63 mm	BAF1130-C8	54.30
.1130	#33	2.870 mm		28.00 mm	(8x)	4 mm	63 mm	CBG1130-C8	59.00
.1130	#33	2.870 mm		34.00 mm	(10x)	4 mm	75 mm	ERY1130-C8	62.40
.1130	#33	2.870 mm		39.00 mm	(12x)	4 mm	75 mm	DQW1130-C8	65.70
.1160	#32	2.946 mm		14.00 mm	(3x)	4 mm	50 mm	AVA1160-C8	50.20
.1160	#32	2.946 mm	.560		(3x)	3/16	2	FSD1160-C8	50.20
.1160	#32	2.946 mm		20.00 mm	(5x)	4 mm	63 mm	BAF1160-C8	54.30
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	GNB1160-C8	54.30
.1160	#32	2.946 mm	1.120		(8x)	3/16	3	HYX1160-C8	59.00
.1160	#32	2.946 mm		29.00 mm	(8x)	4 mm	63 mm	CBG1160-C8	59.00
.1160	#32	2.946 mm		40.00 mm	(12x)	4 mm	75 mm	DQW1160-C8	65.70
.1181		3.000 mm		14.50 mm	(3x)	4 mm	50 mm	AVA1181-C8	51.30
.1181		3.000 mm		20.00 mm	(5x)	4 mm	63 mm	BAF1181-C8	55.80
.1181		3.000 mm		29.00 mm	(8x)	4 mm	63 mm	CBG1181-C8	60.10
.1181		3.000 mm		35.00 mm	(10x)	4 mm	75 mm	ERY1181-C8	63.60
.1181		3.000 mm		42.00 mm	(12x)	4 mm	100 mm	DQW1181-C8	66.90
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.1200	#31	3.048 mm		14.50 mm	(3x)	6 mm	63 mm	AVA1200-C8	63.50
.1200	#31	3.048 mm	.580		(3x)	3/16	2-1/2	FSD1200-C8	63.50
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	GNB1200-C8	68.70
.1200	#31	3.048 mm		21.00 mm	(5x)	6 mm	63 mm	BAF1200-C8	68.70
.1200	#31	3.048 mm		30.00 mm	(8x)	6 mm	75 mm	CBG1200-C8	72.20
.1200	#31	3.048 mm	1.200		(8x)	3/16	3	HYX1200-C8	72.20
.1200	#31	3.048 mm		42.00 mm	(12x)	6 mm	100 mm	DQW1200-C8	79.30
.1250 (1/8)		3.175 mm		15.00 mm	(3x)	6 mm	63 mm	AVA1250-C8	63.50
.1250 (1/8)		3.175 mm	.600		(3x)	3/16	2-1/2	FSD1250-C8	63.50
.1250 (1/8)		3.175 mm		21.00 mm	(5x)	6 mm	63 mm	BAF1250-C8	68.70
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	GNB1250-C8	68.70
.1250 (1/8)		3.175 mm	1.200		(8x)	3/16	3	HYX1250-C8	72.20
.1250 (1/8)		3.175 mm		31.00 mm	(8x)	6 mm	75 mm	CBG1250-C8	72.20
.1250 (1/8)		3.175 mm		44.00 mm	(12x)	6 mm	100 mm	DQW1250-C8	79.30
.1250 (1/8)		3.175 mm		53.00 mm	(15x)	6 mm	100 mm	FAE1250-C8	91.60
.1260		3.200 mm		22.00 mm	(5x)	6 mm	63 mm	BAF1260-C8	68.70
.1260		3.200 mm		31.00 mm	(8x)	6 mm	75 mm	CBG1260-C8	75.10
.1285	#30	3.263 mm	.610		(3x)	1/4	2-1/2	FSD1285-C8	63.50
.1285	#30	3.263 mm		16.00 mm	(3x)	6 mm	63 mm	AVA1285-C8	63.50
.1285	#30	3.263 mm		22.00 mm	(5x)	6 mm	63 mm	BAF1285-C8	68.70
.1285	#30	3.263 mm	.880		(5x)	1/4	2-1/2	GNB1285-C8	68.70
.1285	#30	3.263 mm		32.00 mm	(8x)	6 mm	75 mm	CBG1285-C8	72.20
.1285	#30	3.263 mm	1.280		(8x)	1/4	3	HYX1285-C8	72.20
.1285	#30	3.263 mm		44.00 mm	(12x)	6 mm	100 mm	DQW1285-C8	79.30

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.1299		3.300 mm		22.00 mm	(5x)	6 mm	63 mm	BAF1299-C8	68.70
.1360	#29	3.454 mm		16.00 mm	(3x)	6 mm	63 mm	AVA1360-C8	65.40
.1360	#29	3.454 mm		23.00 mm	(5x)	6 mm	63 mm	BAF1360-C8	68.70
.1360	#29	3.454 mm		34.00 mm	(8x)	6 mm	75 mm	CBG1360-C8	72.20
.1360	#29	3.454 mm		40.00 mm	(10x)	6 mm	100 mm	ERY1360-C8	75.60
.1360	#29	3.454 mm		48.00 mm	(12x)	6 mm	100 mm	DQW1360-C8	79.30
.1405	#28	3.568 mm		24.00 mm	(5x)	6 mm	75 mm	BAF1405-C8	68.70
.1405	#28	3.568 mm		50.00 mm	(12x)	6 mm	100 mm	DQW1405-C8	79.30
.1406 (9/64)		3.571 mm		17.00 mm	(3x)	6 mm	63 mm	AVA1406-C8	63.50
.1406 (9/64)		3.571 mm		24.00 mm	(5x)	6 mm	75 mm	BAF1406-C8	68.70
.1406 (9/64)		3.571 mm		35.00 mm	(8x)	6 mm	75 mm	CBG1406-C8	72.20
.1406 (9/64)		3.571 mm		42.00 mm	(10x)	6 mm	100 mm	ERY1406-C8	75.60
.1406 (9/64)		3.571 mm		50.00 mm	(12x)	6 mm	100 mm	DQW1406-C8	79.30
.1440	#27	3.657 mm		24.00 mm	(5x)	6 mm	75 mm	BAF1440-C8	68.70
.1440	#27	3.657 mm		50.00 mm	(12x)	6 mm	100 mm	DQW1440-C8	79.30
.1470	#26	3.733 mm		18.00 mm	(3x)	6 mm	63 mm	AVA1470-C8	63.50
.1470	#26	3.733 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1470-C8	68.70
.1470	#26	3.733 mm		36.00 mm	(8x)	6 mm	100 mm	CBG1470-C8	72.20
.1470	#26	3.733 mm		44.00 mm	(10x)	6 mm	100 mm	ERY1470-C8	75.60
.1470	#26	3.733 mm		52.00 mm	(12x)	6 mm	100 mm	DQW1470-C8	79.30
.1495	#25	3.797 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1495-C8	68.70
.1495	#25	3.797 mm		52.00 mm	(12x)	6 mm	100 mm	DQW1495-C8	79.30
.1520	#24	3.860 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1520-C8	68.70
.1520	#24	3.860 mm		54.00 mm	(12x)	6 mm	100 mm	DQW1520-C8	79.30
.1540	#23	3.911 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1540-C8	68.70
.1540	#23	3.911 mm		54.00 mm	(12x)	6 mm	100 mm	DQW1540-C8	79.30
.1562 (5/32)		3.968 mm		19.00 mm	(3x)	6 mm	63 mm	AVA1562-C8	63.50
.1562 (5/32)		3.968 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1562-C8	68.70
.1562 (5/32)		3.968 mm		39.00 mm	(8x)	6 mm	100 mm	CBG1562-C8	72.20
.1562 (5/32)		3.968 mm		46.00 mm	(10x)	6 mm	100 mm	ERY1562-C8	75.60
.1562 (5/32)		3.968 mm		54.00 mm	(12x)	6 mm	100 mm	DQW1562-C8	79.30
.1570	#22	3.987 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1570-C8	68.70
.1570	#22	3.987 mm		39.00 mm	(8x)	6 mm	100 mm	CBG1570-C8	72.20
.1570	#22	3.987 mm		54.00 mm	(12x)	6 mm	100 mm	DQW1570-C8	79.30
.1574		4.000 mm		19.00 mm	(3x)	6 mm	63 mm	AVA1574-C8	63.50
.1574		4.000 mm		28.00 mm	(5x)	6 mm	75 mm	BAF1574-C8	68.70
.1574		4.000 mm		39.00 mm	(8x)	6 mm	100 mm	CBG1574-C8	72.20
.1574		4.000 mm		48.00 mm	(10x)	6 mm	100 mm	ERY1574-C8	75.60
.1574		4.000 mm		56.00 mm	(12x)	6 mm	100 mm	DQW1574-C8	79.30
.1590	#21	4.038 mm		19.00 mm	(3x)	6 mm	63 mm	AVA1590-C8	63.50
.1590	#21	4.038 mm		28.00 mm	(5x)	6 mm	75 mm	BAF1590-C8	68.70
.1590	#21	4.038 mm		39.00 mm	(8x)	6 mm	100 mm	CBG1590-C8	72.20
.1590	#21	4.038 mm		48.00 mm	(10x)	6 mm	100 mm	ERY1590-C8	75.60
.1590	#21	4.038 mm		56.00 mm	(12x)	6 mm	100 mm	DQW1590-C8	79.30
.1610	#20	4.089 mm		28.00 mm	(5x)	6 mm	75 mm	BAF1610-C8	68.70
.1610	#20	4.089 mm		56.00 mm	(12x)	6 mm	100 mm	DQW1610-C8	79.30

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.1660	#19	4.216 mm		28.00 mm	(5x)	6 mm	75 mm	BAF1660-C8	68.70
.1660	#19	4.216 mm		58.00 mm	(12x)	6 mm	100 mm	DQW1660-C8	79.30
.1695	#18	4.305 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1695-C8	68.70
.1695	#18	4.305 mm		60.00 mm	(12x)	6 mm	100 mm	DQW1695-C8	79.30
.1718 (11/64)		4.365 mm		21.00 mm	(3x)	6 mm	63 mm	AVA1718-C8	63.50
.1718 (11/64)		4.365 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1718-C8	68.70
.1718 (11/64)		4.365 mm		42.00 mm	(8x)	6 mm	100 mm	CBG1718-C8	72.20
.1718 (11/64)		4.365 mm		52.00 mm	(10x)	6 mm	100 mm	ERY1718-C8	75.60
.1718 (11/64)		4.365 mm		60.00 mm	(12x)	6 mm	100 mm	DQW1718-C8	79.30
.1730	#17	4.394 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1730-C8	68.70
.1730	#17	4.394 mm		60.00 mm	(12x)	6 mm	100 mm	DQW1730-C8	79.30
.1770	#16	4.495 mm		21.00 mm	(3x)	6 mm	63 mm	AVA1770-C8	63.50
.1770	#16	4.495 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1770-C8	68.70
.1770	#16	4.495 mm		44.00 mm	(8x)	6 mm	100 mm	CBG1770-C8	72.20
.1770	#16	4.495 mm		52.00 mm	(10x)	6 mm	100 mm	ERY1770-C8	75.60
.1770	#16	4.495 mm		62.00 mm	(12x)	6 mm	125 mm	DQW1770-C8	79.30
.1800	#15	4.572 mm		22.00 mm	(3x)	6 mm	63 mm	AVA1800-C8	63.50
.1800	#15	4.572 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1800-C8	68.70
.1800	#15	4.572 mm		44.00 mm	(8x)	6 mm	100 mm	CBG1800-C8	72.20
.1800	#15	4.572 mm		54.00 mm	(10x)	6 mm	100 mm	ERY1800-C8	75.60
.1800	#15	4.572 mm		62.00 mm	(12x)	6 mm	125 mm	DQW1800-C8	79.30
.1820	#14	4.622 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1820-C8	68.70
.1820	#14	4.622 mm		64.00 mm	(12x)	6 mm	125 mm	DQW1820-C8	79.30
.1850	#13	4.700 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1850-C8	68.70
.1850	#13	4.700 mm		64.00 mm	(12x)	6 mm	125 mm	DQW1850-C8	79.30
.1875 (3/16)		4.762 mm	.890		(3x)	1/4	2-1/2	FSD1875-C8	63.50
.1875 (3/16)		4.762 mm		23.00 mm	(3x)	6 mm	63 mm	AVA1875-C8	63.50
.1875 (3/16)		4.762 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1875-C8	68.70
.1875 (3/16)		4.762 mm	1.280		(5x)	1/4	3	GNB1875-C8	68.70
.1875 (3/16)		4.762 mm		46.00 mm	(8x)	6 mm	100 mm	CBG1875-C8	72.20
.1875 (3/16)		4.762 mm	1.840		(8x)	1/4	3-1/2	HYX1875-C8	72.20
.1875 (3/16)		4.762 mm		56.00 mm	(10x)	6 mm	100 mm	ERY1875-C8	75.60
.1875 (3/16)		4.762 mm		66.00 mm	(12x)	6 mm	125 mm	DQW1875-C8	79.30
.1890	#12	4.800 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1890-C8	68.70
.1890	#12	4.800 mm		66.00 mm	(12x)	6 mm	125 mm	DQW1890-C8	79.30
.1910	#11	4.851 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1910-C8	68.70
.1910	#11	4.851 mm		66.00 mm	(12x)	6 mm	125 mm	DQW1910-C8	79.30
.1935	#10	4.914 mm		34.00 mm	(5x)	6 mm	75 mm	BAF1935-C8	68.70
.1935	#10	4.914 mm		68.00 mm	(12x)	6 mm	125 mm	DQW1935-C8	79.30
.1960	#9	4.978 mm		34.00 mm	(5x)	6 mm	75 mm	BAF1960-C8	68.70
.1960	#9	4.978 mm		68.00 mm	(12x)	6 mm	125 mm	DQW1960-C8	79.30
.1968		5.000 mm		24.00 mm	(3x)	6 mm	63 mm	AVA1968-C8	63.50
.1968		5.000 mm		34.00 mm	(5x)	6 mm	75 mm	BAF1968-C8	68.70
.1968		5.000 mm		48.00 mm	(8x)	6 mm	100 mm	CBG1968-C8	72.20
.1968		5.000 mm		58.00 mm	(10x)	6 mm	100 mm	ERY1968-C8	75.60
.1968		5.000 mm		68.00 mm	(12x)	6 mm	125 mm	DQW1968-C8	79.30

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.1990	#8	5.054 mm		34.00 mm	(5x)	6 mm	75 mm	BAF1990-C8	68.70
.1990	#8	5.054 mm		70.00 mm	(12x)	6 mm	125 mm	DQW1990-C8	79.30
.2009	#7	5.105 mm		24.00 mm	(3x)	6 mm	63 mm	AVA2009-C8	63.50
.2009	#7	5.105 mm		34.00 mm	(5x)	6 mm	75 mm	BAF2009-C8	68.70
.2009	#7	5.105 mm		50.00 mm	(8x)	6 mm	100 mm	CBG2009-C8	72.20
.2009	#7	5.105 mm		60.00 mm	(10x)	6 mm	100 mm	ERY2009-C8	75.60
.2009	#7	5.105 mm		70.00 mm	(12x)	6 mm	125 mm	DQW2009-C8	79.30
.2031 (13/64)		5.159 mm		24.00 mm	(3x)	6 mm	63 mm	AVA2031-C8	65.40
.2031 (13/64)		5.159 mm		34.00 mm	(5x)	6 mm	75 mm	BAF2031-C8	68.70
.2031 (13/64)		5.159 mm		50.00 mm	(8x)	6 mm	100 mm	CBG2031-C8	72.20
.2031 (13/64)		5.159 mm		60.00 mm	(10x)	6 mm	100 mm	ERY2031-C8	75.60
.2031 (13/64)		5.159 mm		70.00 mm	(12x)	6 mm	125 mm	DQW2031-C8	79.30
.2040	#6	5.181 mm		34.00 mm	(5x)	6 mm	75 mm	BAF2040-C8	68.70
.2040	#6	5.181 mm		72.00 mm	(12x)	6 mm	125 mm	DQW2040-C8	79.30
.2055	#5	5.219 mm		36.00 mm	(5x)	6 mm	75 mm	BAF2055-C8	68.70
.2055	#5	5.219 mm		72.00 mm	(12x)	6 mm	125 mm	DQW2055-C8	79.30
.2090	#4	5.308 mm		36.00 mm	(5x)	6 mm	75 mm	BAF2090-C8	68.70
.2090	#4	5.308 mm		72.00 mm	(12x)	6 mm	125 mm	DQW2090-C8	79.30
.2129	#3	5.410 mm		26.00 mm	(3x)	6 mm	75 mm	AVA2129-C8	63.50
.2129	#3	5.410 mm		36.00 mm	(5x)	6 mm	75 mm	BAF2129-C8	68.70
.2129	#3	5.410 mm		52.00 mm	(8x)	6 mm	100 mm	CBG2129-C8	72.20
.2129	#3	5.410 mm		64.00 mm	(10x)	6 mm	125 mm	ERY2129-C8	75.60
.2129	#3	5.410 mm		74.00 mm	(12x)	6 mm	125 mm	DQW2129-C8	79.30
.2187 (7/32)		5.556 mm		26.00 mm	(3x)	6 mm	75 mm	AVA2187-C8	63.50
.2187 (7/32)		5.556 mm		38.00 mm	(5x)	6 mm	100 mm	BAF2187-C8	68.70
.2187 (7/32)		5.556 mm		54.00 mm	(8x)	6 mm	100 mm	CBG2187-C8	72.20
.2187 (7/32)		5.556 mm		66.00 mm	(10x)	6 mm	125 mm	ERY2187-C8	75.60
.2187 (7/32)		5.556 mm		76.00 mm	(12x)	6 mm	125 mm	DQW2187-C8	79.30
.2210	#2	5.613 mm		38.00 mm	(5x)	6 mm	100 mm	BAF2210-C8	68.70
.2210	#2	5.613 mm		78.00 mm	(12x)	6 mm	125 mm	DQW2210-C8	79.30
.2280	#1	5.791 mm		40.00 mm	(5x)	6 mm	100 mm	BAF2280-C8	68.70
.2280	#1	5.791 mm		80.00 mm	(12x)	6 mm	125 mm	DQW2280-C8	79.30
.2340	A	5.943 mm		40.00 mm	(5x)	6 mm	100 mm	BAF2340-C8	68.70
.2340	A	5.943 mm		82.00 mm	(12x)	6 mm	125 mm	DQW2340-C8	79.30
.2343 (15/64)		5.953 mm		28.00 mm	(3x)	6 mm	75 mm	AVA2343-C8	63.50
.2343 (15/64)		5.953 mm		40.00 mm	(5x)	6 mm	100 mm	BAF2343-C8	68.70
.2343 (15/64)		5.953 mm		58.00 mm	(8x)	6 mm	100 mm	CBG2343-C8	72.20
.2343 (15/64)		5.953 mm		70.00 mm	(10x)	6 mm	125 mm	ERY2343-C8	75.60
.2343 (15/64)		5.953 mm		82.00 mm	(12x)	6 mm	125 mm	DQW2343-C8	79.30
.2362		6.000 mm		28.00 mm	(3x)	6 mm	75 mm	AVA2362-C8	63.50
.2362		6.000 mm		40.00 mm	(5x)	6 mm	100 mm	BAF2362-C8	68.70
.2362		6.000 mm		58.00 mm	(8x)	6 mm	100 mm	CBG2362-C8	72.20
.2362		6.000 mm		70.00 mm	(10x)	6 mm	125 mm	ERY2362-C8	75.60
.2362		6.000 mm		82.00 mm	(12x)	6 mm	125 mm	DQW2362-C8	79.30
.2380	B	6.045 mm		40.00 mm	(5x)	8 mm	100 mm	BAF2380-C8	71.00
.2380	B	6.045 mm		84.00 mm	(12x)	8 mm	125 mm	DQW2380-C8	81.90

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	PRICE
.2420	C	6.146 mm		42.00 mm	(5x)	8 mm	100 mm	BAF2420-C8	71.00
.2420	C	6.146 mm		84.00 mm	(12x)	8 mm	125 mm	DQW2420-C8	81.90
.2460	D	6.248 mm		42.00 mm	(5x)	8 mm	100 mm	BAF2460-C8	71.00
.2460	D	6.248 mm		86.00 mm	(12x)	8 mm	150 mm	DQW2460-C8	81.90
.2500 (1/4)	E	6.350 mm		30.00 mm	(3x)	8 mm	75 mm	AVA2500-C8	63.50
.2500 (1/4)	E	6.350 mm	1.188		(3x)	1/4	3	FSD2500-C8	63.50
.2500 (1/4)	E	6.350 mm		42.00 mm	(5x)	8 mm	100 mm	BAF2500-C8	68.70
.2500 (1/4)	E	6.350 mm	1.680		(5x)	1/4	3-1/2	GNB2500-C8	68.70
.2500 (1/4)	E	6.350 mm	2.400		(8x)	1/4	4	HYX2500-C8	72.20
.2500 (1/4)	E	6.350 mm		62.00 mm	(8x)	8 mm	125 mm	CBG2500-C8	72.20
.2500 (1/4)	E	6.350 mm		74.00 mm	(10x)	8 mm	125 mm	ERY2500-C8	75.60
.2500 (1/4)	E	6.350 mm		88.00 mm	(12x)	8 mm	150 mm	DQW2500-C8	79.30
.2510		6.375 mm		42.00 mm	(5x)	8 mm	100 mm	BAF2510-C8	78.00
.2570	F	6.528 mm		44.00 mm	(5x)	8 mm	100 mm	BAF2570-C8	78.00
.2812 (9/32)		7.142 mm		48.00 mm	(5x)	8 mm	100 mm	BAF2812-C8	78.00
.3125 (5/16)		7.937 mm		54.00 mm	(5x)	8 mm	100 mm	BAF3125-C8	78.00
.3150		8.000 mm		54.00 mm	(5x)	8 mm	100 mm	BAF3150-C8	78.00
.3750 (3/8)		9.525 mm		46.00 mm	(3x)	10 mm	100 mm	AVA3750-C8	123.40
.3750 (3/8)		9.525 mm		64.00 mm	(5x)	10 mm	125 mm	BAF3750-C8	133.90
.3770	V	9.575 mm		46.00 mm	(3x)	10 mm	100 mm	AVA3770-C8	123.40
.3770	V	9.575 mm		64.00 mm	(5x)	10 mm	125 mm	BAF3770-C8	133.90
.3937		10.000 mm		68.00 mm	(5x)	10 mm	125 mm	BAF3937-C8	133.90
.4375 (7/16)		11.112 mm		76.00 mm	(5x)	12 mm	125 mm	BAF4375-C8	170.10
.4724		12.000 mm		82.00 mm	(5x)	12 mm	125 mm	BAF4724-C8	170.10
.5000 (1/2)		12.700 mm		86.00 mm	(5x)	16 mm	150 mm	BAF5000-C8	299.10

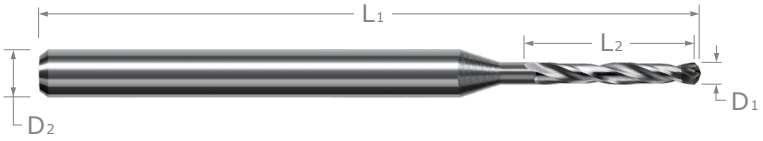
SPEEDS & FEEDS (Miniature High Performance Drills – Aluminum Alloys)

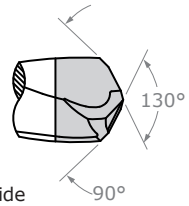
Important Note: Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%; for 12x, reduce to 65%). Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x diameter with each subsequent peck at 2-3x diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material (Hardness: ≤ 28 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter										
		.015	.031	.047	.062	.078	.093	.125	.187	.250	.375	.500
Aluminum Alloys: Casting (2xx, 5xx, 7xx, 8xx)	450	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320	.01980	.02640
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600											
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00071	.00147	.00223	.00295	.00371	.00442	.00594	.00889	.01188	.00889	.02376
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420											
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390											
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350											
Wrought - 5%-8% Si (4xxx)	600											
Wrought - 8%-12% Si (4xxx)	480											
Magnesium Alloys	900	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320	.01782	.02640
Zinc Alloys	480											
Copper Alloys: High Coppers - 90%+ (C1xxx)	170	.00063	.00131	.00199	.00262	.00329	.00393	.00528	.00790	.01056	.01980	.02112
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375											
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170											
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375											
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375											
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170											
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400											
Plastics: Unfilled Plastics	500	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320	.01584	.02640
Reinforced Plastics	350	.00063	.00131	.00199	.00329	.00393	.00528	.00790	.01056	.01584	.02112	.02640

MINIATURE HIGH PERFORMANCE DRILLS

PCD Diamond – Double Angle – Metric





- PCD diamond brazed on entire end of solid carbide body allows for increased tool life over carbide
- Full PCD tip allows for positive cutting geometry
- Double angle point geometry for superior performance in preventing push-out and delamination in layered composites
- Recommended work piece material: aluminum, copper, brass, bronze, plastic, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- h6 shank tolerance for high precision tool holders

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BCF0937	627.30
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BCF1181	627.30
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BCF1250	577.10
.1299		3.300 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	BCF1299	577.10
.1650		4.190 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BCF1650	637.90
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BCF1875	637.90
.1910	#11	4.851 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BCF1910	637.90
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BCF2500	734.50
.2510		6.375 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BCF2510	734.50

For PCD End Mills, see pages 241, 242, 243.

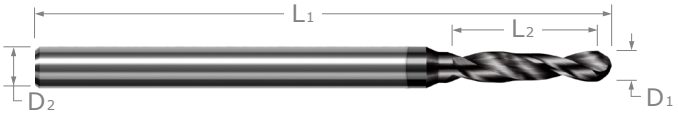
SPEEDS & FEEDS (Miniature High Performance Drills – PCD Diamond – Metric)

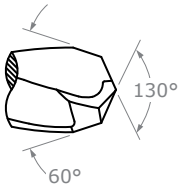
Important Note: Values in table are in inches and are based on 5x drill lengths. Since the melting point varies greatly from in plastics, the speed (RPM) used should be closely supervised. An additional reduction in RPM may be necessary to avoid excessive fraying, splitting and tear out of fibers. Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. For Metal Matrix Composites with aluminum, pecking should begin when part thickness is more than 1x Diameter and a feed reduction of 30%. For titanium, pecking should begin when part thickness is more than .5x Diameter and a feed reduction of 50% with a subsequent peck .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material	Type	Hardness	SFM	Chip Load (IPR) By Drill Diameter				
				.078	.093	.125	.187	.250
Unfilled Plastics ETFE, FEP, HDPE, LDPE, PFA, Polyurethane, PTFE, Rulon, Teflon, UHMW	Unfilled	50 < 100 Rr, (55 < 85 Shore D)	800 - 1200	.0037	.0045	.0060	.0090	.0120
Acrylic, Acetal, Delrin, Lucite, Nylon 6, Nylon 6/6, PAI, PI, PEEK, Plexiglas, PS, PSU, Torlon 4203, Ultem 1000	Unfilled	100 > 150 Rr	500 - 800	.0041	.0049	.0066	.0099	.0132
Filled Plastics Vespel SP-3	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	50 < 100 Rr, (55 < 85 Shore D)	800 - 1200	.0037	.0045	.0060	.0090	.0120
Nyoil, Nylatron, Plavis MS, Torlon 4301	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	100 > 150 Rr	500 - 800	.0041	.0049	.0066	.0099	.0132
	Carbon/Glass Filled 5% < 20%	100 > 150 Rr	400 - 600	.0041	.0049	.0066	.0099	.0132
	Carbon/Glass Filled 21% < 40%	100 > 150 Rr	350 - 500	.0034	.0040	.0054	.0081	.0108
Fiber Reinforced Plastics FR4, G10, G11	Carbon/Glass Fiber 5% < 20%	100 > 150 Rr	350 - 500	.0041	.0049	.0066	.0099	.0132
G30	Carbon/Glass Fiber 21% < 40%	100 > 150 Rr	200 - 300	.0034	.0040	.0054	.0081	.0108
Metal Matrix Composites	Aluminum/Composite Layered		320 - 500	.0041	.0049	.0066	.0099	.0132
	Titanium/Composite Layered		160 - 260	.0030	.0036	.0048	.0072	.0096
Graphite POCO 3			400 - 600	.0043	.0051	.0069	.0103	.0138
Green Ceramic & Green Carbide			100 - 300	.0039	.0047	.0063	.0094	.0126

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle





- Optimized for drilling layered composites with excellent performance in virgin plastics and other composite materials
- Double angle geometry for superior performance in preventing push-out and delamination in layered composites
- Amorphous diamond coated for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

Double Angle Point Geometry Prevents Delamination

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	DDB0312-C4	63.20
.0312 (1/32)		.793 mm		**5.40 mm**	(5x)	3 mm	50 mm	DDA0312-C4	63.80
.0314		.800 mm		**5.40 mm**	(5x)	3 mm	50 mm	DDA0315-C4	63.80
.0320	#67	.812 mm		**5.40 mm**	(5x)	3 mm	50 mm	DDA0320-C4	63.80
.0320	#67	.812 mm	.216		(5x)	1/8	2	DDB0320-C4	63.20
.0330	#66	.838 mm		**5.60 mm**	(5x)	3 mm	50 mm	DDA0330-C4	63.80
.0350	#65	.889 mm		**6.00 mm**	(5x)	3 mm	50 mm	DDA0350-C4	63.80
.0350	#65	.889 mm	.240		(5x)	1/8	2	DDB0350-C4	63.20
.0354		.900 mm		**6.00 mm**	(5x)	3 mm	50 mm	DDA0354-C4	63.80
.0360	#64	.914 mm		**6.20 mm**	(5x)	3 mm	50 mm	DDA0360-C4	63.80
.0370	#63	.939 mm		**6.40 mm**	(5x)	3 mm	50 mm	DDA0370-C4	63.80
.0380	#62	.965 mm		**6.60 mm**	(5x)	3 mm	50 mm	DDA0380-C4	63.80
.0390	#61	.990 mm		**6.60 mm**	(5x)	3 mm	50 mm	DDA0390-C4	63.80
.0393		1.000 mm		**6.80 mm**	(5x)	3 mm	50 mm	DDA0393-C4	65.40
.0400	#60	1.016 mm		**6.80 mm**	(5x)	3 mm	50 mm	DDA0400-C4	65.40
.0400	#60	1.016 mm	.272		(5x)	1/8	2	DDB0400-C4	64.70
.0410	#59	1.041 mm		**7.00 mm**	(5x)	3 mm	50 mm	DDA0410-C4	65.40
.0420	#58	1.066 mm		**7.20 mm**	(5x)	3 mm	50 mm	DDA0420-C4	65.40
.0430	#57	1.092 mm		**7.40 mm**	(5x)	3 mm	50 mm	DDA0430-C4	65.40
.0450		1.143 mm		**7.80 mm**	(5x)	3 mm	50 mm	DDA0450-C4	65.40
.0465	#56	1.181 mm	.312		(5x)	1/8	2	DDB0465-C4	64.70
.0465	#56	1.181 mm		**8.00 mm**	(5x)	3 mm	50 mm	DDA0465-C4	65.40
.0468 (3/64)		1.190 mm		**8.00 mm**	(5x)	3 mm	50 mm	DDA0468-C4	65.40
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	DDB0468-C4	64.70
.0492		1.250 mm		**8.50 mm**	(5x)	3 mm	50 mm	DDA0492-C4	65.40
.0500		1.270 mm		**8.50 mm**	(5x)	3 mm	50 mm	DDA0500-C4	65.40
.0500		1.270 mm	.340		(5x)	1/8	2	DDB0500-C4	64.70
.0520	#55	1.320 mm		**9.00 mm**	(5x)	3 mm	50 mm	DDA0520-C4	65.40
.0520	#55	1.320 mm	.360		(5x)	1/8	2	DDB0520-C4	64.70
.0550	#54	1.397 mm		**9.50 mm**	(5x)	3 mm	50 mm	DDA0550-C4	65.40
.0550	#54	1.397 mm	.380		(5x)	1/8	2	DDB0550-C4	64.70
.0590		1.500 mm		**10.00 mm**	(5x)	3 mm	50 mm	DDA0590-C4	66.30

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MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	PRICE
.0595	#53	1.511 mm		**10.00 mm**	(5x)	3 mm	50 mm	DDA0595-C4	66.30
.0600		1.524 mm		**10.50 mm**	(5x)	3 mm	50 mm	DDA0600-C4	66.30
.0625 (1/16)		1.587 mm		**10.50 mm**	(5x)	3 mm	50 mm	DDA0625-C4	66.30
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	DDB0625-C4	65.70
.0635	#52	1.612 mm		**11.00 mm**	(5x)	3 mm	50 mm	DDA0635-C4	66.30
.0670	#51	1.701 mm		**11.50 mm**	(5x)	3 mm	50 mm	DDA0670-C4	66.30
.0700	#50	1.778 mm		**12.00 mm**	(5x)	3 mm	50 mm	DDA0700-C4	66.30
.0730	#49	1.854 mm		**12.50 mm**	(5x)	3 mm	50 mm	DDA0730-C4	66.30
.0760	#48	1.930 mm		**13.00 mm**	(5x)	3 mm	50 mm	DDA0760-C4	66.30
.0781 (5/64)		1.984 mm		**13.50 mm**	(5x)	3 mm	50 mm	DDA0781-C4	66.30
.0785	#47	1.993 mm		**13.50 mm**	(5x)	3 mm	50 mm	DDA0785-C4	66.30
.0787		2.000 mm		**13.50 mm**	(5x)	4 mm	50 mm	DDA0787-C4	67.50
.0800		2.032 mm		**13.50 mm**	(5x)	4 mm	50 mm	DDA0800-C4	67.50
.0810	#46	2.057 mm		**14.00 mm**	(5x)	4 mm	50 mm	DDA0810-C4	67.50
.0820	#45	2.082 mm		**14.00 mm**	(5x)	4 mm	50 mm	DDA0820-C4	67.50
.0860	#44	2.184 mm		**14.50 mm**	(5x)	4 mm	50 mm	DDA0860-C4	67.50
.0890	#43	2.260 mm		**15.00 mm**	(5x)	4 mm	50 mm	DDA0890-C4	67.50
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	DDB0890-C4	66.80
.0900		2.286 mm		**15.00 mm**	(5x)	4 mm	50 mm	DDA0900-C4	67.50
.0935	#42	2.374 mm		**16.00 mm**	(5x)	4 mm	63 mm	DDA0935-C4	67.50
.0937 (3/32)		2.381 mm		**16.00 mm**	(5x)	4 mm	63 mm	DDA0937-C4	67.50
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	DDB0937-C4	66.80
.0937 (3/32)		2.381 mm		**23.00 mm**	(8x)	4 mm	63 mm	AWS0937-C4	71.30
.0960	#41	2.438 mm		**16.00 mm**	(5x)	4 mm	63 mm	DDA0960-C4	67.50
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	DDB0960-C4	66.80
.0980	#40	2.489 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA0980-C4	67.50
.0984		2.500 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA0984-C4	68.00
.0995	#39	2.527 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA0995-C4	68.00
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	DDB0995-C4	67.40
.1000		2.540 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA1000-C4	68.00
.1000		2.540 mm		**25.00 mm**	(8x)	4 mm	63 mm	AWS1000-C4	71.30
.1015	#38	2.578 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA1015-C4	68.00
.1040	#37	2.641 mm		**18.00 mm**	(5x)	4 mm	63 mm	DDA1040-C4	68.00
.1065	#36	2.705 mm		**18.00 mm**	(5x)	4 mm	63 mm	DDA1065-C4	68.00
.1093 (7/64)		2.778 mm		**19.00 mm**	(5x)	4 mm	63 mm	DDA1093-C4	68.00
.1100	#35	2.794 mm		**19.00 mm**	(5x)	4 mm	63 mm	DDA1100-C4	68.00
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	DDB1100-C4	67.40
.1110	#34	2.819 mm		**19.00 mm**	(5x)	4 mm	63 mm	DDA1110-C4	68.00
.1130	#33	2.870 mm		**19.00 mm**	(5x)	4 mm	63 mm	DDA1130-C4	68.00
.1160	#32	2.946 mm		**20.00 mm**	(5x)	4 mm	63 mm	DDA1160-C4	68.00
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	DDB1160-C4	67.40
.1181		3.000 mm		**20.00 mm**	(5x)	4 mm	63 mm	DDA1181-C4	69.60
.1181		3.000 mm		**29.00 mm**	(8x)	4 mm	63 mm	AWS1181-C4	73.40

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	DDB1200-C4	81.60
.1200	#31	3.048 mm		**21.00 mm**	(5x)	6 mm	63 mm	DDA1200-C4	82.30
.1250 (1/8)		3.175 mm		**15.00 mm**	(3x)	6 mm	63 mm	BAA1250-C4	78.50
.1250 (1/8)		3.175 mm		**21.00 mm**	(5x)	6 mm	63 mm	DDA1250-C4	82.30
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	DDB1250-C4	81.60
.1250 (1/8)		3.175 mm		**31.00 mm**	(8x)	6 mm	75 mm	AWS1250-C4	87.00
.1285	#30	3.263 mm		**22.00 mm**	(5x)	6 mm	63 mm	DDA1285-C4	82.30
.1360	#29	3.454 mm		**23.00 mm**	(5x)	6 mm	63 mm	DDA1360-C4	82.30
.1406 (9/64)		3.571 mm		**24.00 mm**	(5x)	6 mm	75 mm	DDA1406-C4	82.30
.1470	#26	3.733 mm		**26.00 mm**	(5x)	6 mm	75 mm	DDA1470-C4	82.30
.1562 (5/32)		3.968 mm		**26.00 mm**	(5x)	6 mm	75 mm	DDA1562-C4	82.30
.1574		4.000 mm		**28.00 mm**	(5x)	6 mm	75 mm	DDA1574-C4	82.30
.1590	#21	4.038 mm		**28.00 mm**	(5x)	6 mm	75 mm	DDA1590-C4	82.30
.1718 (11/64)		4.365 mm		**30.00 mm**	(5x)	6 mm	75 mm	DDA1718-C4	82.30
.1770	#16	4.495 mm		**30.00 mm**	(5x)	6 mm	75 mm	DDA1770-C4	82.30
.1800	#15	4.572 mm		**30.00 mm**	(5x)	6 mm	75 mm	DDA1800-C4	82.30
.1875 (3/16)		4.762 mm		**32.00 mm**	(5x)	6 mm	75 mm	DDA1875-C4	82.30
.1875 (3/16)		4.762 mm		**46.00 mm**	(8x)	6 mm	100 mm	AWS1875-C4	87.00
.1909		4.851 mm		**23.00 mm**	(3x)	6 mm	63 mm	BAA1909-C4	78.50
.1909		4.851 mm		**32.00 mm**	(5x)	6 mm	75 mm	DDA1909-C4	82.30
.1968		5.000 mm		**34.00 mm**	(5x)	6 mm	75 mm	DDA1968-C4	82.30
.2009	#7	5.105 mm		**34.00 mm**	(5x)	6 mm	75 mm	DDA2009-C4	82.30
.2031 (13/64)		5.159 mm		**34.00 mm**	(5x)	6 mm	75 mm	DDA2031-C4	82.30
.2129	#3	5.410 mm		**36.00 mm**	(5x)	6 mm	75 mm	DDA2129-C4	82.30
.2187 (7/32)		5.556 mm		**38.00 mm**	(5x)	6 mm	100 mm	DDA2187-C4	82.30
.2343 (15/64)		5.953 mm		**40.00 mm**	(5x)	6 mm	100 mm	DDA2343-C4	82.30
.2362		6.000 mm		**40.00 mm**	(5x)	6 mm	100 mm	DDA2362-C4	82.30
.2500 (1/4)	E	6.350 mm		**30.00 mm**	(3x)	8 mm	75 mm	BAA2500-C4	78.50
.2500 (1/4)	E	6.350 mm		**42.00 mm**	(5x)	8 mm	100 mm	DDA2500-C4	82.30
.2500 (1/4)	E	6.350 mm		**62.00 mm**	(8x)	8 mm	125 mm	AWS2500-C4	87.00
.2570		6.528 mm		**32.00 mm**	(3x)	8 mm	75 mm	BAA2570-C4	107.20
.2812		7.142 mm		**34.00 mm**	(3x)	8 mm	75 mm	BAA2812-C4	107.20
.3125 (5/16)		7.937 mm		**38.00 mm**	(3x)	8 mm	100 mm	BAA3125-C4	107.20
.3150		8.000 mm		**38.00 mm**	(3x)	8 mm	100 mm	BAA3150-C4	107.20
.3750 (3/8)		9.525 mm		**46.00 mm**	(3x)	10 mm	100 mm	BAA3750-C4	140.30

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

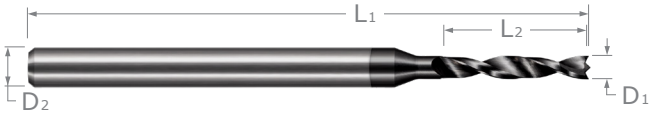
SPEEDS & FEEDS (Miniature High Performance Drills – Composites)

Important Note: Posted chiploads are for the double angle drills. For brad point drills, reduce chiploads by approx. 10%. Since the melting point varies greatly from plastic to plastic, the speed (RPM) used should be closely supervised. An additional reduction in RPM may be necessary to avoid excessive fraying, splitting and tear out of fibers. Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. Look at our online speeds and feeds for more information. For complete speeds and feeds charts, please go to www.harveytool.com.

Material Type		Type	Hardness	SFM	Chip Load Per Revolution (IPR) By Cutter Diameter									
					.015	.031	.047	.062	.078	.093	.125	.187	.250	.375
Unfilled Plastics	ETFE, FEP, HDPE, LDPE, PFA, Polyurethane, PTFE, Rulon, Teflon, UHMW	Unfilled	50 < 100 Rr, 55 < 85 Shore D	800-1200	.0006	.0013	.0020	.0027	.0034	.0040	.0054	.0081	.0108	.0162
	Acrylic, Acetal, Delrin, Lucite, Nylon 6, Nylon 6/6, PAI, PI, PEEK, Plexiglas, PS, PSU, Torlon 4203, Ultem 1000	Unfilled	100 > 150 Rr	500-800	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119	.0178
Filled Plastics	Vespel SP-3	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	50 < 100 Rr, 55 < 85 Shore D	800-1200	.0006	.0013	.0020	.0027	.0034	.0040	.0054	.0081	.0108	.0162
	Nyoil, Nylatron, Plavis MS, Torlon 4301	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	100 > 150 Rr	500-800	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119	.0178
		Carbon/Glass Filled 5% < 20%	100 > 150 Rr	400-600	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119	0178
		Carbon/Glass Filled 21% < 40%	100 > 150 Rr	350-500	.0006	.0012	.0018	.0024	.0030	.0036	.0049	.0073	.0097	.0146
Fiber Reinforced	FR4, G10, G11	Carbon/Glass Fiber 5% < 20%	100 > 150 Rr	350-500	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119	.0178
	G30	Carbon/Glass Fiber 21% < 40%	100 > 150 Rr	200-300	.0006	.0012	.0018	.0024	.0030	.0036	.0049	.0073	.0097	.0146

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Brad Point – Metric



- Optimized for drilling glass or carbon fiber filled and reinforced composites with excellent performance in other filled, layered, and woven composite materials
- Center and OD spur point geometry for accurate scoring action, prevents fraying, uncut fibers, and tear out
- Amorphous diamond coating for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

Brad Point Prevents Fraying & Tear Out

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0312-C4	54.90
.0315		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0315-C4	54.90
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0320-C4	54.90
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	BSW0330-C4	54.90
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BSW0350-C4	54.90
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BSW0354-C4	54.90
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	BSW0360-C4	54.90
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	BSW0370-C4	54.90
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BSW0380-C4	54.90
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BSW0390-C4	54.90
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BSW0393-C4	57.40
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BSW0400-C4	57.40
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	BSW0410-C4	57.40
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	BSW0420-C4	57.40
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	BSW0430-C4	57.40
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	BSW0450-C4	57.40
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BSW0465-C4	57.40
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BSW0468-C4	57.40
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BSW0492-C4	57.40
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BSW0500-C4	57.40
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	BSW0520-C4	57.40
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	BSW0550-C4	57.40
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BSW0590-C4	57.40
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BSW0595-C4	57.40
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BSW0600-C4	57.40
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BSW0625-C4	57.40
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	BSW0635-C4	57.40
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	BSW0670-C4	57.40
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	BSW0700-C4	57.40
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	BSW0730-C4	57.40
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	BSW0760-C4	57.40
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BSW0781-C4	57.40
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BSW0785-C4	57.40
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BSW0787-C4	59.80
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BSW0800-C4	59.80
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BSW0810-C4	59.80
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BSW0820-C4	59.80

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Brad Point – Metric (cont.)

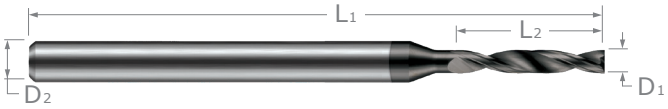
continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	BSW0860-C4	59.80
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BSW0890-C4	59.80
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BSW0900-C4	59.80
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0935-C4	60.50
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0937-C4	60.50
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0960-C4	60.50
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0980-C4	60.50
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0984-C4	61.00
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0995-C4	61.00
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW1000-C4	61.00
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW1015-C4	61.00
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BSW1040-C4	61.00
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BSW1065-C4	61.00
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1093-C4	61.00
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1100-C4	61.00
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1110-C4	61.00
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1130-C4	61.00
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BSW1160-C4	61.00
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BSW1181-C4	61.00
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BSW1200-C4	70.40
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BSW1250-C4	70.40
.1285	#30	3.263 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	BSW1285-C4	70.40
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	BSW1360-C4	70.40
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BSW1406-C4	70.40
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BSW1470-C4	70.40
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BSW1562-C4	70.40
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BSW1574-C4	70.40
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BSW1590-C4	70.40
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1718-C4	70.40
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1770-C4	70.40
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1800-C4	70.40
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BSW1875-C4	70.40
.1909		4.851 mm	1.259	**32.00 mm**	(5x)	6 mm	75 mm	BSW1909-C4	70.40
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW1968-C4	70.40
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW2009-C4	70.40
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW2031-C4	70.40
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BSW2129-C4	70.40
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BSW2187-C4	70.40
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BSW2343-C4	70.40
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BSW2362-C4	70.40
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BSW2500-C4	70.40
.2570		6.528 mm	1.259	**32.00 mm**	(3x)	8 mm	75 mm	BSX2570-C4	107.80
.2812		7.142 mm	1.338	**34.00 mm**	(3x)	8 mm	75 mm	BSX2812-C4	117.70
.3125 (5/16)		7.937 mm	1.496	**38.00 mm**	(3x)	8 mm	100 mm	BSX3125-C4	117.70
.3150		8.000 mm	1.496	**38.00 mm**	(3x)	8 mm	100 mm	BSX3150-C4	140.50
.3750 (3/8)		9.525 mm	1.811	**46.00 mm**	(3x)	10 mm	100 mm	BSX3750-C4	147.00

PLEASE SEE SPEEDS & FEEDS ON PAGE 483

MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom



Ideal for Inclined & Rounded Surfaces

- Flat bottom design (no point angle and no dish) allows for drilling on irregular surfaces and reduces burrs on break through
- Ideal for drilling on inclined and rounded surfaces, creating flat bottom holes, tilted drilling for angled holes, and drilling intersecting holes, half holes, shoulders, or thin plates
- AlTiN coating for improved lubricity and heat resistance
- TiB2 coating for added lubricity and improved tool life in aluminum
- h6 tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

No Point Angle & No Dish Allows for Drilling On Irregular Surfaces

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	FBG0312-C3	50.80	FBG0312-C8	54.30
.0312 (1/32)		.793 mm		**3.80 mm**	(3x)	3 mm	50 mm	FBF0312-C3	48.70	FBF0312-C8	51.30
.0312 (1/32)		.793 mm		**5.40 mm**	(5x)	3 mm	50 mm	FBD0312-C3	51.80	FBD0312-C8	55.30
.0314		.800 mm		**5.40 mm**	(5x)	3 mm	50 mm	FBD0315-C3	51.80	FBD0315-C8	55.30
.0320	#67	.812 mm		**5.40 mm**	(5x)	3 mm	50 mm	FBD0320-C3	51.80	FBD0320-C8	55.30
.0320	#67	.812 mm	.216		(5x)	1/8	2	FBG0320-C3	50.80	FBG0320-C8	54.30
.0330	#66	.838 mm		**5.60 mm**	(5x)	3 mm	50 mm	FBD0330-C3	51.80	FBD0330-C8	55.30
.0350	#65	.889 mm		**6.00 mm**	(5x)	3 mm	50 mm	FBD0350-C3	51.80	FBD0350-C8	55.30
.0350	#65	.889 mm	.240		(5x)	1/8	2	FBG0350-C3	50.80	FBG0350-C8	54.30
.0354		.900 mm		**6.00 mm**	(5x)	3 mm	50 mm	FBD0354-C3	51.80	FBD0354-C8	55.30
.0360	#64	.914 mm		**6.20 mm**	(5x)	3 mm	50 mm	FBD0360-C3	51.80	FBD0360-C8	55.30
.0370	#63	.939 mm		**6.40 mm**	(5x)	3 mm	50 mm	FBD0370-C3	51.80	FBD0370-C8	55.30
.0380	#62	.965 mm		**6.60 mm**	(5x)	3 mm	50 mm	FBD0380-C3	51.80	FBD0380-C8	55.30
.0390	#61	.990 mm		**6.60 mm**	(5x)	3 mm	50 mm	FBD0390-C3	51.80	FBD0390-C8	55.30
.0393		1.000 mm		**6.80 mm**	(5x)	3 mm	50 mm	FBD0393-C3	56.80	FBD0393-C8	60.40
.0400	#60	1.016 mm		**6.80 mm**	(5x)	3 mm	50 mm	FBD0400-C3	56.80	FBD0400-C8	60.40
.0400	#60	1.016 mm	.272		(5x)	1/8	2	FBG0400-C3	55.80	FBG0400-C8	59.30
.0410	#59	1.041 mm		**7.00 mm**	(5x)	3 mm	50 mm	FBD0410-C3	56.80	FBD0410-C8	60.40
.0420	#58	1.066 mm		**7.20 mm**	(5x)	3 mm	50 mm	FBD0420-C3	56.80	FBD0420-C8	60.40
.0430	#57	1.092 mm		**7.40 mm**	(5x)	3 mm	50 mm	FBD0430-C3	56.80	FBD0430-C8	60.40
.0450		1.143 mm		**7.80 mm**	(5x)	3 mm	50 mm	FBD0450-C3	56.80	FBD0450-C8	60.40
.0465	#56	1.181 mm		**8.00 mm**	(5x)	3 mm	50 mm	FBD0465-C3	56.80	FBD0465-C8	60.40
.0465	#56	1.181 mm	.312		(5x)	1/8	2	FBG0465-C3	55.80	FBG0465-C8	59.30
.0468 (3/64)		1.190 mm		**5.60 mm**	(3x)	3 mm	50 mm	FBF0468-C3	53.70	FBF0468-C8	56.30
.0468 (3/64)		1.190 mm		**8.00 mm**	(5x)	3 mm	50 mm	FBD0468-C3	56.80	FBD0468-C8	60.40
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	FBG0468-C3	55.80	FBG0468-C8	59.30
.0492		1.250 mm		**8.50 mm**	(5x)	3 mm	50 mm	FBD0492-C3	56.80	FBD0492-C8	60.40
.0500		1.270 mm		**8.50 mm**	(5x)	3 mm	50 mm	FBD0500-C3	56.80	FBD0500-C8	60.40
.0500		1.270 mm	.340		(5x)	1/8	2	FBG0500-C3	55.80	FBG0500-C8	59.30
.0520	#55	1.320 mm		**9.00 mm**	(5x)	3 mm	50 mm	FBD0520-C3	56.80	FBD0520-C8	60.40
.0520	#55	1.320 mm	.360		(5x)	1/8	2	FBG0520-C3	55.80	FBG0520-C8	59.30
.0550	#54	1.397 mm		**9.50 mm**	(5x)	3 mm	50 mm	FBD0550-C3	56.80	FBD0550-C8	60.40
.0550	#54	1.397 mm	.380		(5x)	1/8	2	FBG0550-C3	55.80	FBG0550-C8	59.30

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MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.0590		1.500 mm		**10.00 mm**	(5x)	3 mm	50 mm	FBD0590-C3	61.10	FBD0590-C8	64.70
.0595	#53	1.511 mm		**10.00 mm**	(5x)	3 mm	50 mm	FBD0595-C3	61.10	FBD0595-C8	64.70
.0600		1.524 mm		**10.50 mm**	(5x)	3 mm	50 mm	FBD0600-C3	61.10	FBD0600-C8	64.70
.0625 (1/16)		1.587 mm		**7.60 mm**	(3x)	3 mm	50 mm	FBF0625-C3	58.00	FBF0625-C8	61.40
.0625 (1/16)		1.587 mm		**10.50 mm**	(5x)	3 mm	50 mm	FBD0625-C3	61.10	FBD0625-C8	64.70
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	FBG0625-C3	59.90	FBG0625-C8	63.50
.0635	#52	1.612 mm		**11.00 mm**	(5x)	3 mm	50 mm	FBD0635-C3	61.10	FBD0635-C8	64.70
.0670	#51	1.701 mm		**11.50 mm**	(5x)	3 mm	50 mm	FBD0670-C3	61.10	FBD0670-C8	64.70
.0700	#50	1.778 mm		**8.50 mm**	(3x)	3 mm	50 mm	FBF0700-C3	58.00	FBF0700-C8	61.40
.0700	#50	1.778 mm		**12.00 mm**	(5x)	3 mm	50 mm	FBD0700-C3	61.10	FBD0700-C8	64.70
.0700	#50	1.778 mm	.480		(5x)	1/8	2	FBG0700-C3	59.90	FBG0700-C8	63.50
.0730	#49	1.854 mm		**12.50 mm**	(5x)	3 mm	50 mm	FBD0730-C3	61.10	FBD0730-C8	64.70
.0760	#48	1.930 mm		**13.00 mm**	(5x)	3 mm	50 mm	FBD0760-C3	61.10	FBD0760-C8	64.70
.0781		1.984 mm	.520		(5x)	1/8	2	FBG0781-C3	59.90	FBG0781-C8	63.50
.0781 (5/64)		1.984 mm		**13.50 mm**	(5x)	3 mm	50 mm	FBD0781-C3	61.10	FBD0781-C8	64.70
.0785	#47	1.993 mm		**13.50 mm**	(5x)	3 mm	50 mm	FBD0785-C3	61.10	FBD0785-C8	64.70
.0787		2.000 mm		**13.50 mm**	(5x)	4 mm	50 mm	FBD0787-C3	66.00	FBD0787-C8	69.40
.0800		2.032 mm		**9.50 mm**	(3x)	4 mm	50 mm	FBF0800-C3	62.90	FBF0800-C8	65.10
.0800		2.032 mm		**13.50 mm**	(5x)	4 mm	50 mm	FBD0800-C3	66.00	FBD0800-C8	69.40
.0810	#46	2.057 mm		**14.00 mm**	(5x)	4 mm	50 mm	FBD0810-C3	66.00	FBD0810-C8	69.40
.0820	#45	2.082 mm		**14.00 mm**	(5x)	4 mm	50 mm	FBD0820-C3	66.00	FBD0820-C8	69.40
.0860	#44	2.184 mm		**14.50 mm**	(5x)	4 mm	50 mm	FBD0860-C3	66.00	FBD0860-C8	69.40
.0860	#44	2.184 mm	.580		(5x)	3/16	2-1/2	FBG0860-C3	64.70	FBG0860-C8	68.10
.0890	#43	2.260 mm		**10.50 mm**	(3x)	4 mm	50 mm	FBF0890-C3	62.90	FBF0890-C8	65.10
.0890	#43	2.260 mm		**15.00 mm**	(5x)	4 mm	50 mm	FBD0890-C3	66.00	FBD0890-C8	69.40
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	FBG0890-C3	64.70	FBG0890-C8	68.10
.0900		2.286 mm		**11.00 mm**	(3x)	4 mm	50 mm	FBF0900-C3	62.90	FBF0900-C8	65.10
.0900		2.286 mm		**15.00 mm**	(5x)	4 mm	50 mm	FBD0900-C3	66.00	FBD0900-C8	69.40
.0935	#42	2.374 mm		**16.00 mm**	(5x)	4 mm	63 mm	FBD0935-C3	66.00	FBD0935-C8	69.40
.0937 (3/32)		2.381 mm		**11.50 mm**	(3x)	4 mm	50 mm	FBF0937-C3	62.90	FBF0937-C8	65.10
.0937 (3/32)		2.381 mm		**16.00 mm**	(5x)	4 mm	63 mm	FBD0937-C3	66.00	FBD0937-C8	69.40
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	FBG0937-C3	64.70	FBG0937-C8	68.10
.0960	#41	2.438 mm		**16.00 mm**	(5x)	4 mm	63 mm	FBD0960-C3	66.00	FBD0960-C8	69.40
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	FBG0960-C3	64.70	FBG0960-C8	68.10
.0980	#40	2.489 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD0980-C3	66.00	FBD0980-C8	69.40
.0984		2.500 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD0984-C3	69.90	FBD0984-C8	73.50
.0995	#39	2.527 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD0995-C3	69.90	FBD0995-C8	73.50
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	FBG0995-C3	68.60	FBG0995-C8	72.20
.1000		2.540 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD1000-C3	69.90	FBD1000-C8	73.50
.1015	#38	2.578 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD1015-C3	69.90	FBD1015-C8	73.50
.1040	#37	2.641 mm		**18.00 mm**	(5x)	4 mm	63 mm	FBD1040-C3	69.90	FBD1040-C8	73.50
.1065	#36	2.705 mm		**18.00 mm**	(5x)	4 mm	63 mm	FBD1065-C3	69.90	FBD1065-C8	73.50
.1093 (7/64)		2.778 mm		**19.00 mm**	(5x)	4 mm	63 mm	FBD1093-C3	69.90	FBD1093-C8	73.50
.1100	#35	2.794 mm		**19.00 mm**	(5x)	4 mm	63 mm	FBD1100-C3	69.90	FBD1100-C8	73.50

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MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	FBG1100-C3	68.60	FBG1100-C8	72.20
.1110	#34	2.819 mm		**19.00 mm**	(5x)	4 mm	63 mm	FBD1110-C3	69.90	FBD1110-C8	73.50
.1130	#33	2.870 mm		**19.00 mm**	(5x)	4 mm	63 mm	FBD1130-C3	69.90	FBD1130-C8	73.50
.1160	#32	2.946 mm		**20.00 mm**	(5x)	4 mm	63 mm	FBD1160-C3	69.90	FBD1160-C8	73.50
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	FBG1160-C3	68.60	FBG1160-C8	72.20
.1181		3.000 mm		**14.50 mm**	(3x)	4 mm	50 mm	FBF1181-C3	66.80	FBF1181-C8	69.10
.1181		3.000 mm		**20.00 mm**	(5x)	4 mm	63 mm	FBD1181-C3	69.90	FBD1181-C8	73.50
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.1200	#31	3.048 mm		**14.50 mm**	(3x)	6 mm	63 mm	FBF1200-C3	74.70	FBF1200-C8	78.10
.1200	#31	3.048 mm		**21.00 mm**	(5x)	6 mm	63 mm	FBD1200-C3	78.30	FBD1200-C8	81.80
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	FBG1200-C3	76.90	FBG1200-C8	80.30
.1250 (1/8)		3.175 mm		**15.00 mm**	(3x)	6 mm	63 mm	FBF1250-C3	74.70	FBF1250-C8	78.10
.1250 (1/8)		3.175 mm		**21.00 mm**	(5x)	6 mm	63 mm	FBD1250-C3	78.30	FBD1250-C8	81.80
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	FBG1250-C3	76.90	FBG1250-C8	80.30
.1285	#30	3.264 mm	.880		(5x)	1/4	2-1/2	FBG1285-C3	76.90	FBG1285-C8	80.30
.1360	#29	3.454 mm		**16.00 mm**	(3x)	6 mm	63 mm	FBF1360-C3	74.70	FBF1360-C8	78.10
.1360	#29	3.454 mm		**23.00 mm**	(5x)	6 mm	63 mm	FBD1360-C3	78.30	FBD1360-C8	81.80
.1360	#29	3.454 mm	.920		(5x)	1/4	3	FBG1360-C3	76.90	FBG1360-C8	80.30
.1405	#28	3.571 mm	.960		(5x)	1/4	3	FBG1405-C3	76.90	FBG1405-C8	80.30
.1406 (9/64)		3.571 mm		**17.00 mm**	(3x)	6 mm	63 mm	FBF1406-C3	75.20	FBF1406-C8	77.30
.1406 (9/64)		3.571 mm		**24.00 mm**	(5x)	6 mm	75 mm	FBD1406-C3	78.30	FBD1406-C8	81.80
.1470	#26	3.733 mm		**26.00 mm**	(5x)	6 mm	75 mm	FBD1470-C3	78.30	FBD1470-C8	81.80
.1562 (5/32)		3.968 mm		**26.00 mm**	(5x)	6 mm	75 mm	FBD1562-C3	78.30	FBD1562-C8	81.80
.1574		4.000 mm		**28.00 mm**	(5x)	6 mm	75 mm	FBD1574-C3	78.30	FBD1574-C8	81.80
.1590	#21	4.038 mm		**19.00 mm**	(3x)	6 mm	75 mm	FBF1590-C3	74.70	FBF1590-C8	78.10
.1590	#21	4.038 mm		**28.00 mm**	(5x)	6 mm	75 mm	FBD1590-C3	78.30	FBD1590-C8	81.80
.1718 (11/64)		4.365 mm		**30.00 mm**	(5x)	6 mm	75 mm	FBD1718-C3	78.30	FBD1718-C8	81.80
.1770	#16	4.495 mm		**30.00 mm**	(5x)	6 mm	75 mm	FBD1770-C3	78.30	FBD1770-C8	81.80
.1800	#15	4.572 mm		**30.00 mm**	(5x)	6 mm	75 mm	FBD1800-C3	78.30	FBD1800-C8	81.80
.1875 (3/16)		4.762 mm		**32.00 mm**	(5x)	6 mm	75 mm	FBD1875-C3	78.30	FBD1875-C8	81.80
.1968		5.000 mm		**34.00 mm**	(5x)	6 mm	75 mm	FBD1968-C3	78.30	FBD1968-C8	81.80
.2009	#7	5.105 mm		**34.00 mm**	(5x)	6 mm	75 mm	FBD2009-C3	78.30	FBD2009-C8	81.80
.2031 (13/64)		5.159 mm		**34.00 mm**	(5x)	6 mm	75 mm	FBD2031-C3	78.30	FBD2031-C8	81.80
.2129	#3	5.410 mm		**36.00 mm**	(5x)	6 mm	75 mm	FBD2129-C3	78.30	FBD2129-C8	81.80
.2187 (7/32)		5.556 mm		**38.00 mm**	(5x)	6 mm	100 mm	FBD2187-C3	78.30	FBD2187-C8	81.80
.2343 (15/64)		5.953 mm		**40.00 mm**	(5x)	6 mm	100 mm	FBD2343-C3	78.30	FBD2343-C8	81.80
.2362		6.000 mm		**40.00 mm**	(5x)	6 mm	100 mm	FBD2362-C3	78.30	FBD2362-C8	81.80
.2500 (1/4)	E	6.350 mm		**30.00 mm**	(3x)	8 mm	100 mm	FBF2500-C3	74.70	FBF2500-C8	78.10
.2500 (1/4)	E	6.350 mm		**42.00 mm**	(5x)	8 mm	100 mm	FBD2500-C3	78.30	FBD2500-C8	81.80

MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

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SPEEDS & FEEDS (Miniature High Performance Drills – Flat Bottom)

Important Note: Values in table are for a fully enclosed tool that is 1x diameter into the workpiece. A starting hole is required on a flat surface. For drilling on inclined or rounded surfaces please refer to the complete speeds and feeds chart available online at www.harveytool.com. Values in table are also based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For Ferrous materials at 38-45 Rc reduce IPR to 80% of the chart value. Pecking cycles are recommended to avoid chip packing and breakage. Initial Peck must fully submerge the drill point into the material. Do not use a pecking cycle for half-hole drilling or any situation where the drill is not fully enclosed in the material during the drilling operation. For steels at 29-37 Rc, an initial peck should be 2-3x Diameter, and each subsequent peck should be 1-2x Diameter. For harder steels at 38-45 Rc, 1-2x Diameter is recommended for an initial peck, and each subsequent peck should be .5-1x Diameter. For Non-Ferrous Materials, an initial peck should be 3-5x Diameter, and each subsequent peck should be 2-3x Diameter.

Coating	Material	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter								
			.015	.031	.047	.062	.078	.093	.125	.187	.250
AlTiN Hardness: 29-37 Rc (279-344 HBn)	**Carbon Steels** Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
	1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
	201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	Tool Steels A, L, O, P, W series	125	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	D, H, M, T, S series	90	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	Titanium Alloys	100	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
TiB_2 Hardness: ≤ 28 Rc (≤ 271 HBn)	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	450	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600									
	Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00065	.00134	.00203	.00268	.00337	.00402	.00540	.00808	.01080
	Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420									
	Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390									
	Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350									
	Wrought - 5%-8% Si (4xxx)	600									
	Wrought - 8%-12% Si (4xxx)	480									
	Magnesium Alloys	900	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Zinc Alloys	480									
	Copper Alloys: High Coppers - 90%+ (C1xxx)	170	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375									
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170									
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375									
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375									
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170									
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400									
	Plastics: Unfilled Plastics	500	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Reinforced Plastics	350	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960

MINIATURE HIGH PERFORMANCE DRILLS

Deep Hole – Coolant-Through – Metric

Available in 12x & 20x Flute Lengths!

- Drill up to 20x diameter in depth
- Coolant through design for improved chip removal and heat reduction at the drill tip
- 140° point angle
- Specialized flute shape for improved chip evacuation and maximum rigidity
- h6 shank tolerance for high precision tool holders
- AlTiN coated for improved lubricity and heat resistance
- CNC ground in Germany
- Solid carbide

Coolant Through Design for Improved Chip Removal

COOLANT-THROUGH

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth						
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	PRICE	2 FL	PRICE
.0520	#55	1.320 mm	.709	**18.00 mm**	(12x)	3 mm	63 mm	ACD0520-C3	200.00	ACD0520-C6	203.70
.0550	#54	1.397 mm	.748	**19.00 mm**	(12x)	3 mm	63 mm	ACD0550-C3	200.00		
.0590		1.500 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	ACD0590-C3	200.00		
.0590		1.500 mm	1.280	**32.50 mm**	(20x)	3 mm	75 mm	CXZ0590-C3	243.60		
.0595	#53	1.511 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	ACD0595-C3	200.00		
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	ACD0625-C3	200.00	ACD0625-C6	203.70
.0625 (1/16)		1.587 mm	1.358	**34.50 mm**	(20x)	3 mm	75 mm	CXZ0625-C3	243.60	CXZ0625-C6	247.40
.0700	#50	1.778 mm	.945	**24.00 mm**	(12x)	3 mm	63 mm	ACD0700-C3	200.00		
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	ACD0781-C3	200.00	ACD0781-C6	203.70
.0781 (5/64)		1.984 mm	1.693	**43.00 mm**	(20x)	3 mm	100 mm	CXZ0781-C3	243.60	CXZ0781-C6	247.40
.0787		2.000 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	ACD0787-C3	207.10		
.0787		2.000 mm	1.732	**44.00 mm**	(20x)	4 mm	100 mm	CXZ0787-C3	270.20		
.0890	#43	2.260 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	ACD0890-C3	207.10		
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	ACD0937-C3	207.10	ACD0937-C6	211.10
.0937 (3/32)		2.381 mm	2.047	**52.00 mm**	(20x)	4 mm	100 mm	CXZ0937-C3	270.20	CXZ0937-C6	274.60
.1015	#38	2.578 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	ACD1015-C3	207.10		
.1065	#36	2.705 mm	1.457	**37.00 mm**	(12x)	4 mm	75 mm	ACD1065-C3	207.10		
.1093 (7/64)		2.778 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	ACD1093-C3	207.10		
.1093 (7/64)		2.778 mm	2.362	**60.00 mm**	(20x)	4 mm	100 mm	CXZ1093-C3	270.20		
.1181		3.000 mm	1.654	**42.00 mm**	(12x)	4 mm	100 mm	ACD1181-C3	207.10	ACD1181-C6	211.50
.1181		3.000 mm	2.559	**65.00 mm**	(20x)	4 mm	100 mm	CXZ1181-C3	270.20		

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MINIATURE HIGH PERFORMANCE DRILLS

Deep Hole – Coolant-Through– Metric (cont.)

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SPEEDS & FEEDS (Miniature High Performance Drills – Deep Hole – Metric)

Important Note: Values in table are in inches and are based on 12x length drills and a material hardness of 29-37 Rc. For longer lengths and higher hardness materials, table values of IPR must be reduced (for 20x, reduce to 75%). For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

Material (Hardness: 29-37 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter							
		.031	.047	.062	.078	.093	.125	.187	.250
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00110	.00167	.00220	.00277	.00330	.00444	.00664	.00887
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00110	.00167	.00220	.00277	.00330	.00444	.00664	.00887
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
Tool Steels A, L, O, P, W series	125	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
D, H, M, T, S series	90	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
Titanium Alloys	100	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507

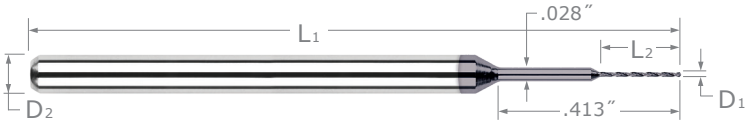
Deep Hole Drilling Guidelines

For best results, the following steps are recommended:

- For hole depths of 12x Diameter or greater, drill a pilot hole up to 1.5x D in depth using a drill with 3x LOF or shorter.
- Insert primary drill at low speed (~500 rpm) and start coolant flow.
- Increase speed and feed to recommended parameters.
- Under optimal conditions, it is possible to feed to full hole depth without pecking. If necessary, use 2-4 pecks to get to full hole depth.
- After reaching desired hole depth, reduce speed (~500 RPM) before retracting the drill.
- Cutting oil is recommended. As an alternative, it is possible to use emulsions with EP additives. Use a fine mesh prefilter (=5µm) on spindle through coolant to prevent a blockage of the coolant hole. A minimum coolant pressure of 600-800 PSI is recommended.

NEW SIZES!

MINIATURE DRILLS



Miniature Drills Down to .002″

- For tools .020″ and smaller, there is an intermediate neck diameter as pictured above
- 130° drill point
- Carbide
- CNC ground in Germany

DRILL DIAMETER			FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
inch	wire	metric									
D_1 $^{+.0000″}_{-.0003″}$ *			L_2	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.0020		.050 mm	.014	1/8	1-1/2	810020**	41.00				
.0020		.050 mm	.028	1/8	1-1/2	20020	41.00				
.0039	#102	.100 mm	.026	1/8	1-1/2	810039**	29.10				
.0039	#102	.100 mm	.039	1/8	1-1/2	20039	29.10				
.0051	#99	.130 mm	.034	1/8	1-1/2	810051**	28.10				
.0051	#99	.130 mm	.056	1/8	1-1/2	20051	28.40				
.0059	#97	.150 mm	.040	1/8	1-1/2	810059**	26.20				
.0059	#97	.150 mm	.066	1/8	1-1/2	20059	26.20				
.0063	#96		.042	1/8	1-1/2	810063	26.20				
.0063	#96		.066	1/8	1-1/2	20063	26.20				
.0067	#95		.066	1/8	1-1/2	20067	26.20				
.0069		.175 mm	.066	1/8	1-1/2	20069	26.20				
.0071	#94		.106	1/8	1-1/2	20071	23.80				
.0075	#93		.106	1/8	1-1/2	20075	23.80				
.0079	#92	.200 mm	.054	1/8	1-1/2	810079**	19.90	810079-C3**	25.40		
.0079	#92	.200 mm	.160	1/8	1-1/2	20079	19.90	20079-C3	25.40	20079-C4	33.70
.0083	#91		.160	1/8	1-1/2	20083	19.90	20083-C3	25.40		
.0087	#90		.126	1/8	1-1/2	20087	19.90	20087-C3	25.40		
.0089		.225 mm	.160	1/8	1-1/2	20089	19.90	20089-C3	25.40		
.0091	#89		.160	1/8	1-1/2	20091	19.50	20091-C3	25.00		
.0095	#88		.064	1/8	1-1/2	810095**	19.50	810095-C3**	25.00		
.0095	#88		.160	1/8	1-1/2	20095	19.50	20095-C3	25.00		
.0098		.250 mm	.066	1/8	1-1/2	810098**	19.50	810098-C3**	25.00		
.0098		.250 mm	.160	1/8	1-1/2	20098	19.50	20098-C3	25.00		
.0100	#87		.068	1/8	1-1/2	810100**	19.50	810100-C3**	25.00		
.0100	#87		.160	1/8	1-1/2	20100	19.50	20100-C3	25.00	20100-C4	33.30
.0105	#86		.160	1/8	1-1/2	20105	19.50	20105-C3	25.00		
.0108		.275 mm	.160	1/8	1-1/2	20108	19.50	20108-C3	25.00		
.0110	#85		.160	1/8	1-1/2	20110	19.50	20110-C3	25.00	20110-C4	33.30
.0115	#84		.180	1/8	1-1/2	20115	19.50	20115-C3	25.00		
.0118		.300 mm	.180	1/8	1-1/2	20118	19.50	20118-C3	25.00		

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Total overhang from shank transition is .250"

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MINIATURE DRILLS

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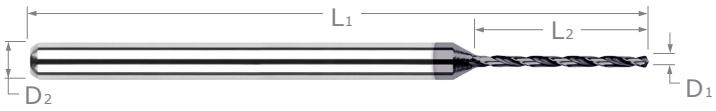

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	DRILL DIAMETER			FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	inch	wire	metric									
	D_1 +.0000″ −.0003″ *			L_2	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
	.0120	#83		.080	1/8	1-1/2	810120**	17.50	810120-C3**	23.00		
	.0120	#83		.230	1/8	1-1/2	20120	17.50	20120-C3	23.00	20120-C4	31.30
	.0125	#82		.230	1/8	1-1/2	20125	17.50	20125-C3	23.00		
	.0130	#81		.230	1/8	1-1/2	20130	17.50	20130-C3	23.00	20130-C4	31.30
NEW	.0135	#80		.270	1/8	1-1/2	20135	17.10	20135-C3	22.60	20135-C4	30.90
	.0138		.350 mm	.270	1/8	1-1/2	20138	17.10	20138-C3	22.60		
NEW	.0145	#79		.100	1/8	1-1/2	810145**	17.10	810145-C3**	22.60	20157-C4	30.90
	.0145	#79		.270	1/8	1-1/2	20145	17.10	20145-C3	22.60	20145-C4	30.90
	.0157		.400 mm	.105	1/8	1-1/2	810157**	17.10	810157-C3**	22.60		
	.0157		.400 mm	.270	1/8	1-1/2	20157	17.10	20157-C3	22.60		
	.0160	#78		.270	1/8	1-1/2	20160	17.10	20160-C3	22.60	20160-C4	30.90
	.0168			.270	1/8	1-1/2	20168	17.10	20168-C3	22.60		
	.0177		.450 mm	.270	1/8	1-1/2	20177	17.10	20177-C3	22.60		
	.0180	#77		.120	1/8	1-1/2	810180**	15.90	810180-C3**	21.40		
	.0180	#77		.270	1/8	1-1/2	20180	15.90	20180-C3	21.40	20180-C4	29.70
NEW	.0197		.500 mm	.135	1/8	1-1/2	810197	16.50	810197-C3	22.00		
NEW	.0197		.500 mm	.275	1/8	1-1/2	20197	15.90	20197-C3	21.40	20197-C4	29.70
	.0200	#76		.135	1/8	1-1/2	810200**	15.90	810200-C3**	21.40		
	.0200	#76		.275	1/8	1-1/2	20200	15.90	20200-C3	21.40	20200-C4	29.70
	.0210	#75		.275	1/8	1-1/2	20205	15.90	20205-C3	21.40	20205-C4	29.70
	.0225	#74		.150	1/8	1-1/2	810210	15.90	810210-C3	21.40		
	.0225	#74		.275	1/8	1-1/2	20210	15.90	20210-C3	21.40		
	.0236		.600 mm	.275	1/8	1-1/2	20214	15.90	20214-C3	21.40		
	.0240	#73		.275	1/8	1-1/2	20215	15.90	20215-C3	21.40		
	.0250	#72		.170	1/8	1-1/2	810220	15.90	810220-C3	21.40		
	.0250	#72		.275	1/8	1-1/2	20220	15.90	20220-C3	21.40	20220-C4	29.70
	.0260	#71		.275	1/8	1-1/2	20225	15.90	20225-C3	21.40		
	.0270			.335	1/8	1-1/2	20227	15.90	20227-C3	21.40		
	.0276		.700 mm	.335	1/8	1-1/2	20229	15.90	20229-C3	21.40		
	.0280	#70		.335	1/8	1-1/2	20230	15.90	20230-C3	21.40		
NEW	.0292	#69		.200	1/8	1-1/2	810235	16.50	810235-C3	22.00		
	.0292	#69		.335	1/8	1-1/2	20235	15.90	20235-C3	21.40	20235-C4	29.70
	.0302			.395	1/8	1-1/2	20240	15.90	20240-C3	21.40		
	.0310	#68		.210	1/8	1-1/2	810245	14.90	810245-C3	20.40		
	.0310	#68		.395	1/8	1-1/2	20245	14.90	20245-C3	20.40	20245-C4	28.70
	.0312 (1/32)			.210	1/8	1-1/2	810250	14.90	810250-C3	20.40		
	.0312 (1/32)			.395	1/8	1-1/2	20250	14.90	20250-C3	20.40	20250-C4	28.70
	.0315		.800 mm	.395	1/8	1-1/2	20253	14.90	20253-C3	20.40		
	.0320	#67		.395	1/8	1-1/2	20255	14.90	20255-C3	20.40	20255-C4	28.70

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Total overhang from shank transition is .250"

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NEW SIZES!

MINIATURE DRILLS

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DRILL DIAMETER inch	wire	metric	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0000″ −.0003″ *			L_2	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE	
.0330	#66		.395	1/8	1-1/2	20260	14.90	20260-C3	20.40			
.0350	#65		.240	1/8	1-1/2	810265	15.50	810265-C3	21.00			NEW
.0350	#65		.395	1/8	1-1/2	20265	14.90	20265-C3	20.40	20265-C4	28.70	
.0354		.900 mm	.395	1/8	1-1/2	20267	14.90	20267-C3	20.40			
.0360	#64		.395	1/8	1-1/2	20270	14.90	20270-C3	20.40			
.0370	#63		.395	1/8	1-1/2	20275	14.90	20275-C3	20.40			
.0380	#62		.395	1/8	1-1/2	20280	14.90	20280-C3	20.40			
.0390	#61		.395	1/8	1-1/2	20285	14.90	20285-C3	20.40			
.0394		1.000 mm	.395	1/8	1-1/2	20290	14.90	20290-C3	20.40	20290-C4	28.70	
.0400	#60		.270	1/8	1-1/2	810295	15.50	810295-C3	21.00			NEW
.0400	#60		.395	1/8	1-1/2	20295	14.90	20295-C3	20.40			
.0410	#59		.395	1/8	1-1/2	20300	14.90	20300-C3	20.40			
.0420	#58		.395	1/8	1-1/2	20305	14.90	20305-C3	20.40			
.0430	#57		.395	1/8	1-1/2	20310	14.90	20310-C3	20.40			
.0433		1.100 mm	.395	1/8	1-1/2	20311	14.90	20311-C3	20.40			
.0440			.395	1/8	1-1/2	20315	14.90	20315-C3	20.40			
.0465	#56		.395	1/8	1-1/2	20320	14.90	20320-C3	20.40			
.0469 (3/64)			.325	1/8	1-1/2	810325	15.50	810325-C3	21.00			NEW
.0469 (3/64)			.395	1/8	1-1/2	20325	14.90	20325-C3	20.40			
.0472		1.200 mm	.395	1/8	1-1/2	20327	14.90	20327-C3	20.40			
.0492		1.250 mm	.395	1/8	1-1/2	20330	14.90	20330-C3	20.40			
.0500		1.270 mm	.395	1/8	1-1/2	20332	14.90	20332-C3	20.40			
.0512		1.300 mm	.413	1/8	1-1/2	20335	14.90	20335-C3	20.40			
.0520	#55		.413	1/8	1-1/2	20340	14.90	20340-C3	20.40			
.0520	#55		.500	1/8	1-1/2	815340	14.90	815340-C3	20.40			
.0531		1.350 mm	.413	1/8	1-1/2	20345	14.90	20345-C3	20.40			
.0550	#54		.413	1/8	1-1/2	20350	14.90	20350-C3	20.40	20350-C4	28.70	
.0550	#54		.525	1/8	1-1/2	815350	14.90	815350-C3	20.40			
.0571		1.450 mm	.375	1/8	1-1/2	810302	15.50	810302-C3	21.00			NEW
.0571		1.450 mm	.413	1/8	1-1/2	20355	14.90	20355-C3	20.40			
.0591		1.500 mm	.413	1/8	1-1/2	20360	14.90	20360-C3	20.40			
.0595	#53		.413	1/8	1-1/2	20365	14.90	20365-C3	20.40			
.0595	#53		.575	1/8	2	815365	15.70	815365-C3	21.20			
.0610		1.550 mm	.413	1/8	1-1/2	20370	14.90	20370-C3	20.40			
.0625 (1/16)			.413	1/8	1-1/2	20375	14.90	20375-C3	20.40	20375-C4	28.70	
.0625 (1/16)			.600	1/8	2	815375	15.70	815375-C3	21.20			

D_1 +.0000″ −.0005″ ***			L_2	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.0630		1.600 mm	.413	1/8	1-1/2	20376	14.90	20376-C3	20.40		
.0635	#52		.413	1/8	1-1/2	20377	14.90	20377-C3	20.40		
.0635	#52		.600	1/8	2	815377	15.70	815377-C3	21.20		
.0670	#51		.413	1/8	1-1/2	20384	14.90	20384-C3	20.40		
.0670	#51		.650	1/8	2	815384	15.70	815384-C3	21.20		

* Tolerance for all AlTiN coating is +.0002"/−.0003". *** Tolerance for AlTiN coating is +.0002"/−.0005".

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MINIATURE DRILLS

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	DRILL DIAMETER inch	wire	metric	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0000"}_{-.0005"}$ ***			L_2	D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
NEW	.0700	#50		.413	1/8	1-1/2	20390	14.90	20390-C3	20.40	20390-C4	28.70
	.0700	#50		.700	1/8	2	815390	15.70	815390-C3	21.20		
	.0730	#49		.413	1/8	1-1/2	20396	14.90	20396-C3	20.40		
	.0760	#48		.413	1/8	1-1/2	20402	14.90	20402-C3	20.40		
	.0760	#48		.750	1/8	2	815402	15.70	815402-C3	21.20		
	.0781 (5/64)			.413	1/8	1-1/2	20407	14.90	20407-C3	20.40		
	.0781 (5/64)			.750	1/8	2	815407	15.70	815407-C3	21.20		
	.0785	#47		.413	1/8	1-1/2	20408	14.90	20408-C3	20.40		
	.0787		2.000 mm	.413	1/8	1-1/2	20409	14.90	20409-C3	20.40		
	.0810	#46		.413	1/8	1-1/2	20414	14.90	20414-C3	20.40		
	.0810	#46		.800	1/8	2	815414	15.70	815414-C3	21.20		
	.0820	#45		.413	1/8	1-1/2	20416	14.90	20416-C3	20.40		
	.0860	#44		.413	1/8	1-1/2	20424	14.90	20424-C3	20.40		
	.0890	#43		.413	1/8	1-1/2	20430	14.90	20430-C3	20.40		
	.0890	#43		.850	1/8	2	815430	15.70	815430-C3	21.20		
	.0935	#42		.413	1/8	1-1/2	20439	14.90	20439-C3	20.40		
NEW	.0938 (3/32)			.413	1/8	1-1/2	20440	14.90	20440-C3	20.40	20440-C4	28.70
	.0938 (3/32)			.900	1/8	2	815440	15.70	815440-C3	21.20		
	.0960	#41		.413	1/8	1-1/2	20445	14.90	20445-C3	20.40		
	.0980	#40		.413	1/8	1-1/2	20449	14.90	20449-C3	20.40		
	.0984		2.500 mm	.413	1/8	1-1/2	20450	14.90	20450-C3	20.40		
	.0995	#39		.413	1/8	1-1/2	20453	14.90	20453-C3	20.40		
	.1015	#38		.413	1/8	1-1/2	20457	14.90	20457-C3	20.40		
	.1040	#37		.413	1/8	1-1/2	20462	14.90	20462-C3	20.40		
	.1065	#36		.413	1/8	1-1/2	20467	14.90	20467-C3	20.40		
	.1094 (7/64)			.413	1/8	1-1/2	20473	14.90	20473-C3	20.40		
	.1094 (7/64)			1.100	1/8	2-1/2	815473	15.70	815473-C3	21.20		
	.1100	#35		.413	1/8	1-1/2	20475	14.90	20475-C3	20.40		
	.1110	#34		.413	1/8	1-1/2	20477	14.90	20477-C3	20.40		
	.1130	#33		.413	1/8	1-1/2	20481	14.90	20481-C3	20.40		
	.1160	#32		.413	1/8	1-1/2	20487	14.90	20487-C3	20.40		
	.1181		3.000 mm	.413	1/8	1-1/2	20491	14.90	20491-C3	20.40		
	.1200	#31		.413	1/8	1-1/2	20493	14.90	20493-C3	20.40		
	.1250 (1/8)			.413	1/8	1-1/2	20498	14.90	20498-C3	20.40		
	.1250 (1/8)			1.200	1/8	2-1/2	815498	15.70	815498-C3	21.20		
	.1875 (3/16)			.480	3/16	2	20623	28.30	20623-C3	34.10		
	.2500 (1/4)			.480	1/4	2	20748	38.00	20748-C3	44.90		

*** Tolerance for AlTiN coating is +.0002"/−.0005".

NEW SIZES!

MINIATURE DRILLS

Spotting Drills

◀ **Stocked in 10 Included Angles**

- Thinned web to reduce walking
- Self-centering point geometry
- 2 flutes
- Solid carbide
- CNC ground in the USA

INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH		WEB THICKNESS	TYPE	SHANK DIA.	OVERALL LENGTH		UNCOATED		AlTiN COATED		TiB_2 COATED		
A $^{+1°}_{-1°}$	D_1	L_2				D_2	L_1		2 FL	PRICE	2 FL	PRICE	2 FL	PRICE	
60°	.020	.060	(3x)	.0020	I	1/8	1-1/2		932720	32.40	932720-C3	37.90			
	.030	.090	(3x)	.0030	I	1/8	1-1/2		932730	31.70	932730-C3	37.20			
	.031 (1/32)	.093	(3x)	.0030	I	1/8	1-1/2		932731	31.70	932731-C3	37.20			
	.045	.135	(3x)	.0030	I	1/8	1-1/2		932745	27.40	932745-C3	32.90			
	.060	.180	(3x)	.0050	I	1/8	1-1/2		932760	31.70	932760-C3	37.20			
	.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2		932762	31.70	932762-C3	37.20			
	.090	.270	(3x)	.0050	I	1/8	1-1/2		932790	31.70	932790-C3	37.20			
	.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2		932793	31.70	932793-C3	37.20			
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2		932808	31.70	932808-C3	37.20			
	.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2		932811	31.70	932811-C3	37.20			
	.187 (3/16)	.312	(1.5x)	.0130	II	3/16	2		715612	28.40	715612-C3	34.20			NEW
	.187 (3/16)	.625	(3x)	.0130	II	3/16	2		932812	28.40	932812-C3	34.30			
	.250 (1/4)	.375	(1.5x)	.0180	II	1/4	2-1/2		715616	34.30	715616-C3	41.80			NEW
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2		932816	34.30	932816-C3	42.30			
	.375 (3/8)	1.000	(3x)	.0270	II	3/8	2-1/2		932824	60.80	932824-C3	71.40			
82°	.010	.030	(3x)	.0015	I	1/8	1-1/2		983110	39.00	983110-C3	44.50			
	.020	.060	(3x)	.0020	I	1/8	1-1/2		983120	33.40	983120-C3	38.90			
	.030	.090	(3x)	.0030	I	1/8	1-1/2		983130	30.60	983130-C3	36.10			
	.045	.135	(3x)	.0030	I	1/8	1-1/2		983145	27.40	983145-C3	32.90			
	.060	.180	(3x)	.0050	I	1/8	1-1/2		983160	27.10	983160-C3	32.60			
	.090	.270	(3x)	.0050	I	1/8	1-1/2		983190	26.00	983190-C3	31.50			
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2		983208	24.50	983208-C3	30.00			
	.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2		965208	24.50	965208-C3	30.00			
	.187 (3/16)	.625	(3x)	.0130	II	3/16	2		965212	28.40	965212-C3	34.30			
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2		965216	35.80	965216-C3	43.80			
90°	.008	.024	(3x)	.0015	I	1/8	1-1/2		11408	46.10	11408-C3	51.60			
	.010	.030	(3x)	.0015	I	1/8	1-1/2		11410	36.70	11410-C3	42.20			
	.010	.030	(3x)	.0015	I	1/8	3	LONG!	987910	45.30	987910-C3	50.80			
	.012	.036	(3x)	.0015	I	1/8	1-1/2		11412	46.10	11412-C3	51.60			
	.015 (1/64)	.045	(3x)	.0015	I	1/8	1-1/2		11415	36.70	11415-C3	42.20	11415-C8	43.80	
	.020	.030	(1.5x)	.0020	I	1/8	1-1/2		816020	31.70	816020-C3	37.20			
	.020	.060	(3x)	.0020	I	1/8	1-1/2		11420	31.70	11420-C3	37.20	11420-C8	38.80	
	.020	.060	(3x)	.0020	I	1/8	3	LONG!	987920	39.00	987920-C3	44.50			
	.025	.075	(3x)	.0020	I	1/8	1-1/2		11425	31.70	11425-C3	37.20			
	.030	.045	(1.5x)	.0030	I	1/8	1-1/2		816030	29.30	816030-C3	35.40			
	.030	.090	(3x)	.0030	I	1/8	1-1/2		11430	29.30	11430-C3	34.80	11430-C8	36.40	
	.030	.090	(3x)	.0030	I	1/8	3	LONG!	987930	38.10	987930-C3	43.60			
	.031 (1/32)	.093	(3x)	.0030	I	1/8	1-1/2		11431	29.30	11431-C3	34.80			
	.035	.105	(3x)	.0030	I	1/8	1-1/2		11435	29.30	11435-C3	34.80			
	.039 (1 mm)	.117	(3x)	.0030	I	1/8	1-1/2		11439	29.30	11439-C3	34.80			

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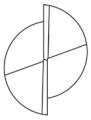
End View

TYPE I

On center design reduces walking and minimizes flat at bottom of spot. Ideally suited for starting smaller diameter drills and shallow spots.


End View

TYPE II

Ahead of center design improves tip strength. Ideally suited for larger diameter drills and tougher materials.

MINIATURE DRILLS

Spotting Drills (cont.)

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	INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH		WEB THICKNESS	TYPE	SHANK DIA.	OVERALL LENGTH		UNCOATED		AlTiN COATED		TiB_2 COATED	
	A $^{+1°}_{-1°}$	D_1	L_2				D_2	L_1		2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
		.040	.120	(3x)	.0030	I	1/8	1-1/2		11440	26.80	11440-C3	32.30	11440-C8	33.90
		.045	.068	(1.5x)	.0030	I	1/8	1-1/2		816045	26.80	816045-C3	32.30		
		.045	.135	(3x)	.0030	I	1/8	1-1/2		11445	26.80	11445-C3	32.30	11445-C8	33.90
		.045	.135	(3x)	.0030	I	1/8	3	LONG!	987945	34.30	987945-C3	39.80		
		.047 (3/64)	.141	(3x)	.0040	I	1/8	1-1/2		11447	26.80	11447-C3	32.30		
		.050	.150	(3x)	.0040	I	1/8	1-1/2		11450	26.80	11450-C3	32.30		
		.055	.165	(3x)	.0040	I	1/8	1-1/2		11455	26.80	11455-C3	32.30		
		.060	.090	(1.5x)	.0050	I	1/8	1-1/2		816060	26.50	816060-C3	32.00		
		.060	.180	(3x)	.0050	I	1/8	1-1/2		11460	26.50	11460-C3	32.00	11460-C8	33.60
		.060	.180	(3x)	.0050	I	1/8	3	LONG!	987960	33.90	987960-C3	39.40		
		.062 (1/16)	.093	(1.5x)	.0050	I	1/8	1-1/2		816062	26.50	816062-C3	32.00		
		.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2		11462	26.50	11462-C3	32.00	11462-C8	33.60
		.070	.210	(3x)	.0050	I	1/8	1-1/2		11470	26.50	11470-C3	32.00		
		.075	.225	(3x)	.0050	I	1/8	1-1/2		11475	26.50	11475-C3	32.00		
NEW		.078 (5/64)	.117	(1.5x)	.0050	I	1/8	1-1/2		816078	26.50	816078-C3	32.00		
		.078 (5/64)	.234	(3x)	.0050	I	1/8	1-1/2		11478	26.50	11478-C3	32.00	11478-C8	33.60
		.080	.240	(3x)	.0050	I	1/8	1-1/2		11480	26.50	11480-C3	32.00		
		.090	.135	(1.5x)	.0050	I	1/8	1-1/2		816090	24.80	816090-C3	30.30		
		.090	.270	(3x)	.0050	I	1/8	1-1/2		11490	24.80	11490-C3	30.30	11490-C8	31.90
		.090	.270	(3x)	.0050	I	1/8	3	LONG!	987990	32.70	987990-C3	38.20		
NEW		.093 (3/32)	.140	(1.5x)	.0060	I	1/8	1-1/2		816093	24.80	816093-C3	30.30		
		.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2		11493	24.80	11493-C3	30.30	11493-C8	31.90
		.100	.300	(3x)	.0060	I	1/8	1-1/2		11500	24.80	11500-C3	30.30		
	90°	.109 (7/64)	.327	(3x)	.0080	I	1/8	1-1/2		11509	24.80	11509-C3	30.30		
		.118 (3 mm)	.354	(3x)	.0080	I	1/8	1-1/2		1153M	24.80	1153M-C3	30.30		
		.125 (1/8)	.188	(1.5x)	.0100	I	1/8	1-1/2		816108	23.30	816108-C3	28.80		
		.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2		11525	23.30	11525-C3	28.80	11525-C8	30.40
		.125 (1/8)	.375	(3x)	.0100	I	1/8	3	LONG!	988008	31.70	988008-C3	37.20		
		.125 (1/8)	.188	(1.5x)	.0100	II	1/8	1-1/2		787708	23.30	787708-C3	28.80		
		.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2		37508	23.30	37508-C3	28.80		
		.125 (1/8)	.375	(3x)	.0100	II	1/8	4	LONG!	55808	33.70	55808-C3	39.60		
		.140 (9/64)	.375	(2.5x)	.0100	II	3/16	2		37509	33.30	37509-C3	39.20		
		.156 (5/32)	.375	(2.5x)	.0110	II	3/16	2		37510	27.60	37510-C3	33.50		
		.187 (3/16)	.625	(3.5x)	.0130	I	3/16	2		803912	26.80	803912-C3	32.70		
		.187 (3/16)	.312	(1.5x)	.0130	II	3/16	2		787712	26.80	787712-C3	32.70		
		.187 (3/16)	.625	(3.5x)	.0130	II	3/16	2		37512	26.80	37512-C3	32.70	37512-C8	34.80
		.187 (3/16)	.625	(3.5x)	.0130	II	3/16	4	LONG!	55812	41.40	55812-C3	49.40		
		.218 (7/32)	.750	(3.5x)	.0150	II	1/4	2-1/2		37514	42.60	37514-C3	50.60		
		.236 (6 mm)	.750	(3x)	.0160	II	1/4	2-1/2		37515	42.60	37515-C3	50.60		
		.250 (1/4)	.750	(3x)	.0180	I	1/4	2-1/2		803916	33.40	803916-C3	41.40		
		.250 (1/4)	.375	(1.5x)	.0180	II	1/4	2-1/2		787716	33.40	787716-C3	41.40		
		.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2		37516	33.70	37516-C3	41.70	37516-C8	44.00
		.250 (1/4)	.750	(3x)	.0180	II	1/4	6	LONG!	55816	56.10	55816-C3	66.70		
		.312 (5/16)	.750	(2.5x)	.0220	II	5/16	2-1/2		37520	57.40	37520-C3	66.80		
		.375 (3/8)	.500	(1.5x)	.0270	II	3/8	2-1/2		787724	60.80	787724-C3	71.40		
		.375 (3/8)	1.000	(2.5x)	.0270	II	3/8	2-1/2		37524	60.80	37524-C3	71.40		
		.500 (1/2)	1.000	(2x)	.0350	II	1/2	3		37532	105.20	37532-C3	121.00		

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NEW SIZES!

MINIATURE DRILLS

Spotting Drills (cont.)

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INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH		WEB THICKNESS	TYPE	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1	L_2				D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
	.030	.090	(3x)	.0030	I	1/8	1-1/2	975830	31.50	975830-C3	37.00		
	.060	.180	(3x)	.0050	I	1/8	1-1/2	975860	27.10	975860-C3	32.60		
	.090	.270	(3x)	.0050	I	1/8	1-1/2	975890	27.40	975890-C3	32.90		
100°	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	975908	24.50	975908-C3	30.00		
	.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2	955908	24.50	955908-C3	30.00		
	.187 (3/16)	.625	(3x)	.0130	II	3/16	2	955912	28.40	955912-C3	34.30		
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	955916	35.40	955916-C3	43.40		
	.010	.030	(3x)	.0015	I	1/8	1-1/2	11610	36.70	11610-C3	42.20		
	.015 (1/64)	.045	(3x)	.0015	I	1/8	1-1/2	11615	36.70	11615-C3	42.20		
	.020	.060	(3x)	.0020	I	1/8	1-1/2	11620	31.70	11620-C3	37.20		
	.025	.075	(3x)	.0020	I	1/8	1-1/2	11625	31.70	11625-C3	37.20		
	.030	.090	(3x)	.0030	I	1/8	1-1/2	11630	29.30	11630-C3	34.80		
	.031 (1/32)	.093	(3x)	.0030	I	1/8	1-1/2	11631	29.30	11631-C3	34.80		
	.040	.120	(3x)	.0030	I	1/8	1-1/2	11640	26.80	11640-C3	32.30		
	.045	.135	(3x)	.0030	I	1/8	1-1/2	11645	26.80	11645-C3	32.30		
	.047 (3/64)	.141	(3x)	.0040	I	1/8	1-1/2	11647	26.80	11647-C3	32.30		
	.050	.150	(3x)	.0040	I	1/8	1-1/2	11650	26.80	11650-C3	32.30		
	.055	.165	(3x)	.0040	I	1/8	1-1/2	11655	26.80	11655-C3	32.30		
	.060	.180	(3x)	.0050	I	1/8	1-1/2	11660	26.50	11660-C3	32.00		
	.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2	11662	26.50	11662-C3	32.00		
120°	.070	.210	(3x)	.0050	I	1/8	1-1/2	11670	26.50	11670-C3	32.00		
	.078 (5/64)	.234	(3x)	.0050	I	1/8	1-1/2	11678	26.50	11678-C3	32.00		
	.090	.270	(3x)	.0050	I	1/8	1-1/2	11690	24.80	11690-C3	30.30		
	.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2	11693	24.80	11693-C3	30.30		
	.100	.300	(3x)	.0060	I	1/8	1-1/2	11700	24.80	11700-C3	30.30		
	.118 (3 mm)	.354	(3x)	.0080	I	1/8	1-1/2	1173M	24.80	1173M-C3	30.30		
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	11725	23.30	11725-C3	28.80		
	.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2	38208	23.30	38208-C3	28.80		
	.156 (5/32)	.375	(2.5x)	.0110	II	3/16	2	38210	52.00	38210-C3	57.90		
	.187 (3/16)	.625	(3.5x)	.0130	I	3/16	2	804012	26.80	804012-C3	32.70		
	.187 (3/16)	.625	(3.5x)	.0130	II	3/16	2	38212	26.80	38212-C3	32.70		
	.250 (1/4)	.750	(3x)	.0180	I	1/4	2-1/2	804016	33.40	804016-C3	41.40		
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	38216	33.70	38216-C3	41.70		
	.375 (3/8)	1.000	(2.5x)	.0270	II	3/8	2-1/2	38224	60.80	38224-C3	71.40		
	.030	.090	(3x)	.0030	I	1/8	1-1/2	839530	34.60	839530-C3	38.70		
	.060	.180	(3x)	.0050	I	1/8	1-1/2	839560	33.70	839560-C3	38.70		
130°	.090	.270	(3x)	.0050	I	1/8	1-1/2	839590	33.70	839590-C3	38.70		
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	839608	35.40	839608-C3	40.30		
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	847016	36.90	847016-C3	44.90		
	.010	.030	(3x)	.0015	I	1/8	1-1/2	39810	37.90	39810-C3	43.40		
	.015 (1/64)	.045	(3x)	.0015	I	1/8	1-1/2	39815	37.90	39815-C3	43.40		
	.020	.030	(1.5x)	.0020	I	1/8	1-1/2	815820	32.40	815820-C3	37.90		
	.020	.060	(3x)	.0020	I	1/8	1-1/2	39820	32.40	39820-C3	37.90	39820-C8	39.50
	.025	.075	(3x)	.0020	I	1/8	1-1/2	39825	32.40	39825-C3	37.90		
	.030	.045	(1.5x)	.0030	I	1/8	1-1/2	815830	30.60	815830-C3	36.10		
140°	.030	.090	(3x)	.0030	I	1/8	1-1/2	39830	30.60	39830-C3	36.10		
	.031 (1/32)	.093	(3x)	.0030	I	1/8	1-1/2	39831	30.60	39831-C3	36.10		
	.039	.117	(3x)	.0030	I	1/8	1-1/2	39839	27.40	39839-C3	32.90		
	.040	.060	(1.5x)	.0030	I	1/8	1-1/2	815840	27.40	815840-C3	32.90		
	.040	.120	(3x)	.0030	I	1/8	1-1/2	39840	27.40	39840-C3	32.90	39840-C8	34.50
	.045	.135	(3x)	.0030	I	1/8	1-1/2	39845	27.40	39845-C3	32.90		
	.047 (3/64)	.141	(3x)	.0040	I	1/8	1-1/2	39847	27.40	39847-C3	32.90		

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MINIATURE DRILLS

Spotting Drills (cont.)

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	INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH		WEB THICKNESS	TYPE	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	A $^{+1°}_{-1°}$	D_1	L_2				D_2	L_1	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
	140°	.050	.150	(3x)	.0040	I	1/8	1-1/2	39850	27.40	39850-C3	32.90		
		.055	.165	(3x)	.0040	I	1/8	1-1/2	39855	27.40	39855-C3	32.90		
		.060	.090	(1.5x)	.0050	I	1/8	1-1/2	815860	27.10	815860-C3	32.60		
		.060	.180	(3x)	.0050	I	1/8	1-1/2	39860	27.10	39860-C3	32.60		
NEW		.062 (1/16)	.093	(1.5x)	.0050	I	1/8	1-1/2	815862	27.10	815862-C3	32.60		
		.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2	39862	27.10	39862-C3	32.60		
		.070	.210	(3x)	.0050	I	1/8	1-1/2	39870	27.10	39870-C3	32.60		
		.075	.225	(3x)	.0050	I	1/8	1-1/2	39875	27.10	39875-C3	32.60		
NEW		.078 (5/64)	.117	(1.5x)	.0050	I	1/8	1-1/2	815878	27.10	815878-C3	32.60		
		.078 (5/64)	.234	(3x)	.0050	I	1/8	1-1/2	39878	27.10	39878-C3	32.60		
		.090	.135	(1.5x)	.0050	I	1/8	1-1/2	815890	26.00	815890-C3	31.50		
		.090	.270	(3x)	.0050	I	1/8	1-1/2	39890	26.00	39890-C3	31.50		
NEW		.093 (3/32)	.140	(1.5x)	.0060	I	1/8	1-1/2	815893	26.00	815893-C3	31.50		
		.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2	39893	26.00	39893-C3	31.50		
		.100	.300	(3x)	.0060	I	1/8	1-1/2	39900	26.00	39900-C3	31.50		
		.118 (3mm)	.354	(3x)	.0080	I	1/8	1-1/2	3993M	26.00	3993M-C3	31.50		
		.125 (1/8)	.188	(1.5x)	.0100	I	1/8	1-1/2	815908	24.50	815908-C3	30.00		
NEW		.125 (1/8)	.188	(1.5x)	.0100	II	1/8	1-1/2	715408	24.50	715408-C3	30.00		
		.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	39925	24.50	39925-C3	30.00	39925-C8	31.60
		.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2	41008	24.50	41008-C3	30.00		
		.140 (9/64)	.375	(2.5x)	.0100	II	3/16	2	41009	28.40	41009-C3	34.30		
		.156 (5/32)	.375	(2.5x)	.0110	II	3/16	2	41010	28.70	41010-C3	34.60		
		.187 (3/16)	.625	(3x)	.0130	I	3/16	2	804112	28.40	804112-C3	34.30		
		.187 (3/16)	.625	(3x)	.0130	II	3/16	2	41012	28.40	41012-C3	34.30		
NEW		.250 (1/4)	.375	(1.5x)	.0180	II	1/4	2-1/2	715416	35.40	715416-C3	42.90		
		.250 (1/4)	.750	(3x)	.0180	I	1/4	2-1/2	804116	35.40	804116-C3	43.40		
		.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	41016	35.40	41016-C3	43.40	41016-C8	45.70
		.375 (3/8)	1.000	(2.5x)	.0270	II	3/8	2-1/2	41024	62.50	41024-C3	73.10		
	142°	.060	.180	(3x)	.005	I	1/8	1-1/2	752560	31.50	752560-C3	37.00		
		.090	.270	(3x)	.005	I	1/8	1-1/2	752590	32.10	752590-C3	37.60		
		.125 (1/8)	.375	(3x)	.010	I	1/8	1-1/2	752608	32.10	752608-C3	37.60		
		.125 (1/8)	.375	(3x)	.010	II	1/8	1-1/2	737808	31.50	737808-C3	37.00		
		.187 (3/16)	.625	(3x)	.0130	II	3/16	2	737812	34.00	737812-C3	41.70		
		.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	737816	39.90	737816-C3	48.00		
	150°	.020	.060	(3x)	.0020	I	1/8	1-1/2	961120	31.50	961120-C3	37.00		
		.030	.090	(3x)	.0030	I	1/8	1-1/2	961130	30.60	961130-C3	36.10		
		.040	.120	(3x)	.0030	I	1/8	1-1/2	961140	27.40	961140-C3	32.90		
		.045	.135	(3x)	.0030	I	1/8	1-1/2	961145	27.40	961145-C3	32.90		
		.047	.141	(3x)	.0040	I	1/8	1-1/2	961147	28.30	961147-C3	33.80		
		.060	.180	(3x)	.0050	I	1/8	1-1/2	961160	27.10	961160-C3	32.60		
		.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2	961162	27.40	961162-C3	32.90		
		.078 (5/64)	.234	(3x)	.0050	I	1/8	1-1/2	961178	27.40	961178-C3	32.90		
		.090	.270	(3x)	.0050	I	1/8	1-1/2	961190	27.40	961190-C3	32.90		
		.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2	961193	27.40	961193-C3	32.90		
		.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	961208	24.50	961208-C3	30.00		
		.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2	949508	24.50	949508-C3	30.00		
		.187 (3/16)	.625	(3x)	.0130	II	3/16	2	949512	28.40	949512-C3	34.30		
		.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	949516	35.40	949516-C3	43.40		
	170°	.060	.180	(3x)	.0050	I	1/8	1-1/2	893660	28.30	893660-C3	33.80		
		.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	893708	28.30	893708-C3	33.80		
		.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	893716	35.80	893716-C3	43.30		

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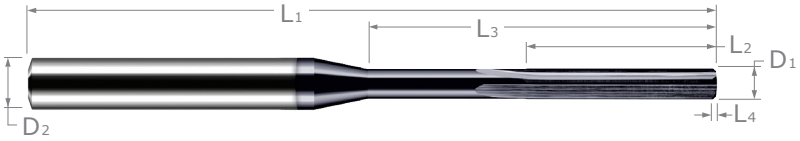
MINIATURE REAMERS



	D1 Tolerances
Uncoated	+.0000″ −.0002″
AlTiN Coated	+.0002″ −.0000″

- Available uncoated or with AlTiN coating for improved lubricity and heat resistance
- Straight flutes for through and blind hole applications
- Oversized, common shanks to maintain strength, stiffness, and accuracy • 45° chamfer angle
- h6 shank tolerance for high precision tool holders • Solid carbide • CNC ground in the USA

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0080		.062	.100	.0013	4	1/8	1-1/2	RSB0080	55.90	RSB0080-C3	60.80
.0083	#91	.062	.100	.0014	4	1/8	1-1/2	RSB0083	57.50	RSB0083-C3	60.80
.0085		.062	.109	.0014	4	1/8	1-1/2	RSB0085	57.50	RSB0085-C3	62.50
.0087	#90	.062	.109	.0015	4	1/8	1-1/2	RSB0087	57.50	RSB0087-C3	62.50
.0090		.062	.118	.0015	4	1/8	1-1/2	RSB0090	55.90	RSB0090-C3	60.80
.0091	#89	.062	.118	.0015	4	1/8	1-1/2	RSB0091	57.50	RSB0091-C3	62.50
.0095	#88	.062	.118	.0016	4	1/8	1-1/2	RSB0095	55.90	RSB0095-C3	60.80
.0100	#87	.078	.125	.0017	4	1/8	1-1/2	RSB0100	55.90	RSB0100-C3	60.80
.0105	#86	.078	.125	.0018	4	1/8	1-1/2	RSB0105	55.90	RSB0105-C3	60.80
.0110	#85	.078	.141	.0018	4	1/8	1-1/2	RSB0110	57.50	RSB0110-C3	60.80
.0115	#84	.078	.141	.0019	4	1/8	1-1/2	RSB0115	57.50	RSB0115-C3	60.80
.0120	#83	.093	.156	.0020	4	1/8	1-1/2	RSB0120	55.90	RSB0120-C3	60.80
.0125	#82	.093	.172	.0021	4	1/8	1-1/2	RSB0125	57.50	RSB0125-C3	60.80
.0130	#81	.093	.172	.0022	4	1/8	1-1/2	RSB0130	55.90	RSB0130-C3	60.80
.0135	#80	.109	.187	.0023	4	1/8	1-1/2	RSB0135	57.50	RSB0135-C3	60.80
.0140		.109	.187	.0023	4	1/8	1-1/2	RSB0140	55.90	RSB0140-C3	60.80
.0145	#79	.109	.187	.0024	4	1/8	1-1/2	RSB0145	55.90	RSB0145-C3	62.50
.0150		.109	.187	.0025	4	1/8	1-1/2	RSB0150	55.90	RSB0150-C3	60.80
.0155		.109	.187	.0026	4	1/8	1-1/2	RSB0155	55.90	RSB0155-C3	60.80
.0160	#78	.125	.218	.0027	4	1/8	1-1/2	RSB0160	42.10	RSB0160-C3	47.00
.0165		.125	.218	.0019	4	1/8	1-1/2	RSB0165	42.10	RSB0165-C3	47.00
.0170		.125	.218	.0020	4	1/8	1-1/2	RSB0170	42.10	RSB0170-C3	47.00
.0175		.125	.218	.0020	4	1/8	1-1/2	RSB0175	42.10	RSB0175-C3	47.00
.0180	#77	.140	.250	.0021	4	1/8	1-1/2	RSB0180	42.10	RSB0180-C3	47.00
.0185		.140	.250	.0021	4	1/8	1-1/2	RSB0185	42.10	RSB0185-C3	47.00
.0190		.140	.250	.0022	4	1/8	1-1/2	RSB0190	42.10	RSB0190-C3	47.00
.0195		.140	.250	.0022	4	1/8	1-1/2	RSB0195	42.10	RSB0195-C3	47.00
.0200	#76	.140	.250	.0023	4	1/8	1-1/2	RSB0200	42.10	RSB0200-C3	47.00
.0205		.140	.250	.0024	4	1/8	1-1/2	RSB0205	42.10	RSB0205-C3	47.00
.0210	#75	.172	.281	.0024	4	1/8	1-1/2	RSB0210	42.10	RSB0210-C3	47.00
.0215		.172	.281	.0025	4	1/8	1-1/2	RSB0215	42.10	RSB0215-C3	47.00
.0220		.172	.281	.0025	4	1/8	1-1/2	RSB0220	42.10	RSB0220-C3	47.00
.0225	#74	.172	.281	.0026	4	1/8	1-1/2	RSB0225	42.10	RSB0225-C3	47.00
.0230		.172	.281	.0026	4	1/8	1-1/2	RSB0230	42.10	RSB0230-C3	47.00
.0235		.172	.281	.0027	4	1/8	1-1/2	RSB0235	42.10	RSB0235-C3	47.00
.0240	#73	.187	.312	.0028	4	1/8	1-1/2	RSB0240	43.30	RSB0240-C3	47.00
.0245		.187	.312	.0028	4	1/8	1-1/2	RSB0245	42.10	RSB0245-C3	48.30
.0250	#72	.187	.312	.0029	4	1/8	1-1/2	RSB0250	42.10	RSB0250-C3	47.00

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0255		.187	.312	.0029	4	1/8	1-1/2	RSB0255	42.10	RSB0255-C3	47.00
.0260	#71	.187	.312	.0030	4	1/8	1-1/2	RSB0260	42.10	RSB0260-C3	47.00
.0265		.187	.312	.0030	4	1/8	1-1/2	RSB0265	43.30	RSB0265-C3	47.00
.0270		.218	.375	.0031	4	1/8	2	RSB0270	43.30	RSB0270-C3	47.00
.0275		.218	.375	.0032	4	1/8	2	RSB0275	42.10	RSB0275-C3	48.30
.0280	#70	.218	.375	.0032	4	1/8	2	RSB0280	42.10	RSB0280-C3	47.00
.0285		.218	.375	.0033	4	1/8	2	RSB0285	43.30	RSB0285-C3	47.00
.0290		.218	.375	.0033	4	1/8	2	RSB0290	42.10	RSB0290-C3	47.00
.0292	#69	.218	.375	.0034	4	1/8	2	RSB0292	43.30	RSB0292-C3	47.00
.0295 (.75 mm)		.218	.375	.0034	4	1/8	2	RSB0295	42.10	RSB0295-C3	47.00
.0300		.218	.375	.0035	4	1/8	2	RSB0300	42.10	RSB0300-C3	47.00
.0305		.218	.375	.0035	4	1/8	2	RSB0305	42.10	RSB0305-C3	47.00
.0310	#68	.218	.375	.0036	4	1/8	2	RSB0310	42.10	RSB0310-C3	47.00
.0315 (.80 mm)		.218	.375	.0036	4	1/8	2	RSB0315	42.10	RSB0315-C3	47.00
.0320	#67	.250	.437	.0037	4	1/8	2	RSB0320	42.10	RSB0320-C3	47.00
.0325		.250	.437	.0037	4	1/8	2	RSB0325	42.10	RSB0325-C3	47.00
.0330	#66	.250	.437	.0038	4	1/8	2	RSB0330	42.10	RSB0330-C3	47.00
.0335 (.85 mm)		.250	.437	.0039	4	1/8	2	RSB0335	42.10	RSB0335-C3	47.00
.0340		.250	.437	.0039	4	1/8	2	RSB0340	42.10	RSB0340-C3	47.00
.0345		.250	.437	.0040	4	1/8	2	RSB0345	42.10	RSB0345-C3	47.00
.0350	#65	.250	.437	.0040	4	1/8	2	RSB0350	42.10	RSB0350-C3	47.00
.0355		.250	.437	.0041	4	1/8	2	RSB0355	42.10	RSB0355-C3	47.00
.0360	#64	.281	.500	.0041	4	1/8	2	RSB0360	43.30	RSB0360-C3	47.00
.0365		.281	.500	.0042	4	1/8	2	RSB0365	42.10	RSB0365-C3	47.00
.0370	#63	.281	.500	.0043	4	1/8	2	RSB0370	42.10	RSB0370-C3	47.00
.0375		.281	.500	.0043	4	1/8	2	RSB0375	42.10	RSB0375-C3	47.00
.0380	#62	.281	.500	.0044	4	1/8	2	RSB0380	42.10	RSB0380-C3	47.00
.0385		.281	.500	.0044	4	1/8	2	RSB0385	42.10	RSB0385-C3	47.00
.0390	#61	.281	.500	.0045	4	1/8	2	RSB0390	42.10	RSB0390-C3	47.00
.0395		.281	.500	.0045	4	1/8	2	RSB0395	42.10	RSB0395-C3	47.00
.0400	#60	.281	.500	.0046	4	1/8	2	RSB0400	42.10	RSB0400-C3	47.00
.0405		.281	.500	.0047	4	1/8	2	RSB0405	42.10	RSB0405-C3	47.00
.0410	#59	.281	.500	.0047	4	1/8	2	RSB0410	42.10	RSB0410-C3	47.00
.0415		.281	.500	.0048	4	1/8	2	RSB0415	42.10	RSB0415-C3	47.00
.0420	#58	.281	.500	.0048	4	1/8	2	RSB0420	42.10	RSB0420-C3	47.00
.0425		.312	.562	.0049	4	1/8	2	RSB0425	43.30	RSB0425-C3	47.00
.0430	#57	.312	.562	.0049	4	1/8	2	RSB0430	42.10	RSB0430-C3	47.00
.0435		.312	.562	.0050	4	1/8	2	RSB0435	42.10	RSB0435-C3	47.00
.0440		.312	.562	.0044	4	1/8	2	RSB0440	43.30	RSB0440-C3	47.00
.0445		.312	.562	.0045	4	1/8	2	RSB0445	43.30	RSB0445-C3	47.00
.0450		.312	.562	.0045	4	1/8	2	RSB0450	42.10	RSB0450-C3	47.00
.0455		.312	.562	.0046	4	1/8	2	RSB0455	42.10	RSB0455-C3	47.00
.0460		.312	.562	.0046	4	1/8	2	RSB0460	42.10	RSB0460-C3	47.00
.0465	#56	.312	.562	.0047	4	1/8	2	RSB0465	42.10	RSB0465-C3	47.00
.0469 (3/64)		.312	.562	.0047	4	1/8	2	RSB0469	35.70	RSB0469-C3	40.20
.0470		.312	.562	.0047	4	1/8	2	RSB0470	35.70	RSB0470-C3	40.20
.0475		.312	.562	.0048	4	1/8	2	RSB0475	35.70	RSB0475-C3	40.20

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0480		.375	.625	.0048	4	1/8	2	RSB0480	35.70	RSB0480-C3	40.20
.0485		.375	.625	.0049	4	1/8	2	RSB0485	35.70	RSB0485-C3	40.20
.0490		.375	.625	.0049	4	1/8	2	RSB0490	35.70	RSB0490-C3	40.20
.0495		.375	.625	.0050	4	1/8	2	RSB0495	35.70	RSB0495-C3	40.20
.0500		.375	.625	.0050	4	1/8	2	RSB0500	35.70	RSB0500-C3	40.20
.0505		.375	.625	.0051	4	1/8	2	RSB0505	35.70	RSB0505-C3	40.20
.0510		.375	.625	.0051	4	1/8	2	RSB0510	35.70	RSB0510-C3	40.20
.0515		.375	.625	.0052	4	1/8	2	RSB0515	35.30	RSB0515-C3	40.50
.0520	#55	.375	.625	.0052	4	1/8	2	RSB0520	35.70	RSB0520-C3	40.50
.0525		.375	.625	.0053	4	1/8	2	RSB0525	36.30	RSB0525-C3	40.20
.0530		.437	.687	.0053	4	1/8	2	RSB0530	35.70	RSB0530-C3	40.20
.0535		.437	.687	.0054	4	1/8	2	RSB0535	35.70	RSB0535-C3	40.20
.0540		.437	.687	.0054	4	1/8	2	RSB0540	35.30	RSB0540-C3	40.20
.0545		.437	.687	.0055	4	1/8	2	RSB0545	36.30	RSB0545-C3	40.20
.0550	#54	.437	.687	.0055	4	1/8	2	RSB0550	35.70	RSB0550-C3	40.20
.0555		.437	.750	.0056	4	1/8	2	RSB0555	35.30	RSB0555-C3	40.50
.0560		.437	.750	.0056	4	1/8	2	RSB0560	35.70	RSB0560-C3	40.20
.0565		.437	.750	.0057	4	1/8	2	RSB0565	35.70	RSB0565-C3	40.20
.0570		.437	.750	.0057	4	1/8	2	RSB0570	35.70	RSB0570-C3	40.20
.0575		.437	.750	.0058	4	1/8	2	RSB0575	35.70	RSB0575-C3	40.50
.0580		.437	.750	.0058	4	1/8	2	RSB0580	35.70	RSB0580-C3	40.20
.0585		.437	.750	.0059	4	1/8	2	RSB0585	35.70	RSB0585-C3	40.20
.0590		.437	.750	.0059	4	1/8	2	RSB0590	35.30	RSB0590-C3	40.20
.0595	#53	.437	.750	.0060	4	1/8	2	RSB0595	35.70	RSB0595-C3	40.20
.0600		.437	.812	.0060	4	1/8	2	RSB0600	35.30	RSB0600-C3	40.20
.0605		.437	.812	.0061	4	1/8	2	RSB0605	35.30	RSB0605-C3	40.20
.0610 (1.55 mm)		.437	.812	.0061	4	1/8	2	RSB0610	35.30	RSB0610-C3	40.20
.0615		.437	.812	.0062	4	1/8	2	RSB0615	35.30	RSB0615-C3	40.20
.0620		.437	.812	.0062	4	1/8	2	RSB0620	35.30	RSB0620-C3	40.20
.0625 (1/16)		.437	.812	.0063	4	1/8	2	RSB0625	35.30	RSB0625-C3	40.20
.0630 (1.60 mm)		.437	.812	.0063	4	1/8	2	RSB0630	35.30	RSB0630-C3	40.20
.0635	#52	.437	.812	.0064	4	1/8	2	RSB0635	35.30	RSB0635-C3	40.20
.0640		.437	.812	.0064	4	1/8	2	RSB0640	35.30	RSB0640-C3	40.20
.0645		.437	.812	.0065	4	1/8	2	RSB0645	35.30	RSB0645-C3	40.80
.0650 (1.65 mm)		.437	.812	.0065	4	1/8	2	RSB0650	35.30	RSB0650-C3	40.20
.0660		.500	.875	.0066	4	1/8	2	RSB0660	35.30	RSB0660-C3	40.20
.0670	#51	.500	.875	.0067	4	1/8	2	RSB0670	35.30	RSB0670-C3	40.20
.0680		.500	.875	.0068	4	1/8	2	RSB0680	35.30	RSB0680-C3	40.20
.0690		.500	.875	.0062	4	1/8	2	RSB0690	36.30	RSB0690-C3	40.20
.0700	#50	.562	.937	.0063	4	1/8	2	RSB0700	35.30	RSB0700-C3	40.20
.0710		.562	.937	.0064	4	1/8	2	RSB0710	35.30	RSB0710-C3	40.20
.0720		.562	.937	.0065	4	1/8	2	RSB0720	35.30	RSB0720-C3	40.20
.0730	#49	.562	.937	.0066	4	1/8	2	RSB0730	35.30	RSB0730-C3	40.20
.0740		.562	.937	.0067	4	1/8	2	RSB0740	36.30	RSB0740-C3	40.20
.0750		.562	1.000	.0068	4	1/8	2	RSB0750	36.30	RSB0750-C3	40.20
.0760	#48	.562	1.000	.0068	4	1/8	2	RSB0760	36.30	RSB0760-C3	40.20
.0765		.562	1.000	.0069	4	1/8	2	RSB0765	35.30	RSB0765-C3	40.20

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0770		.562	1.000	.0069	4	1/8	2	RSB0770	35.30	RSB0770-C3	40.20
.0775		.562	1.000	.0070	4	1/8	2	RSB0775	35.30	RSB0775-C3	40.20
.0780		.562	1.000	.0070	4	1/8	2	RSB0780	35.30	RSB0780-C3	40.20
.0781 (5/64)		.562	1.000	.0070	4	1/8	2	RSB0781	35.30	RSB0781-C3	40.20
.0785	#47	.562	1.000	.0071	4	1/8	2	RSB0785	35.30	RSB0785-C3	40.20
.0787 (2.00 mm)		.562	1.000	.0071	4	1/8	2	RSB0787	35.30	RSB0787-C3	40.20
.0790		.562	1.000	.0071	4	1/8	2	RSB0790	35.30	RSB0790-C3	40.20
.0795		.562	1.000	.0072	4	1/8	2	RSB0795	35.30	RSB0795-C3	40.20
.0800		.562	1.000	.0072	4	1/8	2	RSB0800	35.30	RSB0800-C3	40.20
.0805		.562	1.000	.0072	4	1/8	2	RSB0805	35.30	RSB0805-C3	40.80
.0810	#46	.562	1.000	.0073	4	1/8	2	RSB0810	35.30	RSB0810-C3	40.20
.0815		.562	1.000	.0073	4	1/8	2	RSB0815	35.30	RSB0815-C3	40.80
.0820	#45	.562	1.000	.0074	4	1/8	2	RSB0820	35.30	RSB0820-C3	40.20
.0830		.562	1.000	.0075	4	1/8	2	RSB0830	35.30	RSB0830-C3	40.20
.0840		.625	1.125	.0076	4	1/8	2-1/2	RSB0840	35.30	RSB0840-C3	40.20
.0850		.625	1.125	.0077	4	1/8	2-1/2	RSB0850	36.30	RSB0850-C3	40.20
.0860	#44	.625	1.125	.0077	4	1/8	2-1/2	RSB0860	36.30	RSB0860-C3	40.20
.0870		.625	1.125	.0078	4	1/8	2-1/2	RSB0870	36.30	RSB0870-C3	40.20
.0880		.625	1.125	.0079	4	1/8	2-1/2	RSB0880	36.30	RSB0880-C3	40.20
.0890	#43	.625	1.125	.0080	4	1/8	2-1/2	RSB0890	36.30	RSB0890-C3	40.20
.0900		.625	1.125	.0081	4	1/8	2-1/2	RSB0900	36.30	RSB0900-C3	40.20
.0910		.625	1.125	.0082	4	1/8	2-1/2	RSB0910	36.30	RSB0910-C3	40.20
.0920		.625	1.125	.0083	4	1/8	2-1/2	RSB0920	35.30	RSB0920-C3	40.20
.0925 (2.35 mm)		.687	1.250	.0083	4	1/8	2-1/2	RSB0925	35.30	RSB0925-C3	40.20
.0930		.687	1.250	.0084	4	1/8	2-1/2	RSB0930	35.30	RSB0930-C3	40.20
.0935	#42	.687	1.250	.0084	4	1/8	2-1/2	RSB0935	35.30	RSB0935-C3	40.20
.0937 (3/32)		.687	1.250	.0084	4	1/8	2-1/2	RSB0937	35.30	RSB0937-C3	40.20
.0940		.687	1.250	.0085	4	1/8	2-1/2	RSB0940	35.30	RSB0940-C3	40.20
.0945 (2.40 mm)		.687	1.250	.0085	4	1/8	2-1/2	RSB0945	35.30	RSB0945-C3	40.20
.0950		.687	1.250	.0086	4	1/8	2-1/2	RSB0950	35.30	RSB0950-C3	40.20
.0960	#41	.687	1.250	.0086	4	1/8	2-1/2	RSB0960	35.30	RSB0960-C3	40.20
.0970		.687	1.250	.0087	4	1/8	2-1/2	RSB0970	35.30	RSB0970-C3	40.20
.0980	#40	.687	1.250	.0088	4	1/8	2-1/2	RSB0980	35.30	RSB0980-C3	40.20
.0990		.687	1.250	.0089	4	1/8	2-1/2	RSB0990	36.30	RSB0990-C3	40.20
.0995	#39	.687	1.250	.0090	4	1/8	2-1/2	RSB0995	35.30	RSB0995-C3	40.20
.1000		.750	1.375	.0090	4	1/8	2-1/2	RSB1000	35.30	RSB1000-C3	40.20
.1010		.750	1.375	.0091	4	1/8	2-1/2	RSB1010	35.30	RSB1010-C3	40.20
.1015	#38	.750	1.375	.0091	4	1/8	2-1/2	RSB1015	36.30	RSB1015-C3	40.20
.1020		.750	1.375	.0092	4	1/8	2-1/2	RSB1020	35.30	RSB1020-C3	40.20
.1030		.750	1.375	.0093	4	1/8	2-1/2	RSB1030	35.30	RSB1030-C3	40.20
.1040	#37	.750	1.375	.0094	4	1/8	2-1/2	RSB1040	35.30	RSB1040-C3	40.20
.1050		.750	1.375	.0095	4	1/8	2-1/2	RSB1050	36.30	RSB1050-C3	40.20
.1060		.750	1.375	.0095	4	1/8	2-1/2	RSB1060	35.30	RSB1060-C3	40.20
.1065	#36	.750	1.375	.0096	4	1/8	2-1/2	RSB1065	36.30	RSB1065-C3	40.20
.1070		.750	1.375	.0096	4	1/8	2-1/2	RSB1070	36.30	RSB1070-C3	40.20
.1080		.750	1.375	.0097	4	1/8	2-1/2	RSB1080	36.30	RSB1080-C3	40.20
.1083 (2.75 mm)		.750	1.375	.0097	4	1/8	2-1/2	RSB1083	36.30	RSB1083-C3	41.30

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1085		.750	1.375	.0098	4	1/8	2-1/2	RSB1085	36.30	RSB1085-C3	41.30
.1090		.750	1.375	.0098	4	1/8	2-1/2	RSB1090	36.30	RSB1090-C3	40.20
.1094 (7/64)		.750	1.375	.0098	4	1/8	2-1/2	RSB1094	36.30	RSB1094-C3	41.30
.1100	#35	.750	1.375	.0099	4	1/8	2-1/2	RSB1100	36.30	RSB1100-C3	40.20
.1105		.750	1.375	.0099	4	1/8	2-1/2	RSB1105	36.30	RSB1105-C3	40.20
.1110	#34	.750	1.375	.0100	4	1/8	2-1/2	RSB1110	35.30	RSB1110-C3	40.20
.1120		.750	1.375	.0101	4	1/8	2-1/2	RSB1120	36.30	RSB1120-C3	40.20
.1130	#33	.750	1.500	.0102	4	1/8	2-1/2	RSB1130	36.30	RSB1130-C3	40.20
.1140		.750	1.500	.0103	4	1/8	2-1/2	RSB1140	35.30	RSB1140-C3	40.20
.1150		.750	1.500	.0104	4	1/8	2-1/2	RSB1150	36.30	RSB1150-C3	40.20
.1160	#32	.750	1.500	.0104	4	1/8	2-1/2	RSB1160	36.30	RSB1160-C3	40.20
.1170		.750	1.500	.0105	4	1/8	2-1/2	RSB1170	35.30	RSB1170-C3	40.20
.1180		.750	1.500	.0106	4	1/8	2-1/2	RSB1180	35.30	RSB1180-C3	40.20
.1190		.750	1.500	.0107	4	1/8	2-1/2	RSB1190	35.30	RSB1190-C3	40.20
.1200	#31	.750	1.500	.0108	4	1/8	2-1/2	RSB1200	35.30	RSB1200-C3	40.20
.1210		.750	1.500	.0109	4	1/8	2-1/2	RSB1210	35.30	RSB1210-C3	40.20
.1220 (3.10 mm)		.750	1.500	.0110	4	1/8	2-1/2	RSB1220	36.30	RSB1220-C3	40.20
D_1*		L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1230		.750	1.500	.0111	4	3/16	3	RSB1230	41.90	RSB1230-C3	46.80
.1235		.750	1.500	.0111	4	3/16	3	RSB1235	41.90	RSB1235-C3	46.80
.1240		.750	1.500	.0112	4	3/16	3	RSB1240	41.40	RSB1240-C3	46.80
.1245		.750	1.500	.0112	4	3/16	3	RSB1245	41.40	RSB1245-C3	46.80
.1250 (1/8)		.750	1.500	.0113	4	3/16	3	RSB1250	41.40	RSB1250-C3	46.80
.1255		.750	1.500	.0113	4	3/16	3	RSB1255	41.40	RSB1255-C3	46.80
.1260 (3.20 mm)		.750	1.500	.0113	4	3/16	3	RSB1260	41.40	RSB1260-C3	46.80
.1265		.750	1.500	.0114	4	3/16	3	RSB1265	41.40	RSB1265-C3	46.80
.1270		.750	1.500	.0114	4	3/16	3	RSB1270	41.90	RSB1270-C3	47.80
.1285	#30	.750	1.500	.0116	4	3/16	3	RSB1285	41.90	RSB1285-C3	46.80
.1360	#29	.750	1.625	.0122	4	3/16	3	RSB1360	41.90	RSB1360-C3	46.80
.1390		.750	1.625	.0125	4	3/16	3	RSB1390	41.90	RSB1390-C3	46.80
.1395		.750	1.625	.0126	4	3/16	3	RSB1395	41.90	RSB1395-C3	47.20
.1400		.750	1.625	.0126	4	3/16	3	RSB1400	41.90	RSB1400-C3	46.80
.1405	#28	.750	1.625	.0126	4	3/16	3	RSB1405	41.90	RSB1405-C3	47.20
.1406 (9/64)		.750	1.625	.0127	4	3/16	3	RSB1406	41.90	RSB1406-C3	46.80
.1410		.750	1.625	.0127	4	3/16	3	RSB1410	41.90	RSB1410-C3	47.20
.1415		.750	1.625	.0127	4	3/16	3	RSB1415	41.90	RSB1415-C3	47.20
.1420		.750	1.625	.0128	4	3/16	3	RSB1420	41.90	RSB1420-C3	47.20
.1440	#27	.750	1.625	.0130	4	3/16	3	RSB1440	41.90	RSB1440-C3	46.80
.1470	#26	.875	1.750	.0132	4	3/16	3	RSB1470	41.90	RSB1470-C3	47.20
.1495	#25	.875	1.750	.0135	4	3/16	3	RSB1495	41.90	RSB1495-C3	46.80
.1520	#24	.875	1.750	.0137	4	3/16	3	RSB1520	41.90	RSB1520-C3	47.20
.1540	#23	.875	1.750	.0139	4	3/16	3	RSB1540	41.90	RSB1540-C3	47.20
.1545		.875	1.750	.0139	4	3/16	3	RSB1545	41.90	RSB1545-C3	46.80
.1550		.875	1.750	.0140	4	3/16	3	RSB1550	41.90	RSB1550-C3	46.80
.1555		.875	1.750	.0140	4	3/16	3	RSB1555	41.90	RSB1555-C3	46.80

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.030″ −.000″	L_3 +.030″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1560		.875	1.750	.0140	4	3/16	3	RSB1560	41.40	RSB1560-C3	46.80
.1562 (5/32)		.875	1.750	.0141	4	3/16	3	RSB1562	41.90	RSB1562-C3	46.80
.1565		.875	1.750	.0141	4	3/16	3	RSB1565	41.90	RSB1565-C3	46.80
.1570	#22	.875	1.750	.0141	4	3/16	3	RSB1570	41.40	RSB1570-C3	46.80
.1575 (4.00 mm)		.875	1.750	.0142	4	3/16	3	RSB1575	41.40	RSB1575-C3	46.80
.1580		.875	1.875	.0142	4	3/16	3	RSB1580	41.40	RSB1580-C3	46.80
.1585		.875	1.875	.0143	4	3/16	3	RSB1585	41.90	RSB1585-C3	46.80
.1590	#21	.875	1.875	.0143	4	3/16	3	RSB1590	41.90	RSB1590-C3	46.80
.1610	#20	.875	1.875	.0145	4	3/16	3	RSB1610	41.90	RSB1610-C3	46.80
.1660	#19	.875	1.875	.0149	4	3/16	3	RSB1660	41.90	RSB1660-C3	47.20
.1695	#18	1.000	2.000	.0153	4	3/16	4	RSB1695	46.50	RSB1695-C3	53.00
.1705		1.000	2.000	.0153	4	3/16	4	RSB1705	46.50	RSB1705-C3	53.00
.1710		1.000	2.000	.0154	4	3/16	4	RSB1710	46.50	RSB1710-C3	53.00
.1715		1.000	2.000	.0154	4	3/16	4	RSB1715	46.50	RSB1715-C3	54.60
.1719 (11/64)		1.000	2.000	.0155	4	3/16	4	RSB1719	46.50	RSB1719-C3	53.00
.1725		1.000	2.000	.0155	4	3/16	4	RSB1725	46.50	RSB1725-C3	54.60
.1730	#17	1.000	2.000	.0156	4	3/16	4	RSB1730	46.50	RSB1730-C3	53.00
.1735		1.000	2.000	.0156	4	3/16	4	RSB1735	46.50	RSB1735-C3	53.00
.1770	#16	1.000	2.000	.0159	4	3/16	4	RSB1770	46.50	RSB1770-C3	53.00
.1800	#15	1.000	2.125	.0162	4	3/16	4	RSB1800	46.50	RSB1800-C3	53.00
.1820	#14	1.000	2.125	.0164	4	3/16	4	RSB1820	46.50	RSB1820-C3	53.00
.1850 (4.70 mm)	#13	1.000	2.125	.0167	4	1/4	4	RSB1850	56.10	RSB1850-C3	64.90
.1860		1.000	2.125	.0167	4	1/4	4	RSB1860	56.10	RSB1860-C3	63.10
.1865		1.000	2.125	.0168	4	1/4	4	RSB1865	56.10	RSB1865-C3	63.10
.1870		1.000	2.125	.0168	4	1/4	4	RSB1870	56.10	RSB1870-C3	63.10
.1875 (3/16)		1.000	2.125	.0169	4	1/4	4	RSB1875	56.10	RSB1875-C3	63.10
.1880		1.000	2.125	.0169	4	1/4	4	RSB1880	56.10	RSB1880-C3	63.10
.1885		1.000	2.125	.0170	4	1/4	4	RSB1885	55.50	RSB1885-C3	63.10
.1890	#12	1.000	2.125	.0170	4	1/4	4	RSB1890	56.10	RSB1890-C3	63.10
.1910	#11	1.000	2.125	.0172	4	1/4	4	RSB1910	56.10	RSB1910-C3	64.00
.1935	#10	1.000	2.125	.0174	4	1/4	4	RSB1935	56.10	RSB1935-C3	64.00
.1960	#9	1.000	2.125	.0176	4	1/4	4	RSB1960	56.10	RSB1960-C3	64.00
.1969 (5.00 mm)		1.000	2.125	.0177	4	1/4	4	RSB1969	58.30	RSB1969-C3	66.70
.1990	#8	1.000	2.125	.0179	4	1/4	4	RSB1990	58.30	RSB1990-C3	66.70
.2010	#7	1.000	2.125	.0181	4	1/4	4	RSB2010	58.30	RSB2010-C3	66.70
.2015		1.000	2.125	.0181	4	1/4	4	RSB2015	59.90	RSB2015-C3	66.70
.2020		1.000	2.125	.0182	4	1/4	4	RSB2020	59.90	RSB2020-C3	68.70
.2025		1.000	2.125	.0182	4	1/4	4	RSB2025	59.90	RSB2025-C3	68.70
.2031 (13/64)		1.000	2.250	.0183	4	1/4	4	RSB2031	60.90	RSB2031-C3	69.40
.2035		1.000	2.250	.0183	4	1/4	4	RSB2035	60.90	RSB2035-C3	69.40
.2040	#6	1.000	2.250	.0184	4	1/4	4	RSB2040	60.90	RSB2040-C3	69.40
.2045		1.000	2.250	.0184	4	1/4	4	RSB2045	60.90	RSB2045-C3	69.40
.2055	#5	1.000	2.250	.0185	4	1/4	4	RSB2055	60.90	RSB2055-C3	67.50
.2090	#4	1.000	2.250	.0188	4	1/4	4	RSB2090	60.90	RSB2090-C3	67.50
.2130	#3	1.000	2.250	.0192	4	1/4	4	RSB2130	60.90	RSB2130-C3	67.50
.2170		1.000	2.375	.0195	4	1/4	4	RSB2170	60.90	RSB2170-C3	69.40

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.030"}_{-.000"}$	L_3 $^{+.030"}_{-.000"}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.2175		1.000	2.375	.0196	4	1/4	4	RSB2175	60.90	RSB2175-C3	69.40
.2180		1.000	2.375	.0196	4	1/4	4	RSB2180	60.90	RSB2180-C3	67.50
.2185		1.000	2.375	.0197	4	1/4	4	RSB2185	60.90	RSB2185-C3	67.50
.2187 (7/32)		1.000	2.375	.0197	4	1/4	4	RSB2187	60.90	RSB2187-C3	69.40
.2190		1.000	2.375	.0197	4	1/4	4	RSB2190	60.90	RSB2190-C3	67.50
.2195		1.000	2.375	.0198	4	1/4	4	RSB2195	60.90	RSB2195-C3	67.50
.2200		1.000	2.375	.0198	4	1/4	4	RSB2200	60.90	RSB2200-C3	67.50
.2205 (5.60 mm)		1.000	2.375	.0198	4	1/4	4	RSB2205	60.90	RSB2205-C3	67.50
.2210	#2	1.000	2.375	.0199	4	1/4	4	RSB2210	60.90	RSB2210-C3	69.40
.2280	#1	1.125	2.500	.0182	6	1/4	4	RSB2280	64.10	RSB2280-C3	74.70
.2330		1.125	2.500	.0186	6	1/4	4	RSB2330	66.00	RSB2330-C3	72.60
.2335		1.125	2.500	.0187	6	1/4	4	RSB2335	66.00	RSB2335-C3	74.70
.2340	A	1.125	2.500	.0187	6	1/4	4	RSB2340	66.00	RSB2340-C3	74.70
.2344 (15/64)		1.125	2.500	.0188	6	1/4	4	RSB2344	66.00	RSB2344-C3	74.70
.2350		1.125	2.500	.0188	6	1/4	4	RSB2350	64.10	RSB2350-C3	72.60
.2355		1.125	2.500	.0188	6	1/4	4	RSB2355	66.00	RSB2355-C3	72.60
.2360		1.125	2.500	.0189	6	1/4	4	RSB2360	64.10	RSB2360-C3	72.60
.2362 (6.00 mm)		1.125	2.500	.0189	6	1/4	4	RSB2362	66.00	RSB2362-C3	72.60
.2380	B	1.125	2.500	.0190	6	1/4	4	RSB2380	66.00	RSB2380-C3	72.60
.2420	C	1.125	2.500	.0194	6	1/4	4	RSB2420	66.00	RSB2420-C3	72.60
.2460	D	1.125	2.500	.0197	6	1/4	4	RSB2460	66.00	RSB2460-C3	74.70
.2485		1.125	2.750	.0199	6	5/16	4	RSB2485	68.00	RSB2485-C3	78.30
.2490		1.125	2.750	.0199	6	5/16	4	RSB2490	68.00	RSB2490-C3	78.30
.2495		1.125	2.750	.0200	6	5/16	4	RSB2495	67.20	RSB2495-C3	78.30
.2500 (1/4)	E	1.125	2.750	.0200	6	5/16	4	RSB2500	67.20	RSB2500-C3	78.30
.2505		1.125	2.750	.0200	6	5/16	4	RSB2505	67.20	RSB2505-C3	78.30
.2510		1.125	2.750	.0201	6	5/16	4	RSB2510	67.20	RSB2510-C3	78.30
.2515		1.125	2.750	.0201	6	5/16	4	RSB2515	67.20	RSB2515-C3	78.30
.2570	F	1.125	2.750	.0206	6	5/16	4	RSB2570	68.00	RSB2570-C3	78.30
.2812		1.125	2.875	.0225	6	5/16	6	RSB2812	104.90	RSB2812-C3	120.70
.3125 (5/16)		1.125	3.000	.0250	6	3/8	6	RSB3125	123.10	RSB3125-C3	139.40
.3150		1.125	3.000	.0252	6	3/8	6	RSB3150	123.10	RSB3150-C3	139.40
.3745		1.250	3.500	.0300	6	1/2	6	RSB3745	158.10	RSB3745-C3	173.90
.3750 (3/8)		1.250	3.500	.0300	6	1/2	6	RSB3750	158.10	RSB3750-C3	173.90
.3755		1.250	3.500	.0300	6	1/2	6	RSB3755	158.10	RSB3755-C3	173.90
.3760		1.250	3.500	.0301	6	1/2	6	RSB3760	158.10	RSB3760-C3	176.10

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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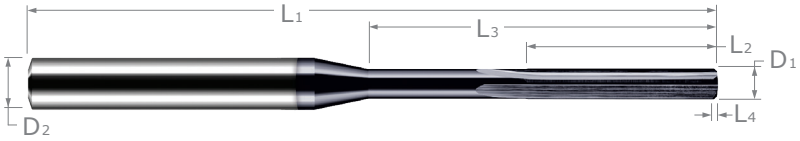

- Straight flutes for through and blind hole applications
- Oversized, common shanks to maintain strength, stiffness, and accuracy
- 45° chamfer angle
- AlTiN coating for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.5mm −.0mm	L_3 +.5mm −.0mm	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.4570	#77	3.5 mm	5.5 mm	.0526	4	3 mm	50 mm	RSC0457	42.10	RSC0457-C3	47.60
.4800		3.5 mm	6 mm	.0552	4	3 mm	50 mm	RSC0480	42.10	RSC0480-C3	47.60
.5080	#76	4 mm	6 mm	.0584	4	3 mm	50 mm	RSC0508	42.10	RSC0508-C3	47.60
.6350	#72	5 mm	8 mm	.0730	4	3 mm	50 mm	RSC0635	42.10	RSC0635-C3	47.60
.6600	#71	5 mm	8 mm	.0759	4	3 mm	50 mm	RSC0660	42.10	RSC0660-C3	47.60
.7870	#68	6 mm	10 mm	.0905	4	3 mm	50 mm	RSC0787	42.10	RSC0787-C3	47.60
.8000		6 mm	10 mm	.0920	4	3 mm	50 mm	RSC0800	42.10	RSC0800-C3	47.60
.8120	#67	6.5 mm	10 mm	.0934	4	3 mm	50 mm	RSC0812	42.10	RSC0812-C3	47.60
.8300		6.5 mm	10 mm	.0955	4	3 mm	50 mm	RSC0830	42.10	RSC0830-C3	47.60
.8380	#66	6.5 mm	10 mm	.0964	4	3 mm	50 mm	RSC0838	42.10	RSC0838-C3	47.60
.8890	#65	7 mm	11 mm	.1022	4	3 mm	50 mm	RSC0889	42.10	RSC0889-C3	47.60
.9000		7 mm	11 mm	.1035	4	3 mm	50 mm	RSC0900	42.10	RSC0900-C3	47.60
.9500		7.5 mm	11 mm	.1093	4	3 mm	50 mm	RSC0950	42.10	RSC0950-C3	47.60
.9900	#61	7.5 mm	12 mm	.1139	4	3 mm	50 mm	RSC0990	42.10	RSC0990-C3	47.60
1.0000		8 mm	12 mm	.1150	4	3 mm	50 mm	RSC1000	42.10	RSC1000-C3	47.60
1.0160	#60	8 mm	12 mm	.1168	4	3 mm	50 mm	RSC1016	42.10	RSC1016-C3	47.60
1.0500		8 mm	13 mm	.1208	4	3 mm	50 mm	RSC1050	42.10	RSC1050-C3	47.60
1.0660	#58	8.5 mm	13 mm	.1226	4	3 mm	50 mm	RSC1066	42.10	RSC1066-C3	47.60
1.0920	#57	8.5 mm	13 mm	.1256	4	3 mm	50 mm	RSC1092	42.10	RSC1092-C3	47.60
1.1500		9 mm	14 mm	.1150	4	3 mm	50 mm	RSC1150	42.10	RSC1150-C3	47.60
1.2000		9 mm	14 mm	.1200	4	3 mm	50 mm	RSC1200	35.70	RSC1200-C3	41.20
1.3970	#54	10 mm	16 mm	.1397	4	3 mm	50 mm	RSC1397	35.70	RSC1397-C3	41.20
1.4000		10 mm	17 mm	.1400	4	3 mm	50 mm	RSC1400	35.70	RSC1400-C3	41.20
1.4500		10 mm	17 mm	.1450	4	3 mm	50 mm	RSC1450	35.70	RSC1450-C3	41.20
1.5000		10 mm	18 mm	.1500	4	3 mm	50 mm	RSC1500	35.30	RSC1500-C3	40.80
1.5110	#53	10 mm	18 mm	.1511	4	3 mm	50 mm	RSC1511	35.70	RSC1511-C3	41.20
1.5500		11 mm	18 mm	.1550	4	3 mm	50 mm	RSC1550	35.30	RSC1550-C3	40.80
1.6000		11 mm	20 mm	.1600	4	3 mm	50 mm	RSC1600	35.30	RSC1600-C3	40.80
1.6120	#52	11 mm	20 mm	.1612	4	3 mm	50 mm	RSC1612	35.30	RSC1612-C3	40.80
1.6500		11 mm	20 mm	.1650	4	3 mm	50 mm	RSC1650	35.30	RSC1650-C3	40.80
1.7010	#51	12 mm	20 mm	.1701	4	3 mm	50 mm	RSC1701	35.30	RSC1701-C3	40.80
1.7780	#50	12 mm	20 mm	.1600	4	3 mm	63 mm	RSC1778	35.30	RSC1778-C3	40.80
1.8540	#49	13 mm	22 mm	.1669	4	3 mm	63 mm	RSC1854	35.30	RSC1854-C3	40.80
1.9500		13 mm	22 mm	.1755	4	3 mm	63 mm	RSC1950	35.30	RSC1950-C3	40.80
1.9930	#47	14 mm	22 mm	.1794	4	3 mm	63 mm	RSC1993	35.30	RSC1993-C3	40.80
2.0000		14 mm	22 mm	.1800	4	4 mm	63 mm	RSC2000	35.30	RSC2000-C3	41.50

*Tolerance for Uncoated is +.000mm/-.005mm. Tolerance for AlTiN coating is +.005mm/-.000mm
**Tolerance for Uncoated is +.000mm/-.005mm. Tolerance for AlTiN coating is +.008mm/-.000mm

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.5mm}_{-.0mm}$	L_3 $^{+.5mm}_{-.0mm}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
2.0500		14 mm	24 mm	.1845	4	4 mm	63 mm	RSC2050	35.30	RSC2050-C3	41.50
2.0570	#46	14 mm	24 mm	.1851	4	4 mm	63 mm	RSC2057	35.30	RSC2057-C3	41.50
2.0820	#45	14 mm	24 mm	.1874	4	4 mm	63 mm	RSC2082	35.30	RSC2082-C3	41.50
2.3500		16 mm	26 mm	.2115	4	4 mm	63 mm	RSC2350	35.30	RSC2350-C3	41.50
2.3740	#42	16 mm	26 mm	.2137	4	4 mm	63 mm	RSC2374	35.30	RSC2374-C3	41.50
2.4000		16 mm	28 mm	.2160	4	4 mm	63 mm	RSC2400	35.30	RSC2400-C3	41.50
2.4380	#41	16 mm	28 mm	.2194	4	4 mm	63 mm	RSC2438	35.30	RSC2438-C3	41.50
2.4890	#40	17 mm	28 mm	.2240	4	4 mm	63 mm	RSC2489	35.30	RSC2489-C3	41.50
2.5000		17 mm	28 mm	.2250	4	4 mm	63 mm	RSC2500	35.30	RSC2500-C3	41.50
2.9500		20 mm	35 mm	.2655	4	4 mm	75 mm	RSC2950	36.30	RSC2950-C3	42.50
3.0000		20 mm	35 mm	.2700	4	4 mm	75 mm	RSC3000	35.30	RSC3000-C3	41.50
3.0480	#31	20 mm	35 mm	.2743	4	6 mm	75 mm	RSC3048	35.30	RSC3048-C3	42.80
D_1*		L_2 $^{+.75mm}_{-.00mm}$	L_3 $^{+.75mm}_{-.00mm}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
3.1500		20 mm	35 mm	.2835	4	6 mm	75 mm	RSC3150	41.40	RSC3150-C3	48.90
3.2000		20 mm	35 mm	.2880	4	6 mm	75 mm	RSC3200	41.40	RSC3200-C3	48.90
3.2630	#30	20 mm	35 mm	.2937	4	6 mm	75 mm	RSC3263	41.90	RSC3263-C3	49.40
3.5000		20 mm	40 mm	.3150	4	6 mm	75 mm	RSC3500	41.90	RSC3500-C3	49.40
3.9500		22 mm	45 mm	.3555	4	6 mm	100 mm	RSC3950	41.90	RSC3950-C3	49.90
4.0000		22 mm	45 mm	.3600	4	6 mm	100 mm	RSC4000	41.40	RSC4000-C3	49.40
4.0500		24 mm	45 mm	.3645	4	6 mm	100 mm	RSC4050	41.90	RSC4050-C3	49.90
4.5000		26 mm	50 mm	.4050	4	6 mm	100 mm	RSC4500	46.50	RSC4500-C3	54.50
4.7500		26 mm	50 mm	.4275	4	6 mm	100 mm	RSC4750	56.10	RSC4750-C3	64.10
D_1**		L_2 $^{+.75mm}_{-.00mm}$	L_3 $^{+.75mm}_{-.00mm}$	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
5.9500		30 mm	60 mm	.4760	6	6 mm	100 mm	RSC5950	66.00	RSC5950-C3	74.00
6.0000		30 mm	60 mm	.4800	6	6 mm	125 mm	RSC6000	66.00	RSC6000-C3	74.50
6.0500		30 mm	60 mm	.4840	6	8 mm	125 mm	RSC6050	66.00	RSC6050-C3	78.30
6.3500	E	35 mm	70 mm	.5080	6	8 mm	125 mm	RSC6350	67.20	RSC6350-C3	79.50
8.0000		40 mm	80 mm	.6400	6	8 mm	125 mm	RSC8000	123.10	RSC8000-C3	135.40

*Tolerance for Uncoated is +.000mm/-.005mm. Tolerance for AlTiN coating is +.005mm/-.000mm
**Tolerance for Uncoated is +.000mm/-.005mm. Tolerance for AlTiN coating is +.008mm/-.000mm

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MINIATURE REAMERS

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SPEEDS & FEEDS (Miniature Reamers)

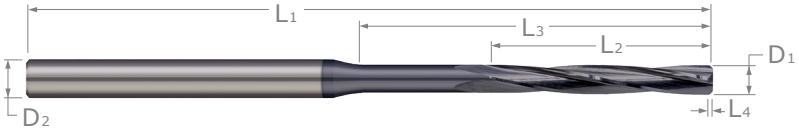
Important Note: Values in table are based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

In order to maintain appropriate stock removal amounts based on the reamer size, a hole should be pre-drilled at a diameter that is 90-94% of the finished reamed hole diameter. For example, for a finished reamed hole diameter of .0625", the pre-drilled hole diameter should be in the range of .056"-.058". The pre-drilled hole should not be smaller than 85% of the finished reamed hole diameter.

Material	SFM	Chip Load IPR (Inches Per Revolution) By Reamer Diameter									
		.015	.031	.047	.062	.078	.093	.125	.187	.250	. 375
Aluminum Alloys Casting (2xx, 5xx, 7xx, 8xx)	450	.00041	.00084	.00127	.00167	.00211	.00251	.00338	.00505	.00675	.01013
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600										
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00036	.00075	.00114	.00151	.00190	.00226	.00304	.00454	.00608	.00911
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420										
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390										
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350										
Wrought - 5%-8% Si (4xxx)	600										
Wrought - 8%-12% Si (4xxx)	480										
Magnesium Alloys	900	.00041	.00084	.00127	.00167	.00211	.00251	.00338	.00505	.00675	.01013
Zinc Alloys	480										
Copper Alloys High Coppers - 90%+ (C1xxxx)	170	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540	.00810
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375										
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170										
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375										
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375										
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170										
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400										
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00035	.00073	.00111	.00146	.00184	.00220	.00295	.00442	.00591	.00886
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540	.00810
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00035	.00073	.00111	.00146	.00184	.00220	.00295	.00442	.00591	.00886
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540	.00810
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.00506
Tool Steels A, L, O, P, W series	125	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540	.00810
D, H, M, T, S series	90	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.00506
Titanium Alloys	100	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.00506
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.00506

MINIATURE REAMERS

Right Hand Spiral



	D1 Tolerances
Uncoated	+.0000″ −.0002″
AlTiN Coated	+.0002″ −.0000″

- Helical flutes increase shearing action on chamfer for superior finish
- Right hand spiral flutes for increased chip evacuation in blind hole applications
- Available uncoated or with AlTiN coating for improved lubricity and heat resistance
- Oversized, common shanks to maintain strength, stiffness, and accuracy
- 45° chamfer angle • h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

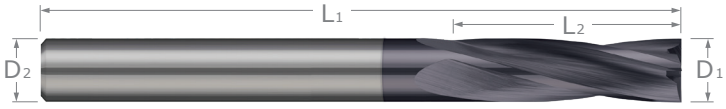
REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.0100	#87	.078	.125	.0017	4	1/8	1-1/2	RRH0100	60.70	RRH0100-C3	66.20
.0150		.109	.187	.0025	4	1/8	1-1/2	RRH0150	61.90	RRH0150-C3	67.40
.0200	#76	.140	.250	.0023	4	1/8	1-1/2	RRH0200	45.60	RRH0200-C3	51.10
.0250	#72	.187	.312	.0029	4	1/8	1-1/2	RRH0250	46.60	RRH0250-C3	52.10
.0300		.218	.375	.0035	4	1/8	2	RRH0300	46.60	RRH0300-C3	52.10
.0305		.218	.375	.0035	4	1/8	2	RRH0305	45.60	RRH0305-C3	51.10
.0310	#68	.218	.375	.0036	4	1/8	2	RRH0310	46.60	RRH0310-C3	52.10
.0315 (.80 mm)		.218	.375	.0036	4	1/8	2	RRH0315	45.60	RRH0315-C3	51.10
.0350	#65	.250	.437	.0040	4	1/8	2	RRH0350	46.60	RRH0350-C3	52.10
.0400	#60	.281	.500	.0046	4	1/8	2	RRH0400	45.60	RRH0400-C3	51.10
.0500		.375	.625	.0050	4	1/8	2	RRH0500	38.40	RRH0500-C3	43.90
.0600		.437	.812	.0060	4	1/8	2	RRH0600	38.40	RRH0600-C3	43.90
.0620		.437	.812	.0062	4	1/8	2	RRH0620	38.40	RRH0620-C3	43.90
.0625 (1/16)		.437	.812	.0063	4	1/8	2	RRH0625	38.40	RRH0625-C3	43.90
.0630 (1.60 mm)		.437	.812	.0063	4	1/8	2	RRH0630	38.40	RRH0630-C3	43.90
.0700	#50	.562	.937	.0063	4	1/8	2	RRH0700	38.40	RRH0700-C3	43.90
.0781 (5/64)		.562	1.000	.0070	4	1/8	2	RRH0781	38.40	RRH0781-C3	43.90
.0800		.562	1.000	.0072	4	1/8	2	RRH0800	38.40	RRH0800-C3	43.90
.0900		.625	1.125	.0081	4	1/8	2-1/2	RRH0900	38.40	RRH0900-C3	43.90
.0935	#42	.687	1.250	.0084	4	1/8	2-1/2	RRH0935	38.40	RRH0935-C3	43.90
.0937 (3/32)		.687	1.250	.0084	4	1/8	2-1/2	RRH0937	38.40	RRH0937-C3	43.90
.0940		.687	1.250	.0085	4	1/8	2-1/2	RRH0940	38.40	RRH0940-C3	43.90
.0950		.687	1.250	.0086	4	1/8	2-1/2	RRH0950	38.40	RRH0950-C3	43.90
.1000		.750	1.375	.0090	4	1/8	2-1/2	RRH1000	38.40	RRH1000-C3	43.90
D_1*		L_2 +.030″ −.000″	L_3 +.030″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	PRICE	TOOL #	PRICE
.1245		.750	1.500	.0112	4	3/16	3	RRH1245	45.00	RRH1245-C3	51.00
.1250 (1/8)		.750	1.500	.0113	4	3/16	3	RRH1250	45.00	RRH1250-C3	51.00
.1255		.750	1.500	.0113	4	3/16	3	RRH1255	45.00	RRH1255-C3	51.00
.1285	#30	.750	1.500	.0116	4	3/16	3	RRH1285	45.00	RRH1285-C3	51.00
.1560		.875	1.750	.0140	4	3/16	3	RRH1560	45.00	RRH1560-C3	51.20
.1575 (4.00 mm)		.875	1.750	.0142	4	3/16	3	RRH1575	45.00	RRH1575-C3	51.00
.1870		1.000	2.125	.0168	4	1/4	4	RRH1870	60.40	RRH1870-C3	69.80
.1875 (3/16)		1.000	2.125	.0169	4	1/4	4	RRH1875	60.40	RRH1875-C3	69.80
.1880		1.000	2.125	.0169	4	1/4	4	RRH1880	60.40	RRH1880-C3	69.80

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

Please See Speeds & Feeds On Page 509

COUNTERBORES

Flat Bottom



For Spot Facing or Counterboring on Irregular Surfaces

- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces • Center cutting
- Can be used for flat bottom reaming or straightening misaligned holes • 15° helix • 4 flutes • Solid carbide
- Ground with full cylindrical margin (not side cutting) • AlTiN coating for increased performance in ferrous materials
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials
- TiB2 coating prevents chip packing in non-abrasive aluminum alloys • CNC ground in the USA

	CUTTER DIAMETER	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED		TiB_2 COATED	
	D_1 $^{+.0000''}_{-.0005''}$*	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE
	.0200	.060	1/8	1-1/2	23320	33.80	23320-C3	39.30				
	.0300	1/8	1/8	1-1/2	23330	33.20	23330-C3	38.70				
	.0312 (1/32)	1/8	1/8	1-1/2	23331	32.90	23331-C3	38.40				
	.0394 (1 mm)	5/32	1/8	1-1/2	2331M	32.90	2331M-C3	38.40			2331M-C8	40.00
	.0400	5/32	1/8	1-1/2	23340	33.20	23340-C3	38.70				
	.0469 (3/64)	3/16	1/8	1-1/2	23347	32.90	23347-C3	38.40				
	.0500	3/16	1/8	1-1/2	23350	33.20	23350-C3	38.70				
	.0550	1/4	1/8	1-1/2	23355	32.90	23355-C3	38.40				
	.0600	1/4	1/8	1-1/2	23360	32.90	23360-C3	38.40				
	.0625 (1/16)	1/4	1/8	1-1/2	23362	32.90	23362-C3	38.40	23362-C6	40.90	23362-C8	40.00
	.0700	9/32	1/8	1-1/2	23370	32.90	23370-C3	38.40				
	.0781 (5/64)	5/16	1/8	1-1/2	23378	32.90	23378-C3	38.40				
	.0787 (2 mm)	5/16	1/8	1-1/2	2332M	32.90	2332M-C3	38.40				
	.0800	5/16	1/8	1-1/2	23380	32.90	23380-C3	38.40				
	.0900	3/8	1/8	1-1/2	23390	32.90	23390-C3	38.80				
	.0937 (3/32)	3/8	1/8	1-1/2	23393	32.90	23393-C3	38.40	23393-C6	40.90		
	.1094 (7/64)	3/8	1/8	1-1/2	23407	32.90	23407-C3	38.40				
	.1181 (3 mm)	3/8	1/8	1-1/2	2343M	32.90	2343M-C3	38.40	2343M-C6	40.90	2343M-C8	40.90
	.1250 (1/8)	1/2	1/8	1-1/2	23408	32.90	23408-C3	38.40	23408-C6	40.90	23408-C8	40.90
	.1406 (9/64)	9/16	3/16	2	23409	31.40	23409-C3	37.30	23409-C6	38.50		
	.1562 (5/32)	5/8	3/16	2	23410	31.40	23410-C3	37.30				
	.1575 (4 mm)	5/8	3/16	2	2344M	31.40	2344M-C3	37.30				
	.1719 (11/64)	5/8	3/16	2	23411	31.40	23411-C3	37.30	23411-C6	40.00		
NEW	.1750	5/8	3/16	2	23574	31.40	23574-C3	37.20				
	.1875 (3/16)	3/4	3/16	2	23412	31.40	23412-C3	37.30	23412-C6	40.00	23412-C8	39.40
	.1968 (5 mm)	3/4	1/4	2-1/2	2345M	43.00	2345M-C3	51.00	2345M-C6	52.40	2345M-C8	53.30
	.2031 (13/64)	3/4	1/4	2-1/2	23413	43.00	23413-C3	51.00				
	.2187 (7/32)	3/4	1/4	2-1/2	23414	43.00	23414-C3	51.00				
	.2344 (15/64)	7/8	1/4	2-1/2	23415	43.00	23415-C3	51.00				
	.2362 (6 mm)	7/8	1/4	2-1/2	2346M	43.00	2346M-C3	51.00	2346M-C6	52.00		
NEW	.2420	7/8	1/4	2-1/2	23641	43.00	23641-C3	50.50				
	.2500 (1/4)	7/8	1/4	2-1/2	23416	43.00	23416-C3	51.00	23416-C6	52.40	23416-C8	52.70
	.2656 (17/64)	7/8	5/16	2-1/2	23417	53.00	23417-C3	62.40				

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN and AlTiN Nano coating is +.0002"/−.0005".

continued on next page

NEW SIZES!

COUNTERBORES

Flat Bottom (cont.)

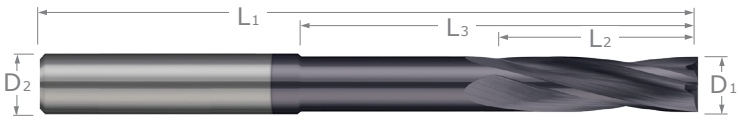
continued from previous page

CUTTER DIAMETER	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED		TiB_2 COATED		
D_1 $^{+.0000"}_{-.0005"}$*	L_2 $^{+.030"}_{-.000"}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE	4 FL	PRICE	
.2812 (9/32)	7/8	5/16	2-1/2	23418	53.00	23418-C3	62.40					
.2900	7/8	5/16	2-1/2	23689	53.00	23689-C3	61.90					NEW
.2969 (19/64)	7/8	5/16	2-1/2	23419	53.00	23419-C3	62.40					
.3125 (5/16)	1	5/16	2-1/2	23420	53.00	23420-C3	62.40	23420-C6	66.30	23420-C8	68.20	
.3150 (8 mm)	1	3/8	2-1/2	2348M	63.40	2348M-C3	74.00					
.3281 (21/64)	1	3/8	2-1/2	23421	63.40	23421-C3	74.00					
.3320	1	3/8	2-1/2	23731	63.40	23731-C3	74.00					NEW
.3437 (11/32)	1	3/8	2-1/2	23422	63.40	23422-C3	74.00					
.3594 (23/64)	1	3/8	2-1/2	23423	63.40	23423-C3	74.00					
.3750 (3/8)	1	3/8	2-1/2	23424	63.40	23424-C3	74.00	23424-C6	76.60	23424-C8	78.00	
.3937 (10 mm)	1	7/16	2-3/4	2340M	78.20	2340M-C3	91.40					
.4062 (13/32)	1	7/16	2-3/4	23426	78.20	23426-C3	91.40					
.4220	1	7/16	2-3/4	23427	78.20	23427-C3	90.50					NEW
.4375 (7/16)	1	7/16	2-3/4	23428	78.20	23428-C3	91.40					
.4687 (15/32)	1	1/2	3	23430	105.90	23430-C3	121.70					
.4724 (12 mm)	1	1/2	3	23476	102.90	23476-C3	118.70					
.5000 (1/2)	1	1/2	3	23432	102.90	23432-C3	118.70	23432-C6	120.00	23432-C8	119.90	
.5625 (9/16)	1-1/2	5/8	3-1/2	23436	146.10	23436-C3	162.00					
.6250 (5/8)	1-1/2	5/8	3-1/2	23440	163.70	23440-C3	179.50					
.6875 (11/16)	1-1/2	3/4	4	23444	244.20	23444-C3	265.50					
.7500 (3/4)	1-1/2	3/4	4	23448	237.30	23448-C3	254.40					

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN and AlTiN Nano coating is +.0002"/−.0005".

COUNTERBORES

Flat Bottom – Long Reach



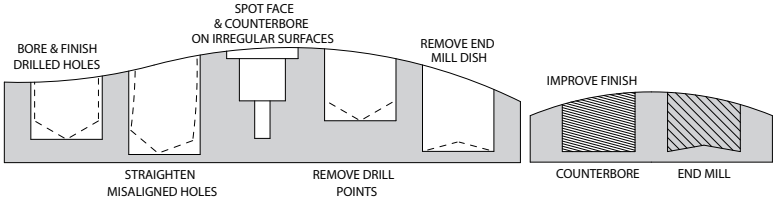
Undersized Neck to Avoid Heeling

- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Can be used for flat bottom reaming or straightening misaligned holes • Center cutting
- Ground with full cylindrical margin (not side cutting) • 15° helix • 4 flutes • Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	FLUTE LENGTH	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.0000″ −.0005″*	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.0312 (1/32)	1/8	1/4	1/8	2-1/2	25431	40.40	25431-C3	45.90
.0394 (1 mm)	5/32	5/16	1/8	2-1/2	2541M	39.60	2541M-C3	45.10
.0469 (3/64)	3/16	3/8	1/8	2-1/2	25447	39.60	25447-C3	45.10
.0625 (1/16)	1/4	1/2	1/8	2-1/2	25462	39.60	25462-C3	45.10
.0781 (5/64)	5/16	5/8	1/8	2-1/2	25478	39.60	25478-C3	45.10
.0787 (2 mm)	5/16	5/8	1/8	2-1/2	2542M	39.60	2542M-C3	45.10
.0937 (3/32)	3/8	3/4	1/8	2-1/2	25493	39.60	25493-C3	45.10
.1094 (7/64)	3/8	7/8	1/8	2-1/2	25507	39.60	25507-C3	45.10
.1181 (3 mm)	3/8	1	1/8	2-1/2	2553M	39.60	2553M-C3	45.10
.1250 (1/8)	1/2	1	1/8	2-1/2	25508	39.60	25508-C3	45.10
.1406 (9/64)	9/16	1-1/8	3/16	3	25509	48.30	25509-C3	54.20
.1562 (5/32)	5/8	1-1/4	3/16	3	25510	48.30	25510-C3	54.20
.1575 (4 mm)	5/8	1-1/4	3/16	3	2554M	48.30	2554M-C3	54.20
.1719 (11/64)	5/8	1-3/8	3/16	3	25511	48.30	25511-C3	54.20
.1875 (3/16)	3/4	1-1/2	3/16	3	25512	48.30	25512-C3	54.20
.1968 (5 mm)	3/4	1-9/16	1/4	4	2555M	66.90	2555M-C3	76.40
.2031 (13/64)	3/4	1-5/8	1/4	4	25513	64.10	25513-C3	73.50
.2187 (7/32)	3/4	1-3/4	1/4	4	25514	64.10	25514-C3	73.50
.2344 (15/64)	7/8	1-7/8	1/4	4	25515	64.10	25515-C3	73.50
.2362 (6 mm)	7/8	1-7/8	1/4	4	2556M	66.90	2556M-C3	76.40
.2500 (1/4)	7/8	2	1/4	4	25516	64.10	25516-C3	73.50
.2656 (17/64)	7/8	2-1/8	5/16	4	25517	81.30	25517-C3	92.60
.2812 (9/32)	7/8	2-1/4	5/16	4	25518	81.30	25518-C3	92.60
.2969 (19/64)	7/8	2-3/8	5/16	4	25519	81.30	25519-C3	92.60
.3125 (5/16)	1	2-1/2	5/16	4	25520	81.30	25520-C3	92.60
.3150 (8 mm)	1	2-1/2	3/8	4	2558M	104.90	2558M-C3	119.50
.3437 (11/32)	1	2-3/4	3/8	4	25522	98.10	25522-C3	112.70
.3750 (3/8)	1	3	3/8	4	25524	98.10	25524-C3	112.70
.3937 (10 mm)	1	3	7/16	4	2550M	122.00	2550M-C3	138.00
.4375 (7/16)	1	3	7/16	4	25528	113.90	25528-C3	129.90
.5000 (1/2)	1	3	1/2	4	25532	139.60	25532-C3	155.60

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN coating is +.0002"/−.0005".

APPLICATIONS:



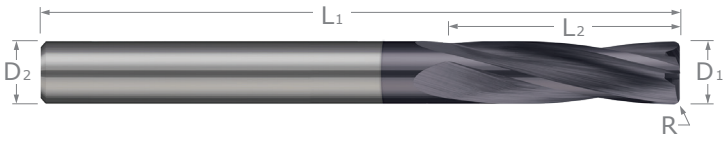
SPOT EFFECTIVELY. The flat bottom removes end mill dish or drill points while effectively spotting on irregular surfaces.

HOLD POSITION. The full cylindrical margin and back taper are not side cutting and won't grab or deflect.

CONTROL FINISH. The slow helix with a low rake avoids part engagement and helps to control finish.

COUNTERBORES

Flat Bottom – Corner Radius

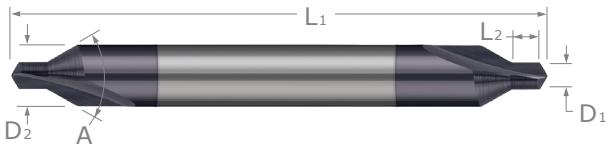


- For spot facing or counterboring on irregular surfaces
- Flat bottom (no dish) design allows spot facing or counterboring on irregular surfaces
- Corner Radius for improved strength
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Can be used for flat bottom reaming or straightening misaligned holes
- 4 flutes • 15° helix • Center cutting
- Ground with full cylindrical margin (not side cutting)
- AlTiN coating for improved lubricity and heat resistance
- Solid carbide • CNC ground in the USA

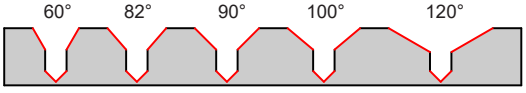
CUTTER DIAMETER	CORNER RADIUS	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0000''}_{-.0005''}$ *	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	PRICE	4 FL	PRICE
.0625	.010	.250	1/8	1-1/2	731562	35.40	731562-C3	40.90
.0937	.010	.375	1/8	1-1/2	731593	35.40	731593-C3	40.90
.1250	.010	.500	1/8	1-1/2	731608	35.40	731608-C3	40.90
.1562	.010	.625	3/16	2	731610	33.90	731610-C3	39.70
.1875	.010	.750	3/16	2	731612	33.90	731612-C3	39.70
.2187	.010	.750	1/4	2-1/2	731614	45.60	731614-C3	53.10
.2500	.010	.875	1/4	2-1/2	731616	45.60	731616-C3	53.10
.2812	.010	.875	5/16	2-1/2	731618	55.80	731618-C3	64.70
.3125	.010	1.000	5/16	2-1/2	731620	55.80	731620-C3	64.70
.3437	.010	1.000	3/8	2-1/2	731622	66.30	731622-C3	76.90
.3750	.010	1.000	3/8	2-1/2	731624	66.30	731624-C3	76.90
.4375	.010	1.000	7/16	2-3/4	731628	81.40	731628-C3	93.70
.5000	.010	1.000	1/2	3	731632	105.80	731632-C3	120.20

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN coating is +.0002"/−.0005".

COMBINED DRILL & COUNTERSINKS



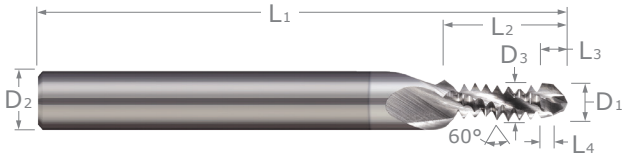
- 60°, 82°, 90°, 100°, and 120° included angles - plain type
- 2 flutes
- 118° included tip angle
- Double-ended
- Solid carbide
- CNC ground in the USA

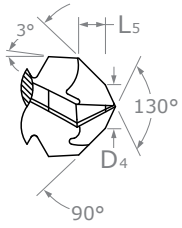


Stocked in *Five* Angles!

INCLUDED ANGLE	SIZE	DRILL DIAMETER	DRILL LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A +1° −1°		D_1 +.0015″ +.0005″	L_2 +.005″ −.000″	D_2	L_1	2 FL	PRICE	2 FL	PRICE
60°	0000	1/64	1/64	1/8	1-1/2	11002	35.10	11002-C3	41.80
	000	.020	.020	1/8	1-1/2	11005	26.60	11005-C3	33.30
	00	.025	.025	1/8	1-1/2	11010	20.70	11010-C3	26.30
	0	1/32	1/32	1/8	1-1/2	11020	20.70	11020-C3	26.30
	1	3/64	3/64	1/8	1-1/2	11030	17.40	11030-C3	23.10
	2	5/64	5/64	3/16	2	11040	26.60	11040-C3	33.10
	3	7/64	7/64	1/4	2	11050	30.30	11050-C3	39.40
	4	1/8	1/8	5/16	2-1/2	11060	41.40	11060-C3	52.30
	5	3/16	3/16	7/16	2-3/4	11070	61.90	11070-C3	78.10
	6	7/32	7/32	1/2	3	11080	88.30	11080-C3	105.20
82°	00	.025	.025	1/8	1-1/2	25610	22.20	25610-C3	27.70
	0	1/32	1/32	1/8	1-1/2	25620	22.00	25620-C3	27.50
	1	3/64	3/64	1/8	1-1/2	25630	18.40	25630-C3	24.10
	2	5/64	5/64	3/16	2	25640	28.40	25640-C3	34.80
	3	7/64	7/64	1/4	2	25650	32.20	25650-C3	41.30
	4	1/8	1/8	5/16	2-1/2	25660	43.70	25660-C3	54.50
	5	3/16	3/16	7/16	2-3/4	25670	65.80	25670-C3	81.80
90°	0000	1/64	1/64	1/8	1-1/2	17902	36.20	17902-C3	41.70
	000	.020	.020	1/8	1-1/2	17905	27.40	17905-C3	34.20
	00	.025	.025	1/8	1-1/2	17910	21.50	17910-C3	28.20
	0	1/32	1/32	1/8	1-1/2	17920	21.50	17920-C3	28.20
	1	3/64	3/64	1/8	1-1/2	17930	18.00	17930-C3	23.70
	2	5/64	5/64	3/16	2	17940	27.40	17940-C3	33.90
	3	7/64	7/64	1/4	2	17950	31.20	17950-C3	40.30
	4	1/8	1/8	5/16	2-1/2	17960	42.50	17960-C3	53.30
	5	3/16	3/16	7/16	2-3/4	17970	63.80	17970-C3	79.90
	6	7/32	7/32	1/2	3	17980	90.20	17980-C3	107.10
100°	0	1/32	1/32	1/8	1-1/2	849520	24.60	849520-C3	30.10
	1	3/64	3/64	1/8	1-1/2	849530	20.90	849530-C3	26.40
	2	5/64	5/64	3/16	2	849540	31.40	849540-C3	37.90
	3	7/64	7/64	1/4	2	849550	35.70	849550-C3	44.60
	4	1/8	1/8	5/16	2-1/2	849560	48.50	849560-C3	58.50
120°	2	5/64	5/64	3/16	2	822540	31.40	822540-C3	36.80
	3	7/64	7/64	1/4	2	822550	35.70	822550-C3	42.40
	4	1/8	1/8	5/16	2-1/2	822560	48.50	822560-C3	55.40

COMBINATION DRILL / THREAD MILLS

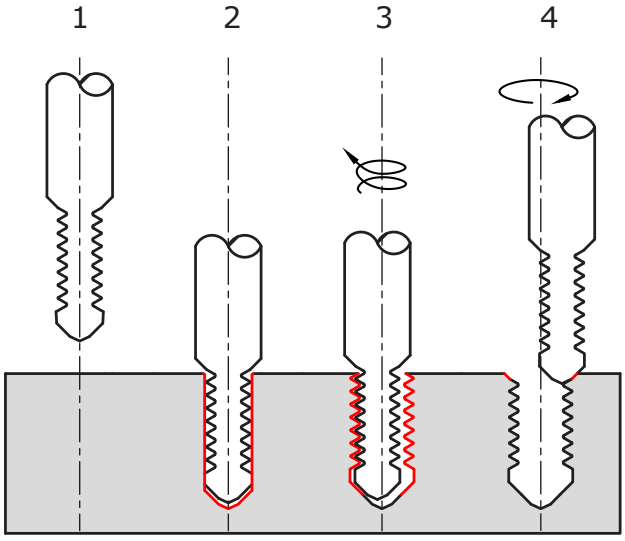




- Designed for combined drilling, threading, thread relief cutting, and chamfering
- One cutter for 4 different operations saves time on tool changes and leaves more room in the tool carousel
- Length of cut includes transition angle, allowing for optional 45° chamfer pass
- Optimized for cutting non-ferrous materials such as aluminum, unfilled plastics, copper, brass, and bronze alloys
- Recommended for cutting, threading and chamfering through holes
- 3 flutes to center • Cuts internal 60° UN threads • 90° included back chamfer
- Solid carbide • CNC ground in the USA

THREAD SIZE	DRILL DIAMETER	LENGTH OF CUT	THREAD DIAMETER	SECONDARY POINT ANGLE DIAMETER	LENGTH OF TIP	LENGTH OF THREAD RELIEF	CHAMFER LENGTH	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
	D_1 +.0005″ −.0005″	L_2 +.030″ −.000″	D_3 +.0005″ −.0005″	D_4	L_3	L_4	L_5	D_2	L_1	3 FL	PRICE	3 FL	PRICE
4-40	.0876	.2513	.085	.0356	.0580	.0250	.0247	1/8	2	820616	128.60	820616-C8	135.70
6-32	.1076	.3323	.100	.0475	.0707	.0312	.0284	3/16	2	820622	132.70	820622-C8	140.70
8-32	.1336	.3652	.115	.0735	.0767	.0312	.0284	3/16	2	820628	142.10	820628-C8	150.10
10-24	.1494	.4966	.120	.0760	.0939	.0416	.0345	1/4	2	820634	149.10	820634-C8	157.90
10-32	.1596	.4681	.120	.0995	.0828	.0312	.0284	1/4	2	820636	149.10	820636-C8	157.90
1/4-20	.2013	.7154	.180	.1172	.1168	.0500	.0394	3/8	2-1/2	820644	177.60	820644-C8	191.80
1/4-28	.2152	.7078	.180	.1494	.1016	.0357	.0310	3/8	2-1/2	820646	177.60	820646-C8	192.20
5/16-18	.2584	.8750	.240	.1671	.1372	.0555	.0427	3/8	2-1/2	820654	194.10	820654-C8	208.70
5/16-24	.2719	.8248	.240	.1985	.1224	.0416	.0345	3/8	2-1/2	820656	218.30	820656-C8	232.90
3/8-16	.3141	1.019	.285	.2140	.1592	.0625	.0468	1/2	3	820664	259.40	820664-C8	276.40
7/16-20	.3888	1.154	.335	.3047	.1605	.0500	.0394	1/2	3-1/2	820676	280.50	820676-C8	298.70
1/2-13	.4251	1.279	.350	.3064	.2036	.0769	.0553	5/8	3-1/2	820684	289.40	820684-C8	314.10

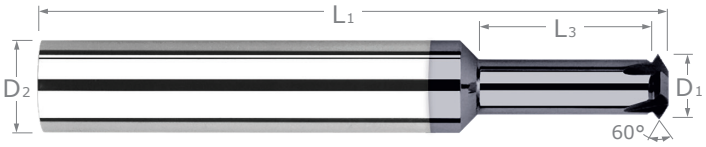
Combination Drill/Thread Mills Order of Operations



1. Approach the workpiece by centering the tool along the axis of the anticipated hole.
2. Drill a hole to the desired depth. For simultaneous chamfering, use the full length of cut to engage on the transition of the tool.
3. To begin thread, lift drill up by ½x - 1x pitch, then helically interpolate up 1 pitch. Return tool to center axis of the hole for retraction.
4. Re-engage the tool on top of the hole to create, increase, or finish the chamfer if desired.

THREAD MILLING CUTTERS

Single Form – UN Threads



Stocked in Multiple Reach Lengths!

- Single thread form – can mill multiple pitches
- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point • Solid carbide • CNC ground in the USA

For thread fit chart, scan the QR code or visit harveytool.com/resources

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
00	.032	.016	**1/16**	2	1/8	1-1/2	71001	83.90	71001-C3	89.40		
00	.032	.016	**3/32**	2	1/8	1-1/2	41401	88.90	41401-C3	94.40		
00	.032	.016	**1/8**	2	1/8	1-1/2	54201	89.70	54201-C3	95.20		
0	.044	.024	**3/32**	2	1/8	1-1/2	71002	81.00	71002-C3	86.50	71002-C4	94.80
0	.044	.024	**1/8**	2	1/8	1-1/2	41402	86.00	41402-C3	91.50	41402-C4	99.80
0	.044	.024	**3/16**	2	1/8	1-1/2	54202	92.50	54202-C3	98.00	54202-C4	106.30
0	.044	.024	**1/4**	2	1/8	1-1/2	993902	96.80	993902-C3	102.30		
0	.044	.024	**5/16**	2	1/8	1-1/2	901202	100.80	901202-C3	106.30		
1	.054	.032	**3/32**	2	1/8	1-1/2	932904	81.60	932904-C3	87.10		
1	.054	.032	**1/8**	2	1/8	1-1/2	71004	81.00	71004-C3	86.50	71004-C4	94.80
1	.054	.032	**3/16**	2	1/8	1-1/2	41404	86.00	41404-C3	91.50	41404-C4	99.80
1	.054	.032	**1/4**	2	1/8	1-1/2	54204	92.50	54204-C3	98.00	54204-C4	106.30
1	.054	.032	**5/16**	2	1/8	1-1/2	993904	96.80	993904-C3	102.30		
1	.054	.032	**3/8**	2	1/8	1-1/2	901204	100.80	901204-C3	106.30		
2	.064	.038	**1/8**	2	1/8	1-1/2	772906	81.60	772906-C3	87.10		
2	.064	.038	**5/32**	2	1/8	1-1/2	71006	81.00	71006-C3	86.50	71006-C4	94.80
2	.064	.038	**3/16**	2	1/8	1-1/2	822706	83.50	822706-C3	89.00		
2	.064	.038	**7/32**	2	1/8	1-1/2	41406	86.00	41406-C3	91.50	41406-C4	99.80
2	.064	.038	**1/4**	2	1/8	1-1/2	821406	89.20	821406-C3	94.70		
2	.064	.038	**5/16**	2	1/8	1-1/2	54206	92.50	54206-C3	98.00	54206-C4	106.30
2	.064	.038	**7/16**	2	1/8	1-1/2	993906	96.80	993906-C3	102.30		
2	.064	.038	**9/16**	2	1/8	1-1/2	901206	100.80	901206-C3	106.30		
3	.072	.040	**5/32**	2	1/8	1-1/2	71008	81.00	71008-C3	86.50	71008-C4	94.80
3	.072	.040	**1/4**	2	1/8	1-1/2	41408	86.00	41408-C3	91.50	41408-C4	99.80
3	.072	.040	**5/16**	2	1/8	1-1/2	821408	89.30	821408-C3	94.80		
3	.072	.040	**3/8**	2	1/8	1-1/2	54208	92.50	54208-C3	98.00	54208-C4	106.30
3	.072	.040	**1/2**	2	1/8	1-1/2	993908	96.80	993908-C3	102.30		
4	.080	.040	**1/8**	2	3/16	2	71010	81.20	71010-C3	87.10	71010-C4	96.70
4	.080	.040	**3/16**	2	3/16	2	820310	83.70	820310-C3	89.70		
4	.080	.040	**1/4**	2	3/16	2	41410	86.20	41410-C3	92.20	41410-C4	105.40
4	.080	.040	**5/16**	2	3/16	2	821410	89.50	821410-C3	95.50		
4	.080	.040	**3/8**	2	3/16	2	54210	92.90	54210-C3	98.90	54210-C4	112.00
4	.080	.040	**7/16**	2	3/16	2	771810	95.20	771810-C3	101.20		
4	.080	.040	**1/2**	2	3/16	2	993910	97.50	993910-C3	103.50		
4	.080	.040	**5/8**	2	3/16	2	901210	102.40	901210-C3	108.30		
5	.093	.050	**1/8**	4	3/16	2	932915	81.60	932915-C3	87.40		
5	.093	.050	**3/16**	4	3/16	2	71015	81.00	71015-C3	86.90		
5	.093	.050	**1/4**	4	3/16	2	822715	83.50	822715-C3	89.50		
5	.093	.050	**3/8**	4	3/16	2	41415	86.00	41415-C3	92.00	41415-C4	105.20
5	.093	.050	**1/2**	4	3/16	2	54215	92.50	54215-C3	98.40		
5	.093	.050	**5/8**	4	3/16	2	993915	97.50	993915-C3	103.50		

continued on next page

THREAD MILLING CUTTERS

Single Form – UN Threads (cont.)

continued from previous page

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
6	.098	.050	**5/32**	4	3/16	2	932920	81.20	932920-C3	87.10		
6	.098	.050	**1/4**	4	3/16	2	71020	81.20	71020-C3	87.10	71020-C4	100.30
6	.098	.050	**5/16**	4	3/16	2	822720	83.50	822720-C3	89.50		
6	.098	.050	**3/8**	4	3/16	2	41420	86.20	41420-C3	92.20	41420-C4	105.40
6	.098	.050	**7/16**	4	3/16	2	821420	89.50	821420-C3	95.50		
6	.098	.050	**1/2**	4	3/16	2	54220	92.90	54220-C3	98.90	54220-C4	112.00
6	.098	.050	**5/8**	4	3/16	2	993920	97.50	993920-C3	103.50		
6	.098	.050	**3/4**	4	3/16	2	901220	102.40	901220-C3	108.30		
8	.120	.070	**7/32**	4	1/4	2-1/2	932930	82.30	932930-C3	90.40		
8	.120	.070	**5/16**	4	1/4	2-1/2	71030	83.30	71030-C3	91.40	71030-C4	103.10
8	.120	.070	**3/8**	4	1/4	2-1/2	820330	86.00	820330-C3	94.10		
8	.120	.070	**1/2**	4	1/4	2-1/2	41430	88.90	41430-C3	97.00	41430-C4	108.70
8	.120	.070	**9/16**	4	1/4	2-1/2	821430	91.80	821430-C3	98.40		
8	.120	.070	**5/8**	4	1/4	2-1/2	54230	95.00	54230-C3	103.10	54230-C4	116.80
8	.120	.070	**3/4**	4	1/4	2-1/2	993930	102.40	993930-C3	110.50		
8	.120	.070	**7/8**	4	1/4	2-1/2	901230	108.50	901230-C3	116.60		
10	.135	.070	**7/32**	4	1/4	2-1/2	932940	82.30	932940-C3	90.40		
10	.135	.070	**5/16**	4	1/4	2-1/2	71040	83.30	71040-C3	91.40	71040-C4	105.10
10	.135	.070	**3/8**	4	1/4	2-1/2	820340	86.00	820340-C3	94.10		
10	.135	.070	**1/2**	4	1/4	2-1/2	41440	88.90	41440-C3	97.00	41440-C4	110.70
10	.135	.070	**5/8**	4	1/4	2-1/2	54240	95.00	54240-C3	103.10	54240-C4	116.80
10	.135	.070	**3/4**	4	1/4	2-1/2	771840	98.70	771840-C3	106.80		
10	.135	.070	**7/8**	4	1/4	2-1/2	993940	102.40	993940-C3	110.50		
10	.135	.070	**1-1/8**	4	1/4	2-1/2	901240	108.50	901240-C3	116.60		
12	.160	.095	**1/4**	4	1/4	2-1/2	932945	84.00	932945-C3	92.10		
12	.160	.095	**3/8**	4	1/4	2-1/2	71045	83.30	71045-C3	91.40		
12	.160	.095	**1/2**	4	1/4	2-1/2	822745	86.00	822745-C3	94.10		
12	.160	.095	**5/8**	4	1/4	2-1/2	41445	88.90	41445-C3	97.00		
12	.160	.095	**7/8**	4	1/4	2-1/2	54245	95.00	54245-C3	103.10		
12	.160	.095	**1-1/8**	4	1/4	2-1/2	993945	100.40	993945-C3	108.50		
1/4	.180	.115	**5/16**	4	1/4	2-1/2	932950	82.30	932950-C3	90.40		
1/4	.180	.115	**3/8**	4	1/4	2-1/2	772950	82.90	772950-C3	90.90		
1/4	.180	.115	**1/2**	4	1/4	2-1/2	71050	83.30	71050-C3	91.40	71050-C4	105.10
1/4	.180	.115	**5/8**	4	1/4	2-1/2	822750	86.00	822750-C3	94.10		
1/4	.180	.115	**3/4**	4	1/4	2-1/2	41450	88.90	41450-C3	97.00	41450-C4	110.70
1/4	.180	.115	**7/8**	4	1/4	2-1/2	821450	91.80	821450-C3	99.90		
1/4	.180	.115	**1**	4	1/4	2-1/2	54250	95.00	54250-C3	103.10	54250-C4	116.80
1/4	.180	.115	**1-1/8**	4	1/4	2-1/2	771850	98.50	771850-C3	106.60		
1/4	.180	.115	**1-1/4**	4	1/4	2-1/2	993950	102.40	993950-C3	110.50		
1/4	.180	.115	**1-1/2**	4	1/4	3	901250	108.50	901250-C3	116.60		
5/16	.240	.160	**3/8**	4	1/4	2-1/2	932955	84.00	932955-C3	92.10		
5/16	.240	.160	**1/2**	4	1/4	2-1/2	71055	83.30	71055-C3	91.40	71055-C4	105.10
5/16	.240	.160	**5/8**	4	1/4	2-1/2	822755	86.00	822755-C3	94.10		
5/16	.240	.160	**3/4**	4	1/4	2-1/2	41455	88.90	41455-C3	97.00	41455-C4	110.70
5/16	.240	.160	**7/8**	4	1/4	2-1/2	821455	93.50	821455-C3	101.60		
5/16	.240	.160	**1**	4	1/4	2-1/2	54255	98.10	54255-C3	106.10	54255-C4	119.80
5/16	.240	.160	**1-1/4**	4	1/4	2-1/2	993955	102.40	993955-C3	110.50		
5/16	.240	.160	**1-1/2**	4	1/4	3	901255	108.50	901255-C3	116.60		

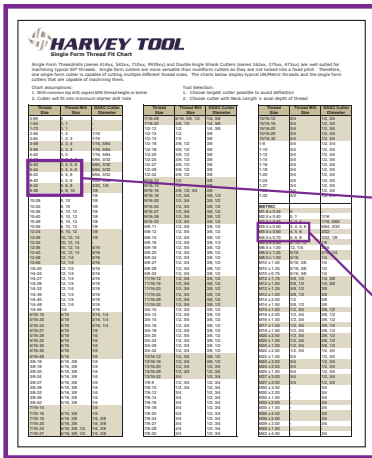
continued on next page

THREAD MILLING CUTTERS

Single Form – UN Threads (cont.)

continued from previous page

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
3/8	.300	.218	**3/4**	4	3/8	2-1/2	71060	108.50	71060-C3	119.10	71060-C4	134.70
3/8	.300	.218	**7/8**	4	3/8	2-1/2	822760	111.10	822760-C3	121.70		
3/8	.300	.218	**1**	4	3/8	2-1/2	41460	113.90	41460-C3	124.50	41460-C4	140.10
3/8	.300	.218	**1-1/8**	4	3/8	2-1/2	821460	119.30	821460-C3	129.90		
3/8	.300	.218	**1-1/4**	4	3/8	2-1/2	54260	120.00	54260-C3	130.60	54260-C4	146.20
3/8	.300	.218	**1-3/8**	4	3/8	3	771860	122.10	771860-C3	132.70		
3/8	.300	.218	**1-1/2**	4	3/8	3	993960	124.50	993960-C3	135.10		
3/8	.300	.218	**1-3/4**	4	3/8	3	901260	129.10	901260-C3	139.70		
7/16	.340	.230	**3/4**	4	3/8	2-1/2	71065	122.20	71065-C3	132.80		
7/16	.340	.230	**1**	4	3/8	2-1/2	41465	127.40	41465-C3	138.00		
7/16	.340	.230	**1-1/4**	4	3/8	3	54265	136.20	54265-C3	146.80		
1/2	.388	.250	**3/4**	4	1/2	3	71070	122.20	71070-C3	138.20		
1/2	.388	.250	**1**	4	1/2	3	822770	125.10	822770-C3	141.10		
1/2	.388	.250	**1-1/4**	4	1/2	3	41470	127.90	41470-C3	143.90	41470-C4	161.30
1/2	.388	.250	**1-1/2**	4	1/2	3	821470	132.10	821470-C3	148.10		
1/2	.388	.250	**1-3/4**	4	1/2	4	54270	136.40	54270-C3	152.30		
1/2	.388	.250	**2-1/4**	4	1/2	4	993970	142.20	993970-C3	158.10		
1/2	.388	.250	**2-3/4**	4	1/2	6	901270	147.80	901270-C3	163.70		
9/16	.400	.270	**7/8**	6	1/2	3	71073	127.70	71073-C3	143.70		
9/16	.400	.270	**1-1/4**	6	1/2	3	41473	127.70	41473-C3	143.70		
5/8	.450	.300	**1**	6	1/2	3	71075	127.70	71075-C3	143.70		
5/8	.450	.300	**1-3/8**	6	1/2	3	41475	133.70	41475-C3	149.70		
5/8	.450	.300	**1-3/4**	6	1/2	4	54275	143.10	54275-C3	159.10		
3/4	.495	.325	**1**	6	1/2	3	71080	127.70	71080-C3	143.70		
3/4	.495	.325	**1-1/4**	6	1/2	3	822780	133.20	822780-C3	149.20		
3/4	.495	.325	**1-3/8**	6	1/2	3	41480	133.70	41480-C3	149.70		
3/4	.495	.325	**1-3/4**	6	1/2	4	54280	140.80	54280-C3	156.80		
3/4	.495	.325	**2-1/4**	6	1/2	4	993980	146.90	993980-C3	162.90		
3/4	.495	.325	**2-3/4**	6	1/2	6	901280	152.90	901280-C3	168.90		
7/8	.590	.400	**1-1/4**	6	5/8	3-1/2	71085	173.70	71085-C3	189.70		
7/8	.590	.400	**1-1/2**	6	5/8	3-1/2	41485	183.30	41485-C3	199.30		
1	.620	.420	**1-5/16**	6	5/8	3-1/2	71090	173.70	71090-C3	189.70		
1	.620	.420	**1-3/4**	6	5/8	3-1/2	41490	183.30	41490-C3	199.30		
1	.625	.420	**2-1/4**	6	5/8	4	54290	196.60	54290-C3	213.80		



SINGLE FORM THREAD FIT CHARTS

5-40	3, 4, 5, 6
5-44	3, 4, 5, 6
6-32	4, 5, 6
6-40	4, 5, 6
8-32	5, 6, 8

M3.0 x 0.50	3, 4, 5, 6
M3.5 x 0.60	4, 5, 6
M4.0 x 0.70	5, 6, 8

Our single form thread milling cutters can produce a range of thread sizes, from common UN threads to metric threads.

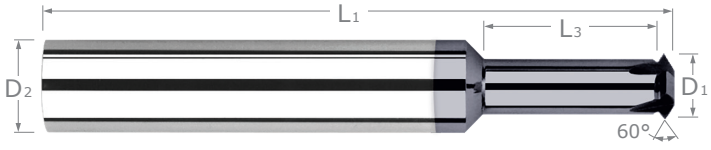
For example, our 5 thread size single form cutters (pictured left) can produce a range of thread sizes from 5-40 to 8-32 as well as M3.0 x 0.50 to M4.0 x 0.70.

For help with choosing the right thread mill, please call our Technical Support Team at **800-645-5609**.

For thread fit chart, scan the QR code or visit harveytool.com/resources

THREAD MILLING CUTTERS

Single Form – Metric



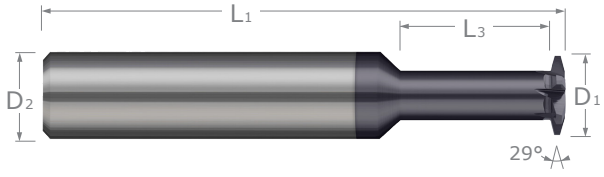
- Single thread form – can mill multiple pitches
- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point
- Solid carbide • CNC ground in the USA

For thread fit chart, scan the QR code or visit harveytool.com/resources

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		ALTiN COATED	
	D_1 +.00 mm −.05 mm		L_3 +.50 mm −.00 mm		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M1.6	1.16 mm	.696 mm	**2.10 mm**	2	3 mm	38 mm	890316	87.30	890316-C3	92.80
M1.6	1.16 mm	.696 mm	**3.50 mm**	2	3 mm	38 mm	882116	87.30	882116-C3	92.80
M1.6	1.16 mm	.696 mm	**5.60 mm**	2	3 mm	38 mm	826516	89.80	826516-C3	95.30
M2	1.50 mm	.900 mm	**2.70 mm**	2	3 mm	38 mm	890319	87.30	890319-C3	92.80
M2	1.50 mm	.900 mm	**4.50 mm**	2	3 mm	38 mm	882119	87.30	882119-C3	92.80
M2	1.50 mm	.900 mm	**6.30 mm**	2	3 mm	38 mm	737619	88.50	737619-C3	94.00
M2	1.50 mm	.900 mm	**7.00 mm**	2	3 mm	38 mm	826519	89.80	826519-C3	95.30
M2	1.50 mm	.900 mm	**9.00 mm**	2	3 mm	38 mm	761419	91.20	761419-C3	96.70
M2.5	1.90 mm	1.140 mm	**3.50 mm**	2	3 mm	38 mm	890322	88.10	890322-C3	93.60
M2.5	1.90 mm	1.140 mm	**5.80 mm**	2	3 mm	38 mm	882122	87.30	882122-C3	92.80
M2.5	1.90 mm	1.140 mm	**9.00 mm**	2	3 mm	38 mm	826522	89.80	826522-C3	95.30
M3	2.30 mm	1.380 mm	**4.00 mm**	4	3 mm	38 mm	890324	87.30	890324-C3	92.80
M3	2.30 mm	1.380 mm	**6.80 mm**	4	3 mm	38 mm	882124	87.30	882124-C3	92.80
M3	2.30 mm	1.380 mm	**9.50 mm**	4	3 mm	38 mm	737624	88.50	737624-C3	94.00
M3	2.30 mm	1.380 mm	**11.00 mm**	4	3 mm	38 mm	826524	89.80	826524-C3	95.30
M3	2.30 mm	1.380 mm	**14.00 mm**	4	3 mm	38 mm	761424	91.20	761424-C3	96.70
M4	3.00 mm	1.800 mm	**5.50 mm**	4	3 mm	38 mm	890326	88.50	890326-C3	94.00
M4	3.00 mm	1.800 mm	**9.00 mm**	4	3 mm	38 mm	882126	89.80	882126-C3	95.30
M4	3.00 mm	1.800 mm	**14.00 mm**	4	3 mm	38 mm	826526	92.50	826526-C3	98.00
M4	3.00 mm	1.800 mm	**18.00 mm**	4	3 mm	50 mm	761426	93.90	761426-C3	99.40
M5	4.00 mm	2.400 mm	**7.00 mm**	4	4 mm	50 mm	890328	89.80	890328-C3	95.80
M5	4.00 mm	2.400 mm	**12.00 mm**	4	4 mm	50 mm	882128	92.50	882128-C3	98.50
M5	4.00 mm	2.400 mm	**19.00 mm**	4	4 mm	50 mm	826528	95.50	826528-C3	101.40
M6	4.80 mm	2.880 mm	**8.50 mm**	4	6 mm	50 mm	890330	88.50	890330-C3	96.60
M6	4.80 mm	2.880 mm	**14.00 mm**	4	6 mm	50 mm	882130	89.80	882130-C3	97.90
M6	4.80 mm	2.880 mm	**23.00 mm**	4	6 mm	63 mm	826530	96.80	826530-C3	104.90
M8	6.00 mm	3.600 mm	**11.00 mm**	4	6 mm	50 mm	890332	89.80	890332-C3	97.90
M8	6.00 mm	3.600 mm	**18.00 mm**	4	6 mm	50 mm	882132	95.50	882132-C3	103.60
M10	8.00 mm	4.800 mm	**15.00 mm**	4	8 mm	63 mm	890334	116.40	890334-C3	125.90
M10	8.00 mm	4.800 mm	**24.00 mm**	4	8 mm	63 mm	882134	122.60	882134-C3	132.10
M16	13.70 mm	8.220 mm	**25.00 mm**	6	14 mm	75 mm	890339	137.30	890339-C3	153.40
M16	13.70 mm	8.220 mm	**42.00 mm**	6	14 mm	89 mm	882139	151.30	882139-C3	168.50

THREAD MILLING CUTTERS

Single Form – ACME

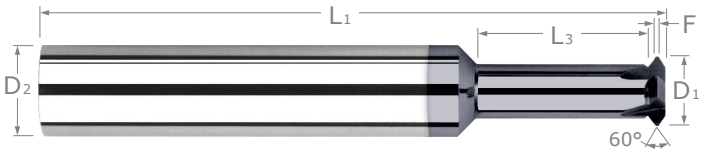


- Single thread form
- Cuts internal 29° ACME threads
- Mills right hand and left hand threads
- AlTiN coating for improved lubricity and heat resistance
- Solid carbide
- CNC ground in USA

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000"}_{-.002"}$		L_3 $^{+.020"}_{-.000"}$		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/4-16	.170	.078	**1/4**	4	3/16	2-1/2	736950	46.20	736950-C3	52.40
3/8	.245	.132	**1/2**	4	1/4	2-1/2	736960	54.90	736960-C3	62.40
1/2-10	.360	.210	**5/8**	4	3/8	2-1/2	736970	71.70	736970-C3	82.30
5/8-8	.450	.275	**7/8**	6	1/2	3	736975	99.60	736975-C3	114.00
3/4-6	.495	.278	**7/8**	6	1/2	3	736980	107.30	736980-C3	121.70
7/8-6	.495	.278	**7/8**	6	1/2	3	736985	107.30	736985-C3	121.70
1-5	.620	.370	**1-1/8**	6	5/8	3-1/2	736990	127.60	736990-C3	145.50

THREAD MILLING CUTTERS

Single Form – UN Threads – For Hardened Steels



Tip of Included Angle Ground to a Flat for Increased Wear Resistance

- **Designed for threading hardened steels 46-68Rc**
- Single thread form designed to mill common pitch sizes
- Cuts internal and external 60° UN threads
- Tip of included angle ground to a flat for increased wear resistance
- Large rigid core diameter and eccentric relief for improved strength
- Mills left hand and right hand threads • h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for improved edge retention • CNC ground in the USA

THREAD SIZE	PITCH RANGE*	CUTTER DIAMETER	TIP FLAT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 $^{+.000''}_{-.002''}$	F $^{+.0000''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	PRICE
0	80	.044	.0013	.028	**3/32**	3	1/8	1-1/2	986602-C6	100.70
0	80	.044	.0013	.028	**1/8**	3	1/8	1-1/2	993102-C6	103.90
0	80	.044	.0013	.028	**3/16**	3	1/8	1-1/2	959502-C6	108.70
0	80	.044	.0013	.028	**1/4**	3	1/8	1-1/2	930302-C6	113.60
0	80	.044	.0013	.028	**5/16**	3	1/8	1-1/2	898902-C6	117.90
1	64-72	.054	.0014	.034	**1/8**	3	1/8	1-1/2	986604-C6	99.70
1	64-72	.054	.0014	.034	**3/16**	3	1/8	1-1/2	993104-C6	103.90
1	64-72	.054	.0014	.034	**1/4**	3	1/8	1-1/2	959504-C6	108.70
1	64-72	.054	.0014	.034	**5/16**	3	1/8	1-1/2	930304-C6	113.30
2	56-64	.064	.0016	.041	**5/32**	3	1/8	1-1/2	986606-C6	99.70
2	56-64	.064	.0016	.041	**7/32**	3	1/8	1-1/2	993106-C6	103.90
2	56-64	.064	.0016	.041	**1/4**	3	1/8	1-1/2	771706-C6	106.30
2	56-64	.064	.0016	.041	**5/16**	3	1/8	1-1/2	959506-C6	108.70
2	56-64	.064	.0016	.041	**7/16**	3	1/8	1-1/2	930306-C6	113.60
3	48-56	.072	.0018	.046	**5/32**	3	1/8	1-1/2	986608-C6	99.70
3	48-56	.072	.0018	.046	**1/4**	3	1/8	1-1/2	993108-C6	103.90
3	48-56	.072	.0018	.046	**3/8**	3	1/8	1-1/2	959508-C6	108.70
4	40-48	.080	.0021	.050	**5/32**	3	3/16	2	986610-C6	100.50
4	40-48	.080	.0021	.050	**1/4**	3	3/16	2	993110-C6	106.40
4	40-48	.080	.0021	.050	**5/16**	3	3/16	2	771710-C6	108.60
4	40-48	.080	.0021	.050	**3/8**	3	3/16	2	959510-C6	110.80
4	40-48	.080	.0021	.050	**1/2**	3	3/16	2	930310-C6	115.50
4	40-48	.080	.0021	.050	**5/8**	3	3/16	2	898910-C6	120.20
5	40-44	.093	.0023	.063	**3/16**	4	3/16	2	986615-C6	106.40
5	40-44	.093	.0023	.063	**1/2**	4	3/16	2	959515-C6	110.80
5	40-44	.093	.0023	.063	**5/8**	4	3/16	2	930315-C6	116.70
6	32-40	.098	.0025	.062	**1/4**	4	3/16	2	986620-C6	100.50
6	32-40	.098	.0025	.062	**5/16**	4	3/16	2	773220-C6	103.40
6	32-40	.098	.0025	.062	**3/8**	4	3/16	2	993120-C6	106.40
6	32-40	.098	.0025	.062	**1/2**	4	3/16	2	959520-C6	110.80
6	32-40	.098	.0025	.062	**5/8**	4	3/16	2	930320-C6	115.50

*Tools are designed to produce an 83% depth of thread maximum.

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THREAD MILLING CUTTERS

Single Form – UN Threads – For Hardened Steels (cont.)

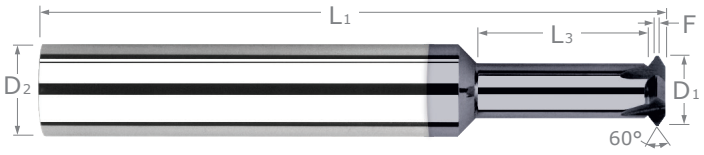
continued from previous page

THREAD SIZE	PITCH RANGE*	CUTTER DIAMETER	TIP FLAT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 $^{+.000″}_{-.002″}$	F $^{+.0000″}_{-.0005″}$		L_3 $^{+.020″}_{-.000″}$		D_2 (h6)	L_1	TOOL #	PRICE
8	32-36	.120	.0028	.084	**5/16**	4	1/4	2-1/2	986630-C6	105.50
8	32-36	.120	.0028	.084	**1/2**	4	1/4	2-1/2	993130-C6	111.70
8	32-36	.120	.0028	.084	**5/8**	4	1/4	2-1/2	959530-C6	117.50
8	32-36	.120	.0028	.084	**3/4**	4	1/4	2-1/2	930330-C6	123.30
8	32-36	.120	.0028	.084	**7/8**	4	1/4	2-1/2	898930-C6	129.30
10	24-36	.135	.0028	.086	**5/16**	5	1/4	2-1/2	986640-C6	105.50
10	24-36	.135	.0028	.086	**3/8**	5	1/4	2-1/2	773240-C6	108.60
10	24-36	.135	.0028	.086	**1/2**	5	1/4	2-1/2	993140-C6	111.70
10	24-36	.135	.0028	.086	**5/8**	5	1/4	2-1/2	959540-C6	117.50
10	24-36	.135	.0028	.086	**7/8**	5	1/4	2-1/2	930340-C6	123.30
10	24-36	.135	.0028	.086	**1-1/8**	5	1/4	2-1/2	898940-C6	129.30
12	24-32	.160	.0030	.111	**3/8**	5	1/4	2-1/2	986645-C6	105.50
12	24-32	.160	.0030	.111	**5/8**	5	1/4	2-1/2	993145-C6	117.50
1/4	20-32	.180	.0030	.122	**5/16**	5	1/4	2-1/2	845750-C6	105.50
1/4	20-32	.180	.0030	.122	**3/8**	5	1/4	2-1/2	757350-C6	108.60
1/4	20-32	.180	.0030	.122	**1/2**	5	1/4	2-1/2	986650-C6	111.70
1/4	20-32	.180	.0030	.122	**5/8**	5	1/4	2-1/2	773250-C6	114.60
1/4	20-32	.180	.0030	.122	**3/4**	5	1/4	2-1/2	993150-C6	117.50
1/4	20-32	.180	.0030	.122	**1**	5	1/4	2-1/2	959550-C6	123.30
1/4	20-32	.180	.0030	.122	**1-1/4**	5	1/4	2-1/2	930350-C6	129.10
5/16	18-28	.240	.0036	.174	**3/8**	5	1/4	2-1/2	845755-C6	106.50
5/16	18-28	.240	.0036	.174	**1/2**	5	1/4	2-1/2	986655-C6	111.70
5/16	18-28	.240	.0036	.174	**5/8**	5	1/4	2-1/2	773255-C6	115.70
5/16	18-28	.240	.0036	.174	**3/4**	5	1/4	2-1/2	993155-C6	117.50
5/16	18-28	.240	.0036	.174	**1**	5	1/4	2-1/2	959555-C6	123.30
5/16	18-28	.240	.0036	.174	**1-1/4**	5	1/4	2-1/2	930355-C6	129.10
3/8	16-28	.300	.0036	.227	**1/2**	5	3/8	2-1/2	845760-C6	136.20
3/8	16-28	.300	.0036	.227	**3/4**	5	3/8	2-1/2	986660-C6	142.00
3/8	16-28	.300	.0036	.227	**1**	5	3/8	2-1/2	993160-C6	148.00
3/8	16-28	.300	.0036	.227	**1-1/4**	5	3/8	2-1/2	959560-C6	154.00
3/8	16-28	.300	.0036	.227	**1-1/2**	5	3/8	3	930360-C6	159.80
3/8	16-28	.300	.0036	.227	**1-3/4**	5	3/8	3	898960-C6	163.80
1/2	12-18	.388	.0056	.294	**3/4**	5	1/2	3	986670-C6	156.90
1/2	12-18	.388	.0056	.294	**1**	5	1/2	3	773270-C6	162.10
1/2	12-18	.388	.0056	.294	**1-1/4**	5	1/2	3	993170-C6	167.40
1/2	12-18	.388	.0056	.294	**1-3/4**	5	1/2	4	959570-C6	173.60
1/2	12-18	.388	.0056	.294	**2-1/4**	5	1/2	4	930370-C6	179.30
3/4	10-16	.495	.0063	.385	**1**	6	1/2	3	986680-C6	166.40
3/4	10-16	.495	.0063	.385	**1-3/8**	6	1/2	3	993180-C6	180.40
3/4	10-16	.495	.0063	.385	**1-3/4**	6	1/2	4	959580-C6	194.50
3/4	10-16	.495	.0063	.385	**2-1/4**	6	1/2	4	930380-C6	208.50
1	8-14	.620	.0071	.480	**1-5/16**	6	5/8	3-1/2	986690-C6	197.00
1	8-14	.620	.0071	.480	**1-3/4**	6	5/8	3-1/2	993190-C6	211.10

*Tools are designed to produce an 83% depth of thread maximum.

THREAD MILLING CUTTERS

Single Form – Metric – For Hardened Steels



Tip of Included Angle Ground to a Flat for Increased Wear Resistance

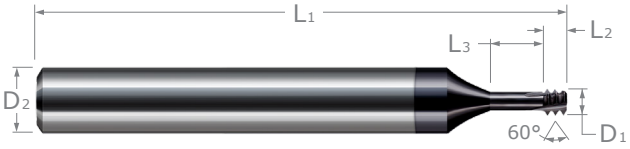
- **Designed for threading hardened steels 48-68Rc**
- Single thread form designed to mill common pitch sizes
- Cuts internal and external 60° Metric threads
- Tip of included angle ground to a flat for increased wear resistance
- Large rigid core diameter and eccentric relief for improved strength
- Mills left hand and right hand threads • h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for improved edge retention • CNC ground in the USA

THREAD SIZE	PITCH RANGE*	CUTTER DIA.	TIP FLAT	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 +.00 mm −.05 mm	F +.000 mm −.127 mm		L_3 +.50 mm −.00 mm		D_2	L_1	TOOL #	PRICE
M1.6	0.35	1.16 mm	.035	.742 mm	**2.10 mm**	3	3 mm	38 mm	771616-C6	99.90
M1.6	0.35	1.16 mm	.035	.742 mm	**3.50 mm**	3	3 mm	38 mm	772716-C6	99.00
M1.6	0.35	1.16 mm	.035	.742 mm	**4.90 mm**	3	3 mm	38 mm	724216-C6	101.30
M2	0.40	1.50 mm	.040	.960 mm	**2.70 mm**	3	3 mm	38 mm	771619-C6	99.90
M2	0.40	1.50 mm	.040	.960 mm	**4.50 mm**	3	3 mm	38 mm	772719-C6	99.00
M2	0.40	1.50 mm	.040	.960 mm	**6.30 mm**	3	3 mm	38 mm	724219-C6	101.30
M2.5	0.45	1.90 mm	.045	1.216 mm	**3.50 mm**	3	3 mm	38 mm	771622-C6	99.90
M2.5	0.45	1.90 mm	.045	1.216 mm	**5.80 mm**	3	3 mm	38 mm	772722-C6	99.00
M2.5	0.45	1.90 mm	.045	1.216 mm	**8.00 mm**	3	3 mm	38 mm	724222-C6	101.30
M3	0.50	2.30 mm	.050	1.541 mm	**4.00 mm**	4	3 mm	38 mm	771624-C6	99.90
M3	0.50	2.30 mm	.050	1.541 mm	**6.80 mm**	4	3 mm	38 mm	772724-C6	99.00
M3	0.50	2.30 mm	.050	1.541 mm	**9.50 mm**	4	3 mm	38 mm	724224-C6	101.30
M4	0.70	3.00 mm	.070	2.010 mm	**5.50 mm**	4	3 mm	38 mm	771626-C6	100.40
M4	0.70	3.00 mm	.070	2.010 mm	**9.00 mm**	4	3 mm	38 mm	772726-C6	101.60
M4	0.70	3.00 mm	.070	2.010 mm	**12.60 mm**	4	3 mm	38 mm	724226-C6	103.90
M5	0.80	4.00 mm	.080	2.800 mm	**7.00 mm**	5	4 mm	50 mm	771628-C6	102.60
M5	0.80	4.00 mm	.080	2.800 mm	**12.00 mm**	5	4 mm	50 mm	772728-C6	105.10
M5	0.80	4.00 mm	.080	2.800 mm	**17.00 mm**	5	4 mm	50 mm	724228-C6	107.40
M6	1.00	4.80 mm	.100	3.360 mm	**8.50 mm**	5	6 mm	50 mm	771630-C6	103.10
M6	1.00	4.80 mm	.100	3.360 mm	**14.00 mm**	5	6 mm	50 mm	772730-C6	104.40
M6	1.00	4.80 mm	.100	3.360 mm	**20.00 mm**	5	6 mm	63 mm	724230-C6	106.70

*Tools are designed to produce an 83% depth of thread maximum.

THREAD MILLING CUTTERS

Tri-Form – UN Threads



Left-Hand Cut, Left Hand Spiral Design

- **Designed for threading in hardened steels and difficult-to-machine materials**
- Left-hand cut, left-hand spiral design for climb milling from top to bottom of right-hand threads
- Three forms and helical design reduces tool pressure and deflection resulting in accurate threads
- Cuts internal 60° UN threads
- Able to cut larger threads of the same pitch
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for maximum tool life
- CNC ground in the USA

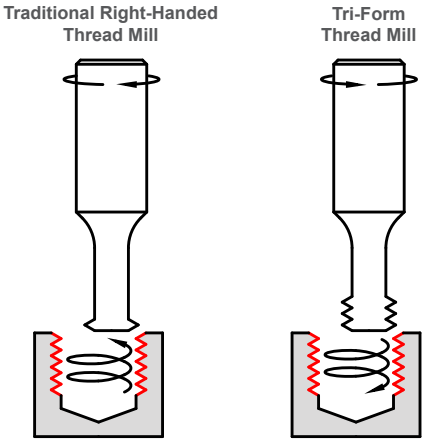
Left-Hand Cut, Left-Hand Spiral Design

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		L_3 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	3 FL	PRICE
2-56	.065	.053	.042	**3/32**	3	1/4	2-1/2	899910-C6	199.10
2-56	.065	.053	.042	**5/32**	3	1/4	2-1/2	896410-C6	207.40
4-40	.085	.075	.053	**3/32**	3	1/4	2-1/2	899916-C6	199.10
4-40	.085	.075	.053	**5/32**	3	1/4	2-1/2	896416-C6	207.40
6-32	.100	.093	.061	**5/32**	3	1/4	2-1/2	899922-C6	199.10
6-32	.100	.093	.061	**1/4**	3	1/4	2-1/2	896422-C6	207.40
8-32	.126	.093	.087	**7/32**	3	1/4	2-1/2	899928-C6	185.00
8-32	.126	.093	.087	**5/16**	3	1/4	2-1/2	896428-C6	193.30
10-24	.138	.125	.086	**7/32**	3	1/4	2-1/2	899934-C6	185.00
10-24	.138	.125	.086	**5/16**	3	1/4	2-1/2	896434-C6	193.30
10-32	.145	.093	.106	**7/32**	3	1/4	2-1/2	899936-C6	185.00
10-32	.145	.093	.106	**5/16**	3	1/4	2-1/2	896436-C6	193.30
1/4-20	.187	.150	.124	**5/16**	3	1/4	2-1/2	899944-C6	185.00
1/4-20	.187	.150	.124	**1/2**	3	1/4	2-1/2	896444-C6	193.30
1/4-28	.197	.107	.151	**5/16**	3	1/4	2-1/2	899946-C6	185.00
1/4-28	.197	.107	.151	**1/2**	3	1/4	2-1/2	896446-C6	193.30
5/16-18	.236	.166	.166	**3/8**	3	1/4	2-1/2	899954-C6	185.00
5/16-18	.236	.166	.166	**1/2**	3	1/4	2-1/2	896454-C6	193.30
3/8-16	.264	.187	.186	**1/2**	3	5/16	2-1/2	899964-C6	195.00
3/8-16	.264	.187	.186	**3/4**	3	5/16	2-1/2	896464-C6	203.30

Tri-Form Thread Mills

Our Tri-Form Thread Mills are unlike traditional right-handed thread mills, as they have a left-hand cut, left-hand spiral design.

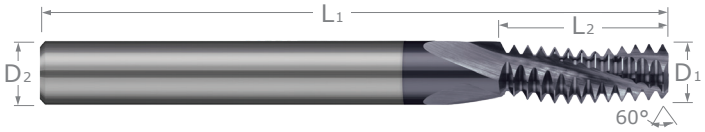
- Improves thread accuracy and surface finish by climb milling from the top to the bottom of a hole.
- Tri-Form Thread Mills eliminate the need to arc-in when engaging the tool, which reduces radial pressure and deflection.



NEW COATING!

THREAD MILLING CUTTERS

Multi-Form – UN Threads



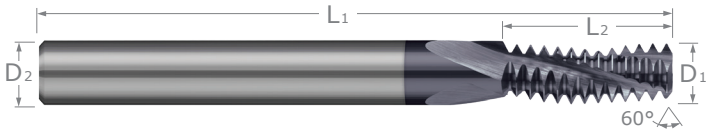
- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIA.	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED		CVD DIAMOND (9 µm)		
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE	
2-56	.065	.125	3*	1/8	2	70010	94.60	70010-C3	100.10	70010-C8	102.60			
3-48	.075	.167	3*	1/8	2	70012	100.00	70012-C3	105.50					
4-40	.085	.175	3*	1/8	2	70016	100.00	70016-C3	105.50	70016-C8	107.90	732816	155.20	NEW
5-44	.095	.228	3	1/8	2	70020	100.00	70020-C3	105.50					
6-32	.100	.218	3	1/8	2	70022	103.40	70022-C3	108.90	70022-C8	111.40	732822	158.60	NEW
8-32	.115	.250	3	1/8	2	70028	110.90	70028-C3	116.40	70028-C8	118.90			
8-36	.115	.250	3	1/8	2	70031	110.90	70031-C3	116.40					
10-24	.120	.312	3	1/8	2	70034	116.70	70034-C3	122.20	70034-C8	124.70			
10-28	.120	.312	3	1/8	2	70035	119.10	70035-C3	124.60					
10-32	.120	.312	3	1/8	2	70036	116.70	70036-C3	122.20	70036-C8	124.70	732836	171.90	NEW
1/4-20	.180	.500	3	3/16	2-1/2	70044	139.60	70044-C3	145.50	70044-C8	147.60	732844	205.80	NEW
1/4-28	.180	.500	3	3/16	2-1/2	70046	139.60	70046-C3	145.50	70046-C8	147.60	732846	205.80	NEW
5/16-18	.235	.625	3	1/4	2-1/2	70054	151.20	70054-C3	159.20	70054-C8	159.80	732854	230.60	NEW
5/16-24	.235	.625	3	1/4	2-1/2	70056	170.80	70056-C3	178.80	70056-C8	179.40			
3/8-16	.285	.750	4	5/16	3	70064	203.30	70064-C3	212.70	70064-C8	221.50			
3/8-24	.285	.750	4	5/16	3	70066	203.30	70066-C3	212.70	70066-C8	221.50			
7/16-14	.305	.750	4	5/16	3	70074	203.30	70074-C3	212.70	70074-C8	221.50			
7/16-20	.335	.875	4	3/8	3-1/2	70076	219.40	70076-C3	230.00	70076-C8	241.50			
1/2-13	.350	.875	4	3/8	3-1/2	70084	226.70	70084-C3	237.30					
1/2-20	.370	1.000	6	3/8	3-1/2	70086	238.00	70086-C3	248.60					
1/2-32	.370	1.000	6	3/8	3-1/2	70089	238.00	70089-C3	248.60					
9/16-12	.370	.875	4	3/8	3-1/2	70092	226.70	70092-C3	237.30					
9/16-18	.370	.875	4	3/8	3-1/2	70094	226.70	70094-C3	237.30					
5/8-11	.470	1.250	4	1/2	3-1/2	70104	280.30	70104-C3	296.20					
3/4-10	.495	1.250	4	1/2	3-1/2	70124	280.30	70124-C3	296.20					
3/4-12	.495	1.250	4	1/2	3-1/2	70126	280.30	70126-C3	296.20					
3/4-16	.490	1.250	4	1/2	3-1/2	70128	286.00	70128-C3	301.80					
7/8-9	.620	1.375	4	5/8	4	70132	430.00	70132-C3	447.10					
7/8-14	.490	1.250	4	1/2	3-1/2	70134	286.00	70134-C3	301.80					
1-8	.620	1.375	4	5/8	4	70154	430.00	70154-C3	447.10					
1-12	.745	1.500	6	3/4	4	70158	538.20	70158-C3	555.30					

*Straight flutes

THREAD MILLING CUTTERS

Multi-Form – UN Threads – For Hardened Steels

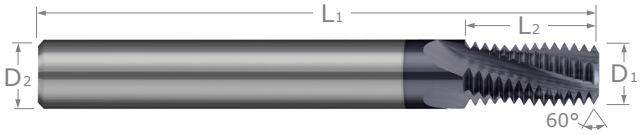


- Designed for threading hardened steels 46-68 Rc
- Cuts internal and external 60° UN threads
- Mill right hand and left hand threads
- Able to cut larger threads of the same pitch
- Variable helix design reduces chatter and harmonics and produces more accurate threads
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for maximum tool life
- CNC ground in the USA

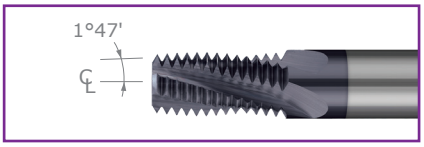
THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2		D_2	L_1	TOOL #	PRICE
2-56	.065	.125	3	1/8	2	836710-C6	138.60
4-40	.085	.180	3	1/8	2	836716-C6	132.40
5-44	.095	.228	3	1/8	2	836720-C6	138.60
6-32	.100	.218	3	1/8	2	836722-C6	136.60
8-32	.115	.250	3	1/8	2	836728-C6	146.20
10-24	.120	.312	3	3/16	2	836734-C6	153.50
10-32	.120	.312	3	3/16	2	836736-C6	153.50
1/4-20	.180	.500	3	3/16	2-1/2	836744-C6	182.80
1/4-28	.180	.500	3	3/16	2-1/2	836746-C6	182.80
5/16-18	.240	.625	3	1/4	2-1/2	836754-C6	199.90
5/16-24	.240	.625	3	1/4	2-1/2	836756-C6	224.80
3/8-16	.285	.750	4	5/16	3	836764-C6	267.10
3/8-24	.285	.750	4	5/16	3	836766-C6	267.10
7/16-20	.335	.875	4	3/8	3-1/2	836776-C6	288.80
1/2-13	.350	.875	4	3/8	3-1/2	836784-C6	298.10
3/4-16	.495	1.250	4	1/2	3-1/2	836798-C6	378.80

THREAD MILLING CUTTERS

Multi-Form – N.P.T. Threads



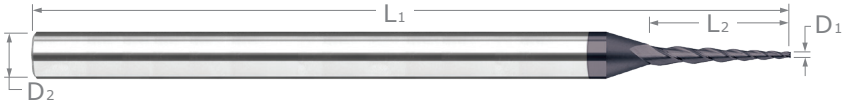
- Cuts internal and external 60° National Pipe Taper (N.P.T.) threads
- Mills right hand and left hand threads
- Helical flutes
- Solid carbide
- CNC ground in the USA



THREAD SIZE	MAJOR CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 +.0005″ −.0005″	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
1/16, 1/8-27	.245	.437	3	1/4	2-1/2	70204	157.10	70204-C3	165.20	70204-C8	165.80
1/4, 3/8-18	.305	.625	4	5/16	3	70214	215.30	70214-C3	224.70	70214-C8	233.70
1/4, 3/8-18	.363	.680	4	3/8	3-1/2	790414	229.00	790414-C3	239.70		
1/2, 3/4-14	.495	.875	4	1/2	3-1/2	70226	251.10	70226-C3	267.10		
1,2-11.5	.620	1.125	4	5/8	4	70232	355.00	70232-C3	372.20		

THREAD MILLING CUTTERS

N.P.T. Tapered End Mills – Square



1°47' Angle for NPT threads

- 1°47' angle for preparation of parts prior to internal or external NPT thread milling
- Length of cut and diameters designed for range of standard NPT dimensions
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

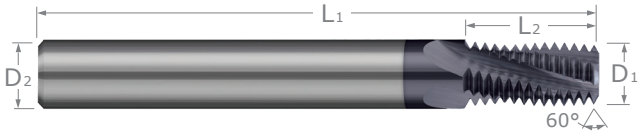
ANGLE PER SIDE	END DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 +0°30′ −0°30′	D_1 +.0005″ −.0005″	L_2 +.020″ −.000″	D_2 (h6)	L_1	3 FL	PRICE	3 FL	PRICE
1°47'	.200	**.625** (3x)	1/4	2	912282	65.50	912282-C6	77.40
	.300	**.900** (3x)	3/8	2-1/2	912286	81.70	912286-C6	95.10
	.400	**1.250** (3x)	1/2	3	912292	109.90	912292-C6	127.20

N.P.T. Thread Fit Chart

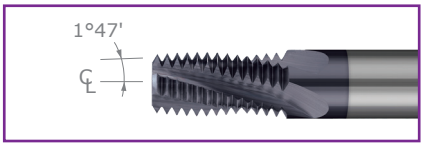
Thread Mill Tool #	Thread Size	Tapered End Mill Tool #
70204	1/16, 1/8-27	912282
70214, 790914	1/4, 3/8-18	912282, 912286
70226	1/2, 3/4-14	912286
70232	1, 2-11.5	912292

THREAD MILLING CUTTERS

Multi-Form – N.P.T.F. Threads



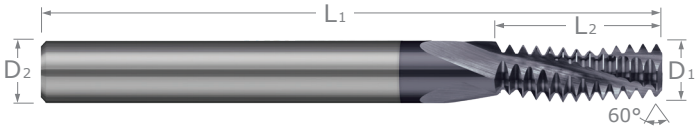
- Cuts internal and external 60° National Pipe Taper - Fuel (N.P.T.F.) threads
- Mills right hand and left hand threads
- Helical flutes
- Solid carbide
- CNC ground in the USA



THREAD SIZE	MAJOR CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
1/16, 1/8-27	.245	.437	3	1/4	2-1/2	784304	183.50	784304-C3	191.60
1/4, 3/8-18	.305	.625	4	5/16	3	784314	219.10	784314-C3	226.50
1/2, 3/4-14	.495	.875	4	1/2	3-1/2	784326	284.30	784326-C3	300.30
1, 2-11.5	.620	1.125	4	5/8	4	784332	423.00	784332-C3	440.90

THREAD MILLING CUTTERS

Multi-Form – Metric

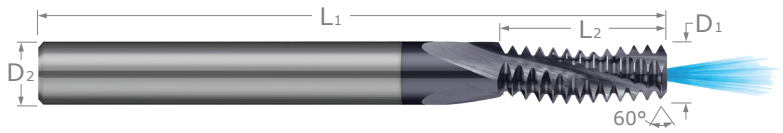


- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch • Helical flutes • Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M2-0.40	.059	.126	3	1/8	2	16901	129.30	16901-C3	134.80
M2.5-0.45	.059	.142	3	1/8	2	16902	129.30	16902-C3	134.80
M3-0.50	.085	.178	3	1/8	2	16903	126.90	16903-C3	132.40
M4-0.70	.115	.276	3	1/8	2	16907	126.90	16907-C3	132.40
M4.5-0.75	.120	.250	3	1/8	2	16909	126.90	16909-C3	132.40
M5-0.80	.120	.312	3	1/8	2	16911	126.90	16911-C3	132.40
M6-0.75	.170	.366	3	3/16	2-1/2	16919	156.80	16919-C3	162.80
M6-1.00	.170	.500	3	3/16	2-1/2	16917	153.90	16917-C3	159.80
M8-1.00	.235	.625	3	1/4	2-1/2	16924	168.50	16924-C3	176.60
M8-1.25	.235	.625	3	1/4	2-1/2	16923	165.40	16923-C3	173.40
M10-1.00	.300	.750	4	5/16	3	16930	227.20	16930-C3	236.60
M10-1.50	.300	.750	4	5/16	3	16929	223.00	16929-C3	232.40
M12-1.75	.360	.875	4	3/8	3-1/2	16935	248.10	16935-C3	258.80
M14-1.50	.370	.875	4	3/8	3-1/2	16941	248.10	16941-C3	258.80
M16-2.00	.470	1.250	4	1/2	3-1/2	16947	305.50	16947-C3	321.50
M18-1.50	.490	1.250	4	1/2	3-1/2	16953	305.50	16953-C3	321.50
M20-2.50	.495	1.250	4	1/2	3-1/2	16959	311.40	16959-C3	327.40

THREAD MILLING CUTTERS

Multi-Form – Coolant-Through – UN Threads



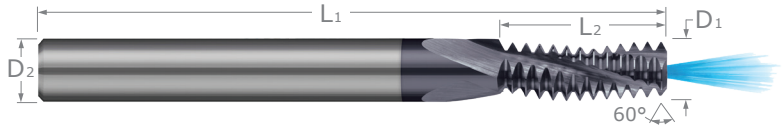
Coolant-Fed for Chip Removal

- Coolant through design for maximum chip ejection in blind holes
- Mills right hand and left hand 60° UN threads
- Able to cut larger threads of the same pitch
- Helical flutes • Solid carbide • CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
2-56	.065	.125	3	1/8	1-1/2	17310	104.90	17310-C3	110.40
4-40	.085	.175	3	1/8	1-1/2	17316	104.90	17316-C3	110.40
6-32	.100	.218	3	1/8	1-1/2	17322	104.90	17322-C3	110.40
10-24	.145	.312	3	3/16	2-3/8	17334	125.10	17334-C3	131.10
10-32	.150	.312	3	3/16	2-3/8	17336	125.10	17336-C3	131.10
1/4-20	.180	.500	3	3/16	2-3/8	17344	150.30	17344-C3	156.20
1/4-28	.180	.500	3	3/16	2-3/8	17346	150.30	17346-C3	156.20
5/16-18	.235	.625	3	1/4	2-3/8	17354	161.80	17354-C3	169.90
5/16-24	.235	.625	3	1/4	2-3/8	17356	188.90	17356-C3	197.10
3/8-16	.285	.750	4	5/16	3	17364	218.10	17364-C3	227.60
3/8-24	.285	.750	4	5/16	3	17366	218.10	17366-C3	227.60
7/16-14	.305	.750	4	5/16	3	17374	218.10	17374-C3	227.60
7/16-20	.335	.875	4	3/8	3	17376	235.00	17376-C3	245.60
1/2-13	.350	.875	4	3/8	3	17384	242.40	17384-C3	253.00

THREAD MILLING CUTTERS

Multi-Form – Coolant-Through – Metric



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- Helical flutes
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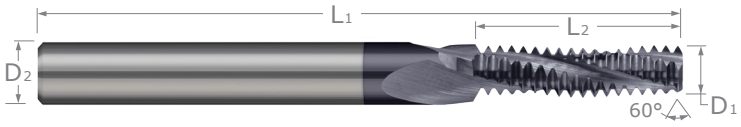
THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M3-0.50	.085	.1780	3	1/8	2	819624	133.70	819624-C3	139.20
M4-0.70	.115	.2760	3	1/8	2	819626	133.70	819626-C3	139.20
M5-0.80	.120	.3125	3	1/8	2	819628	133.70	819628-C3	139.20
M6-1.00	.170	.5000	3	3/16	2-1/2	819630	162.40	819630-C3	168.40
M8-1.25	.235	.6250	3	1/4	2-1/2	819632	174.40	819632-C3	182.50

THREAD MILLING CUTTERS

Multi-Form – Long Flute – UN Threads



Designed for Deep Threaded Applications!

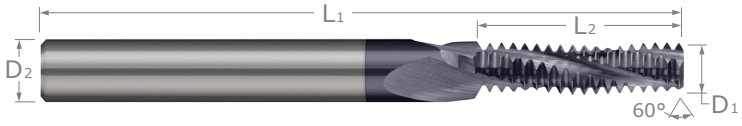
- Designed for deep threaded applications
- Larger cutter diameter for maximum strength
- Due to increased cutter diameter, tools are designed to achieve 60% threads
- Cuts internal 60° UN threads only
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
2-56	.069	.215	3*	1/8	2	987110	121.40	987110-C3	126.90	987110-C8	129.50
3-48	.079	.250	3	1/8	2	987112	127.50	987112-C3	133.00		
4-40	.089	.275	3	1/8	2	987116	127.50	987116-C3	133.00	987116-C8	135.60
6-32	.110	.375	3	1/8	2	987122	127.50	987122-C3	133.00	987122-C8	135.60
8-32	.131	.407	3	3/16	2-1/2	987128	135.70	987128-C3	141.70	987128-C8	143.80
8-36	.131	.417	3	3/16	2-1/2	987131	142.70	987131-C3	148.70		
10-24	.145	.500	3	3/16	2-1/2	987134	167.40	987134-C3	173.40	987134-C8	175.50
10-32	.150	.500	3	3/16	2-1/2	987136	167.40	987136-C3	173.40	987136-C8	175.50
1/4-20	.195	.750	3	1/4	2-1/2	987144	170.20	987144-C3	178.30	987144-C8	178.90
1/4-28	.195	.750	3	1/4	2-1/2	987146	170.20	987146-C3	178.30	987146-C8	178.90
5/16-18	.245	.944	3	5/16	3	987154	221.00	987154-C3	230.40		
5/16-24	.245	.958	3	5/16	3	987156	226.80	987156-C3	236.30		
3/8-16	.300	1.125	4	3/8	3-1/2	987164	263.50	987164-C3	274.20		
3/8-24	.300	1.125	4	3/8	3-1/2	987166	271.10	987166-C3	281.90		
7/16-20	.350	1.300	4	3/8	3-1/2	987176	271.10	987176-C3	281.90		
1/2-13	.400	1.308	4	1/2	3-1/2	987184	275.00	987184-C3	291.10		
9/16-18	.450	1.500	4	1/2	3-1/2	987194	292.10	987194-C3	308.10		
5/8-11	.490	1.820	4	1/2	4	987100	321.30	987100-C3	337.40		
3/4-16	.580	1.875	4	5/8	4	987103	414.60	987103-C3	432.50		

*Straight flutes

THREAD MILLING CUTTERS

Multi-Form – Long Flute – Metric



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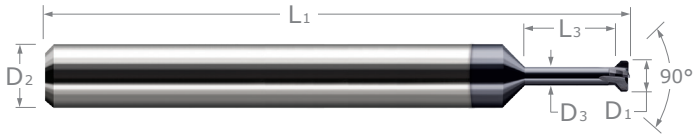
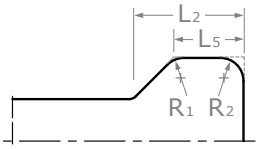
THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	PRICE	TOOL #	PRICE
M3-0.50	.090	.276	3	1/8	2	842903	150.20	842903-C3	155.70
M4-0.70	.124	.441	3	3/16	2-1/2	842907	153.90	842907-C3	159.80
M5-0.80	.155	.504	3	3/16	2-1/2	842911	150.60	842911-C3	156.60
M6-1.00	.186	.748	3	1/4	2-1/2	842917	178.10	842917-C3	186.20
M8-1.25	.245	.984	3	5/16	2-1/2	842923	229.00	842923-C3	238.50
M10-1.50	.311	1.122	4	3/8	3-1/2	842929	287.40	842929-C3	298.20
M16-2.00	.490	1.890	4	1/2	3-1/2	842947	375.10	842947-C3	391.10

THREAD MILLING CUTTERS

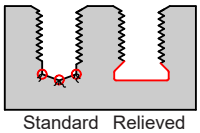
Thread Relief Cutter





- Tool designed to relieve stress concentrations at corners of undercut and bottom of last thread to prevent fracture and failure
- Relief is typically done before threading operation to avoid damaging the thread forms
- Chamfer eliminates burrs and partial threads at last thread
- Flattens bottom of hole to achieve maximum thread depth
- Center cutting
- Solid carbide
- CNC ground in the USA

THREADED HOLES



Standard Relieved

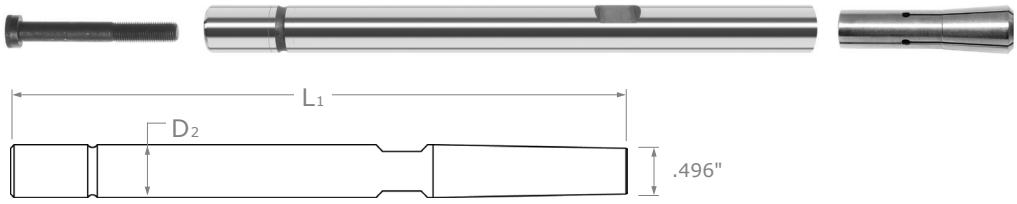
CUTTER DIA.	LOC	WIDTH (TSC)	RADIUS 1	RADIUS 2	NECK DIA.	NECK LENGTH	RADIAL DOC	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.001″	L_2 +.002″ −.000″	L_5	R_1 +.001″ −.001″	R_2 +.001″ −.001″	D_3	L_3 +.010″ −.000″		D_2	L_1	4 FL	PRICE	4 FL	PRICE
.066	.029	.015	.000	.005	.036	.172	.014	1/8	1-1/2	896602	64.10	896602-C3	69.60
.075	.030	.015	.000	.005	.042	.187	.015	1/8	1-1/2	877502	61.30	877502-C3	66.80
.084	.038	.020	.000	.005	.045	.218	.018	3/16	2	988804	59.50	988804-C3	65.50
.102	.049	.025	.000	.010	.051	.281	.024	3/16	2	985707	60.70	985707-C3	66.70
D_1 +.000″ −.002″	L_2 +.005″ −.000″	L_5	R_1 +.001″ −.001″	R_2 +.001″ −.001″	D_3	L_3 +.030″ −.000″		D_2	L_1	4 FL	PRICE	4 FL	PRICE
.125	.054	.030	.000	.010	.074	.343	.024	1/4	2-1/2	979609	73.70	979609-C3	81.80
.142	.050	.020	.000	.010	.078	.359	.030	1/4	2-1/2	975405	75.40	975405-C3	83.50
.168	.050	.020	.000	.010	.103	.422	.030	1/4	2-1/2	955305	73.70	955305-C3	81.80
.193	.055	.020	.000	.010	.118	.547	.035	1/4	2-1/2	952505	75.70	952505-C3	83.90
.193	.075	.040	.015	.015	.118	.547	.035	1/4	2-1/2	952516	75.70	952516-C3	83.90
.245	.072	.030	.000	.010	.155	.797	.042	1/4	2-1/2	946009	78.60	946009-C3	86.70
.245	.102	.060	.020	.020	.155	.797	.042	1/4	2-1/2	946027	78.60	946027-C3	86.70
.355	.086	.030	.000	.010	.236	1.078	.056	3/8	2-1/2	942909	122.50	942909-C3	133.10
.355	.116	.060	.020	.020	.236	1.078	.056	3/8	2-1/2	942927	122.50	942927-C3	133.10
.355	.136	.080	.030	.030	.236	1.078	.056	3/8	2-1/2	942931	122.50	942931-C3	133.10

TOOL HOLDERS

Browse a fully stocked and expanded offering of Tool Holders and Collets, including Extended Reach Tool Holders, Solid ER Integrated Tool Holders, Saw Arbors, ER Collets, ER Performance Collets, and accompanying nuts and wrenches. When your machine setup includes a Harvey Tool holder and collet, you can rest assured that you'll maximize tool performance and repeatability.

TOOL HOLDERS

Extended Reach Tool Holders & Collets



- Center gripping collet with threaded draw screw
- More accurate than traditional single-set screw type holders
- High precision concentricity and rigidity
- Maximum T.I.R. of .0002" from shank to collet pocket
- Quick tool changes
- Coolant through capable
- Allen wrench included
- Collet not included — choose from many sizes
- Two offsetting flats to maintain T.I.R.
- Use with mills, lathes, and grinders

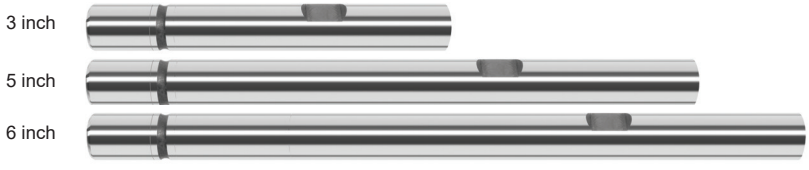
Center Gripping Collet Design.
Choose from Six Sizes!

Tool Holders

SHANK DIAMETER	OVERALL LENGTH	TOOL HOLDERS (Collet Not Included)	
D_2	L_1	TOOL #	PRICE
1/2	3	36730	248.10
1/2	5	36750	266.20
1/2	6	36760	282.10

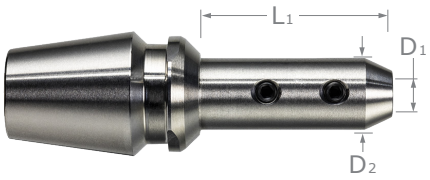
Collets

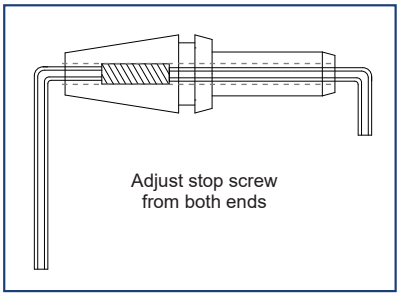
COLLET SIZE	TOOL #	PRICE
1/8	36810	84.00
3/16	36820	84.00
1/4	36830	84.00
3 mm	36840	84.00
4 mm	36850	84.00
6 mm	36860	84.00



TOOL HOLDERS

Solid ER Integrated Tool Holders



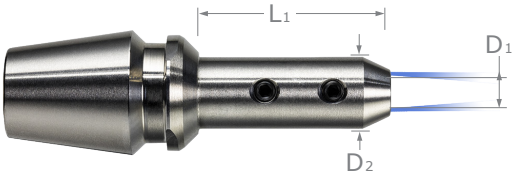


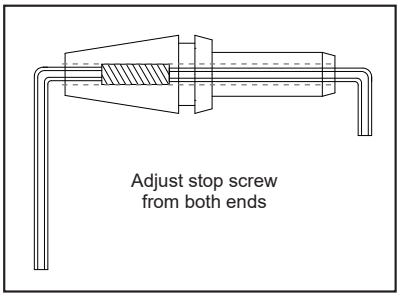
- Reached taper integrated holder that eliminates the need for multiple spindle accessories
- Designed for Turn Mill Centers and Machining Centers
- Works with any ER holder or spindle
- Multiple reaches • Maximum T.I.R. of <.0002”
- Capable of quick change with included stop screw
- Stop screw can be adjusted from both ends of holder

BORE DIAMETER	SHAFT DIAMETER	PROJECTION LENGTH	TAPER	TOOL HOLDERS	
D_1	D_2	L_1		TOOL #	PRICE
.1250	9.5 mm	16 mm	ER16	83001	295.10
.1250	9.5 mm	25 mm	ER16	83003	295.10
.1875	9.5 mm	16 mm	ER16	83002	295.10
.1875	9.5 mm	25 mm	ER16	83004	295.10
.2500	12.5 mm	14 mm	ER20	83005	352.30
.2500	12.5 mm	25 mm	ER20	83006	345.70

TOOL HOLDERS

Solid ER Integrated Tool Holders – Coolant-Through



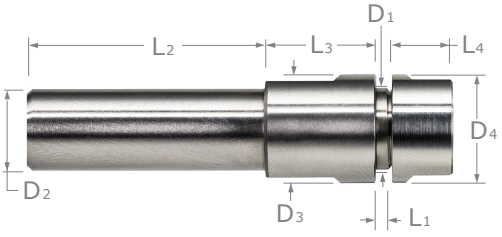


- Reached taper integrated holder that eliminates the need for multiple spindle accessories
- Designed for Turn Mill Centers and Machining Centers
- Works with any ER holder or spindle
- Multiple reaches
- Maximum T.I.R. of <.0002”
- Capable of quick change with included stop screw
- Compatible with coolant through holders
- Stop screw can be adjusted from both ends of holder

BORE DIAMETER	SHAFT DIAMETER	PROJECTION LENGTH	TAPER	TOOL HOLDERS	
D_1	D_2	L_1		TOOL #	PRICE
.1250	9.5 mm	25 mm	ER16	83203	379.50

SAW ARBORS

Straight Shank



- Maximum T.I.R. of .0001”
- Straight shank allows for chucking at multiple depths
- Key not included

ARBOR DIAMETER	ARBOR LENGTH	SHANK DIAMETER	SHANK LENGTH	FLANGE DIAMETER	FLANGE LENGTH	NUT DIAMETER	NUT LENGTH	THREAD LENGTH (IN FRONT OF ARBOR)	SAW ARBORS	
D_1	L_1	D_2	L_2	D_3	L_3	D_4	L_4		TOOL #	PRICE
.250	.045	.250	1.40	.394	.500	.394	.250	.300	84100	263.00
.375	.050	.375	1.40	.500	.500	.500	.276	.300	84101	263.00
.500	.050	.500	1.40	.625	.500	.625	.276	.300	84102	263.00
1.000	.125	.750	2.00	1.250	1.500	1.250	.437	.500	84103	336.10

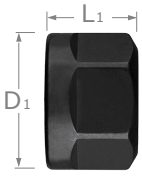
For Slitting Saws, see pages 400 - 403.

ER COLLETS

- Maximum T.I.R. of .0004”
- High polished finish helps resists oxidation
- Related nut and wrench sold separately

SIZE	BORE DIAMETER	CLAMP RANGE	ER COLLETS	
	D_1		TOOL #	PRICE
ER11	1/8	.086 - .125	82401	17.00
ER16	1/8	.086 - .125	82402	18.40
ER16	3/16	.148 - .187	82403	18.40
ER16	1/4	.211 - .250	82404	18.40
ER16	3/8	.336 - .375	82405	26.60
ER20	1/4	.211 - .250	82406	28.30
ER32	1/4	.211 - .250	82407	29.90
ER32	3/8	.336 - .375	82408	29.90
ER32	1/2	.461 - .500	82409	29.90

ER COLLETS
Nuts



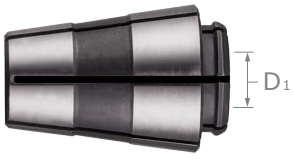
- Special anti-friction coating increases clamping pressure of tool shank

SIZE	HEAD DIAMETER	NUT LENGTH	THREAD SIZE	MAX TORQUE	ER NUTS	
	D_1	L_1			TOOL #	PRICE
ER11	19 mm	12 mm	M14 x 0.75	17 ft. lbs	82461	31.70
ER16	27.5 mm	18 mm	M22 x 1.5	42 ft. lbs	82462	31.70
ER20	34 mm	19 mm	M25 x 1.5	59 ft. lbs	82463	45.00
ER32	50 mm	23 mm	M40 x 1.5	100 ft. lbs	82464	49.90

ER COLLETS
Wrenches

SIZE	LENGTH	WIDTH	THICKNESS	ER WRENCHES	
				TOOL #	PRICE
ER11	4.80	1.50	0.20	82481	15.10
ER16	5.60	2.00	0.20	82482	15.10
ER20	6.30	2.40	0.20	82483	31.60
ER32	10.00	3.00	0.20	82484	37.50

ER PERFORMANCE COLLETS

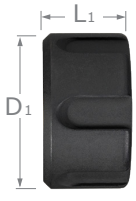


- Specialized, low profile design reduces radial distortion and improves repeatability during tool changeover
- Maximum T.I.R. of .0002”
- Works with any ER holder or spindle
- High polished finish helps resist oxidation
- Related nut and wrench sold separately

SIZE	BORE DIAMETER	CLAMP RANGE	ER PERFORMANCE COLLETS	
	D_1		TOOL #	PRICE
ER11	1/8	.1050 - .1250	85501	39.70
ER16	1/8	.1050 - .1250	85502	39.70
ER16	3/16	.1470 - .1875	85503	39.70
ER16	1/4	.2100 - .2500	85504	39.70

ER PERFORMANCE COLLETS

Nuts



- Provides increased clamping pressure on tool shank which reduces vibration and increases tool life
- Allows collet to sit further into the collet pocket, creating a more concentric tool
- Special anti-friction coating increases clamping pressure of tool shank

SIZE	HEAD DIAMETER	NUT LENGTH	THREAD SIZE	MAX TORQUE	ER PERFORMANCE NUTS	
	D_1	L_1			TOOL #	PRICE
ER11	18 mm	12 mm	M14 x 0.75	25 ft. lbs	85561	38.80
ER16	26 mm	14 mm	M22 x 1.5	42 ft. lbs	85562	38.80

ER PERFORMANCE COLLETS

Wrenches

SIZE	LENGTH	WIDTH	THICKNESS	ER PERFORMANCE WRENCHES	
				TOOL #	PRICE
ER11	Please see page 525 for ER11 Wrench size				
ER16	6.50	2.20	0.20	85582	37.80

IN THE LOUPE

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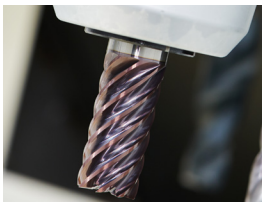
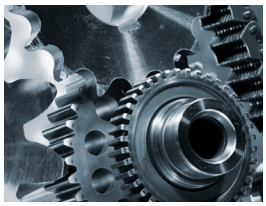
Our corporate blog, In the Loupe, is dedicated to machining how-tos, technical tips, and tool selection guides. Access helpful resources at any time and share them easily with fellow machinists at www.harveyperformance.com/in-the-loupe/.

How to Avoid Common Part Finish Problems

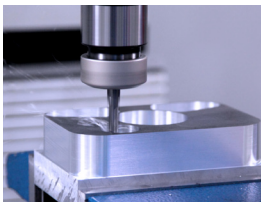
Optimize Roughing with Chipbreaker Tooling



Why Flute Count Matters

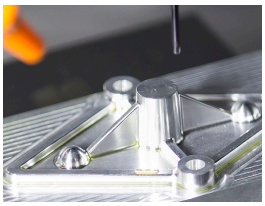


Titanium Machining Guide

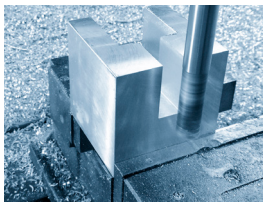


How to Avoid 4 Major Types of Tool Wear

Ball Nose Milling Strategy



Corner Engagement: How to Machine Corners



Introduction to High Efficiency Milling

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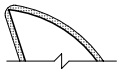
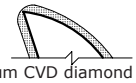
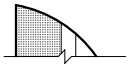
COATINGS & SUBSTRATES CHART

Coating/ Substrate:	TiN Titanium Nitride -C1	AlTiN Aluminum Titanium Nitride -C3	AlTiN Nano Aluminum Titanium Nitride Nano -C6	Ti Nano Titanium Based -C10
Application/ Benefits:	• General purpose coating for machining ferrous materials.	• High performance coating in ferrous materials. • Excellent high temperature resistance and hardness. • Maintains high surface hardness at elevated temperatures improving tool life and allowing faster feed rates. • Produces aluminum oxide layer at high temperature which reduces thermal conductivity, transferring heat into the chip. • Excellent in dry machining, machining titanium alloys, inconel, stainless alloys and cast iron. • Not recommended for use in aluminum and aluminum alloys.	• Premium coating in ferrous materials. • Latest generation AlTiN coating mixed with silicon to produce a unique nanocomposite coating. This structure improves hardness, heat resistance, and toughness over traditional AlTiN coatings. • Superior results, extended tool life and reduced cycle times over traditional AlTiN coatings in demanding applications where setup minimizes runout and vibration. • Not recommended for use in aluminum and aluminum alloys.	• Highest performing coating in ferrous materials. • Exceptionally hard nanocomposite coating, particularly suitable for hard machining, high temperature, and premium finish applications. • Enhanced wear resistance and longer tool life in rigid, vibration-free machine setups. • Optimized for a wide variety of ferrous and difficult-to-machine materials including inconel, stainless steel, and high hardness materials up to 65 Rc .
Materials:	**Ferrous Materials & Exotic Metals**			
	General Purpose Ferrous Materials	Alloy steels, stainless steels, tool steels, titanium, inconel, nickel and other aerospace materials	Hardened steels, hardened stainless, nickel based alloys, tool steels, titanium alloys, inconel and other aerospace materials	Inconel, superalloys, hardened steels, stainless steel, titanium, and other aerospace materials.
Color:	Gold	Dark Gray / Black	Blue / Black	Copper
Structure:	Mono-layer	Multi-layer	Nano Composite Multi-layer	Nano Composite
Hardness (HV 0.05):	2447 (24 GPa)	3569 (35 GPa)	4181 (41 GPa)	4487 (44 GPa)
Coefficient of Friction:	.40	.70	.40	.35
Coating Thickness (microns):	2 - 5	2 - 5	1 - 4	1-4
Max. Working Temp:	1000° F	1400° F	2100° F	2,192°F

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

COATINGS & SUBSTRATES CHART

ZrN Zirconium Nitride -C7	**TiB_2** Titanium Diboride -C8	**Amorphous Diamond** Diamond-Like Coating -C4	**CVD Diamond (4 µm)** Crystalline CVD Diamond	**CVD Diamond (9 µm)** Crystalline CVD Diamond	**PCD Diamond** Polycrystalline Diamond
• High hardness, lubricity and abrasion resistance. • Improves performance over uncoated carbide in a wide variety of non-ferrous materials. • Less expensive alternative to diamond.	• Primary benefit over other non-ferrous coatings is extremely low affinity to aluminum. • Prevents build-up on cutting edge, chip packing and extends tool life. • Recommended in Aluminum Alloys and Magnesium Alloys. • Not ideally suited for abrasive varieties of these alloys.	• A PVD amorphous diamond coating which improves lubricity and wear resistance in non-ferrous materials. • Coating is thin relative to CVD diamond, preventing edge rounding. • Sharp edges improve results (performance and finish) over CVD in certain abrasive, non-ferrous materials (copper, brass, high silicon aluminum). • Low temperature threshold makes diamond unsuitable for ferrous applications.	• True Crystalline CVD diamond is grown directly into a carbide end mill. • Dramatically improves hardness. • Hardness improves abrasion resistance and allows higher feed rates than uncoated carbide. • Ideal for machining Graphite, Composites, Green Carbide, and Green Ceramics. • Thinner CVD layer yields a sharper cutting edge compared to the standard CVD coating and leaves a smoother finish on non-ferrous materials • Low temperature threshold makes diamond unsuitable for ferrous applications.	• True Crystalline CVD diamond is grown directly into a carbide end mill. • Dramatically improves hardness. • Hardness improves abrasion resistance and allows higher feed rates than uncoated carbide. • Ideal for machining Graphite, Composites, Green Carbide, and Green Ceramics. • Diamond layer approx 5 times thicker than Amorphous Diamond, improving wear resistance. • Low temperature threshold makes diamond unsuitable for ferrous applications.	• PCD diamond is manufactured as a carbide backed flat wafer. The wafer is brazed to a carbide body to form an end mill. • PCD has excellent hardness and abrasion resistance, and is the thickest diamond layer we offer. • Sharply ground cutting edges and thick diamond layer combine the sharp edge benefits of Amorphous Diamond with the abrasion resistance of CVD Diamond. • Low temperature threshold makes diamond unsuitable for ferrous applications.
		 Thin coating maintains sharper edge.	 4 µm CVD diamond layer for a balance between wear resistance and edge sharpness.	 9 µm diamond layer for increased wear resistance.	 Thickest diamond layer ground to sharp edge.
Non-Ferrous & Non-Metallic Materials					
Abrasive non-ferrous alloys such as Brass, Bronze, Copper and Abrasive Aluminum Alloys	Aluminum Alloys, Magnesium Alloys	Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc	Graphite, Composites, Green Carbide, Green Ceramics	Graphite, Composites, Green Carbide, Green Ceramics	Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc, Green Carbide, Green Ceramics
Light Gold / Champagne	Light Gray / Silver	Charcoal / Gray	Gray	Gray	Gray / Black
Mono-layer	Mono-layer	Mono-layer	True Crystalline CVD Multi-Layer	True Crystalline CVD Multi-Layer	Polycrystalline Diamond (Carbide Backed)
2243 (22 GPa)	2804 (27.5 GPa)	7954 - 8973 (78 - 88 GPa)	8973 - 9993 (88 - 98 GPa)	8973 - 9993 (88 - 98 GPa)	8973 - 9993 (88 - 98 GPa)
.40	.35	.10	.05 - .30	.05 - .30	.05 - .20
2 - 5	1 - 3	.5 - 2.5	3 - 5	8 - 10	.010" - .030" Solid PCD Layer
1100° F	900° F	750° F	1100° F	1100° F	1100° F

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

ALPHABETICAL INDEX

ALPHABETICAL INDEX (CONT.)

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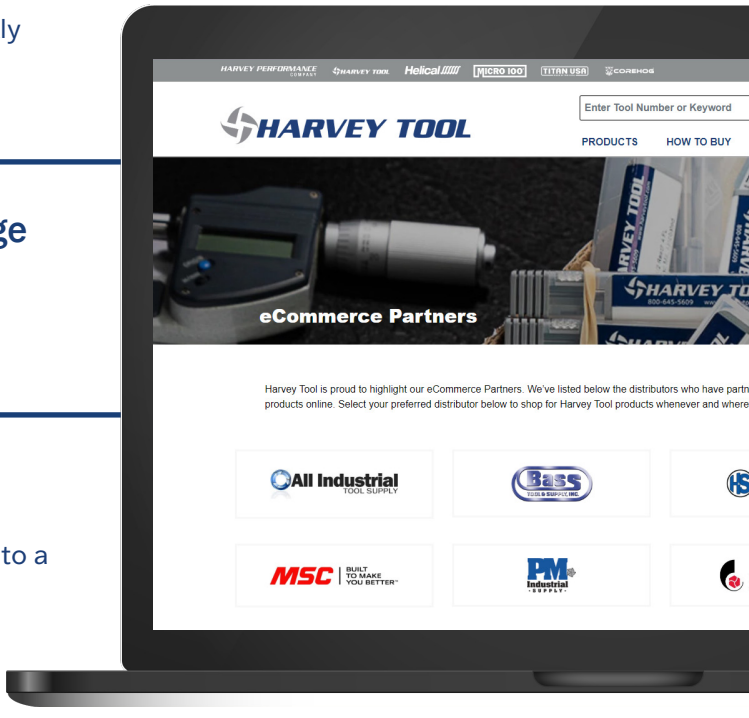

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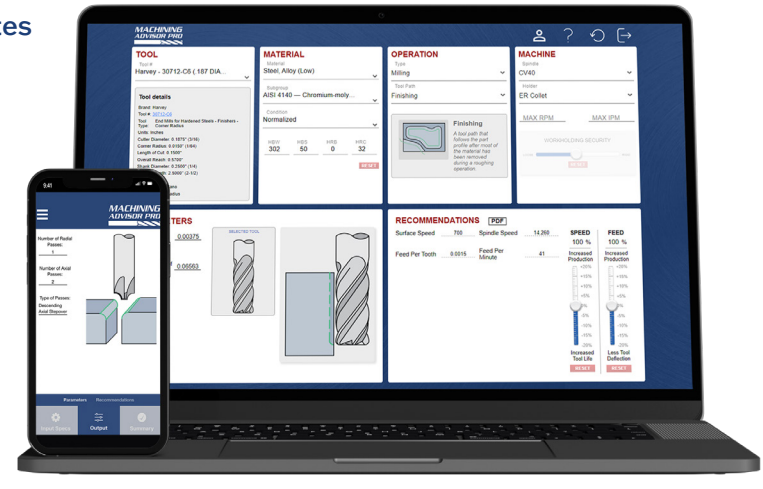


NEW!

15 NEW Products & NEW Ti Nano Coating

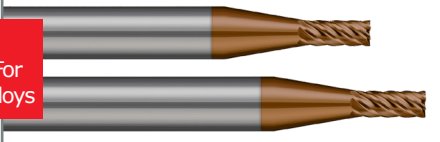
Miniature End Mills

Stub & Standard - 5 Flute - Ball - pg 50
Stub & Standard - 5 Flute - Corner Radius - pg 81

Tapered - Corner Radius - pg 103

Material Specific End Mills

NEW
End Mills For Titanium Alloys



Variable Pitch End Mills for Titanium Alloys
Square - pg 129
Corner Radius - pg 130

High Feed End Mills - pg 131

Variable Helix End Mills for Medium Alloy Steels - Finishers - Square - Long Reach - pg 194

High Helix End Mills for Aluminum Alloys - 45° Helix - Corner Radius - pg 228

Specialty Profiles

Engraving Cutters - Marking Cutters - Double-Ended - pg 354

Corner Rounding End Mills - 4 Flute - Flared - High Performance - pg 417

Parker Hannifin O-Ring Dovetail Rougher WITHOUT Drop Hole Allowance - pg 431

NEW
Burs

Cylindrical SA Double Cut - pg 433
Cylindrical Ball Nose - SC Double Cut - pg 433
Round Nose Tree - SF Double Cut - pg 434
Pointed Tree SG Double Cut - pg 434

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15 Entirely New Product Tables

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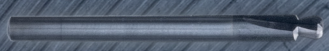
5 Flute Miniature Ball End Mills

5 Flute Miniature Corner Radius End Mills

O-Ring Dovetail Roughers

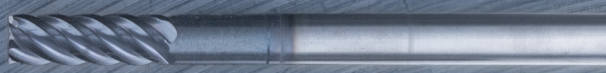


Double-Ended Marking Engravers

Miniature Corner Radius Tapered End Mills

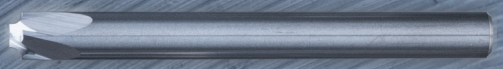
High Feed End Mills for High Temp Alloys

Square Finishers for Medium Alloy Steels - Long Reach

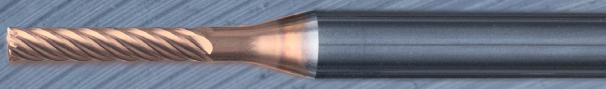


45° Helix Corner Radius End Mills for Aluminum

4 Flute Corner Rounding End Mills



End Mills for Titanium Alloys



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