AEROSPACE

DIE & MOLD

MACHINE TOOL INDUSTRY

MEDICAL

CUTTING TOOLS

END MILLS • HIGH-PERFORMANCE CARBIDE DRILLS

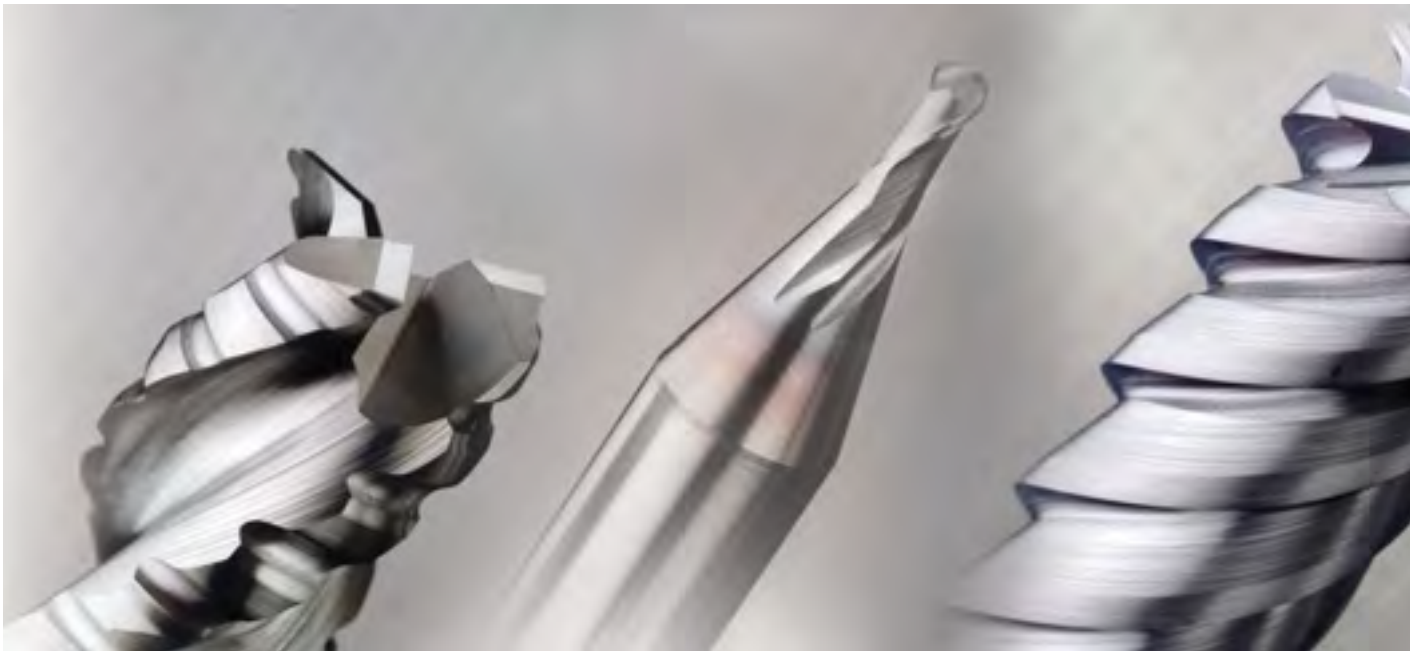
HANITA

A PRODUCT OF KENNAMETAL INC.

METRIC VERSION


HANITA
A PRODUCT OF KENNAMETAL INC.

HANITA CUTTING TOOLS

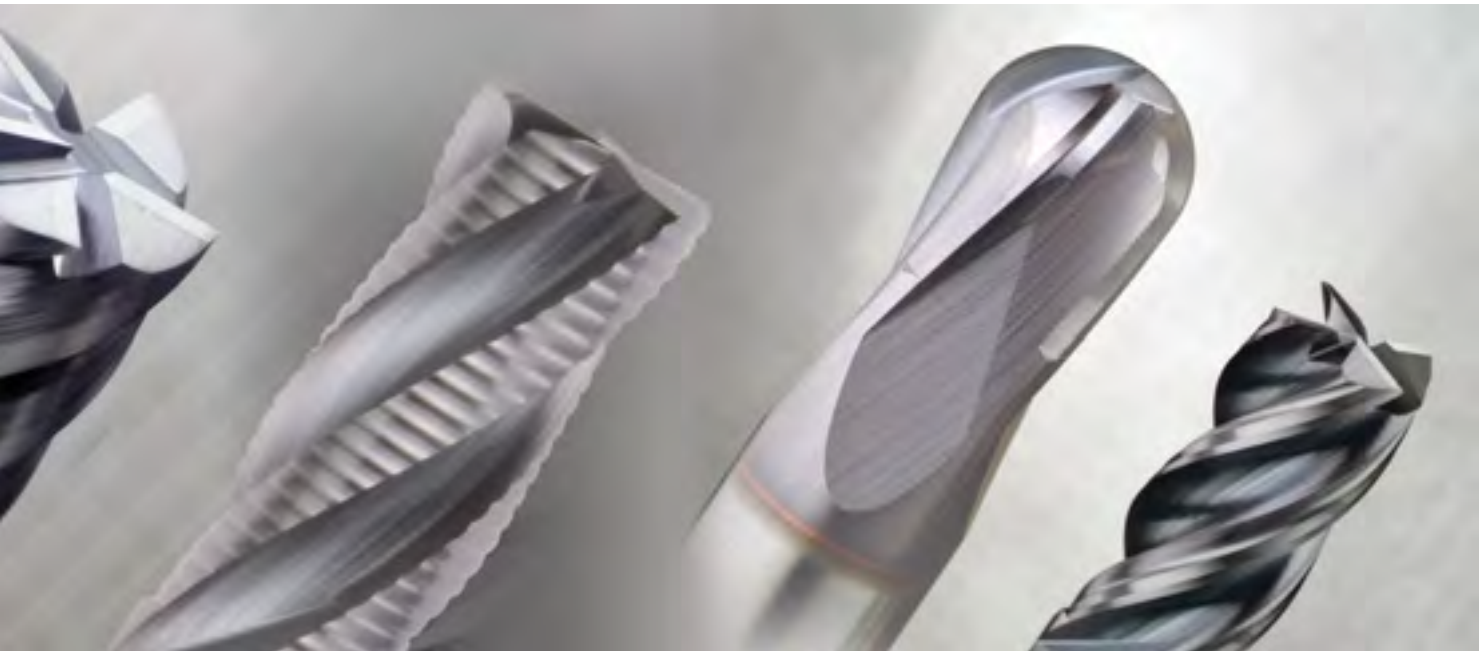


Hanita Cutting Tools is recognized as one of the world's leading manufacturers of high quality, high performance end mills and carbide drills.
Providing its products, services and technical support through a global network of local distributors and regional service centers, Hanita serves its user customers with state of the art capabilities designed to optimize productivity and throughput.

Hanita products are manufactured in a wide range of standard styles, including high performance roughing, semi – finishing and finishing end mills, solid and coolant hole drills and special cutting tools, made from the world's finest quality Sub – Micrograin carbide and premium conventional and powdered metal High Speed Steels. Hanita also provides the widest range of in-house PVD coating capabilities, including TiN, TiCN, TiAlN, AlTiN and Diamond coatings as well as a variety of unique proprietary coatings for special applications. Serving every major industrial market throughout the world, Hanita

manufacturers tools to all known standard specifications, including metric DIN, JIS, NAS 986, Imperial and ANSI requirements and targets to be a vendor of choice to the most demanding industries, including Aerospace, Die and Mold, Automotive, Heavy Equipment, Medical and General Engineering.

Throughout its 50 year history, Hanita has achieved a reputation for high quality, consistency, reliability and innovation, providing to its customers a constant flow of new and unique products and services, especially designed for maximum efficiency and performance in particular applications. Hanita has enabled its customers to become more competitive and more profitable in their own fields, producing parts in less time, with fewer tool changes and longer tool life.
Recognizing the unique needs of every customer, Hanita is also



known for its creative versatility in developing custom–tailored specialty tools. Offering application and design services and quick delivery specials capabilities, Hanita offers the advantages of state-of-the-art, high performance and high speed manufacturing processes that give their customers the winning edge.

Hanita is a wholly owned company of Kennametal, Inc., a NYSE corporation, and one of the world's largest companies in its field. Hanita fully utilizes Kennametal's global resources to assure a leading edge in research and product development, manufacturing engineering and quality control. Under the continuous supervision of the Israel Standards Institute, Hanita is ISO 9001, ISO 14001, and OHSAS 18001 certified.
Hanita Metal Works Ltd. is committed to providing its customers with tools and services that meet the highest industry standards, the most demanding machining objectives and the ultimate in customer satisfaction.

KENNAMETAL

HANITA
A PRODUCT OF KENNAMETAL INC.

HANITA METAL WORKS LTD.

PRODUCT SELECTION

pg 5-12

"What is the optimal tool?", a concise and structured guide to find the optimal tool for the right application, all tools, all diameter ranges.

CARBIDE ROUGHERS & SEMI FINISHERS

pg 13-22

The widest line of Carbide Roughers and Carbide Semi Finishers available for all materials and applications, including different pitch and profiles specifically designed to remove High Volumes with low Power consumption at High speeds with Extreme Long Life.

HSSE/HSS PM ROUGHERS & SEMI FINISHERS

pg 23-36

High Performance and General Purpose HSSE (M-42) and HSS PM (Premium Powder Metal) Roughers and Semi Finishers, High Toughness Tools including different pitch and profiles specifically designed to Remove High Volumes with low Power consumption and Long Life.

VARIMILL

pg 37-42

The Revolutionary Resonance Avoiding Line of Tools, CARBIDE and HSS PM. This extended line of products is the Chosen Solution to Machine Stainless Steels, Titanium, Inconel and Low Carbon Steels.

VISION PLUS

pg 43–58

Large Range of Tools Specifically designed for Mold and Die and Ultra Hard Steels Machining, and get High Accuracy, Very straight walls and very long life at High Speed machining conditions, made from Premium Carbide and Coated TiAlN.

CARBIDE FINISHERS

pg 59–84

High Performance and General Purpose Carbide End Mills, made from High Quality Carbide.

HSSE/HSS PM FINISHERS

pg 85–100

High Performance and General Purpose High speed steels, made from Premium M-42 (HSSE) and HSS PM (Premium Powder Metal).

CARBIDE DRILLS

pg 101–120

High Performance and General Purpose Carbide Straight Point, easily regrindable Drills, made from High Quality Carbide.

SPECIALS

pg 121–126

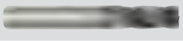
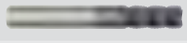
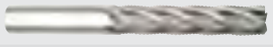
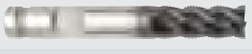
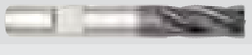
Explanation on the Hanita Expertise for Special tools, including request for quotation forms.

INFO

pg 127-128

General Information.

HANITA METAL WORKS LTD.

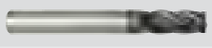
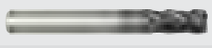
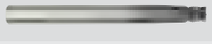
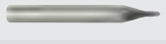
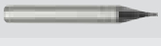
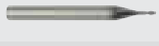
Type of tool	List no.	Shape	Range of size (mm) ⌀Min-⌀Max	Coating	Tool Material	Length of cut (D: Diameter) 1xD	2xD	3xD	4xD
Carbide Roughers & Semi Finishers									
	4909		6 ~ 25	••, WW	Carbide				
	4979		6 ~ 25	••, CT	Carbide				
	49N9		6 ~ 20	••	Carbide				
	49G9		8 ~ 25	CT, CW	Carbide				
	DQ13		3 ~ 20	LW	Carbide				
	4966		5 ~ 25	CW, RW, LW	Carbide				
	4906		4 ~ 25	TW, ZW, CW, RW, LW, RT	Carbide				
	4976		4 ~ 25	MT	Carbide				
	4940		6 ~ 25	LT	Carbide				
	4970		6 ~ 25	CT, LT, LW	Carbide				
	49H6		8 ~ 20	RW, LW	Carbide				
HSSE / HSS - PM Roughers & Semi Finishers									
	6609/19		6 ~ 32	WW	HSSE				
	6676		10 ~ 32	WW, CW, LW	HSSE				
	6667JJ		8 ~40	JJ, CJ, LJ	HSSE				
	6604		6 ~ 25	WW, TW, ZW, CW, LW	HSSE				
	6605/6/15/16		4 ~ 40	WW, FF, TW, ZW, CW, LW	HSSE				
	6607/8/17/18		5 ~ 40	WW, FF, TW, CW,LW	HSSE				
	6637JJ/38JJ		20 ~ 40	JJ	HSSE				
	6645		4 ~ 30	WW, CW, LW	HSSE				
	6673		10 ~ 32	WW, LW	HSSE				
	6674		10 ~ 32	TW, CW, LW	HSSE				
	6675		10 ~ 25	CW, LW	HSSE				
	6N04		6 ~ 25	CW, LW	HSS-PM				
	6N06		6 ~ 30	WW, CW, LW	HSS-PM				
	6N70		6 ~ 32	LW, LT	HSS-PM				
	6NL6		10 ~ 25	LW	HSS-PM				

Uncoated •• WW, AA, FF, JJ | TiN TT, TW, TA, TF, TJ, TN | Z-Coat ZT, ZW | TiCN CT, CW, CA, CF, CJ | TiAlN LT, RT, LW, RW, LJ, RJ, RN | AlTiN MT

Application Features	Suitable to Machine										See Page	Recommended Working Details Page
	General Purpose	30 HRc or Less	40 HRc or Less / Cast Iron	55 HRc or Less	55 HRc to 68 HRc	Stainless steels	Titanium	High temperature Alloys	Aluminium &Non Ferrous	Graphite		
Roughing Operation on Aluminium		✓✓							✓✓✓		15	21
Roughing and Semi-Finishing Aluminium Alloys		✓							✓✓✓		15	21
Deep Roughing and Semi-Finishing Aluminium		✓✓							✓✓✓		16	21
Roughing and Semi-Finishing Aluminium Alloys		✓							✓✓✓		16	21
Roughing and Semi-Finishing Stainless Steels	✓✓✓					✓✓✓					17	21
3D Roughing Operation	✓✓✓										17	21
General Purpose Roughing Operation	✓✓✓	✓✓✓	✓✓✓			✓					18	22
High Performance Roughing Operation		✓✓✓	✓✓✓	✓✓		✓✓	✓	✓✓			18	22
Roughing High Tensile Strength Steels And Titanium			✓✓✓	✓✓✓	✓	✓	✓✓✓	✓✓			19	22
Roughing High Tensile Strength Steels And Titanium			✓✓✓	✓✓✓	✓	✓✓	✓✓✓	✓✓			19	22
General Purpose Deep Roughing Operation		✓✓✓	✓✓✓			✓✓					20	22
Roughing Operation on Aluminium		✓✓							✓✓✓		25	34
Milling Aluminium Alloys		✓							✓✓✓		25	-
General Purpose 3D Roughing Operation	✓✓✓										26	-
General Purpose Roughing Operation		✓✓✓	✓✓			✓✓	✓				26	34
General Purpose Roughing Operation	✓✓✓										27	34
General Purpose Roughing Operation	✓✓✓										28	35
General Purpose Roughing Operation	✓✓✓										29	-
General Purpose, Pocketing and Roughing Operations	✓✓✓					✓✓✓					29	35
Milling Titanium Alloys		✓				✓✓					30	-
Milling Medium Tensile Strength Steels		✓✓✓				✓					30	-
Milling Medium Stainless Steel, Nickel and Cobalt Base Alloys		✓✓				✓✓✓					31	-
General Purpose Roughing Operation		✓✓✓	✓✓✓			✓✓	✓	✓			31	35
General Purpose Roughing Operation		✓✓✓	✓✓			✓✓✓	✓✓	✓			32	35
High Performance Semi-Roughing Operation		✓✓✓	✓✓✓			✓✓✓	✓✓✓	✓✓✓			32	36
General Purpose Deep Roughing Operation, Long Reach		✓✓✓	✓✓✓			✓✓✓	✓✓	✓			33	36

✓ GOOD ✓✓ VERY GOOD ✓✓✓ EXCELLENT

HANITA METAL WORKS LTD.

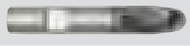
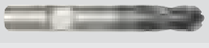
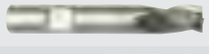
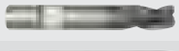
Type of tool	List no.	Shape	Range of size (mm) ⌀Min-⌀Max	Coating	Tool Material	Length of cut (D: Diameter) 1xD	2xD	3xD	4xD
VariMill									
	47N0		5 ~ 20	LT	Premium Carbide	←	—	- - →	
	4777		4 ~ 25	LT	Premium Carbide	←	—	- - →	
	4778		4 ~ 25	MT	Premium Carbide	←	—	- - →	
	1N77		6 ~ 30	CT, CW	HSS PM	←	—	- - →	
Vision Plus									
	7151		1 ~ 20	RT	Premium Carbide	↔			
	7061		1 ~ 12	RT	Premium Carbide	←	—	- - →	
	70N1		1 ~ 12	RT	Premium Carbide	←	—	- - →	
	7150		2 ~ 20	RT	Premium Carbide	↔			
	7050/60		2 ~ 20	RT	Premium Carbide	←	—	- - →	
	75N2		3 ~ 12	RT	Premium Carbide	←	—	- - →	
	75N8		6 ~ 12	RT	Premium Carbide	←	—	- - →	
	7585/95		3 ~ 25	LT	Premium Carbide	←	—	→	
	7505/45		3 ~ 25	LT	Premium Carbide	←	—	→	
	7515/25		6 ~ 25	LT	Premium Carbide	←	—	- - →	
	75N5		3 ~ 25	LT	Premium Carbide	←	—	- - →	
	7670		4 ~ 25	LT	Premium Carbide	←	—	- - →	
	7N01		0.3 ~ 6	RJ	Premium Carbide	←	—	- - →	
	7N02		0.3 ~ 2.5	RJ	Premium Carbide	←	—	- - →	
	7N12		0.5 ~ 2.5	RJ	Premium Carbide	←	—	- - →	
	7N22		0.4 ~ 3	RJ	Premium Carbide	←	—	- - →	

Uncoated	** WW, AA, FF, JJ	TiN	TT, TW, TA, TF, TJ, TN	Z-Coat	ZT, ZW
TiCN	CT, CW, CA, CF, CJ	TiAlN	LT, RT, LW, RW, LJ, RJ, RN	AlTiN	MT

Application Features	Suitable to Machine										See Page	Recommended Working Details Page
	General Purpose	30 HRc or Less	40 HRc or Less / Cast Iron	55 HRc or Less	55 HRc to 68 HRc	Stainless steels	Titanium	High temperature Alloys	Aluminium &Non Ferrous	Graphite		
Slotting and Finishing various Materials.		✓✓✓	✓✓			✓✓✓	✓✓✓	✓			39	41
Slotting and Finishing various Materials.		✓✓✓	✓✓✓			✓✓✓	✓✓	✓			39	41
Slotting and Finishing various Materials.		✓✓	✓✓✓			✓✓	✓✓✓	✓			40	41
Slotting and Finishing various Materials.		✓✓✓	✓✓✓			✓✓✓	✓✓✓	✓✓			40	42
Finishing in 3D Milling			✓✓	✓✓✓	✓✓✓						45	56
Deep 3D milling operation Additional strength due to the taper angle			✓✓	✓✓✓	✓✓✓						45	56
Deep 3D milling operation		✓	✓✓	✓✓✓	✓✓			✓			46	56
finishing in 3D milling			✓✓	✓✓✓	✓✓✓						46	56
Deep 3D milling operation			✓✓	✓✓✓	✓✓✓						47	56
Deep slotting and finishing operations		✓	✓✓	✓✓✓	✓	✓	✓		✓		48	56
Peripheral high finishing accuracy operation			✓✓	✓✓✓	✓✓✓						48	57
Deep Slotting and Peripheral Milling of Hard Steels			✓✓	✓✓✓	✓✓						49	57
Deep Slotting and Peripheral Milling of Hard Steels			✓✓	✓✓✓	✓✓						50	57
Shallow Slotting and Peripheral Deep Milling of Hard Steels			✓✓	✓✓✓	✓✓						50	57
Deep Slotting and Peripheral Milling of Hard Steels, Long Reach			✓✓	✓✓✓	✓✓✓						51	57
Roughing in 3D Milling			✓✓	✓✓✓	✓✓✓	✓	✓✓✓				52	58
Milling on precision machining centers		✓✓	✓✓	✓✓✓	✓✓✓	✓	✓	✓	✓	✓✓✓	52	58
Milling on precision machining centers		✓✓	✓✓	✓✓✓	✓✓✓	✓	✓	✓	✓	✓✓✓	53	58
Milling on precision machining centers		✓✓	✓✓	✓✓✓	✓✓✓	✓	✓	✓	✓	✓✓✓	53	58
Rib processing and very fine operations		✓✓	✓✓	✓✓✓	✓✓✓	✓	✓	✓	✓	✓✓✓	54-55	58

✓ GOOD ✓✓ VERY GOOD ✓✓✓ EXCELLENT

HANITA METAL WORKS LTD.

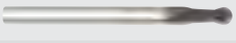
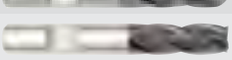
Type of tool	List no.	Shape	Range of size (mm) ⌀Min-⌀Max	Coating	Tool Material	Length of cut (D: Diameter) 1xD	2xD	3xD	4xD
Carbide Finishers									
	4001/11/21		1 ~ 20	••, TT, CT, RT	Carbide	←	—	—	→
	4001JJ		1 ~ 20	JJ, RJ	Carbide	←	—	—	→
	4651		1 ~ 2	••, CT, RT	Carbide	←	→		
	4000/10		3 ~ 20	••, TT, CT, RT	Carbide	←	—	—	→
	4002/12/22		1 ~ 25	••, TT, ZT, CT, RT	Carbide	←	—	—	→
	4102		1.5 ~ 20	••, CT, RT	Carbide	←	—	—	→
	4632		0.4 ~ 1.5	••, CT, RT	Carbide	←	—	→	
	4003/13		1 ~ 25	••, TT, ZT, CT RT	Carbide	←	—	—	→
	4103		3 ~ 20	••, CT	Carbide	←	—	—	→
	4503JJ		1 ~ 20	JJ, CJ, RJ	Carbide	←	—	→	
	4603		3 ~ 20	••, RT	Carbide	←	—	→	
	4633		0.4 ~ 1.8	••, CT, RT	Carbide	←	—	→	
	4004/14/24		1 ~ 25	••, TT, ZT, CT, RT	Carbide	←	—	—	→
	D001/11		3 ~ 20	WW, CW, RW	Carbide	←	—	→	
	D501		2 ~ 20	••, RT	Carbide	←	→		
	D009		3 ~ 20	RW	Carbide	←	—	→	
	DC19		3 ~ 20	LW	Carbide	←	—	→	
	D000/10		3 ~ 20	WW, CW, RW	Carbide	←	—	→	
	D002/12		2 ~ 20	WW, CW, RW	Carbide	←	—	—	→
	D502		3 ~ 20	••, RT	Carbide	←	→		
	D003/13		2 ~ 20	WW, CW, RW	Carbide	←	—	—	→
	D503/13		2 ~ 20	WW, CW, RW	Carbide	←	—	→	
	DC03		3 ~ 20	WW, LW	Carbide	←	→		
	D004/14		2 ~ 20	WW, CW, RW	Carbide	←	—	—	→
	D507/17		6 ~ 20	WW, CW, RW	Carbide	←	—	→	
	D518		4 ~ 25	RW, CW, RT	Carbide	←	—	—	→
	D618		3 ~ 20	RJ	Premium Carbide	←	—	—	→

Uncoated •• WW, AA, FF, JJ | TiN TT, TW, TA, TF, TJ, TN | Z-Coat ZT, ZW | TiCN CT, CW, CA, CF, CJ | TiAlN LT, RT, LW, RW, LJ, RJ, RN | AlTiN MT

Application Features	Suitable to Machine										See Page	Recommended Working Details Page
	General Purpose	30 HRc or Less	40 HRc or Less / Cast Iron	55 HRc or Less	55 HRc to 68 HRc	Stainless steels	Titanium	High temperature Alloys	Aluminium &Non Ferrous	Graphite		
3D Milling and Deep Slotting	✓✓✓	✓✓✓	✓✓✓							✓✓✓	61	79
Deep 3D Milling	✓✓✓	✓✓✓	✓✓✓							✓✓✓	61	79
3D Milling	✓✓✓	✓✓✓	✓✓✓						✓		62	-
3D Milling	✓✓✓	✓✓✓	✓✓✓								62	79
Slotting	✓✓✓	✓✓✓	✓✓✓							✓✓	63	79
Slotting Aluminium									✓✓✓		64	80
Slotting and Side Milling	✓✓✓	✓✓✓	✓✓✓						✓✓		64	-
Slotting and Side Milling	✓✓✓	✓✓✓	✓✓✓								65	80
Slotting and side milling Aluminium									✓✓✓		66	80
Deep Slotting and Peripheral Finishing Operation		✓✓✓	✓✓✓	✓		✓✓✓	✓✓		✓✓		66	80
Peripheral Finishing Operation		✓	✓✓			✓✓	✓		✓		67	-
Slotting and Side Milling	✓✓✓	✓✓✓	✓✓✓						✓		67	-
Peripheral Finishing Operation	✓✓✓	✓✓✓	✓✓✓								68	81
3D Milling	✓✓✓	✓✓✓	✓✓✓							✓✓	69	81
3D Milling at High Speed Machining		✓✓✓	✓✓						✓✓✓	✓✓	69	81
Deep 3D Milling	✓✓✓	✓✓✓				✓✓			✓		70	-
3D Milling		✓✓	✓			✓✓✓	✓✓✓	✓	✓✓	✓✓	70	81
3D Milling	✓✓✓	✓✓✓	✓✓✓								71	82
Deep Slotting	✓✓✓	✓✓✓	✓✓✓							✓✓✓	72	82
Slotting and Side Milling at High Speed Machining		✓✓✓							✓✓✓		73	82
Slotting and Side Milling	✓✓✓	✓✓✓	✓✓✓								74	82
Deep Slotting and Peripheral Finishing Operations		✓✓✓	✓✓✓	✓		✓✓	✓✓	✓	✓✓		75	83
Slotting and Finishing Stainless Steel and Aluminium		✓✓✓	✓✓			✓✓✓	✓✓		✓		75	83
Peripheral Finishing Operation	✓✓✓	✓✓✓	✓✓✓							✓✓	76	83
Peripheral Finishing Operation		✓✓✓	✓✓✓	✓✓		✓✓✓	✓✓✓	✓✓✓		✓	77	83
Peripheral High Accuracy Finishing Operation		✓	✓✓✓	✓✓	✓		✓	✓✓✓		✓✓	77	84
Peripheral High Accuracy Long Milling of Ultra-Hard Steels				✓✓✓	✓✓✓						78	84

✓ GOOD ✓✓ VERY GOOD ✓✓✓ EXCELLENT

HANITA METAL WORKS LTD.

Type of tool	List no.	Shape	Range of size (mm) ⌀Min-⌀Max	Coating	Tool Material	Length of cut (D: Diameter) 1xD	2xD	3xD	4xD
HSSE/HSS-PM Finishers									
	1601		3 ~ 25	WW, FF, TW, CW, LW	HSSE	→	→	⇢	
	1601JJ		3 ~ 25	JJ, TJ, CJ	HSSE	→	→	⇢	
	1602/12		2 ~ 32	WW, FF, TW, ZW, CW, CF, LW	HSSE	→	→	⇢	
	1N02		3 ~ 20	WW, CW, LW	HSSE-PM	→	⇢		
	3502		9 ~ 25	WW, CW	HSSE	→	→	→	⇢
	1652JJ/62JJ		2 ~ 50	JJ, TJ, CJ	HSSE	→	→	⇢	
	1603		3 ~ 25	WW, FF, TW, ZW, CW, LW	HSSE	→	→	⇢	
	3603AA/13AA		1/5 ~ 10	AA, TA, CA	HSSE	→	→	⇢	
	1605/15		2 ~ 20	WW, FF, TW, ZW, CW, LW	HSSE	→	→	→	→
	1634JJ		3 ~ 32	JJ, CJ, LJ	HSSE	→	→	→	→
	1625		6 ~ 25	WW	HSSE	→	→	→	→
	1N0M		3 ~ 25	LW	HSSE-PM	→	→	⇢	
	1N0M/JJ		3 ~ 25	LJ	HSSE-PM	→	→	⇢	
	1606/16		21 ~ 34	WW, FF, TW, CW, LW	HSSE	→	→	→	⇢
	1600		3 ~ 25	WW, TW, ZW, CW, LW	HSSE	→	→	⇢	
	1N05/7		6 ~ 25	WW, CW, LW	HSSE-PM	→	⇢		
	3605/15		3 ~ 30	••, WW, CW, CT, LW	HSSE	→	→	→	⇢
	3N05		6 ~ 25	WW, CW, LW	HSSE-PM	→	⇢		
	5870		8 ~ 48	••, WW	HSSE				
Carbide Drills									
	M112		1 ~ 20	••, TT, RT	Carbide	→	→	→	→
	M132		0.5 ~ 20	••, TT, RT	Carbide	→	→	→	
	M133		3 ~ 20	••, RT	Carbide	→	→	→	
	M152		3 ~ 20	TN, RN, RT	Carbide	→	→	→	→
	M155		3 ~ 20	RT	Premium Carbide	→	→	→	→
	M162		3 ~ 20	TN, RN, RT	Carbide	→	→	→	→
	M252		3 ~ 20	RN, RT	Carbide	→	→	→	→
	M262		3 ~ 20	RN, RT	Carbide	→	→	→	→

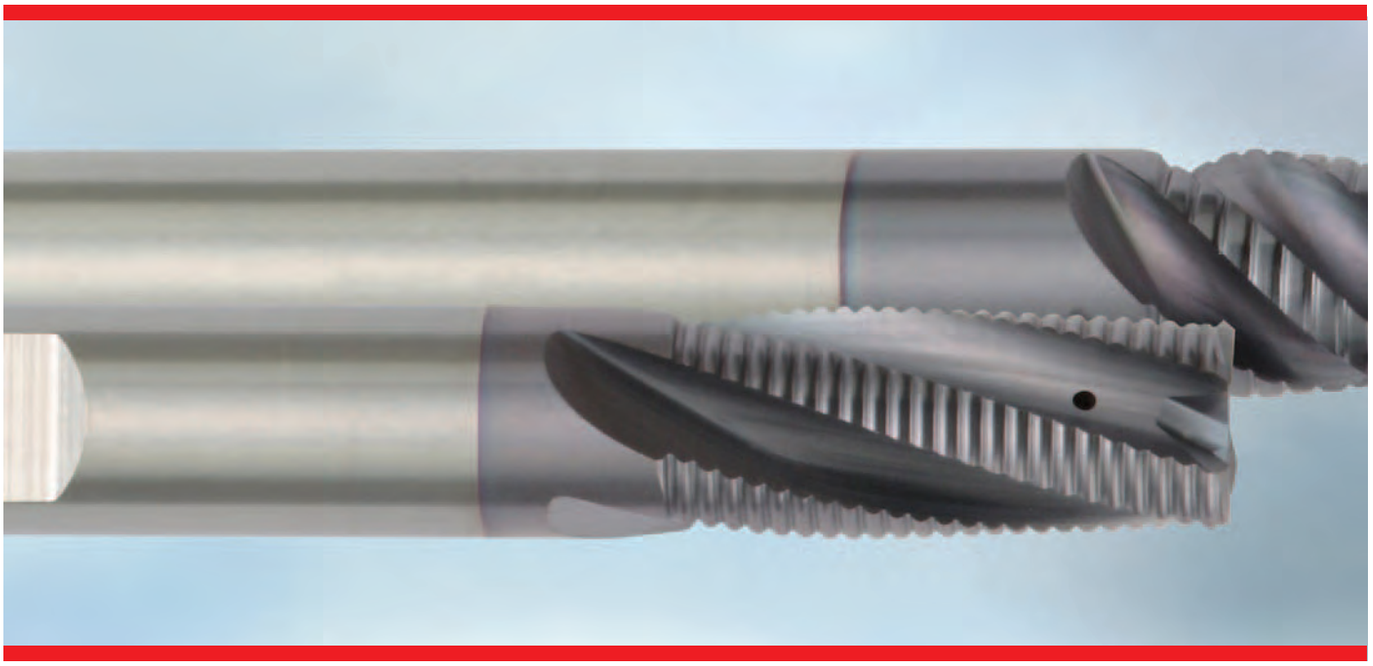
Uncoated •• WW, AA, FF, JJ | TiN TT, TW, TA, TF, TJ, TN | Z-Coat ZT, ZW | TiCN CT, CW, CA, CF, CJ | TiAlN LT, RT, LW, RW, LJ, RJ, RN | AlTiN MT

Application Features	Suitable to Machine										See Page	Recommended Working Details Page
	General Purpose	30 HRc or Less	40 HRc or Less / Cast Iron	55 HRc or Less	55 HRc to 68 HRc	Stainless steels	Titanium	High temperature Alloys	Aluminium &Non Ferrous	Graphite		
3D Milling	✓✓✓										87	-
Deep 3D Milling	✓✓✓										87	-
General Purpose Slotting	✓✓✓										88	98
Slotting		✓✓✓	✓✓						✓✓		89	98
Roughing and Finishing Aluminium		✓✓									89	-
Deep Slotting	✓✓✓	✓✓							✓✓		90	-
Slotting and Side Milling	✓✓✓										91	-
Slotting and Side Milling - General Purpose	✓✓✓										91	-
Peripheral Finishing Operation	✓✓✓										92	98
Deep Peripheral Finishing Operation	✓✓✓										93	99
Deep Peripheral Finishing Operation	✓✓✓										93	99
High Performance Roughing and Finishing Operations		✓✓✓	✓✓			✓✓	✓✓✓	✓✓✓	✓✓✓		94	99
High Performance Roughing and Finishing Operations		✓✓✓	✓✓			✓✓	✓✓✓	✓✓✓	✓✓✓		94	-
Peripheral Finishing Operation	✓✓✓										95	-
3D Milling	✓✓✓										95	-
Peripheral Finishing Operation		✓✓✓	✓✓				✓✓	✓✓	✓✓		96	99
Slotting and Peripheral Finishing Operations		✓✓✓				✓	✓✓	✓✓✓			96	100
Slotting and Peripheral Finishing Operations		✓✓✓	✓✓			✓	✓✓	✓✓✓			97	100
Corner Radius Milling	✓✓✓										97	-

General Purpose Drilling	✓✓✓										103-104	119
General Purpose Drilling	✓✓✓										105-106	119
Shallow Depth Holes with Self Centering	✓✓✓										107-108	119
Drilling Depth of 3XD		✓	✓✓✓	✓✓	✓	✓	✓	✓			109-110	119
Drilling Depth of 3XD for Ultra Hard Steels				✓✓✓	✓✓✓						111-112	119
Drilling Depth of 5XD		✓	✓✓✓	✓✓✓	✓✓	✓	✓	✓			113-114	119
Drilling Depth of 3XD		✓	✓✓✓	✓✓✓	✓	✓✓	✓✓	✓✓			115-116	119
Drilling Depth of 5XD		✓	✓✓✓	✓✓✓	✓	✓✓	✓✓	✓✓			117-118	119

✓ GOOD ✓✓ VERY GOOD ✓✓✓ EXCELLENT

CARBIDE ROUGHERS & SEMI FINISHERS



With a focused objective of maximum metal removal capability for the particular workpiece material at hand, Hanita provides a wide range of unique sinusoidal profiles and chipbreaker forms required to attain that objective. Far more than just a given pitch, Hanita profile designs are uniquely formed and fine tuned to optimize chip form, size and speed of evacuation generated by a given material. Special proprietary carbide substrate materials and in-house true high quality coatings combine with these unique geometries to provide Hanita users a capability of significantly reducing machining time, with heavier and deeper cuts, fewer passes and much faster surface speed.

There are many applications when semi finished surface are acceptable on a part.

For these situations, Hanita offers a range of semi-finishing styles capable of producing extraordinary metal removal rates in a single pass, leaving this range of surface finish and thereby reducing machining time by hundreds of percents, with fewer tool changes and tool passes.

- Provides maximum metal removal rates in slotting and profiling operations.
- Available in:
  - 3, 4 & 5 flute styles
  - stub, regular and long lengths
  - TiN, TiCN and TiAlN Coatings
  - Solid and internal coolant hole styles
- Specific geometries targeted for, Aluminium, Steels, Stainless Steel, High Temperature Alloys, Titanium, Hardened and Ultra Hard Materials.

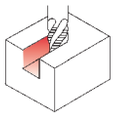
3 FLUTES SQUARE END | COARSE PITCH
LIST 4909

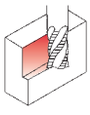
for Roughing Operation on Aluminium

CARBIDE | 30°

HANITA Standard

Uncoated **WW





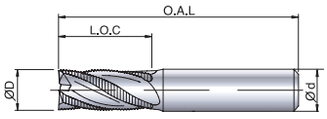
NF

Al

AlSi

COARSE PITCH

D(d11)	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	3	**490906002**
8	8	16	63	3	**490908003**
10	10	22	72	3	**490910004**
12	12	26	83	3	**490912005**
14	14	26	83	3	**490914014**
16	16	32	92	3	**490916006**
18	18	32	92	3	**490918018**
20	20	38	104	3	**490920007**
25	25	45	121	3	**490925008**



3 FLUTES SQUARE END | CORNER RADII
LIST 4979

for Roughing and Semi-Finishing Aluminium Alloys

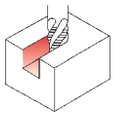
CARBIDE | 40°

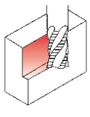
HANITA Standard

Corner Radius

Uncoated **

TiCN CT





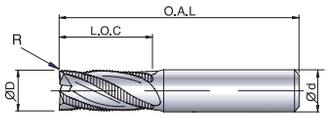
NF

Al

AlSi

CHAMFERED PITCH

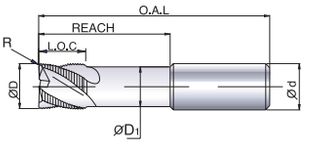
D(d11)	d	L.O.C	O.A.L	R	Z	ITEM No.
6	6	13	57	0.25	3	**497906002**
8	8	16	63	0.25	3	**497908003**
10	10	22	72	0.50	3	**497910004**
12	12	26	83	0.50	3	**497912005**
16	16	32	92	1.0	3	**497916006**
20	20	38	104	1.0	3	**497920007**
25	25	45	121	1.5	3	**497925008**

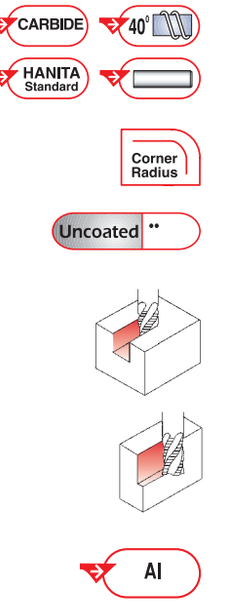


for Deep Roughing and Semi-Finishing Aluminium

3 FLUTES SQUARE END | CORNER RADII AND NECK
LIST 49N9

D(d11)	d	L.O.C	O.A.L	R	REACH	D1	Z	ITEM No.
6	6	8	57	0.25	18	5	3	**49N906002**
8	8	10	63	0.25	24	7	3	**49N908003**
10	10	12	72	0.50	30	9	3	**49N910004**
12	12	15	83	0.50	36	11	3	**49N912005**
16	16	20	92	1.0	48	15	3	**49N916006**
20	20	24	104	1.0	60	19	3	**49N920007**

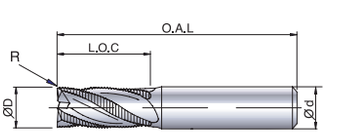


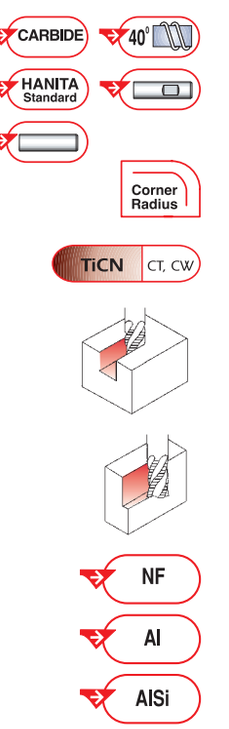


for Roughing and Semi-Finishing Aluminium Alloys, Improving Chip Evacuation

3 FLUTES SQUARE END | INTERNAL COOLANT
LIST 49G9

D(d11)	d	L.O.C	O.A.L	R	Z	ITEM No.
8	8	16	63	0.25	3	**49G908003**
10	10	22	72	0.50	3	**49G910004**
12	12	26	83	0.50	3	**49G912005**
16	16	32	92	1.0	3	**49G916006**
20	20	38	104	1.0	3	**49G920007**
25	25	45	121	1.5	3	**49G925008**

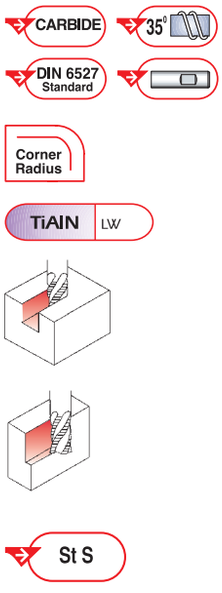




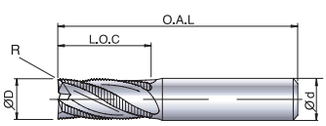
3 FLUTES SQUARE END | FLAT PROFILE | CHIP BREAKER | CORNER RADII

for Roughing and Semi-Finishing Stainless Steels

LIST DQ13



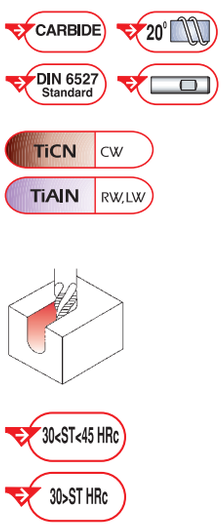
D(d11)	d	L.O.C	O.A.L	R	Z	ITEM No.
3	6	7	54	0.25	3	DQ1303002
4	6	8	57	0.25	3	DQ1304002
5	6	10	57	0.25	3	DQ1305002
6	6	10	57	0.45	3	DQ1306002
7	8	13	63	0.45	3	DQ1307003
8	8	16	63	0.45	3	DQ1308003
10	10	19	72	0.45	3	DQ1310004
12	12	22	83	0.45	3	DQ1312005
14	14	22	83	0.45	3	DQ1314014
16	16	32	92	0.45	3	DQ1316006
18	18	32	92	0.45	3	DQ1318018
20	20	38	104	0.45	3	DQ1320007

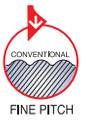


MULTI-FLUTES BALL NOSE

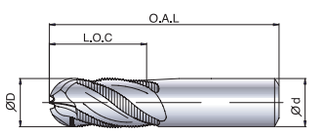
for 3D Roughing Operation

LIST 4966





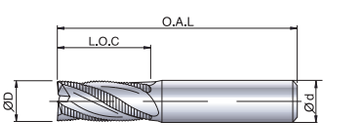
D(d11)	d	L.O.C	O.A.L	Z	ITEM No.
5	6	13	57	3	496605002
6	6	13	57	3	496606002
8	8	16	63	3	496608003
10	10	22	72	4	496610004
12	12	26	83	4	496612005
14	14	26	83	4	496614014
16	16	32	92	4	496616006
18	18	32	92	4	496618018
20	20	38	104	4	496620007
25	25	45	121	4	496625008

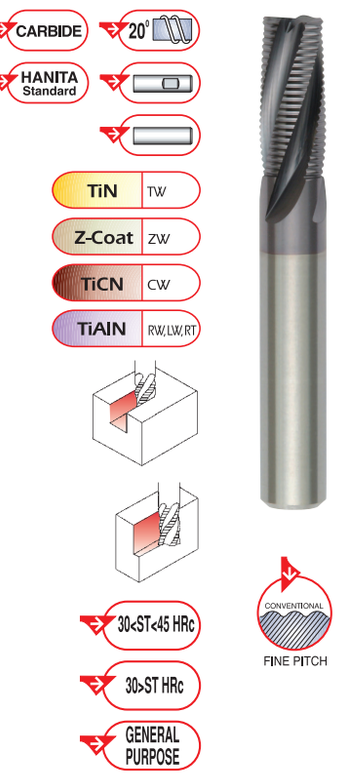


for General Purpose Roughing Operation

MULTI-FLUTES SQUARE END | FINE PITCH
LIST 4906

D(d11)	d	L.O.C	O.A.L	Z	ITEM No.
4	6	11	55	3	490604002
5	6	13	57	3	490605002
6	6	13	57	3	490606002
7	8	16	63	3	490607003
8	8	16	63	3	490608003
9	10	19	72	4	490609004
10	10	22	72	4	490610004
11	12	26	83	4	490611005
12	12	26	83	4	490612005
13	14	26	83	4	490613014
14	14	26	83	4	490614014
16	16	32	92	4	490616006
18	18	32	92	4	490618018
20	20	38	104	4	490620007
25	25	45	121	5	490625008

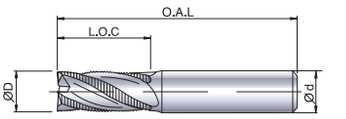




for High Performance Roughing Operation

MULTI-FLUTES SQUARE END | FLAT SHALLOW PITCH
LIST 4976

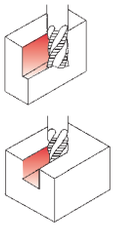
D(d11)	d	L.O.C	O.A.L	Z	ITEM No.
4	6	8	57	3	497604002
5	6	13	57	3	497605002
6	6	13	57	3	497606002
8	8	16	63	3	497608003
10	10	22	72	4	497610004
12	12	26	83	4	497612005
14	14	26	83	4	497614014
16	16	32	92	4	497616006
18	18	32	92	4	497618018
20	20	38	104	4	497620007
25	25	45	121	5	497625008



MULTI-FLUTES SQUARE END | CORNER RADII
LIST 4940

for Roughing High Tensile Strength Steels
And Titanium

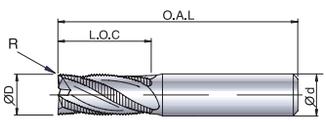
CARBIDE | 45°
HANITA Standard
Corner Radius
TiAlN | LT



Ti
ST>45 HRc
30<ST<45 HRc
30>ST HRc

NEW GENERATION
FLAT SHALLOW PITCH

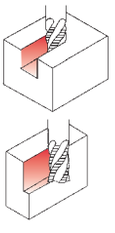
D(d11)	d	L.O.C	O.A.L	R	Z	ITEM No.
6	6	6	57	0.75	4	**494006002**
8	8	8	63	0.75	4	**494008003**
10	10	10	72	0.75	4	**494010004**
12	12	12	83	1.0	4	**494012005**
16	16	16	92	1.0	6	**494016006**
20	20	20	104	1.25	6	**494020007**
25	25	25	121	1.25	6	**494025008**



MULTI-FLUTES SQUARE END
LIST 4970

for Roughing High Tensile Strength Steels
And Titanium

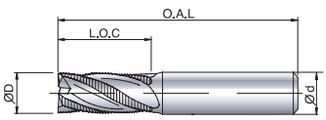
CARBIDE | 45°
HANITA Standard
TiCN | CT
TiAlN | LT, LW



Ti
St S
ST>45 HRc
30<ST<45 HRc
30>ST HRc

NEW GENERATION
FLAT SHALLOW PITCH

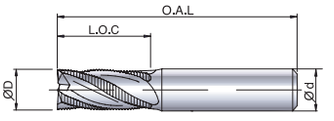
D(d11)	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	4	**497006002**
8	8	16	63	4	**497008003**
10	10	22	72	4	**497010004**
12	12	26	83	4	**497012005**
16	16	32	92	4	**497016046**
16	16	32	92	6	**497016006**
20	20	38	104	4	**497020047**
20	20	38	104	6	**497020007**
25	25	45	121	4	**497025048**
25	25	45	121	6	**497025008**

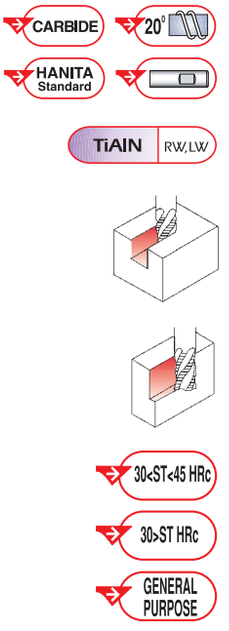


for General Purpose
Deep Roughing Operation

MULTI-FLUTES SQUARE END | INTERNAL COOLANT
LIST 49H6

D(d11)	d	L.O.C	O.A.L	Z	ITEM No.
8	8	16	63	3	**49H608003**
10	10	22	72	4	**49H610004**
12	12	26	83	4	**49H612005**
14	14	26	83	4	**49H614014**
16	16	32	92	4	**49H616006**
18	18	32	92	4	**49H618018**
20	20	38	104	4	**49H620007**





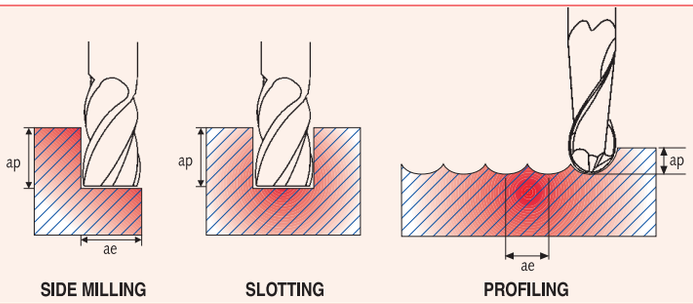
RECOMMENDED WORKING DETAILS

FORMULAS

Cutting Speed	$V_c = \frac{D \times \pi \times n}{1000}$ (m/min)	
Spindle Speed	$n = \frac{V_c \times 1000}{\pi \times d}$ (1/min)	
Feed per Tooth	$f_z = \frac{V_f}{z \times n}$ (mm)	
Table Feed	$V_f = fz \times z \times n$ (mm/min)	

Formula Symbols:

D (mm)	Tool diameter
z	No. of Flutes
V_c (m/min)	Cutting Speed
F_z (mm)	Feed per Tooth
n (1/min)	Spindle Speed
V_f (mm/min)	Table Feed
π	3.1416



SIDE MILLING **SLOTTING** **PROFILING**

LISTS 4909 / 4979 / 49G9

Material	Application			Vc-Cutting Speed	f z- feed per tooth in mm D-Diameter in mm								
	Side Milling		Slotting	m/min									
	ap	ae	ap	uncoated	6	8	10	12	14	16	18	20	25
Aluminium alloys	1.5 x D	0.5 x D	1 x D	250-1000	0.054	0.069	0.085	0.100	0.115	0.131	0.146	0.162	0.200
Aluminium High Silicon	1.5 x D	0.5 x D	1 x D	150-250	0.045	0.058	0.071	0.083	0.096	0.109	0.122	0.135	0.167

For 4979 Uncoated Max Cutting Speed 2000 m/min
For 4979 Coated TiCN Max Cutting Speed 2500 m/min
For 49G9 Coated TiCN Max Cutting Speed 3000 m/min
For slotting : multiply by 0.8 the feed per tooth (f z) in the table.

LIST 49N9

Material	Application			Vc-Cutting Speed	fz- Feed Per Tooth in mm D- Diameter in mm					
	Side milling		Slotting	m/min						
	ap	ae	ap	uncoated	6	8	10	12	16	20
Aluminium Alloys	1xD	0.5xD	1xD	250-1000	0.071	0.120	0.150	0.170	0.200	0.220

LIST DQ13

Material	Rockwell Hardness	Type	Slotting	Vc-Cutting Speed m/min	f z- feed per tooth in mm D-Diameter in mm											
	HRc		ap	TiAlN	3	4	5	6	7	8	10	12	14	16	18	20
Steels	< 25		1 x D	150	0.015	0.020	0.025	0.030	0.033	0.036	0.041	0.061	0.061	0.061	0.064	0.066
Stainless Steels		AISI 302	1 x D	120	0.015	0.020	0.025	0.030	0.033	0.036	0.041	0.061	0.061	0.061	0.064	0.066
Stainless Steels		AISI 410	1 x D	100	0.010	0.015	0.020	0.025	0.028	0.030	0.036	0.051	0.053	0.056	0.058	0.061
Stainless Steels		AISI 316	1 x D	80	0.005	0.010	0.015	0.020	0.023	0.025	0.030	0.041	0.043	0.046	0.048	0.051
Inconel 718			1 x D	25	0.003	0.005	0.010	0.015	0.018	0.020	0.023	0.030	0.033	0.038	0.043	0.051
Aluminium			1 x D	500-1500	0.041	0.046	0.051	0.056	0.058	0.061	0.076	0.102	0.109	0.119	0.135	0.152

LIST 4966

Material	Rockwell Hardness	Application			Vc-Cutting Speed		f z- feed per tooth in mm D-Diameter in mm							
		Side Milling		Slotting	m/min	m/min								
	HRc	ap	ae	ap	TiCN	TiAlN	6	8	10	12	14	16	20	25
Steels	< 22	1.5 x D	0.5 x D	0.75 x D	120	210	0.030	0.035	0.045	0.050	0.065	0.075	0.085	0.100
Steels	22-32	1.5 x D	0.4 x D	0.75 x D	100	180	0.025	0.030	0.040	0.045	0.052	0.060	0.080	0.090
Steels	32-40	1.5 x D	0.4 x D	0.6 x D	80	120	0.017	0.022	0.027	0.032	0.037	0.042	0.047	0.052
Steels	40-45	1 x D	0.4 x D	0.5 x D	70	90	0.015	0.019	0.023	0.027	0.031	0.035	0.039	0.043
Steels	45-50	1 x D	0.3 x D	0.4 x D		80	0.012	0.015	0.018	0.021	0.024	0.027	0.030	0.033
Cast Iron		1.5 x D	0.5 x D	1 x D	150	180	0.030	0.036	0.048	0.054	0.062	0.072	0.096	0.120

RECOMMENDED WORKING DETAILS

LIST 4906

Material	Rockwell Hardness	Application			Vc-Cutting Speed		f z- feed per tooth in mm D-Diameter in mm							
		Side Milling		Slotting	m/min	m/min								
	HRc	ap	ae	ap	TiCN	TiAlN	6	8	10	12	14	16	20	25
Steels	< 22	1.5 x D	0.5 x D	0.75 x D	120	210	0.030	0.035	0.045	0.050	0.065	0.075	0.085	0.100
Steels	22-32	1.5 x D	0.4 x D	0.75 x D	100	180	0.025	0.030	0.040	0.045	0.052	0.060	0.080	0.090
Steels	32-40	1.5 x D	0.4 x D	0.6 x D	80	120	0.017	0.022	0.027	0.032	0.037	0.042	0.047	0.052
Steels	40-45	1 x D	0.4 x D	0.5 x D	70	90	0.015	0.019	0.023	0.027	0.031	0.035	0.039	0.043
Steels	45-50	1 x D	0.3 x D	0.4 x D		80	0.012	0.015	0.018	0.021	0.024	0.027	0.030	0.033
Cast Iron		1.5 x D	0.5 x D	1 x D	150	180	0.030	0.036	0.048	0.054	0.062	0.072	0.096	0.120

LIST 4976

Material	Application			VC- Cutting Speed	fz-feed per tooth in mm D - diameter in mm							
	Side milling		Slotting									
	ae	ap	ap	m/min AlTiN	4	6	8	10	12	16	20	25
steels<30HRc	0.5xD	1xD	1xD	160~200	0.025	0.030	0.035	0.045	0.050	0.055	0.080	0.100
30HRc~40HRc	0.3xD	1xD	1xD	120~160	0.020	0.025	0.030	0.040	0.045	0.060	0.066	0.070
40HRc~52HRc	0.25xD	1xD	0.5xD	70~120	0.015	0.020	0.025	0.030	0.040	0.045	0.050	0.055
EASY TO CUT STAINLESS STEELS	0.4xD	1xD	1xD	80~120	0.025	0.031	0.034	0.045	0.050	0.052	0.055	0.062
DIFFICULT TO CUT	0.3xD	1xD	0.5xD	60~80	0.015	0.020	0.030	0.040	0.045	0.050	0.052	0.060
STAINLESS STEELS GRAY CAST IRON	0.5xD	1xD	1xD	120~180	0.030	0.035	0.040	0.045	0.050	0.052	0.056	0.060
TITANIUM	0.3xD	1xD	0.5xD	40~60	0.015	0.020	0.025	0.040	0.050	0.055	0.057	0.060

LISTS 4970 / 4940

Material	Rockwell Hardness	Application			Vc-Cutting Speed m/min	Vc-Cutting Speed m/min	f z- feed per tooth in mm D-Diameter in mm						
		Side Milling		Slotting									
	HRc	ap	ae	ap	TiCN	TiAlN	6	8	10	12	16	20	25
Steels	35-45	1.5 x D	0.40 x D	0.50 x D	100	150	0.020	0.025	0.030	0.040	0.050	0.065	0.070
Steels	45-55	1.5 x D	0.33 x D	0.50 x D	73	110	0.015	0.020	0.025	0.030	0.040	0.050	0.055
Steels	55-60	1.5 x D	0.25 x D	0.30 x D	60	90	0.010	0.015	0.020	0.025	0.030	0.040	0.045
Titanium	< 40	1.5 x D	0.33 x D	0.50 x D	45	70	0.030	0.035	0.040	0.050	0.070	0.080	0.085
Titanium	> 40	1.5 x D	0.25 x D	0.30 x D	40	60	0.025	0.030	0.035	0.045	0.060	0.075	0.080
Inconel		1.0 x D	0.20 x D	0.25 x D	20	30	0.015	0.020	0.025	0.030	0.040	0.050	0.055

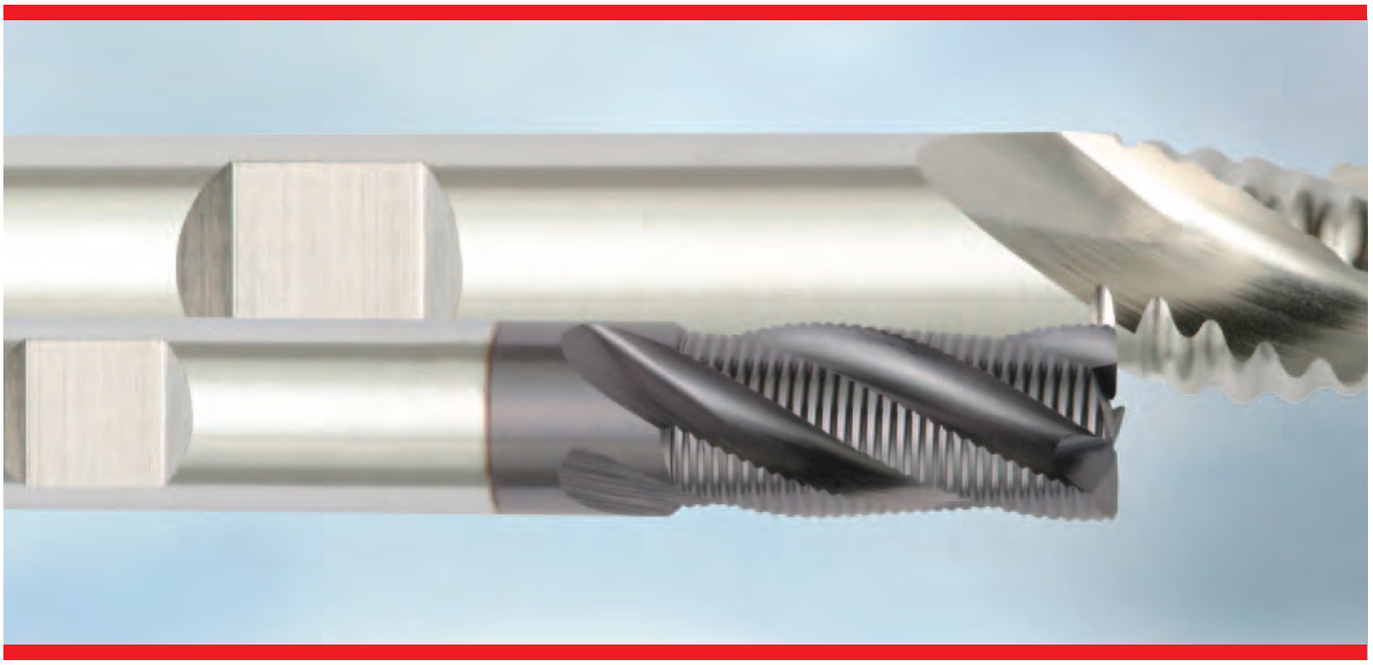
Feed per tooth (fz) in the table is for 4970, for 4940 multiply feed per tooth by 1.2.
For slotting : Use 4 flute and multiply by 0.8 the feed per tooth (f z) in the table.

LIST 49H6

Material	Rockwell Hardness	Application			Vc-Cutting Speed		f z- feed per tooth in mm D-Diameter in mm							
		Side Milling		Slotting	m/min	m/min								
	HRc	ap	ae	ap	TiCN	TiAlN	6	8	10	12	14	16	20	25
Steels	< 22	1.5 x D	0.5 x D	0.75 x D	120	210	0.030	0.035	0.045	0.050	0.065	0.075	0.085	0.100
Steels	22-32	1.5 x D	0.4 x D	0.75 x D	100	180	0.025	0.030	0.040	0.045	0.052	0.060	0.080	0.090
Steels	32-40	1.5 x D	0.4 x D	0.6 x D	80	120	0.017	0.022	0.027	0.032	0.037	0.042	0.047	0.052
Steels	40-45	1 x D	0.4 x D	0.5 x D	70	90	0.015	0.019	0.023	0.027	0.031	0.035	0.039	0.043
Steels	45-50	1 x D	0.3 x D	0.4 x D		80	0.012	0.015	0.018	0.021	0.024	0.027	0.030	0.033
Cast Iron		1.5 x D	0.5 x D	1 x D	150	180	0.030	0.036	0.048	0.054	0.062	0.072	0.096	0.120

NOTE
Data shown is the result of actual machining tests and is suggested as a starting point.
Do sensitivity analyses to achieve optimum results.
The tests were run on an optimal machining environment.

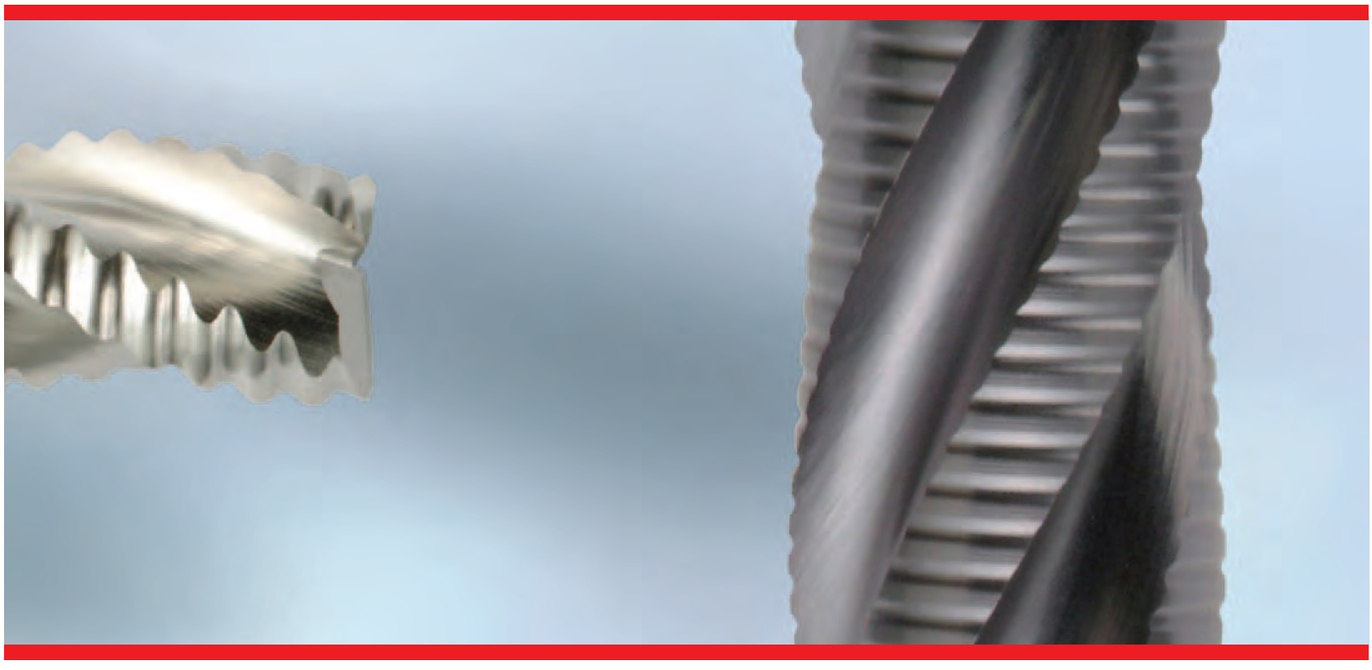
HSSE/HSS PM ROUGHERS & SEMI FINISHERS



Known as the leader in the field of roughing end mills, Hanita delivers outstanding tools, achieving maximum metal removal rates while offering the widest variety of premium cobalt and powdered metal roughing tools available. The tools are designed with unique sinusoidal profiles and chipbreaker forms to optimize performance and are offered with high quality PVD coatings to enable the tools to run at high speeds and deliver longest tool life.

Hanita roughers enable the user to save considerable tool costs even over carbide tools. They can also help to avoid severe tool breakage because of their superior toughness. Often able to outperform even indexable style tools, with their capability of taking deeper and heavier cuts Hanita users can significantly reduce machining time and increase overall productivity.

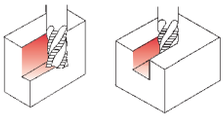
- Available in Coarse, Fine, Extra Fine and specially designed profiles for specific materials.
- Provides maximum metal removal rates in slotting and profiling operations.
- Specific geometries targeted for Aluminium, Steels, Stainless Steels, High Temperature Alloys and Titanium.



3 FLUTES SQUARE END | COARSE PITCH
LISTS 6609 / 6619 HSS Co

for Roughing Operation on Aluminium

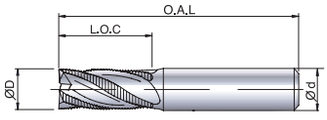
HSS-M42 | 35° | DIN 844 Standard | Uncoated WW



Al | AlSi | NF

CONVENTIONAL COARSE PITCH

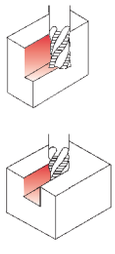
D	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	3	**660906002**
8	10	19	69	3	**660908004**
10	10	22	72	3	**660910004**
12	12	26	83	3	**660912005**
12	12	53	110	3	**661912005**
16	16	32	92	3	**660916006**
16	16	63	123	3	**661916006**
20	20	38	104	3	**660920007**
20	20	75	141	3	**661920007**
25	25	45	121	3	**660925008**
25	25	90	166	3	**661925008**
30	25	45	125	3	**660930008**
32	32	53	133	3	**660932009**
32	32	106	186	3	**661932009**



3 FLUTES SQUARE END | SEMI-FINISHER | FLAT PROFILE TYPE D
LIST 6676 HSS Co

for Milling Aluminium Alloys

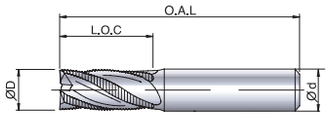
HSS-M42 | 45° | DIN-844 Standard | Uncoated WW | TiCN CW | TiAlN LW



Al

TYPE - D

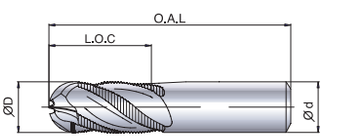
D	d	L.O.C	O.A.L	Z	ITEM No.
10	10	22	72	3	**667610004**
12	12	26	83	3	**667612005**
14	12	26	83	3	**667614005**
16	16	32	92	3	**667616006**
18	16	32	92	3	**667618006**
20	20	38	104	3	**667620007**
22	20	38	104	3	**667622007**
25	25	45	121	3	**667625008**
32	32	53	133	3	**667632009**



for General Purpose 3D
Roughing Operation

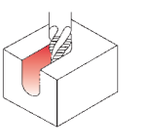
MULTI-FLUTES BALL NOSE | COARSE PITCH
LIST 6667 JJ HSS Co

D	d	L.O.C	O.A.L	R	Z	ITEM No.
8	8	20	90	4	4	666708003
10	10	25	100	5	4	666710004
12	12	32	115	6	4	666712005
14	12	32	115	7	4	666714005
16	16	36	130	8	4	666716006
18	16	40	130	9	4	666718006
20	20	45	145	10	4	666720007
25	25	50	165	12.5	6	666725008
30	25	63	180	15	6	666730008
40	32	70	190	20	6	666740009



HSS-M42 | 30° | JIS Standard

Uncoated JJ
TiCN CJ
TiAlN LJ



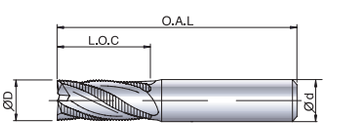
30>ST HRc
GENERAL PURPOSE

COARSE PITCH

for General Purpose
Roughing Operation

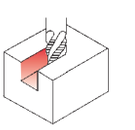
MULTI-FLUTES SQUARE END | EXTRA FINE PITCH
LIST 6604 HSS Co

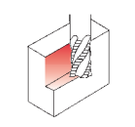
D	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	3	**660406002**
8	10	19	69	3	**660408004**
10	10	22	72	4	**660410004**
12	12	26	83	4	**660412005**
14	12	26	83	4	**660414005**
16	16	32	92	4	**660416006**
18	16	32	92	4	**660418006**
20	20	38	104	4	**660420007**
22	20	38	104	5	**660422007**
25	25	45	121	5	**660425008**



HSS-M42 | 30° | DIN-844 Standard

Uncoated WW
TiN TW
Z-Coat ZW
TiCN CW
TiAlN LW





St S
30>ST HRc
GENERAL PURPOSE

EXTRA FINE PITCH

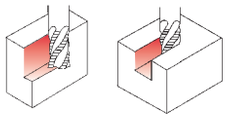
MULTI-FLUTES SQUARE END | FINE PITCH
LISTS 6605/6606/6615/6616 HSS Co

for General Purpose
Roughing Operation

HSS-M42
DIN-844 Standard
30°

Uncoated WW, FF*
TiN TW
Z-Coat ZW
TiCN CW
TiAlN LW

* only for lists 6605/6

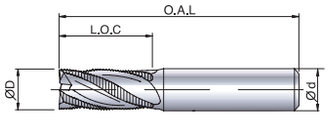


CONVENTIONAL
FINE PITCH

St S
30>ST HRc
GENERAL PURPOSE

D	d	L.O.C	O.A.L	Z	ITEM No.
4	6	11	55	3	660604002
5	6	13	57	3	660605002
6	6	13	57	3	660606002
6	6	24	68	3	661606002
7	10	16	66	3	660607004
8	10	19	69	3	660608004
8	10	38	88	3	661608004
9	10	19	69	3	660609004
10	10	22	72	4	660610004
10	10	45	95	4	661610004
11	12	22	79	4	660611005
12	12	26	83	4	660612005
12	12	53	110	4	661612005
13	12	26	83	4	660613005
14	12	26	83	4	660614005
14	12	53	110	4	661614005
15	12	26	83	4	660615005
16	16	32	92	4	660616006
16	16	63	123	4	661616006
17	16	32	92	4	660617006
18	16	32	92	4	660618006
18	16	63	123	4	661618006
19	16	32	92	4	660619006
20	16	38	98	4	660620006
20	20	38	104	4	660620007
20	16	75	135	4	661620006
20	20	75	141	4	661620007
22	20	38	104	5	660622007
22	20	75	141	5	661622007
24	25	45	121	5	660624008
25	25	45	121	5	660625008
25	25	90	166	5	661625008
28	25	45	121	6	* 660528008
28	25	90	166	6	* 661528008
30	25	45	121	6	* 660530008
30	25	90	166	6	* 661530008
32	32	53	133	6	* 660532009
32	32	100	170	6	* 661532009
35	32	53	133	6	* 660535009
36	32	53	133	6	* 660536009
36	32	100	170	6	* 661536009
40	40	63	155	6	* 660540001
40	32	63	143	6	* 660540009
40	40	125	217	6	• 661540001
40	32	100	170	6	* 661540009

* CENTRE HOLE
• NOT AVAILABLE WITH FF THREADED SHANK



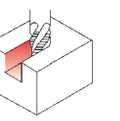
for General Purpose
Roughing Operation

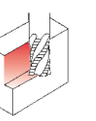
MULTI-FLUTES SQUARE END | COARSE PITCH
LISTS 6607/6608/6617/6618 HSS Co

D	d	L.O.C	O.A.L	Z	ITEM No.
5	6	13	57	3	660805002
6	6	13	57	3	660806002
6	6	24	68	3	661806002
7	10	16	66	3	660807004
8	10	19	69	3	660808004
8	10	38	88	3	661808004
9	10	19	69	3	660809004
10	10	22	72	4	660810004
10	10	45	95	4	661810004
11	12	22	79	4	660811005
12	12	26	83	4	660812005
12	12	53	110	4	661812005
13	12	26	83	4	660813005
14	12	26	83	4	660814005
14	12	53	110	4	661814005
15	12	26	83	4	660815005
16	16	32	92	4	660816006
16	16	63	123	4	661816006
18	16	32	92	4	660818006
18	16	63	123	4	661818006
20	16	38	98	4	660820006
20	20	38	104	4	660820007
20	16	75	135	4	661820006
20	20	75	141	4	661820007
22	20	38	104	5	660822007
22	25	85	150	5	661822008
24	25	45	121	5	660824008
25	25	45	121	5	660825008
25	25	90	166	5	661825008
28	25	45	121	6	* 660728008
28	25	90	166	6	* 661728008
30	25	45	121	6	* 660730008
30	25	90	166	6	* 661730008
32	32	53	133	6	* 660732009
32	32	100	170	6	* 661732009
35	32	53	133	6	* 660735009
36	32	53	133	6	* 660736009
36	32	100	170	6	* 661736009
40	32	63	143	6	* 660740009
40	40	125	217	6	* 661740001

HSS-M42
30°
DIN 844 Standard

Uncoated WW, FF*
TiN TW
TiCN CW
TiAlN LW
* only for lists 6607/8

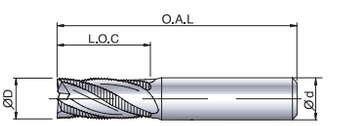




CONVENTIONAL
COARSE PITCH

St S
30>ST HRc
GENERAL PURPOSE

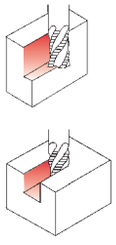
* CENTRE HOLE
• NOT AVAILABLE WITH FF THREADED SHANK



MULTI-FLUTES SQUARE END | COARSE PITCH | EXTRA LONG TYPE
LISTS 6637JJ / 6638JJ HSS Co

for General Purpose Roughing Operation

HSS-M42 | 30° | JIS Standard | Uncoated JJ

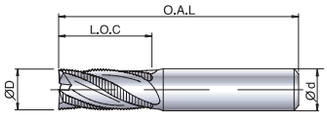


GENERAL PURPOSE

CONVENTIONAL COARSE PITCH

D	d	L.O.C	O.A.L	Z	ITEM No.
20	20	100	200	4	**663820007**
25	25	100	200	5	**663825008**
25	25	120	220	5	**663825018**
30	25	120	220	6	* **663730008**
30	25	150	250	6	* **663730018**
40	32	120	220	6	* **663740009**
40	32	150	250	6	* **663740019**

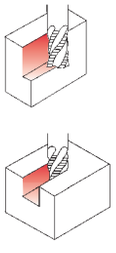
* CENTRE HOLE



MULTI-FLUTES SQUARE END | FINE PITCH | STUB LENGTH
LIST 6645 HSS Co

for General Purpose, Pocketing and Roughing Operations

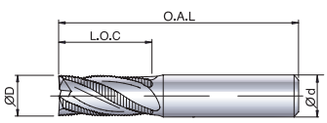
HSS-M42 | 30° | DIN-327 Standard | Uncoated WW | TiCN CW | TiAlN LW



CONVENTIONAL FINE PITCH

St S | 30>ST HRc | GENERAL PURPOSE

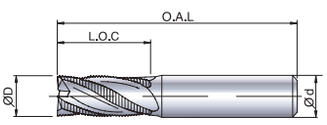
D	d	L.O.C	O.A.L	Z	ITEM No.
4	6	7	51	3	**664504002**
5	6	8	52	3	**664505002**
6	6	8	52	3	**664506002**
8	10	11	61	3	**664508004**
10	10	13	63	3	**664510004**
12	12	16	73	3	**664512005**
14	12	16	73	3	**664514005**
16	16	19	79	3	**664516006**
18	16	19	79	3	**664518006**
20	16	23	89	3	**664520006**
25	25	26	102	3	**664525008**
30	25	26	102	4	**664530008**



for Milling
Titanium Alloys

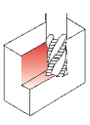
MULTI FLUTES SQUARE END | SEMI-FINISHER | FLAT PROFILE TYPE V1
LIST 6673 HSS Co

D	d	L.O.C	O.A.L	Z	ITEM No.
10	10	22	72	4	667310004
12	12	26	83	4	667312005
14	12	26	83	4	667314005
16	16	32	92	4	667316006
18	16	32	92	5	667318006
20	20	38	104	5	667320007
22	20	38	104	5	667322007
25	25	45	121	6	667325008
32	32	53	133	6	667332009

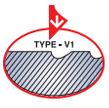


HSS-M42 | 37° | DIN-844 Standard

Uncoated WW
TiAlN LW



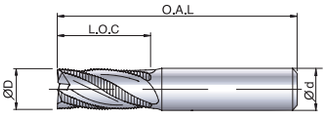
Ti



for Milling Medium
Tensile Strength Steels

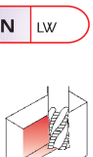
MULTI-FLUTES SQUARE END | SEMI-FINISHER | FLAT PROFILE TYPE O
LIST 6674 HSS Co

D	d	L.O.C	O.A.L	Z	ITEM No.
10	10	22	72	4	667410004
12	12	26	83	4	667412005
14	12	26	83	4	667414005
16	16	32	92	4	667416006
18	16	32	92	4	667418006
20	20	38	104	4	667420007
22	20	38	104	4	667422007
25	25	45	121	5	667425008
32	32	53	133	5	667432009

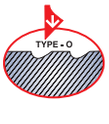


HSS-M42 | 30° | DIN-844 Standard

TiN TW
TiCN CW
TiAlN LW



30>ST HRc

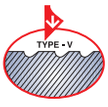


MULTI-FLUTES SQUARE END | SEMI-FINISHER | FLAT PROFILE TYPE V

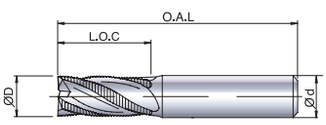
LIST 6675 HSS Co

for Milling Medium
Stainless Steel, Nickel and Cobalt Base Alloys

HSS-M42 | 45° | DIN-844 Standard | TiCN CW | TiAlN LW | St S | Ti | INCONEL



D	d	L.O.C	O.A.L	Z	ITEM No.
10	10	22	72	4	**667510004**
12	12	26	83	4	**667512005**
14	12	26	83	4	**667514005**
16	16	32	92	4	**667516006**
18	16	32	92	5	**667518006**
20	20	38	104	5	**667520007**
22	20	38	104	5	**667522007**
25	25	45	121	6	**667525008**



MULTI-FLUTES SQUARE END | EXTRA FINE PITCH

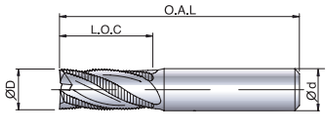
LIST 6N04 HSS PM

for General Purpose
Roughing Operation

HSS-PM | 30° | DIN-844 Standard | TiCN CW | TiAlN LW | 30<ST<45 HRc | 30>ST HRc | GENERAL PURPOSE

EXTRA FINE PITCH

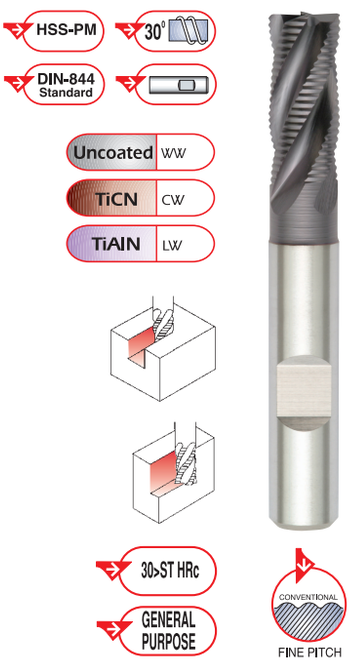
D	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	3	**6N0406002**
8	10	19	69	3	**6N0408004**
10	10	22	72	4	**6N0410004**
12	12	26	83	4	**6N0412005**
16	16	32	92	4	**6N0416006**
18	16	32	92	4	**6N0418006**
20	20	38	104	4	**6N0420007**
25	25	45	121	5	**6N0425008**

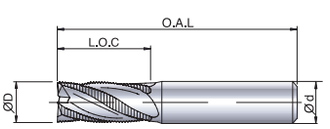


for General Purpose
Roughing Operation

MULTI-FLUTES SQUARE END | FINE PITCH
LIST 6N06 HSS PM

D	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	4	6N0606002
7	10	16	66	4	6N0607004
8	10	19	69	4	6N0608004
9	10	19	69	4	6N0609004
10	10	22	72	4	6N0610004
11	12	22	79	4	6N0611005
12	12	26	83	4	6N0612005
13	12	26	83	4	6N0613005
14	12	26	83	4	6N0614005
15	12	26	83	4	6N0615005
16	16	32	92	4	6N0616006
18	16	32	92	4	6N0618006
20	20	38	104	4	6N0620007
22	20	38	104	5	6N0622007
25	25	45	121	5	6N0625008
30	25	45	121	6	6N0630008

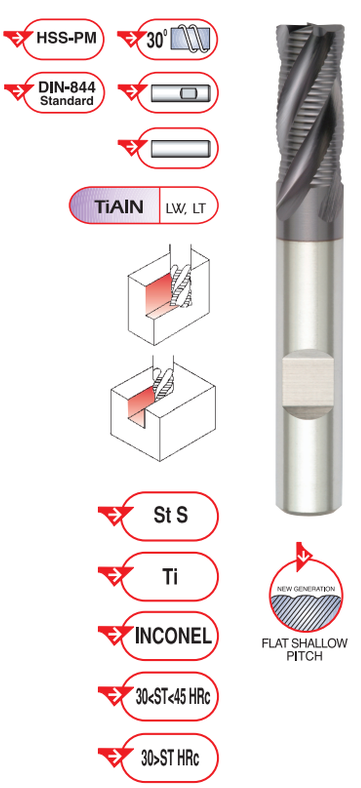


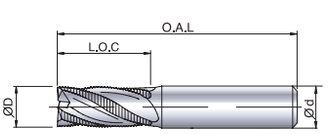


for High Performance
Semi-Roughing Operation

HIGH PERFORMANCE MULTI-FLUTES SQUARE END | SEMI-FINISHER
LIST 6N70 HSS PM

D	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	4	6N7006002
8	10	19	69	4	6N7008004
10	10	22	72	4	6N7010004
12	12	26	83	4	6N7012005
14	12	26	83	4	6N7014005
16	16	32	92	4	6N7016006
18	16	32	92	4	6N7018006
20	20	38	104	4	6N7020007
25	25	45	121	4	6N7025008
32	32	53	133	6	6N7032009

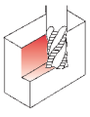


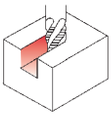


MULTI-FLUTES SQUARE END | FINE PITCH | WITH NECK
LIST 6NL6 HSS PM

for General Purpose Deep Roughing Operation, Long Reach

HSS-PM
30°
HANITA Standard
TiAlN LW

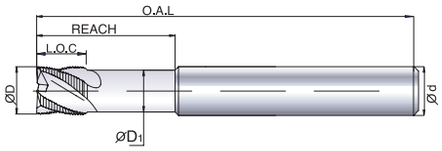




30>ST HRc
GENERAL PURPOSE

CONVENTIONAL
FINE PITCH

D	d	L.O.C	O.A.L	REACH	Z	ITEM No.
10	10	22	110	69	4	**6NL610004**
12	12	26	125	78	4	**6NL612005**
16	16	32	138	87	4	**6NL616006**
20	20	38	160	108	4	**6NL620007**
25	25	45	216	155	5	**6NL625008**



HSSE/HSS PM ROUGHERS & SEMI FINISHERS

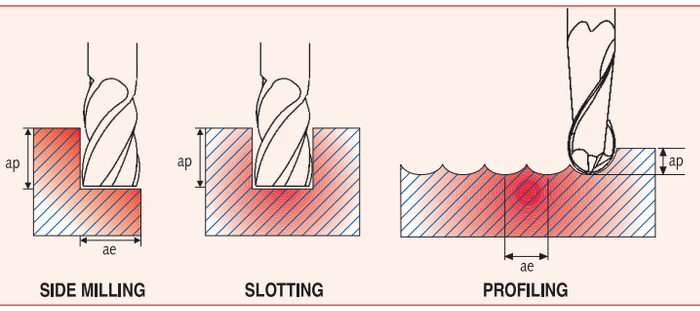
RECOMMENDED WORKING DETAILS

FORMULAS

Cutting Speed	$V_c = \frac{D \times \pi \times n}{1000}$ (m/min)	
Spindle Speed	$n = \frac{V_c \times 1000}{\pi \times d}$ (1/min)	
Feed per Tooth	$f_z = \frac{V_f}{z \times n}$ (mm)	
Table Feed	$V_f = fz \times z \times n$ (mm/min)	

Formula Symbols:

D (mm)	Tool diameter
z	No. of Flutes
V_c (m/min)	Cutting Speed
F_z (mm)	Feed per Tooth
n (1/min)	Spindle Speed
V_f (mm/min)	Table Feed
π	3.1416



SIDE MILLING SLOTTING PROFILING

LISTS 6609 / 6619

Material	Application			Vc-Cutting Speed		Fz=feed per tooth in mm D - diameter in mm						
	Side Milling		slotting	m/min	m/min							
	ap	ae	ap	Uncoated	TiCN	10	12	16	20	25	30	32
Aluminum Alloys	1.5xD	0.5xD	1xD	110	220	0.052	0.065	0.075	0.105	0.125	0.125	0.125
Aluminum High S ilicon	1.5xD	0.5xD	1xD	65	130	0.050	0.060	0.070	0.100	0.120	0.120	0.120

LIST 6604

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm									
		Side Milling		Slotting	m/min	m/min	m/min										
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	6	8	10	12	16	20	25	28	30	36
Steels	<20	1.5xD	0.5xD	1xD	30	70	80	0.014	0.024	0.044	0.056	0.067	0.085	0.100	0.110	0.120	0.120
Steels	20-32	1.5xD	0.5xD	1xD	25	55	60	0.012	0.022	0.032	0.048	0.060	0.081	0.085	0.088	0.100	0.100
Steels	32-42	1.5xD	0.5xD	1xD	15	40	45	0.012	0.020	0.029	0.043	0.054	0.073	0.087	0.077	0.077	0.097
Cast Iron <180 HB		1.5xD	0.5xD	1xD	25	55	60	0.012	0.022	0.032	0.048	0.060	0.081	0.085	0.088	0.100	0.100
Cast Iron >180 HB		1.5xD	0.5xD	1xD	15	40	45	0.012	0.020	0.029	0.043	0.054	0.073	0.087	0.077	0.077	0.097
Stainless Steels		1.5xD	0.5xD	1xD	12	30	35	0.011	0.019	0.027	0.041	0.050	0.070	0.073	0.073	0.079	0.092
Titanium		1.5xD	0.5xD	0.5xD	10	25	30	0.011	0.019	0.027	0.041	0.050	0.070	0.073	0.073	0.079	0.092
High Temperature Alloys		1.5xD	0.5xD	0.25xD	6	9	12	0.012	0.020	0.029	0.043	0.054	0.073	0.087	0.077	0.077	0.097

For slotting: multiply by 0.6 the feed per tooth (fz) in the table.

LISTS 6605 / 6606 / 6615 / 6616

Material	Rockwell Hardness	Application			Vc-Cutting Speed	Vc-Cutting Speed			fz-feed per tooth in mm D-Diameter in mm									
		Side Milling		Slotting	m/min	m/min	m/min	m/min										
	HRc	ap	ae	ap	uncoated	TiN	TiCN	TiAlN	6	7	8	9	10	11	12	13	14	16	18
Steels		1.5 x D	0.5 x D	1 x D	30	45	70	90	0.015	0.020	0.024	0.030	0.036	0.048	0.054	0.056	0.060	0.066	0.078
Steels	20-30	1.5 x D	0.5 x D	1 x D	25	35	40	75	0.012	0.018	0.022	0.027	0.032	0.043	0.048	0.050	0.054	0.060	0.070
Steels	32-40	1.5 x D	0.5 x D	1 x D	15	23	40	45	0.012	0.016	0.020	0.024	0.029	0.039	0.043	0.045	0.049	0.054	0.063
Stainless Steels		1.5 x D	0.5 x D	1 x D	10	15	25	35	0.011	0.015	0.019	0.023	0.027	0.037	0.041	0.043	0.046	0.050	0.060
Titanium	>40	1.5 x D	0.5 x D	1 x D	10	15	25	25	0.011	0.015	0.019	0.023	0.027	0.037	0.041	0.043	0.046	0.050	0.060

fz-feed per tooth in mm
D-Diameter in mm

20	22	24	25	28	30	32	35	36	40	50
0.090	0.096	0.102	0.108	0.096	0.096	0.102	0.108	0.120	0.120	0.120
0.081	0.086	0.092	0.097	0.086	0.086	0.092	0.107	0.108	0.108	0.108
0.073	0.077	0.083	0.087	0.077	0.077	0.083	0.083	0.097	0.097	0.097
0.070	0.073	0.079	0.079	0.073	0.079	0.079	0.079	0.092	0.092	0.092
0.070	0.073	0.079	0.079	0.073	0.079	0.079	0.079	0.092	0.092	0.092

For slotting : multiply by 0.6 the feed per tooth (fz) in the table.

RECOMMENDED WORKING DETAILS

LISTS 6607 / 6608 / 6617 / 6618

Material	Rockwell Hardness	Application			Vc Cutting Speed			fz-feed per tooth in mm D - diameter in mm									
		Side Milling		slotting	m/min	m/min	m/min										
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	6	8	10	12	16	20	25	28	30	36
Steels	<20	1.5xD	0.5xD	1xD	30	70	80	0.014	0.024	0.044	0.056	0.067	0.085	0.100	0.110	0.120	0.120
Steels	20-30	1.5xD	0.5xD	1xD	25	55	60	0.012	0.022	0.032	0.048	0.060	0.081	0.085	0.088	0.100	0.100
Cast Iron		1.5xD	0.5xD	1xD	25	55	60	0.012	0.022	0.032	0.048	0.060	0.081	0.085	0.088	0.100	0.100

For slotting : multiply by 0.6 the feed per tooth (f z) in the table.

LIST 6645

Material	Rockwell Hardness	Application			VC-Cutting Speed				fz-feed per tooth in mm D-Diameter in mm										
		Side Milling		Slotting	m/min	m/min	m/min	m/min											
	HRc	ap	ae	ap	uncoated	TiN	TiCN	TiAlN	6	7	8	9	10	11	12	13	14	16	18
Steels		1.5 x D	0.5 x D	1 x D	30	45	70	90	0.015	0.020	0.024	0.030	0.036	0.048	0.054	0.056	0.060	0.066	0.078
Steels	20-30	1.5 x D	0.5 x D	1 x D	25	35	55	75	0.012	0.018	0.022	0.027	0.032	0.043	0.048	0.050	0.054	0.060	0.070
Steels	32-40	1.5 x D	0.5 x D	1 x D	15	23	35	45	0.012	0.016	0.020	0.024	0.029	0.039	0.043	0.045	0.049	0.054	0.063
Stainless Steels		1.5 x D	0.5 x D	1 x D	10	15	25	35	0.011	0.015	0.019	0.023	0.027	0.037	0.041	0.043	0.046	0.050	0.060
Titanium	>40	1.5 x D	0.5 x D	1 x D	10	15	20	25	0.011	0.015	0.019	0.023	0.027	0.037	0.041	0.043	0.046	0.050	0.060

fz-feed per tooth in mm D-Diameter in mm					
20	22	24	25	28	30
0.090	0.096	0.102	0.108	0.096	0.096
0.081	0.086	0.092	0.097	0.086	0.086
0.073	0.077	0.083	0.087	0.077	0.077
0.070	0.073	0.079	0.079	0.073	0.079
0.070	0.073	0.079	0.079	0.073	0.079

LIST 6N04

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm						
		Side Milling		Slotting	m/min	m/min	m/min							
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	6	8	10	12	16	20	25
Steels	<32	1.5xD	0.5xD	1xD	18	48	55	0.012	0.022	0.032	0.048	0.060	0.081	0.085
Steels	32-42	1.5xD	0.5xD	1xD	15	30	48	0.014	0.080	0.029	0.043	0.059	0.073	0.087
Cast Iron <180 HB		1.5xD	0.5xD	1xD	18	48	55	0.012	0.022	0.032	0.048	0.060	0.081	0.085
Cast Iron >180 HB		1.5xD	0.5xD	1xD	15	30	48	0.014	0.080	0.029	0.043	0.059	0.073	0.087
Stainless Steels		1.5xD	0.5xD	1xD	12	22	30	0.013	0.019	0.027	0.041	0.050	0.070	0.080
Titanium		1.5xD	0.5xD	0.5xD	10	18	25	0.011	0.018	0.025	0.040	0.047	0.066	0.075
High Temperature Alloys		1.5xD	0.5xD	0.25xD	7	11	15	0.014	0.018	0.029	0.043	0.059	0.073	0.087

LIST 6N06

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm							
		Side Milling		Slotting	m/min	m/min	m/min								
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	6	8	10	12	16	20	25	30
Steels	<32	1.5xD	0.5xD	1xD	18	48	55	0.012	0.022	0.032	0.048	0.060	0.081	0.085	0.100
Steels	32-42	1.5xD	0.5xD	1xD	15	30	48	0.014	0.080	0.029	0.043	0.059	0.073	0.087	0.077
Cast Iron <180 HB		1.5xD	0.5xD	1xD	18	48	55	0.012	0.022	0.032	0.048	0.060	0.081	0.085	0.100
Cast Iron >180 HB		1.5xD	0.5xD	1xD	15	30	48	0.014	0.080	0.029	0.043	0.059	0.073	0.087	0.077
Stainless Steels		1.5xD	0.5xD	1xD	12	22	30	0.013	0.019	0.027	0.041	0.050	0.070	0.080	0.079
Titanium		1.5xD	0.5xD	0.5xD	10	18	25	0.011	0.018	0.025	0.040	0.047	0.066	0.075	0.079
High Temperature Alloys		1.5xD	0.5xD	0.25xD	7	11	15	0.014	0.018	0.029	0.043	0.059	0.073	0.087	0.077

RECOMMENDED WORKING DETAILS

LIST 6N70

Material	Rockwell Hardness	Application			VC-Cutting Speed	f z- feed per tooth in mm D-Diameter in mm						
		Side Milling		Slotting	m/min							
	HRc	ap	ae	ap	TiAlN	6	8	10	12	16	20	25
Steels	<20	1.5 x D	0.50 x D	1.0 x D	75-85	0.025	0.035	0.055	0.065	0.085	0.110	0.130
Steels	20-30	1.0 x D	0.40 x D	1.0 x D	65-75	0.023	0.032	0.052	0.062	0.082	0.100	0.120
Steels	32-40	1.0 x D	0.40 x D	1.0 x D	45-55	0.020	0.030	0.045	0.050	0.070	0.090	0.110
Tool Steels	32-40	1.0 x D	0.33 x D	0.75 x D	30-40	0.018	0.020	0.040	0.045	0.065	0.080	0.100
Titanium	>40	1.0 x D	0.25 x D	0.75 x D	15-20	0.020	0.030	0.045	0.050	0.070	0.090	0.110

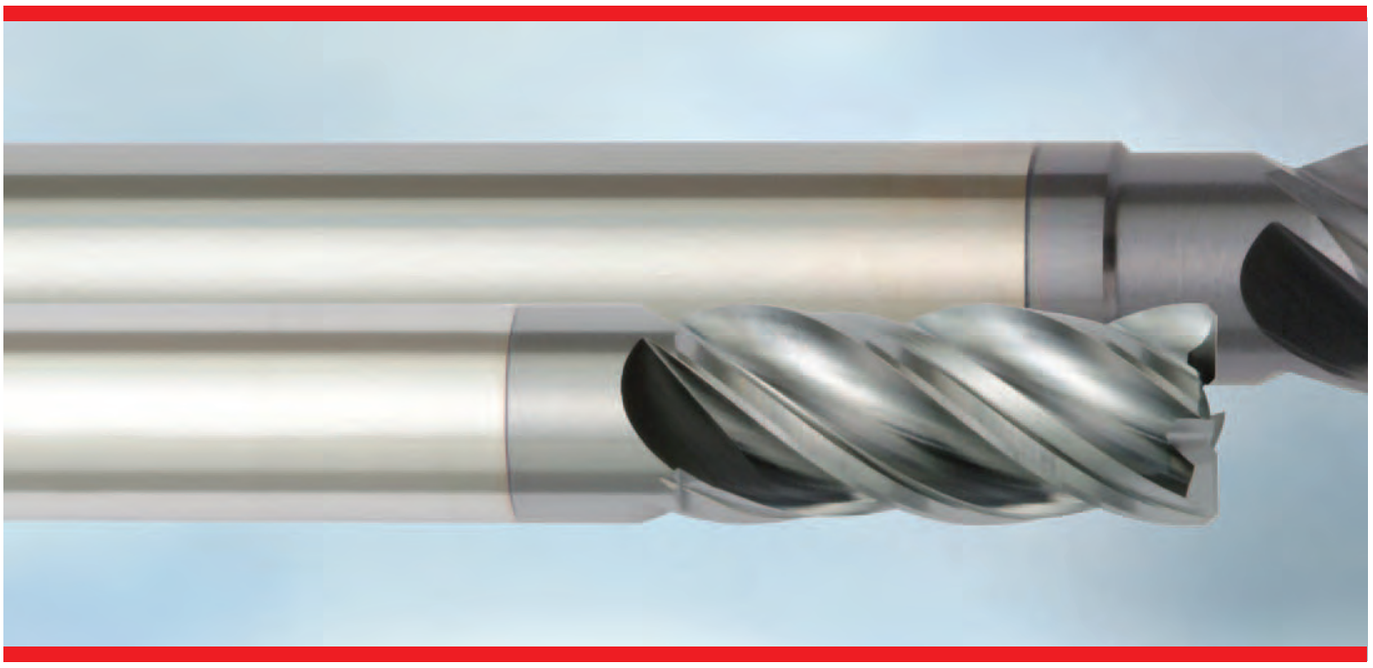
For slotting: multiply by 0.8 the feed per tooth (f z) in the table.

LIST 6NL6

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm						
		Side Milling		Slotting	m/min	m/min	m/min							
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	6	8	10	12	16	20	25
Steels	<32	1.5xD	0.5xD	1xD	18	48	55	0.010	0.019	0.027	0.041	0.051	0.069	0.072
Steels	32-42	1.5xD	0.5xD	1xD	15	30	48	0.012	0.068	0.025	0.037	0.050	0.062	0.074
Cast Iron <180 HB		1.5xD	0.5xD	1xD	18	48	55	0.010	0.019	0.027	0.041	0.051	0.069	0.072
Cast Iron >180 HB		1.5xD	0.5xD	1xD	15	30	48	0.012	0.068	0.025	0.037	0.050	0.062	0.074
Stainless Steels		1.5xD	0.5xD	1xD	12	22	30	0.011	0.016	0.023	0.035	0.043	0.060	0.068
Titanium		1.5xD	0.5xD	0.5xD	10	18	25	0.009	0.015	0.021	0.034	0.040	0.056	0.064
High Temperature Alloys		1.5xD	0.5xD	0.25xD	7	11	15	0.012	0.015	0.025	0.037	0.050	0.062	0.074

NOTE
Data shown is the result of actual machining tests and is suggested as a starting point.
Do sensitivity analyses to achieve optimum results.
The tests were run on an optimal machining environment.

VARIMILL I



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- Is effective in slotting, profiling and pocketing operations.
- Effective in extreme conditions and at high surface speeds.
- Easy to resharpen and maintains performance.
- Outstanding performance in:

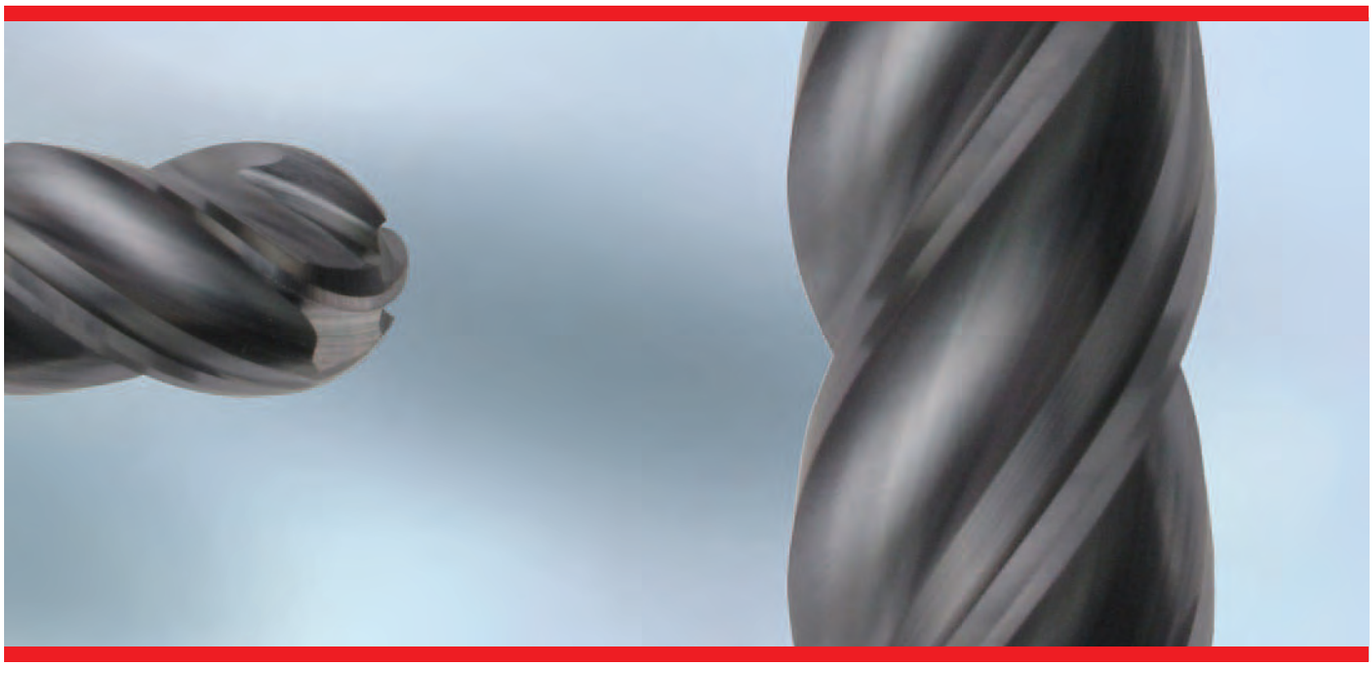
Stainless Steels

Cast Iron

High Temperature Alloys

Low Carbon Steels < 35 HRc

Titanium

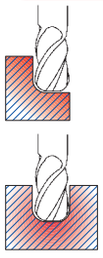


VariMill Ball | 4 FLUTES BALL NOSE | HIGH HELIX WITH NECK

LIST 47N0

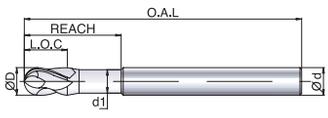
for Slotting and Finishing various Materials. Extreme Performance Milling Stainless Steels, Titanium and High Temperature Alloys.

PREMIUM CARBIDE | 38° | HANITA Standard | TiAlN LT



St S | Ti | INCONEL | 30>ST HRc

D(e8)	d	L.O.C	O.A.L	Reach	Z	ITEM No.
5	6	9	57	15	4	47N005002
6	6	10	57	15	4	47N006002
8	8	12	63	20	4	47N008003
10	10	14	72	25	4	47N010004
12	12	16	83	30	4	47N012005
16	16	22	92	38	4	47N016006
20	20	26	104	50	4	47N020007

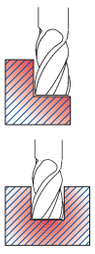


VariMill St S | 4 FLUTES SQUARE END | HIGH HELIX

LIST 4777

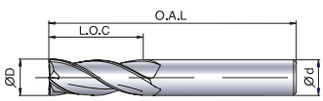
for Slotting and Finishing various Materials. Extreme Performance Milling Stainless Steels and High Temperature Alloys.

PREMIUM CARBIDE | 38° | HANITA Standard | TiAlN LT



St S | INCONEL | 30>ST HRc

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
4	6	12	55	4	477704002
5	6	13	57	4	477705002
6	6	13	57	4	477706002
7	8	16	63	4	477707003
8	8	16	63	4	477708003
9	10	19	72	4	477709004
10	10	22	72	4	477710004
12	12	26	83	4	477712005
14	14	26	83	4	477714014
16	16	32	92	4	477716006
18	18	32	92	4	477718018
20	20	38	104	4	477720007
25	25	45	121	4	477725008

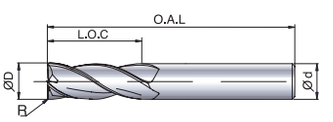


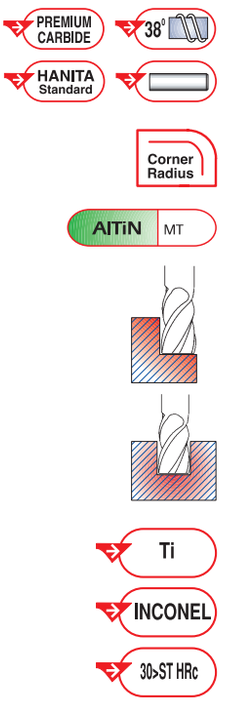
for Slotting and Finishing various Materials.
Extreme Performance Milling Titanium.

VariMill Ti | 4 FLUTES SQUARE END | HIGH HELIX

LIST 4778

D(e8)	d	L.O.C	O.A.L	R	Z	ITEM No.
4	6	12	55	0.2	4	477804002
5	6	13	57	0.2	4	477805002
6	6	13	57	0.2	4	477806002
7	8	16	63	0.2	4	477807003
8	8	16	63	0.2	4	477808003
9	10	19	72	0.2	4	477809004
10	10	22	72	0.3	4	477810004
12	12	26	83	0.3	4	477812005
14	14	26	83	0.3	4	477814014
16	16	32	92	0.3	4	477816006
18	18	32	92	0.3	4	477818018
20	20	38	104	0.3	4	477820007
25	25	45	121	0.3	4	477825008



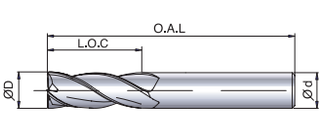


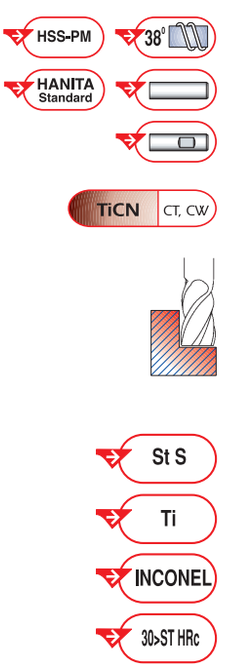
for Slotting and Finishing various Materials.
Extreme Performance Milling Stainless Steels,
Titanium and High Temperature Alloys.

VARIMILL-PM | 4 FLUTES SQUARE END | HIGH HELIX

LIST 1N77

D(+0.04)	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	4	1N7706002
8	10	19	69	4	1N7708004
10	10	22	72	4	1N7710004
12	12	26	83	4	1N7712005
14	12	26	83	4	1N7714005
16	16	32	92	4	1N7716006
18	16	32	92	4	1N7718006
20	20	38	104	4	1N7720007
22	20	38	104	4	1N7722007
25	25	45	121	4	1N7725008
30	25	45	121	4	1N7730008





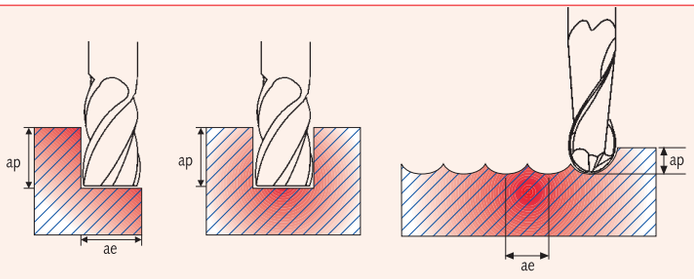
RECOMMENDED WORKING DETAILS

FORMULAS

Cutting Speed	$V_C = \frac{D \times \pi \times n}{1000}$ (m/min)
Spindle Speed	$n = \frac{Vc \times 1000}{\pi \times d}$ (1/min)
Feed per Tooth	$f_z = \frac{Vf}{z \times n}$ (mm)
Table Feed	$V_f = fz \times z \times n$ (mm/min)

Formula Symbols:

D (mm)	Tool diameter
z	No. of Flutes
V_C (m/min)	Cutting Speed
F_Z (mm)	Feed per Tooth
n (1/min)	Spindle Speed
V_f (mm/min)	Table Feed
π	3.1416



SIDE MILLING SLOTTING PROFILING

LIST 47N0

Material	Application			VC-Cutting Speed m/min	fz- Feed per Tooth in mm D- Diameter in mm						
	Side milling		slotting								
	ap	ae	ap	TiAlN	5	6	8	10	12	16	20
Easy to cut stainless steels (304)	1xD	0.5XD	1xD	80~100	0.027	0.036	0.045	0.054	0.059	0.063	0.068
Moderately difficult to cut stainless steels	1xD	0.4XD	1xD	60~75	0.023	0.032	0.041	0.045	0.050	0.054	0.059
Difficult to cut stainless steels (316L)	1xD	0.4XD	1xD	55~70	0.023	0.027	0.036	0.041	0.045	0.050	0.054
High temperature alloys	1xD	0.2XD	0.5xD	22~30	0.010	0.015	0.024	0.024	0.034	0.044	0.050
Soft Steels	1xD	0.5XD	1xD	135~160	0.027	0.036	0.054	0.054	0.063	0.068	0.081
Titanium	1xD	0.3XD	0.5XD	45~55	0.014	0.018	0.027	0.027	0.036	0.041	0.054
Gray Cast Iron	1xD	0.4XD	1xD	110~135	0.027	0.036	0.054	0.054	0.063	0.068	0.081

LIST 4777 / 4778

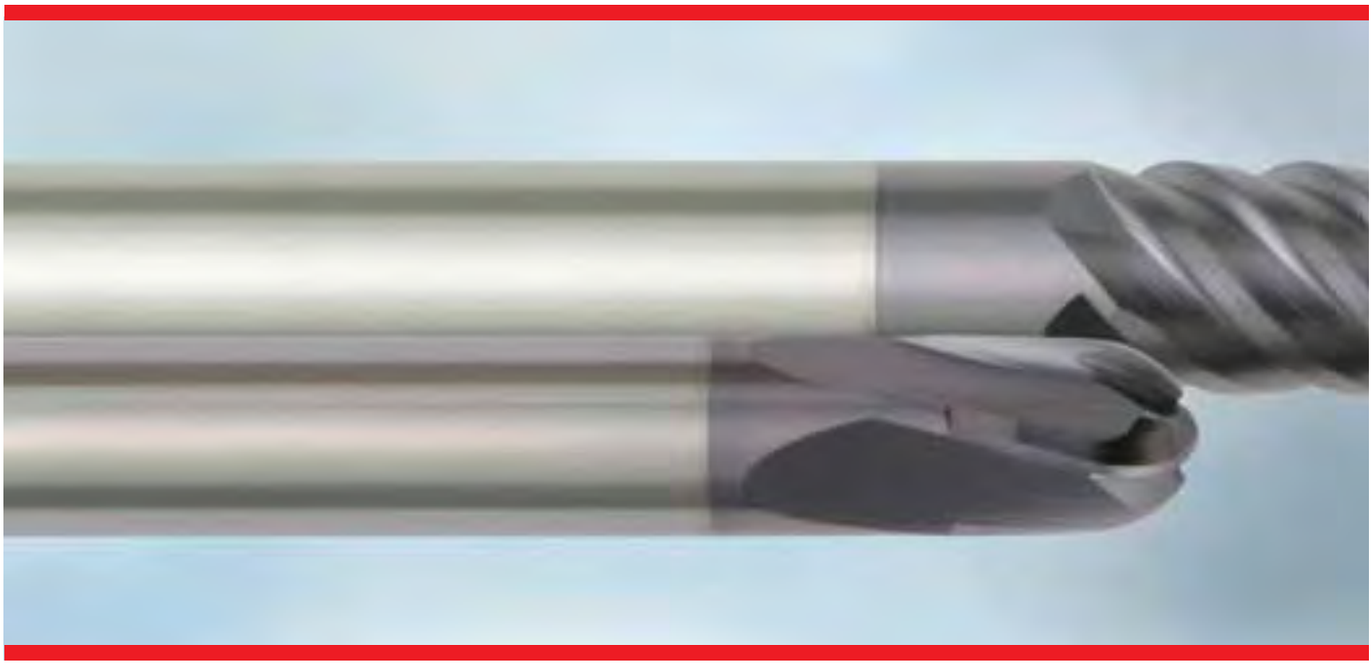
Material	Application			VC-Cutting Speed m/min	fz- Feed per Tooth in mm D- Diameter in mm									
	Side milling		slotting											
	ap	ae	ap	TiAlN/AlTiN	4	5	6	8	10	12	16	18	20	25
Easy to cut stainless steels (304)	1xD	0.5XD	1xD	90~115	0.025	0.030	0.040	0.050	0.060	0.065	0.070	0.072	0.075	0.075
Moderately difficult to cut stainless steels	1xD	0.5XD	1xD	70~85	0.020	0.025	0.035	0.045	0.050	0.055	0.060	0.065	0.065	0.070
Difficult to cut stainless steels (316L)	1xD	0.5XD	1xD	60~80	0.015	0.025	0.030	0.040	0.045	0.050	0.055	0.060	0.060	0.060
High temperature alloys	1xD	0.2XD	0.3xD	25~35	0.011	0.011	0.017	0.027	0.027	0.038	0.049	0.055	0.055	0.055
Soft Steels	1xD	0.5XD	1xD	150~180	0.025	0.030	0.040	0.060	0.060	0.070	0.075	0.080	0.090	0.100
Titanium	1xD	0.5XD	1xD	50~60	0.012	0.015	0.020	0.030	0.030	0.040	0.045	0.050	0.060	0.070
Gray Cast Iron	1xD	0.5XD	1xD	120~150	0.025	0.030	0.040	0.060	0.060	0.070	0.075	0.080	0.090	0.100

LIST 1N77

Material	Application			VC-Cutting Speed m/min	fz- Feed per Tooth in mm D- Diameter in mm								
	Side milling		Slotting										
	ap	ae	ap	TiCN	6	8	10	12	16	18	20	25	30
Easy to cut stainless steels (304)	1xD	0.5XD		35~45	0.060	0.070	0.080	0.090	0.095	0.100	0.110	0.115	0.122
Moderately difficult to cut stainless steels	1xD	0.5XD		30~42	0.055	0.065	0.075	0.085	0.090	0.100	0.110	0.114	0.120
Difficult to cut stainless steels (316L)	1xD	0.5XD		20~38	0.050	0.060	0.070	0.080	0.085	0.090	0.100	0.110	0.120
Titanium	1xD	0.5XD		15~25	0.019	0.030	0.030	0.043	0.055	0.062	0.062	0.063	0.073
Soft Steels	1xD	0.5XD		40~50	0.045	0.067	0.067	0.078	0.084	0.090	0.101	0.115	0.132
High temperature alloys	1xD	0.3XD		8~15	0.022	0.034	0.034	0.045	0.050	0.056	0.067	0.081	0.093
Gray Cast Iron	1xD	0.4XD		40~50	0.045	0.067	0.067	0.078	0.084	0.090	0.101	0.115	0.132

NOTE
Data shown is the result of actual machining tests and is suggested as a starting point.
Do sensitivity analyses to achieve optimum results.
The tests were run on an optimal machining environment.

VISION PLUS



Designed for optimum performance in machining hardened steels and ultra hardened materials, Vision Plus carbide end mills utilize special proprietary substrate materials, patented designs and a truly superb quality coating, combining a high level of hardness with extremely high stability. This enables maximum metal removal rates in materials up to 68 HRc, even in dry conditions, saving in coolant costs and protecting the environment.

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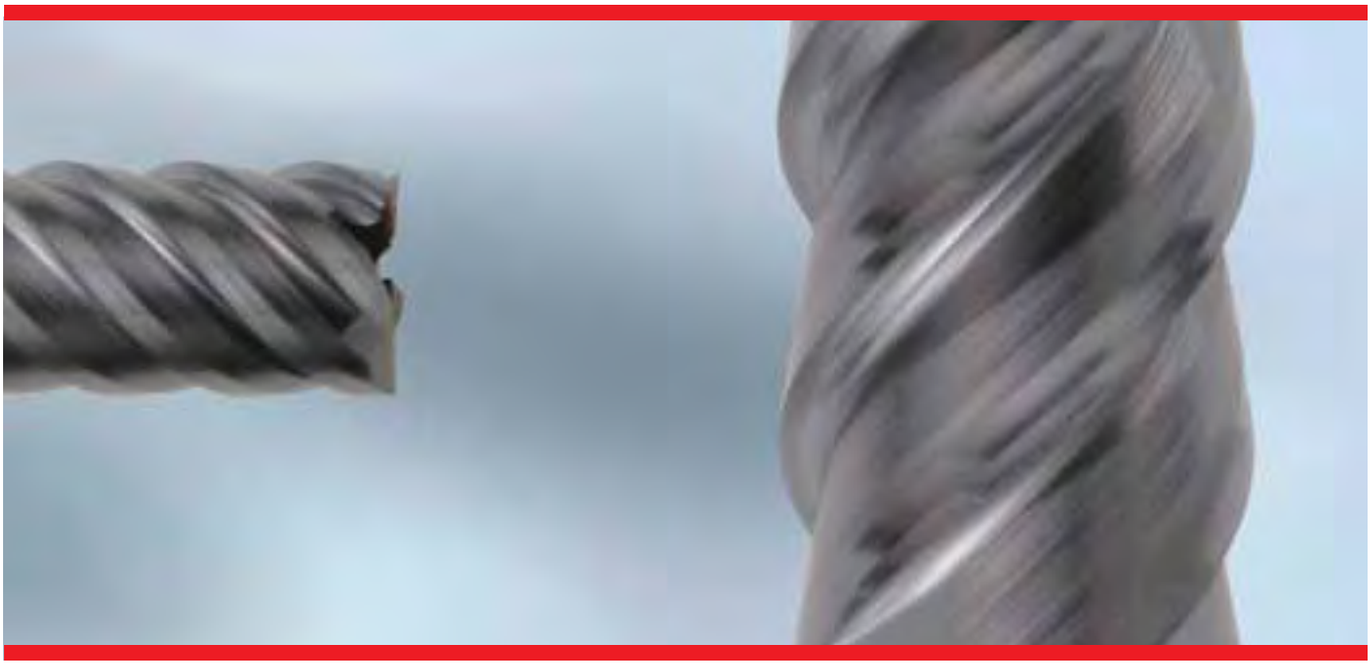
- Excellent in long reach and Z-axis milling applications.
- Provides outstanding surface finish quality and straightness of deep walls.
- Available in many styles, including radius, ball nose, miniature, rib processing and roughing style tools.

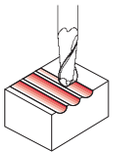


VISION PLUS

2 FLUTES BALL NOSE I 15° HELIX
LIST 7151

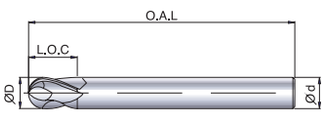
for Finishing in 3D Milling

PREMIUM CARBIDE
15°
HANITA Standard
TiAlN RT



ST>45 HRc
30<ST<45 HRc

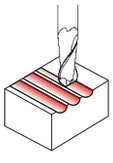
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
1	3	3	38	2	715101000
2	3	3	38	2	715102000
2.5	3	3	38	2	715102500
3	3	3	38	2	715103000
4	4	4	50	2	715104001
5	5	5	50	2	715105001
6	6	6	50	2	715106002
8	8	8	63	2	715108003
10	10	10	76	2	715110004
12	12	12	76	2	715112005
16	16	16	89	2	715116006
20	20	20	104	2	715120007



2 FLUTES BALL NOSE I 15° HELIX I TAPER ANGLE
LIST 7061

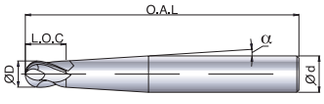
for Deep 3D milling operation
Additional strength due to the taper angle

PREMIUM CARBIDE
15°
HANITA Standard
TiAlN RT



ST>45 HRc
30<ST<45 HRc

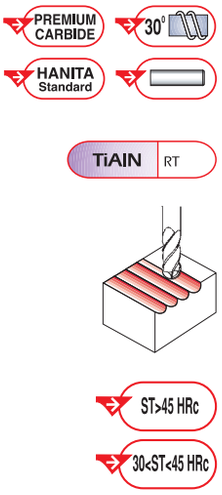
D(e8)	d	L.O.C	O.A.L	Z	α	ITEM No.
1	4	1	63	2	3.5	706101001
2	4	2	63	2	3.5	706102001
2.5	4	2.5	63	2	3	706102501
3	6	3	75	2	1.5	706103002
4	6	4	75	2	1.5	706104002
5	6	5	75	2	1.5	706105002
6	10	6	100	2	1.5	706106004
8	10	8	100	2	1.5	706108004
10	12	10	125	2	1.5	706110005
12	16	12	125	2	1.5	706112006

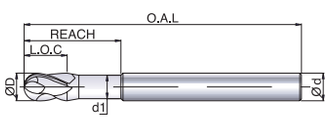


for Deep 3D milling operation

2 FLUTES BALL NOSE | 30º HELIX | WITH NECK
LIST 70N1

D(e8)	d	L.O.C	O.A.L	Z	REACH	D1	ITEM No.
1	4	1	63	2	3	0.8	70N101001
1.5	4	1.5	63	2	4.5	1.3	70N101501
2	6	2	76	2	6	1.8	70N102002
3	6	3	76	2	9	2.8	70N103002
4	6	4	76	2	12	3.7	70N104002
5	6	5	76	2	15	4.6	70N105002
6	6	6	76	2	18	5.5	70N106002
8	8	8	100	2	24	7.4	70N108003
10	10	10	100	2	30	9.2	70N110004
12	12	12	125	2	36	11	70N112005

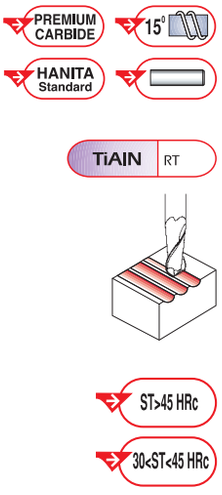


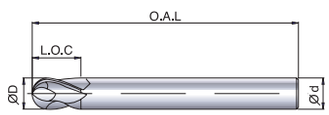


for finishing in 3D milling

4 FLUTES BALL NOSE | 15º HELIX
LIST 7150

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
2	3	2	38	4	715002000
2.5	3	3	38	4	715002500
3	3	3	38	4	715003000
4	4	4	50	4	715004001
5	5	5	50	4	715005001
6	6	6	50	4	715006002
8	8	8	63	4	715008003
10	10	10	76	4	715010004
12	12	12	76	4	715012005
16	16	16	89	4	715016006
20	20	20	104	4	715020007





4 FLUTES BALL NOSE I 15° HELIX

for Deep 3D milling operation

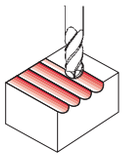
LISTS 7050 / 7060

PREMIUM CARBIDE

15°

HANITA Standard

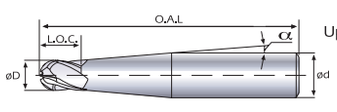
TiAlN RT



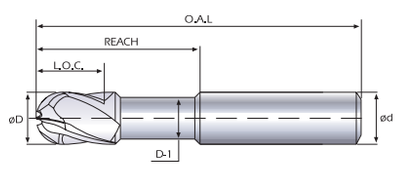
ST>45 HRc

30<ST<45 HRc

D(e8)	d	L.O.C	O.A.L	Z	α	ITEM No.
2	4	2	63	4	2.5	**705002001**
2	4	2	63	4	3.5	**706002001**
2.5	4	2.5	63	4	2.5	**705002501**
2.5	4	2.5	63	4	3	**706002501**
3	6	3	75	4	2.5	**705003002**
3	6	3	75	4	2.5	**706003002**
4	6	4	75	4	2.5	**705004002**
4	6	4	75	4	2	**706004002**
5	6	5	75	4	2.5	**705005002**
5	6	5	75	4	1.5	**706005002**
6	10	6	100	4	2.5	**705006004**
6	10	6	100	4	1.5	**706006004**
8	10	8	100	4	2.5	**705008004**
8	10	8	100	4	1.5	**706008004**
10	12	10	125	4	2.5	**705010005**
10	12	10	125	4	1.5	**706010005**
12	16	12	125	4	2.5	**705012006**
12	16	12	125	4	1.5	**706012006**
16	16	16	125	4		**705016006**
20	20	20	150	4		**705020007**



Upto ø12 including



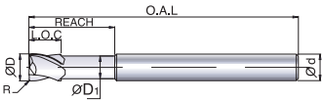
Above ø12

for Deep slotting and finishing operations

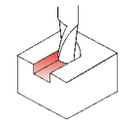
2 FLUTES SQUARE END | 30º HELIX | CORNER RADII AND NECK

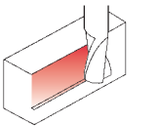
LIST 75N2

D(e8)	d	L.O.C	O.A.L	Z	R	REACH	D1	ITEM No.
3	6	3	75	2	0.3	9	2.8	75N203022
3	6	3	75	2	0.5	9	2.8	75N203042
3	6	3	75	2	1.0	9	2.8	75N203062
4	6	4	75	2	0.3	12	3.7	75N204022
4	6	4	75	2	0.5	12	3.7	75N204042
4	6	4	75	2	1.0	12	3.7	75N204062
5	6	5	75	2	0.3	15	4.6	75N205022
5	6	5	75	2	1.0	15	4.6	75N205042
6	6	6	75	2	0.3	18	5.5	75N206032
6	6	6	75	2	0.5	18	5.5	75N206042
6	6	6	75	2	0.75	18	5.5	75N206052
6	6	6	75	2	1.0	18	5.5	75N206062
6	6	6	75	2	1.5	18	5.5	75N206072
8	8	8	100	2	0.5	24	7.4	75N208023
8	8	8	100	2	1.0	24	7.4	75N208043
8	8	8	100	2	1.5	24	7.4	75N208063
10	10	10	100	2	0.5	30	9.2	75N210024
10	10	10	100	2	0.75	30	9.2	75N210034
10	10	10	100	2	1.0	30	9.2	75N210044
10	10	10	100	2	2.0	30	9.2	75N210064
12	12	12	125	2	0.5	36	11	75N212025
12	12	12	125	2	0.75	36	11	75N212035
12	12	12	125	2	1.0	36	11	75N212045
12	12	12	125	2	1.5	36	11	75N212055
12	12	12	125	2	2.0	36	11	75N212065



PREMIUM CARBIDE
30°
HANITA Standard
Corner Radius
TiAlN RT





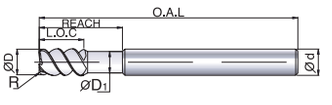
ST>45 HRc
30<ST<45 HRc

for Peripheral high finishing accuracy operation

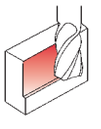
6 FLUTES SQUARE END | 50º HELIX | CORNER RADII AND NECK

LIST 75N8

D(e8)	d	L.O.C	O.A.L	R	Z	REACH	D1	ITEM No.
6	6	6	76	0.5	6	18	5.5	75N806002
8	8	8	100	0.5	6	24	7.4	75N808003
10	10	10	100	1.0	6	30	9.2	75N810004
12	12	12	125	1.0	6	36	11	75N812005



PREMIUM CARBIDE
50°
JIS Standard
Corner Radius
TiAlN RT



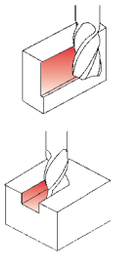
ST>45 HRc
30<ST<45 HRc

VISION PLUS

MULTI-FLUTES SQUARE END | CORNER RADII
LISTS 7585 / 7595

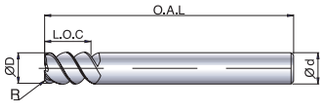
for Deep Slotting and Peripheral Milling of Hard Steels

PREMIUM CARBIDE
50°
HANITA Standard
Corner Radius
TiAlN LT



ST>45 HRc
30<ST<45 HRc
30>ST HRc

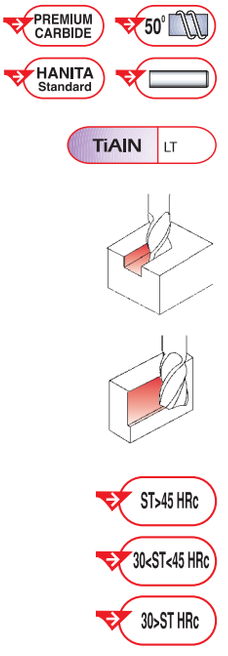
D(e8)	d	L.O.C	O.A.L	R	Z	ITEM No.
3	6	4.5	50	0.25	4	**759503002**
3	6	4.5	50	0.5	4	**759503012**
4	6	6	50	0.25	4	**759504002**
4	6	6	50	0.5	4	**759504012**
5	6	7.5	50	0.25	4	**759505002**
5	6	7.5	50	0.5	4	**759505012**
6	6	9	50	0.25	4	**759506002**
6	6	9	50	0.5	4	**759506012**
6	6	9	50	0.75	4	**759506022**
6	6	9	50	1.0	4	**759506032**
6	6	9	76	0.25	4	**758506002**
6	6	9	76	0.5	4	**758506012**
8	8	12	63	0.5	4	**759508003**
8	8	12	63	1.0	4	**759508013**
8	8	12	63	0.75	4	**759508023**
8	8	12	63	1.5	4	**759508033**
8	8	12	100	0.5	4	**758508003**
8	8	12	100	1.0	4	**758508013**
10	10	15	76	0.5	4	**759510004**
10	10	15	76	1.0	4	**759510014**
10	10	15	76	1.5	4	**759510024**
10	10	15	76	2.0	4	**759510034**
10	10	15	100	0.5	4	**758510004**
10	10	15	100	1.0	4	**758510014**
12	12	18	76	0.5	4	**759512005**
12	12	18	76	1.5	4	**759512015**
12	12	18	76	1.0	4	**759512025**
12	12	18	76	2.0	4	**759512035**
12	12	18	125	0.5	4	**758512005**
12	12	18	125	1.5	4	**758512015**
16	16	24	89	0.5	4	**759516006**
16	16	24	89	1.5	4	**759516016**
16	16	24	89	2.0	4	**759516036**
16	16	24	125	0.5	4	**758516006**
16	16	24	125	1.5	4	**758516016**
20	20	30	104	0.5	4	**759520007**
20	20	30	104	2.0	4	**759520017**
20	20	30	104	1.0	4	**759520027**
20	20	30	150	0.5	4	**758520007**
20	20	30	150	2.0	4	**758520017**
25	25	38	121	0.5	5	**759525008**
25	25	38	121	3.0	5	**759525018**
25	25	38	150	0.5	5	**758525008**
25	25	38	150	3.0	5	**758525018**

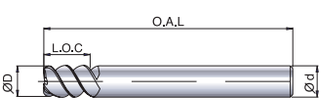


for Deep Slotting and Peripheral
Milling of Hard Steels

MULTI-FLUTES SQUARE END
LISTS 7505 / 7545

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	4.5	50	4	754503002
3	6	4.5	57	4	750503002
4	6	6	50	4	754504002
4	6	6	57	4	750504002
5	6	7.5	50	4	754505002
5	6	7.5	76	4	750505002
6	6	9	50	4	754506002
6	6	9	76	4	750506002
8	8	12	63	4	754508003
8	8	12	100	4	750508003
10	10	15	76	4	754510004
10	10	15	100	4	750510004
12	12	18	76	4	754512005
12	12	18	125	4	750512005
16	16	24	89	4	754516006
16	16	24	125	4	750516006
20	20	30	104	4	754520007
20	20	30	150	4	750520007
25	25	38	121	5	754525008
25	25	38	150	5	750525008

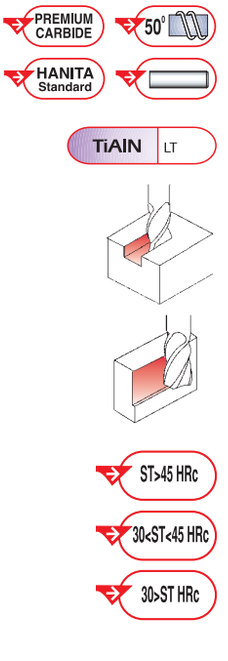


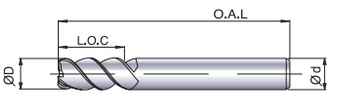


for Shallow Slotting and Peripheral
Deep Milling of Hard Steels

MULTI-FLUTES SQUARE END
LISTS 7515 / 7525

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
6	6	15	76	4	751506002
6	6	21	76	4	752506002
8	8	20	100	4	751508003
8	8	28	100	4	752508003
10	10	25	100	5	751510004
10	10	35	100	5	752510004
12	12	30	125	6	751512005
12	12	42	125	6	752512005
16	16	40	125	6	751516006
16	16	56	125	6	752516006
20	20	50	150	6	751520007
20	20	70	150	6	752520007
25	25	63	150	6	751525008
25	25	88	150	6	752525008

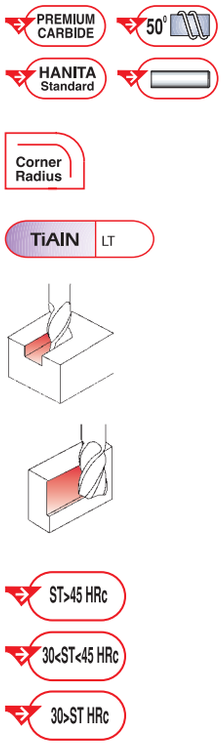




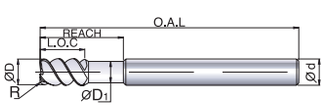
VISION PLUS

MULTI-FLUTES SQUARE END I CORNER RADII
LIST 75N5

for Deep Slotting and Peripheral Milling of Hard Steels, Long Reach



D(e8)	d	L.O.C	O.A.L	R	Z	Reach	D1	ITEM No.
3	6	4.5	57	0.25	4	9	2.7	75N503022
3	6	4.5	57	0.5	4	9	2.7	75N503042
4	6	6	57	0.25	4	12	3.7	75N504022
4	6	6	57	0.5	4	12	3.7	75N504042
5	6	7.5	76	0.25	4	15	4.6	75N505022
5	6	7.5	76	0.5	4	15	4.6	75N505042
6	6	9	76	0	4	18	5.5	75N506002
6	6	9	76	0.25	4	18	5.5	75N506022
6	6	9	76	0.5	4	18	5.5	75N506042
6	6	9	76	0.75	4	18	5.5	75N506062
6	6	9	76	1.0	4	18	5.5	75N506082
8	8	12	100	0	4	24	7.4	75N508003
8	8	12	100	0.5	4	24	7.4	75N508023
8	8	12	100	1.0	4	24	7.4	75N508033
8	8	12	100	1.5	4	24	7.4	75N508043
8	8	12	100	2.0	4	24	7.4	75N508053
10	10	15	100	0	4	30	9.4	75N510004
10	10	15	100	0.5	4	30	9.2	75N510024
10	10	15	100	1.0	4	30	9.2	75N510034
10	10	15	100	1.5	4	30	9.2	75N510044
10	10	15	100	2.0	4	30	9.2	75N510054
12	12	18	125	0	4	36	11.4	75N512005
12	12	18	125	0.5	4	36	11	75N512025
12	12	18	125	1.0	4	36	11	75N512035
12	12	18	125	1.5	4	36	11	75N512045
12	12	18	125	2.0	4	36	11	75N512055
16	16	24	125	0	4	48	15.4	75N516006
16	16	24	125	0.5	4	48	15	75N516026
16	16	24	125	1.5	4	48	15	75N516046
20	20	30	150	0	4	60	19.4	75N520007
20	20	30	150	0.5	4	60	19	75N520027
20	20	30	150	2.0	4	60	19	75N520047
25	25	38	150	0	5	75	24.4	75N525008
25	25	38	150	0.5	5	75	24	75N525028
25	25	38	150	3	5	75	24	75N525048

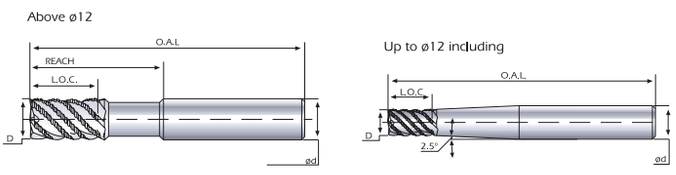


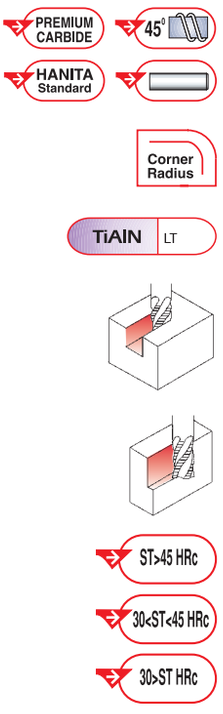
for Roughing in 3D Milling

MULTI-FLUTES SQUARE END | CORNER RADII | FLAT SHALLOW PROFILE

LIST 7670

D(d11)	d	L.O.C	O.A.L	R	Z	ITEM No.
4	6	4	75	0.75	3	767004002
5	6	5	75	0.75	3	767005002
6	10	6	100	0.75	4	767006004
8	10	8	100	0.75	4	767008004
10	12	10	125	0.75	4	767010005
12	16	12	125	1.0	4	767012006
16	16	16	125	1.0	6	767016006
20	20	20	150	1.25	6	767020007
25	25	25	150	1.25	6	767025008





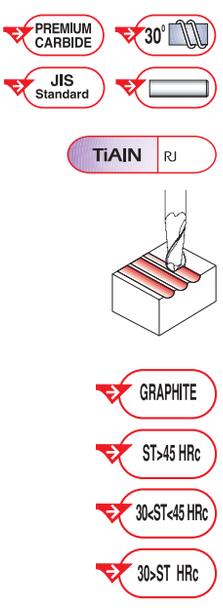
VISION PLUS

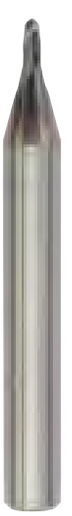
for Milling on precision machining centers

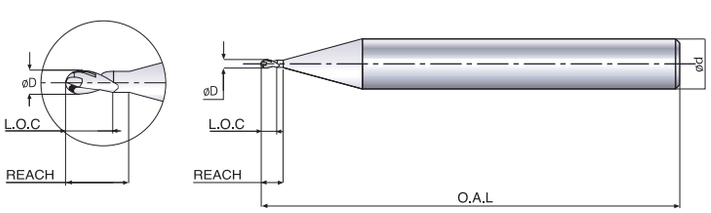
2 FLUTES BALL NOSE | SHORT NECK | MICRO

LIST 7N01

D(e8)	Reach	d	D1	L.O.C	O.A.L	ITEM No.
0.3		6		0.3	50	7N0100302
0.4		6		0.4	50	7N0100402
0.5	1.5	6	0.45	0.5	50	7N0100502
0.6	1.8	6	0.55	0.6	50	7N0100602
0.8	2.4	6	0.75	0.8	50	7N0100802
1.0	2.5	6	0.95	1.0	50	7N0101002
1.2	3.0	6	1.15	1.2	50	7N0101202
1.4	3.5	6	1.35	1.4	50	7N0101402
1.5	3.8	6	1.45	1.5	50	7N0101502
1.6	4.0	6	1.55	1.6	50	7N0101602
1.8	4.5	6	1.75	1.8	50	7N0101802
2.0	5.0	6	1.95	2.0	50	7N0102002
2.5	5.0	6	2.4	2.5	50	7N0102502
3.0	6.0	6	2.85	3.0	50	7N0103002
4.0	6.0	6	3.85	4.0	50	7N0104002
6.0	9.0	6	5.85	6.0	50	7N0106002



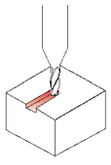




2 FLUTES SQUARE END | SHORT NECK | MICRO
LIST 7N02

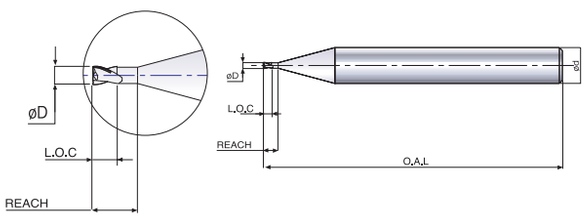
for Milling on precision machining centers

PREMIUM CARBIDE
30°
JIS Standard
TiAlN RJ



GRAPHITE
ST>45 HRc
30>ST HRc
30<ST<45 HRc

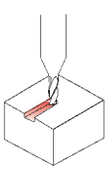
D(e8)	Reach	d	D1	L.O.C	O.A.L	ITEM No.
0.3		6		0.4	50	7N0200302
0.4		6		0.6	50	7N0200402
0.5	1.5	6	0.45	0.7	50	7N0200502
0.6	1.8	6	0.55	0.9	50	7N0200602
0.8	2.4	6	0.75	1.2	50	7N0200802
1.0	2.5	6	0.95	1.5	50	7N0201002
1.2	3.0	6	1.15	1.8	50	7N0201202
1.4	3.5	6	1.35	2.1	50	7N0201402
1.5	3.8	6	1.45	2.3	50	7N0201502
1.6	4.0	6	1.55	2.4	50	7N0201602
1.8	4.5	6	1.75	2.7	50	7N0201802
2.0	5.0	6	1.95	3.0	50	7N0202002
2.5	5.0	6	2.4	3.7	50	7N0202502



2 FLUTES SQUARE END | VERY LONG NECK | MICRO
LIST 7N12

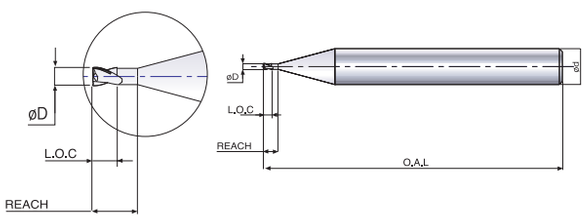
for Milling on precision machining centers

PREMIUM CARBIDE
30°
JIS Standard
TiAlN RJ

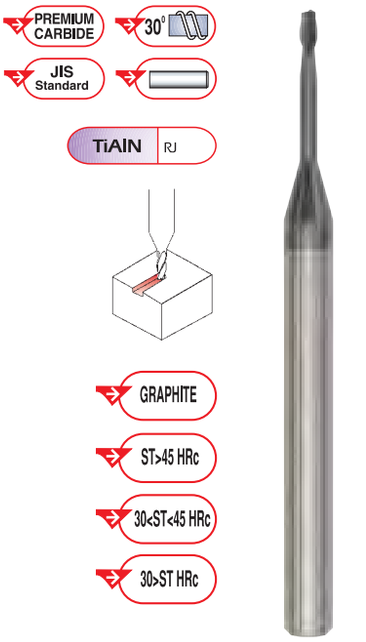


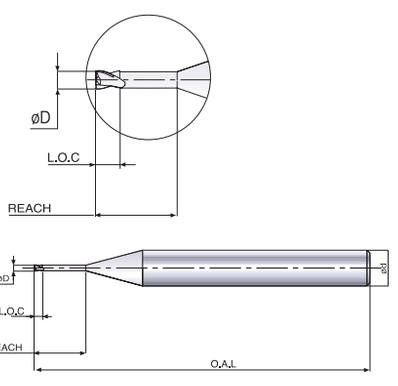
GRAPHITE
ST>45 HRc
30<ST<45 HRc
30>ST HRc

D(e8)	Reach	d	D1	L.O.C	O.A.L	ITEM No.
0.5	2.5	6	0.45	0.7	60	7N1200502
0.6	3.0	6	0.55	0.9	60	7N1200602
0.8	4.0	6	0.75	1.2	60	7N1200802
1.0	5.0	6	0.95	1.5	60	7N1201002
1.2	6.0	6	1.15	1.8	60	7N1201202
1.4	7.0	6	1.35	2.1	60	7N1201402
1.5	7.5	6	1.45	2.3	60	7N1201502
1.6	8.0	6	1.55	2.4	60	7N1201602
1.8	9.0	6	1.75	2.7	60	7N1201802
2.0	10.0	6	1.95	3.0	60	7N1202002
2.5	12.5	6	2.4	3.7	60	7N1202502



D(e8)	Reach	d	D1	L.O.C	O.A.L	ITEM No.
0.4	2	3	0.36	0.6	38	**7N2200400**
0.4	4	3	0.36	0.6	38	**7N2200410**
0.5	2	3	0.45	0.7	38	**7N2200500**
0.5	4	3	0.45	0.7	38	**7N2200510**
0.5	6	3	0.45	0.7	38	**7N2200520**
0.6	2	3	0.55	0.9	38	**7N2200600**
0.6	4	3	0.55	0.9	38	**7N2200610**
0.6	6	3	0.55	0.9	38	**7N2200620**
0.7	2	4	0.65	1	50	**7N2200701**
0.7	4	4	0.65	1	50	**7N2200711**
0.7	6	4	0.65	1	50	**7N2200721**
0.8	4	4	0.75	1.2	50	**7N2200801**
0.8	6	4	0.75	1.2	50	**7N2200811**
0.8	8	4	0.75	1.2	50	**7N2200821**
0.9	6	4	0.85	1.35	50	**7N2200901**
0.9	8	4	0.85	1.35	50	**7N2200911**
0.9	10	4	0.85	1.35	50	**7N2200921**
1	6	4	0.97	1.5	50	**7N2201001**
1	8	4	0.95	1.5	50	**7N2201011**
1	10	4	0.95	1.5	50	**7N2201021**
1	12	4	0.93	1.5	50	**7N2201031**
1.2	6	4	1.17	1.5	50	**7N2201201**
1.2	8	4	1.15	1.8	50	**7N2201211**
1.2	10	4	1.15	1.8	50	**7N2201221**
1.2	12	4	1.13	1.8	50	**7N2201231**
1.4	6	4	1.37	2.1	50	**7N2201401**
1.4	8	4	1.35	2.1	50	**7N2201411**
1.4	10	4	1.35	2.1	50	**7N2201421**
1.4	12	4	1.33	2.1	50	**7N2201431**
1.4	16	4	1.31	2.1	50	**7N2201441**
1.5	6	4	1.47	2.3	50	**7N2201501**
1.5	10	4	1.45	2.3	50	**7N2201511**
1.5	12	4	1.43	2.3	50	**7N2201521**
1.5	16	4	1.41	2.3	50	**7N2201531**
1.5	18	4	1.41	2.3	63	**7N2201541**
1.5	20	4	1.39	2.3	63	**7N2201551**
1.6	6	4	1.57	2.4	50	**7N2201601**
1.6	10	4	1.55	2.4	50	**7N2201611**
1.6	12	4	1.53	2.4	50	**7N2201621**
1.6	16	4	1.51	2.4	50	**7N2201631**
1.6	20	4	1.49	2.4	63	**7N2201641**
1.7	6	4	1.67	2.6	50	**7N2201701**
1.7	10	4	1.65	2.6	50	**7N2201711**
1.7	12	4	1.63	2.6	50	**7N2201721**
1.7	16	4	1.61	2.6	50	**7N2201731**
1.7	20	4	1.59	2.6	63	**7N2201741**
1.8	6	4	1.77	2.7	50	**7N2201801**
1.8	10	4	1.75	2.7	50	**7N2201811**
1.8	12	4	1.73	2.7	50	**7N2201821**
1.8	16	4	1.71	2.7	50	**7N2201831**
1.8	20	4	1.69	2.7	50	**7N2201841**
1.9	6	4	1.87	2.8	50	**7N2201901**
1.9	10	4	1.85	2.8	50	**7N2201911**
1.9	12	4	1.83	2.8	50	**7N2201921**
1.9	16	4	1.81	2.8	50	**7N2201931**
1.9	20	4	1.79	2.8	63	**7N2201941**
2	6	4	1.97	3	50	**7N2202001**
2	10	4	1.95	3	50	**7N2202011**
2	16	4	1.91	3	50	**7N2202021**
2	20	4	1.89	3	63	**7N2202031**
2	30	4	1.89	3	75	**7N2202041**



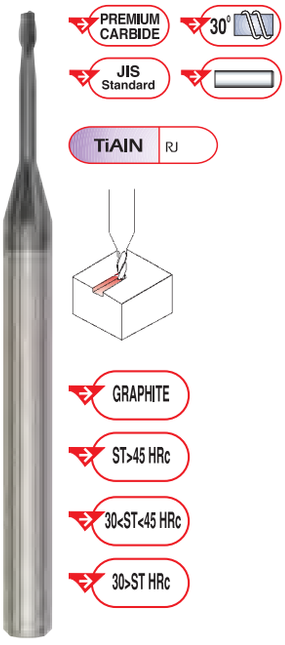


VISION PLUS

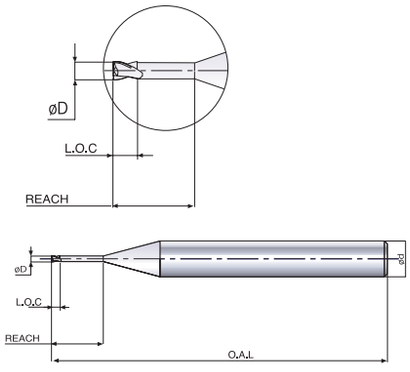
2 FLUTES SQUARE END | EXTRA LONG NECK | MICRO

for Rib processing and very fine operations

LIST 7N22



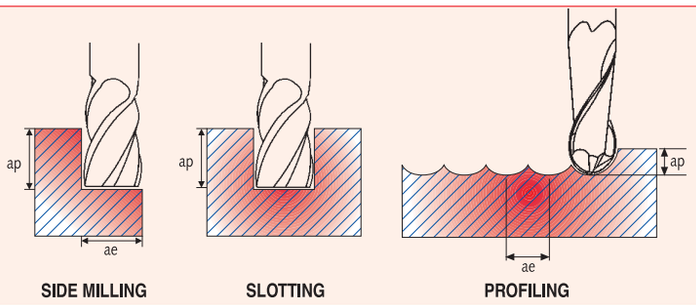
D(e8)	Reach	d	D1	L.O.C	O.A.L	ITEM No.
2.5	8	4	2.4	3.7	50	**7N2202501**
2.5	10	4	2.4	3.7	50	**7N2202511**
2.5	16	4	2.4	3.7	63	**7N2202521**
2.5	20	4	2.4	3.7	63	**7N2202531**
2.5	30	4	2.4	3.7	80	**7N2202541**
3	8	6	2.85	4.5	50	**7N2203002**
3	10	6	2.85	4.5	50	**7N2203012**
3	16	6	2.85	4.5	63	**7N2203022**
3	20	6	2.85	4.5	63	**7N2203032**
3	30	6	2.85	4.5	80	**7N2203042**



RECOMMENDED WORKING DETAILS

FORMULAS

Cutting Speed	$V_c = \frac{D \times \pi \times n}{1000}$ (m/min)	**Formula Symbols:**	
Spindle Speed	$n = \frac{V_c \times 1000}{\pi \times d}$ (1/min)	**D** (mm)	Tool diameter
Feed per Tooth	$f_z = \frac{V_f}{z \times n}$ (mm)	**z**	No. of Flutes
Table Feed	$V_f = fz \times z \times n$ (mm/min)	**V_c** (m/min)	Cutting Speed
		F_z (mm)	Feed per Tooth
		n (1/min)	Spindle Speed
		V_f (mm/min)	Table Feed
		π	3.1416



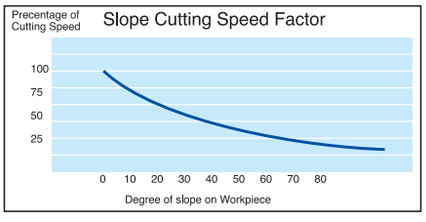
SIDE MILLING **SLOTTING** **PROFILING**

LISTS 7050 / 7150 / 7151

→ **Profiling**

Material	Rockwell Hardness	Finishing		Semi Finishing		Roughing		Vc - Cutting Speed TiAlN m/min			fz - Feed per tooth in mm D - Diameter in mm										
	HRc	ap	ae	ap	ae	ap	ae	Finishing	Semi-finishing	Roughing	2	2.5	3	4	5	6	8	10	12	16	20
Steels	<30	0.01 x D	0.01 x D	0.05 x D	0.05 x D	0.10 x D	0.10 x D	3000	1500	1000	0.050	0.060	0.080	0.120	0.150	0.200	0.200	0.220	0.240	0.260	0.300
Steels	30-40	0.01 x D	0.01 x D	0.05 x D	0.05 x D	0.10 x D	0.07 x D	2400	1200	800	0.040	0.050	0.060	0.100	0.130	0.180	0.180	0.200	0.220	0.240	0.280
Steels	40-50	0.01 x D	0.01 x D	0.05 x D	0.05 x D	0.10 x D	0.05 x D	1500	750	500	0.040	0.040	0.060	0.070	0.080	0.100	0.120	0.140	0.160	0.180	0.200
Steels	50-60	0.01 x D	0.01 x D	0.04 x D	0.04 x D	0.05 x D	0.05 x D	1200	600	400	0.030	0.030	0.040	0.050	0.050	0.060	0.070	0.070	0.080	0.090	0.100
Steels	60-70	0.01 x D	0.01 x D	0.03 x D	0.03 x D	0.05 x D	0.03 x D	900	500	300	0.020	0.020	0.030	0.040	0.040	0.050	0.060	0.060	0.070	0.080	0.080

Cutting data is for ap and ae equal 0.01D. for every 0.01D of dia. addition to ap, decrease feed per tooth by 3%.
Cutting data is for dry machining or mist cooling.
Use the diagram to determine cutting speed incase of slopes on workpiece.



LISTS 70N1 / 7060 / 7061

→ **Profiling**

Material	Rockwell Hardness	Finishing		Semi finishing		Roughing		Vc - Cutting speed TiAlN m/min			fz - Feed per tooth in mm D - Diameter in mm										
	HRc	ap	ae	ap	ae	ap	ae	Finishing	Semi-finishing	Roughing	2	2.5	3	4	5	6	8	10	12	16	20
STEELS	<30	0.01 x D	0.01 x D	0.05 x D	0.05 x D	0.10 x D	0.10 x D	3000	1500	1000	0.050	0.060	0.080	0.120	0.150	0.200	0.200	0.220	0.240	0.260	0.300
STEELS	30-40	0.01 x D	0.01 x D	0.05 x D	0.05 x D	0.10 x D	0.07 x D	2400	1200	800	0.040	0.050	0.060	0.100	0.130	0.180	0.180	0.200	0.220	0.240	0.280
STEELS	40-50	0.01 x D	0.01 x D	0.05 x D	0.05 x D	0.10 x D	0.05 x D	1500	750	500	0.040	0.040	0.060	0.070	0.080	0.100	0.120	0.140	0.160	0.180	0.200
STEELS	50-60	0.01 x D	0.01 x D	0.04 x D	0.04 x D	0.05 x D	0.05 x D	1200	600	400	0.030	0.030	0.040	0.050	0.050	0.060	0.070	0.070	0.080	0.090	0.100
STEELS	60-70	0.01 x D	0.01 x D	0.03 x D	0.03 x D	0.05 x D	0.03 x D	900	500	300	0.020	0.020	0.030	0.040	0.040	0.050	0.060	0.060	0.070	0.080	0.080

Cutting data is for ap and ae equal 0.01D. for every 0.01D of dia. addition to ap, decrease feed per tooth by 3%.
Cutting data is for dry machining or mist cooling.
Use the diagram to determine cutting speed incase of slopes on workpiece.

LIST 75N2

→ **Conventional milling**

Material	Rockwell Hardness	Application			Vc-Cutting Speed m/min	f z- feed per tooth in mm D-Diameter in mm				
		Side Milling		Slotting						
	HRc	ap	ae	ap	TiAlN	4	6	8	10	12
Steels	<45	1xD	0.05xD	~1xD	220	0.019	0.028	0.033	0.035	0.041
Steels	45-55	1xD	0.05xD	~0.05xD	120-180	0.019	0.028	0.033	0.035	0.041
Steels	55-60	1xD	0.05xD	~0.05xD	80-120	0.017	0.025	0.030	0.032	0.038
Steels	60-65	1xD	~0.2 mm	~0.05xD	50-80	0.016	0.024	0.029	0.031	0.036
Steels	65-70	1xD	~0.2 mm	~0.05xD	20-50	0.015	0.023	0.028	0.031	0.035

→ **HSM milling**

Material	Rockwell Hardness	Application			Cutting Speed m/min	f z- feed per tooth in mm D-Diameter in mm				
		Side Milling		Slotting						
	HRc	ap	ae	ap	TiAlN	4	6	8	10	12
Steels	45-55	1xD	0.05xD	~0.05xD	~300	0.041	0.061	0.081	0.100	0.11
Steels	55-60	1xD	0.5 mm	~0.05xD	~150	0.040	0.060	0.080	0.098	0.10
Steels	60-65	1xD	0.2 mm	~0.05xD	~75	0.038	0.058	0.078	0.095	0.10

VISION PLUS

RECOMMENDED WORKING DETAILS

LIST 75N8

Conventional milling

Material	Rockwell Hardness	Application			Vc-Cutting Speed m/min	fz- feed per tooth in mm D-Diameter in mm				
		Side Milling		Slotting						
	HRc	ap	ae	ap	TiAlN	4	6	8	10	12
Steels	45-55	1xD	0.05xD	~0.05xD	120-180	0.019	0.028	0.033	0.035	0.041
Steels	55-60	1xD	0.05xD	~0.05xD	80-120	0.017	0.025	0.030	0.032	0.038
Steels	60-65	1xD	~0.2 mm	~0.05xD	50-80	0.016	0.024	0.029	0.031	0.036
Steels	65-70	1xD	~0.2 mm	~0.05xD	20-50	0.015	0.023	0.028	0.031	0.035

HSM milling

Material	Rockwell Hardness	Application			Vc-Cutting Speed m/min	fz- feed per tooth in mm D-Diameter in mm				
		Side Milling		Slotting						
	HRc	ap	ae	ap	TiAlN	4	6	8	10	12
Steels	45-55	1xD	0.05xD	~0.05xD	~300	0.041	0.061	0.081	0.100	0.11
Steels	55-60	1xD	0.5 mm	~0.05xD	~150	0.040	0.060	0.080	0.098	0.10
Steels	60-65	1xD	0.2 mm	~0.05xD	~75	0.038	0.058	0.078	0.095	0.10

LISTS 7505 / 7585 / 75N5

Roughing

Material	Rockwell Hardness	Application			Vc-Cutting Speed m/min	fz- feed per tooth in mm D-Diameter in mm							
		Side Milling		Slotting									
	HRc	ap	ae	ap	TiAlN	3	6	8	10	12	16	20	25
Steels	< 30	1 x D	0.2 x D	0.5 x D	200	0.040	0.055	0.070	0.090	0.110	0.150	0.180	0.200
Steels	30-40	1 x D	0.2 x D	0.5 x D	180	0.030	0.050	0.060	0.085	0.100	0.140	0.170	0.190
Steels	40-45	1 x D	0.2 x D	0.5 x D	160	0.025	0.040	0.055	0.070	0.080	0.110	0.130	0.170
Steels	45-50	1 x D	0.2 x D	0.5 x D	120	0.020	0.030	0.045	0.055	0.070	0.090	0.110	0.140
Steels	50-55	1 x D	0.2 x D	0.5 x D	80	0.015	0.020	0.030	0.040	0.045	0.060	0.075	0.090
Steels	> 55	1 x D	0.2 x D	0.25 x D	70	0.010	0.015	0.020	0.030	0.035	0.050	0.060	0.070

Finishing

Material	Rockwell Hardness	Application		Vc-Cutting Speed m/min	fz- feed per tooth in mm D-Diameter in mm							
		Side Milling										
	HRc	ap	ae	TiAlN	3	6	8	10	12	16	20	25
Steels	< 30	1.5 x D	0.1 x D	200	0.040	0.055	0.070	0.090	0.110	0.150	0.180	0.200
Steels	30-40	1.5 x D	0.1 x D	180	0.030	0.050	0.060	0.085	0.100	0.140	0.170	0.190
Steels	40-45	1.5 x D	0.1 x D	160	0.025	0.040	0.055	0.070	0.080	0.110	0.130	0.170
Steels	45-50	1.5 x D	0.1 x D	120	0.020	0.030	0.045	0.055	0.070	0.090	0.110	0.140
Steels	50-55	1.5 x D	0.1 x D	80	0.015	0.020	0.030	0.040	0.045	0.060	0.075	0.090
Steels	> 55	1.5 x D	0.1 x D	70	0.010	0.015	0.020	0.030	0.035	0.050	0.060	0.070

LISTS 7515 / 7525

Roughing

Material	Rockwell Hardness	Application			Vc-Cutting Speed m/min	fz- feed per tooth in mm D-Diameter in mm							
		Side Milling		Slotting									
	HRc	ap	ae	ap	TiAlN	3	6	8	10	12	16	20	25
Steels	< 30	1 x D	0.2 x D	0.5 x D	200	0.040	0.055	0.070	0.090	0.110	0.150	0.180	0.200
Steels	30-40	1 x D	0.2 x D	0.5 x D	180	0.030	0.050	0.060	0.085	0.100	0.140	0.170	0.190
Steels	40-45	1 x D	0.2 x D	0.5 x D	160	0.025	0.040	0.055	0.070	0.080	0.110	0.130	0.170
Steels	45-50	1 x D	0.2 x D	0.5 x D	120	0.020	0.030	0.045	0.055	0.070	0.090	0.110	0.140
Steels	50-55	1 x D	0.2 x D	0.5 x D	80	0.015	0.020	0.030	0.040	0.045	0.060	0.075	0.090
Steels	> 55	1 x D	0.2 x D	0.25 x D	70	0.010	0.015	0.020	0.030	0.035	0.050	0.060	0.070

Finishing

Material	Rockwell Hardness	Application		Vc-Cutting Speed m/min	fz- feed per tooth in mm D-Diameter in mm							
		Side Milling										
	HRc	ap	ae	TiAlN	3	6	8	10	12	16	20	25
Steels	< 30	3,5 x D	0.1 x D	200	0.040	0.055	0.070	0.090	0.110	0.150	0.180	0.200
Steels	30-40	3,5 x D	0.1 x D	180	0.030	0.050	0.060	0.085	0.100	0.140	0.170	0.190
Steels	40-45	3,5 x D	0.1 x D	160	0.025	0.040	0.055	0.070	0.080	0.110	0.130	0.170
Steels	45-50	3,5 x D	0.1 x D	120	0.020	0.030	0.045	0.055	0.070	0.090	0.110	0.140
Steels	50-55	3.5 x D	0.1 x D	80	0.015	0.020	0.030	0.040	0.045	0.060	0.075	0.090
Steels	> 55	3.5 x D	0.1 x D	70	0.010	0.015	0.020	0.030	0.035	0.050	0.060	0.070

LISTS 7545 / 7595

→ **Roughing**

Material	Rockwell Hardness	Application			Vc-Cutting Speed	fz- feed per tooth in mm D-Diameter in mm							
		Side Milling		Slotting	m/min								
	HRc	ap	ae	ap	TiAlN	3	6	8	10	12	16	20	25
Steels	< 30	1 x D	0.4 x D	1 x D	200	0.040	0.055	0.070	0.090	0.110	0.150	0.180	0.200
Steels	30-40	1 x D	0.4 x D	0.75 x D	180	0.030	0.050	0.060	0.085	0.100	0.140	0.170	0.190
Steels	40-45	1 x D	0.4 x D	0.75 x D	160	0.025	0.040	0.055	0.070	0.080	0.110	0.130	0.170
Steels	45-50	0.8 x D	2.5 x D	0.5 x D	120	0.020	0.030	0.045	0.055	0.070	0.090	0.110	0.140
Steels	50-55	0.75 x D	2.5 x D	0.5 x D	80	0.015	0.020	0.030	0.040	0.045	0.060	0.075	0.090
Steels	> 55	0.75 x D	2.5 x D	0.4 x D	70	0.010	0.015	0.020	0.030	0.035	0.050	0.060	0.070

→ **Finishing**

Material	Rockwell Hardness	Application		Vc-Cutting Speed	fz- feed per tooth in mm D-Diameter in mm							
		Side Milling		m/min								
	HRc	ap	ae	TiAlN	3	6	8	10	12	16	20	25
Steels	< 30	1.5 x D	0.1 x D	200	0.040	0.055	0.070	0.090	0.110	0.150	0.180	0.200
Steels	30-40	1.5 x D	0.1 x D	180	0.030	0.050	0.060	0.085	0.100	0.140	0.170	0.190
Steels	40-45	1.5 x D	0.1 x D	160	0.025	0.040	0.055	0.070	0.080	0.110	0.130	0.170
Steels	45-50	1.5 x D	0.1 x D	120	0.020	0.030	0.045	0.055	0.070	0.090	0.110	0.140
Steels	50-55	1.5 x D	0.1 x D	80	0.015	0.020	0.030	0.040	0.045	0.060	0.075	0.090
Steels	> 55	1.5 x D	0.1 x D	70	0.010	0.015	0.020	0.030	0.035	0.050	0.060	0.070

LIST 7670

Material	Rockwell Hardness	Application			Vc-Cutting Speed	fz- feed per tooth in mm D-Diameter in mm								
		Side Milling		Slotting	m/min									
	HRc	ap	ae	ap	TiAlN	4	5	6	8	10	12	16	20	25
Steels	<30	0.8 x D	0.5 x D	0.8 x D	180	0.020	0.025	0.030	0.040	0.050	0.060	0.080	0.100	0.120
Steels	30-40	0.8 x D	0.4 x D	0.8 x D	120	0.015	0.020	0.025	0.030	0.040	0.045	0.060	0.080	0.100
Steels	40-50	0.8 x D	0.4 x D	0.5 x D	80	0.010	0.015	0.020	0.025	0.030	0.040	0.050	0.060	0.070
Steels	50-60	0.8 x D	0.25 x D	0.3 x D	60	0.007	0.008	0.010	0.015	0.020	0.025	0.030	0.040	0.045
Steels	60-70	0.8 x D	0.2 x D	0.25 x D	40	0.006	0.007	0.010	0.010	0.015	0.020	0.025	0.030	0.035

For slotting: multiply by 0.8 the feed per tooth (fz) in the table.

LIST 7N01

Material	Rockwell Hardness	Application			Vc-Cutting Speed	fz- Feed Per Tooth in mm D- Diameter in mm								
		Side milling		Slotting	m/min									
	HRc	ae	ap	ap	TiAlN	0.3	0.4	0.5	0.6	0.8	1	1.5	2	3
Steel	~30	0.2xD	0.05xD	~0.1xD	40~150	0.0075	0.0088	0.010	0.011	0.013	0.015	0.022	0.030	0.032
Steel	30~40	0.2xD	0.05xD	~0.1xD	40~120	0.0070	0.0080	0.009	0.010	0.012	0.013	0.020	0.025	0.030
Steel	40~55	0.2xD	0.05xD	~0.1xD	40~100	0.0035	0.0047	0.006	0.007	0.010	0.012	0.015	0.020	0.025
Steel	55~60	0.2xD	0.05xD	~0.1xD	40~60	0.0020	0.0035	0.005	0.006	0.008	0.010	0.014	0.018	0.022

if D<1.0mm ap= 0.05D
D>1.0mm ap= 0.1D
>45HRC ap= 0.05D

LISTS 7N02 / 7N12 / 7N22

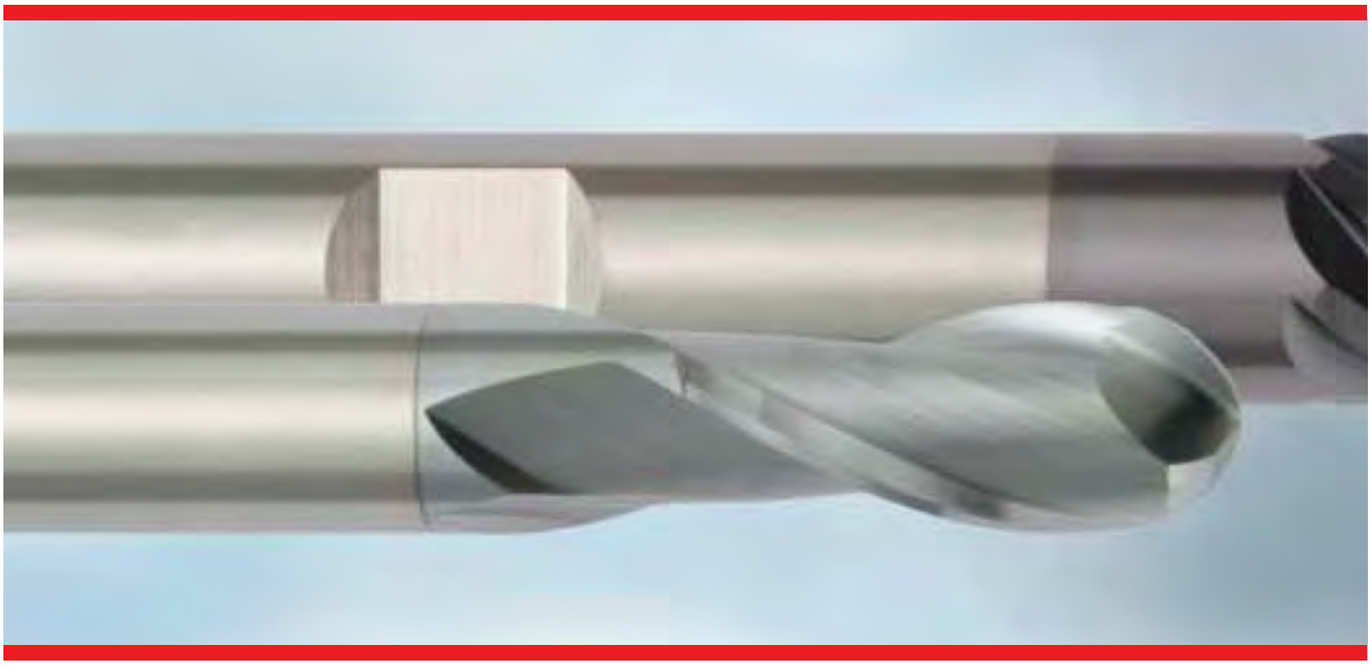
Material	Rockwell Hardness	Application			Vc-Cutting Speed	fz- Feed Per Tooth in mm D- Diameter in mm								
		Side milling		Slotting	m/min									
	HRc	ae	ap	ap	TiAlN	0.3	0.4	0.5	0.6	0.8	1	1.5	2	3
Steel	~30	0.2xD	0.5xD-D	0.1xD	40~80	0.0026	0.0035	0.0045	0.0050	0.007	0.008	0.013	0.018	0.023
Steel	30~40	0.2xD	0.5xD-D	0.1xD	40~70	0.0020	0.0030	0.0037	0.0047	0.006	0.007	0.012	0.015	0.020
Steel	40~55	0.2xD	0.5xD-D	0.02xD	30~50	0.0014	0.0019	0.0025	0.0029	0.035	0.045	0.007	0.009	0.010
Steel	55~60	0.2xD	0.5xD-D	0.01xD	15~30	0.0011	0.0014	0.0017	0.0019	0.0025	0.003	0.005	0.0068	0.0082

if D<1.0mm ap= 0.1D
D>1.0mm ap= 0.3D

For list 7N22 reduce cutting speed and feed by 20~30%

NOTE
Data shown is the result of actual machining tests and is suggested as a starting point.
Do sensitivity analyses to achieve optimum results.
The tests were run on an optimal machining environment.

CARBIDE FINISHERS



Hanita's wide range of carbide finishing end mills, ranging from conventional geometries for general machining situations or ultra high performance styles for very specific applications, provides the right tool for the job at hand.

Only the finest carbide substrate materials, with the proper microstructure are used, to assure appropriate hardness, toughness and stability, combined with focused geometries, fully compliant with DIN, JIS, or NAS specifications, targeted at delivering superior productivity for the applications they were meant to serve and our high quality, in-house PVD coatings.

Hanita carbide end mills deliver superior performance, reliably and consistently, from tool to tool.

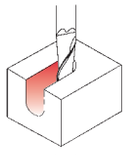
- Available as standard in 2, 3, 4 and 6 flute styles.
- special designs with higher # of flutes for super finishing applications.
- many helix choices for specific applications.
- stub, regular, long and extra lengths.
- TiN, TiCN and TiAlN Coatings.
- Specific geometries targeted for Aluminium, Stainless Steel, High Temperature Alloys , Titanium, Soft, Hardened and Ultra Hard Steels.

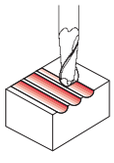
2 FLUTES BALL NOSE
LISTS 4001 / 4011 / 4021

for 3D Milling and Deep Slotting

CARBIDE · 30° · HANITA Standard

Uncoated ••
TiN TT*
TiCN CT
TiAlN RT
*only for List 4001

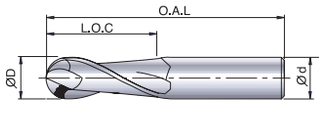




ST>45 HRc
30<ST<45 HRc
30>ST HRc
GRAPHITE
GENERAL PURPOSE

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
1	3	4	38	2	400101000
1.5	3	5	38	2	400101500
2	3	6.3	38	2	400102000
3	3	9.5	38	2	400103002
3	3	25	75	2	402103000
4	4	12	50	2	400104002
4	4	19	63	2	401104001
4	4	31	75	2	402104001
5	6	14	50	2	400105002
5	5	20	63	2	401105001
5	5	31	100	2	402105001
6	6	16	50	2	400106002
6	6	28	76	2	401106002
6	6	38	100	2	402106002
8	8	20	63	2	400108003
8	8	28	76	2	401108003
8	8	41	100	2	402108003
10	10	22	76	2	400110004
10	10	32	89	2	401110004
10	10	45	100	2	402110004
12	12	25	76	2	400112005
12	12	45	100	2	401112005
12	12	75	150	2	402112005
14	14	32	83	2	400114014
14	14	50	100	2	401114014
14	14	75	150	2	402114014
16	16	32	89	2	400116006
16	16	56	110	2	401116006
16	16	75	150	2	402116006
18	18	38	100	2	400118007
18	18	75	150	2	402118018
20	20	38	104	2	400120007
20	20	56	125	2	401120007
20	20	75	150	2	402120007

Weldon Shank upon request

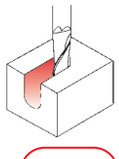


2 FLUTES BALL NOSE | LONG SHANK
LIST 4001 JJ

for Deep 3D Milling

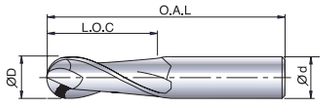
CARBIDE · 30° · JIS Standard

Uncoated JJ
TiAlN RJ



30<ST<45 HRc
30>ST HRc
GRAPHITE
GENERAL PURPOSE

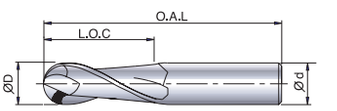
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	9.5	58	2	400103002
4	6	12	76	2	400104002
5	6	14	76	2	400105002
6	6	16	100	2	400106002
8	8	20	100	2	400108003
10	10	22	100	2	400110004
12	12	25	125	2	400112005
14	14	32	125	2	400114005
16	16	32	150	2	400116006
18	16	38	150	2	400118006
20	20	38	150	2	400120007



for 3D Milling

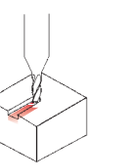
2 FLUTES BALL NOSE | MICRO
LIST 4651

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
1	3	2	38	2	465101000
1.2	3	2	38	2	465101200
1.5	3	2	38	2	465101500
1.8	3	2	38	2	465101800
2	3	2	38	2	465102000



CARBIDE | 30° | HANITA Standard

Uncoated ••
TiCN CT
TiAlN RT

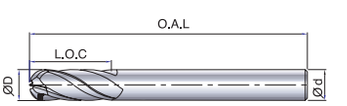


GENERAL PURPOSE

for 3D Milling

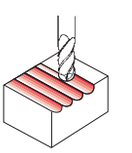
4 FLUTES BALL NOSE
LISTS 4000 / 4010

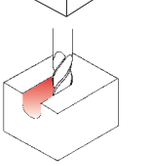
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	3	9.5	38	4	400003002
4	4	12	50	4	400004002
4	4	19	63	4	401004001
5	6	14	50	4	400005002
5	5	20	63	4	401005001
6	6	16	50	4	400006002
6	6	28	76	4	401006002
8	8	20	63	4	400008003
8	8	28	76	4	401008003
10	10	22	76	4	400010004
10	10	32	89	4	401010004
12	12	25	76	4	400012005
12	12	45	100	4	401012005
14	14	32	83	4	400014014
14	14	50	100	4	401014014
16	16	32	89	4	400016006
16	16	56	110	4	401016006
18	18	38	100	4	400018007
20	20	38	104	4	400020007
20	20	56	125	4	401020007



CARBIDE | 30° | HANITA Standard

Uncoated ••
TiN TT
TiCN CT
TiAlN RT





ST>45 HRc
30<ST<45 HRc
30>ST HRc
GENERAL PURPOSE

CARBIDE FINISHERS

2 FLUTES SQUARE END

for Slotting

LISTS 4002 / 4012 / 4022

CARBIDE

30°

HANITA Standard

Uncoated ••

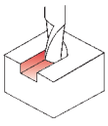
TiN TT*

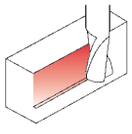
Z-Coat ZT*

TiCN CT

TiAlN RT

* only for list 4002





ST>45 HRc

30<ST<45 HRc

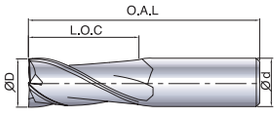
30>ST HRc

GRAPHITE

GENERAL PURPOSE

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
1	3	4	38	2	400201000
1.5	3	4	38	2	400201500
2	3	6.3	38	2	400202000
2.5	3	6.3	38	2	400202500
3	3	9.5	38	2	400203000
3	3	19	63	2	401203000
3	3	25	75	2	402203000
3.5	4	12	50	2	400203501
4	4	12	50	2	400204001
4	4	19	63	2	401204001
4	4	31	75	2	402204001
4.5	6	14	50	2	400204502
5	6	14	50	2	400205002
5	5	20	63	2	401205001
5	5	31	100	2	402205001
5.5	6	14	50	2	400205502
6	6	16	50	2	400206002
6	6	28	76	2	401206002
6	6	38	100	2	402206002
7	7	20	63	2	400207003
8	8	20	63	2	400208003
8	8	28	76	2	401208003
8	8	41	100	2	402208003
9	9	20	63	2	400209004
10	10	22	76	2	400210004
10	10	32	89	2	401210004
10	10	45	100	2	402210004
11	11	25	76	2	400211005
12	12	25	76	2	400212005
12	12	45	100	2	401212005
12	12	75	150	2	402212005
14	14	32	83	2	400214014
14	14	50	100	2	401214014
14	14	75	150	2	402214014
16	16	32	89	2	400216006
16	16	56	110	2	401216006
16	16	75	150	2	402216006
18	18	38	100	2	400218007
18	18	60	125	2	401218018
18	18	75	150	2	402218018
20	20	38	104	2	400220007
20	20	56	125	2	401220007
20	20	75	150	2	402220007
25	25	62	140	2	401225008

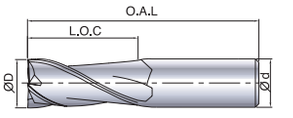
Weldon Shank upon request



for Slotting Aluminium

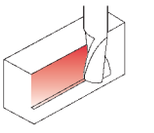
2 FLUTES SQUARE END | HIGH HELIX
LIST 4102

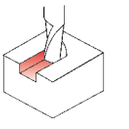
D(h6)	d	L.O.C	O.A.L	Z	ITEM No.
1.5	3	6	38	2	410201500
2	3	8	38	2	410202000
2.5	3	9	38	2	410202500
3	3	12	38	2	410203000
4	4	12	50	2	410204001
5	5	14	50	2	410205001
5	6	14	50	2	410205002
6	6	16	50	2	410206002
8	8	20	63	2	410208003
10	10	22	76	2	410210004
12	12	25	76	2	410212005
14	14	32	83	2	410214014
16	16	32	89	2	410216006
18	18	38	100	2	410218018
20	20	38	104	2	410220007



CARBIDE | 45° | HANITA Standard

Uncoated ••
TiCN CT
TiAlN RT



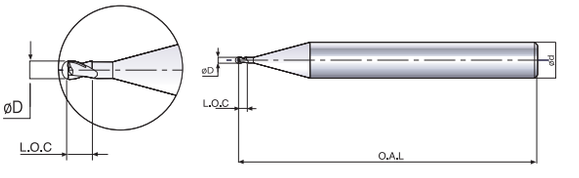


NF
Al
AlSi

for Slotting and Side Milling

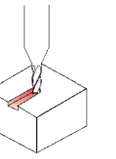
2 FLUTES SQUARE END | MICRO
LIST 4632

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
0.4	3	1.5	38	2	463200400
0.5	3	1.5	38	2	463200500
0.6	3	1.5	38	2	463200600
0.8	3	1.5	38	2	463200800
1	3	2	38	2	463201000
1.5	3	2	38	2	463201500



CARBIDE | 30° | HANITA Standard

Uncoated ••
TiCN CT
TiAlN RT



GENERAL PURPOSE

CARBIDE FINISHERS

3 FLUTES SQUARE END
LISTS 4003 / 4013

for Slotting and Side Milling

CARBIDE

37°

HANITA Standard

Uncoated ••

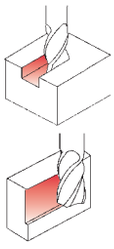
TiN TT*

Z-Coat ZT*

TiCN CT

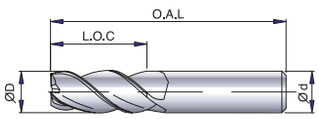
TiAlN RT

* only for list 4003



GENERAL PURPOSE

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
1	3	4	38	3	400301000
1.5	3	4	38	3	400301500
2	3	6.3	38	3	400302000
2.5	3	6.3	38	3	400302500
3	3	9.5	38	3	400303000
3	3	19	63	3	401303000
3.5	4	12	50	3	400303501
4	4	12	50	3	400304001
4	4	19	63	3	401304001
4.5	6	14	50	3	400304502
5	6	14	50	3	400305002
5	5	20	63	3	401305001
6	6	16	50	3	400306002
6	6	28	76	3	401306002
7	7	20	63	3	400307003
8	8	20	63	3	400308003
8	8	28	76	3	401308003
9	9	20	63	3	400309004
10	10	22	76	3	400310004
10	10	32	89	3	401310004
11	11	25	76	3	400311005
12	12	25	76	3	400312005
12	12	45	100	3	401312005
14	14	32	83	3	400314014
16	16	32	89	3	400316006
16	16	56	110	3	401316006
18	18	38	100	3	400318007
20	20	38	104	3	400320007
20	20	56	125	3	401320007
25	25	62	140	3	401325008

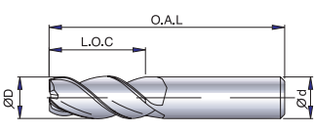


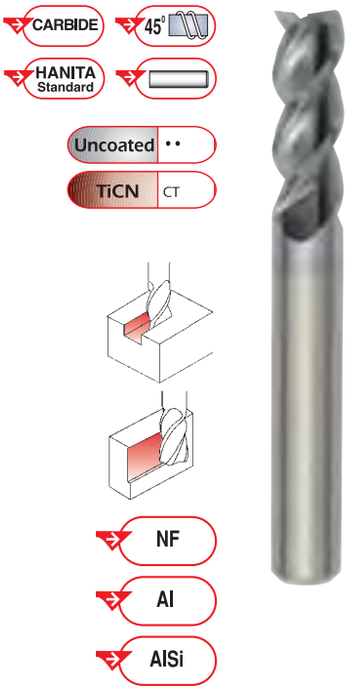
for Slotting and Side Milling Aluminium

3 FLUTES SQUARE END | HIGH HELIX

LIST 4103

D(h6)	d	L.O.C	O.A.L	Z	ITEM No.
3	3	12	38	3	410303000
4	4	12	50	3	410304001
5	5	14	50	3	410305001
6	6	16	50	3	410306002
8	8	20	63	3	410308003
10	10	22	76	3	410310004
12	12	25	76	3	410312005
14	14	32	83	3	410314014
16	16	32	89	3	410316006
18	18	38	100	3	410318018
20	20	38	104	3	410320007



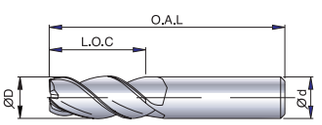


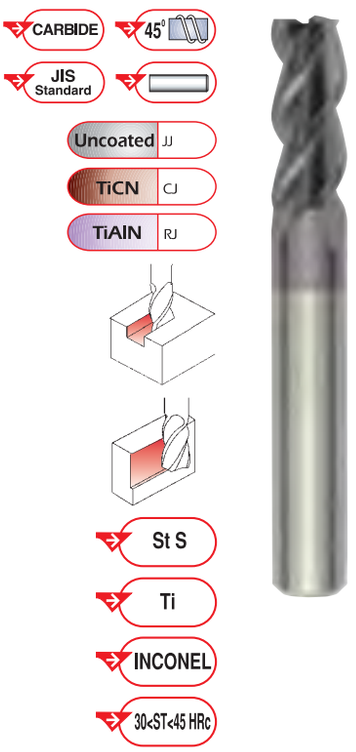
for Deep Slotting and Peripheral Finishing Operation

3 FLUTES SQUARE END | HIGH HELIX | LONG SHANK

LIST 4503 JJ

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
1	4	3	50	3	450301001
1.5	4	3	50	3	450301501
2	4	3	50	3	450302001
2.5	4	4	50	3	450302501
2.5	4	5	50	3	450302511
3	6	8	50	3	450303002
3.5	6	12	50	3	450303502
4	6	12	50	3	450304002
4.5	6	14	50	3	450304502
5	6	14	50	3	450305002
6	6	16	50	3	450306002
8	8	20	63	3	450308003
10	10	22	76	3	450310004
12	12	25	76	3	450312005
16	16	32	89	3	450316006
20	20	38	104	3	450320007



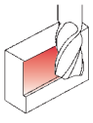


3 FLUTES SQUARE END | HIGH HELIX

for Peripheral Finishing Operation

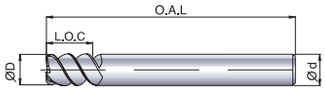
LIST 4603

CARBIDE | 60° | HANITA Standard | Uncoated •• | TiAlN RT



St S | Ti | INCONEL

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	8	57	3	460303002
4	6	11	57	3	460304002
5	6	13	57	3	460305002
6	6	13	57	3	460306002
8	8	19	63	3	460308003
10	10	22	72	3	460310004
12	12	26	83	3	460312005
16	16	32	92	3	460316006
20	20	38	104	3	460320007

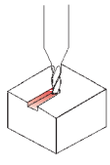


3 FLUTES SQUARE END | MICRO

for Slotting and Side Milling

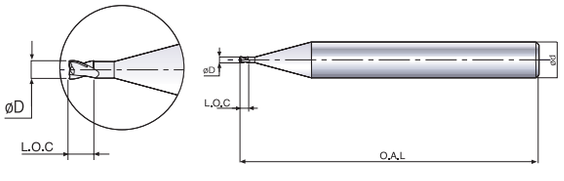
LIST 4633

CARBIDE | 30° | HANITA Standard | Uncoated •• | TiCN CT | TiAlN RT



GENERAL PURPOSE

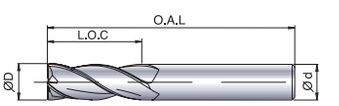
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
0.4	3	1.5	38	3	463300400
0.5	3	1.5	38	3	463300500
0.6	3	1.5	38	3	463300600
0.8	3	1.5	38	3	463300800
1	3	2	38	3	463301000
1.2	3	2	38	3	463301200
1.5	3	2	38	3	463301500
1.8	3	2	38	3	463301800



4 FLUTES SQUARE END
LISTS 4004 / 4014 / 4024

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
1	3	4	38	4	400401000
1.5	3	4	38	4	400401500
2	3	6.3	38	4	400402000
2.5	3	6.3	38	4	400402500
3	3	9.5	38	4	400403000
3	3	19	63	4	401403000
3	3	25	75	4	402403000
3.5	4	12	50	4	400403501
4	4	12	50	4	400404001
4	4	19	63	4	401404001
4	4	31	75	4	402404001
4.5	6	14	50	4	400404502
5	5	14	50	4	400405001
5	6	14	50	4	400405002
5	5	20	63	4	401405001
5	5	31	100	4	402405001
5.5	6	14	50	4	400405502
6	6	16	50	4	400406002
6	6	28	76	4	401406002
6	6	38	100	4	402406002
7	7	20	63	4	400407003
8	8	20	63	4	400408003
8	8	28	76	4	401408003
8	8	41	100	4	402408003
9	9	20	63	4	400409004
10	10	22	76	4	400410004
10	10	32	89	4	401410004
10	10	45	100	4	402410004
11	11	25	76	4	400411005
12	12	25	76	4	400412005
12	12	45	100	4	401412005
12	12	75	150	4	402412005
14	14	32	83	4	400414014
14	14	50	100	4	401414014
14	14	75	150	4	402414014
16	16	32	89	4	400416006
16	16	56	110	4	401416006
16	16	75	150	4	402416006
18	18	38	100	4	400418007
18	18	60	125	4	401418018
18	18	75	150	4	402418018
20	20	38	104	4	400420007
20	20	56	125	4	401420007
20	20	75	150	4	402420007
25	25	62	140	4	401425008

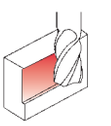
Weldon Shank upon request



CARBIDE | 30° | HANITA Standard

Uncoated **
TiN TT**
Z-Coat ZT *
TiCN CT
TiAlN RT

* only for list 4004
** only for lists 4004/14



GENERAL PURPOSE

2 FLUTES BALL NOSE
LISTS D001 / D011

for 3D Milling

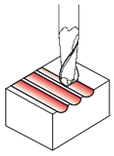
CARBIDE | 30°

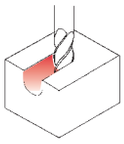
DIN 6527 Standard

Uncoated WW

TiCN CW

TiAlN RW





ST>45 HRc

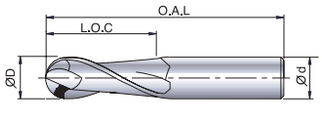
30<ST<45 HRc

30>ST HRc

GRAPHITE

GENERAL PURPOSE

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	4	50	2	D00103002
3	6	7	57	2	D01103002
4	6	5	54	2	D00104002
4	6	8	57	2	D01104002
5	6	6	54	2	D00105002
5	6	10	57	2	D01105002
6	6	7	54	2	D00106002
6	6	10	57	2	D01106002
8	8	9	58	2	D00108003
8	8	16	63	2	D01108003
10	10	11	66	2	D00110004
10	10	19	72	2	D01110004
12	12	12	73	2	D00112005
12	12	22	83	2	D01112005
14	14	14	75	2	D00114014
14	14	22	83	2	D01114014
16	16	16	82	2	D00116006
16	16	26	92	2	D01116006
18	18	18	84	2	D00118018
18	18	26	92	2	D01118018
20	20	20	92	2	D00120007
20	20	32	104	2	D01120007



2 FLUTES BALL NOSE
LIST D501

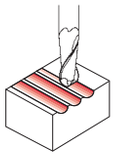
for 3D Milling at High Speed Machining

CARBIDE | 30°

DIN 6527 Standard

Uncoated ••

TiAlN RT



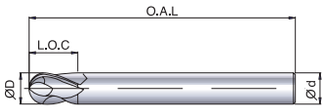
ST>45 HRc

30<ST<45 HRc

GRAPHITE

Al

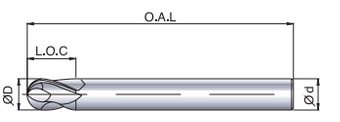
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
2	6	4	50	2	D50102002
3	6	4	50	2	D50103002
4	6	5	54	2	D50104002
5	6	6	54	2	D50105002
6	6	7	54	2	D50106002
8	8	9	58	2	D50108003
10	10	11	66	2	D50110004
12	12	12	73	2	D50112005
14	14	14	75	2	D50114014
16	16	16	82	2	D50116006
18	18	18	84	2	D50118018
20	20	20	92	2	D50120007

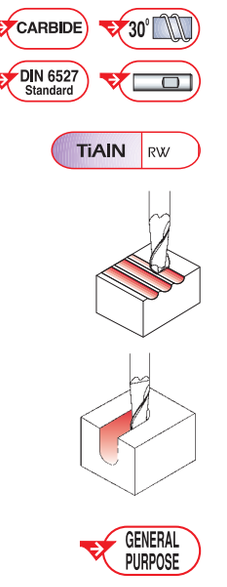


for Deep 3D Milling

3 FLUTES BALL NOSE | LONG TYPE
LIST D009

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	7	57	3	D00903002
4	6	8	57	3	D00904002
5	6	10	57	3	D00905002
6	6	10	57	3	D00906002
8	8	16	63	3	D00908003
10	10	19	72	3	D00910004
12	12	22	83	3	D00912005
14	14	22	83	3	D00914014
16	16	26	92	3	D00916006
18	18	26	92	3	D00918018
20	`20	32	104	3	D00920007



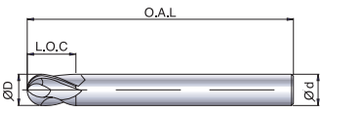


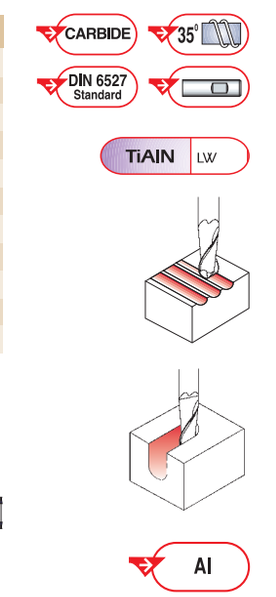
CARBIDE FINISHERS

for 3D Milling

3 FLUTES BALL NOSE | LONG TYPE
LIST DC19

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	7	57	3	DC1903002
4	6	8	57	3	DC1904002
5	6	10	57	3	DC1905002
6	6	10	57	3	DC1906002
8	8	16	63	3	DC1908003
10	10	19	72	3	DC1910004
12	12	22	83	3	DC1912005
14	14	22	83	3	DC1914014
16	16	26	92	3	DC1916006
18	18	26	92	3	DC1918018
20	20	32	104	3	DC1920007





4 FLUTES BALL NOSE
LISTS D000 / D010

for 3D Milling

CARBIDE

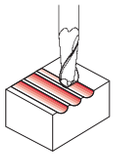
30°

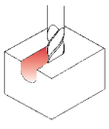
DIN 6527 Standard

Uncoated WW

TiCN CW

TiAlN RW





ST>45 HRc

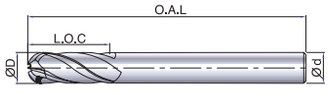
30<ST<45 HRc

30>ST HRc

GRAPHITE

GENERAL PURPOSE

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	5	50	4	D00003002
3	6	8	57	4	D01003002
4	6	8	54	4	D00004002
4	6	11	57	4	D01004002
5	6	9	54	4	D00005002
5	6	13	57	4	D01005002
6	6	10	54	4	D00006002
6	6	13	57	4	D01006002
8	8	12	58	4	D00008003
8	8	19	63	4	D01008003
10	10	14	66	4	D00010004
10	10	22	72	4	D01010004
12	12	16	73	4	D00012005
12	12	26	83	4	D01012005
14	14	18	75	4	D00014014
14	14	26	83	4	D01014014
16	16	22	82	4	D00016006
16	16	32	92	4	D01016006
18	18	24	84	4	D00018018
18	18	32	92	4	D01018018
20	20	26	92	4	D00020007
20	20	38	104	4	D01020007



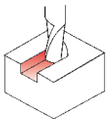
for Deep Slotting

2 FLUTES SQUARE END
LISTS D002 / D012

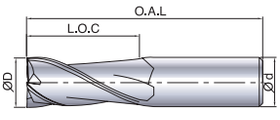
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
2	6	3	50	2	**D00202002**
2	6	6	53	2	**D01202002**
2.5	6	3	50	2	**D00202502**
2.5	6	6	53	2	**D01202502**
2.8	6	7	57	2	**D01202802**
3	6	4	50	2	**D00203002**
3	6	7	57	2	**D01203002**
3.5	6	7	57	2	**D01203502**
3.8	6	8	57	2	**D01203802**
4	6	5	54	2	**D00204002**
4	6	8	57	2	**D01204002**
4.5	6	8	57	2	**D01204502**
4.8	6	10	57	2	**D01204802**
5	6	6	54	2	**D00205002**
5	6	10	57	2	**D01205002**
5.5	6	10	57	2	**D01205502**
5.75	6	10	57	2	**D01205752**
6	6	7	54	2	**D00206002**
6	6	10	57	2	**D01206002**
6.5	8	13	63	2	**D01206503**
6.75	8	13	63	2	**D01206753**
7	8	8	58	2	**D00207003**
7	8	13	63	2	**D01207003**
7.75	8	16	63	2	**D01207753**
8	8	9	58	2	**D00208003**
8	8	16	63	2	**D01208003**
8.7	10	16	72	2	**D01208704**
9	10	10	66	2	**D00209004**
9	10	16	72	2	**D01209004**
9.7	10	19	72	2	**D01209704**
10	10	11	66	2	**D00210004**
10	10	19	72	2	**D01210004**
11.7	12	22	83	2	**D01211705**
12	12	12	73	2	**D00212005**
12	12	22	83	2	**D01212005**
14	14	14	75	2	**D00214014**
14	14	22	83	2	**D01214014**
16	16	16	82	2	**D00216006**
16	16	26	92	2	**D01216006**
18	18	18	84	2	**D00218018**
18	18	26	92	2	**D01218018**
20	20	20	92	2	**D00220007**
20	20	32	104	2	**D01220007**

CARBIDE
30°
DIN 6527 Standard

Uncoated WW
TiCN CW
TiAlN RW



ST>45 HRc
30<ST<45 HRc
30>ST HRc
GRAPHITE
GENERAL PURPOSE



CARBIDE FINISHERS

2 FLUTES SQUARE END
LIST D502

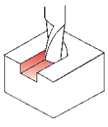
for Slotting and Side Milling
at High Speed Machining

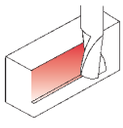
CARBIDE | 30°

DIN 6527 Standard

Uncoated

TiAlN | RT





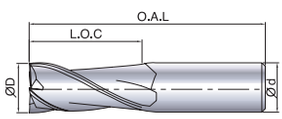
Al

AlSi

NF

GRAPHITE

D(h6)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	4	50	2	**D50203002**
4	6	5	54	2	**D50204002**
5	6	6	54	2	**D50205002**
6	6	7	54	2	**D50206002**
8	8	9	58	2	**D50208003**
10	10	11	66	2	**D50210004**
12	12	12	73	2	**D50212005**
14	14	14	75	2	**D50214014**
16	16	16	82	2	**D50216006**
18	18	18	84	2	**D50218018**
20	20	20	92	2	**D50220007**



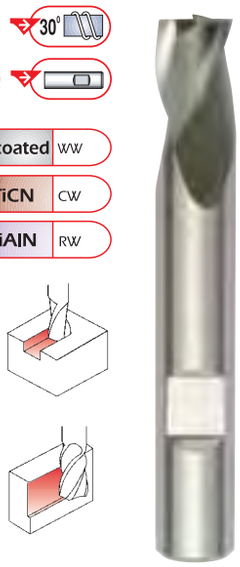
for Slotting and Side Milling

3 FLUTES SQUARE END
LISTS D003 / D013

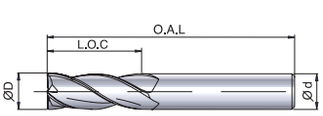
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
2	6	3	50	3	**D00302002**
2	6	6	53	3	**D01302002**
2.5	6	3	50	3	**D00302502**
2.5	6	6	53	3	**D01302502**
3	6	4	50	3	**D00303002**
3	6	7	57	3	**D01303002**
3.5	6	4	50	3	**D00303502**
3.5	6	7	57	3	**D01303502**
4	6	5	54	3	**D00304002**
4	6	8	57	3	**D01304002**
4.5	6	5	54	3	**D00304502**
4.5	6	8	57	3	**D01304502**
5	6	6	54	3	**D00305002**
5	6	10	57	3	**D01305002**
5.5	6	7	54	3	**D00305502**
5.5	6	10	57	3	**D01305502**
6	6	7	54	3	**D00306002**
6	6	10	57	3	**D01306002**
6.5	8	13	63	3	**D01306503**
7	8	8	58	3	**D00307003**
7	8	13	63	3	**D01307003**
8	8	9	58	3	**D00308003**
8	8	16	63	3	**D01308003**
9	10	10	66	3	**D00309004**
9	10	16	72	3	**D01309004**
10	10	11	66	3	**D00310004**
10	10	19	72	3	**D01310004**
12	12	12	73	3	**D00312005**
12	12	22	83	3	**D01312005**
14	14	14	75	3	**D00314014**
14	14	22	83	3	**D01314014**
16	16	16	82	3	**D00316006**
16	16	26	92	3	**D01316006**
18	18	18	84	3	**D00318018**
18	18	26	92	3	**D01318018**
20	20	20	92	3	**D00320007**
20	20	32	104	3	**D01320007**

CARBIDE
30°
DIN 6527 Standard

Uncoated WW
TiCN CW
TiAlN RW



ST>45 HRc
30<ST<45 HRc
30>ST HRc
GRAPHITE
GENERAL PURPOSE



CARBIDE FINISHERS

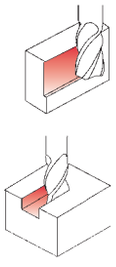
CARBIDE FINISHERS

3 FLUTES SQUARE END | HIGH HELIX | LONG SHANK
LISTS D503 / D513

for Deep Slotting and Peripheral Finishing Operations

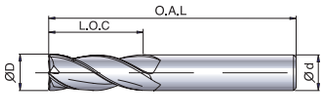
CARBIDE | 45° | DIN 6527 Standard

Uncoated WW
TiCN CW
TiAlN RW



St S
Ti
INCONEL
30<ST<45<HRc

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
2	6	3	50	3	D50302002
3	6	4	50	3	D50303002
3	6	7	57	3	D51303002
4	6	5	54	3	D50304002
4	6	8	57	3	D51304002
5	6	6	54	3	D50305002
5	6	10	57	3	D51305002
6	6	7	54	3	D50306002
6	6	10	57	3	D51306002
8	8	9	58	3	D50308003
8	8	16	63	3	D51308003
10	10	11	66	3	D50310004
10	10	19	72	3	D51310004
12	12	12	73	3	D50312005
12	12	22	83	3	D51312005
14	14	14	75	3	D50314014
14	14	22	83	3	D51314014
16	16	16	82	3	D50316006
16	16	26	92	3	D51316006
18	18	18	84	3	D50318018
18	18	26	92	3	D51318018
20	20	20	92	3	D50320007
20	20	32	104	3	D51320007

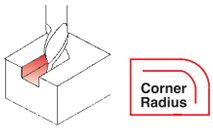


3 FLUTES SQUARE END | CORNER RADII
LIST DC03

for Slotting and Finishing Stainless Steel and Aluminium

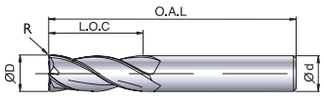
CARBIDE | 35° | DIN 6527 Standard

Uncoated WW
TiAlN LW



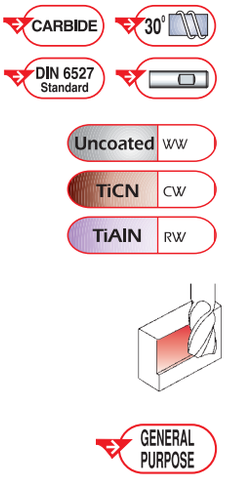
Al
AlSi
St S
Ti
INCONEL
NF
GRAPHITE

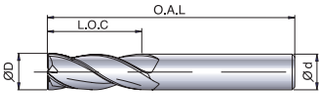
D(e8)	d	L.O.C	O.A.L	R	Z	ITEM No.
3	6	4	50	0.25	3	DC0303002
4	6	5	54	0.25	3	DC0304002
5	6	6	54	0.25	3	DC0305002
6	6	7	54	0.45	3	DC0306002
8	8	9	58	0.45	3	DC0308003
10	10	11	66	0.45	3	DC0310004
12	12	12	73	0.45	3	DC0312005
14	14	14	75	0.45	3	DC0314014
16	16	16	82	0.45	3	DC0316006
18	18	18	84	0.45	3	DC0318018
20	20	20	92	0.45	3	DC0320007



4 FLUTES SQUARE END
LISTS D004 / D014

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
2	6	4	50	4	D00402002
2	6	7	53	4	D01402002
2.5	6	4	50	4	D00402502
2.5	6	7	53	4	D01402502
3	6	5	50	4	D00403002
3	6	8	57	4	D01403002
3.5	6	6	50	4	D00403502
3.5	6	10	57	4	D01403502
4	6	8	54	4	D00404002
4	6	11	57	4	D01404002
4.5	6	8	54	4	D00404502
4.5	6	11	57	4	D01404502
5	6	9	54	4	D00405002
5	6	13	57	4	D01405002
5.5	6	10	54	4	D00405502
5.5	6	13	57	4	D01405502
6	6	10	54	4	D00406002
6	6	13	57	4	D01406002
6.5	8	16	63	4	D01406503
7	8	11	58	4	D00407003
7	8	16	63	4	D01407003
8	8	12	58	4	D00408003
8	8	19	63	4	D01408003
9	10	13	66	4	D00409004
9	10	19	72	4	D01409004
10	10	14	66	4	D00410004
10	10	22	72	4	D01410004
12	12	16	73	4	D00412005
12	12	26	83	4	D01412005
14	14	18	75	4	D00414014
14	14	26	83	4	D01414014
16	16	22	82	4	D00416006
16	16	32	92	4	D01416006
18	18	24	84	4	D00418018
18	18	32	92	4	D01418018
20	20	26	92	4	D00420007
20	20	38	104	4	D01420007
25	25	45	121	4	D01425008





6 FLUTES SQUARE END | HIGH HELIX

for Peripheral Finishing Operation

LISTS D507 / D517

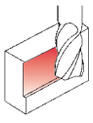
CARBIDE | 45°

DIN 6527 Standard

Uncoated WW

TiCN CW

TiAlN RW



St S

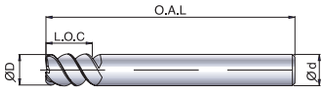
Ti

INCONEL

ST>45 HRc

30<ST<45 HRc

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
6	6	10	54	6	D50706002
6	6	13	57	6	D51706002
8	8	12	58	6	D50708003
8	8	19	63	6	D51708003
10	10	14	66	6	D50710004
10	10	22	72	6	D51710004
12	12	16	73	6	D50712005
12	12	26	83	6	D51712005
14	14	18	75	6	D50714014
14	14	26	83	6	D51714014
16	16	22	82	6	D50716006
16	16	32	92	6	D51716006
18	18	24	84	6	D50718018
18	18	32	92	6	D51718018
20	20	26	92	6	D50720007
20	20	38	104	6	D51720007



MULTI-FLUTES SQUARE END | HIGH HELIX

for Peripheral High Accuracy Finishing Operation

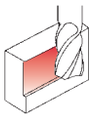
LIST D518

PREMIUM CARBIDE | 50°

DIN 6527 Standard

TiCN CW

TiAlN RT, RW



St S

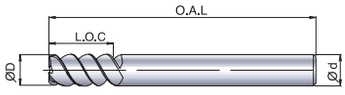
Ti

INCONEL

ST>45 HRc

30<ST<45 HRc

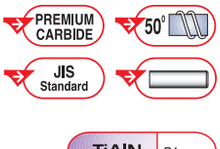
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
4	6	11	57	4	D51804002
5	6	13	57	4	D51805002
6	6	13	57	6	D51806002
7	8	16	63	6	D51807003
8	8	19	63	6	D51808003
9	10	19	72	6	D51809004
10	10	22	72	6	D51810004
12	12	26	83	6	D51812005
14	14	26	83	6	D51814014
16	16	32	92	8	D51816006
18	18	32	92	8	D51818018
20	20	38	104	8	D51820007
25	25	45	121	8	D51825008

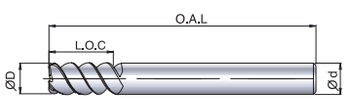


for Peripheral High Accuracy
Long Milling of Ultra-Hard Steels

MULTI FLUTES SQUARE END | HIGH HELIX
LIST D618

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	4	8	50	4	**D61803002**
4	6	12	57	4	**D61804002**
5	6	13	57	4	**D61805002**
6	6	15	60	6	**D61806002**
7	8	20	75	6	**D61807003**
8	8	20	75	6	**D61808003**
10	10	25	80	6	**D61810004**
12	12	30	100	6	**D61812005**
16	16	40	110	6	**D61816006**
20	20	45	120	6	**D61820007**





CARBIDE FINISHERS

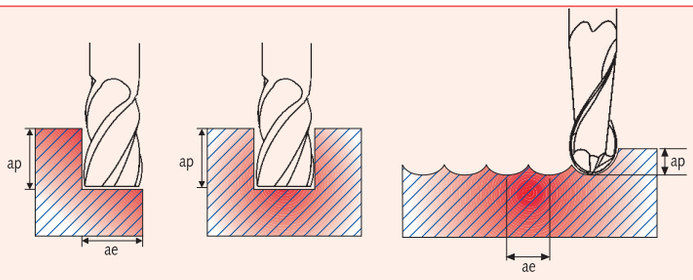
RECOMMENDED WORKING DETAILS

FORMULAS

Cutting Speed	$V_C = \frac{D \times \pi \times n}{1000}$ (m/min)	
Spindle Speed	$n = \frac{V_C \times 1000}{\pi \times d}$ (1/min)	
Feed per Tooth	$f_Z = \frac{V_f}{z \times n}$ (mm)	
Table Feed	$V_f = fz \times z \times n$ (mm/min)	

Formula Symbols:

D (mm)	Tool diameter
z	No. of Flutes
V_C (m/min)	Cutting Speed
F_Z (mm)	Feed per Tooth
n (1/min)	Spindle Speed
V_f (mm/min)	Table Feed
π	3.1416



SIDE MILLING **SLOTTING** **PROFILING**

LISTS 4001 / 4011 / 4021 / JJ

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm						
		Side Milling		Slotting	m/min	m/min	m/min							
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	4	6	8	10	12	16	20
Steels	<42	0.3xD	0.7xD		70	100	120	0.020	0.033	0.040	0.049	0.054	0.063	0.080
Steels	42-48	0.3xD	0.7xD		60	80	100	0.019	0.031	0.037	0.046	0.050	0.059	0.074
Steels	48-52	0.3xD	0.7xD		45	60	80	0.015	0.025	0.030	0.037	0.041	0.047	0.060
Cast Iron <180 HB		0.3xD	0.7xD		100	140	160	0.030	0.050	0.060	0.074	0.081	0.095	0.120
Cast Iron >180 HB		0.3xD	0.7xD		80	100	140	0.024	0.040	0.048	0.059	0.064	0.075	0.096
Stainless Steels		0.3xD	0.7xD		60	80	100	0.022	0.037	0.045	0.055	0.060	0.070	0.089
Titanium		0.3xD	0.7xD		60	80	100	0.021	0.034	0.042	0.051	0.056	0.065	0.083

LISTS 4000 / 4010

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm						
		Side Milling		Slotting	m/min	m/min	m/min	m/min							
	HRc	ap	ae	ap	Uncoated	Z-coat	TiCN	TiAlN	4	6	8	10	12	16	20
Steels	<42	0.3xD	0.7xD		70	85	100	120	0.015	0.025	0.030	0.037	0.040	0.047	0.060
Steels	42-48	0.3xD	0.7xD		60	70	80	100	0.014	0.024	0.028	0.035	0.038	0.044	0.056
Steels	48-52	0.3xD	0.7xD		45	50	60	80	0.010	0.016	0.020	0.024	0.026	0.031	0.039
Cast Iron <180 HB		0.3xD	0.7xD		100	120	140	160	0.030	0.050	0.060	0.074	0.080	0.094	0.012
Cast Iron >180 HB		0.3xD	0.7xD		80	85	100	140	0.024	0.040	0.048	0.059	0.064	0.075	0.096
Stainless Steels		0.3xD	0.7xD		60	70	80	100	0.014	0.024	0.028	0.035	0.038	0.044	0.056
Titanium		0.3xD	0.7xD		60	70	80	100	0.014	0.024	0.028	0.035	0.038	0.044	0.056

LISTS 4002 / 4012 / 4022

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm							
		Side Milling		Slotting	m/min	m/min	m/min	m/min								
	HRc	ap	ae	ap	Uncoated	Z-coat	TiCN	TiAlN	2	4	6	8	10	12	16	20
Steels	<42			0.25xD	70	80	100	120	0.005	0.012	0.019	0.026	0.032	0.040	0.052	0.078
Steels	42-48			0.25xD	60	85	80	100	0.005	0.011	0.017	0.023	0.029	0.036	0.047	0.070
Steels	48-52			0.25xD	45	50	60	80	0.005	0.010	0.016	0.022	0.026	0.033	0.043	0.065
Cast Iron <180 HB				0.5xD	100	110	140	160	0.006	0.013	0.020	0.028	0.034	0.043	0.056	0.084
Cast Iron >180 HB				0.5xD	80	80	100	140	0.005	0.012	0.019	0.026	0.032	0.040	0.052	0.078
Stainless Steels				0.25xD	60	64	80	100	0.005	0.011	0.017	0.023	0.029	0.036	0.047	0.070
Titanium				0.25xD	60	64	80	100	0.005	0.011	0.017	0.023	0.029	0.036	0.047	0.070

LIST 4102

Material	Application			Vc-Cutting Speed	fz-feed per tooth in mm D - diameter in mm						
	Side Milling		Slotting	m/min							
	ap	ae	ap	Uncoated	3	6	8	10	12	16	20
Aluminium Alloys	1xD	0.5xD	1xD	250	0.013	0.037	0.046	0.071	0.095	0.100	0.110
Aluminium High Silicon	1xD	0.5xD	1xD	180	0.011	0.027	0.034	0.052	0.070	0.108	0.100

LISTS 4003 / 4013

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm							
		Side Milling		Slotting	m/min	m/min	m/min	m/min								
	HRc	ap	ae	ap	Uncoated	TiN	TiCN	TiAlN	2	4	6	8	10	12	16	20
Steels	<42	1xD	0.1xD	0.25xD	70	80	100	120	0.003	0.006	0.010	0.014	0.017	0.021	0.028	0.041
Steels	42-48	1xD	0.1xD	0.25xD	60	65	80	100	0.004	0.008	0.013	0.018	0.022	0.028	0.036	0.054
Steels	48-52	1xD	0.1xD		45	48	60	80	0.003	0.008	0.015	0.018	0.028	0.026	0.033	0.050
Cast Iron <180 HB		1xD	0.1xD		100	110	140	160	0.005	0.013	0.023	0.028	0.044	0.023	0.030	0.045
Cast Iron >180 HB		1xD	0.1xD		80	80	100	140	0.002	0.003	0.005	0.007	0.009	0.023	0.030	0.045
Stainless Steels		1xD	0.1xD		60	65	80	100	0.001	0.003	0.004	0.006	0.008	0.028	0.036	0.054
Titanium		1xD	0.1xD		60	65	80	100	0.001	0.002	0.004	0.005	0.006	0.028	0.036	0.054

LIST 4103

Material	Application			Vc-Cutting Speed	fz-feed per tooth in mm D - diameter in mm						
	Side Milling		Slotting	m/min							
	ap	ae	ap	Uncoated	3	6	8	10	12	16	20
Aluminium Alloys	1xD	0.5xD	1xD	250	0.013	0.037	0.046	0.071	0.095	0.100	0.110
Aluminium High Silicon	1xD	0.5xD	1xD	180	0.011	0.027	0.034	0.052	0.070	0.108	0.100

LIST 4503 JJ

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm							
		Side Milling		Slotting	m/min	m/min	m/min								
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	2	4	6	8	10	12	16	20
Steels	<42	1xD	0.1xD	0.25XD	70	100	120	0.003	0.006	0.010	0.014	0.017	0.021	0.028	0.041
Steels	42-48	1xD	0.1xD	0.25XD	60	80	100	0.004	0.008	0.013	0.018	0.022	0.028	0.036	0.054
Steels	48-52	1xD	0.1xD	0.25XD	45	60	80	0.003	0.008	0.012	0.017	0.021	0.026	0.033	0.050
Cast Iron <180 HB		1xD	0.1xD	0.5XD	100	140	160	0.003	0.007	0.011	0.015	0.018	0.023	0.030	0.045
Cast Iron >180 HB		1xD	0.1xD	0.5XD	80	100	140	0.003	0.007	0.011	0.015	0.018	0.023	0.030	0.045
Stainless Steels		1xD	0.1xD	0.25XD	60	80	100	0.004	0.008	0.010	0.018	0.022	0.028	0.036	0.054
Titanium		1xD	0.1xD	0.25XD	60	80	100	0.004	0.008	0.013	0.018	0.022	0.028	0.036	0.054

RECOMMENDED WORKING DETAILS

LISTS 4004 / 4014 / 4024

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm							
		Side Milling		Slotting	m/min	m/min	m/min	m/min								
	HRc	ap	ae	ap	Uncoated	Z-coat	TiCN	TiAlN	2	4	6	8	10	12	16	20
Steels	<42	1xD	0.1xD		70	85	100	120	0.006	0.015	0.026	0.032	0.050	0.065	0.100	0.130
Steels	42-48	1xD	0.1xD		60	70	80	100	0.005	0.013	0.022	0.027	0.043	0.055	0.085	0.011
Steels	48-52	1xD	0.1xD		45	50	60	80	0.004	0.011	0.018	0.022	0.035	0.046	0.070	0.091
Cast Iron <180 HB		1xD	0.1xD		100	120	140	160	0.007	0.017	0.029	0.035	0.055	0.072	0.110	0.143
Cast Iron >180 HB		1xD	0.1xD		80	85	100	140	0.002	0.004	0.007	0.009	0.011	0.014	0.018	0.027
Stainless Steels		1xD	0.1xD		60	70	80	100	0.002	0.004	0.006	0.008	0.009	0.012	0.015	0.023
Titanium		1xD	0.1xD		60	70	80	100	0.001	0.003	0.005	0.006	0.008	0.010	0.013	0.019

For TiN Coating: multiply by 0.9 the Cutting Speed of Z-coat in the table.

LISTS D001 / D011

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm						
		Side Milling		Slotting	m/min	m/min	m/min							
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	4	6	8	10	12	16	20
Steels	<42	0.3xD	0.7xD		70	100	120	0.020	0.033	0.040	0.049	0.054	0.063	0.080
Steels	42-48	0.3xD	0.7xD		60	80	100	0.019	0.031	0.037	0.046	0.050	0.059	0.074
Steels	48-52	0.3xD	0.7xD		45	60	80	0.015	0.025	0.030	0.037	0.041	0.047	0.060
Cast Iron <180 HB		0.3xD	0.7xD		100	140	160	0.030	0.050	0.060	0.074	0.081	0.095	0.120
Cast Iron >180 HB		0.3xD	0.7xD		80	100	140	0.024	0.040	0.048	0.059	0.064	0.075	0.096
Stainless Steels		0.3xD	0.7xD		60	80	100	0.022	0.037	0.045	0.055	0.060	0.070	0.089
Titanium		0.3xD	0.7xD		60	80	100	0.021	0.034	0.042	0.051	0.056	0.065	0.083

LIST D501

Material	Application			Vc-Cutting Speed	fz-feed per tooth in mm D - diameter in mm						
	Side Milling		Slotting	m/min							
	ap	ae	ap	Uncoated	2	6	8	10	12	16	20
Aluminium Alloys	0.3xD	0.7xD		250	0.016	0.044	0.055	0.085	0.114	0.120	0.132
Aluminium High Silicon	0.3xD	0.7xD		180	0.013	0.032	0.041	0.062	0.084	0.130	0.120

LIST DC19

Material	Rockwell Hardness	Application			Vc-Cutting Speed	fz-feed per tooth in mm D - diameter in mm						
		Side Milling		Slotting	m/min							
	HRc	ap	ae	ap	TiAlN	3	5	8	10	12	16	20
Steels	<42	1xD	0.5xD	1xD	120	0.024	0.036	0.045	0.054	0.059	0.063	0.068
Steels	42-48	1xD	0.4xD	1xD	100	0.023	0.032	0.041	0.045	0.050	0.054	0.059
Steels	48-52	1xD	0.4xD	1xD	80	0.020	0.027	0.036	0.040	0.045	0.050	0.054
Cast Iron <180 HB		1xD	0.2xD	0.5xD	160	0.010	0.015	0.024	0.024	0.034	0.044	0.050
Cast Iron >180 HB		1xD	0.5xD	1xD	140	0.024	0.036	0.054	0.054	0.063	0.068	0.081
Stainless Steels		1xD	0.3xD	0.5xD	100	0.011	0.018	0.027	0.027	0.036	0.041	0.054
Titanium		1xD	0.4xD	1xD	100	0.024	0.036	0.054	0.054	0.063	0.068	0.081

LISTS D000 / D010

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm						
		Side Milling		Slotting	m/min	m/min	m/min	m/min							
	HRc	ap	ae	ap	Uncoated	Z-coat	TiCN	TiAlN	4	6	8	10	12	16	20
Steels	<42	0.3xD	0.7xD		70	85	100	120	0.015	0.025	0.030	0.037	0.040	0.047	0.060
Steels	42-48	0.3xD	0.7xD		60	70	80	100	0.014	0.024	0.028	0.035	0.038	0.044	0.056
Steels	48-52	0.3xD	0.7xD		45	50	60	80	0.010	0.016	0.020	0.024	0.026	0.031	0.039
Cast Iron <180 HB		0.3xD	0.7xD		100	120	140	160	0.030	0.050	0.060	0.074	0.080	0.094	0.012
Cast Iron >180 HB		0.3xD	0.7xD		80	85	100	140	0.024	0.040	0.048	0.059	0.064	0.075	0.096
Stainless Steels		0.3xD	0.7xD		60	70	80	100	0.014	0.024	0.028	0.035	0.038	0.044	0.056
Titanium		0.3xD	0.7xD		60	70	80	100	0.014	0.024	0.028	0.035	0.038	0.044	0.056

LISTS D002 / D012

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm							
		Side Milling		Slotting	m/min	m/min	m/min	m/min								
	HRc	ap	ae	ap	Uncoated	Z-coat	TiCN	TiAlN	2	4	6	8	10	12	16	20
Steels	<42			0.25xD	70	80	100	120	0.005	0.012	0.019	0.026	0.032	0.040	0.052	0.078
Steels	42-48			0.25xD	60	85	80	100	0.005	0.011	0.017	0.023	0.029	0.036	0.047	0.070
Steels	48-52			0.25xD	45	50	60	80	0.005	0.010	0.016	0.022	0.026	0.033	0.043	0.065
Cast Iron <180 HB				0.5xD	100	110	140	160	0.006	0.013	0.020	0.028	0.034	0.043	0.056	0.084
Cast Iron >180 HB				0.5xD	80	80	100	140	0.005	0.012	0.019	0.026	0.032	0.040	0.052	0.078
Stainless Steels				0.25xD	60	64	80	100	0.005	0.011	0.017	0.023	0.029	0.036	0.047	0.070
Titanium				0.25xD	60	64	80	100	0.005	0.011	0.017	0.023	0.029	0.036	0.047	0.070

LIST D502

Material	Application			Vc-Cutting Speed	fz-feed per tooth in mm D - diameter in mm						
	Side Milling		Slotting	m/min							
	ap	ae	ap	Uncoated	3	6	8	10	12	16	20
Aluminium Alloys	1xD	0.5xD	1xD	250	0.013	0.037	0.046	0.071	0.095	0.100	0.110
Aluminium High Silicon	1xD	0.5xD	1xD	180	0.011	0.027	0.034	0.052	0.070	0.108	0.100

LISTS D003 / D013

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm							
		Side Milling		Slotting	m/min	m/min	m/min	m/min								
	HRc	ap	ae	ap	Uncoated	TiN	TiCN	TiAlN	2	4	6	8	10	12	16	20
Steels	<42	1xD	0.1xD	0.25xD	70	80	100	120	0.004	0.010	0.015	0.021	0.026	0.032	0.042	0.062
Steels	42-48	1xD	0.1xD	0.25xD	60	65	80	100	0.004	0.009	0.014	0.019	0.023	0.029	0.037	0.056
Steels	48-52	1xD	0.1xD		45	48	60	80	0.004	0.008	0.013	0.017	0.021	0.026	0.034	0.052
Cast Iron <180 HB		1xD	0.1xD		100	110	140	160	0.005	0.010	0.016	0.022	0.028	0.034	0.045	0.067
Cast Iron >180 HB		1xD	0.1xD		80	80	100	140	0.004	0.010	0.015	0.021	0.026	0.032	0.042	0.062
Stainless Steels		1xD	0.1xD		60	65	80	100	0.004	0.009	0.014	0.019	0.023	0.029	0.037	0.056
Titanium		1xD	0.1xD		60	65	80	100	0.004	0.009	0.014	0.019	0.023	0.029	0.037	0.056

RECOMMENDED WORKING DETAILS

LISTS D503 / D513

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm							
		Side Milling		Slotting	m/min	m/min	m/min								
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	2	4	6	8	10	12	16	20
Steels	<42	1xD	0.1xD	0.25XD	70	100	120	0.003	0.006	0.010	0.014	0.017	0.021	0.028	0.041
Steels	42-48	1xD	0.1xD	0.25XD	60	80	100	0.004	0.008	0.013	0.018	0.022	0.028	0.036	0.054
Steels	48-52	1xD	0.1xD	0.25XD	45	60	80	0.003	0.008	0.012	0.017	0.021	0.026	0.033	0.050
Cast Iron <180 HB		1xD	0.1xD	0.5XD	100	140	160	0.003	0.007	0.011	0.015	0.018	0.023	0.030	0.045
Cast Iron >180 HB		1xD	0.1xD	0.5XD	80	100	140	0.003	0.007	0.011	0.015	0.018	0.023	0.030	0.045
Stainless Steels		1xD	0.1xD	0.25XD	60	80	100	0.004	0.008	0.010	0.018	0.022	0.028	0.036	0.054
Titanium		1xD	0.1xD	0.25XD	60	80	100	0.004	0.008	0.013	0.018	0.022	0.028	0.036	0.054

LIST DC03

		Slotting	Vc-Cutting Speed m/min	fz- feed per tooth in mm D-Diameter in mm					
Material	Type	ap	TiAlN	6	8	10	12	16	20
Stainless Steels	AISI 304 & AISI 316	0.5 x D	80-90	0.030	0.040	0.050	0.065	0.075	0.080
Stainless Steels	AISI 303	0.5 x D	80-90	0.030	0.040	0.050	0.065	0.075	0.080
Stainless Steels	AISI 416 & AISI 420	0.5 x D	100-115	0.035	0.045	0.055	0.070	0.080	0.090

LISTS D004 / D014

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm							
		Side Milling		Slotting	m/min	m/min	m/min	m/min								
	HRc	ap	ae	ap	Uncoated	Z-coat	TiCN	TiAlN	2	4	6	8	10	12	16	20
Steels	<42	1xD	0.1xD		70	85	100	120	0.006	0.015	0.026	0.032	0.050	0.065	0.100	0.130
Steels	42-48	1xD	0.1xD		60	70	80	100	0.005	0.013	0.022	0.027	0.043	0.055	0.085	0.011
Steels	48-52	1xD	0.1xD		45	50	60	80	0.004	0.011	0.018	0.022	0.035	0.046	0.070	0.091
Cast Iron <180 HB		1xD	0.1xD		100	120	140	160	0.007	0.017	0.029	0.035	0.055	0.072	0.110	0.143
Cast Iron >180 HB		1xD	0.1xD		80	85	100	140	0.004	0.004	0.007	0.009	0.011	0.014	0.018	0.027
Stainless Steels		1xD	0.1xD		60	70	80	100	0.004	0.004	0.006	0.008	0.009	0.012	0.015	0.023
Titanium		1xD	0.1xD		60	70	80	100	0.003	0.003	0.005	0.006	0.008	0.010	0.013	0.019

LISTS D507 / D517

Material	Rockwell Hardness	Application			Vc-Cutting Speed		fz- feed per tooth in mm D-Diameter in mm					
		Side Milling		Slotting	m/min	m/min						
	HRc	ap	ae	ap	TiCN	TiAlN	6	8	10	12	16	20
Steels	<42	1xD	0.1xD		150	200	0.033	0.040	0.050	0.060	0.090	0.120
Steels	42-48	1xD	0.1xD		100	150	0.031	0.035	0.042	0.055	0.082	0.100
Steels	48-55	1xD	0.1xD		80	120	0.029	0.031	0.042	0.050	0.076	0.082
Cast Iron <180 HB		1xD	0.1xD		180	220	0.037	0.050	0.062	0.075	0.110	0.110
Cast Iron >180 HB		1xD	0.1xD		150	200	0.032	0.045	0.055	0.067	0.100	0.120
Stainless Steels		1xD	0.1xD		120	150	0.026	0.037	0.046	0.055	0.083	0.100
Titanium		1xD	0.1xD		150	200	0.031	0.035	0.042	0.055	0.082	0.100

LIST D518

Material	Rockwell Hardness	Application			Vc-Cutting Speed		fz- feed per tooth in mm D-Diameter in mm						
		Side Milling		Slotting	m/min	m/min							
	HRc	ap	ae	ap	TiCN	TiAlN	4	6	8	10	12	16	20
Steels	40-50	1.5 x D	0.07 x D	0.2 x D	80	300	0.021	0.026	0.037	0.046	0.055	0.083	0.110
Steels	50-55	1.5 x D	0.05 x D	0.18 x D	60	250	0.018	0.024	0.034	0.042	0.050	0.076	0.100
Steels	55-60	1.5 x D	0.03 x D	0.13 x D	50	180	0.013	0.018	0.024	0.034	0.042	0.050	0.076
Steels	>= 60	1.5 x D	0.025 x D	0.1 x D		120	0.009	0.013	0.018	0.024	0.034	0.042	0.050

LIST D618

Material	Rockwell Hardness	Applications			Vc-Cutting Speed	fz- feed per tooth in mm D-Diameter in mm							
		Side Milling		Slotting	m/min								
	HRc	ap	ae	ap	TiAlN	4	6	8	10	12	16	20	25
Steels	45~55	⩽1xD	0.05xD	⩽0.05xD	120-180	0.017	0.025	0.033	0.035	0.041	0.050	0.055	0.058
Steels	55~60	⩽1xD	0.05xD	⩽0.05xD	80-120	0.016	0.024	0.031	0.032	0.038	0.045	0.052	0.055
Steels	60~65	⩽1xD	⩽0.2	⩽0.05xD	50-80	0.014	0.023	0.029	0.031	0.036	0.042	0.051	0.052
Steels	65~70	⩽1xD	⩽0.2	⩽0.05xD	20-50	0.015	0.022	0.028	0.030	0.035	0.041	0.050	0.051

NOTE
Data shown is the result of actual machining tests and is suggested as a starting point.
Do sensitivity analyses to achieve optimum results.
The tests were run on an optimal machining environment.

HSSE/HSS PM FINISHERS

The Hanita line provides a full range of end mills made from the highest quality Cobalt and Powder Metal steels. Providing maximum toughness and durability, often required when conventional or slow spindle machines are used, or workpieces are held in less-than rigid set ups, Hanita's HSSE / HSS-PM finishing end mills can provide excellent alternatives to carbide.

Hanita's standard offering for non ferrous materials are made from premium cobalt and powdered metal materials.

- Standard cutting diameters range from 1mm to 50mm (1/16-2″).
- Available as standard in:

  2, 3, 4 and 6 flute styles

  30, 35,37 and 45 Degree helixes

  stub, regular, long and extra lengths

  TiN, TiCN and TiAlN Coatings

2 FLUTES BALL NOSE

for 3D Milling

LIST 1601 HSS Co

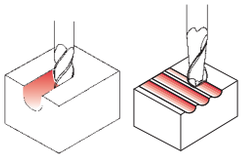
HSS-M42 | 30° | DIN-327 Standard

Uncoated WW, FF

TiN TW

TiCN CW

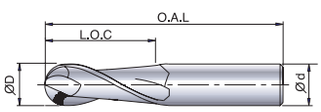
TiAlN LW



30>ST HRc

GENERAL PURPOSE

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	5	49	2	**160103002**
4	6	7	51	2	**160104002**
5	6	8	52	2	**160105002**
6	6	8	52	2	**160106002**
7	10	10	60	2	**160107004**
8	10	11	61	2	**160108004**
10	10	13	63	2	**160110004**
12	12	16	73	2	**160112005**
14	12	16	73	2	**160114005**
16	16	19	79	2	**160116006**
18	16	19	79	2	**160118006**
20	16	19	79	2	**160120006**
25	25	26	102	2	**160125008**



2 FLUTES BALL NOSE | LONG SHANK

for Deep 3D Milling

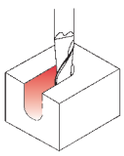
LIST 1601 JJ HSS Co

HSS-M42 | 30° | JIS Standard

Uncoated JJ

TiN TJ

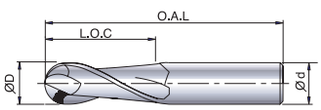
TiCN CJ



30>ST HRc

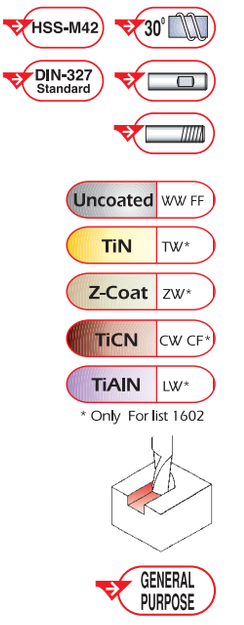
GENERAL PURPOSE

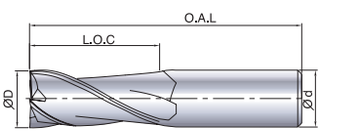
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
1	6	2	49	2	**160101002**
2	6	4	52	2	**160102002**
2.5	6	5	55	2	**160102502**
3	6	8	60	2	**160103002**
4	6	8	70	2	**160104002**
5	6	10	80	2	**160105002**
6	6	12	90	2	**160106002**
8	8	14	100	2	**160108003**
10	10	18	100	2	**160110004**
12	12	22	110	2	**160112005**
14	12	26	110	2	**160114005**
16	16	30	140	2	**160116006**
18	16	30	140	2	**160118006**
20	20	38	160	2	**160120007**
25	25	50	180	2	**160125008**



2 FLUTES SQUARE END
LISTS 1602 / 1612 HSS Co

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
2	6	4	48	2	**160202002**
2.5	6	5	49	2	**160202502**
3	6	5	49	2	**160203002**
3	6	9	60	2	**161203002**
3.5	6	6	50	2	**160203502**
4	6	7	51	2	**160204002**
4	6	13	67	2	**161204002**
4.5	6	7	51	2	**160204502**
5	6	8	52	2	**160205002**
5	6	13	71	2	**161205002**
5.5	6	8	52	2	**160205502**
6	6	8	52	2	**160206002**
6	6	16	75	2	**161206002**
6.5	10	10	60	2	**160206504**
7	10	10	60	2	**160207004**
7	10	16	75	2	**161207004**
7.5	10	10	60	2	**160207504**
8	10	11	61	2	**160208004**
8	10	20	80	2	**161208004**
8.5	10	11	61	2	**160208504**
9	10	11	61	2	**160209004**
9	10	22	80	2	**161209004**
9.5	10	11	61	2	**160209504**
10	10	13	63	2	**160210004**
10	10	22	80	2	**161210004**
10.5	12	13	70	2	**160210505**
11	12	13	70	2	**160211005**
12	12	16	73	2	**160212005**
12	12	25	100	2	**161212005**
12.5	12	16	73	2	**160212505**
13	12	16	73	2	**160213005**
13.5	12	16	73	2	**160213505**
14	12	16	73	2	**160214005**
14	12	28	100	2	**161214005**
15	12	16	73	2	**160215005**
16	16	19	79	2	**160216006**
16	16	32	116	2	**161216006**
17	16	19	79	2	**160217006**
18	16	19	79	2	**160218006**
18	16	35	118	2	**161218006**
19	16	19	79	2	**160219006**
20	16	19	79	2	**160220006**
20	20	22	88	2	**160220007**
20	16	38	125	2	**161220006**
21	20	22	88	2	**160221007**
22	20	22	88	2	**160222007**
22	25	40	140	2	**161222008**
24	25	26	102	2	**160224008**
24	25	45	150	2	**161224008**
25	25	26	102	2	**160225008**
25	25	45	160	2	**161225008**
26	25	26	102	2	**160226008**
28	25	26	102	2	**160228008**
30	25	26	102	2	**160230008**
32	32	32	112	2	**160232009**

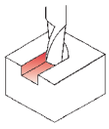




2 FLUTES SQUARE END
LIST 1N02 HSS PM

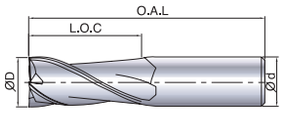
for Slotting

HSS-PM | 30°
DIN-327 Standard
Uncoated WW
TiCN CW
TiAlN LW



30>ST HRc
GENERAL PURPOSE

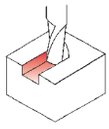
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	5	49	2	1N0203002
4	6	7	51	2	1N0204002
5	6	8	52	2	1N0205002
6	6	8	52	2	1N0206002
8	10	11	61	2	1N0208004
10	10	13	63	2	1N0210004
12	12	16	73	2	1N0212005
14	12	16	73	2	1N0214005
16	16	19	79	2	1N0216006
18	16	19	79	2	1N0218006
20	20	22	88	2	1N0220007

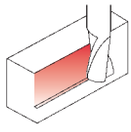


2 FLUTES SQUARE END | HIGH HELIX
LIST 3502 HSS Co

for Roughing and Finishing Aluminium

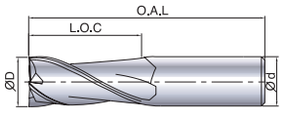
HSS-M42 | 42°
DIN-844 Standard
Uncoated WW
TiCN CW





Al

D	d	L.O.C	O.A.L	Z	ITEM No.
2	6	7	51	2	350202002
3	6	8	52	2	350203002
4	6	11	55	2	350204002
5	6	13	57	2	350205002
6	6	13	57	2	350206002
8	10	19	69	2	350208002
10	10	22	72	2	350210004
12	12	26	83	2	350212005
14	12	26	83	2	350214005
16	16	32	92	2	350216006
18	16	32	92	2	350218006
20	16	38	98	2	350220006
22	25	40	106	2	350222008
24	25	45	121	2	350224008
25	25	45	121	2	350225008



for Deep Slotting

2 FLUTES SQUARE END | LONG TYPE

LISTS 1652JJ / 1662JJ HSS Co

D	d	L.O.C	O.A.L	Z	ITEM No.
2	6	4	50	2	**165202002**
3	6	6	50	2	**165203002**
3	6	15	50	2	**166203002**
4	8	8	60	2	**165204003**
4	6	20	55	2	**166204002**
5	8	10	60	2	**165205003**
5	6	25	60	2	**166205002**
6	8	12	60	2	**165206003**
6	6	25	60	2	**166206002**
7	10	14	60	2	**165207004**
8	10	14	60	2	**165208004**
8	10	35	80	2	**166208004**
9	10	18	70	2	**165209004**
10	10	18	70	2	**165210004**
10	10	45	90	2	**166210004**
11	12	22	80	2	**165211005**
12	12	22	80	2	**165212005**
12	12	55	105	2	**166212005**
13	12	26	85	2	**165213005**
14	16	26	90	2	**165214006**
14	12	55	105	2	**166214005**
15	16	30	95	2	**165215006**
16	16	30	95	2	**165216006**
16	16	65	120	2	**166216006**
17	16	34	95	2	**165217006**
18	16	34	95	2	**165218006**
18	16	65	120	2	**166218006**
19	20	38	110	2	**165219007**
20	20	38	110	2	**165220007**
20	20	75	140	2	**166220007**
22	20	45	110	2	**165222007**
24	25	50	120	2	**165224008**
24	25	90	160	2	**166224008**
25	25	50	120	2	**165225008**
25	25	90	160	2	**166225008**
35	32	60	145	2	**165235009**
45	42	70	160	2	**165245001**
50	42	75	165	2	**165250001**

HSS-M42

30°

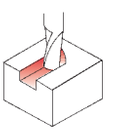
JIS Standard

Uncoated JJ

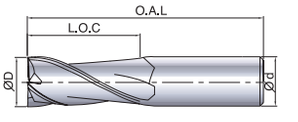
TiN TJ*

TiCN CJ

* Only For list 1652JJ



GENERAL PURPOSE



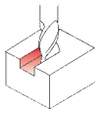
HSSE/HSS PM FINISHERS

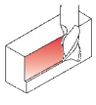
3 FLUTES SQUARE END
LIST 1603 HSS Co

for Slotting and Side Milling

HSS-M42 | 30°
DIN-844 Standard

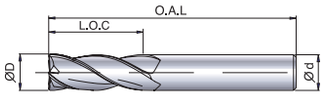
Uncoated WW, FF
TiN TW
Z-Coat ZW
TiCN CW
TiAlN LW





GENERAL PURPOSE

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	8	52	3	160303002
3.5	6	10	54	3	160303502
4	6	11	55	3	160304002
4.5	6	11	55	3	160304502
5	6	13	57	3	160305002
5.5	6	13	57	3	160305502
6	6	13	57	3	160306002
6.5	10	16	66	3	160306504
7	10	16	66	3	160307004
8	10	19	69	3	160308004
9	10	19	69	3	160309004
10	10	22	72	3	160310004
11	12	22	79	3	160311005
12	12	26	83	3	160312005
14	12	26	83	3	160314005
15	12	26	83	3	160315005
16	16	32	92	3	160316006
18	16	32	92	3	160318006
20	16	38	98	3	160320006
25	25	45	121	3	160325008

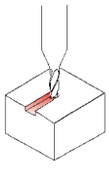


3 FLUTES SQUARE END | THROW-AWAY
LISTS 3603AA / 3613AA HSS Co

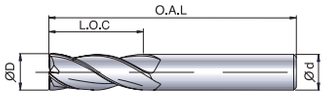
for Slotting and Side Milling - General Purpose

HSS-M42 | 30°
DIN-327 Standard

Uncoated AA
TiN TA
TiCN CA



GENERAL PURPOSE

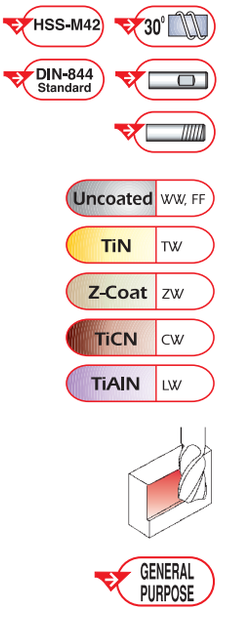


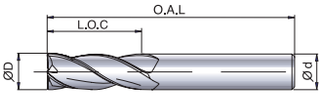
D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
1.5	6	3	34	3	360301502
1.5	6	4	38	3	361301502
2	6	4	35	3	360302002
2	6	7	38	3	361302002
2.5	6	5	36	3	360302502
2.5	6	8	39	3	361302502
3	6	5	36	3	360303002
3	6	8	39	3	361303002
3.5	6	6	37	3	360303502
3.5	6	10	41	3	361303502
4	6	7	38	3	360304002
4	6	11	42	3	361304002
4.5	6	7	38	3	360304502
4.5	6	11	42	3	361304502
5	6	8	39	3	360305002
5	6	13	44	3	361305002
5.5	6	8	39	3	360305502
5.5	6	13	44	3	361305502
6	6	8	39	3	360306002
6	6	13	44	3	361306002
7	8	10	42	3	360307003
7	8	16	48	3	361307003
8	8	11	43	3	360308003
8	8	19	51	3	361308003
9	10	11	48	3	360309004
9	10	19	56	3	361309004
10	10	13	50	3	360310004
10	10	22	59	3	361310004

for Peripheral
Finishing Operation

4 FLUTES SQUARE END
LISTS 1605 / 1615 HSS Co

D(+0.04)	d	L.O.C	O.A.L	Z	ITEM No.
2	6	7	51	4	160502002
2.5	6	8	52	4	160502502
3	6	8	52	4	160503002
3	6	12	56	4	161503002
3.5	6	10	54	4	160503502
4	6	11	55	4	160504002
4	6	19	63	4	161504002
4.5	6	11	55	4	160504502
5	6	13	57	4	160505002
5	6	24	68	4	161505002
5.5	6	13	57	4	160505502
6	6	13	57	4	160506002
6	6	24	68	4	161506002
6.5	10	16	66	4	160506504
7	10	16	66	4	160507004
7	10	30	80	4	161507004
7.5	10	16	66	4	160507504
8	10	19	69	4	160508004
8	10	38	88	4	161508004
8.5	10	19	69	4	160508504
9	10	19	69	4	160509004
9	10	38	88	4	161509004
9.5	10	19	69	4	160509504
10	10	22	72	4	160510004
10	10	45	95	4	161510004
10.5	12	22	79	4	160510505
11	12	22	79	4	160511005
11	12	45	102	4	161511005
11.5	12	22	79	4	160511505
12	12	26	83	4	160512005
12	12	53	110	4	161512005
12.5	12	26	83	4	160512505
13	12	26	83	4	160513005
13	12	53	110	4	161513005
13.5	12	26	83	4	160513505
14	12	26	83	4	160514005
14	12	53	110	4	161514005
14.5	12	26	83	4	160514505
15	12	26	83	4	160515005
15	12	53	110	4	161515005
16	16	32	92	4	160516006
16	16	63	123	4	161516006
17	16	32	92	4	160517006
17	16	63	123	4	161517006
18	16	32	92	4	160518006
18	16	63	123	4	161518006
18.5	16	32	92	4	160518506
19	16	32	92	4	160519006
19	16	63	123	4	161519006
20	16	38	98	4	160520006
20	20	38	104	4	160520007
20	20	75	141	4	161520007





4 FLUTES SQUARE END
LIST 1634 JJ HSS Co

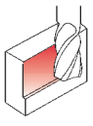
for Deep Peripheral Finishing Operation

HSS-M42 | 30° | JIS Standard

Uncoated JJ

TiCN CJ

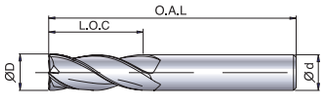
TiAlN LJ



30>ST HRc

GENERAL PURPOSE

D	d	L.O.C	O.A.L	Z	ITEM No.
3	6	10	50	4	**163403002**
4	8	12	60	4	**163404003**
5	8	15	60	4	**163405003**
6	8	15	60	4	**163406003**
7	10	20	60	4	**163407004**
8	10	20	60	4	**163408004**
9	10	25	70	4	**163409004**
10	10	25	70	4	**163410004**
11	12	30	80	4	**163411005**
12	12	30	80	4	**163412005**
13	12	35	85	4	**163413005**
14	16	35	90	4	**163414006**
15	16	40	95	4	**163415006**
16	16	40	95	4	**163416006**
17	16	40	95	4	**163417006**
18	16	40	95	4	**163418006**
19	20	45	110	4	**163419007**
20	20	45	110	4	**163420007**
22	20	45	110	4	**163422007**
24	25	50	120	4	**163424008**
25	25	50	120	4	**163425008**
28	25	55	125	4	**163428008**
30	25	55	125	4	**163430008**
32	32	60	145	4	**163432009**

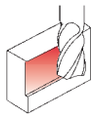


4 FLUTES SQUARE END
LIST 1625 HSS Co

for Deep Peripheral Finishing Operation

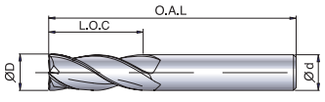
HSS-M42 | 30° | DIN-844 Standard

Uncoated WW



GENERAL PURPOSE

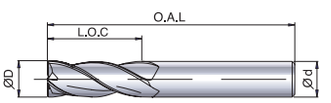
D	d	L.O.C	O.A.L	Z	ITEM No.
6	6	56	100	4	**162506002**
7	10	63	113	4	**162507004**
8	10	63	113	4	**162508004**
10	10	70	120	4	**162510004**
12	12	80	137	4	**162512005**
14	12	80	137	4	**162514005**
16	16	90	150	4	**162516006**
18	16	100	160	4	**162518006**
19	20	110	176	4	**162519007**
20	20	110	176	4	**162520007**
22	20	110	176	4	**162522007**
25	25	110	186	4	**162525008**



for High Performance Roughing and Finishing Operations

4 FLUTES SQUARE END
LIST 1N0M HSS PM

D(+0.04)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	8	52	4	1N0M03002
4	6	11	55	4	1N0M04002
5	6	13	57	4	1N0M05002
6	6	13	57	4	1N0M06002
8	10	19	69	4	1N0M08004
10	10	22	72	4	1N0M10004
12	12	26	83	4	1N0M12005
14	12	26	83	4	1N0M14005
16	16	32	92	4	1N0M16006
18	16	32	92	4	1N0M18006
20	20	38	104	4	1N0M20007
22	20	38	104	4	1N0M22007
25	25	45	121	4	1N0M25008

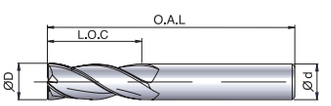


HSS-PM
30°
DIN-844 Standard
TiAlN LW
30>ST HRc
GENERAL PURPOSE

for High Performance Roughing and Finishing Operations

4 FLUTES SQUARE END
LIST 1N0M JJ HSS PM

D(+0.04)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	10	50	4	1N0M03002
4	8	12	60	4	1N0M04003
5	8	15	60	4	1N0M05003
6	8	15	60	4	1N0M06003
8	10	20	65	4	1N0M08004
10	10	25	75	4	1N0M10004
12	12	30	80	4	1N0M12005
14	16	35	90	4	1N0M14006
16	16	40	95	4	1N0M16006
18	20	40	105	4	1N0M18007
20	20	45	110	4	1N0M20007
22	20	45	125	4	1N0M22007
25	25	50	130	4	1N0M25008



HSS-PM
30°
JIS Standard
TiAlN LJ
30>ST HRc
GENERAL PURPOSE

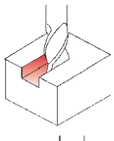
HSSE/HSS PM FINISHERS

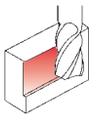
6 FLUTES SQUARE END
LISTS 1606 / 1616 HSS Co

for Peripheral Finishing Operation

HSS-M42 | 30°
DIN-844 Standard

Uncoated WW, FF
TiN TW
TiCN CW
TiAlN LW

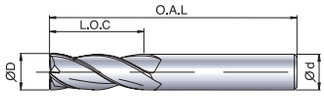




GENERAL PURPOSE

D	d	L.O.C	O.A.L	Z	ITEM No.
21	20	38	104	6	**160621007**
22	20	38	104	6	**160622007**
22	25	85	150	6	**161622008**
23	20	38	104	6	**160623007**
24	25	45	121	6	**160624008**
24	25	90	166	6	**161624008**
25	25	45	121	6	**160625008**
25	25	90	166	6	**161625008**
26	25	45	121	6	* **160626008**
26	25	90	166	6	* **161626008**
28	25	45	121	6	* **160628008**
28	25	90	166	6	* **161628008**
30	25	45	121	6	* **160630008**
30	25	90	166	6	* **161630008**
32	32	53	133	6	* **160632009**
32	32	100	170	6	* **161632009**
34	32	53	133	6	* **160634009**
36	32	100	170	6	* **161636009**
40	32	100	170	6	* **161640009**

* CENTRE HOLE

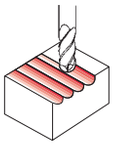


MULTI- FLUTES BALL NOSE
LIST 1600 HSS Co

for 3D Milling

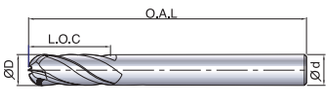
HSS-M42 | 30°
DIN-844 Standard

Uncoated WW
TiN TW
Z-Coat ZW
TiCN CW
TiAlN LW



30>ST HRc
GENERAL PURPOSE

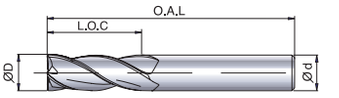
D	d	L.O.C	O.A.L	Z	ITEM No.
3	6	8	52	4	**160003002**
4	6	11	55	4	**160004002**
5	6	13	57	4	**160005002**
6	6	13	57	4	**160006002**
8	10	19	69	4	**160008004**
10	10	22	72	4	**160010004**
12	12	26	83	4	**160012005**
14	12	26	83	4	**160014005**
16	16	32	92	4	**160016006**
18	16	32	92	4	**160018006**
20	16	38	98	4	**160020006**
22	25	40	106	6	**160022008**
25	25	45	121	6	**160025008**



for Peripheral Finishing Operation

MULTI-FLUTES SQUARE END
LISTS 1N05 / 1N07 HSS - PM

D	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	4	1N0506002
8	10	19	69	4	1N0508004
10	10	22	72	4	1N0510004
12	12	26	83	4	1N0512005
14	12	26	83	4	1N0514005
16	16	32	92	4	1N0516006
18	16	32	92	4	1N0518006
20	20	38	104	4	1N0520007
25	25	45	121	6	1N0725008

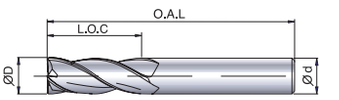


HSS-PM
30°
DIN-844 Standard
Uncoated WW
TiCN CW
TiAlN LW
30>ST HRc
GENERAL PURPOSE

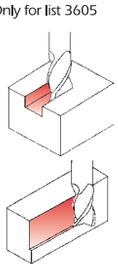
for Slotting and Peripheral Finishing Operations

MULTI FLUTES SQUARE END | HIGH HELIX
LISTS 3605 / 3615 HSS Co

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	8	52	3	360503002
4	6	11	55	3	360504002
5	6	13	57	3	360505002
6	6	13	57	3	360506002
7	10	16	66	3	360507004
8	10	19	69	3	360508004
9	10	19	69	3	360509004
10	10	22	72	3	360510004
10	10	45	95	3	361510004
12	12	26	83	3	360512005
12	12	53	110	3	361512005
14	12	26	83	3	360514005
15	12	26	83	3	360515005
16	16	32	92	3	360516006
16	16	63	123	3	361516006
18	16	32	92	3	360518006
20	20	38	104	3	360520007
20	20	75	141	3	361520007
22	20	38	104	4	360522007
25	25	45	121	4	360525008
25	25	90	166	4	361525008
28	25	45	121	4	360528008
30	25	45	121	4	360530008
30	25	90	166	4	361530008



HSS-M42
45°
DIN-844 Standard
Uncoated WW
TiCN CW, CT*
TiAlN LW
* Only for list 3605



Al
AlSi
St S
Ti
INCONEL
30>ST HRc

HSSE/HSS PM FINISHERS

HSSE/HSS PM FINISHERS

MULTI FLUTES SQUARE END | HIGH HELIX
LIST 3N05 HSS - PM

for Slotting and Peripheral Finishing Operations

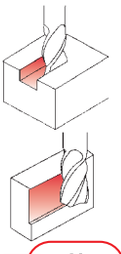
HSS-PM | 45°

DIN-844 Standard

Uncoated WW

TiCN CW

TiAlN LW



Al

AlSi

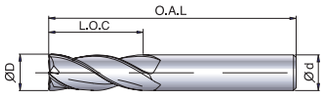
St S

Ti

INCONEL

30>ST HRc

D(e8)	d	L.O.C	O.A.L	Z	ITEM No.
6	6	13	57	3	**3N0506002**
8	10	19	69	3	**3N0508004**
10	10	22	72	3	**3N0510004**
12	12	26	83	3	**3N0512005**
16	16	32	92	3	**3N0516006**
20	20	38	104	3	**3N0520007**
25	25	45	121	4	**3N0525008**



CORNER ROUNDING CUTTER
LIST 5870 HSS Co

for Corner Radius Milling

HSS-M42

DIN 6518 Standard

Uncoated ** WW

GENERAL PURPOSE

d	O.A.L	R	ITEM No.
8	60	1	**587000010**
10	60	2	**587000020**
12	60	3	**587000030**
14	60	4	**587000040**
16	60	5	**587000050**
20	64	6	**587000060**
24	64	7	**587000070**
24	73	8	**587000080**
28	79	10	**587000100**
35	83	12	**587000120**
42	90	14	**587000140**
48	90	16	**587000160**

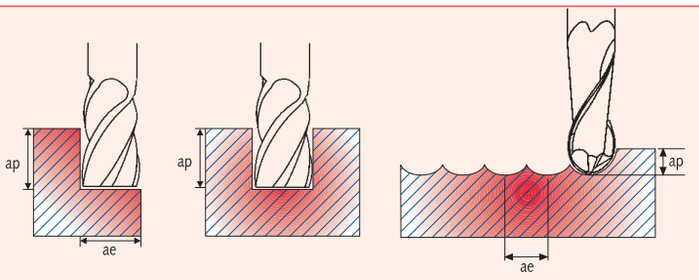
RECOMMENDED WORKING DETAILS

FORMULAS

Cutting Speed	$V_c = \frac{D \times \pi \times n}{1000}$ (m/min)	
Spindle Speed	$n = \frac{V_c \times 1000}{\pi \times d}$ (1/min)	
Feed per Tooth	$f_z = \frac{V_f}{z \times n}$ (mm)	
Table Feed	$V_f = fz \times z \times n$ (mm/min)	

Formula Symbols:

D (mm)	Tool diameter
z	No. of Flutes
V_c (m/min)	Cutting Speed
F_z (mm)	Feed per Tooth
n (1/min)	Spindle Speed
V_f (mm/min)	Table Feed
π	3.1416



SIDE MILLING **SLOTTING** **PROFILING**

LISTS 1602 / 1612

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm								
		Side Milling		Slotting	m/min	m/min	m/min	m/min									
	HRc	ap	ae	ap	Uncoated	TiN	TiCN	TiAlN	4	6	8	10	12	16	20	25	30
Steels	<20			0.5xD	30	55	70	80	0.018	0.030	0.050	0.070	0.080	0.095	0.100	0.100	0.120
Steels	20-32			0.5xD	25	45	55	60	0.014	0.024	0.040	0.056	0.067	0.085	0.100	0.100	0.110
Steels	32-42			0.5xD	10	20	25	30	0.012	0.020	0.034	0.040	0.060	0.080	0.100	0.100	0.110
Cast Iron <180 HB				0.5xD	25	45	55	60	0.014	0.024	0.040	0.056	0.067	0.085	0.100	0.100	0.110
Cast Iron >180 HB				0.5xD	10	20	25	30	0.012	0.020	0.034	0.040	0.060	0.080	0.100	0.100	0.110
Stainless Steels				0.5xD	15	30	40	45	0.012	0.020	0.034	0.040	0.060	0.080	0.100	0.100	0.110
Titanium				0.5xD	15	30	40	45	0.012	0.020	0.034	0.040	0.060	0.080	0.100	0.100	0.110
High Temperature Alloys				0.25XD	6	7	9	12	0.006	0.011	0.080	0.030	0.035	0.045	0.060	0.080	0.090

LIST 1N02

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm						
		Side Milling		Slotting	m/min	m/min	m/min							
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	4	6	8	10	12	16	20
Steels	<20			0.5XD	25	55	65	0.011	0.029	0.051	0.064	0.070	0.093	0.124
Steels	20-32			0.5XD	20	50	55	0.008	0.021	0.035	0.050	0.063	0.084	0.105
Steels	32-42			0.5XD	18	48	50	0.010	0.024	0.042	0.058	0.070	0.089	0.105
Cast Iron <180 HB				0.5XD	20	50	55	0.008	0.021	0.035	0.050	0.063	0.084	0.105
Cast Iron >180 HB				0.5XD	18	48	50	0.010	0.024	0.042	0.058	0.070	0.089	0.105
Stainless Steels				0.5XD	12	30	35	0.008	0.021	0.035	0.050	0.063	0.084	0.105
Titanium				0.5XD	10	15	30	0.008	0.021	0.035	0.050	0.063	0.084	0.105
High Temperature Alloys				0.25XD	7	11	15	0.006	0.021	0.031	0.047	0.058	0.075	0.094

LISTS 1605 / 1615

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm								
		Side Milling		Slotting	m/min	m/min	m/min	m/min									
	HRc	ap	ae	ap	Uncoated	TiN	TiCN	TiAlN	4	6	8	10	12	16	20	25	30
Steels	<20	1.5XD	0.1XD		30	55	70	80	0.014	0.025	0.044	0.550	0.060	0.080	0.106	0.120	0.126
Steels	20-32	1.5XD	0.1XD		25	45	55	60	0.010	0.018	0.030	0.043	0.054	0.072	0.090	0.106	0.120
Steels	32-42	1.5XD	0.1XD		10	20	25	30	0.013	0.021	0.036	0.050	0.060	0.076	0.090	0.106	0.120
Cast Iron <180 HB		1.5XD	0.1XD		25	45	55	60	0.010	0.018	0.030	0.043	0.054	0.072	0.090	0.106	0.120
Cast Iron >180 HB		1.5XD	0.1XD		10	20	25	30	0.013	0.021	0.036	0.050	0.060	0.076	0.090	0.106	0.120
Stainless Steels		1.5XD	0.1XD		15	30	40	45	0.010	0.018	0.030	0.043	0.054	0.072	0.090	0.106	0.120
Titanium		1.5XD	0.1XD		15	30	40	45	0.010	0.018	0.030	0.043	0.054	0.072	0.090	0.106	0.120
High Temperature Alloys		1.5XD	0.1XD		6	7	9	12	0.008	0.018	0.027	0.040	0.050	0.064	0.081	0.090	0.120

RECOMMENDED WORKING DETAILS

LIST 1634JJ

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm								
		Side Milling		Slotting	m/min	m/min	m/min	m/min									
	HRc	ap	ae	ap	Uncoated	TiN	TiCN	TiAlN	4	6	8	10	12	16	20	25	30
Steels	<20	1.5XD	0.1XD	0.5XD	30	55	70	80	0.011	0.020	0.035	0.044	0.048	0.064	0.086	0.098	0.103
Steels	20-32	1.5XD	0.1XD		25	45	55	60	0.008	0.014	0.024	0.034	0.043	0.058	0.073	0.086	0.098
Steels	32-42	1.5XD	0.1XD		10	20	25	30	0.010	0.017	0.029	0.040	0.048	0.061	0.073	0.086	0.098
Cast Iron <180 HB		1.5XD	0.1XD		25	45	55	60	0.008	0.014	0.024	0.034	0.043	0.058	0.073	0.086	0.098
Cast Iron >180 HB		1.5XD	0.1XD		10	20	25	30	0.010	0.017	0.029	0.040	0.048	0.061	0.073	0.086	0.098
Stainless Steels		1.5XD	0.1XD		15	30	40	45	0.008	0.014	0.024	0.034	0.043	0.058	0.073	0.086	0.098
Titanium		1.5XD	0.1XD		15	30	40	45	0.008	0.014	0.024	0.034	0.043	0.058	0.073	0.086	0.098
High Temperature Alloys		1.5XD	0.1XD		6	7	9	12	0.006	0.014	0.022	0.032	0.040	0.051	0.066	0.073	0.080

LIST 1625

Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm								
		Side Milling		Slotting	m/min	m/min	m/min	m/min									
	HRc	ap	ae	ap	Uncoated	TiN	TiCN	TiAlN	4	6	8	10	12	16	20	25	30
Steels	<20	1.5XD	0.1XD		30	55	70	80	0.007	0.012	0.022	0.027	0.030	0.040	0.053	0.060	0.063
Steels	20-32	1.5XD	0.1XD		25	45	55	60	0.005	0.009	0.015	0.021	0.027	0.036	0.045	0.053	0.060
Steels	32-42	1.5XD	0.1XD		10	20	25	30	0.006	0.010	0.018	0.025	0.030	0.038	0.045	0.053	0.060
Cast Iron <180 HB		1.5XD	0.1XD		25	45	55	60	0.005	0.009	0.015	0.021	0.027	0.036	0.045	0.053	0.060
Cast Iron >180 HB		1.5XD	0.1XD		10	20	25	30	0.006	0.010	0.018	0.025	0.030	0.038	0.045	0.053	0.060
Stainless Steels		1.5XD	0.1XD		15	30	40	45	0.005	0.009	0.015	0.021	0.027	0.036	0.045	0.053	0.055
Titanium		1.5XD	0.1XD		15	30	40	45	0.005	0.009	0.015	0.021	0.027	0.036	0.045	0.053	0.055
High Temperature Alloys		1.5XD	0.1XD		6	7	9	12	0.004	0.009	0.013	0.020	0.025	0.032	0.040	0.045	0.050

LIST 1N0M

Material	Application			Cutting Speed	fz- Feed Per Tooth in mm D- Diameter in mm												
	Side milling		Slotting	m/min													
	ap	ae	ap	TiAlN	3	4	5	6	8	10	12	14	16	18	20	25	30
Easy to cut stainless steels (304)	1XD	0.5XD	1XD	30~40	0.035	0.039	0.041	0.045	0.056	0.067	0.073	0.075	0.078	0.081	0.084	0.086	0.099
Moderately difficult to stainless steels	1XD	0.5XD	1XD	25~35	0.028	0.031	0.035	0.039	0.050	0.056	0.062	0.065	0.067	0.073	0.073	0.081	0.093
Difficult to cut stainless steels (316L)	1XD	0.5XD	1XD	15~30	0.025	0.028	0.031	0.034	0.045	0.050	0.056	0.060	0.062	0.067	0.067	0.069	0.079
Titanium	1XD	0.5XD	1XD	15~25	0.010	0.012	0.015	0.019	0.030	0.030	0.043	0.050	0.055	0.062	0.062	0.063	0.073
Soft Steels	1XD	0.5XD	1XD	40~60	0.033	0.040	0.050	0.060	0.080	0.090	0.100	0.110	0.120	0.120	0.125	0.130	0.132
High temperature alloys	1XD	0.3XD	0.5XD	8~15	0.013	0.017	0.020	0.022	0.034	0.034	0.045	0.042	0.050	0.056	0.067	0.081	0.093
Gray Cast Iron	1XD	0.4XD	1XD	40~50	0.034	0.038	0.041	0.045	0.067	0.067	0.078	0.080	0.084	0.090	0.101	0.115	0.132
Aluminium	1XD	0.5XD	1XD	120~150	0.040	0.045	0.050	0.060	0.080	0.100	0.120	0.150	0.017	0.170	0.180	0.190	0.200

LISTS 1N05 / 1N07

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm								
		Side Milling		Slotting	m/min	m/min	m/min									
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	4	6	8	10	12	16	20	25	30
Steels	<20	1.5XD	0.1XD		25	55	65	0.011	0.022	0.040	0.050	0.060	0.077	0.090	0.099	0.100
Steels	20-32	1.5XD	0.1XD		20	50	55	0.008	0.013	0.022	0.032	0.040	0.053	0.066	0.072	0.080
Steels	32-42	1.5XD	0.1XD		18	48	50	0.010	0.018	0.032	0.042	0.054	0.072	0.072	0.099	0.100
Cast Iron <180 HB		1.5XD	0.1XD		20	50	55	0.008	0.013	0.022	0.032	0.040	0.053	0.066	0.072	0.100
Cast Iron >180 HB		1.5XD	0.1XD		18	48	50	0.010	0.018	0.032	0.042	0.054	0.072	0.072	0.099	0.100
Stainless Steels		1.5XD	0.1XD		12	30	35	0.008	0.016	0.027	0.040	0.054	0.063	0.080	0.090	0.100
Titanium		1.5XD	0.1XD		10	15	30	0.008	0.016	0.027	0.040	0.054	0.063	0.080	0.090	0.100
High Temperature Alloys		1.5XD	0.1XD		7	11	15	0.006	0.018	0.027	0.040	0.050	0.063	0.080	0.090	0.100

RECOMMENDED WORKING DETAILS

LISTS 3605 /3615

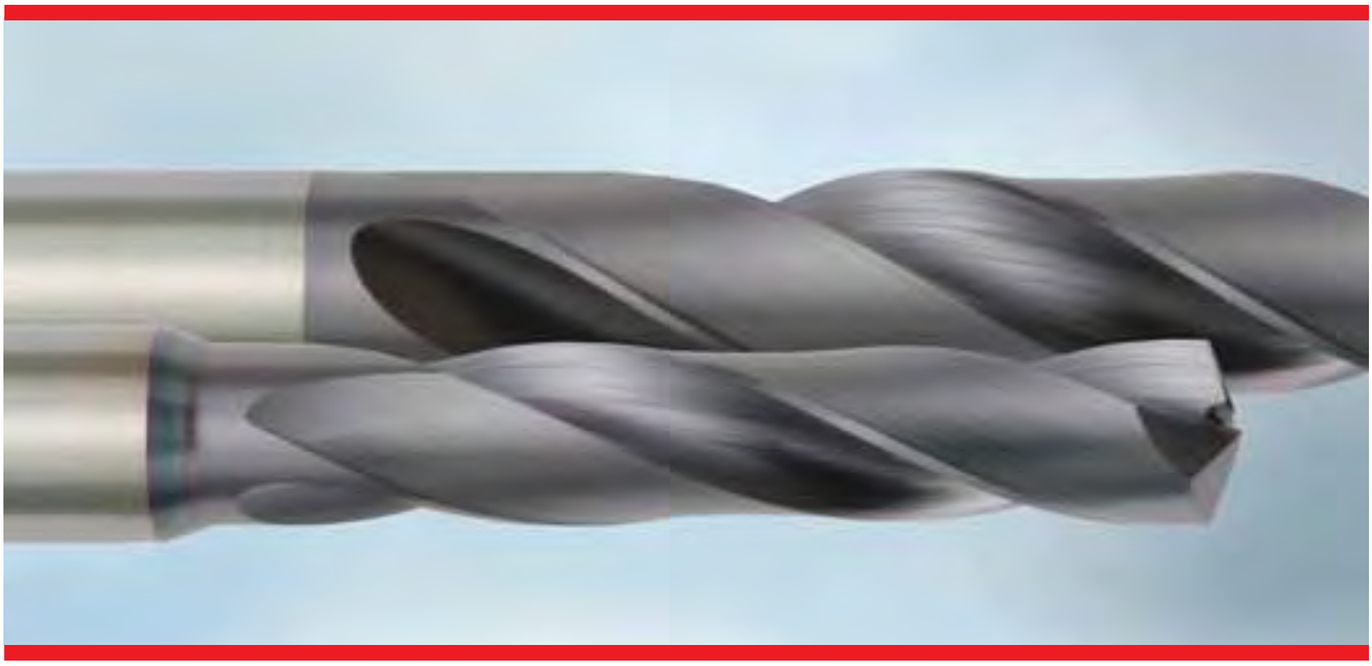
Material	Rockwell Hardness	Application			Vc-Cutting Speed				fz-feed per tooth in mm D - diameter in mm								
		Side Milling		Slotting	m/min	m/min	m/min	m/min									
	HRc	ap	ae	ap	Uncoated	TiN	TiCN	TiAlN	4	6	8	10	12	16	20	25	30
Steels	<20	1.5XD	0.1XD	0.5XD	30	55	70	80	0.011	0.029	0.051	0.064	0.070	0.093	0.124	0.124	0.124
Steels	20-32	1.5XD	0.1XD	0.3XD	25	45	55	60	0.008	0.021	0.035	0.050	0.063	0.084	0.105	0.105	0.105
Steels	32-42	1.5XD	0.1XD		10	20	25	30	0.010	0.024	0.042	0.058	0.070	0.089	0.105	0.105	0.110
Cast Iron <180 HB		1.5XD	0.1XD		25	45	55	60	0.008	0.021	0.035	0.050	0.063	0.084	0.105	0.105	0.110
Cast Iron >180 HB		1.5XD	0.1XD		10	20	25	30	0.010	0.024	0.042	0.058	0.070	0.089	0.105	0.105	0.110
Stainless Steels		1.5XD	0.1XD	0.5XD	15	30	40	45	0.008	0.021	0.035	0.050	0.063	0.084	0.105	0.105	0.110
Titanium		1.5XD	0.1XD		15	30	40	45	0.008	0.021	0.035	0.050	0.063	0.084	0.105	0.105	0.110
High Temperature Alloys		1.5XD	0.1XD		6	7	9	12	0.006	0.021	0.031	0.047	0.058	0.075	0.094	0.105	0.110

LIST 3N05

Material	Rockwell Hardness	Application			Vc-Cutting Speed			fz-feed per tooth in mm D - diameter in mm								
		Side Milling		Slotting	m/min	m/min	m/min									
	HRc	ap	ae	ap	Uncoated	TiCN	TiAlN	4	6	8	10	12	16	20	25	30
Steels	<20	1.5XD	0.1XD		25	55	65	0.011	0.022	0.040	0.050	0.060	0.077	0.090	0.099	0.100
Steels	20-32	1.5XD	0.1XD		20	50	55	0.008	0.013	0.022	0.032	0.040	0.053	0.066	0.072	0.080
Steels	32-42	1.5XD	0.1XD		18	48	50	0.010	0.018	0.032	0.042	0.054	0.072	0.072	0.099	0.100
Cast Iron <180 HB		1.5XD	0.1XD		20	50	55	0.008	0.013	0.022	0.032	0.040	0.053	0.066	0.072	0.100
Cast Iron >180 HB		1.5XD	0.1XD		18	48	50	0.010	0.018	0.032	0.042	0.054	0.072	0.072	0.099	0.100
Stainless Steels		1.5XD	0.1XD		12	30	35	0.008	0.016	0.027	0.040	0.054	0.063	0.080	0.090	0.100
Titanium		1.5XD	0.1XD		10	15	30	0.008	0.016	0.027	0.040	0.054	0.063	0.080	0.090	0.100
High Temperature Alloys		1.5XD	0.1XD		7	11	15	0.006	0.018	0.027	0.040	0.050	0.063	0.080	0.090	0.100

NOTE
Data shown is the result of actual machining tests and is suggested as a starting point.
Do sensitivity analyses to achieve optimum results.
The tests were run on an optimal machining environment.

CARBIDE DRILLS



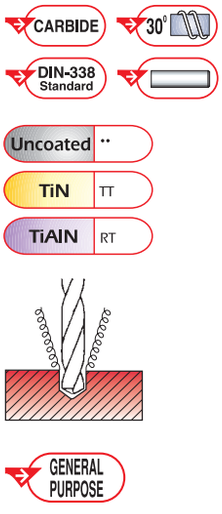
The perfect solution for high performance hole-making. Hanita's unique geometry and point styles provide high throughput, high accuracy and consistent performance in large variety of materials all the way up to hardened steels with 68 HRc. Available in over 1000 standard diameters of solid and coolant hole style drills.

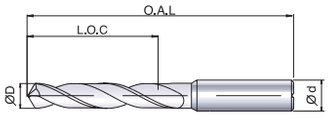
- Provides exceptional tool life, while working at high speeds and feeds.
- Provides high quality dimensional tolerances and hole to hole accuracy.
- Reinforced shank for toughness and strength.
- Easy to regrind.
- Coolant hole drills offered in small diameters, starting at 3 mm (1/8").
- Specials, including step drills are available.

JOBBER DRILL | POINT 118°

for General Purpose Drilling

LIST M112





D(h7)	d	L.O.C	O.A.L	Z	ITEM No.
1	1	12	34	2	**M11201000**
1.1	1.1	14	36	2	**M11201100**
1.2	1.2	16	38	2	**M11201200**
1.3	1.3	16	38	2	**M11201300**
1.4	1.4	18	40	2	**M11201400**
1.5	1.5	18	40	2	**M11201500**
1.6	1.6	20	43	2	**M11201600**
1.7	1.7	20	43	2	**M11201700**
1.8	1.8	22	46	2	**M11201800**
1.9	1.9	22	46	2	**M11201900**
2	2	24	49	2	**M11202000**
2.1	2.1	24	49	2	**M11202100**
2.2	2.2	27	53	2	**M11202200**
2.3	2.3	27	53	2	**M11202300**
2.4	2.4	30	57	2	**M11202400**
2.5	2.5	30	57	2	**M11202500**
2.6	2.6	30	57	2	**M11202600**
2.7	2.7	33	61	2	**M11202700**
2.8	2.8	33	61	2	**M11202800**
2.9	2.9	33	61	2	**M11202900**
3	3	33	61	2	**M11203000**
3.1	3.1	36	65	2	**M11203100**
3.2	3.2	36	65	2	**M11203200**
3.3	3.3	36	65	2	**M11203300**
3.4	3.4	39	70	2	**M11203400**
3.5	3.5	39	70	2	**M11203500**
3.6	3.6	39	70	2	**M11203600**
3.7	3.7	39	70	2	**M11203700**
3.8	3.8	43	75	2	**M11203800**
3.9	3.9	43	75	2	**M11203900**
4	4	43	75	2	**M11204000**
4.1	4.1	43	75	2	**M11204100**
4.2	4.2	43	75	2	**M11204200**
4.3	4.3	47	80	2	**M11204300**
4.4	4.4	47	80	2	**M11204400**
4.5	4.5	47	80	2	**M11204500**
4.6	4.6	47	80	2	**M11204600**
4.7	4.7	47	80	2	**M11204700**
4.8	4.8	52	86	2	**M11204800**
4.9	4.9	52	86	2	**M11204900**
5	5	52	86	2	**M11205000**
5.1	5.1	52	86	2	**M11205100**
5.2	5.2	52	86	2	**M11205200**
5.3	5.3	52	86	2	**M11205300**
5.4	5.4	57	93	2	**M11205400**
5.5	5.5	57	93	2	**M11205500**
5.6	5.6	57	93	2	**M11205600**
5.7	5.7	57	93	2	**M11205700**
5.8	5.8	57	93	2	**M11205800**
5.9	5.9	57	93	2	**M11205900**
6	6	57	93	2	**M11206000**
6.1	6.1	63	101	2	**M11206100**
6.2	6.2	63	101	2	**M11206200**
6.3	6.3	63	101	2	**M11206300**
6.4	6.4	63	101	2	**M11206400**
6.5	6.5	63	101	2	**M11206500**
6.6	6.6	63	101	2	**M11206600**

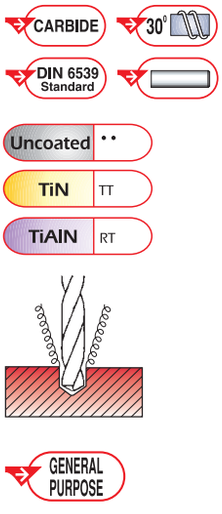
D(h7)	d	L.O.C	O.A.L	Z	ITEM No.
6.7	6.7	63	101	2	**M11206700**
6.8	6.8	69	109	2	**M11206800**
6.9	6.9	69	109	2	**M11206900**
7	7	69	109	2	**M11207000**
7.1	7.1	69	109	2	**M11207100**
7.2	7.2	69	109	2	**M11207200**
7.3	7.3	69	109	2	**M11207300**
7.4	7.4	69	109	2	**M11207400**
7.5	7.5	69	109	2	**M11207500**
7.6	7.6	75	117	2	**M11207600**
7.7	7.7	75	117	2	**M11207700**
7.8	7.8	75	117	2	**M11207800**
7.9	7.9	75	117	2	**M11207900**
8	8	75	117	2	**M11208000**
8.1	8.1	75	117	2	**M11208100**
8.2	8.2	75	117	2	**M11208200**
8.3	8.3	75	117	2	**M11208300**
8.4	8.4	75	117	2	**M11208400**
8.5	8.5	75	117	2	**M11208500**
8.6	8.6	81	125	2	**M11208600**
8.7	8.7	81	125	2	**M11208700**
8.8	8.8	81	125	2	**M11208800**
8.9	8.9	81	125	2	**M11208900**
9	9	81	125	2	**M11209000**
9.1	9.1	81	125	2	**M11209100**
9.2	9.2	81	125	2	**M11209200**
9.3	9.3	81	125	2	**M11209300**
9.4	9.4	81	125	2	**M11209400**
9.5	9.5	81	125	2	**M11209500**
9.6	9.6	87	133	2	**M11209600**
9.7	9.7	87	133	2	**M11209700**
9.8	9.8	87	133	2	**M11209800**
9.9	9.9	87	133	2	**M11209900**
10	10	87	133	2	**M11210000**
10.2	10.2	87	133	2	**M11210200**
10.5	10.5	87	133	2	**M11210500**
10.8	10.8	94	142	2	**M11210800**
11	11	94	142	2	**M11211000**
11.5	11.5	94	142	2	**M11211500**
12	12	101	151	2	**M11212000**
12.5	12.5	101	151	2	**M11212500**
13	13	101	151	2	***M11213000**
13.5	13.5	108	160	2	***M11213500**
14	14	108	160	2	***M11214000**
14.5	14.5	114	169	2	***M11214500**
15	15	114	169	2	***M11215000**
15.5	15.5	120	178	2	***M11215500**
16	16	120	178	2	***M11216000**
16.5	16.5	125	184	2	***M11216500**
17	17	125	184	2	***M11217000**
17.5	17.5	130	191	2	***M11217500**
18	18	130	191	2	***M11218000**
18.5	18.5	135	198	2	***M11218500**
19	19	135	198	2	***M11219000**
19.5	19.5	140	205	2	***M11219500**
20	20	140	205	2	***M11220000**

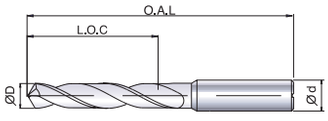
* Non stock items available upon request

STUB LENGTH DRILL | POINT 118°

for General Purpose Drilling

LIST M132





D(h7)	d	L.O.C	O.A.L	Z	ITEM No.
0.5	0.5	6	26	2	M13200500
0.6	0.6	6	26	2	M13200600
0.7	0.7	6	26	2	M13200700
0.8	0.8	6	26	2	M13200800
0.9	0.9	6	26	2	M13200900
1	1	6	26	2	M13201000
1.1	1.1	7	28	2	M13201100
1.2	1.2	8	30	2	M13201200
1.3	1.3	8	30	2	M13201300
1.4	1.4	9	32	2	M13201400
1.5	1.5	9	32	2	M13201500
1.6	1.6	10	34	2	M13201600
1.7	1.7	10	34	2	M13201700
1.8	1.8	11	36	2	M13201800
1.9	1.9	11	36	2	M13201900
2	2	12	38	2	M13202000
2.1	2.1	12	38	2	M13202100
2.2	2.2	13	40	2	M13202200
2.3	2.3	13	40	2	M13202300
2.4	2.4	14	43	2	M13202400
2.5	2.5	14	43	2	M13202500
2.6	2.6	14	43	2	M13202600
2.7	2.7	16	46	2	M13202700
2.8	2.8	16	46	2	M13202800
2.9	2.9	16	46	2	M13202900
3	3	16	46	2	M13203000
3.1	3.1	18	49	2	M13203100
3.2	3.2	18	49	2	M13203200
3.3	3.3	18	49	2	M13203300
3.4	3.4	20	52	2	M13203400
3.5	3.5	20	52	2	M13203500
3.6	3.6	20	52	2	M13203600
3.7	3.7	20	52	2	M13203700
3.8	3.8	22	55	2	M13203800
3.9	3.9	22	55	2	M13203900
4	4	22	55	2	M13204000
4.1	4.1	22	55	2	M13204100
4.2	4.2	22	55	2	M13204200
4.3	4.3	24	58	2	M13204300
4.4	4.4	24	58	2	M13204400
4.5	4.5	24	58	2	M13204500
4.6	4.6	24	58	2	M13204600
4.7	4.7	24	58	2	M13204700
4.8	4.8	26	62	2	M13204800
4.9	4.9	26	62	2	M13204900
5	5	26	62	2	M13205000
5.1	5.1	26	62	2	M13205100
5.2	5.2	26	62	2	M13205200
5.3	5.3	26	62	2	M13205300
5.4	5.4	28	66	2	M13205400
5.5	5.5	28	66	2	M13205500
5.6	5.6	28	66	2	M13205600
5.7	5.7	28	66	2	M13205700
5.8	5.8	28	66	2	M13205800
5.9	5.9	28	66	2	M13205900
6	6	28	66	2	M13206000
6.1	6.1	31	70	2	M13206100
6.2	6.2	31	70	2	M13206200
6.3	6.3	31	70	2	M13206300

D(h7)	d	L.O.C	O.A.L	Z	ITEM No.
6.4	6.4	31	70	2	**M13206400**
6.5	6.5	31	70	2	**M13206500**
6.6	6.6	31	70	2	**M13206600**
6.7	6.7	31	70	2	**M13206700**
6.8	6.8	34	74	2	**M13206800**
6.9	6.9	34	74	2	**M13206900**
7	7	34	74	2	**M13207000**
7.1	7.1	34	74	2	**M13207100**
7.2	7.2	34	74	2	**M13207200**
7.3	7.3	34	74	2	**M13207300**
7.4	7.4	34	74	2	**M13207400**
7.5	7.5	34	74	2	**M13207500**
7.6	7.6	37	79	2	**M13207600**
7.7	7.7	37	79	2	**M13207700**
7.8	7.8	37	79	2	**M13207800**
7.9	7.9	37	79	2	**M13207900**
8	8	37	79	2	**M13208000**
8.1	8.1	37	79	2	**M13208100**
8.2	8.2	37	79	2	**M13208200**
8.3	8.3	37	79	2	**M13208300**
8.4	8.4	37	79	2	**M13208400**
8.5	8.5	37	79	2	**M13208500**
8.6	8.6	40	84	2	**M13208600**
8.7	8.7	40	84	2	**M13208700**
8.8	8.8	40	84	2	**M13208800**
8.9	8.9	40	84	2	**M13208900**
9	9	40	84	2	**M13209000**
9.1	9.1	40	84	2	**M13209100**
9.2	9.2	40	84	2	**M13209200**
9.3	9.3	40	84	2	**M13209300**
9.4	9.4	40	84	2	**M13209400**
9.5	9.5	40	84	2	**M13209500**
9.6	9.6	43	89	2	**M13209600**
9.7	9.7	43	89	2	**M13209700**
9.8	9.8	43	89	2	**M13209800**
9.9	9.9	43	89	2	**M13209900**
10	10	43	89	2	**M13210000**
10.2	10.2	43	89	2	**M13210200**
10.5	10.5	43	89	2	**M13210500**
10.8	10.8	47	95	2	**M13210800**
11	11	47	95	2	**M13211000**
11.5	11.5	47	95	2	**M13211500**
11.8	11.8	47	95	2	**M13211800**
12	12	51	102	2	**M13212000**
12.5	12.5	51	102	2	**M13212500**
13	13	51	102	2	***M13213000**
13.5	13.5	54	107	2	***M13213500**
14	14	54	107	2	***M13214000**
14.5	14.5	56	111	2	***M13214500**
15	15	56	111	2	***M13215000**
15	15	58	115	2	***M13215500**
16	16	58	115	2	***M13216000**
16.5	16.5	60	119	2	***M13216500**
17	17	60	119	2	***M13217000**
17.5	17.5	62	123	2	***M13217500**
18	18	62	123	2	***M13218000**
18.5	18.5	64	127	2	***M13218500**
19	19	64	127	2	***M13219000**
19.5	19.5	66	131	2	***M13219500**
20	20	66	131	2	***M13220000**

* Non stock items available upon request

3 FLUTES STUB LENGTH DRILL | POINT 135°

for Shallow Depth Holes with Self Centering

LIST M133

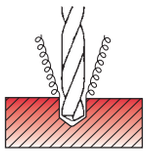
CARBIDE

30°

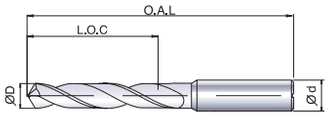
DIN 6539 Standard

Uncoated

TiAlN RT



GENERAL PURPOSE



D(h7)	d	L.O.C	O.A.L	Z	ITEM No.
3	3	16	46	3	M13303000
3.1	3.1	18	49	3	M13303100
3.2	3.2	18	49	3	M13303200
3.3	3.3	18	49	3	M13303300
3.4	3.4	20	52	3	M13303400
3.5	3.5	20	52	3	M13303500
3.6	3.6	20	52	3	M13303600
3.7	3.7	20	52	3	M13303700
3.8	3.8	22	55	3	M13303800
3.9	3.9	22	55	3	M13303900
4	4	22	55	3	M13304000
4.1	4.1	22	55	3	M13304100
4.2	4.2	22	55	3	M13304200
4.3	4.3	24	58	3	M13304300
4.4	4.4	24	58	3	M13304400
4.5	4.5	24	58	3	M13304500
4.6	4.6	24	58	3	M13304600
4.7	4.7	24	58	3	M13304700
4.8	4.8	26	62	3	M13304800
4.9	4.9	26	62	3	M13304900
5	5	26	62	3	M13305000
5.1	5.1	26	62	3	M13305100
5.2	5.2	26	62	3	M13305200
5.3	5.3	26	62	3	M13305300
5.5	5.5	28	66	3	M13305500
5.6	5.6	28	66	3	M13305600
5.8	5.8	28	66	3	M13305800
6	6	28	66	3	M13306000
6.1	6.1	31	70	3	M13306100
6.2	6.2	31	70	3	M13306200
6.3	6.3	31	70	3	M13306300
6.5	6.5	31	70	3	M13306500
6.6	6.6	31	70	3	M13306600
6.7	6.7	31	70	3	M13306700
6.8	6.8	34	74	3	M13306800
6.9	6.9	34	74	3	M13306900
7	7	34	74	3	M13307000
7.1	7.1	34	74	3	M13307100
7.2	7.2	34	74	3	M13307200
7.3	7.3	34	74	3	M13307300
7.4	7.4	34	74	3	M13307400
7.5	7.5	34	74	3	M13307500
7.6	7.6	37	79	3	M13307600
7.7	7.7	37	79	3	M13307700
7.8	7.8	37	79	3	M13307800
7.9	7.9	37	79	3	M13307900
8	8	37	79	3	M13308000
8.1	8.1	37	79	3	M13308100
8.2	8.2	37	79	3	M13308200
8.3	8.3	37	79	3	M13308300
8.4	8.4	37	79	3	M13308400
8.5	8.5	37	79	3	M13308500
8.6	8.6	40	84	3	M13308600
8.7	8.7	40	84	3	M13308700
8.8	8.8	40	84	3	M13308800
8.9	8.9	40	84	3	M13308900
9	9	40	84	3	M13309000
9.1	9.1	40	84	3	M13309100
9.2	9.2	40	84	3	M13309200
9.3	9.3	40	84	3	M13309300

D(h7)	d	L.O.C	O.A.L	Z	ITEM No.
9.4	9.4	40	84	3	**M13309400**
9.5	9.5	40	84	3	**M13309500**
9.6	9.6	43	89	3	**M13309600**
9.7	9.7	43	89	3	**M13309700**
9.8	9.8	43	89	3	**M13309800**
9.9	9.9	43	89	3	**M13309900**
10	10	43	89	3	**M13310000**
10.2	10.2	43	89	3	**M13310200**
10.5	10.5	43	89	3	**M13310500**
10.8	10.8	47	95	3	**M13310800**
11	11	47	95	3	**M13311000**
11.5	11.5	47	95	3	**M13311500**
12	12	51	102	3	**M13312000**
12.5	12.5	51	102	3	**M13312500**
13	13	51	102	3	***M13313000**
13.5	13.5	54	107	3	***M13313500**
14	14	54	107	3	***M13314000**
14.5	14.5	56	111	3	***M13314500**
15	15	56	111	3	***M13315000**
15.5	15.5	58	115	3	***M13315500**
16	16	58	115	3	***M13316000**
16.5	16.5	60	119	3	***M13316500**
17.5	17.5	62	123	3	***M13317500**
18	18	62	123	3	***M13318000**
18.5	18.5	64	127	3	***M13318500**
19	19	64	127	3	***M13319000**
19.5	19.5	66	131	3	***M13319500**
20	20	66	131	3	***M13320000**

* Non stock items available upon request

HIGH PERFORMANCE SHORT DRILL | POINT 140°

for Drilling Depth of 3XD

LIST M152

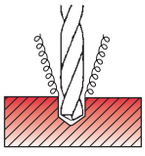
CARBIDE

30°

DIN 6537 Standard

TiN TN

TiAlN RN, RT



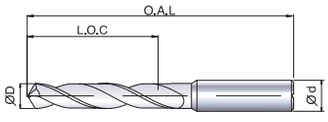
St S

Ti

INCONEL

ST>45 HRc

30<ST<45 HRc



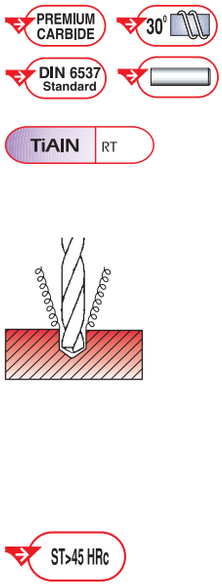
D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	20	62	2	M15203000
3	6	20	62	2	M15203100
3.2	6	20	62	2	M15203200
3.3	6	20	62	2	M15203300
3.4	6	20	62	2	M15203400
3.5	6	20	62	2	M15203500
3.6	6	20	62	2	M15203600
3.7	6	20	62	2	M15203700
3.8	6	24	66	2	M15203800
3.9	6	24	66	2	M15203900
4	6	24	66	2	M15204000
4.1	6	24	66	2	M15204100
4.2	6	24	66	2	M15204200
4.3	6	24	66	2	M15204300
4.4	6	24	66	2	M15204400
4.5	6	24	66	2	M15204500
4.6	6	24	66	2	M15204600
4.7	6	24	66	2	M15204700
4.8	6	28	66	2	M15204800
4.9	6	28	66	2	M15204900
5	6	28	66	2	M15205000
5.1	6	28	66	2	M15205100
5.2	6	28	66	2	M15205200
5.3	6	28	66	2	M15205300
5.4	6	28	66	2	M15205400
5.5	6	28	66	2	M15205500
5.6	6	28	66	2	M15205600
5.7	6	28	66	2	M15205700
5.8	6	28	66	2	M15205800
5.9	6	28	66	2	M15205900
6	6	28	66	2	M15206000
6.1	8	34	79	2	M15206100
6.2	8	34	79	2	M15206200
6.3	8	34	79	2	M15206300
6.4	8	34	79	2	M15206400
6.5	8	34	79	2	M15206500
6.6	8	34	79	2	M15206600
6.7	8	34	79	2	M15206700
6.8	8	34	79	2	M15206800
6.9	8	34	79	2	M15206900
7	8	34	79	2	M15207000
7.1	8	41	79	2	M15207100
7.2	8	41	79	2	M15207200
7.3	8	41	79	2	M15207300
7.4	8	41	79	2	M15207400
7.5	8	41	79	2	M15207500
7.6	8	41	79	2	M15207600
7.7	8	41	79	2	M15207700
7.8	8	41	79	2	M15207800
7.9	8	41	79	2	M15207900
8	8	41	79	2	M15208000
8.1	10	47	89	2	M15208100
8.2	10	47	89	2	M15208200
8.3	10	47	89	2	M15208300
8.4	10	47	89	2	M15208400
8.5	10	47	89	2	M15208500
8.6	10	47	89	2	M15208600

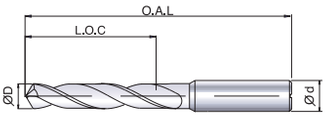
D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
8.7	10	47	89	2	M15208700
8.8	10	47	89	2	M15208800
8.9	10	47	89	2	M15208900
9	10	47	89	2	M15209000
9.1	10	47	89	2	M15209100
9.2	10	47	89	2	M15209200
9.3	10	47	89	2	M15209300
9.4	10	47	89	2	M15209400
9.5	10	47	89	2	M15209500
9.6	10	47	89	2	M15209600
9.7	10	47	89	2	M15209700
9.8	10	47	89	2	M15209800
9.9	10	47	89	2	M15209900
10	10	47	89	2	M15210000
10.1	12	55	102	2	M15210100
10.2	12	55	102	2	M15210200
10.3	12	55	102	2	M15210300
10.4	12	55	102	2	M15210400
10.5	12	55	102	2	M15210500
10.6	12	55	102	2	M15210600
10.7	12	55	102	2	M15210700
10.8	12	55	102	2	M15210800
10.9	12	55	102	2	M15210900
11	12	55	102	2	M15211000
11.1	12	55	102	2	M15211100
11.2	12	55	102	2	M15211200
11.3	12	55	102	2	M15211300
11.4	12	55	102	2	M15211400
11.5	12	55	102	2	M15211500
11.6	12	55	102	2	M15211600
11.7	12	55	102	2	M15211700
11.8	12	55	102	2	M15211800
11.9	12	55	102	2	M15211900
12	12	55	102	2	M15212000
12.5	14	60	107	2	M15212500
12.8	14	60	107	2	M15212800
13	14	60	107	2	*M15213000
13.5	14	60	107	2	*M15213500
13.8	14	60	107	2	*M15213800
14	14	60	107	2	*M15214000
14.5	16	65	115	2	*M15214500
14.8	16	65	115	2	*M15214800
15	16	65	115	2	*M15215000
15.5	16	65	115	2	*M15215500
15.8	16	65	115	2	*M15215800
16	16	65	115	2	*M15216000
16.5	18	73	123	2	*M15216500
17	18	73	123	2	*M15217000
17.5	18	73	123	2	*M15217500
18	18	73	123	2	*M15218000
18.5	20	79	131	2	*M15218500
19	20	79	131	2	*M15219000
19.5	20	79	131	2	*M15219500
20	20	79	131	2	*M15220000

* Non stock items available upon request

HIGH PERFORMANCE SHORT DRILL | POINT 140° for Drilling Depth of 3XD for Ultra Hard Steels

LIST M155





D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	20	62	2	M15503000
3.1	6	20	62	2	M15503100
3.2	6	20	62	2	M15503200
3.3	6	20	62	2	M15503300
3.4	6	20	62	2	M15503400
3.5	6	20	62	2	M15503500
3.6	6	20	62	2	M15503600
3.7	6	24	66	2	M15503700
3.8	6	24	66	2	M15503800
3.9	6	24	66	2	M15503900
4	6	24	66	2	M15504000
4.1	6	24	66	2	M15504100
4.2	6	24	66	2	M15504200
4.3	6	24	66	2	M15504300
4.4	6	24	66	2	M15504400
4.5	6	24	66	2	M15504500
4.6	6	24	66	2	M15504600
4.7	6	24	66	2	M15504700
4.8	6	28	66	2	M15504800
4.9	6	28	66	2	M15504900
5	6	28	66	2	M15505000
5.1	6	28	66	2	M15505100
5.2	6	28	66	2	M15505200
5.3	6	28	66	2	M15505300
5.4	6	28	66	2	M15505400
5.5	6	28	66	2	M15505500
5.6	6	28	66	2	M15505600
5.7	6	28	66	2	M15505700
5.8	6	28	66	2	M15505800
5.9	6	28	66	2	M15505900
6	6	28	66	2	M15506000
6.1	8	34	79	2	M15506100
6.2	8	34	79	2	M15506200
6.3	8	34	79	2	M15506300
6.4	8	34	79	2	M15506400
6.5	8	34	79	2	M15506500
6.6	8	34	79	2	M15506600
6.7	8	34	79	2	M15506700
6.8	8	34	79	2	M15506800
6.9	8	34	79	2	M15506900
7	8	34	79	2	M15507000
7.1	8	41	79	2	M15507100
7.2	8	41	79	2	M15507200
7.3	8	41	79	2	M15507300
7.4	8	41	79	2	M15507400
7.5	8	41	79	2	M15507500
7.6	8	41	79	2	M15507600
7.7	8	41	79	2	M15507700
7.8	8	41	79	2	M15507800
7.9	8	41	79	2	M15507900
8	8	41	79	2	M15508000
8.1	10	47	89	2	M15508100
8.2	10	47	89	2	M15508200
8.3	10	47	89	2	M15508300
8.4	10	47	89	2	M15508400
8.5	10	47	89	2	M15508500
8.6	10	47	89	2	M15508600
8.7	10	47	89	2	M15508700

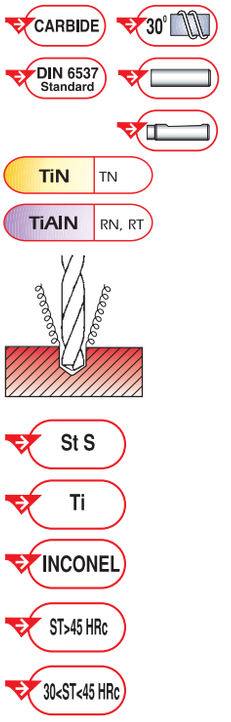
D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
8.8	10	47	89	2	M15508800
8.9	10	47	89	2	M15508900
9	10	47	89	2	M15509000
9.1	10	47	89	2	M15509100
9.2	10	47	89	2	M15509200
9.3	10	47	89	2	M15509300
9.4	10	47	89	2	M15509400
9.5	10	47	89	2	M15509500
9.6	10	47	89	2	M15509600
9.7	10	47	89	2	M15509700
9.8	10	47	89	2	M15509800
9.9	10	47	89	2	M15509900
10	10	47	89	2	M15510000
10.1	12	55	102	2	M15510100
10.2	12	55	102	2	M15510200
10.3	12	55	102	2	M15510300
10.4	12	55	102	2	M15510400
10.5	12	55	102	2	M15510500
10.6	12	55	102	2	M15510600
10.7	12	55	102	2	M15510700
10.8	12	55	102	2	M15510800
10.9	12	55	102	2	M15510900
11	12	55	102	2	M15511000
11.1	12	55	102	2	M15511100
11.2	12	55	102	2	M15511200
11.3	12	55	102	2	M15511300
11.4	12	55	102	2	M15511400
11.5	12	55	102	2	M15511500
11.6	12	55	102	2	M15511600
11.7	12	55	102	2	M15511700
11.8	12	55	102	2	M15511800
11.9	12	55	102	2	M15511900
12	12	55	102	2	M15512000
12.5	14	60	107	2	M15512500
12.8	14	60	107	2	*M15512800
13	14	60	107	2	*M15513000
13.5	14	60	107	2	*M15513500
13.8	14	60	107	2	*M15513800
14	14	60	107	2	*M15514000
14.5	16	65	115	2	*M15514500
14.8	16	65	115	2	*M15514800
15	16	65	115	2	*M15515000
15.5	16	65	115	2	*M15515500
16	16	65	115	2	*M15516000
16.5	18	73	123	2	*M15516500
17	18	73	123	2	*M15517000
17.5	18	73	123	2	*M15517500
18	18	73	123	2	*M15518000
18.5	20	79	131	2	*M15518500
19	20	79	131	2	*M15519000
19.5	20	79	131	2	*M15519500
20	20	79	131	2	*M15520000

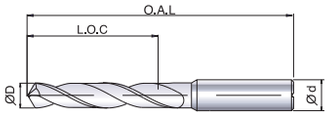
* Non stock items available upon request

HIGH PERFORMANCE LONG DRILL | POINT 140°

for Drilling Depth of 5XD

LIST M162





D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	28	66	2	M16203000
3.1	6	28	66	2	M16203100
3.2	6	28	66	2	M16203200
3.3	6	28	66	2	M16203300
3.4	6	28	66	2	M16203400
3.5	6	28	66	2	M16203500
3.6	6	28	66	2	M16203600
3.7	6	28	66	2	M16203700
3.8	6	36	74	2	M16203800
3.9	6	36	74	2	M16203900
4	6	36	74	2	M16204000
4.1	6	36	74	2	M16204100
4.2	6	36	74	2	M16204200
4.3	6	36	74	2	M16204300
4.4	6	36	74	2	M16204400
4.5	6	36	74	2	M16204500
4.6	6	36	74	2	M16204600
4.7	6	36	74	2	M16204700
4.8	6	44	82	2	M16204800
4.9	6	44	82	2	M16204900
5	6	44	82	2	M16205000
5.1	6	44	82	2	M16205100
5.2	6	44	82	2	M16205200
5.3	6	44	82	2	M16205300
5.4	6	44	82	2	M16205400
5.5	6	44	82	2	M16205500
5.6	6	44	82	2	M16205600
5.7	6	44	82	2	M16205700
5.8	6	44	82	2	M16205800
5.9	6	44	82	2	M16205900
6	6	44	82	2	M16206000
6.1	8	53	91	2	M16206100
6.2	8	53	91	2	M16206200
6.3	8	53	91	2	M16206300
6.4	8	53	91	2	M16206400
6.5	8	53	91	2	M16206500
6.6	8	53	91	2	M16206600
6.7	8	53	91	2	M16206700
6.8	8	53	91	2	M16206800
6.9	8	53	91	2	M16206900
7	8	53	91	2	M16207000
7.1	8	53	91	2	M16207100
7.2	8	53	91	2	M16207200
7.3	8	53	91	2	M16207300
7.4	8	53	91	2	M16207400
7.5	8	53	91	2	M16207500
7.6	8	53	91	2	M16207600
7.7	8	53	91	2	M16207700
7.8	8	53	91	2	M16207800
7.9	8	53	91	2	M16207900
8	8	53	91	2	M16208000
8.1	10	61	103	2	M16208100
8.2	10	61	103	2	M16208200
8.3	10	61	103	2	M16208300
8.4	10	61	103	2	M16208400
8.5	10	61	103	2	M16208500
8.6	10	61	103	2	M16208600

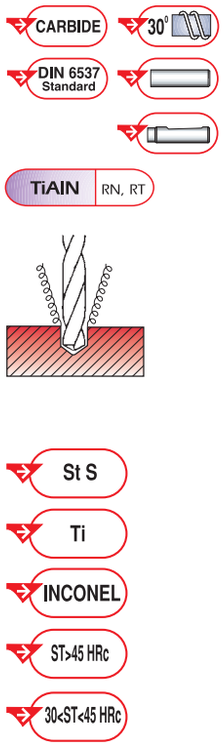
D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
8.7	10	61	103	2	M16208700
8.8	10	61	103	2	M16208800
8.9	10	61	103	2	M16208900
9	10	61	103	2	M16209000
9.1	10	61	103	2	M16209100
9.2	10	61	103	2	M16209200
9.3	10	61	103	2	M16209300
9.4	10	61	103	2	M16209400
9.5	10	61	103	2	M16209500
9.6	10	61	103	2	M16209600
9.7	10	61	103	2	M16209700
9.8	10	61	103	2	M16209800
9.9	10	61	103	2	M16209900
10	10	61	103	2	M16210000
10.1	12	71	118	2	M16210100
10.2	12	71	118	2	M16210200
10.3	12	71	118	2	M16210300
10.4	12	71	118	2	M16210400
10.5	12	71	118	2	M16210500
10.6	12	71	118	2	M16210600
10.7	12	71	118	2	M16210700
10.8	12	71	118	2	M16210800
10.9	12	71	118	2	M16210900
11	12	71	118	2	M16211000
11.1	12	71	118	2	M16211100
11.2	12	71	118	2	M16211200
11.3	12	71	118	2	M16211300
11.4	12	71	118	2	M16211400
11.5	12	71	118	2	M16211500
11.6	12	71	118	2	M16211600
11.7	12	71	118	2	M16211700
11.8	12	71	118	2	M16211800
11.9	12	71	118	2	M16211900
12	12	71	118	2	M16212000
12.5	14	77	124	2	M16212500
13	14	77	124	2	*M16213000
13.5	14	77	124	2	*M16213500
14	14	77	124	2	*M16214000
14.5	16	83	133	2	*M16214500
15	16	83	133	2	*M16215000
15.5	16	83	133	2	*M16215500
16	16	83	133	2	*M16216000
16.5	18	93	143	2	*M16216500
17	18	93	143	2	*M16217000
17.5	18	93	143	2	*M16217500
18	18	93	143	2	*M16218000
18.5	20	101	153	2	*M16218500
19	20	101	153	2	*M16219000
19.5	20	101	153	2	*M16219500
20	20	101	153	2	*M16220000

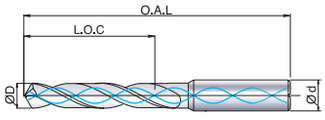
* Non stock items available upon request

HIGH PERFORMANCE SHORT DRILL | INTERNAL COOLANT | POINT 140°

for Drilling Depth of 3XD

LIST M252





D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	20	62	2	M25203000
3.1	6	20	62	2	M25203100
3.2	6	20	62	2	M25203200
3.3	6	20	62	2	M25203300
3.4	6	20	62	2	M25203400
3.5	6	20	62	2	M25203500
3.6	6	20	62	2	M25203600
3.7	6	20	62	2	M25203700
3.8	6	24	66	2	M25203800
3.9	6	24	66	2	M25203900
4	6	24	66	2	M25204000
4.1	6	24	66	2	M25204100
4.2	6	24	66	2	M25204200
4.3	6	24	66	2	M25204300
4.4	6	24	66	2	M25204400
4.5	6	24	66	2	M25204500
4.6	6	24	66	2	M25204600
4.7	6	24	66	2	M25204700
4.8	6	28	66	2	M25204800
4.9	6	28	66	2	M25204900
5	6	28	66	2	M25205000
5.1	6	28	66	2	M25205100
5.2	6	28	66	2	M25205200
5.3	6	28	66	2	M25205300
5.4	6	28	66	2	M25205400
5.5	6	28	66	2	M25205500
5.6	6	28	66	2	M25205600
5.7	6	28	66	2	M25205700
5.8	6	28	66	2	M25205800
5.9	6	28	66	2	M25205900
6	6	28	66	2	M25206000
6.1	8	34	79	2	M25206100
6.2	8	34	79	2	M25206200
6.3	8	34	79	2	M25206300
6.4	8	34	79	2	M25206400
6.5	8	34	79	2	M25206500
6.6	8	34	79	2	M25206600
6.7	8	34	79	2	M25206700
6.8	8	34	79	2	M25206800
6.9	8	34	79	2	M25206900
7	8	34	79	2	M25207000
7.1	8	41	79	2	M25207100
7.2	8	41	79	2	M25207200
7.3	8	41	79	2	M25207300
7.4	8	41	79	2	M25207400
7.5	8	41	79	2	M25207500
7.6	8	41	79	2	M25207600
7.7	8	41	79	2	M25207700
7.8	8	41	79	2	M25207800
7.9	8	41	79	2	M25207900
8	8	41	79	2	M25208000
8.1	10	47	89	2	M25208100
8.2	10	47	89	2	M25208200
8.3	10	47	89	2	M25208300
8.4	10	47	89	2	M25208400
8.5	10	47	89	2	M25208500
8.6	10	47	89	2	M25208600

* TiN coating upon request

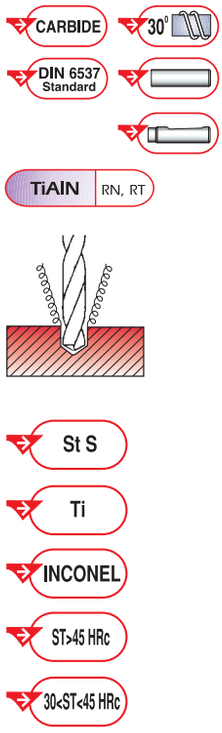
D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
8.7	10	47	89	2	**M25208700**
8.8	10	47	89	2	**M25208800**
8.9	10	47	89	2	**M25208900**
9	10	47	89	2	**M25209000**
9.1	10	47	89	2	**M25209100**
9.2	10	47	89	2	**M25209200**
9.3	10	47	89	2	**M25209300**
9.4	10	47	89	2	**M25209400**
9.5	10	47	89	2	**M25209500**
9.6	10	47	89	2	**M25209600**
9.7	10	47	89	2	**M25209700**
9.8	10	47	89	2	**M25209800**
9.9	10	47	89	2	**M25209900**
10	10	47	89	2	**M25210000**
10.1	12	55	102	2	**M25210100**
10.2	12	55	102	2	**M25210200**
10.3	12	55	102	2	**M25210300**
10.4	12	55	102	2	**M25210400**
10.5	12	55	102	2	**M25210500**
10.6	12	55	102	2	**M25210600**
10.7	12	55	102	2	**M25210700**
10.8	12	55	102	2	**M25210800**
10.9	12	55	102	2	**M25210900**
11	12	55	102	2	**M25211000**
11.1	12	55	102	2	**M25211100**
11.2	12	55	102	2	**M25211200**
11.3	12	55	102	2	**M25211300**
11.4	12	55	102	2	**M25211400**
11.5	12	55	102	2	**M25211500**
11.6	12	55	102	2	**M25211600**
11.7	12	55	102	2	**M25211700**
11.8	12	55	102	2	**M25211800**
11.9	12	55	102	2	**M25211900**
12	12	55	102	2	**M25212000**
12.5	14	60	107	2	**M25212500**
13	14	60	107	2	***M25213000**
13.5	14	60	107	2	***M25213500**
14	14	60	107	2	***M25214000**
14.5	16	65	115	2	***M25214500**
15	16	65	115	2	***M25215000**
15.5	16	65	115	2	***M25215500**
16	16	65	115	2	***M25216000**
16.5	18	73	123	2	***M25216500**
17	18	73	123	2	***M25217000**
17.5	18	73	123	2	***M25217500**
18	18	73	123	2	***M25218000**
18.5	20	79	131	2	***M25218500**
19	20	79	131	2	***M25219000**
19.5	20	79	131	2	***M25219500**
20	20	79	131	2	***M25220000**

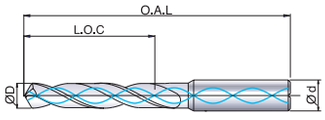
* Non stock items available upon request

HIGH PERFORMANCE LONG DRILL | INTERNAL COOLANT | POINT 140°

for Drilling Depth of 5XD

LIST M262





D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
3	6	28	66	2	M26203000
3.1	6	28	66	2	M26203100
3.2	6	28	66	2	M26203200
3.3	6	28	66	2	M26203300
3.4	6	28	66	2	M26203400
3.5	6	28	66	2	M26203500
3.6	6	28	66	2	M26203600
3.7	6	28	66	2	M26203700
3.8	6	36	74	2	M26203800
3.9	6	36	74	2	M26203900
4	6	36	74	2	M26204000
4.1	6	36	74	2	M26204100
4.2	6	36	74	2	M26204200
4.3	6	36	74	2	M26204300
4.4	6	36	74	2	M26204400
4.5	6	36	74	2	M26204500
4.6	6	36	74	2	M26204600
4.7	6	36	74	2	M26204700
4.8	6	44	82	2	M26204800
4.9	6	44	82	2	M26204900
5	6	44	82	2	M26205000
5.1	6	44	82	2	M26205100
5.2	6	44	82	2	M26205200
5.3	6	44	82	2	M26205300
5.4	6	44	82	2	M26205400
5.5	6	44	82	2	M26205500
5.6	6	44	82	2	M26205600
5.7	6	44	82	2	M26205700
5.8	6	44	82	2	M26205800
5.9	6	44	82	2	M26205900
6	6	44	82	2	M26206000
6.1	8	53	91	2	M26206100
6.2	8	53	91	2	M26206200
6.3	8	53	91	2	M26206300
6.4	8	53	91	2	M26206400
6.5	8	53	91	2	M26206500
6.6	8	53	91	2	M26206600
6.7	8	53	91	2	M26206700
6.8	8	53	91	2	M26206800
6.9	8	53	91	2	M26206900
7	8	53	91	2	M26207000
7.1	8	53	91	2	M26207100
7.2	8	53	91	2	M26207200
7.3	8	53	91	2	M26207300
7.4	8	53	91	2	M26207400
7.5	8	53	91	2	M26207500
7.6	8	53	91	2	M26207600
7.7	8	53	91	2	M26207700
7.8	8	53	91	2	M26207800
7.9	8	53	91	2	M26207900
8	8	53	91	2	M26208000
8.1	10	61	103	2	M26208100
8.2	10	61	103	2	M26208200
8.3	10	61	103	2	M26208300
8.4	10	61	103	2	M26208400
8.5	10	61	103	2	M26208500
8.6	10	61	103	2	M26208600

* TiN coating upon request

D(m7)	d	L.O.C	O.A.L	Z	ITEM No.
8.7	10	61	103	2	M26208700
8.8	10	61	103	2	M26208800
8.9	10	61	103	2	M26208900
9	10	61	103	2	M26209000
9.1	10	61	103	2	M26209100
9.2	10	61	103	2	M26209200
9.3	10	61	103	2	M26209300
9.4	10	61	103	2	M26209400
9.5	10	61	103	2	M26209500
9.6	10	61	103	2	M26209600
9.7	10	61	103	2	M26209700
9.8	10	61	103	2	M26209800
9.9	10	61	103	2	M26209900
10	10	61	103	2	M26210000
10.1	12	71	118	2	M26210100
10.2	12	71	118	2	M26210200
10.3	12	71	118	2	M26210300
10.4	12	71	118	2	M26210400
10.5	12	71	118	2	M26210500
10.6	12	71	118	2	M26210600
10.7	12	71	118	2	M26210700
10.8	12	71	118	2	M26210800
10.9	12	71	118	2	M26210900
11	12	71	118	2	M26211000
11.1	12	71	118	2	M26211100
11.2	12	71	118	2	M26211200
11.3	12	71	118	2	M26211300
11.4	12	71	118	2	M26211400
11.5	12	71	118	2	M26211500
11.6	12	71	118	2	M26211600
11.7	12	71	118	2	M26211700
11.8	12	71	118	2	M26211800
11.9	12	71	118	2	M26211900
12	12	71	118	2	M26212000
12.5	14	77	124	2	M26212500
13	14	77	124	2	*M26213000
13.5	14	77	124	2	*M26213500
14	14	77	124	2	*M26214000
14.5	16	83	133	2	*M26214500
15	16	83	133	2	*M26215000
15.5	16	83	133	2	*M26215500
16	16	83	133	2	*M26216000
16.5	18	93	143	2	*M26216500
17	18	93	143	2	*M26217000
17.5	18	93	143	2	*M26217500
18	18	93	143	2	*M26218000
18.5	20	101	153	2	*M26218500
19	20	101	153	2	*M26219000
19.5	20	101	153	2	*M26219500
20	20	101	153	2	*M26220000

* Non stock items available upon request

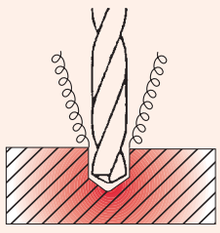
RECOMMENDED WORKING DETAILS

FORMULAS

Cutting Speed	$V_c = \frac{D \times \pi \times n}{1000}$ (m/min)	
Spindle Speed	$n = \frac{V_c \times 1000}{\pi \times d}$ (1/min)	
Feed per Tooth	$f_z = \frac{Vf}{n}$ (mm)	
Table Feed	$V_f = fz \times n$ (mm/min)	

Formula Symbols:

D (mm)	Tool diameter
z	No. of Flutes
V_c (m/min)	Cutting Speed
F_z (mm)	Feed per Tooth
n (1/min)	Spindle Speed
V_f (mm/min)	Table Feed
π	3.1416



DRILLING

LISTS M152 /M155 / M162 / M252 / M262

	Rockwell Hardness	Lists	Vc- Cutting Speed		fz-feed per revolution in mm							
			m/min	m/min	D - diameter in mm							
Material	**HRc**		**TiCN**	**TiAlN**	**3**	**5**	**8**	**10**	**12**	**16**	**18**	**20**
Steel	<30HRc	**M152**	70~90	70~100	0.07~0.11	0.1~0.16	0.16~0.22	0.21~0.25	0.24~0.27	0.25~0.27	0.26~0.28	0.27~0.30
		M252	70~90	90~100	0.07~0.12	0.12~0.18	0.17~0.23	0.22~0.27	0.26~0.28	0.26~0.30	0.26~0.30	0.27~0.30
		M162/M262		90~100	0.05~0.09	0.08~0.13	0.012~0.16	0.15~0.2	0.18~0.2	0.18~0.2	0.18~0.2	0.18~0.2
	30<HRc<40HRc	**M152**		40~70	0.06~0.10	0.08~0.13	0.10~0.16	0.17~0.20	0.18~0.24	0.22~0.27	0.26~0.28	0.28~0.30
		M252		50~70	0.06~0.12	0.08~0.14	0.10~0.17	0.17~0.22	0.18~0.25	0.22~0.28	0.26~0.29	0.28~0.30
		M162/M262		50~70	0.04~0.08	0.05~0.1	0.07~0.12	0.1~0.15	0.12~0.15	0.14~0.2	0.18~0.2	0.18~0.2
	40<HRc<50HRc	**M152**		25~40	0.05~0.09	0.09~0.11	0.11~0.15	0.13~0.16	0.14~0.17	0.15~0.19	0.17~0.21	0.19~0.21
		M252		35~40	0.05~0.10	0.09~0.12	0.11~0.16	0.13~0.17	0.14~0.18	0.15~0.20	0.17~0.22	0.19~0.22
		M162/M262		35~40	0.04~0.08	0.06~0.1	0.08~0.11	0.1~0.13	0.11~0.14	0.11~0.16	0.14~0.2	0.15~0.2
	50<HRc<57	**M152/M162**		10~35	0.03~0.07	0.05~0.08	0.07~0.10	0.09~0.11	0.09~0.12	0.10~0.13	0.10~0.15	0.12~0.15
		M252/M262		10~35	0.03~0.08	0.05~0.09	0.07~0.11	0.09~0.12	0.09~0.13	0.10~0.13	0.10~0.15	0.12~0.15
	50<HRc<57	**M155**		15~45	0.05~0.1	0.07~0.12	0.08~0.13	0.09~0.15	0.1~0.16	0.11~0.16	0.12~0.17	0.12~0.18
	55<HRc<60	**M155**		10~35	0.03~0.07	0.05~0.08	0.07~0.10	0.09~0.11	0.09~0.12	0.10~0.13	0.10~0.15	0.12~0.15
	>60HRc	**M155**		7~12	0.02~0.05	0.04~0.06	0.04~0.06	0.04~0.06	0.04~0.06	0.04~0.06	0.04~0.06	0.04~0.06
Stainless steels 4XX		**M252**	50~60	50~60	0.05~0.06	0.07~0.08	0.10~0.13	0.12~0.17	0.10~0.16	0.11~0.21	0.11~0.22	0.12~0.21
Stainless steels 3XX		**M252**	40~50	40~50	0.04~0.06	0.06~0.08	0.09~0.12	0.10~0.15	0.11~0.16	0.11~0.16	0.11~0.17	0.13~0.20
		M162/M262	40~50	40~50	0.03~0.05	0.04~0.08	0.05~0.1	0.08~0.13	0.09~0.13	0.09~0.13	0.09~0.17	0.09~0.18
Titanium		**M252/M262**		40~45	0.02~0.04	0.04~0.05	0.06~0.9	0.09~0.11	0.10~0.11	0.12~0.14	0.14~0.14	0.15~0.19
High Temperature Alloys (Inconel)		**M252/M262**		10~15	0.02~0.04	0.04~0.06	0.06~0.10	0.09~0.12	0.10~0.12	0.12~0.13	0.14~0.15	0.15~0.20

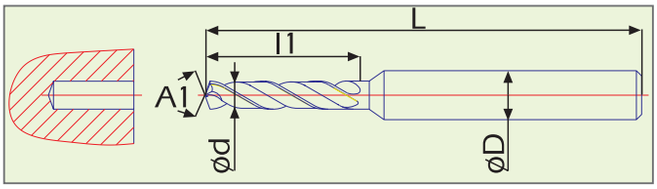
NOTE
Data shown is the result of actual machining tests and is suggested as a starting point.
Do sensitivity analyses to achieve optimum results.
The tests were run on an optimal machining environment.

SPECIAL TOOLS

The Department for Special Tools at Hanita Metal Works, is entirely dedicated to the design and manufacturing of special milling solutions for high demanding operations and focused manufacturing.
Unique advantages such as in-house PVD high quality coating facilities (TiN, TiCN, TiAlN, AlTiN and Z-coat), a wide range of raw materials (HSS, HSSE, HSS-Powder; Solid Carbide) and capabilities for a wide range of diameters (0.3mm to 100mm) places Hanita as the preferred solution for high quality and specific application special tools.

Among other tools, we specialize in making: End Mills, Drills, Step Drills, Routers, Reamers, Counterbores, Tappered Tools, Threading Cutters.

SOLID STEP DRILL



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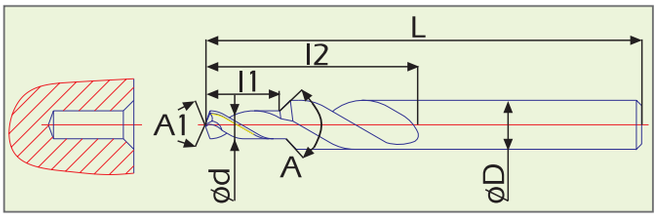

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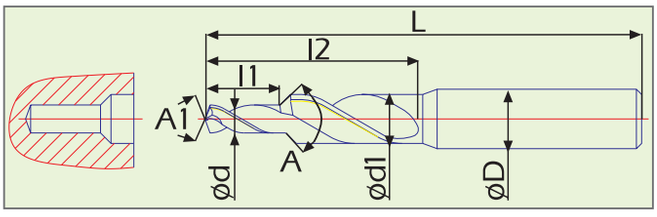

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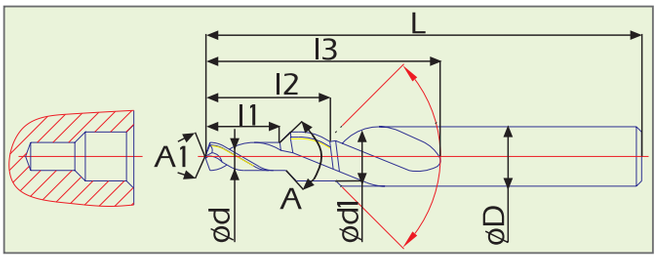

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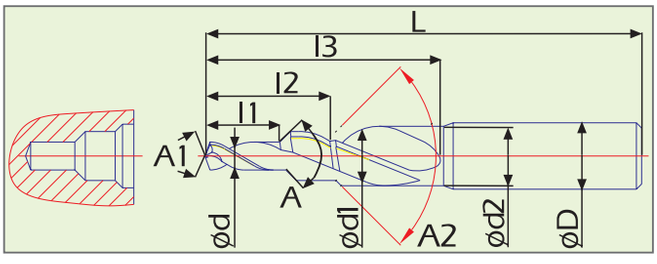

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MARK TYPE

od : - - - - - - - - - - - - - -

l1 : - - - - - - - - - - - - - -

A° : - - - - - - - - - - - - - -

ød1 : - - - - - - - - - - - - - -

l2 : - - - - - - - - - - - - - -

A1° : - - - - - - - - - - - - - -

ød2 : - - - - - - - - - - - - - -

A2° : - - - - - - - - - - - - - -

øD : - - - - - - - - - - - - - -

l3 : - - - - - - - - - - - - - -

L : - - - - - - - - - - - - - -

No of flute : - - - - - - - - - - - - - -

HELIX : - - - - - - - - - - - - - - - - - -

Material to be cut : - - - - - - - - -

Coating : - - - - - - - - - - - - - - - -

Coolant holes : Yes ☐ No ☐

Quantities, pcs : - - - - - - - - -

PRINT OR DRAWING ENCLOSED

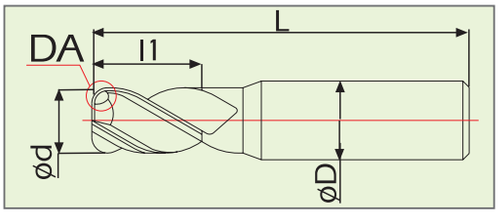
Notes : - - - - - - - - - - - - - - - - - -

- -

- - - - - - - - - - - - - -

Other form and special tools are available upon request.

END MILL



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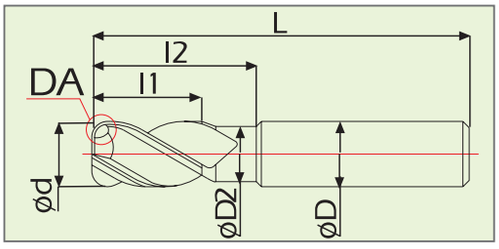

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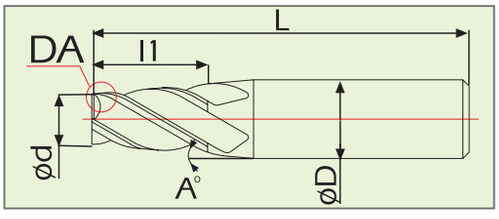

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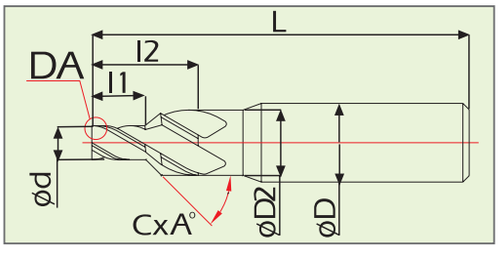

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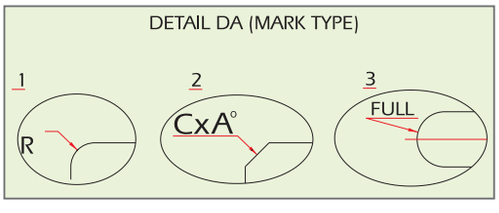


☐

ød : _____

l1 : _____

A° : _____

L2 : _____

CXA° : _____

øD : _____

øD2 : _____

L : _____

No of flute : _____

HELIX :- - - - RH ☐ LH ☐

CUTTING : RH ☐ LH ☐

TOOL MATERIAL : HSS _____ S.CARBIDE _____

TOOL TYPE : FINISHER ☐ ROUGHER ☐

Coolant Holes : Yes ☐ No ☐

Coating : _____

HANITA LIST : _____

Material to be cut : _____

Quantities, pcs : _____

PRINT OR DRAWING ENCLOSED

Notes : _____

_____

_____

_____

Other form and special tools are available upon request.

SPECIALS

ORDER GUIDE

To order follow these 3 easy steps

1. Identify the relevant List

EXAMPLE **LIST 1600**

2. Choose the **ITEM No.** in the category

3. And finally add the suffix code from one of the suffix categories: **Uncoated, TiN, Z-Coat, TiCN, TiAlN, AlTiN.**

EXAMPLE **Hanita Ordering No.**

(11 digits)

List No.		
160003002	WW	
Item No.		Suffix

The suffix categories

The suffix categories:

Uncoated

••	. . .	Plain Shank Uncoated
AA	. . .	Weldon Shank Type A Uncoated
BB	. .	Weldon Shank Type B Uncoated
FF	. . .	Screwed Shank Uncoated
JJ	. . .	Japanese Standard, Plain Shank Uncoated
WW	. .	Weldon Shank Uncoated

TiN

TA	. . .	TiN Coated Weldon Shank Type A
TB	. . .	TiN Coated Weldon Shank Type B
TF	. .	TiN Coated Screwed Shank
TJ	. . .	TiN Coated Japanese Standard Plain Shank
TN	. . .	TiN Coated Whistle Notch Shank
TT	. .	TiN Coated Plain Shank
TW	. . .	TiN Coated Weldon Shank

Z-Coat

ZF	. . .	Z-Coat Coated Screwed Shank
ZJ	. . .	Z-Coat Coated Japanese Standard Plain Shank
ZT	. .	Z-Coat Coated Plain Shank
ZW	. . .	Z-Coat Coated Weldon Shank

TiCN

CA	. . .	TiCN Coated Weldon Shank Type A
CB	. . .	TiCN Coated Weldon Shank Type B
CF	. .	TiCN Coated Screwed Shank
CJ	. . .	TiCN Coated Japanese Standard Plain Shank
CN	. . .	TiCN Coated Whistle Notch Shank
CT	. .	TiCN Coated Plain Shank
CW	. . .	TiCN Coated Weldon Shank

TiAlN

LF	. . .	TiAlN Coated Screwed Shank
LJ	. . .	TiAlN Coated Japanese Standard Plain Shank
LT	. .	TiAlN Coated Plain Shank
LW	. . .	TiAlN Coated Weldon Shank
RJ	. . .	TiAlN Coated Japanese Standard Plain Shank
RN	. .	TiAlN Coated Whistle Notch Shank
RT	. . .	TiAlN Coated Plain Shank
RW	. . .	TiAlN Coated Weldon Shank

AlTiN MT

MT	. . .	AlTiN Coated Plain Shank

GUIDE TO TOOL SPECIFICATIONS

Machine Material →

NON FERROUS · ALUMINIUM · HIGH SILICON ALUMINIUM · STAINLESS STEEL · TITANIUM · SOFT STEELS · MEDIUM HARD STEELS · HARDENED STEELS

Pitch →

CHAMFERED PITCH · FLAT SHALLOW PITCH · CHIP BREAKER PITCH · COARSE PITCH · FINE PITCH · EXTRA FINE PITCH

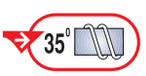
Shank →

PLAIN · WELDON · SCREWED · WHISTLE NOTCH

Materials →

Corner Radius →

Helix Angle →

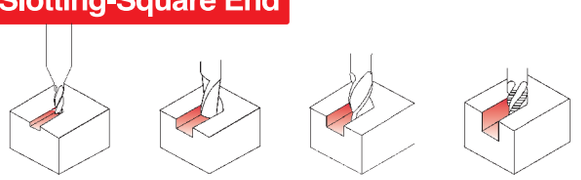


Standard →

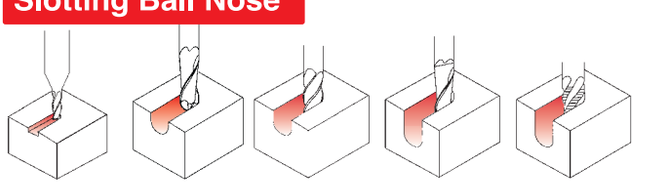
HANITA · DIN · JAPANESE

GUIDE TO TOOLS APPLICATIONS

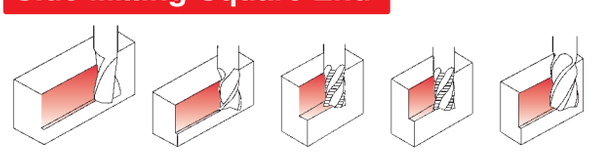
Slotting-Square End



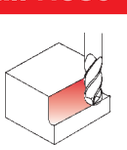
Slotting Ball Nose



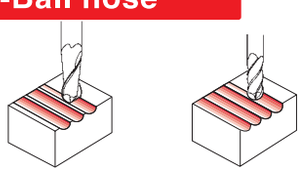
Side Milling-Square End



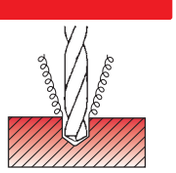
Side Milling-Ball Nose



Profiling-Ball nose



Drilling



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