VERMONT TAP & DIE

GREENFIELD INDUSTRIES

Taps, Tap Sets

VERMONT TAP & DIE

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THE VERMONT TAP & DIE TRADITION

At VTD we maintain a tradition of high quality in our products and services. This Vermont Tap & Die product catalog continues that tradition, bringing you the finest taps and dies for industrial applications.

QUICK DELIVERY

For quick delivery of non-standard product, inquire about our *Fast Tap* service. VTD can custom engineer and manufacture specials to your specifications in the same time it takes other companies to select "ready made" specials off the shelf, finish and ship. VTD has the unique capability of manufacturing a special tap and custom-coating it with our VERTANIUM® or other high-performance coatings.

Style Number Index

Customer Service
Telephone: 800.348.2885 Fax: 800.892.4290

VERMONT TAP & DIE

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TAP LIST NUMBER CODES

Example: TiCN Coated HP-CNC Spiral Point Tap for Hard Metals, Extension Length

T C N - 3 7 1 2 - H M E

Coating

S -Steam Oxide
TN -TiN
TCN -TiCN

Flute Construction

1 -Forming
2 -HS Cut
3 -Straight

Category

5 -Spiral
2 -Dies
6 -2 Piece Dies
7 -HP

Style

9 -Forming

05 -Straight Flute-Hand
12 -Spiral Point
50 -Slow Spiral
55 -Fast Spiral
80 -Reg Taper Pipe
81 -Straight Pipe
82 -Interrupted Pipe
83 -High Hook Pipe

Special Features

86 -Forming
AR -AERO
CI -Cast Iron
H -Eight Pitch
HD -Heavy Duty
HM -Hard Metals
L -Left Hand
M -Metric
SM -Soft Metals
CH -Coolant Hole

Blank Style

none - ANSI
E - Extra/Extension

High Performance Tap Selector

- Select tap based on material to be threaded.
- Select high performance coated taps for additional tool life.

THROUGH HOLES

Material	Tap Style	Page
Stainless	3712SM	6
Softer metal	TN3712SM	6
Harder metal	3712HM	8
	TCN3712HM	8
Cast iron	3705HDCI	10
Aerospace metal	TN3712AR	5

BLIND HOLES

Material	Tap Style	Page
Stainless	5750SM	7
Softer metal	TN5750SM	7
Harder metal	5750HM	9
	TCN5750HM	9
Cast iron	3705HDCI	10

MATERIAL	HARDNESS Rc	HARDNESS BHN	3712SM	TN3712SM	3712HM	TCN3712HM	3705HDCI	TN3712AR	5750SM	TN5750SM	5750HM	TCN5750HM	3705HDCI
Steels													
Carbon	<29	<275	❖						❖				
Tool, Mold	>29	>275			❖						❖		
Cast Iron													
Gray	<25	<250					❖				❖		❖
Ductile	<29	<275	❖				❖		❖				❖
Stainless Steels													
	<29	<275	❖						❖				
	>29	>275			❖						❖		
Nickel Base Alloys (Inconel, Waspalloy, Hastelloy, etc.)	<29	<275			❖ ❖								
Aluminum, Copper, Magnesium	–	–	❖						❖				
Cast Aluminum, Copper Alloy	–	–	❖						❖				
Plastic													
Soft, stringy chips	–	–	❖						❖				
Plastic, Fiberglass, Bakelite													
Broken chips	–	–					❖						❖
Speed SFM (Bright)			45-75	15-35			45-70	25-50	30-50	15-30			15-30
													10-20
			20-30										5-10
			10-20										5-10
			75-115						40-100				45-75
													30-60
			40-50										20-35
			40-50										20-35

Speed SFM (Bright)

HPCNC AERO SPIRAL POINT TAPS

Ground Thread / Premium HSS

List No. TN-3712-AR VERTANIUM® Coated

Machine Screw and Fractional Sizes

- Designed for tapping heat resisting stainless steel alloys such as A286 at 275 BHN
- Recommended for through hole tapping
- Manufactured from HSS premium material
- TiN coated to improve performance
- Spiral point pushes chips forward
- Plug chamfer

Tap Size	TPI	Pitch Dia.	# of Flutes	TN-3712-AR Plug
6	32 NC	H3	3	**285057**
8	32 NC	H3	3	**285107**
10	24 NC	H3	3	**285156**
10	32 NF	H3	3	**285206**
10	32 NF	H5	3	**285222**
1/4	20 NC	H3	3	**285255**
1/4	20 NC	H5	3	**285305**
1/4	28 NF	H3	3	**285354**
1/4	28 NF	H5	3	**285370**
5/16	18 NC	H3	3	**285404**
5/16	18 NC	H5	3	**285420**
5/16	24 NF	H3	3	**285453**
5/16	24 NF	H5	3	**285479**
3/8	16 NC	H3	3	**285503**
3/8	16 NC	H5	3	**285552**
3/8	24 NF	H3	3	**285602**
3/8	24 NF	H5	3	**285628**
7/16	14 NC	H3	3	**285651**
7/16	20 NF	H3	3	**285701**
1/2	13 NC	H3	3	**285750**
1/2	13 NC	H5	3	**285801**
1/2	20 NF	H3	3	**285859**

Package Quantities: No 6-10, 1/4", = 12/pkg; 5/16" to 1/2" = 6/pkg

HP-CNC

SPIRAL POINT TAPS
SOFT METALS & STAINLESS

Ground Thread / Premium HSS

List No. 3712-SM X-10 Treated
List No. TN-3712-SM VERTANIUM® Coated

Machine Screw, Fractional and Metric Sizes

- Designed for tapping soft to medium hard steel and stainless at 346 BHN or less
- Recommended for through hole tapping
- Spiral point pushes chips forward
- Manufactured from PM-M4 HSS
- Black oxide reduces galling & chip welding
- TiN coated for higher speeds and wear resistance
- Plug chamfer

Tap Size	TPI NC	TPI NF	# of Flutes	3712-SM H2	3712-SM H3	3712-SM H4	3712-SM H5	TN-3712-SM H2	TN-3712-SM H3	TN-3712-SM H4
4	40		2	330302				330714		
6	32		2	330303	330309		330332	330715	330716	
8	32		3	330304	330310		330333		330717	
10	24		3	330305	330311		330334		330718	
10		32	3	330306	330312		330335		330719	
1/4	20		3	330307	330313		330336		330720	330721
1/4		28	3	330308	330314	330329			330722	
5/16	18		3		330315		330337		330723	
5/16		24	3		330316	330330			330724	
3/8	16		3		330317		330338		330725	
3/8		24	3		330318	330331			330951	
7/16	14		3		330319		330339		330726	
7/16		20	3		330320		330340		330727	
1/2	13		3		330321		330341		330728	
1/2		20	3		330322		330342		330729	
9/16	12		3		330323				330730	
9/16		18	3		330324				330731	
5/8	11		3		330325		330343		330732	
5/8		18	3		330326				330733	
3/4	10		3		330327				330734	
3/4		16	3		330328				330735	

Package Quantities: No. 4 - 10, 1/4" = 12/pkg; 5/16" to 1/2" = 6/pkg; 9/16" to 3/4" = 3/pkg

Tap Size	Pitch (mm)	# of Flutes	3712-SM D3	3712-SM D4	3712-SM D5	3712-SM D6
M3	0.5	2	330344			
M4	0.7	3		330345		
M5	0.8	3		330346		
M6	1	3			330347	
M8	1.25	3			330348	
M10	1.5	3				330349
M12	1.75	3				330350
M14	1.5	3				330351
M18	1.5	3				330352

Package Quantities: M3 to M6 = 12/pkg; M8 to M12 = 6/pkg; M14 to M18 = 3/pkg

HPCNC

SPIRAL FLUTED TAPS
SOFT METALS & STAINLESS

Ground Thread / Premium HSS

List No. 5750-SM X-10 Treated
List No. TN-5750-SM VERTANIUM® Coated

Machine Screw, Fractional and Metric Sizes

- Designed for tapping soft to medium hard steel at 346 BHN or less
- Spiral flute design recommended for blind holes
- 2.5 thread modified bottoming chamfer
- Manufactured from PM-M4 premium material
- Black oxide reduces gallling & chip welding
- TiN coated for higher speeds & wear resistance

Tap Size	TPI NC	TPI NF	# of Flutes	5750-SM H2	5750-SM H3	5750-SM H4	5750-SM H5	TN-5750-SM H2	TN-5750-SM H3	TN-5750-SM H4
4	40		2	330455				330758		
6	32		3	330456	330462		330485	330759	330760	
8	32		3	330457	330463		330486		330761	
10	24		3	330458	330464		330487		330762	
10		32	3	330459	330465		330488		330763	
1/4	20		3	330460	330466		330489		330764	330765
1/4		28	3	330461	330467	330482			330766	
5/16	18		3		330468		330490		330767	
5/16		24	3		330469	330483			330768	
3/8	16		3		330470		330491		330769	
3/8		24	3		330471	330484			330770	
7/16	14		3		330472		330492		330771	
7/16		20	3		330473		330493		330772	
1/2	13		3		330474		330494		330773	
1/2		20	3		330475		330495		330774	
9/16	12		3		330476				330775	
9/16		18	3		330477				330776	
5/8	11		4		330478		330496		330777	
5/8		18	4		330479				330778	
3/4	10		4		330480				330779	
3/4		16	4		330481				330780	

Package Quantities: No. 4 - 10, 1/4" = 12/pkg; 5/16" to 1/2" = 6/pkg; 9/16" to 3/4" = 3/pkg

Tap Size	Pitch (mm)	# of Flutes	5750-SM D3	5750-SM D4	5750-SM D5	5750-SM D6
M3	0.5	2	330497			
M4	0.7	3		330498		
M5	0.8	3		330499		
M6	1	3			330502	
M8	1.25	3			330503	
M10	1.5	3				330504
M12	1.75	3				330505
M14	1.5	3				330506
M18	1.5	4				330507

Package Quantities: M3 to M6 = 12/pkg; M8 to M12 = 6/pkg; M14 to M18 = 3/pkg

HP CNC SPIRAL POINT TAPS HARD METALS

Ground Thread / Premium HSS

List No. 3712-HM X-10 Treated
List No. TCN-3712-HM TiCN Coated

Machine Screw, Fractional and Metric Sizes

- Designed for tapping harder materials up to 45 Rc
- Recommended for through hole tapping
- Spiral point pushes chips forward
- Plug chamfer
- Manufactured from PM M-4
- Black oxide reduces chip welding
- TiCN coated to increase tap life

Tap Size	TPI NC	TPI NF	# of Flutes	3712-HM H2	3712-HM H3	3712-HM H4	3712-HM H5	TCN-3712-HM H2	TCN-3712-HM H3	TCN-3712-HM H4
4	40		2	330353				330736		
6	32		2	330354	330360		330383	330737	330738	
8	32		3	330355	330361		330384		330739	
10	24		3	330356	330362		330385		330740	
10		32	3	330357	330363		330386		330952	
1/4	20		3	330358	330364		330387		330741	330742
1/4		28	3	330359	330365	330380			330743	
5/16	18		3		330366		330388		330744	
5/16		24	3		330367	330381			330745	
3/8	16		3		330368		330389		330746	
3/8		24	3		330369	330382			330747	
7/16	14		4		330370		330390		330748	
7/16		20	4		330371		330391		330749	
1/2	13		4		330372		330392		330750	
1/2		20	4		330373		330393		330751	
9/16	12		4		330374				330752	
9/16		18	4		330375				330753	
5/8	11		4		330376		330394		330754	
5/8		18	4		330377				330755	
3/4	10		4		330378				330756	
3/4		16	4		330379				330757	

Package Quantities: No. 4 - 10, 1/4" = 12/pkg; 5/16" to 1/2" = 6/pkg; 9/16" to 3/4" = 3/pkg

Tap Size	Pitch (mm)	# of Flutes	3712-HM D3	3712-HM D4	3712-HM D5	3712-HM D6
M3	0.5	2	330395			
M4	0.7	3		330396		
M5	0.8	3		330397		
M6	1	3			330398	
M8	1.25	3			330399	
M10	1.5	3				330400
M12	1.75	4				330401
M14	1.5	4				330402
M18	1.5	4				330403

Package Quantities: M3 to M6 = 12/pkg; M8 to M12 = 6/pkg; M14 to M18 = 3/pkg

HP-CNC

SPIRAL FLUTED TAPS HARD METALS

Ground Thread / Premium HSS

List No. 5750-HM X-10 Treated
List No. TCN-5750-HM TiCN Coated

Machine Screw, Fractional and Metric Sizes

- Designed for tapping harder materials up to 45 Rc
- Spiral flute design recommended for blind holes
- 2.5 thread modified bottoming chamfer
- Manufactured from PM M-4
- Black oxide reduces chip welding
- TiCN coated to increase tap life

Tap Size	TPI NC	TPI NF	# of Flutes	5750-HM H2	5750-HM H3	5750-HM H4	5750-HM H5	TCN-5750-HM H2	TCN-5750-HM H3	TCN-5750-HM H4
4	40		2	330508				330781		
6	32		2	330509	330515		330538	330782	330783	
8	32		2	330510	330516		330539		330784	
10	24		3	330511	330517		330540		330785	
10		32	3	330512	330518		330541		330786	
1/4	20		3	330513	330519		330542		330787	330788
1/4		28	3	330514	330520	330535			330789	
5/16	18		3		330521		330543		330790	
5/16		24	3		330522	330536			330791	
3/8	16		3		330523		330544		330792	
3/8		24	3		330524	330537			330793	
7/16	14		3		330525		330545		330794	
7/16		20	3		330526		330546		330795	
1/2	13		4		330527		330547		330796	
1/2		20	4		330528		330548		330797	
9/16	12		4		330529				330798	
9/16		18	4		330530				330799	
5/8	11		4		330531		330549		330802	
5/8		18	4		330532				330803	
3/4	10		4		330533				330804	
3/4		16	4		330534				330805	

Package Quantities: No. 4 - 10, 1/4" = 12/pkg; 5/16" to 1/2" = 6/pkg; 9/16" to 3/4" = 3/pkg

Tap Size	Pitch (mm)	# of Flutes	5750-HM D3	5750-HM D4	5750-HM D5	5750-HM D6
M3	0.5	2	330550			
M4	0.7	2		330551		
M5	0.8	3		330552		
M6	1	3			330553	
M8	1.25	3			330554	
M10	1.5	3				330555
M12	1.75	4				330556
M14	1.5	4				330557
M18	1.5	4				330558

Package Quantities: M3 to M6 = 12/pkg; M8 to M12 = 6/pkg; M14 to M18 = 3/pkg

HPCNC STRAIGHT FLUTED HAND TAPS CAST IRON

Ground Thread / Premium HSS

List No. 3705-HDCI X-20 Treated

Machine Screw, Fractional and Metric Sizes

- ■Straight fluted tap design for “Cast Iron” materials
- ■Manufactured from PM M-4 premium material
- ■Semi-bottom chamfer (2 to 2-1/2 threads) for through and blind holes
- ■X-20 treatment (oxide over nitride)
- ■Titanium Carbonitride (TiCN) available upon request

Tap Size	TPI NC	TPI NF	# of Flutes	3705-HDCI H3	3705-HDCI H5
10	24		4	**330259**	**330277**
10		32	4	**330260**	
1/4	20		4	**330261**	**330278**
1/4		28	4	**330262**	
5/16	18		4	**330263**	**330279**
5/16		24	4	**330264**	
3/8	16		4	**330265**	**330280**
3/8		24	4	**330266**	
7/16	14		4	**330267**	**330281**
7/16		20	4	**330268**	**330282**
1/2	13		4	**330269**	**330283**
1/2		20	4	**330270**	**330284**
9/16	12		4	**330271**	**330285**
9/16		18	4	**330272**	**330286**
5/8	11		6	**330273**	**330287**
5/8		18	6	**330274**	**330288**
3/4	10		6	**330275**	**330289**
3/4		16	6	**330276**	**330290**

Package Quantities: No.10, 1/4” = 12/pkg; 5/16” to 1/2” = 6/pkg; 9/16” to 3/4” = 3/pkg

Tap Size	Pitch (mm)	# of Flutes	3705-HDCI D4	3705-HDCI D5	3705-HDCI D6
M5	0.8	4	**330291**		
M6	1	4		**330292**	
M8	1.25	4		**330293**	
M10	1.5	4			**330294**
M12	1.25	4			**330295**
M12	1.75	4			**330296**
M14	1.25	4			**330297**
M14	1.5	4			**330298**
M18	1.5	6			**330299**

Package Quantities: M3 to M6 = 12/pkg; M8 to M12 = 6/pkg; M14 to M18 = 3/pkg

STRAIGHT FLUTED HAND TAPS

Ground Thread / High Speed Steel

List No. 3105

List No. TN-3105 VERTANIUM® Coated

Machine Screw and Fractional Sizes
including oversize and optional number of flutes

- Taper chamfer generally for starting or hand operations
- Plug chamfer for through holes (4 - 5 threads)
- Bottoming chamfer for blind holes (1 -2 threads)
- Ground threads
- Optional number of flutes to optimize tapping operation
- Optional “H” limit tolerance to meet individual customer requirements
- TiN coating for higher tapping speeds & wear resistance reduces tapping torque and tap breakage

Tap Size	TPI	Pitch Dia	# Flutes	Overall Length	Thread Length	3105 Taper	3105 Plug	3105 Bottoming	TN-3105 Taper	TN-3105 Plug	TN-3105 Bottoming
0	80 NF	H1	2	1-5/8	5/16	—	300017	300025			
0	80 NF	H2	2	1-5/8	5/16	—	300041	300058	—	300047	300054
1	64 NC	H1	2	1-11/16	3/8	300066	300074	300082			
1	64 NC	H2	2	1-11/16	3/8	—	300108	—			
1	72 NF	H1	2	1-11/16	3/8	300124	300133	300140			
1	72 NF	H2	2	1-11/16	3/8	—	300165	300173			
2	56 NC	H1	2	1-3/4	7/16	—	300199	300207			
2	56 NC	H1	3	1-3/4	7/16	300249	300256	300264			
2	56 NC	H2	3	1-3/4	7/16	300272	300280	300299	300278	300286	300294
2	64 NF	H2	3	1-3/4	7/16	300397	300405	300413	300393	300402	300419
3	48 NC	H2	3	1-13/16	1/2	300512	300520	300538	339044	300526	339045
3	56 NF	H2	3	1-13/16	1/2	300637	300645	300652	339046	339047	339048
4	36 NS	H2	3	1-7/8	9/16	—	300702	300710			
4	40 NC	H1	3	1-7/8	9/16	—	300793	—			
4	40 NC	H2	2	1-7/8	9/16	—	300769	300778			
4	40 NC	H2	3	1-7/8	9/16	300819	300827	300835	300815	300823	300831
4	48 NF	H1	3	1-7/8	9/16	—	300918	—			
4	48 NF	H2	3	1-7/8	9/16	300934	300942	300959	300930	300948	300955
5	40 NC	H2	2	1-15/16	5/8	—	301007	301015			
5	40 NC	H2	3	1-15/16	5/8	301056	301064	301072	301052	301060	301078
5	44 NF	H2	3	1-15/16	5/8	301171	301189	301197	301177	301185	301193
6	32 NC	H1	3	2	11/16	301296	301304	301312			
6	32 NC	H2	2	2	11/16	—	301247	301254			
6	32 NC	H2	3	2	11/16	301320	301338	301346			
6	32 NC	H3	2	2	11/16	—	301270	301288			
6	32 NC	H3	3	2	11/16	301353	301361	301379	301359	301367	301375
6	32 NC	H7	3	2	11/16	—	323506	323514			
6	40 NF	H2	2	2	11/16	—	301429	—			
6	40 NF	H2	3	2	11/16	301478	301486	301494	301474	301482	301490
8	32 NC	H1	4	2-1/8	3/4	—	301692	301702			
8	32 NC	H2	2	2-1/8	3/4	—	301544	301551			
8	32 NC	H2	3	2-1/8	3/4	—	301635	301643			
8	32 NC	H2	4	2-1/8	3/4	301718	301726	301734			

continued on next page

List No. 3105
List No. TN-3105 VERTANIUM® Coated . . . *continued*

Tap Size	TPI	Pitch Dia	# Flutes	Overall Length	Thread Length	3105 Taper	3105 Plug	3105 Bottoming	TN-3105 Taper	TN-3105 Plug	TN-3105 Bottoming
8	32 NC	H3	2	2-1/8	3/4	—	301577	301585			
8	32 NC	H3	3	2-1/8	3/4	—	301668	301676			
8	32 NC	H3	4	2-1/8	3/4	301742	301759	301767	301748	301755	301763
8	32 NC	H7	4	2-1/8	3/4	—	323563	—			
8	36 NF	H1	4	2-1/8	3/4	—	301908	—			
8	36 NF	H2	4	2-1/8	3/4	301924	301933	301940	301920	301938	301946
10	24 NC	H1	4	2-3/8	7/8	—	302146	—			
10	24 NC	H2	2	2-3/8	7/8	—	301999	—			
10	24 NC	H2	4	2-3/8	7/8	302161	302179	302187			
10	24 NC	H3	2	2-3/8	7/8	—	302021	302039			
10	24 NC	H3	3	2-3/8	7/8	—	302112	302120			
10	24 NC	H3	4	2-3/8	7/8	302195	302203	302211	302191	302209	302217
10	32 NF	H1	4	2-3/8	7/8	302402	302419	302427			
10	32 NF	H2	2	2-3/8	7/8	—	302260	302278			
10	32 NF	H2	4	2-3/8	7/8	302435	302443	302450			
10	32 NF	H3	2	2-3/8	7/8	—	302294	302302			
10	32 NF	H3	3	2-3/8	7/8	—	302385	302393			
10	32 NF	H3	4	2-3/8	7/8	302468	302476	302484	302464	302472	302480
10	32 NF	H7	4	2-3/8	7/8	—	323688	—			
12	24 NC	H3	4	2-3/8	15/16	302526	302534	302542	302522	302530	302548
12	28 NF	H1	4	2-3/8	15/16	—	302567	—			
12	28 NF	H3	4	2-3/8	15/16	302583	302591	302609			
1/4	20 NC	H1	4	2-1/2	1	305008	305016	305024			
1/4	20 NC	H2	4	2-1/2	1	305033	305040	305057			
1/4	20 NC	H3	2	2-1/2	1	—	326004	326012	—	326002	326018
1/4	20 NC	H3	3	2-1/2	1	—	326160	326178	—	326166	326174
1/4	20 NC	H3	4	2-1/2	1	305065	305073	305081	305061	305079	305087
1/4	20 NC	H5	4	2-1/2	1	—	305107	305115	—	305103	305111
1/4	20 NC	H13	4	2-1/2	1	—	325006	—			
1/4	28 NF	H1	4	2-1/2	1	—	305164	—			
1/4	28 NF	H2	4	2-1/2	1	—	305198	305206			305209
1/4	28 NF	H3	2	2-1/2	1	—	326087	326095			
1/4	28 NF	H3	3	2-1/2	1	—	326244	326251	—	326240	—
1/4	28 NF	H3	4	2-1/2	1	305214	305222	305230	305210	305228	305236
1/4	28 NF	H4	4	2-1/2	1	—	305255	305263			
5/16	18 NC	H1	4	2-23/32	1-1/8	—	305347	305354			
5/16	18 NC	H2	4	2-23/32	1-1/8	—	305370	305388			
5/16	18 NC	H3	2	2-23/32	1-1/8	—	326285	326293			
5/16	18 NC	H3	3	2-23/32	1-1/8	—	326368	326376	—	326364	—
5/16	18 NC	H3	4	2-23/32	1-1/8	305396	305404	305412	305392	305403	305418
5/16	18 NC	H5	4	2-23/32	1-1/8	—	305438	305446	—	305434	305442
5/16	18 NC	H13	4	2-23/32	1-1/8	—	325048	—			
5/16	24 NF	H1	4	2-23/32	1-1/8	—	305461	305479			
5/16	24 NF	H2	4	2-23/32	1-1/8	—	305495	305503			
5/16	24 NF	H3	3	2-23/32	1-1/8	—	326442	326459			
5/16	24 NF	H3	4	2-23/32	1-1/8	305511	305529	305537	305517	305525	305533

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List No. 3105
List No. TN-3105 VERTANIUM® Coated . . . *continued*

Tap Size	TPI	Pitch Dia	# Flutes	Overall Length	Thread Length	3105 Taper	3105 Plug	3105 Bottoming	TN-3105 Taper	TN-3105 Plug	TN-3105 Bottoming
5/16	24 NF	H4	4	2-23/32	1-1/8	—	305552	305560			305563
3/8	16 NC	H1	4	2-15/16	1-1/4	—	305644	305651			
3/8	16 NC	H2	4	2-15/16	1-1/4	—	305677	305685			
3/8	16 NC	H3	3	2-15/16	1-1/4	—	326525	326533	—	326521	326539
3/8	16 NC	H3	4	2-15/16	1-1/4	305693	305701	305719	305699	305707	305715
3/8	16 NC	H5	4	2-15/16	1-1/4	—	305735	305743	—	305731	305749
3/8	16 NC	H13	4	2-15/16	1-1/4	—	325089	—			
3/8	24 NF	H1	4	2-15/16	1-1/4	—	305768	305776			
3/8	24 NF	H2	4	2-15/16	1-1/4	—	305792	305802			
3/8	24 NF	H3	3	2-15/16	1-1/4	—	326608	326616	—	326604	—
3/8	24 NF	H3	4	2-15/16	1-1/4	305818	305826	305834	305814	305822	305830
3/8	24 NF	H4	4	2-15/16	1-1/4	—	305859	305867			
7/16	14 NC	H3	3	3-5/32	1-7/16	—	326640	—			
7/16	14 NC	H3	4	3-5/32	1-7/16	305990	306006	306014	305996	306002	306010
7/16	14 NC	H5	4	3-5/32	1-7/16	—	306030	306048	—	306036	306044
7/16	14 NC	H13	4	3-5/32	1-7/16	—	325121	—			
7/16	20 NF	H3	4	3-5/32	1-7/16	306113	306121	306139	306119	306127	306135
7/16	20 NF	H5	4	3-5/32	1-7/16	—	306154	306162		306157	306165
1/2	13 NC	H1	4	3-3/8	1-21/32	—	306246	306253			
1/2	13 NC	H3	3	3-3/8	1-21/32	—	326681	326699	—	326687	326692
1/2	13 NC	H3	4	3-3/8	1-21/32	306295	306303	306311	306291	306309	306317
1/2	13 NC	H5	4	3-3/8	1-21/32	—	306337	306345	—	306333	306341
1/2	13 NC	H13	4	3-3/8	1-21/32	—	325162	—			
1/2	20 NF	H1	4	3-3/8	1-21/32	—	306394	—			
1/2	20 NF	H3	3	3-3/8	1-21/32	—	326707	—			
1/2	20 NF	H3	4	3-3/8	1-21/32	306444	306451	306469	306440	306457	306465
1/2	20 NF	H5	4	3-3/8	1-21/32	—	306485	—	—	306481	—
9/16	12 NC	H3	4	3-19/32	1-21/32	306626	306634	306642	306622	306630	306648
9/16	18 NF	H2	4	3-19/32	1-21/32	—	306725	—			
9/16	18 NF	H3	4	3-19/32	1-21/32	306741	306758	306766	306747	306754	306762
9/16	18 NF	H5	4	3-19/32	1-21/32	—	306782	—	—	306788	—
5/8	11 NC	H3	4	3-13/16	1-13/16	306923	306931	306949	306929	306937	306945
5/8	11 NC	H5	4	3-13/16	1-13/16	—	306964	306972	—	306960	306978
5/8	11 NC	H13	4	3-13/16	1-13/16	—	325204	—			
5/8	18 NF	H2	4	3-13/16	1-13/16	—	307020	—			
5/8	18 NF	H3	4	3-13/16	1-13/16	307046	307053	307061	307042	307059	307067
5/8	18 NF	H5	4	3-13/16	1-13/16	—	307087	307095	—	307083	307091
11/16	11 NC	H3	4	4-1/32	1-13/16	307160	307178	307186			
11/16	16 NF	H3	4	4-1/32	1-13/16	307194	307202	307210			
3/4	10 NC	H2	4	4-1/4	2	—	307327	—			
3/4	10 NC	H3	4	4-1/4	2	307343	307350	307368	307349	307356	307364
3/4	10 NC	H5	4	4-1/4	2	—	307384	307392	—	307380	307398
3/4	16 NF	H1	4	4-1/4	2	—	307418	—			
3/4	16 NF	H2	4	4-1/4	2	—	307442	—			
3/4	16 NF	H3	4	4-1/4	2	307467	307475	307483	307463	307471	307489
3/4	16 NF	H5	4	4-1/4	2	—	307509	307517	—	307505	307513

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List No. 3105
List No. TN-3105 VERTANIUM® Coated . . . *continued*

Tap Size	TPI	Pitch Dia	# Flutes	Overall Length	Thread Length	3105 Taper	3105 Plug	3105 Bottoming	TN-3105 Taper	TN-3105 Plug	TN-3105 Bottoming
7/8	9 NC	H4	4	4-11/16	2-7/32	307707	307715	307723	307703	307711	307729
7/8	9 NC	H6	4	4-11/16	2-7/32	—	307749	—	—	307745	—
7/8	14 NF	H2	4	4-11/16	2-7/32	—	307806	—			
7/8	14 NF	H4	4	4-11/16	2-7/32	307822	307830	307848	307828	307836	307844
7/8	14 NF	H6	4	4-11/16	2-7/32	—	307863	—	—	307869	—
1	8 NC	H4	4	5-1/8	2-1/2	308069	308077	308085	308065	308073	308081
1	8 NC	H6	4	5-1/8	2-1/2	—	308101	—	—	308107	—
1	12 NF	H4	4	5-1/8	2-1/2	308184	308192	308200	339049	339050	339051
1	14 NS	H4	4	5-1/8	2-1/2	308275	308283	308291			
1-1/8	7 NC	H4	4	5-7/16	2-9/16	308424	308432	308440	339052	339053	339054
1-1/8	12 NF	H4	4	5-7/16	2-9/16	308457	308465	308473	339055	339056	339057
1-1/4	7 NC	H4	4	5-3/4	2-9/16	308549	308556	308564	339058	339059	339060
1-1/4	12 NF	H4	6	5-3/4	2-9/16	308572	308580	308598	339061	339062	339063
1-3/8	6 NC	H4	4	6-1/16	3	308663	308671	308689			
1-3/8	12 NF	H4	6	6-1/16	3	308697	308705	308713			
1-1/2	6 NC	H4	4	6-3/8	3	308788	308796	308804			
1-1/2	12 NF	H4	6	6-3/8	3	308812	308820	308838			

Package Quantities: No 0-12, 1/4", = 12/pkg; 5/16" to 1/2" = 6/pkg; 9/16" to 1" = 3/pkg; 1-1/8" to 1-1/2" = 1/pkg

STRAIGHT FLUTED HAND TAP SETS

Ground Thread / High Speed Steel

List No. 3105- Sets
List No. TN-3105-Sets VERTANIUM® Coated

Machine Screw and Fractional Sizes
One each taper, plug, bottoming

Tap Size	TPI	Pitch Dia	# of Flutes	3105 Set EDP No.	TN-3105-Sets EDP No.
1	64 NC	H1	2	341524	
1	72 NC	H1	2	341540	
2	56 NC	H2	3	341573	174511
2	64 NF	H2	3	341581	174512
3	48 NC	H2	3	341599	355802
3	56 NF	H2	3	341607	355803
4	40 NC	H2	3	341623	174530
4	48 NC	H2	3	341649	174531
5	40 NC	H2	3	341664	174536
5	44 NF	H2	3	341672	174537

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List No. 3105- Sets
List No. TN-3105-Sets VERTANIUM® Coated . . . *continued*

Tap Size	TPI	Pitch Dia	# of Flutes	3105 Set EDP No.	TN-3105-Sets EDP No.
6	32 NC	H2	3	341698	
6	32 NC	H3	3	341706	174538
6	40 NF	H2	3	341714	174539
8	32 NC	H2	4	341730	
8	32 NC	H3	4	341748	174544
8	36 NF	H2	4	341755	174545
10	24 NC	H2	4	341771	
10	24 NC	H3	4	341789	174508
10	32 NF	H2	4	341805	
10	32 NF	H3	4	341813	174509
12	24 NC	H3	4	341821	174510
12	28 NF	H3	4	341839	
1/4	20 NC	H2	4	342514	
1/4	20 NC	H3	4	342522	174506
1/4	28 NF	H3	4	342530	174507
5/16	18 NC	H3	4	342555	174532
5/16	24 NF	H3	4	342563	174533
3/8	16 NC	H3	4	342589	174528
3/8	24 NF	H3	4	342597	174529
7/16	14 NC	H3	4	342605	174540
7/16	20 NF	H3	4	342613	174541
1/2	13 NC	H3	4	342621	174504
1/2	20 NF	H3	4	342639	174505
9/16	12 NC	H3	4	342647	174546
9/16	18 NF	H3	4	342654	174547
5/8	11 NC	H3	4	342662	174534
5/8	18 NF	H3	4	342670	174535
11/16	11 NC	H3	4	342688	
11/16	16 NF	H3	4	342696	
3/4	10 NC	H3	4	342704	174513
3/4	16 NF	H3	4	342712	174514
7/8	9 NC	H4	4	342720	174543
7/8	14 NF	H4	4	342738	174542
1	8 NC	H4	4	342746	174503
1	12 NF	H4	4	342753	355804
1	14 NS	H4	4	342761	
1-1/8	7 NC	H4	4	342779	355805
1-1/8	12 NF	H4	4	342787	355807
1-1/4	7 NC	H4	4	342795	355808
1-1/4	12 NF	H4	6	342803	355809
1-3/8	6 NC	H4	4	342811	
1-3/8	12 NF	H4	6	342829	
1-1/2	6 NC	H4	4	342837	
1-1/2	12 NF	H4	6	342845	

Package Quantities: 1 set/pkg

METRIC STRAIGHT FLUTED HAND TAPS

Ground Thread / High Speed Steel

List No. 3105-M

List No. TN-3105-M VERTANIUM® Coated

Metric Sizes

- Taper chamfer generally for starting or hand operations
- Plug chamfer for through holes (4 - 5 threads)
- Bottoming chamfer for blind holes (1 - 2 threads)
- Ground threads
- TiN coating for higher tapping speeds & wear resistance
- Pitch diameter limits for ISO Class 6H (medium fit)

Tap Size	Pitch (mm)	Pitch Dia.	# of Flutes	Overall Length	Thread Length	3105-M Taper	3105-M Plug	3105-M Bottoming	TN-3105-M Plug	TN-3105-M Bottoming
M1.6	0.35	D3	2	1-5/8	5/16	—	328018	—		
M2	0.4	D3	3	1-3/4	7/16	328067	328075	328083	328685	328686
M2.5	0.45	D3	3	1-13/16	1/2	—	328166	—	328689	
M3	0.5	D3	3	1-15/16	5/8	328182	328190	328208	328188	328205
M3.5	0.6	D4	3	2	11/16	—	328257	—	328693	
M4	0.7	D4	4	2-1/8	3/4	328273	328281	328299	328287	328295
M4.5	0.75	D4	4	2-3/8	7/8	—	328349	—	328697	
M5	0.8	D4	4	2-3/8	7/8	328364	328372	328380	328378	328386
M6	1	D5	4	2-1/2	1	328422	328430	328448	328436	328444
M6.3	1	D5	4	2-1/2	1	—	328463	—		
M7	1	D5	4	2-23/32	1-1/8	328489	328497	328505		
M8	1.25	D5	4	2-23/32	1-1/8	328547	328554	328562	328550	328568
M10	1.5	D6	4	2-15/16	1-1/4	328604	328612	328620	328618	328626
M12	1.75	D6	4	3-3/8	1-21/32	328661	328679	328687	328675	328683
M14	2	D7	4	3-19/32	1-21/32	328752	328760	328778	328707	328708
M16	2	D7	4	3-13/16	1-13/16	328810	328828	328836	328710	328711
M18	2.5	D7	4	4-1/32	1-13/16	328877	328885	328893	328713	328714
M20	2.5	D7	4	4-15/32	2	328935	328943	328950	328716	328717
M24	3	D8	4	4-29/32	2-7/32	329057	329065	329073	328719	328720
M30	3.5	D9	4	5-7/16	2-9/16	329172	329180	329198		
M36	4	D9	4	6-1/16	3	329297	329305	329313		

Package Quantities: M1.6 to M6.3 = 12/pkg; M7 to M12 = 6/pkg; M14 to M24 = 3/pkg; M30 to M36 = 1/pkg

METRIC STRAIGHT FLUTED HAND TAP SETS

1 Each Taper, Plug, Bottoming

List No. 3105-M-Sets
List No. TN-3105-M-Sets VERTANIUM® Coated

Tap Size	Pitch (m/m)	Pitch Dia.	# of Flutes	3105-M Sets	TN-3105-M Sets
M2	0.4	D3	3	174516	343502
M2.5	0.45	D3	4	174559	343503
M3	0.5	D3	4	174519	343504
M3.5	0.6	D4	4	174560	343505
M4	0.7	D4	4	174520	343506
M4.5	0.75	D4	4	174561	343507
M5	0.8	D4	4	174521	343508
M6	1	D5	4	174522	343509
M7	1	D5	4	174523	343510
M8	1.25	D5	4	174524	343511
M10	1.5	D6	4	174548	343512
M12	1.75	D6	4	174549	343513
M14	2	D7	4	174550	343514
M16	2	D7	4	174551	343515
M18	2.5	D7	4	174552	343516
M20	2.5	D7	4	174553	343517
M24	3	D8	4	174515	343518
M30	3.5	D9	4	174517	
M36	4	D9	4	174518	

Package Quantities: 1 set/pkg

EIGHT PITCH HAND TAPS

Ground Thread / High Speed Steel / Straight Flute

List No. 3105-H
List No. 3105-H Sets

Fractional Sizes

- Taper chamfer generally for starting or hand operations
- Plug chamfer for through holes (4 - 5 threads)
- Bottoming chamfer for blind holes (1 - 2 threads)
- Ground threads
- Bright finish

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	3105-H Taper	3105-H Plug	3105-H Bottoming	3105-H Set
1-1/8	8	H5	4	5-7/16	2-9/16	327710	327712	327714	327716
1-1/4	8	H5	4	5-3/4	2-9/16	327720	327722	327724	327726
1-3/8	8	H5	4	6-1/16	3	327730	327732	327734	327736
1-1/2	8	H5	6	6-3/8	3	327740	327742	327744	327746
1-5/8	8	H6	6	6-11/16	3-3/16	—	327752	327754	
1-3/4	8	H6	6	7	3-3/16	327760	327762	327764	327766
1-7/8	8	H6	6	7-5/16	3-9/16	—	327772	327774	
2	8	H6	6	7-5/8	3-9/16	327780	327782	327784	327786
2-1/8	8	H6	6	8	3-9/16	—	327792	327794	
2-1/4	8	H6	6	8-1/4	3-9/16	—	327802	327804	
2-3/8	8	H6	6	8-1/2	4	—	327812	327814	
2-1/2	8	H6	6	8-3/4	4	—	327822	327824	

Package Quantities: 1/pkg Sets contain one each: taper, plug and bottoming.

6” EXTENSION HAND TAPS

Ground Thread / High Speed Steel / Straight Flute

List No. 3105-E

Machine Screw & Fractional Sizes

- Plug chamfer for through holes
- Ground threads
- Bottom chamfer for blind holes
- General purpose straight flute design
- Overall lengths are all 6”

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thead Length	3105-E Plug	3105-E Bottoming
6	32 NC	H3	3	6	11/16	**918827**	**918828**
8	32 NC	H3	4	6	3/4	**918891**	**918892**
10	24 NC	H3	4	6	7/8	**918833**	**918834**
10	32 NF	H3	4	6	7/8	**918836**	**918837**
1/4	20 NC	H3	4	6	1	**918839**	**918840**
1/4	28 NF	H3	4	6	1	**918842**	**918843**
5/16	18 NC	H3	4	6	1-1/8	**918845**	**918846**
5/16	24 NF	H3	4	6	1-1/8	**918848**	**918849**
3/8	16 NC	H3	4	6	1-1/4	**918851**	**918852**
3/8	24 NF	H3	4	6	1-1/4	**918854**	**918855**

Package Quantities: 1/pkg

General Dimension Tolerances - see Table #4

STRAIGHT FLUTED HAND TAPS for CAST IRON

Ground Thread / High Speed Steel / Straight Flute

List No. 3105-CI

Machine Screw and Fractional Sizes

- Special design and nitride surface treated for tapping highly abrasive materials
- Plug chamfer for through holes
- Ground threads
- Bottom chamfer for blind holes
- Semi-bottom (2 - 2.5 threads) offered to alleviate problem of “bell mouthing”

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	3105-CI Plug	3105-CI Semi-Bott	3105-CI Bottoming
6	32 NC	H3	3	2	11/16	**327139**	**327147**	**327155**
8	32 NC	H3	4	2-1/8	3/4	**327163**	**327171**	**327179**
10	24 NC	H3	4	2-3/8	7/8	**327187**	**327195**	**327203**
10	32 NF	H3	4	2-3/8	7/8	**327211**	**327219**	**327227**
12	24 NC	H3	4	2-3/8	15/16	**327235**	**327243**	**327251**
1/4	20 NC	H3	4	2-1/2	1	**327259**	**327267**	**327275**
1/4	20 NC	H5	4	2-1/2	1	**327283**	**327291**	**327309**
1/4	28 NF	H3	4	2-1/2	1	**327311**	**327315**	**327316**
5/16	18 NC	H3	4	2-23/32	1-1/8	**327317**	**327325**	**327333**
5/16	18 NC	H5	4	2-23/32	1-1/8	**327341**	**327358**	**327366**
5/16	24 NF	H3	4	2-23/32	1-1/8	**327368**	**327371**	**327372**

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List No. 3105CI . . . *continued*

Tap Size	TPI	Pitch Dia.	#. of Flutes	Overall Length	Thread Length	3105-CI Plug	3105-CI Semi-Bott	3105-CI Bottoming
3/8	16 NC	H3	4	2-15/16	1-1/4	**327374**	**327382**	**327390**
3/8	16 NC	H5	4	2-15/16	1-1/4	**327408**	**327416**	**327424**
3/8	24 NF	H3	4	2-15/16	1-1/4	**327426**	**327428**	**327430**
7/16	14 NC	H3	4	3-5/32	1-7/16	**327432**	**327440**	**327457**
7/16	14 NC	H5	4	3-5/32	1-7/16	**327465**	**327473**	**327481**
7/16	20 NF	H3	4	3-5/32	1-7/16	**327483**	**327485**	**327487**
1/2	13 NC	H3	4	3-3/8	1-21/32	**327499**	**327507**	**327515**
1/2	13 NC	H5	4	3-3/8	1-21/32	**327523**	**327531**	**327549**
1/2	20 NF	H3	4	3-3/8	1-21/32	**327551**	**327553**	**327555**
1/2	20 NF	H5	4	3-3/8	1-21/32	**327557**	**327559**	**327561**
9/16	12 NC	H3	4	3-19/32	1-21/32	**327563**	**327565**	**327567**
9/16	12 NC	H5	4	3-19/32	1-21/32	**327569**	**327571**	**327573**
9/16	18 NF	H3	4	3-19/32	1-21/32	**327575**	**327577**	**327579**
9/16	18 NF	H5	4	3-19/32	1-21/32	**327581**	**327583**	**327585**
5/8	11 NC	H3	4	3-13/16	1-13/16	**327587**	**327589**	**327591**
5/8	11 NC	H5	4	3-13/16	1-13/16	**327593**	**327595**	**327597**
5/8	18 NF	H3	4	3-13/16	1-13/16	**327599**	**327601**	**327603**
5/8	18 NF	H5	4	3-13/16	1-13/16	**327605**	**327607**	**327609**
3/4	10 NC	H3	4	4-1/4	2	**327611**	**327613**	**327615**
3/4	16 NF	H3	4	4-1/4	2	**327617**	**327619**	**327621**

Package Quantities: No 6-12, 1/4", = 12/pkg; 5/16" to 1/2" = 6/pkg; 9/16" to 3/4" = 3/pkg

METRIC STRAIGHT FLUTED HAND TAPS for CAST IRON

Ground Thread / High Speed Steel / Straight Flute

List No. 3105-CIM

Metric Sizes

- Special design and nitride surface treated for tapping highly abrasive materials
- Plug chamfer for through holes
- Bottom chamfer for blind holes
- Pitch diameter limits for ISO class 6H (medium fit)
- Semi-bottom (2 - 2.5 threads) offered to alleviate problem of "bell mouthing"

Tap Size	Pitch (mm)	Pitch Dia.	# of Flutes	Overall Length	Thread Length	3105-CIM Plug	3105-CIM Semi-Bott	3105-CIM Bottoming
M6	1	D5	4	2-1/2	1	**327652**	**327650**	**327654**
M8	1.25	D5	4	2-23/32	1-1/8	**327658**	**327656**	**327660**
M10	1.5	D6	4	2-15/16	1-1/4	**327664**	**327662**	**327666**
M12	1.75	D6	4	3-3/8	1-21/32	**327670**	**327668**	**327672**

Package Quantities: M6 = 12/pkg; M8 to M12 = 6/pkg

STRAIGHT FLUTED HAND TAPS

Ground Thread / High Speed Steel / Left Hand

List No. 3105-L

List No. 3105-L Sets

Machine Screw and Fractional Sizes

- ■Taper chamfer generally for starting or hand operations
- ■Plug chamfer for through holes (4 - 5 threads)
- ■Bottoming chamfer for blind holes (1 -2 threads)
- ■Ground threads
- ■Optional number of flutes to optimize tapping operation
- ■Optional “H” limit tolerance to meet individual customer requirements
- ■TiN coating for higher tapping speeds & wear resistance reduces tapping torque and tap breakage
- ■Left hand cut for left hand threads

Tap Size	TPI	Pitch Dia	# of Flutes	Overall Length	Thread Length	3105-L Taper	3105-L Plug	3105-L Bottoming	3105-L Set EDP No.
10	32 NC	H3	4	2-3/8	7/8	—	313102	313119	
1/4	20 NC	H3	4	2-1/2	1	317508	317516	317524	174562
1/4	28 NF	H3	4	2-1/2	1	—	317540	—	
5/16	18 NC	H3	4	2-23/32	1-1/8	317565	317573	317581	174563
5/16	24 NF	H3	4	2-23/32	1-1/8	317599	317607	317615	174564
3/8	16 NC	H3	4	2-15/16	1-1/4	317623	317631	317649	174565
3/8	24 NF	H3	4	2-15/16	1-1/4	317656	317664	317672	174566
7/16	14 NC	H3	4	3-5/32	1-7/16	317680	317698	317706	174567
7/16	20 NF	H3	4	3-5/32	1-7/16	317714	317722	317730	174568
1/2	13 NC	H3	4	3-3/8	1-21/32	317748	317755	317763	174569
1/2	20 NF	H3	4	3-3/8	1-21/32	317771	317789	317797	174570
9/16	12 NC	H3	4	3-19/32	1-21/32	317805	317813	317821	174571
9/16	18 NF	H3	4	3-19/32	1-21/32	—	317847	—	
5/8	11 NC	H3	4	3-13/16	1-13/16	317862	317870	317888	174572
5/8	18 NF	H3	4	3-13/16	1-13/16	317896	317904	317912	174573
3/4	10 NC	H3	4	4-1/4	2	317987	317995	318001	174574
3/4	16 NF	H3	4	4-1/4	2	318019	318027	318035	174575
7/8	9 NC	H4	4	4-11/16	2-7/32	—	318050	318068	
7/8	14 NF	H4	4	4-11/16	2-7/32	318076	318084	318092	174576
1	8 NC	H4	4	5-1/8	2-1/2	318100	318118	318126	174577
1	12 NF	H4	4	5-1/8	2-1/2	318134	318142	318159	174578
1	14 NS	H4	4	5-1/8	2-1/2	318167	318175	318183	174579

Package Quantities: No 10, 1/4”, = 12/pkg; 5/16” to 1/2” = 6/pkg; 9/16” to 1” = 3/pkg

STRAIGHT FLUTED HAND TAPS

List No. TN-3105-CH VERTANIUM® Coated CNC COOLANT HOLE

- Best performance in blind holes
- Require “through the spindle” coolant source
- High pressure coolant forces chips back out flutes
- Semi-bottoming (2 - 2-1/2 threads) for blind hole tapping
- TiN coated for wear resistance

Tap Size	TPI	#. of Flutes	Pitch Dia.	TN-3105-CH Semi-Bott
3/8	16 NC	3	H3	**298526**
3/8	24 NF	3	H3	**298527**
7/16	14 NC	4	H3	**298528**
7/16	20 NF	4	H3	**298529**
1/2	13 NC	4	H3	**298530**
1/2	20 NF	4	H3	**298531**
9/16	12 NC	4	H3	**298532**
5/8	11 NC	4	H3	**298533**
3/4	10 NC	4	H3	**298534**
7/8	9 NC	4	H4	**298535**
1	8 NC	4	H4	**298536**

Package Quantities: 3/8” to 1/2” = 6/pkg; 9/16” to 1” = 3/pkg

SPIRAL POINT TAPS

Ground Thread / High Speed Steel

List No. 3112

List No. TN-3112 VERTANIUM® Coated

Machine Screw and Fractional Sizes including oversize H7 (H3+.002) and H13 (H3+.005)

- ■Ground threads
- ■Spiral point pushes chips forward for through hole applications
- ■Over size for pre-plate threads included as GH-7 and GH-13
- ■TiN coated for higher speeds & wear resistance
- ■Reduces tapping torque and tap breakage

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	3112 Plug	3112 Bottoming	TN-3112 Plug	TN-3112 Bottoming
0	80 NF	H1	2	1-5/8	5/16	356002	356019		
0	80 NF	H2	2	1-5/8	5/16	356027	356035	356023	—
1	64 NC	H1	2	1-11/16	3/8	356043	—		
1	64 NC	H2	2	1-11/16	3/8	356068	—	356061	
1	72 NF	H1	2	1-11/16	3/8	356084	—		
1	72 NF	H2	2	1-11/16	3/8	356102	—	356106	—
2	56 NC	H1	2	1-3/4	7/16	356126	356134		
2	56 NC	H2	2	1-3/4	7/16	356142	356159	356148	—
2	64 NF	H2	2	1-3/4	7/16	356183	—	356189	—
3	48 NC	H2	2	1-13/16	1/2	356225	356233	356221	—
3	56 NF	H1	2	1-13/16	1/2	356241	—		
3	56 NF	H2	2	1-13/16	1/2	356266	—	356262	—
4	36 NS	H2	2	1-7/8	9/16	356282	—		
4	40 NC	H1	2	1-7/8	9/16	356308	—		
4	40 NC	H2	2	1-7/8	9/16	356324	356332	356320	356338
4	48 NF	H2	2	1-7/8	9/16	356365	—	356361	—
5	40 NC	H1	2	1-15/16	5/8	356381	—		
5	40 NC	H2	2	1-15/16	5/8	356407	356415	356403	—
5	44 NF	H2	2	1-15/16	5/8	356419	—	356402	—
6	32 NC	H1	2	2	11/16	356421	—	356420	—
6	32 NC	H2	2	2	11/16	356422	356498	356486	—
6	32 NC	H3	2	2	11/16	356506	356514	356502	356510
6	32 NC	H7	2	2	11/16	359005	359013		
6	40 NF	H2	2	2	11/16	356548	356555	356544	—
8	32 NC	H1	2	2-1/8	3/4	356563	—	356569	—
8	32 NC	H2	2	2-1/8	3/4	356589	356597	356585	—
8	32 NC	H3	2	2-1/8	3/4	356633	356634	356602	356635
8	32 NC	H7	2	2-1/8	3/4	359047	359054		
8	36 NF	H2	2	2-1/8	3/4	356647	—		
10	24 NC	H1	2	2-3/8	7/8	356662	—	356668	—
10	24 NC	H2	2	2-3/8	7/8	356688	356696	356684	—
10	24 NC	H3	2	2-3/8	7/8	356704	356712	356703	356718
10	24 NC	H7	2	2-3/8	7/8	359088	—	359084	—
10	32 NF	H1	2	2-3/8	7/8	356720	356738	356726	—
10	32 NF	H2	2	2-3/8	7/8	356746	356753	356742	—
10	32 NF	H3	2	2-3/8	7/8	356761	356779	356767	356775

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List No. 3112

List No. TN-3112 VERTANIUM® Coated . . . *continued*

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	3112 Plug	3112 Bottoming	TN-3112 Plug	TN-3112 Bottoming
10	32 NF	H7	2	2-3/8	7/8	359120	—	359123	
12	24 NC	H3	2	2-3/8	15/16	356803	—	356809	—
12	28 NF	H3	2	2-3/8	15/16	356845	—	356841	—
1/4	20 NC	H1	2	2-1/2	1	357009	—		
1/4	20 NC	H2	2	2-1/2	1	357025	—	357021	—
1/4	20 NC	H3	2	2-1/2	1	357041	357058	357047	357054
1/4	20 NC	H3	3	2-1/2	1	357082	—	357088	—
1/4	20 NC	H5	2	2-1/2	1	357066	—	357062	—
1/4	20 NC	H5	3	2-1/2	1	357108	—	357101	
1/4	20 NC	H13	2	2-1/2	1	358494	—	358490	—
1/4	28 NF	H1	2	2-1/2	1	357124	—		
1/4	28 NF	H2	2	2-1/2	1	357140	—		
1/4	28 NF	H3	3	2-1/2	1	357207	357215		
1/4	28 NF	H3	2	2-1/2	1	357165	357173	357161	357179
1/4	28 NF	H4	2	2-1/2	1	357181	—		
1/4	28 NF	H4	3	2-1/2	1	357223	—	357226	
5/16	18 NC	H1	2	2-23/32	1-1/8	357249	—		
5/16	18 NC	H2	2	2-23/32	1-1/8	357264	—		
5/16	18 NC	H3	2	2-23/32	1-1/8	357280	357298	357286	357294
5/16	18 NC	H3	3	2-23/32	1-1/8	357322	—	357328	—
5/16	18 NC	H5	2	2-23/32	1-1/8	357306	—	357302	—
5/16	18 NC	H5	3	2-23/32	1-1/8	357348	—	357344	—
5/16	18 NC	H13	2	2-23/32	1-1/8	358510	—	358516	—
5/16	24 NF	H1	2	2-23/32	1-1/8	357363	—		
5/16	24 NF	H2	2	2-23/32	1-1/8	357389	—		
5/16	24 NF	H3	2	2-23/32	1-1/8	357405	357413	357401	357419
5/16	24 NF	H3	3	2-23/32	1-1/8	357447	—		
5/16	24 NF	H4	2	2-23/32	1-1/8	357421	—	357427	—
5/16	24 NF	H4	3	2-23/32	1-1/8	357462	—		
3/8	16 NC	H1	3	2-15/16	1-1/4	357488	—		
3/8	16 NC	H2	3	2-15/16	1-1/4	357504	—		
3/8	16 NC	H3	3	2-15/16	1-1/4	357520	—	357526	—
3/8	16 NC	H5	3	2-15/16	1-1/4	357546	—	357542	—
3/8	16 NC	H13	3	2-15/16	1-1/4	358536	—	358532	—
3/8	24 NF	H1	3	2-15/16	1-1/4	357561	—		
3/8	24 NF	H2	3	2-15/16	1-1/4	357587	—		
3/8	24 NF	H3	3	2-15/16	1-1/4	357603	—	357609	—
3/8	24 NF	H4	3	2-15/16	1-1/4	357629	—		
7/16	14 NC	H2	3	3-5/32	1-7/16	357660	—		
7/16	14 NC	H3	3	3-5/32	1-7/16	357686	—	357682	—
7/16	14 NC	H5	3	3-5/32	1-7/16	357702	—		
7/16	14 NC	H13	3	3-5/32	1-7/16	358551	—		
7/16	20 NF	H3	3	3-5/32	1-7/16	357769	—	357765	—
7/16	20 NF	H5	3	3-5/32	1-7/16	357785	—		
1/2	13 NC	H2	3	3-3/8	1-21/32	357819	—		
1/2	13 NC	H3	3	3-3/8	1-21/32	357827	—	357823	—
1/2	13 NC	H5	3	3-3/8	1-21/32	357835	—	357831	—

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List No. 3112
List No. TN-3112 VERTANIUM® Coated . . . *continued*

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	3112 Plug	3112 Bottoming	TN-3112 Plug	TN-3112 Bottoming
1/2	13 NC	H13	3	3-3/8	1-21/32	**358569**	—	**358565**	—
1/2	20 NF	H1	3	3-3/8	1-21/32	**357843**	—		
1/2	20 NF	H2	3	3-3/8	1-21/32	**357850**	—		
1/2	20 NF	H3	3	3-3/8	1-21/32	**357868**	—	**357864**	—
1/2	20 NF	H5	3	3-3/8	1-21/32	**357876**	—	**357879**	
5/8	11 NC	H3	3	3-13/16	1-13/16	**357926**	—	**357922**	—
5/8	11 NC	H5	3	3-13/16	1-13/16	**357934**	—	**357930**	—
5/8	11 NC	H13	3	3-13/16	1-13/16	**358585**	—		
5/8	18 NF	H3	3	3-13/16	1-13/16	**357942**	—		
3/4	10 NC	H3	3	4-1/4	2	**357967**	—	**357963**	—
3/4	10 NC	H5	3	4-1/4	2	**357975**	—	**357971**	—

Package Quantities: No 0-12, 1/4" = 12/pkg; 5/16" to 1/2" = 6/pkg; 5/8" to 1" = 3/pkg

SPIRAL POINT METRIC TAPS

Ground Thread / High Speed Steel

List No. 3112-M
List No. TN-3112-M VERTANIUM® Coated

Metric Sizes

- Ground threads
- Spiral point pushes chips forward for through hole applications
- TiN coated for higher speeds & wear resistance

Tap Size	Pitch (mm)	Pitch Dia.	# of Flutes	OA Length.	Thread Length	3112-M Plug	TN-3112-M Plug
M1.6	0.35	D3	2	1-5/8	5/16	**360755**	
M2	0.4	D3	2	1-3/4	7/16	**360771**	**360774**
M2.5	0.45	D3	2	1-13/16	1/2	**360797**	
M3	0.5	D3	2	1-15/16	5/8	**360805**	**360801**
M3.5	0.6	D4	2	2	11/16	**360821**	
M4	0.7	D4	2	2-1/8	3/4	**360839**	**360835**
M4.5	0.75	D4	2	2-3/8	7/8	**360854**	
M5	0.8	D4	2	2-3/8	7/8	**360862**	**360868**
M6	1	D5	2	2-1/2	1	**360888**	**360884**
M6.3	1	D5	2	2-1/2	1	**360896**	
M7	1	D5	2	2-23/32	1-1/8	**360904**	
M8	1.25	D5	2	2-23/32	1-1/8	**360920**	**360926**
M10	1.5	D6	3	2-15/16	1-1/4	**360946**	**360942**
M12	1.75	D6	3	3-3/8	1-21/32	**360961**	**360967**
M14	2	D7	3	3-19/32	1-21/32	**360995**	
M16	2	D7	3	3-13/16	1-13/16	**361019**	
M18	2.5	D7	3	4-1/32	1-13/16	**361035**	
M20	2.5	D7	3	4-15/32	2	**361050**	

Package Quantities: M1.6 to M6.3 = 12/pkg; M7 to M12 = 6/pkg; M14 to M20 = 3/pkg

SPIRAL POINT TAPS

6” Extension

List No. 3112-E

Machine Screw and Fractional Sizes

- Plug chamfer for general purpose applications
- Ground threads
- Spiral point pushes chips forward for through hole application
- Overall lengths are all 6” for additional reach

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	3112-E Plug
6	32 NC	H3	2	6	11/16	**918930**
8	32 NC	H3	2	6	3/4	**918932**
10	24 NC	H3	2	6	7/8	**918934**
10	32 NF	H3	2	6	7/8	**918935**
1/4	20 NC	H3	2	6	1	**918936**
1/4	28 NF	H3	2	6	1	**918937**
5/16	18 NC	H3	2	6	1-1/8	**918938**
5/16	24 NF	H3	2	6	1-1/8	**918939**
3/8	16 NC	H3	3	6	1-1/4	**918940**
3/8	24 NF	H3	3	6	1-1/4	**918941**

Package Quantities: 1/pkg

SPIRAL POINT TAPS

CNC / Heavy Duty / Premium HSS

List No. 3112-HD

List No. TN-3112-HD VERTANIUM® Coated

Machine Screw and Fractional Sizes

- Designed to tap hard materials up to 30Rc
- Recommended for through hole tapping
- Manufactured with premium HSS
- TiN coated for higher speeds and wear resistance
- Plug chamfer

Tap Size	TPI	Pitch Dia.	#. of Flutes	Overall Length	Thread Length	3112-HD Plug	TN-3112-HD Plug
6	32 NC	H3	3	2	3/8	**282108**	**280108**
8	32 NC	H3	3	2-1/8	3/8	**282157**	**280157**
10	24 NC	H3	3	2-3/8	1/2	**282207**	**280207**
10	32 NF	H3	3	2-3/8	1/2	**282256**	**280256**
10	32 NF	H5	3	2-3/8	1/2	**282272**	**280272**
1/4	20 NC	H3	3	2-1/2	5/8	**282306**	**280306**
1/4	20 NC	H5	3	2-1/2	5/8	**282355**	**280355**
1/4	28 NF	H3	3	2-1/2	5/8	**282405**	**280405**
1/4	28 NF	H5	3	2-1/2	5/8	**282421**	**280421**
5/16	18 NC	H3	3	2-23/32	11/16	**282454**	**280454**
5/16	18 NC	H5	3	2-23/32	11/16	**282470**	**280470**
5/16	24 NF	H3	3	2-23/32	11/16	**282504**	**280504**
5/16	24 NF	H5	3	2-23/32	11/16	**282520**	**280520**
3/8	16 NC	H3	3	2-15/16	3/4	**282553**	**280553**

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List No. 3112-HD
List No. TN-3112-HD VERTANIUM® Coated . . . *continued*

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	3112-HD Plug	TN-3112-HD Plug
3/8	16 NC	H5	3	2-15/16	3/4	**282603**	**280603**
3/8	24 NF	H3	3	2-15/16	3/4	**282652**	**280652**
3/8	24 NF	H5	3	2-15/16	3/4	**282678**	**280678**
7/16	14 NC	H3	3	3-5/32	7/8	**282702**	**280702**
7/16	20 NF	H3	3	3-5/32	7/8	**282751**	**280751**
1/2	13 NC	H3	3	3-3/8	15/16	**282801**	**280801**
1/2	13 NC	H5	3	3-3/8	15/16	**282850**	**280850**
1/2	20 NF	H3	3	3-3/8	15/16	**282901**	**280901**
5/8	11 NC	H3	3	3-13/16	1-1/8	**282959**	**280959**
5/8	11 NC	H5	3	3-13/16	1-1/8	**282975**	**280975**
3/4	10 NC	H5	3	4-1/4	1-1/4	**282056**	**281056**

Package Quantities: No 6-10, 1/4" = 12/pkg; 5/16" to 1/2" = 6/pkg; 5/8" to 3/4" = 3/pkg

CNC HEAVY DUTY SPIRAL POINT METRIC TAPS
List No. 3112-MHD
Metric Sizes

Tap Size	Pitch (mm)	# of Flutes	Pitch Dia.	Overall Length	Thread Length	3112-MHD Plug
M3	0.5	2	D3	2	3/8	**272544**
M4	0.7	3	D4	2-1/8	3/8	**272546**
M5	0.8	3	D4	2-3/8	1/2	**272548**
M6	1	3	D5	2-1/2	5/8	**272550**
M8	1.25	3	D5	2-23/32	11/16	**272552**
M10	1.5	3	D6	2-15/16	3/4	**272554**
M12	1.75	3	D6	3-3/8	15/16	**272556**

Package Quantities: M3 to M6 = 12/pkg; M8 to M12 = 6/pkg

SPIRAL FLUTED HAND TAPS

Ground Thread / High Speed Steel / Regular Helix 30°

List No. 5150

List No. TN-5150 VERTANIUM® Coated

Machine Screw and Fractional Sizes

- Plug chamfer for through hole applications
- Bottoming chamfer to thread close to an obstruction or blind hole
- Ground threads
- Slow spiral for maximum chip space & chip evacuation in blind holes

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	5150 Plug	5150 Bottoming	TN-5150 Plug	TN-5150 Bottoming
4	40 NC	H2	2	1-7/8	9/16	365676	365678	365675	365677
6	32 NC	H3	2	2	11/16	365648	365655	365679	365680
8	32 NC	H3	2	2-1/8	3/4	365689	365697	365685	365693
10	24 NC	H3	2	2-3/8	7/8	365721	365739	365727	365735
10	32 NF	H3	2	2-3/8	7/8	365747	365754	365743	365750
1/4	20 NC	H3	2	2-1/2	1	366307	366315		
1/4	20 NC	H3	3	2-1/2	1	366323	366331	366329	366337
1/4	28 NF	H3	3	2-1/2	1	366364	366372	366360	366378
5/16	18 NC	H3	3	2-23/32	1- 1/8	366406	366414	366402	366410
5/16	24 NF	H3	3	2-23/32	1- 1/8	366448	366455	366444	366451
3/8	16 NC	H3	3	2-15/16	1- 1/4	366463	366471	366469	366477
3/8	24 NF	H3	3	2-15/16	1- 1/4	366489	366497	366485	366493
7/16	14 NC	H3	3	3-5/32	1- 7/16	366505	366513	366501	366519
7/16	20 NF	H3	3	3-5/32	1- 7/16	366521	366538	366527	366535
1/2	13 NC	H3	3	3-3/8	1- 21/32	366547	366554	366543	366550
1/2	20 NF	H3	3	3-3/8	1- 21/32	366562	366570	366568	366576

SPIRAL FLUTED HAND TAPS

Ground Thread / High Speed Steel / High Helix 49°

List No. 5155

List No. TN-5155 VERTANIUM® Coated

Machine Screw and Fractional Sizes

- Plug chamfer for through hole applications
- Bottoming chamfer to thread close to an obstruction or blind hole
- Ground threads
- High spiral for maximum shearing action
- Spiral flute for better chip evacuation in blind holes & for interrupted conditions
- TiN coated for higher speeds & wear resistance

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	5155 Plug	5155 Bottoming	TN-5155 Plug	TN-5155 Bottoming
3	48 NC	H2	2	1-13/16	1/2	367107	367115		
4	40 NC	H2	2	1-7/8	9/16	367149	367156	367145	367152
5	40 NC	H2	2	1-15/16	5/8	367180	367198		
6	32 NC	H3	3	2	11/16	367222	367230	367228	367236
8	32 NC	H3	3	2-1/8	3/4	367263	367271	367269	367278
10	24 NC	H3	3	2-3/8	7/8	367305	367313	367302	367320
10	32 NF	H3	3	2-3/8	7/8	367321	367339	367327	367335

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List No. 5155
List No. TN-5155 VERTANIUM® Coated . . . *continued*

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	5155 Plug	5155 Bottoming	TN-5155 Plug	TN-5155 Bottoming
12	24 NC	H3	3	2-3/8	15/16	367347	367354		
1/4	20 NC	H3	3	2-1/2	1	367909	367917	367905	367913
1/4	28 NF	H3	3	2-1/2	1	367925	367933	367921	367939
5/16	18 NC	H3	3	2-23/32	1- 1/8	367941	367958	367947	367954
5/16	24 NF	H3	3	2-23/32	1- 1/8	367966	367974	367962	367970
3/8	16 NC	H3	3	2-15/16	1- 1/4	367982	367990	367988	367996
3/8	16 NC	H5	3	2-15/16	1- 1/4	-	-	368341	368358
3/8	24 NF	H3	3	2-15/16	1- 1/4	368006	368014	368038	368039
7/16	14 NC	H3	3	3-5/32	1- 7/16	368022	368030	368043	368036
7/16	20 NF	H3	3	3-5/32	1- 7/16	368048	368055	-	-
1/2	13 NC	H3	3	3-3/8	1- 21/32	368063	368071	368069	368077
1/2	20 NF	H3	3	3-3/8	1- 21/32	368089	368097	-	-
5/8	11 NC	H3	4	3-13/16	1- 13/16	368147	368154	368145	368091

Package Quantities: No 3-10, 1/4" = 12/pkg; 5/16" to 1/2" = 6/pkg; 5/8" = 3/pkg

METRIC SPIRAL FLUTED TAPS

Ground Thread / High Speed Steel / High Helix 49°

List No. 5155-M

Metric Sizes

- Plug chamfer for through hole applications
- Bottoming chamfer to thread close to an obstruction or blind hole
- Ground threads
- High spiral for maximum shearing action
- Spiral flute for better chip evacuation in blind holes & for interrupted conditions
- Pitch diameter limits for ISO Class 6H (medium fit)

Tap Size	Pitch (mm)	Pitch Dia	# of Flutes	Overall Length	Thread Length	5155-M Plug	5155-M Bottoming
M3	0.5	D3	2	1-15/16	5/8	366110	366112
M3.5	0.6	D4	3	2	11/16	366120	366122
M4	0.7	D4	3	2-1/8	3/4	366130	366132
M5	0.8	D4	3	2-3/8	7/8	366140	366142
M6	1	D5	3	2-1/2	1	366150	366152
M8	1.25	D5	3	2-23/32	1-1/8	366160	366162
M10	1.5	D6	3	2-15/16	1-1/4	366170	366172
M12	1.75	D6	3	3-3/8	1-21/32	366180	366182

Package Quantities: M3 to M6 = 12/pkg; M8 to M12 = 6/pkg

CNC SPIRAL FLUTED TAPS

Ground Thread / Premium HSS / Heavy Duty

List No. TN-5155-HD VERTANIUM® Coated

Machine Screw and Fractional Sizes

- Designed to tap blind holes in hard materials up to 30 Rc
- Manufactured with premium HSS
- TiN coated for higher speeds and wear resistance
- Plug chamfer for through hole applications
- Bottoming chamfer to thread close to an obstruction or blind hole

Tap Size	TPI	Pitch Dia.	# of Flutes	Overall Length	Thread Length	TN-5155-HD Plug	TN-5155-HD Bottoming
6	32 NC	H3	3	2	3/8	**281957**	**282005**
8	32 NC	H3	3	2-1/8	3/8	**282054**	**282104**
10	24 NC	H3	3	2-3/8	1/2	**282062**	**282120**
10	32 NF	H3	3	2-3/8	1/2	**282153**	**282203**
10	32 NF	H5	3	2-3/8	1/2	**282179**	**282229**
1/4	20 NC	H3	3	2-1/2	5/8	**282252**	**282302**
1/4	20 NC	H5	3	2-1/2	5/8	**282278**	**282328**
1/4	28 NF	H3	3	2-1/2	5/8	**282351**	**282401**
5/16	18 NC	H3	3	2-23/32	11/16	**282450**	**282501**
5/16	18 NC	H5	3	2-23/32	11/16	**282542**	**282518**
5/16	24 NF	H3	3	2-23/32	11/16	**282468**	**282526**
3/8	16 NC	H3	3	2-15/16	3/4	**282559**	**282609**
3/8	16 NC	H5	3	2-15/16	3/4	**282641**	**282617**
3/8	24 NF	H3	3	2-15/16	3/4	**282567**	**282625**
7/16	14 NC	H3	3	3-5/32	7/8	**282658**	**282708**
1/2	13 NC	H3	3	3-3/8	15/16	**282757**	**282807**
1/2	13 NC	H5	3	3-3/8	15/16	**282799**	**282815**
1/2	20 NF	H3	3	3-3/8	15/16	**282765**	**282823**
5/8	11 NC	H3	4	3-13/16	1-1/8	**282856**	**282906**
5/8	11 NC	H5	4	3-13/16	1-1/8	**282872**	**282922**

Package Quantities: No 6-10, 1/4" = 12/pkg; 5/16" to 1/2" = 6/pkg; 5/8" 3/pkg

CNC FORMING TAPS

Ground Thread / High Speed Steel

List No. 1986

List No. TN-1986 VERTANIUM® Coated

Machine Screw and Fractional Sizes

>> For tap drill recommendations, see Table #10 in technical information section.

- ■Plug chamfer for through hole applications (4 threads)
- ■Bottoming chamfer to thread close to an obstruction or blind hole (2 threads)
- ■Ground threads
- ■Form tap style eliminates chips, increases thread strength & enables higher tapping speeds
- ■Lube grooves No. 5 and larger ensure maximum lubrication during tapping
- ■TiN coated for higher speeds & wear resistance
- ■ Form taps require a larger drilled hole size prior to tapping than corresponding cutting taps.

Tap Size	TPI	Pitch Dia	OA Length	Thread Length	1986 Plug	1986 Bottoming	TN-1986 Plug	TN-1986 Bottoming
4	40 NC	H3	1-7/8	9/16	289004	289012		
4	40 NC	H5	1-7/8	9/16	289020	289038		
4	48 NF	H3	1-7/8	9/16	289046	289053		
5	40 NC	H3	1-15/16	5/8	289087	289095		
5	40 NC	H5	1-15/16	5/8	—	289111		
6	32 NC	H3	2	3/8	289202	289210	287004	287053
6	32 NC	H5	2	3/8	289228	289236	287103	287152
6	32 NC	H10	2	3/8	289244	289251		
6	40 NF	H3	2	3/8	289160	289178		
6	40 NF	H5	2	3/8	289186	289194		
8	32 NC	H3	2-1/8	3/8	289269	289277	287202	287251
8	32 NC	H5	2-1/8	3/8	289285	289293	287301	287350
8	32 NC	H10	2-1/8	3/8	289301	289319		
8	36 NF	H3	2-1/8	3/8	—	289335		
8	36 NF	H5	2-1/8	3/8	289343	289350		
10	24 NC	H4	2-3/8	1/2	289368	289376	287400	287459
10	24 NC	H6	2-3/8	1/2	289384	289392	287509	287558
10	32 NF	H4	2-3/8	1/2	289426	289434		
10	32 NF	H6	2-3/8	1/2	289442	289459	287608	287657
10	32 NF	H10	2-3/8	1/2	289467	—		
1/4	20 NC	H4	2-1/2	5/8	289525	289533	287665	287634
1/4	20 NC	H6	2-1/2	5/8	289541	289558	287707	287756
1/4	20 NC	H10	2-1/2	5/8	289566	—		
1/4	28 NF	H4	2-1/2	5/8	289582	289590		
1/4	28 NF	H6	2-1/2	5/8	289608	289616	287806	287855
5/16	18 NC	H5	2-23/32	11/16	289640	289657		
5/16	18 NC	H7	2-23/32	11/16	289665	289673	287905	287954
5/16	18 NC	H10	2-23/32	11/16	—	289699		
5/16	24 NF	H5	2-23/32	11/16	289707	289715		
5/16	24 NF	H7	2-23/32	11/16	289723	289731	288002	288051

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List No. 1986
List No. TN-1986 VERTANIUM® Coated . . . *continued*

Tap Size	TPI	Pitch Dia	OA Length	Thread Length	1986 Plug	1986 Bottoming	TN-1986 Plug	TN-1986 Bottoming
3/8	16 NC	H5	2-15/16	3/4	**289764**	**289772**		
3/8	16 NC	H7	2-15/16	3/4	**289780**	**289798**	**288101**	**288150**
3/8	24 NF	H5	2-15/16	3/4	**289822**	**289830**		
3/8	24 NF	H7	2-15/16	3/4	—	**289855**	**288200**	**288259**
7/16	14 NC	H5	3-5/32	7/8	**289889**	**289897**		
7/16	14 NC	H8	3-5/32	7/8	—	**289913**	**288309**	**288358**
7/16	20 NF	H5	3-5/32	7/8	**289921**	**289939**		
7/16	20 NF	H8	3-5/32	7/8	—	**289954**		
1/2	13 NC	H5	3-3/8	15/16	**289962**	**289970**		
1/2	13 NC	H8	3-3/8	15/16	**289988**	**289996**	**288408**	**288457**
1/2	20 NF	H5	3-3/8	15/16	**290002**	**290010**		

Package Quantities: No 4-10, 1/4" = 12/pkg; 5/16" to 1/2" = 6/pkg
See technical pages for tap/drill sizes.

CNC FORMING METRIC TAPS

Ground Thread / High Speed Steel

List No. 1986-M
List No. TN-1986-M VERTANIUM®

Metric Sizes

>> For tap drill recommendations, see Table #11 in technical information section.

- Plug chamfer for through hole applications (4 threads)
- Bottoming chamfer to thread close to an obstruction or blind hole (2 threads)
- Ground threads
- Form tap style eliminates chips, increases thread strength & enables higher tapping speeds
- Lube grooves ensure maximum lubrication during tapping
- TiN coated for higher speeds & wear resistance
- Pitch diameter limits for ISO Class 6H (medium fit)

Tap Size	Pitch (mm)	Pitch Dia	OA Length	Thread Length	1986-M Plug	1986-M Bottoming	TN-1986-M Plug	TN-1986-M Bottoming
M3	0.5	D5	1-15/16	5/8	**291001**	**291018**	**291006**	**291014**
M4	0.7	D6	2-1/8	3/8	**291083**	**291091**	**291089**	**291097**
M5	0.8	D7	2-3/8	1/2	**291125**	**291133**	**291123**	**291139**
M6	1	D8	2-1/2	5/8	**291166**	**291174**	**291162**	**291170**
M8	1.25	D9	2-23/32	11/16	**291240**	**291257**	**291246**	**291253**
M10	1.5	D10	2-15/16	3/4	**291176**	**291178**	**291287**	**291295**
M12	1.75	D11	3-3/8	15/16	**291179**	**291181**	**291180**	**291182**

Package Quantities: M3 to M6 = 12/pkg; M8 to M12 = 6/pkg
See technical pages for tap/drill sizes.

TAPER PIPE TAPS

Ground Thread / High Speed Steel / Regular Full Thread

List No. 3180

List No. TN-3180 VERTANIUM® Coated

NPT, NPTF

- Medium hook for general purpose
- Ground threads
- Small shank available 1/8”
- NPT/NPTF thread design
- TiN coated for higher speeds & wear resistance
- NPT can be used in ANPT applications

Tap Size	TPI	# of Flutes	Overall Length	Thread Length	3180 NPT	3180 NPTF	TN-3180 NPT	TN-3180 NPTF
1/16	27	4	2-1/8	11/16	385307	385323	385328	385329
1/8*	27	4	2-1/8	3/4	385331	385356	385357	385359
1/8	27	4	2-1/8	3/4	385364	385380	385385	385386
1/4	18	4	2-7/16	1-1/16	385398	385413	385409	385410
3/8	18	4	2-9/16	1-1/16	385422	385448	385443	385444
1/2	14	4	3-1/8	1-3/8	385455	385471	385458	385477
3/4	14	5	3-1/4	1-3/8	385489	385505	385500	385501
1	11-1/2	5	3-3/4	1-3/4	385513	385539	385534	385536
1-1/4	11-1/2	5	4	1-3/4	385547	385562	385680	385685
1-1/2	11-1/2	7	4-1/4	1-3/4	385570	385596	385681	385686
2	11-1/2	7	4-1/2	1-3/4	385604	385620	385682	385687

Package Quantities: 1/16” to 3/8” = 6/pkg; 1/2” to 3/4” = 3/pkg; 1” and over 1/pkg
**Small shank diameter*

CNC EXTRA LENGTH TAPER PIPE TAPS

Ground Thread / High Speed Steel (w/Hand Tap Shanks)
Regular Full Thread

List No. 3180-E

List No. TN-3180-E VERTANIUM® Coated

NPTF

- Medium hook design for general purpose applications
- Ground threads
- Extra length permits access to recessed areas
- Standard hand tap shank dimensions

Tap Size	TPI	# of Flutes	Overall Length	Thread Length	Shank Diameter	3180-E NPTF	3180-E NPT	TN-3180-E NPTF
1/8	27	4	3	3/4	0.318	386008	384524	386129
1/4	18	4	3-1/2	1-1/16	0.480	386024	384525	386152
3/8	18	4	3-3/4	1-1/16	0.480	386040	384526	386186
1/2	14	4	4-3/8	1-3/8	0.480	386065	384527	386210
3/4	14	5	4-5/8	1-3/8	0.800		384528	
1-11	1/2	5	5-1/4	1-3/4	0.800		384529	

Package Quantities: 1/8” = 6/pkg; 1/4” to 1/2” = 3/pkg; 3/4” and over = 1/pkg

TAPER PIPE TAP

Ground Thread / High Speed Steel / Interrupted Thread

List No. 3182

List No. TN-3182 VERTANIUM® Coated

NPT, NPTF

- Medium hook design for general purpose applications
- Ground threads
- Interrupted thread for improved thread finish and reducing drag
- Small shank available 1/8”
- NPT/NPTF thread design
- TiN coated for higher speeds & wear resistance

Tap Size	TPI	# of Flutes	Overall Length	Thread Length	3182 NPT	3182 NPTF	TN-3182 NPTF
1/8*	27	5	2-1/8	3/4	**385703**	**385729**	
1/8	27	5	2-1/8	3/4	**385737**	**385752**	**385755**
1/4	18	5	2-7/16	1-1/16	**385760**	**385786**	**385789**
3/8	18	5	2-9/16	1-1/16	**385794**	**385810**	**385813**
1/2	14	5	3-1/8	1-3/8	**385828**	**385844**	**385847**
3/4	14	5	3-1/4	1-3/8	**385851**	**385877**	**385870**
1	11-1/2	5	3-3/4	1-3/4	**385885**	**385901**	**385904**
1-1/4	11-1/2	5	4	1-3/4	**385919**	—	
1-1/2	11-1/2	7	4-1/4	1-3/4	**385943**	—	

Package Quantities: 1/16” to 3/8” = 6/pkg; 1/2” to 3/4” = 3/pkg; 1” and over 1/pkg
**Small shank diameter*

TAPER PIPE TAPS

Ground Thread / High Speed Steel / High Hook / Regular Full Thread

List No. 3183 Bright Finish

List No. S-3183 Surface Treated

NPT, NPTF

- High hook design for soft material applications
- Ground threads
- NPT/NPTF thread design
- Surface treated with steam oxide to prevent galling while tapping ductile materials
- NPT can be used in ANPT applications

Tap Size	TPI	# of Flutes	OA Length	Thread Length	3183 NPT	3183 NPTF	3183-S NPT	3183-S NPTF
1/8	27	4	2-1/8	3/4	**916206**	**916211**	**919700**	**919705**
1/4	18	4	2-7/16	1-1/16	**916213**	**916216**	**919715**	**919725**
3/8	18	4	2-9/16	1-1/16	**916218**	**916221**	**919735**	**919727**
1/2	14	4	3-1/8	1-3/8	**916223**	**916226**	**919745**	**919750**
3/4	14	5	3-1/4	1-3/8	**916228**	**916231**	**919765**	**919755**
1	11-1/2	5	3-3/4	1-3/4	**916233**	**916236**		

Package Quantities: 1/8” to 3/8” = 6/pkg; 1/2” to 3/4” = 3/pkg; 1” and over 1/pkg

STRAIGHT PIPE TAPS

Ground Thread / High Speed Steel

List No. 3181

NPS, NPSM, NPSC

- Medium hook design for general purpose applications
- Gound threads
- Straight flutes
- Use for NPSC and NPSM applications

Tap Size	TPI	# of Flutes	OA Length	Thread Length	3181 NPS / NPSM NPSC
1/8*	27	4	2-1/8	3/4	**387105**
1/8	27	4	2-1/8	3/4	**387113**
1/4	18	4	2-7/16	1-1/16	**387121**
3/8	18	4	2-9/16	1-1/16	**387139**
1/2	14	4	3-1/8	1-3/8	**387147**
3/4	14	5	3-1/4	1-3/8	**387154**
1	11-1/2	5	3-3/4	1-3/4	**387162**

Package Quantities: 1/8" to 3/8" = 6/pkg; 1/2" to 3/4" = 3/pkg; 1" and over 1/pkg

** Small shank diameter*

STRAIGHT DRYSEAL PIPE TAPS

Ground Thread / High Speed Steel

List No. 3181-D

NPSF

- Medium hook design for general purpose applications
- Gound threads
- Straight flutes
- NPSF dryseal thread design

Tap Size	TPI	# of Flutes	OA Length	Thread Length	3181-D NPSF
1/8*	27	4	2-1/8	3/4	**387212**
1/8	27	4	2-1/8	3/4	**387220**
1/4	18	4	2-7/16	1-1/16	**387238**
3/8	18	4	2-9/16	1-1/16	**387246**
1/2	14	4	3-1/8	1-3/8	**387253**
3/4	14	5	3-1/4	1-3/8	**387261**
1	11-1/2	5	3-3/4	1-3/4	**387279**

Package Quantities: 1/8" to 3/8" = 6/pkg; 1/2" to 3/4" = 3/pkg; 1" and over 1/pkg

**Small shank diameter*

HEXAGON RETHREADING DIES

Carbon Steel

List No. 280

Fractional Sizes

- Used in repair work for dressing over bruised and rusty threads
- Can be used in free machining materials

Die Size	TPI	Hex Size Across Flat	Die Thickness	280 EDP No.
5/16	18 NC	11/16	5/16	**403124**
5/16	24 NF	11/16	5/16	**403132**
3/8	16 NC	25/32	3/8	**403140**
7/16	14 NC	7/8	7/16	**403165**
7/16	20 NF	7/8	7/16	**403173**
1/2	13 NC	1-1/16	1/2	**403181**
1/2	20 NF	1-1/16	1/2	**403199**
5/8	11 NC	1-1/4	5/8	**403223**
3/4	10 NC	1-7/16	3/4	**403264**
7/8	9 NC	1-5/8	7/8	**403280**
1	8 NC	1-13/16	1	**403306**

Also available as special in left hand, special thread pitch, special sizes, and in high speed steel.
Package Quantities: all dies = 1/pkg

ROUND ADJUSTABLE DIES

High Speed Steel

List No. 2290

Machine Screw and Fractional Sizes

- Will cut external threads when held in a die stock
- Will produce (UN) thread form
- Adjustable for wear & size
- One side of the die has a 2 to 3 thread chamfer for threading, the other side has a 1 to 1-1/2 thread chamfer for threading close to a shoulder

Die Size	TPI	O.D. x Thickness	2290 EDP No.
1/4	20	1" O.D. x 3/8" thick	**400302**
3/8	16	1" O.D. x 3/8" thick	**400344**

Packaging Quantities: all dies = 1/pkg

SOLID ROUND DIES FOR TAPER PIPE

Carbon Steel

List No. 290

NPT Sizes

- To repair external pipe threads when held in a die stock
- Will produce NPT thread form

Die Size	TPI	O.D. x Thickness	290 NPT
1/8	27	1” O.D. x 3/8” thick	**405202**
1/4	18	2” O.D. x 5/8” thick	**405301**

Sizes other than shown are available as special. Pipe dies with straight threads for garden hose threads, etc., are available as special. Dies for all pipe sizes manufactured from high speed steel are available as special.

Packaging Quantities: all dies = 1/pkg

DIE STOCKS

For Round Adjustable Dies

■Made from steels for added toughness

Die Stock #	Capacity Die O.D.	OA Length	EDP No.
1852	1	9	**420522**
1853	1-1/2	14	**420548**
1857	2	23	**420555**

T-HANDLE TAP WRENCHES

■Made from steels for added toughness

Tap Wrench #	Type of Handle	Capacity - Tap Size Fract.	Mach.Sc.	Body Length	EDP No.
328	Sliding	1/16 - 1/4	0-14	2-3/4	**420803**
332	Sliding	7/32 - 1/2	12-14	3-5/8	**420829**
336	Stationary	1/16 - 1/4	0-14	8-3/4	**420845**
338	Ratchet	1/16 - 1/4	0-14	3-3/4	**420860**
339	Ratchet	7/32 - 1/2	12-14	5	**420878**

ADJUSTABLE TAP and REAMER WRENCHES

Wrench Number	Capacity - Tap Size Fract	Machine Screw	Pipe	Hand Reamer	Body Length	EDP No.
5	5/32 - 1/2	7-14	1/8	11/64 - 7/16	11	**420936**
6	5/32 - 3/4	7-14	1/8 - 1/4	11/64 - 41/64	15	**420944**
7	1/4 - 1-1/8	–	1/8 - 3/4	9/32 - 29/32	19	**420951**

VERMONT TAP FACTS: TYPES OF TAPS

Straight Fluted Hand Taps

These are general purpose taps used for a wide variety of hand and machine tapping applications. They are available, in most cases, in taper, plug, semi-bottoming, and bottoming chamfers and in various numbers of flutes.

Spiral Pointed Taps

These taps have a special angular grind at the point which shears chips and drives them ahead of the tap. Advantages are reduced tapping torque and increased speed in through hole tapping.

Spiral Fluted Taps

These taps are manufactured with spiral flutes for increased chip clearing efficiency in soft materials in which stringy chips are generated. Especially useful in tapping deep or blind holes, and in bridging keyways, these taps are available with regular or high helix flutes.

Fluteless or Forming Taps

Forming taps generate threads by displacing rather than cutting metal, thereby eliminating or greatly reducing chips. They are especially useful for applications in which chips cannot be tolerated. CNC Forming taps are designed to allow tapping harder and tougher materials than have been successfully tapped with other forming taps.

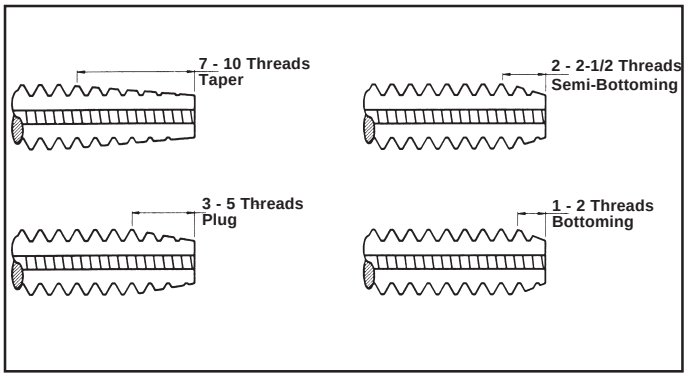
Extra Length Taps

Vermont Tap and Die produces, as standard and special, five different types of taps with extra long shanks that permit tapping in deep or obstructed areas. They are extension taps, pulley taps, nut taps, tapper taps and taper pipe taps (extra length). Of these, nut taps, tapper taps, and extension taps 7/16" and larger have shank diameters smaller than the minor diameter of the nut being tapped.

Pipe Taps

Taps for internal threading of pipe, pipe fittings, or holes in which threaded pipe is to be assembled are pipe taps. The types of pipe taps manufactured by Vermont Tap and Die as standard include: Taper Pipe Taps in regular or interrupted thread; Extra Length Taper Pipe Taps in regular or interrupted thread; and Straight Pipe Taps. Interrupted thread pipe taps are manufactured with alternate teeth removed on adjacent lands (with the exception of the first few threads at the point). Designed for tapping certain tough metals or those which tend to tear or load the cutting teeth, these taps are to be used only when regular full thread taps fail.

VERMONT TAP FACTS: CHAMFER STYLES



All taps have a certain number of threads at the starting end chamfer ground and relieved. This chamfer helps to guide the tap into the hole and also serves to distribute the cutting action over as many threads as possible. There are four standard styles of tap chamfer —taper, plug, semi-bottoming, and bottoming — with a different number of threads chamfered in each case. Each is designed for a different type of hole situation.

Taper taps have 7 to 10 threads chamfered and are designed for threading through holes.

Plug taps have 3 to 5 threads chamfered and are most widely used in through holes and in blind holes that do not have to be threaded all the way to the bottom. Although most hand taps are available in taper, plug, and bottoming styles, some taps, such as pipe taps, are available only in the plug chamfer.

Semi-bottoming taps have 2 to 2-1/2 threads chamfered and are designed for both through and blind hole tapping.

Bottoming taps have 1 to 2 threads chamfered, and are designed to thread blind holes close to the bottom.

NUMBER OF FLUTES

Cutting taps (as opposed to forming taps which do not cut metal or produce chips) are manufactured with a number of flutes running the length of their thread sections. These flutes have two functions: ground perpendicular to the tap threads as they are, they provide the teeth which cut into the object being threaded; and they provide channels along which the metal chips produced in thread cutting can escape from the workpiece. Generally speaking, increasing the number of flutes increases the number of cutting faces presented to the work piece, thereby distributing the cutting action over a greater number of teeth and reducing the wear on each tooth.

The basic number of flutes for most standard hand tap sizes from No. 8 through 1" is four, but for applications in which greater land strength or greater chip clearing ability is required (as in the case of tough, stringy metals), two and three fluted taps are available as optional standards. Two and three fluted taps are provided as standard in the spiral pointed and spiral fluted tap lines while standard pipe taps, in the larger sizes, are manufactured with as many as eight flutes.

THREAD PITCH DIAMETER LIMITS

The basic pitch diameter of any given thread size is equivalent to both the maximum pitch diameter of all screws manufactured to that size and to the minimum pitch diameter of any nut of that size. However, since basic pitch diameter is a theoretical figure which cannot be attained under production conditions, it is primarily a control point from which standardized deviations or tolerances are established.

Accordingly, since basic pitch diameter is the same as minimum pitch diameter of internally threaded objects such as nuts, standard taps in a given size are manufactured to various different size levels that produce dimensions greater than that of basic pitch diameter. For instance, the basic pitch diameter of a 1/4-20 screw thread is .2175, but a 1/4-20 tap produced to the tolerances of G H3 limits has a pitch diameter tolerance range of .2185 to .2190. Pitch diameter limits for taps through 1" in diameter follow.

H1 basic to basic plus .0005"
H2 basic plus .0005" to basic plus .0010"
H3 basic plus .0010" to basic plus .0015"
H4 basic plus .0015" to basic plus .0020"
H5 basic plus .0020" to basic plus .0025"
H6 basic plus .0025" to basic plus .0030"

TECHNICAL DATA

Of most importance to successful hole tapping is the information for determining the correct tap/drill sizes given for thread cutting taps in Table #15. The same information for forming taps can be found in Table #10. In addition, specific recommendations regarding tapping in different types of material can be found in Table #13.

SCREW THREAD CLASSES OF FIT

Three classes of fit have been established for screw threads in the unified system which permit the making of standard recommendations that relate screw thread class of fit to specific tap tolerance limits.

The class of fit of two threaded members such as a nut and a bolt is expressed by a symbol containing a number and a letter as part of the thread designation. The number, 1 through 3, expresses the class of fit while the letter "A" or "B" respectively expresses whether external or internal threads are involved. In the example "1/2-13 UNC-2B", 2B expresses the class of fit for an internal thread.

Class 1A External and Class 1B Internal Threads

This class of fit is intended to apply to the manufacture of threaded parts where frequent quick assembly is necessary or desired. A wide allowance, or difference, between basic pitch diameter and maximum pitch diameter, is provided to permit the loose assembly.

Class 2A External and Class 2B Internal Threads

This class of fit is medium loose and is intended to apply to screws, bolts, and nuts for general fastener use. This allowance will permit freedom of fit to prevent seizure in assembly and will allow limited plating and coating.

Class 3A External and Class 3B Internal Threads

This class of fit is intended for thread assembly where closeness of fit and accuracy of thread angle and lead are required. This close fit can be obtained consistently only by use of high quality tooling and equipment and a highly efficient system of gaging and inspection.

Unified threads, American threads, and UNJ threads have the same tap thread form so that Unified and American threaded parts are mechanically interchangeable.

UNJ internal threads are produced with taps with standard thread form. Radius root applies only to the externally threaded member. Special oversize minor diameter (drilled hole) is required in UNJ threads. Refer to MIL-S-8879A which is the industry standard for the UNJ thread.

PITCH DIAMETER LIMIT RECOMMENDATIONS

The chart on the next page lists recommendations of specific taps by pitch diameter limit in each thread size for each class of fit. The recommended tap in each case should provide the required class of fit under good tapping conditions. There are some conditions, however, such as a tendency to oversize tapping, that may necessitate the selection of an alternate pitch diameter limit. Generally, if only the first few holes gage loose and can be tolerated, it is best to use the recommended pitch diameter limit in order to secure maximum tap life.

Pitch diameters shown under "Min/All Classes (Basic)" are those for the thread gage GO member. Pitch diameters shown under the four "Max" classes are those for the HI or NO GO member. If only the class of fit is shown on orders, taps with corresponding limits as shown on this chart will be furnished. If only ground thread is specified, taps with the limit for Class 2B or 3B fit will be furnished.

In very abrasive material, improved tap life can be realized by using taps with one pitch diameter limit higher than recommended in the chart. The first few holes tapped may gage a little loose, but after wear land has developed, good gaging will usually follow.

There are several factors other than the pitch diameter limit in maintaining good gaging. High flute hook, high chamfer relief, and high thread relief as well as spindle run-out, misalignment, overfeeding, in or out, and incorrect tapping speeds can all cause oversize gaging. On the other hand, some materials tend to expand under comparatively low heat conditions and to close up the tapped hole, which will result in tight gaging. (continued on next page)

PITCH DIAMETER LIMIT RECOMMENDATIONS (continued)

Some high production tapping machines cause the tap to stop on reversing about one thread from the top of the hole and pull out without turning. This causes distortion of the top thread that may restrict the GO gage. If gaging problems persist, call your Vermont representative or the Technical Service Department at Vermont Tap & Die.

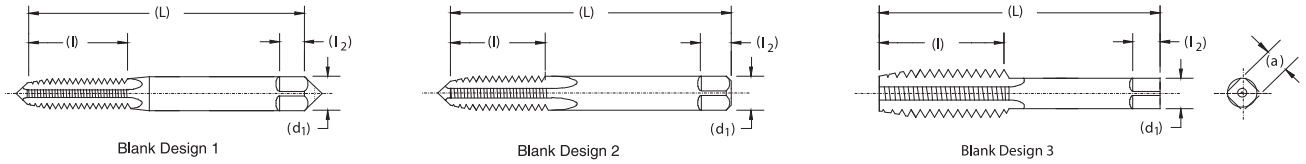
TECHNICAL TABLES

TABLE #1 TAP RECOMMENDATIONS FOR CLASSES 2, 3, 2B & 3B
UNIFIED AND AMERICAN NATIONAL SCREW THREADS

	THREADS PER INCH		RECOMMENDED TAP LIMITS				INTERNAL THREAD PITCH DIAMETER LIMITS				
SIZE	NC UNC	NF UNF	CLASS 2	CLASS 3	CLASS 2B	CLASS 3B	MIN/ALL CLASSES (BASIC)	MAX CLASS 2	MAX CLASS 3	MAX CLASS 2B	MAX CLASS 3B
0		80	G H1	G H1	G H2	G H1	.0519	.0536	.0532	.0542	.0536
1	64		G H1	G H1	G H2	G H1	.0629	.0648	.0643	.0655	.0648
1		72	G H1	G H1	G H2	G H1	.0640	.0658	.0653	.0665	.0659
2	56		G H1	G H1	G H2	G H1	.0744	.0764	.0759	.0772	.0765
2		64	G H1	G H1	G H2	G H1	.0759	.0778	.0773	.0786	.0779
3	48		G H1	G H1	G H2	G H1	.0855	.0877	.0871	.0885	.0877
3		56	G H1	G H1	G H2	G H1	.0874	.0894	.0889	.0902	.0895
4	40		G H2	G H1	G H2	G H2	.0958	.0982	.0975	.0991	.0982
4		48	G H1	G H1	G H2	G H1	.0985	.1007	.1001	.1016	.1008
5	40		G H2	G H1	G H2	G H2	.1088	.1112	.1105	.1121	.1113
5		44	G H1	G H1	G H2	G H1	.1102	.1125	.1118	.1134	.1126
6	32		G H2	G H1	G H3	G H2	.1177	.1204	.1196	.1214	.1204
6		40	G H2	G H1	G H2	G H2	.1218	.1242	.1235	.1252	.1243
8	32		G H2	G H1	G H3	G H2	.1437	.1464	.1456	.1475	.1465
8		36	G H2	G H1	G H2	G H2	.1460	.1485	.1478	.1496	.1487
10	24		G H3	G H1	G H3	G H3	.1629	.1662	.1653	.1672	.1661
10		32	G H2	G H1	G H3	G H2	.1697	.1724	.1716	.1736	.1726
12	24		G H3	G H1	G H3	G H3	.1889	.1922	.1913	.1933	.1922
12		28	G H3	G H1	G H3	G H3	.1928	.1959	.1950	.1970	.1959
1/4	20		G H3	G H2	G H5	G H3	.2175	.2211	.2201	.2223	.2211
1/4		28	G H3	G H1	G H4	G H3	.2268	.2299	.2290	.2311	.2300
5/16	18		G H3	G H2	G H5	G H3	.2764	.2805	.2794	.2817	.2803
5/16		24	G H3	G H1	G H4	G H3	.2854	.2887	.2878	.2902	.2890
3/8	16		G H3	G H2	G H5	G H3	.3344	.3389	.3376	.3401	.3387
3/8		24	G H3	G H1	G H4	G H3	.3479	.3512	.3503	.3528	.3516
7/16	14		G H5	G H3	G H5	G H3	.3911	.3960	.3947	.3972	.3957
7/16		20	G H3	G H1	G H5	G H3	.4050	.4086	.4076	.4104	.4091
1/2	13		G H5	G H3	G H5	G H3	.4500	.4552	.4537	.4565	.4548
1/2		20	G H3	G H1	G H5	G H3	.4675	.4711	.4701	.4731	.4717
9/16	12		G H5	G H3	G H5	G H3	.5084	.5140	.5124	.5152	.5135
9/16		18	G H3	G H2	G H5	G H3	.5264	.5305	.5294	.5323	.5308
5/8	11		G H5	G H3	G H5	G H3	.5660	.5719	.5702	.5732	.5714
5/8		18	G H3	G H2	G H5	G H3	.5889	.5930	.5919	.5949	.5934
3/4	10		G H5	G H3	G H5	G H5	.6850	.6914	.6895	.6927	.6907
3/4		16	G H3	G H2	G H5	G H3	.7094	.7139	.7126	.7159	.7143
7/8	9		G H6	G H4	G H6	G H4	.8028	.8098	.8077	.8110	.8089
7/8		14	G H4	G H2	G H6	G H4	.8286	.8335	.8322	.8356	.8339
1	8		G H6	G H4	G H6	G H4	.9188	.9264	.9242	.9276	.9254
1		12	G H4	G H2	G H6	G H4	.9459	.9515	.9499	.9535	.9516
1		14 NS	G H4	G H2	G H6	G H4	.9536	.9585	.9572	.9609	.9590
1-1/8	7		G H8	G H4	G H8	G H4	1.0322	1.0407	1.0381	1.0416	1.0393
1-1/8		12	G H4	G H4	G H6	G H4	1.0709	1.0765	1.0749	1.0787	1.0768
1-1/4	7		G H8	G H4	G H8	G H4	1.1572	1.1657	1.1631	1.1668	1.1644
1-1/4		12	G H4	G H4	G H6	G H4	1.1959	1.2015	1.1999	1.2039	1.2019
1-3/8	6		G H8	G H4	G H8	G H4	1.2667	1.2768	1.2738	1.2771	1.2745
1-3/8		12	G H4	G H4	G H6	G H4	1.3209	1.3265	1.3249	1.3291	1.3270
1-1/2	6		G H8	G H4	G H8	G H4	1.3917	1.4018	1.3988	1.4022	1.3996
1-1/2		12	G H4	G H4	G H6	G H4	1.4459	1.4515	1.4499	1.4542	1.4522

NOTES: ***Class 1B:*** *tapped holes can be produced with cut thread taps.* ***Class 2B:*** *cut thread taps may be used under normal conditions and in average materials for producing tapped holes to this classification. The above recommended taps normally produce the class of thread indicated in average materials when used with reasonable care. However, if the tap specified does not give a satisfactory gage fit in the work, a choice of some other limit tap will be necessary.*

ILLUSTRATION #1 GENERAL TAP DIMENSIONS



L = Overall Length l = Thread Length including chamfer l_2 = Square Length d_1 = Shank Diameter a = Size of Square

TABLE #2 USCTI TABLE 302 STANDARD TAP DIMENSIONS, GROUND THREAD

NOMINAL DIAMETER RANGE (INCHES)		TAP SIZE				TAP DIMENSIONS (INCHES)				
OVER	TO (INCL)	MACHINE SCREW NO.	FRACTIONAL INCHES	METRIC MILLIMETERS	STYLE	OVERALL LENGTH L	THREAD LENGTH l	SQUARE LENGTH l_2	SHANK DIAMETER d_1	SIZE OF SQUARE a
.052	.065	0	1/16	M1.6	1	1-5/8	5/16	3/16	.141	.110
.065	.078	1		M1.8	1	1-11/16	3/8	3/16	.141	.110
.078	.091	2		M2, M2.2	1	1-3/4	7/16	3/16	.141	.110
.091	.104	3	3/32	M2.5	1	1-13/16	1/2	3/16	.141	.110
.104	.117	4			1	1-7/8	9/16	3/16	.141	.110
.117	.130	5	1/8	M3, M3.15	1	1-15/16	5/8	3/16	.141	.110
.130	.145	6		M3.5	1	2	11/16	3/16	.141	.110
.145	.171	8	5/32	M4	1	2-1/8	3/4	1/4	.168	.131
.171	.197	10	3/16	M4.5, M5	1	2-3/8	7/8	1/4	.194	.152
.197	.223	12	7/32		1	2-3/8	15/16	9/32	.220	.165
.223	.260	14	1/4	M6, M6.3	2	2-1/2	1	5/16	.255	.191
.260	.323		5/16	M7, M8	2	2-23/32	1-1/8	3/8	.318	.238
.323	.395		3/8	M10	2	2-15/16	1-1/4	7/16	.381	.286
.395	.448		7/16		3	3-5/32	1-7/16	13/32	.323	.242
.448	.510		1/2	M12, M12.5	3	3-3/8	1-21/32	7/16	.367	.275
.510	.573		9/16	M14	3	3-19/32	1-21/32	1/2	.429	.322
.573	.635		5/8	M16	3	3-13/16	1-13/16	9/16	.480	.360
.635	.709		11/16	M18	3	4-1/32	1-13/16	5/8	.542	.406
.709	.760		3/4		3	4-1/4	2	11/16	.590	.442
.760	.823		13/16	M20	3	4-15/32	2	11/16	.652	.489
.823	.885		7/8	M22	3	4-11/16	2-7/32	3/4	.697	.523
.885	.948		15/16	M24	3	4-29/32	2-7/32	3/4	.760	.570
.948	1.010		1	M25	3	5-1/8	2-1/2	13/16	.800	.600
1.010	1.073		1-1/16	M27	3	5-1/8	2-1/2	7/8	.896	.672
1.073	1.135		1-1/8		3	5-7/16	2-9/16	7/8	.896	.672
1.135	1.198		1-3/16	M30	3	5-7/16	2-9/16	1	1.021	.766
1.198	1.260		1-1/4		3	5-3/4	2-9/16	1	1.021	.766
1.260	1.323		1-5/16	M33	3	5-3/4	2-9/16	1-1/16	1.108	.831
1.323	1.385		1-3/8		3	6-1/16	3	1-1/16	1.108	.831
1.385	1.448		1-7/16	M36	3	6-1/16	3	1-1/8	1.233	.925
1.448	1.510		1-1/2		3	6-3/8	3	1-1/8	1.233	.925
1.510	1.635		1-5/8	M39	3	6-11/16	3-3/16	1-1/8	1.305	.979
1.635	1.760		1-3/4	M42	3	7	3-3/16	1-1/4	1.430	1.072
1.760	1.885		1-7/8		3	7-5/16	3-9/16	1-1/4	1.519	1.139
1.885	2.010		2	M48	3	7-5/8	3-9/16	1-3/8	1.644	1.233
2.010	2.135		2-1/8		3	8	3-9/16	1-3/8	1.769	1.327
2.135	2.260		2-1/4	M56	3	8-1/4	3-9/16	1-7/16	1.894	1.420
2.260	2.385		2-3/8		3	8-1/2	4	1-7/16	2.019	1.514
2.385	2.510		2-1/2		3	8-3/4	4	1-1/2	2.100	1.575
2.510	2.635		2-5/8	M64	3	8-3/4	4	1-1/2	2.225	1.669
2.635	2.760		2-3/4		3	9-1/4	4	1-9/16	2.350	1.762
2.760	2.885		2-7/8	M72	3	9-1/4	4	1-9/16	2.475	1.856
2.885	3.010		3		3	9-3/4	4-9/16	1-5/8	2.543	1.907
3.010	3.135		3-1/8		3	9-3/4	4-9/16	1-5/8	2.668	2.001
3.135	3.260		3-1/4	M80	3	10	4-9/16	1-3/4	2.793	2.095
3.260	3.385		3-3/8		3	10	4-9/16	1-3/4	2.883	2.162
3.385	3.510		3-1/2		3	10-1/4	4-15/16	2	3.008	2.256
3.510	3.635		3-5/8	M90	3	10-1/4	4-15/16	2	3.133	2.350
3.635	3.760		3-3/4		3	10-1/2	5-5/16	2-1/8	3.217	2.413
3.760	3.885		3-7/8		3	10-1/2	5-5/16	2-1/8	3.342	2.506
3.885	4.010		4	M100	3	10-3/4	5-5/16	2-1/4	3.467	2.600

TABLE #3 USCTI TABLE 303 SPECIAL FINE PITCH TAPS – SHORT SERIES

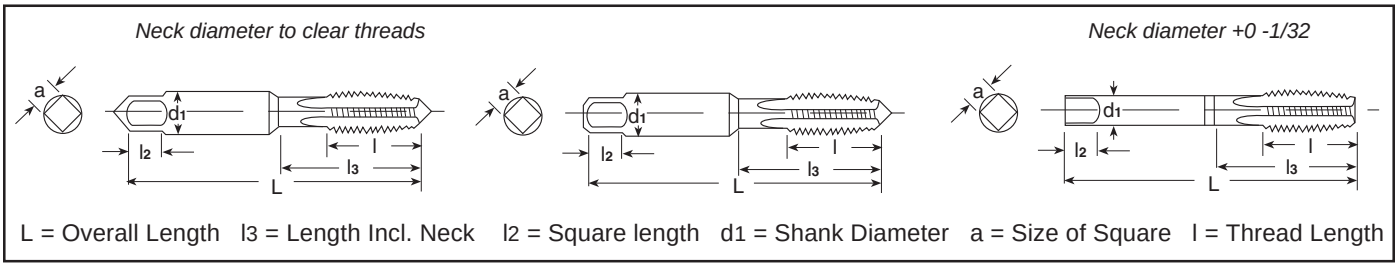
Unless otherwise specified, special taps 1.010" to 1.510" diameter inclusive, have 14 or more threads per inch or 1.75 millimeter pitch and finer. Sizes over 1.510" diameter with 10 or more threads per inch or 2.5 millimeter pitch and finer will be made to the general dimensions shown below. Standard tap dimensions are illustrated on the previous page.

NOMINAL DIAMETER RANGE (INCHES)		TAP SIZE		TAP DIMENSIONS (INCHES)				
OVER	TO (INCL)	FRACTIONAL INCHES	METRIC MILLIMETERS	OVERALL LENGTH L	THREAD LENGTH l	SQUARE LENGTH l_2	SHANK DIAMETER d_1	SIZE OF SQUARE a
1.010	1.073	1-1/16	M27	4	1-1/2	7/8	.896	.672
1.073	1.135	1-1/8		4	1-1/2	7/8	.896	.672
1.135	1.198	1-3/16	M30	4	1-1/2	1	1.021	.766
1.198	1.260	1-1/4		4	1-1/2	1	1.021	.766
1.260	1.323	1-5/16	M33	4	1-1/2	1	1.108	.831
1.323	1.385	1-3/8		4	1-1/2	1	1.108	.831
1.385	1.448	1-7/16	M36	4	1-1/2	1	1.233	.925
1.448	1.510	1-1/2		4	1-1/2	1	1.233	.925
1.510	1.635	1-5/8	M39	5	2	1-1/8	1.305	.979
1.635	1.760	1-3/4	M42	5	2	1-1/4	1.430	1.072
1.760	1.885	1-7/8		5	2	1-1/4	1.519	1.139
1.885	2.010	2	M48	5	2	1-3/8	1.644	1.233
2.010	2.135	2-1/8		5-1/4	2	1-3/8	1.769	1.327
2.135	2.260	2-1/4	M56	5-1/4	2	1-7/16	1.894	1.420
2.260	2.385	2-3/8		5-1/4	2	1-7/16	2.019	1.514
2.385	2.510	2-1/2		5-1/4	2	1-1/2	2.100	1.575
2.510	2.635	2-5/8	M64	5-1/2	2	1-1/2	2.100	1.575
2.635	2.760	2-3/4		5-1/2	2	1-1/2	2.100	1.575
2.760	2.885	2-7/8	M72	5-1/2	2	1-1/2	2.100	1.575
2.885	3.010	3		5-1/2	2	1-1/2	2.100	1.575
3.010	3.135	3-1/8		5-3/4	2	1-1/2	2.100	1.575
3.135	3.260	3-1/4	M80	5-3/4	2	1-1/2	2.100	1.575
3.260	3.385	3-3/8		5-3/4	2	1-1/2	2.100	1.575
3.385	3.510	3-1/2		5-3/4	2	1-1/2	2.100	1.575
3.510	3.635	3-5/8	M90	6	2	1-3/4	2.100	1.575
3.635	3.760	3-3/4		6	2	1-3/4	2.100	1.575
3.760	3.885	3-7/8		6	2	1-3/4	2.100	1.575
3.885	4.010	4	M100	6	2	1-3/4	2.100	1.575

TABLE #4 GENERAL TAP DIMENSION TOLERANCES

ELEMENT	NOMINAL DIAMETER RANGE (INCHES) OVER	TO (INCL.)	DIRECTION	TOLERANCE (INCHES) GROUND THREAD
Length Overall - A	.052	1.010	Plus or Minus	1/32
	1.010	4.010	Plus or Minus	1/16
Length of Thread - B	.052	.223	Plus or Minus	3/64
	.223	.510	Plus or Minus	1/16
	.510	1.510	Plus or Minus	3/32
	1.510	4.010	Plus or Minus	1/8
Length of Square - C	.052	1.010	Plus or Minus	1/32
	1.010	4.010	Plus or Minus	1/16
Diameter of Shank - D	.052	.223	Minus	.0015
	.223	.635	Minus	.0015
	.635	1.010	Minus	.002
	1.010	1.510	Minus	.002
	1.510	2.010	Minus	.003
	2.010	4.010	Minus	.003
Size of Square - E	.052	.510	Minus	.004
	.510	1.010	Minus	.006
	1.010	2.010	Minus	.008
	2.010	4.010	Minus	.010

ILLUSTRATION #2 NECKED TAPS



L = Overall Length l3 = Length Incl. Neck l2 = Square length d1 = Shank Diameter a = Size of Square l = Thread Length

TABLE #5 USCTI TABLE 302A GENERAL TAP DIMENSIONS AND TOLERANCES Optional Necks and Optional Shortened Thread Length

NOMINAL DIAMETER RANGE (INCHES)		TAP SIZE				TAP DIMENSIONS (INCHES)					
OVER	TO (INCL)	MACHINE SCREW NO.	FRACTIONAL INCHES	METRIC MILLIMETERS	STYLE	OVERALL LENGTH L	NECKED LENGTH *l_3	SQUARE LENGTH l_2	SHANK DIAMETER d1	SIZE OF SQUARE a	THREAD LENGTH **l
.104	.117	4			1	1-7/8	9/16	3/16	.141	.110	5/16
.117	.130	5	1/8	M3, M3.15	1	1-15/16	5/8	3/16	.141	.110	5/16
.130	.145	6		M3.5	1	2	11/16	3/16	.141	.110	3/8
.145	.171	8	5/32	M4	1	2-1/8	3/4	1/4	.168	.131	3/8
.171	.197	10	3/16	M4.5, M5	1	2-3/8	7/8	1/4	.194	.152	1/2
.197	.223	12	7/32		1	2-3/8	15/16	9/32	.220	.165	1/2
.223	.260	14	1/4	M6, M6.3	2	2-1/2	1	5/16	.255	.191	5/8
.260	.323		5/16	M7, M8	2	2-23/32	1-1/8	3/8	.318	.238	11/16
.323	.395		3/8	M10	2	2-15/16	1-1/4	7/16	.381	.286	3/4
.395	.448		7/16		3	3-5/32	—	13/32	.323	.242	7/8
.448	.510		1/2	M12, M12.5	3	3-3/8	—	7/16	.367	.275	15/16
.510	.573		9/16	M14	3	3-19/32	—	1/2	.429	.322	1
.573	.635		5/8	M16	3	3-13/16	—	9/16	.480	.360	1-3/32
.635	.709		11/16	M18	3	4-1/32	—	5/8	.542	.406	1-3/32
.709	.760		3/4		3	4-1/4	—	11/16	.590	.442	1-7/32
.760	.823		13/16	M20	3	4-15/32	—	11/16	.652	.489	1-7/32
.823	.885		7/8	M22	3	4-11/16	—	3/4	.697	.523	1-11/32
.885	.948		15/16	M24	3	4-29/32	—	3/4	.760	.570	1-11/32
.948	1.010		1	M25	3	5-1/8	—	13/16	.800	.600	1-1/2

** "l_3" based on Table 302, column B and shall be no less than minimum USCTI Table 302 thread length. ** "l" based on the length of 12 pitches of the UNC series. Note: 1) "l" is minimum value and has no tolerance. 2) Unless otherwise specified, all tolerances are in accordance with USCTI Table 302. 3) For eccentricity tolerances, see USCTI Table 317.*

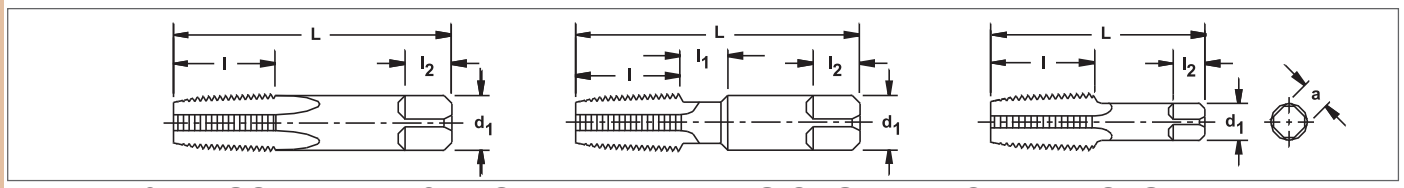


TABLE #6 USCTI TABLE 311 GENERAL DIMENSIONS AND TOLERANCES FOR STRAIGHT AND TAPER PIPE TAPS

Nominal Size (inches)	Dimensions - Inches Length Overall L	Length of Thread l	Length of Square l2	Diameter of Shank d1	Size of Square a
1/16	2-1/8	11/16	3/8	.3125	.234
1/8	2-1/8	3/4	3/8	.3125	.234
1/8	2-1/8	3/4	3/8	.4375	.328
1/4	2-7/16	1-1/16	7/16	.5625	.421
3/8	2-9/16	1-1/16	1/2	.7000	.531
1/2	3-1/8	1-3/8	5/8	.6875	.515
3/4	3-1/4	1-3/8	11/16	.9063	.679
1	3-3/4	1-3/4	13/16	1.1250	.843
1-1/4	4	1-3/4	15/16	1.3125	.984
1-1/2	4-1/4	1-3/4	1	1.5000	1.125
2	4-1/2	1-3/4	1-1/8	1.8750	1.406
2-1/2	5-1/2	2-9/16	1-1/4	2.2500	1.687
3	6	2-5/8	1-3/8	2.6250	1.968
3-1/2	6-1/2	2-11/16	1-1/2	2.8125	2.108
4	6-3/4	2-3/4	1-5/8	3.0000	2.250

Tolerances			
Element	Range (inches)	Direction	Tolerance (inches)
Length Overall L	1/16 to 3/4 incl.	Plus or Minus	1/32
	1 to 4 inc.	Plus or Minus	1/16
Length of Thread l	1/16 to 3/4 incl.	Plus or Minus	1/16
	1 to 1-1/4 incl.	Plus or Minus	3/32
	1-1/2 to 4 incl.	Plus or Minus	1/8
Length of Square l_2	1/16 to 3/4 incl.	Plus or Minus	1/32
	1 to 4 incl.	Plus or Minus	1/16
Diameter of Shank d_1	1/16 to 1/8 incl.	Minus	.0015
	1/4 to 1/2 incl.	Minus	.0020
	3/4 to 1 incl.	Minus	.0020
	1-1/4 to 4 incl.	Minus	.0030
Size of Square a	1/16 to 1/8 incl.	Minus	.0040
	1/8 to 3/4 incl.	Minus	.0060
	1 to 4 incl.	Minus	.0080

TABLE #7 SURFACE TREATMENTS AND COATINGS FOR HIGH-SPEED STEEL GROUND THREAD TAPS

Coating	Properties and Application	Precautions
VERTANIUM® Titanium Nitride (TiN)	Proprietary TiN coating (hardness 2300 Vickers) offers significantly improved wear life and thread finish, often at higher tapping speeds in a broad range of materials, especially ferrous steels. Golden color.	Use with caution in nonferrous materials because of tendency to gall.
VERTANIUM ULTRA® Titanium Carbonitride (TiCN)	Proprietary TiCN coating (hardness 3000 Vickers) is harder, tougher and more wear resistant than TiN under conditions of moderate cutting temperatures. Like TiN, TiCN may be used at higher cutting speeds in a broad range of materials, especially ferrous steels. Blue-gray color.	Use with caution in nonferrous materials because of tendency to gall. TiAlN is a better choice when used at extreme temperatures.
Titanium Aluminum Nitride (TiAlN)	TiAlN coating (2600 Vickers) offers improved wear life and thread finish, especially in conditions where high temperatures can be generated. Violet-gray color.	Use with caution in nonferrous materials because of tendency to gall.
Chromium Nitride (CrN)	CrN is medium hard (1800 Vickers) has lower wear resistance than TiN, TiCN and TiAlN. However unlike thesecoatings, CrN does not gall when used in some nonferrous work materials. Silver color.	Ineffective in ferrous materials.
Nitride A-10	Hardened case extends wear life in abrasive materials.	Avoid on taper pipe, fast spiral and small diameter (<#6) or fine pitch taps due to tendency for thread chipping.
Oxide X-10	Helps prevent galling in ferrous (iron based) materials. For free machining steel.	Has a tendency to cause galling in nonferrous materials such as aluminum.
Nitride and Oxide X-20	Combines the benefits of nitride and oxide surface treatments.	See precautions for nitride and oxide surface treatments.

TABLE #8 HSS Tap Coating and Surface Treatment Guide

Best: *First choice among all commercially available coatings. Should provide superior results in the proper application.*

Alternate: *Provides a significant performance benefit over uncoated tool. This may include improved life, productivity, size, finish or any combination.*

Possible: *Performance often application dependent. Results are difficult to predict and may be variable.*

Not Recommended: *Not compatible with the selected material. Likely to perform worse than an uncoated tool and the benefitmay not be cost justifiable.*

Speed *: A generalized safe starting point compared to speeds currently recommended for uncoated taps.*

NOTE*: Chart applies to un-heat treated materials, generally hardness levels less than 275 BHN or 28 HRC.*

Material Class	Material Type	Examples	TiN	TiCN	TiN+CrCC	TiAlN	CrN	Nitride	Oxide	Nitride, Oxide
	Speed compared to uncoated >		+50% speed	+50% speed	+50% speed	+100% speed	Same speed	A-10	X-10	X-20
Steel	Carbon steels	1010, 1045	ALT	BEST	ALT	NR	NR	NR	POSS	POSS
	Alloy steels	4140, 8620	ALT	BEST	ALT	POSS	NR	NR	POSS	POSS
	Tool steels	A2, D2, H13	ALT	BEST	ALT	ALT	NR	NR	POSS	POSS
	Martensitic stainless	414, 440	ALT	BEST	ALT	ALT	NR	NR	POSS	POSS
	PH stainless	15-5PH, 17-4PH	ALT	ALT	ALT	BEST	NR	NR	POSS	POSS
Stainless	Austenitic stainless	304, 316	ALT	ALT	BEST	ALT	NR	NR	POSS	POSS
Cast iron	Cast irons, ductile		ALT	BEST	ALT	ALT	NR	POSS	POSS	POSS
	Cast irons, gray	Class 20 -50	ALT	BEST	ALT	ALT	NR	POSS	POSS	POSS
Non-ferrous	Aluminum, wrought	1100, 2024	NR	NR	BEST	NR	ALT	ALT	NR	NR
	Alum. silicon, cast	319, 360, 380	POSS	ALT	BEST	NR	POSS	ALT	NR	NR
	Copper & alloys		NR	NR	POSS	NR	ALT	ALT	NR	NR
	Brass		NR	NR	POSS	NR	ALT	ALT	NR	NR
	Bronze		NR	NR	POSS	NR	ALT	ALT	NR	NR
	Zinc		NR	NR	POSS	NR	ALT	ALT	NR	NR
	Magnesium & alloys		NR	NR	POSS	NR	ALT	ALT	NR	NR
High-temp	Titaniums, pure	CP Ti	NR	NR	BEST	NR	POSS	ALT	NR	NR
	Titanium, alloys	Ti-6Al-4V	POSS	POSS	BEST	POSS	POSS	ALT	NR	NR
	Nickel based alloys	Monel, Inconel	ALT	ALT	ALT	BEST	ALT	POSS	POSS	POSS
	Iron based alloys	A-286, Incoloy	ALT	ALT	ALT	BEST	NR	POSS	POSS	POSS
	Cobalt based alloys	Haynes	ALT	ALT	ALT	BEST	NR	POSS	POSS	POSS
Other	Plastics, soft		BEST	ALT	POSS	NR	POSS	ALT	NR	NR
	Plastics, abrasive		ALT	BEST	POSS	NR	POSS	ALT	NR	NR
	Graphite		ALT	BEST	POSS	NR	POSS	ALT	NR	NR

CNC FORMING TAPS

Ground Thread / High Speed Steel

When engineering a new job with the Forming Tap, it is recommended that the drill size for 65% of thread be used as shown on Table #10 and #11. In most cases, the tap limit shown on Table #9 will produce the class of fit indicated. If it does not, use a lower or higher H number than indicated or contact the factory.

The formula on which Table #10 and #11 is based, is derived form extensive statistical data and laboratory testing on a wide variety of ductile metals, and can be expressed as follows:

Hole Size =

Basic tap major diameter - $\frac{.0068 \times \text{amount of \% of thread}}{\text{threads per inch.}}$

Example: Correct hole size for 65% of thread with a 1/4-20 CNC Forming Tap

Basic tap O.D. = .2500

Hole Size = $.2500 - \frac{.0068 \times 65}{20} = \frac{.442}{20}$

$= .2500 - \frac{.442}{20}$

$= .2500 - .0220$

$= .2280$ or #1 drill

If results are not satisfactory or if assistance is needed in determining correct hole sizes, contact your area Vermont sales representative or the Technical Services Department at Vermont Tap and Die.

The Vermont CNC Forming Tap is a new design expanding the use of forming taps further into harder and less ductile materials which up to now have not been successfully tapped with other existing types of forming taps.

The design of the CNC Forming Tap makes it less sensitive to undesirable hole conditions such as size variation, out-of-roundness, and excessive taper that often cause other forming taps to fail or break. However, in the case of holes that are small, or excessively tapered, the CNC Forming Tap may generate some fine chips.

The same recommendations, such as hole size, coolant, and spindle speed, that are made for other forming taps also apply to corresponding CNC Forming Taps.

CNC Forming Taps are available, as standard, in sizes, thread pitches, and pitch diameter limits shown on pages 31 and 32.

Bottom style CNC Forming Taps have approximately 2 threads tapered. Plug style CNC Forming Taps have approximately 4 threads tapered.

Other diameter, thread pitches, and left hand threads, may be available as special.

If further assistance is needed when engineering a new job with the CNC Forming Tap, contact your area Vermont sales representative, or the Technical Services Department at Vermont Tap and Die.

TABLE #9
CNC FORMING TAP RECOMMENDATIONS FOR NOMINAL CLASS OF FIT

TAP SIZE	PITCH	BASIC PITCH DIA.	H LIMIT / RECOMMENDED TAP TOLERANCE FOR CLASS 2 FIT	CLASS 2B FIT	CLASS 3B FIT
2	56	.0744	-	-	-
2	64	.0759	-	-	-
3	48	.0855	-	-	-
3	56	.0874	-	-	-
4	40	.0958	H3	H5	H3
4	48	.0985	H3	H5	H3
5	40	.1088	H3	H5	H3
5	44	.1102	H3	H5	H3
6	32	.1117	H3	H5	H3
6	40	.1218	H3	H5	H3
8	32	.1437	H3	H5	H3
8	36	.1460	H3	H5	H3
10	24	.1629	H4	H6	H4
10	32	.1697	H4	H6	H4
12	24	.1889	H4	H6	H4
12	28	.1928	H4	H6	H4
1/4	20	.2175	H4	H6	H4
1/4	28	.2268	H4	H6	H4
5/16	18	.2764	H5	H7	H5
5/16	24	.2854	H5	H7	H5
3/8	16	.3344	H5	H7	H5
3/8	24	.3479	H5	H7	H5
7/16	14	.3911	H5	H8	H5
7/16	20	.4050	H5	H8	H5
1/2	13	.4500	H5	H8	H5
1/2	20	.4675	H5	H8	H5
9/16	12	.5084	H7	H10	H7
9/16	18	.5264	H7	H10	H7

CNC FORMING TAPS

Ground Thread / High Speed Steel

TABLE #10
TAP DRILL SIZES FOR FORMING TAPS

THEORETICAL HOLE SIZE = (BASIC TAP O.D.) - .0068 X % OF THREAD
(core, punch, or dirll size) THREADS PER INCH

		75% THREAD		70% THREAD		65% THREAD		60%THREAD	
TAP SIZE	PITCH	THEORETICAL HOLE SIZE	NEAREST DRILL SIZE	THEORETICAL HOLE SIZE	NEAREST DRILL SIZE	THEORETICAL HOLE SIZE	NEAREST DRILL SIZE	THEORETICAL HOLE SIZE	NEAREST DRILL SIZE
2	56	.0769	1.95 mm	.0774	1.95 mm	.0781	5/64	.0787	#47
2	64	.0780	5/64	.0785	#47	.0791	2.0 mm	.0796	2.0 mm
3	48	.0884	2.25 mm	.0890	#43	.0898	#43	.0905	2.3 mm
3	56	.0899	#43	.0904		.0911	2.3 mm	.0917	2.3 mm
4	40	.0993	2.5 mm	.1000	#39	.1010	#39	.1018	#38
4	48	.1014	#38	.1020	#38	.1028	2.6 mm	.1035	2.6 mm
5	40	.1123	#34	.1130	#33	.1140	#33	.1148	2.9 mm
5	44	.1134	#33	.1141	2.9 mm	.1150	2.9 mm	.1157	
6	32	.1221	3.1 mm	.1230	3.1 mm	.1242		.1252	1/8
6	40	.1253	1/8	.1260	3.2 mm	.1270	3.2 mm	.1278	3.25 mm
8	32	.1481	3.75 mm	.1490		.1502	#25	.1512	3.8 mm
8	36	.1498	#25	.1507	3.8 mm	.1517	#24	.1526	#24
10	24	.1688		.1700	#18	.1716	11/64	.1729	11/64
10	32	.1741	#17	.1750	=	.1762		.1772	#16
12	24	.1948	#10	.1960	#9	.1976	5.0 mm	.1989	#8
12	28	.1978	5.0 mm	.1989	#8	.2002	#8	.2014	#7
1/4	20	.2245	5.7 mm	.2260		.2279	#1	.2295	#1
1/4	28	.2318		.2329	5.9 mm	.2342	A	.2354	15/64
5/16	18	.2842	7.2 mm	.2861	7.25 mm	.2879	7.3 mm	.2898	L
5/16	24	.2912	7.4 mm	.2927		.2941	M	.2955	7.5 mm
3/8	16	.3431	11/32	.3452	8.75 mm	.3474	S	.3495	8.9 mm
3/8	24	.3537	9.0 mm	.3552	9.0 mm	.3566		.3580	T
7/16	14	.4011		.4035	Y	.4059	13/32	.4084	
7/16	20	.4120	Z	.4137	10.5 mm	.4154		.4171	
1/2	13	.4608		.4634		.4660		.4686	15/32
1/2	20	.4745	12.0 mm	.4762		.4779		.4796	
9/16	12	.5200		.5229		.5257		.5285	17/32
9/16	18	.5342	13.5 mm	.5361		.5380		.5398	

TABLE #11
METRIC TAP / DRILL SIZES FOR FORMING TAPS

THEORETICAL HOLE SIZE = (BASIC TAP O.D.) - .0068 X % OF THREAD
(core, punch, or drill size) THREADS PER INCH

		75% THREAD		70% THREAD		65% THREAD		60 %THREAD	
TAP SIZE	PITCH	THEORETICAL HOLE SIZE	NEAREST DRILL SIZE	THEORETICAL HOLE SIZE	NEAREST DRILL SIZE	THEORETICAL HOLE SIZE	NEAREST DRILL SIZE	THEORETICAL HOLE SIZE	NEAREST DRILL SIZE
M3	0.5	.1081	2.75 mm	.1087	2.75 mm	.1094	7/64	.1101	2.8 mm
M3	0.6	.1061	2.7 mm	.1069	2.7 mm	.1077	2.75 mm	.1085	2.75 mm
M3.5	0.6	.1258	3.2 mm	.1265	3.2 mm	.1274	3.2 mm	.1281	#30
M4	0.7	.1434	#27	.1444	#27	.1453	3.7 mm	.1462	3.7 mm
M4	0.8	.1414	3.6 mm	.1425	3.6 mm	.1435	#27	.1447	#27
M4.5	0.75	.1621	4.1 mm	.1631	4.1 mm	.1661	#19	.1651	4.2 mm
M5	0.8	.1808	4.6 mm	.1819	4.6 mm	.1829	#14	.1840	4.7 mm
M5	0.9	.1788	#15	.1800	#15	.1812	4.6 mm	.1824	#14
M6	1	.2161	5.5 mm	.2175	5.5 mm	.2188	7/32	.2202	5.6 mm
M6.3	1	.2280	5.8 mm	.2293	5.8 mm	.2306	5.8 mm	.2320	5.9 mm
M7	1	.2555	6.5 mm	.2569	6.5 mm	.2582	F	.2595	6.6 mm
M8	1	.2949	7.5 mm	.2962	7.5 mm	.2976	19/64	.2989	7.6 mm
M8	1.25	.2899	7.4 mm	.2915	7.4 mm	.2932	7.4 mm	.2949	7.5 mm
M10	1.25	.3686	9.4 mm	.3702	9.4 mm	.3720	9.4 mm	.3726	9.5 mm
M10	1.5	.3636	9.2 mm	.3656	9.3 mm	.3676	9.3 mm	.3696	9.4 mm
M12	1.25	.4474	11.4 mm	.4490	11.4 mm	.4507	11.4 mm	.4524	11.5 mm
M12	1.75	.4373	11.1 mm	.4397	7/16	.4420	11.2 mm	.4443	11.3 mm
M14	1.25	.5261	13.4 mm	.5278	13.4 mm	.5295	13.4 mm	.5311	13.5 mm
M14	1.5	.5211	13.2 mm	.5231	13.3 mm	.5251	13.3 mm	.5271	13.4 mm
M14	2	.5110	13.0 mm	.5137	13.0 mm	.5164	13.1 mm	.5191	13.2 mm

ISO METRIC THREADS

The ISO (International Standards Organization) metric screw thread system is the international standard.

Standards for taps and dies for ISO metric threads have been established by the United States Cutting Tool Institute. Those standards cover general dimensions of tap overall length, thread length, shank diameter, square size, and the thread major diameter and pitch diameter needed to produce the required thread assembly fit.

All standards established by USCTI are to best suit tapping operations in the U.S. The shank and square dimensions of the closest American Standard tap are used so that existing tapping equipment can be used. For example, M8 x 1.25 tap with basic major diameter of .3150 would be made to 5/16 tap general dimensions. Those taps would be used essentially the same as 5/16 taps, with the only difference being in the thread lead.

If a lead screw or other lead mechanism must be used, it must be changed to the metric thread pitch.

There are three classes of fit in the ISO system for internal threads or nuts: close fit - Class 5H; medium fit - Class 6H; and free fit - Class 7H.

The most commonly used and generally recommended class of fit is 6H which is closely equivalent to the Unified System class 2-B fit.

Metric tap pitch diameter, for U.S. operation, is indicated in 'D' limit which is essentially the same as the 'H' limit in American Standard taps.

Conversion to the metric thread system is not complicated. However, when in doubt about class of fit or tap pitch diameter requirements, indicate the pitch diameter shown on the thread gage or on the work piece point when ordering taps, or contact Vermont Tap & Die Technical Services Department.

TABLE #12 METRIC SCREW THREADS

	INTERNAL THREAD – CLASS 6H (Nut or Workpiece)							TAP THREAD DIMENSIONS			
	MILLIMETERS			INCHES				MILLIMETERS		INCHES	
NOMINAL SIZE AND PITCH	PITCH DIAMETER MIN	PITCH DIAMETER MAX	MIN. MAJOR DIA.	PITCH DIAMETER MIN	PITCH DIAMETER MAX	MIN. MAJOR DIA.	D LIMIT	PITCH DIAMETER MIN	PITCH DIAMETER MAX	PITCH DIAMETER MIN	PITCH DIAMETER MAX
M1.6 x 0.35	1.373	1.458	1.600	.0541	.0574	.0630	D3	1.397	1.412	.0550	.0556
M1.8 x 0.35	1.573	1.658	1.800	.0620	.0653	.0709	D3	1.598	1.613	.0629	.0635
M2 x 0.4	1.740	1.830	2.000	.0685	.0720	.0787	D3	1.763	1.778	.0694	.0700
M2 x 0.45	1.707	1.802	2.000	.0672	.0709	.0787	D3	1.730	1.745	.0681	.0687
M2.2 x 0.45	1.908	2.003	2.200	.0751	.0789	.0866	D3	1.930	1.945	.0760	.0766
M2.5 x 0.45	2.208	2.303	2.500	.0869	.0907	.0984	D3	2.230	2.245	.0878	.0884
M3 x 0.6	2.610	2.722	3.000	.1028	.1072	.1181	D4	2.642	2.662	.1040	.1048
M3 x 0.5	2.675	2.775	3.000	.1053	.1093	.1181	D3	2.697	2.712	.1062	.1068
M3.5 x 0.6	3.110	3.222	3.500	.1225	.1268	.1378	D4	3.142	3.162	.1237	.1245
M4 x 0.8	3.481	3.606	4.000	.1370	.1420	.1575	D4	3.510	3.530	.1382	.1390
M4 x 0.7	3.545	3.663	4.000	.1396	.1442	.1575	D4	3.576	3.596	.1408	.1416
M4.5 x 0.75	4.013	4.131	4.500	.1580	.1626	.1772	D4	4.044	4.064	.1592	.1600
M5 x 0.9	4.417	4.551	5.000	.1739	.1792	.1969	D4	4.448	4.468	.1751	.1759
M5 x 0.8	4.480	4.605	5.000	.1764	.1813	.1969	D4	4.511	4.531	.1776	.1784
M6 x 1	5.350	5.500	6.000	.2106	.2165	.2362	D5	5.387	5.412	.2121	.2131
M6.3 x 1	5.650	5.800	6.300	.2224	.2283	.2480	D5	5.687	5.712	.2239	.2249
M7 x 1	6.350	6.500	7.000	.2500	.2559	.2756	D5	6.388	6.413	.2515	.2525
M8 x 1.25	7.188	7.348	8.000	.2830	.2893	.3150	D5	7.221	7.251	.2843	.2855
M8 x 1	7.350	7.500	8.000	.2894	.2953	.3150	D5	7.389	7.414	.2909	.2919
M10 x 1.5	9.026	9.206	10.000	.3553	.3624	.3937	D6	9.070	9.100	.3571	.3583
M10 x 1.25	9.188	9.348	10.000	.3617	.3680	.3937	D5	9.220	9.250	.3630	.3642
M12 x 1.75	10.863	11.063	12.000	.4277	.4356	.4724	D6	10.909	10.939	.4295	.4307
M12 x 1.25	11.188	11.368	12.000	.4405	.4476	.4724	D5	11.222	11.252	.4418	.4430
M14 x 2	12.701	12.913	14.000	.5000	.5084	.5512	D7	12.748	12.789	.5019	.5035
M14 x 1.5	13.026	13.216	14.000	.5128	.5203	.5512	D6	13.071	13.101	.5146	.5158
M14 x 1.25	13.188	13.368	14.000	.5192	.5263	.5512	D5	13.221	13.251	.5205	.5217
M16 x 2	14.701	14.913	16.000	.5788	.5871	.6299	D7	14.750	14.790	.5807	.5823
M16 x 1.5	15.026	15.216	16.000	.5916	.5990	.6299	D6	15.072	15.102	.5934	.5946
M18 x 2.5	16.376	16.600	18.000	.6447	.6535	.7087	D7	16.424	16.464	.6466	.6482
M18 x 1.5	17.026	17.216	18.000	.6703	.6778	.7087	D6	17.071	17.101	.6721	.6733
M20 x 2.5	18.376	18.600	20.000	.7235	.7323	.7874	D7	18.425	18.466	.7254	.7270
M20 x 1.5	19.026	19.216	20.000	.7490	.7565	.7874	D6	19.070	19.100	.7508	.7520
M22 x 2.5	20.376	20.600	22.000	.8022	.8110	.8661	D7	20.424	20.465	.8041	.8057
M22 x 1.5	21.026	21.216	22.000	.8278	.8353	.8661	D6	21.072	21.102	.8296	.8308
M24 x 3	22.051	22.316	24.000	.8682	.8786	.9449	D8	22.113	22.154	.8706	.8722
M24 x 2	22.701	22.925	24.000	.8937	.9026	.9449	D7	22.748	22.789	.8956	.8972
M27 x 3	25.051	25.316	27.000	.9863	.9967	1.0630	D8	25.103	25.154	.9883	.9903
M27 x 2	25.701	25.925	27.000	1.0118	1.0207	1.0630	D7	25.748	25.789	1.0137	1.0153
M30 x 3.5	27.727	28.007	30.000	1.0916	1.1026	1.1811	D9	27.790	27.841	1.0941	1.0961
M30 x 2	28.701	28.925	30.000	1.1300	1.1388	1.1811	D7	28.750	28.791	1.1319	1.1335
M33 x 3.5	30.727	31.007	33.000	1.2097	1.2207	1.2992	D9	30.790	30.841	1.2122	1.2142
M33 x 2	31.701	31.925	33.000	1.2481	1.2569	1.2992	D7	31.750	31.791	1.2500	1.2516
M36 x 4	33.402	33.702	36.000	1.3150	1.3268	1.4173	D9	33.464	33.515	1.3175	1.3195
M36 x 3	34.051	34.316	36.000	1.3406	1.3510	1.4173	D8	34.102	34.153	1.3426	1.3446

TECHNICAL INFORMATION

TABLE #13 SUGGESTED SPEEDS FOR HIGH SPEED STEEL AND VERTANIUM TAPS

WORK MATERIAL		SPEED-FEET-PER-MINUTE UNCOATED	VERTANIUM
Alloy Steels	125-225 BHN	30-60	60-120
	225-325 Bhn	20-45	40-90
	325-425 Bhn	10-35	20-70
Aluminum Alloys		75-150	*150-300
Carbon Steels	Low Carbon (.10-.25C)	50-75	100-150
225 Bhn or less	Med Carbon (.30-.55C)	40-65	80-130
	High Carbon (.60-.95C)	30-55	60-110
Cast Iron	Ductile, Annealed	40-60	80-120
	Ductile, As Cast	20-45	40-90
	Gray (Class 20, 25)	40-80	80-160
	Gray (Class 30-50)	25-50	50-100
	Malleable 200 Bhn or less	30-60	60-120
Copper Alloys		40-100	*80-200
Graphites & Carbons		5-10	10-20

WORK MATERIAL		SPEED-FEET-PER-MINUTE UNCOATED	VERTANIUM
High Temperature	Cobalt Base (Haynes Alloys)	3-8	5-16
Alloys	Iron Base (Incoloy, A-286)	7-15	15-30
	Nickel Base (Hastelloy, Inconel)	4-10	8-20
Magnesium		100-150	*150-200
Plastics		25-50	50-100
Stainless Steels		15-35	30-70
Titanium	Pure	25-55	*50-110
	Alloys (Ti-6A1-4V)	10-25	*20-50
Tool Steels	200-275 Bhn	15-30	30-60
	300-350 Bhn	10-25	20-50
	40-50 Rc	5-15	10-30
Zinc Alloys		100-150	*150-250

** Success of VERTANIUM® taps in nonferrous materials depends on the machining conditions used.*

TABLE #14 SPEEDS FOR TAPS CONVERSION CHART - fpm to rpm

Tap Sizes	Taper Pipe Taps	Surface Feet per Minute 5'	10'	15'	20'	25'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
		Revolutions per Minute																	
0		318	637	955	1273	1592	1910	2546	3183	3820	4456	5093	5729	6366	7003	7639	8276	8913	9549
1		273	546	819	1046	1308	1570	2093	2617	3140	3663	4186	4710	5233	5756	6279	6805	7326	7849
2		212	424	637	888	1110	1333	1777	2221	2665	3109	3554	3999	4442	4886	5330	5774	6218	6662
3		191	382	573	772	964	1157	1543	1929	2315	2701	3086	3472	3858	4244	4629	5015	5401	5787
4		174	347	521	682	853	1023	1364	1705	2046	2387	2728	3069	3411	3751	4092	4434	4775	5116
5		147	294	441	611	764	917	1222	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	4584
6		136	273	409	553	691	829	1106	1382	1659	1935	2212	2488	2766	3042	3318	3595	3871	4148
8		119	239	358	466	583	699	932	1165	1398	1631	1864	2097	2330	2563	2796	3029	3262	3495
10		101	201	302	402	502	603	804	1005	1205	1406	1607	1808	2009	2210	2411	2612	2813	3014
12		87	174	260	354	442	531	707	884	1061	1238	1415	1592	1769	1945	2122	2300	2476	2653
1/4		76	153	229	306	382	458	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292
5/16		62	123	185	245	306	367	489	611	733	856	978	1100	1222	1345	1467	1589	1711	1833
3/8		50	101	151	204	255	305	407	509	611	713	815	917	1019	1120	1222	1324	1426	1528
7/16	1/8	43	87	130	175	219	262	349	437	524	611	698	786	873	960	1048	1135	1222	1310
1/2	–	38	76	115	153	191	229	305	382	458	535	611	688	764	840	917	993	1070	1146
9/16	1/4	34	68	102	137	172	206	274	342	410	478	547	616	683	752	820	888	952	1020
5/8	–	32	64	96	122	153	183	244	306	367	428	489	550	611	672	733	794	856	917
11/16	3/8	28	55	83	111	138	167	222	278	333	389	444	500	556	611	667	722	778	833
3/4	–	25	51	76	102	128	153	203	255	305	357	407	458	509	560	611	662	713	764
7/8	1/2	22	43	65	87	109	131	175	218	262	306	350	392	437	480	524	568	611	655
1	–	19	38	57	76	96	115	153	191	230	268	305	344	382	420	458	497	535	573
1-1/8	3/4	17	34	51	68	84	102	136	170	204	238	272	306	340	373	407	441	475	509
1-1/4	–	15	31	46	61	76	92	122	153	183	214	244	275	305	336	367	397	428	458
1-3/8	1	14	28	42	56	69	83	111	139	167	194	222	250	278	306	333	361	389	417
1-1/2	–	13	25	38	51	63	76	102	127	153	178	204	229	255	280	305	331	356	382
1-5/8		12	23	35	47	59	71	94	118	141	165	188	212	235	259	282	306	329	353
1-3/4		11	22	33	44	55	65	87	109	131	153	175	196	218	240	262	284	306	327
1-7/8		10	20	30	41	51	61	81	102	122	143	163	183	204	224	244	265	285	306
2		9	19	29	38	48	57	76	96	115	134	153	172	191	210	229	248	267	287
M1		490	979	1469	1959	2449	2938	3918	4897	5877	6856	7836	8815	9795	10774	11754	12733	13713	14692
M2		242	484	725	967	1209	1451	1934	2418	2901	3385	3868	4352	4835	5319	5803	6286	6770	7253
M3		162	324	486	647	829	971	1295	1619	1942	2266	2590	2914	3237	3561	3885	4208	4532	4856
M3.5		138	277	415	557	692	830	1107	1384	1661	1938	2214	2491	2768	3045	3322	3599	3875	4152
M4		122	243	365	487	608	730	973	1217	1460	1698	1946	2190	2433	2676	2920	3163	3406	3650
M5		97	194	291	388	785	582	776	970	1163	1357	1551	1745	1939	2133	2327	2521	2715	2909
M6		81	162	243	324	405	486	647	809	971	1133	1295	1457	1619	1781	1942	2104	2266	2428
M7		69	138	208	277	346	415	554	692	830	969	1107	1246	1384	1522	1661	1799	1938	2076
M8		61	121	182	243	303	364	485	606	728	849	970	1091	1213	1334	1455	1577	1698	1819
M10		48	97	145	194	242	291	388	485	582	679	776	873	970	1067	1163	1260	1357	1454
M12		40	81	121	162	202	243	324	405	486	567	647	728	809	890	971	1052	1133	1214
M14		35	69	104	139	173	208	277	347	416	485	555	624	693	763	832	901	971	1040
M16		30	61	91	121	152	182	243	303	364	424	485	546	606	667	728	788	849	910
M18		27	54	81	108	135	162	216	269	323	377	431	485	539	593	647	700	754	808
M20		24	49	73	97	121	146	194	243	291	340	388	437	485	534	582	631	680	728
M22		22	44	66	88	110	132	176	221	265	309	353	397	441	485	529	573	618	662
M24		20	40	61	81	101	121	162	202	243	283	323	364	404	445	485	526	566	606
M27		18	36	54	72	90	108	144	180	216	252	287	323	359	395	431	467	503	539
M30		16	32	49	65	81	97	129	162	194	226	259	291	323	356	388	420	453	485

TABLE #15 TAP DRILL SIZES

Probable Percentage of Full Thread Produced In Tapped Hole Using Stock Sizes of Drill

TAP	TAP DRILL	DEC. EQUIV.	THEOR. % OF THREAD	PROB. OVERSIZE (MEAN)	HOLE SIZE	% OF THREAD
0-80	56	.0465	83	.0015	.0480	74
	3/64	.0469	81	.0015	.0484	71
1-64	54	.0550	89	.0015	.0565	81
	53	.0595	67	.0015	.0610	59
1-72	53	.0595	75	.0015	.0610	67
	1/16	.0625	58	.0015	.0640	50
2-56	51	.0670	82	.0017	.0687	74
	50	.0700	69	.0017	.0717	62
	49	.0730	56	.0017	.0747	49
	50	.0700	79	.0017	.0717	70
2-64	49	.0730	64	.0017	.0747	56
	48	.0760	85	.0017	.0779	78
3-48	5/64	.0781	77	.0019	.0800	70
	47	.0785	76	.0019	.0804	69
	46	.0810	67	.0019	.0829	60
	45	.0820	63	.0019	.0839	56
3-56	46	.0810	78	.0019	.0829	69
	45	.0820	73	.0019	.0839	65
	44	.0860	56	.0019	.0879	48
4-40	44	.0860	80	.0020	.0880	74
	43	.0890	71	.0020	.0910	65
	42	.0935	57	.0020	.0955	51
	3/32	.0938	56	.0020	.0958	50
4-48	42	.0935	68	.0020	.0955	61
	3/32	.0938	68	.0020	.0958	60
	41	.0960	59	.0020	.0980	52
5-40	40	.0980	83	.0023	.1003	76
	39	.0995	79	.0023	.1018	71
	38	.1015	72	.0023	.1038	65
	37	.1040	65	.0023	.1063	58
5-44	38	.1015	79	.0023	.1038	72
	37	.1040	71	.0023	.1063	63
	36	.1065	63	.0023	.1088	55
6-32	37	.1040	84	.0023	.1063	78
	36	.1065	78	.0026	.1091	71
	7/64	.1094	70	.0026	.1120	64
	35	.1100	69	.0026	.1126	63
	34	.1110	67	.0026	.1136	60
	33	.1130	62	.0026	.1156	55
6-40	34	.1110	83	.0026	.1136	75
	33	.1130	77	.0026	.1156	69
	32	.1160	68	.0026	.1186	60
8-32	29	.1360	69	.0029	.1389	62
	28	.1405	58	.0029	.1434	51
8-36	29	.1360	78	.0029	.1389	70
	28	.1405	68	.0029	.1434	57
	9/64	.1406	68	.0029	.1435	57
10-24	27	.1440	85	.0032	.1472	79
	26	.1170	79	.0032	.1502	74
	25	.1495	75	.0032	.1527	69
	24	.1520	70	.0032	.1552	64
	23	.1540	67	.0032	.1572	61
	5/32	.1563	62	.0032	.1595	56
	22	.1570	61	.0032	.1602	55
10-32	5/32	.1563	83	.0032	.1595	75
	22	.1570	81	.0032	.1602	73
	21	.1590	76	.0032	.1622	68
	20	.1610	71	.0032	.1642	64
	19	.1660	59	.0032	.1692	51
12-24	11/64	.1719	82	.0035	.1754	75
	17	.1730	79	.0035	.1765	73
	16	.1770	72	.0035	.1805	66
	15	.1800	67	.0035	.1835	60
	14	.1820	63	.0035	.1855	56
12-28	16	.1770	84	.0035	.1805	77
	15	.1800	78	.0035	.1835	70
	14	.1820	73	.0035	.1855	66
	13	.1850	67	.0035	.1885	59
	3/16	.1875	61	.0035	.1910	54
1/4-20	9	.1960	83	.0038	.1998	77
	8	.1990	79	.0038	.2028	73
	7	.2010	75	.0038	.2048	70
	13/64	.2031	72	.0038	.2069	66
	6	.2040	71	.0038	.2078	65
	5	.2055	69	.0038	.2093	63
	4	.2090	63	.0038	.2128	57

TAP	TAP DRILL	DEC. EQUIV.	THEOR. % OF THREAD	PROB. OVERSIZE (MEAN)	HOLE SIZE	% OF THREAD
1/4-28	3	.2130	80	.0038	.2168	72
	7/32	.2188	67	.0038	.2226	59
	2	.2210	63	.0038	.2248	55
5/16-18	F	.2570	77	.0038	.2608	72
	G	.2610	71	.0041	.2651	66
	17/64	.2656	65	.0041	.2697	59
	H	.2660	64	.0041	.2701	59
5/16-24	H	.2660	86	.0041	.2701	78
	I	.2720	75	.0041	.2761	67
	J	.2770	66	.0041	.2811	58
3/8-16	5/16	.3125	77	.0044	.3169	72
	O	.3160	73	.0044	.3204	68
	P	.3230	64	.0044	.3274	59
3/8-24	21/64	.3281	87	.0044	.3325	79
	Q	.3320	79	.0044	.3364	71
	R	.3390	67	.0044	.3434	58
7/16-14	T	.3580	86	.0046	.3626	81
	23/64	.3594	84	.0046	.3640	79
	U	.3680	75	.0046	.3726	70
	3/8	.3750	67	.0046	.3796	62
	V	.3770	65	.0046	.3816	60
7/16-20	W	.3860	79	.0046	.3906	72
	25/64	.3906	72	.0046	.3952	65
	X	.3970	62	.0046	.4016	55
1/2-13	27/64	.4219	78	.0047	.4266	73
	7/16	.4375	63	.0047	.4422	58
1/2-20	29/64	.4531	72	.0047	.4578	65
9/16-12	15/32	.4688	87	.0048	.4736	82
	31/64	.4844	72	.0048	.4892	68
9/16-18	1/2	.5000	87	.0048	.5048	80
	33/64	.5156	65	.0048	.5204	58
5/8-11	17/32	.5313	79	.0049	.5362	75
	35/64	.5469	66	.0049	.5518	62
5/8-18	9/16	.5625	87	.0049	.5674	80
	37/64	.5781	65	.0049	.5831	58
3/4-10	41/64	.6406	84	.0050	.6456	80
	21/32	.6563	72	.0050	.6613	68
3/4-16	11/16	.6875	77	.0050	.6925	71
7/8-9	49/64	.7656	76	.0052	.7708	72
	25/32	.7812	65	.0052	.7864	61
7/8-14	51/64	.7969	84	.0052	.8021	79
	13/16	.8125	67	.0052	.8177	62
1"-8	55/64	.8594	87	.0059	.8653	83
	7/8	.8750	77	.0059	.8809	73
	57/64	.8906	67	.0059	.8965	64
	29/32	.9063	58	.0059	.9122	54
1"-12	29/32	.9063	87	.0060	.9123	81
	59/64	.9219	72	.0060	.9279	67
	15/16	.9375	58	.0060	.9435	52
1"-14	59/64	.9219	84	.0060	.9279	78
	15/16	.9375	67	.0060	.9435	61
1-1/8—7	31/32	.9688	84	.0062	.9750	81
	63/64	.9844	76	.0067	.9911	72
	1	1.0000	67	.0070	1.0070	64
	1-1/64	1.0156	59	.0070	1.0226	55
1-1/8—12	1-1/32	1.0313	87	.0071	1.0384	80
	1-3/64	1.0469	72	.0072	1.0541	66
1-1/4—7	1-3/32	1.0938	84			
	1-7/64	1.1094	76			
	1-1/8	1.1250	67			
1-1/4—12	1-5/32	1.1563	87			
	1-11/64	1.1719	72			
1-3/8—6	1-3/16	1.1875	87			
	1-13/64	1.2031	79			
	1-7/32	1.2188	72			
	1-15/64	1.2344	65			
1-3/8—12	1-9/32	1.2813	87			
	1-19/64	1.2969	72			
1-1/2—6	1-5/16	1.3125	87			
	1-21/64	1.3281	79			
	1-11/32	1.3438	72			
	1-23/64	1.3594	65			
1-1/2—12	1-13/32	1.4063	87			
	1-27/64	1.4219	72			

REAMING RECOMMENDED

TABLE #16 METRIC TAP DRILL SIZES
Probable Percentage of Full Thread Produced In Tapped Hole Using Stock Sizes of Drill

Metric Tap Size (mm)	Tap Drill Drill (mm or in.)	Decimal Equiv. Tap Drill (in.)	Thoretical % of Thread	Probable Mean Oversize (in.)	Probable Hole Size (in.)	Probable % of Thread
M1.6 x 0.35	1.20mm	.0472	88	.0014	.0486	80
	1.25mm	.0492	77	.0014	.0506	69
M2 x 0.4	1/16	.0625	79	.0015	.0640	72
	1.60mm	.0630	77	.0017	.0647	69
	52	.0635	74	.0017	.0652	66
M2.5 x 0.45	2.05mm	.0807	77	.0019	.0826	69
	46	.0810	76	.0019	.0829	67
	45	.0820	71	.0019	.0839	63
M3 x 0.5	40	.0980	79	.0023	.1003	70
	2.5mm	.0984	77	.0023	.1007	68
	39	.0995	73	.0023	.1018	64
M3.5 x 0.6	33	.1130	81	.0026	.1156	72
	2.9mm	.1142	77	.0026	.1168	68
	32	.1160	71	.0026	.1186	63
M4 x 0.7	3.2mm	.1260	88	.0029	.1289	80
	30	.1285	81	.0029	.1314	73
	3.3mm	.1299	77	.0029	.1328	69
M4.5 x 0.75	3.7mm	.1457	82	.0032	.1489	74
	26	.1470	79	.0032	.1502	70
	25	.1495	72	.0032	.1527	64
M5 x 0.8	4.2mm	.1654	77	.0032	.1686	69
	19	.1660	75	.0032	.1692	68
M6 x 1	10	.1935	84	.0038	.1973	76
	9	.1960	79	.0038	.1998	71
	5.0mm	.1969	77	.0038	.2006	70
	8	.1990	73	.0038	.2028	65
M7 x 1	A	.2340	81	.0038	.2378	74
	6.0mm	.2362	77	.0038	.2400	70
	B	.2380	74	.0038	.2418	66
M8 x 1.25	6.7mm	.2638	80	.0041	.2679	74
	17/64	.2656	77	.0041	.2697	71
	H	.2660	77	.0041	.2701	70
	6.8mm	.2677	74	.0041	.2718	68
M10 x 1.5	8.4mm	.3307	82	.0044	.3351	76
	Q	.3320	80	.0044	.3364	75
	8.5mm	.3346	77	.0044	.3390	71
M12 x 1.75	10.2mm	.4016	79	.0047	.4063	75
	Y	.4040	76	.0047	.4087	71
	13/32	.4062	74	.0047	.4109	69
M14 x 2	15/32	.4688	81	.0048	.4736	76
	12mm	.4724	77	.0048	.4772	72
M16 x 2	35/64	.5469	81	.0049	.5518	76
	14mm	.5512	77	.0049	.5561	72
M20 x 2.5	11/16	.6875	78	.0050	.6925	74
	17.5mm	.6890	77	.0052	.6942	73
M24 x 3	13/16	.8125	86	.0052	.8177	82
	21mm	.8268	76	.0054	.8322	73
	53/64	.8281	76	.0054	.8335	73
M30 x 3.5	1-1/32	1.0312	83	.0071	1.0383	80
	25.5mm	1.0433	77	.0071	1.0504	73
	1-3/64	1.0469	75	.0072	1.0541	70
M36 x 4	1-17/64	1.2656	74	REAMING RECOMMENDED		

TABLE #17 TAP DRILL SIZE FORMULAE

$$\text{Major Diameter of Thread} - \frac{.01299 \times \text{Amt. of percentage of full thread}}{\text{Number of threads per inch}} = \text{Drilled Hole Size}$$

Note: Select nearest commercial stock drill.

Percentage of Full Thread for Other Drill Sizes

$$\text{No. of Threads per Inch} \times \left(\frac{\text{Major Diameter of Thread - Selected Drill Diameter}}{.01299} \right) = \text{Percentage of Full Thread}$$

TABLE #18 WORD AND TERM DEFINITIONS APPLYING TO SCREW THREADS, TAPS AND DIES

ALLOWANCE. An allowance is an intentional difference in correlated dimensions of mating parts. It is the minimum clearance (positive allowance) or maximum interference (negative allowance) between such parts.

ANGLE OF THREAD. The angle included between the flanks of the thread, measured in an axial plane.

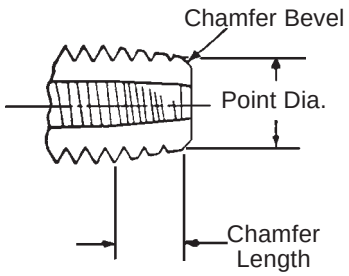
AXIS. The longitudinal central line through the screw or tap.

BACK TAPER. A slight axial relief on the thread of the tap which makes the pitch diameter of the thread near the shank somewhat smaller than that at the chamfered end. (See RELIEF)

BASIC. The theoretical or nominal standard size from which all variations are made. (See SIZE)

CHAMFER. The tapering of the end of the thread on a tap by cutting away and relieving the crest of the first few teeth to distribute the cutting action over several teeth. It also acts as a guide in starting the tap. When this tapering amounts to 8 to 10 threads, the tap is called a *taper* tap; when 3 to 5 threads, a *plug* tap; and with 1 to 2 threads chamfer, a *bottoming* tap.

Chamfer Dimensions



CORE DIAMETER. The diameter of an imaginary cylinder tangent to the deepest part of the flute.

CREST. The top surface joining the two flanks of a thread. The crest of an external thread is at its major diameter, while the crest of an internal thread is at its minor diameter.

CREST CLEARANCE. The space between the crest of a thread and the root of its component.

CUTTING EDGE. The leading side of the land in the direction of rotation for cutting and which does the actual cutting.

DEPTH OF THREAD. The distance between the crest and the base of the thread, measured normal to the axis.

DRYSEAL. A fuel connection for both external and internal application designed for use where the assembled product must withstand high fluid or gas pressures without the use of a sealing compound or where a sealer is functionally objectionable.

FLANK. The surface of the thread, sometimes referred to as side of thread, which connects the crest with the root.

FLUTES. The longitudinal channels formed in a tap to create cutting edges on the thread profile and to provide chip spaces and cutting-fluid passages.

FLUTE LEAD. The axial advance of a helical or spiral cutting edge in one turn around the tool axis.

HEEL. The face of the tap land trailing the cutting edge during forward rotation.

HEIGHT OF THREAD. The distance between the crest and the base of thread measured normal to the axis.

HELIX ANGLE—FLUTE. Flutes of taps are sometimes cut helically instead of straight. This helix angle is the angle made by the flute with the axis of the tap. (Helical flutes are sometimes called spiral flutes.)

HELIX ANGLE—THREAD. The angle made by the helix of a thread at the pitch diameter with a plane perpendicular to the axis.

HOOK. The concave cutting face of a tap land between the crest and the root of thread.

INTERRUPTED THREAD. A tap having an odd number of lands, with every other tooth along the thread helix removed.

Tap Terms

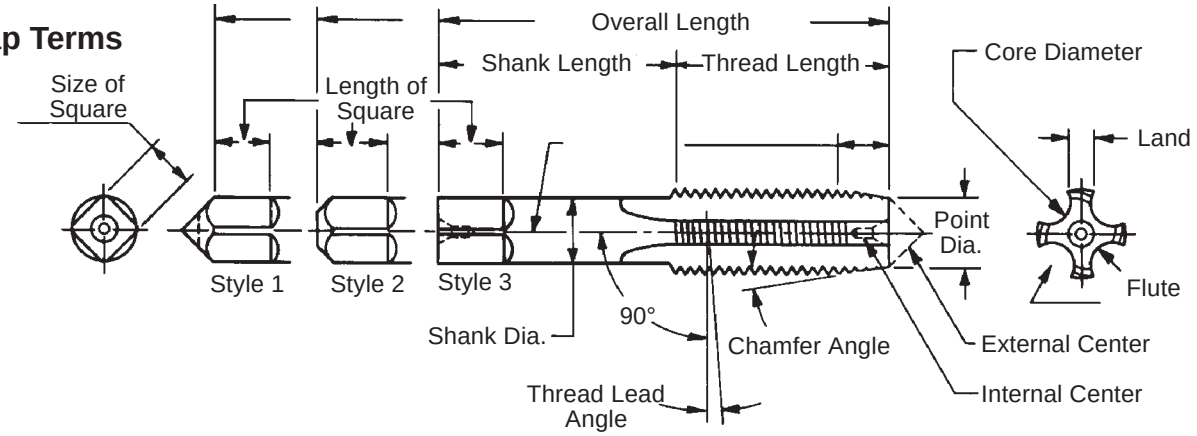


TABLE #18 WORD AND TERM DEFINITIONS APPLYING TO SCREW THREADS, TAPS AND DIES (continued)

LAND. One of the threaded sections between the flutes on a tap.

LEAD. The distance a screw thread advances axially in one complete turn. On a single-thread screw or tap, the lead and pitch are identical. On a double-thread, the lead is twice the pitch; on a triple-thread, the lead is three times the pitch, etc.

LEAD ERROR. The amount the actual lead of the screw thread differs from the specified lead.

LEAD—DRUNKEN. Irregular advance of the thread helix or lead. Usually called “drunken thread.”

LENGTH OF ENGAGEMENT. The length of contact between two mating threaded parts measured axially.

LIMITS. The maximum and minimum sizes permissible for a specific dimension. (See ALLOWANCE AND TOLERANCE)

MAJOR DIAMETER. The largest diameter of a straight thread. On a taper thread, the largest diameter at any given plane normal to the axis. The term “major diameter” replaces the term “outside diameter” as applied to the thread of a screw or tap and also the term “full diameter” as applied to the thread of a nut or die.

MINOR DIAMETER. The smallest diameter of a straight thread. On a taper thread, the smallest diameter at any given plane normal to the axis. The term “minor diameter” replaces the terms “root diameter” and “core diameter” as applied to the thread of a screw or tap and also the term “inside diameter” as applied to the thread of a nut or die.

PERCENT OF THREAD. One-half the difference between the basic major diameter and the actual minor diameter of an internal thread, divided by the basic thread height, expressed as percentage.

PITCH. The distance from a point on a screw thread to a corresponding point on the next thread, measured parallel to the axis and on the same side of the axis. The pitch equals one divided by the number of threads per inch.

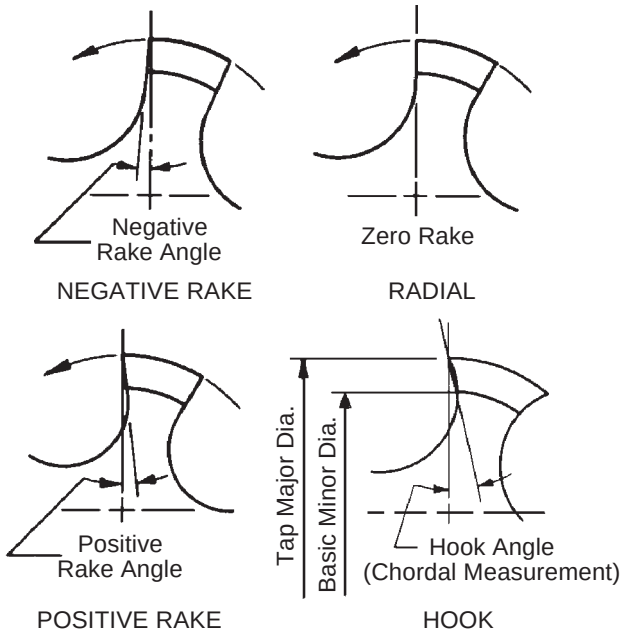
PITCH DIAMETER. On a straight screw thread, the diameter of an imaginary cylinder, the surface of which would pass through the threads at such points as to make equal the width of the threads and the width of the spaces cut by the surface of the cylinder. On a taper screw thread, the diameter at a given distance from a reference plane perpendicular to the axis of an imaginary cone, the surface of which would pass through the threads at such points as to make equal the width of the threads and the width of the spaces cut by the surface of the cone.

PITCH LINE. A generator of the imaginary cylinder or cone specified in the definition of PITCH DIAMETER.

RAKE. On a tap, any deviation of a straight cutting face of the tooth from a radial line. Positive rake means that the crest of the cutting face is angularly advanced ahead of the balance of the face of the tooth. Negative rake means that the same point is angularly behind the balance of the cutting face of the tooth. Zero rake means that the cutting face is directly on the center line.

RELIEF—RADIAL. The clearance produced by removal of metal from behind the cutting edge. Taps should have the chamfer relieved and should have back taper, but may or may not have relief in the angle and on the major diameter of the threads. When the thread angle is relieved from heel to cutting edge, the tap is said to have “eccentric” relief. If relieved from heel for only a portion of land width (usually 2/3) the tap is said to have “con-eccentric” relief. (See BACK TAPER)

Rake Angles



Pitch Dimensions

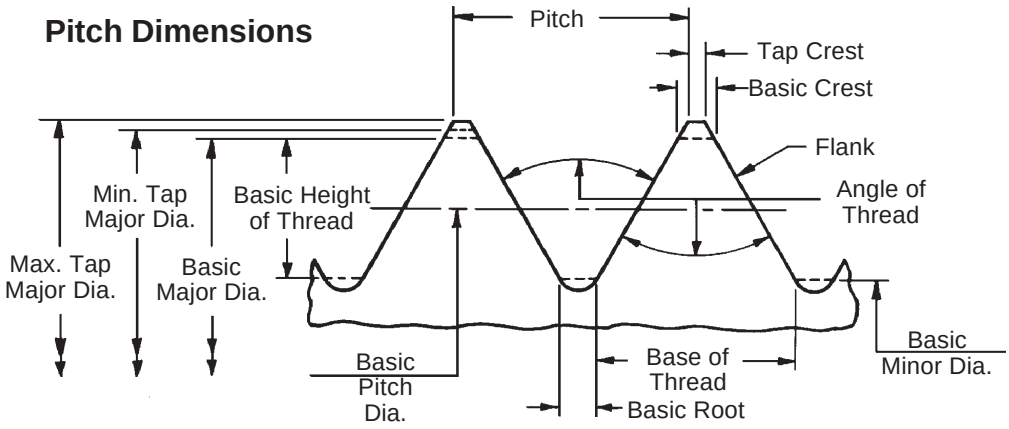
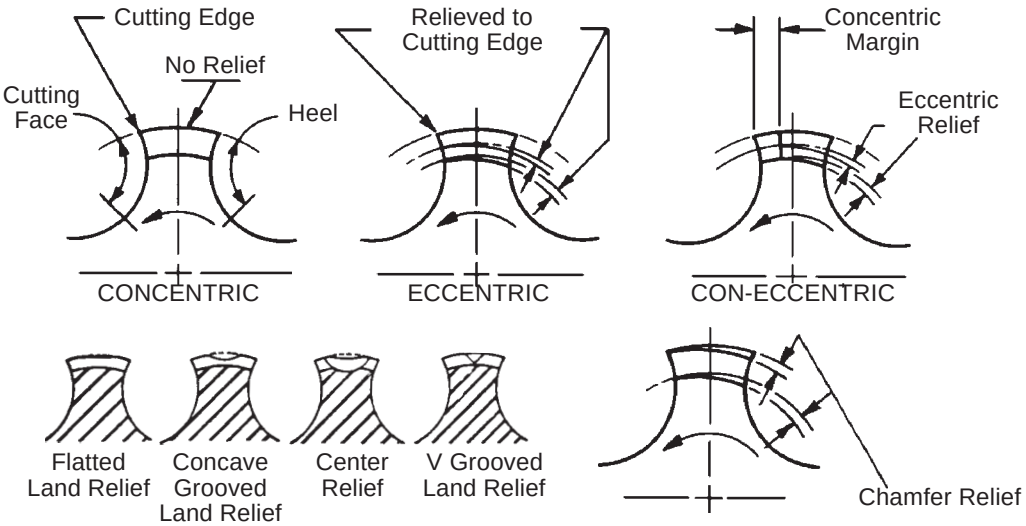


TABLE #18 WORD AND TERM DEFINITIONS APPLYING TO SCREW THREADS, TAPS AND DIES (continued)

Relief Styles



ROOT. The bottom surface joining the flanks of two adjacent threads. The root of an external thread is at its minor diameter, while the root of an internal thread is at its major diameter.

SCREW THREAD. A ridge of uniform section in the form of a helix on the external or internal surface of a cylinder, or in the form of a conical spiral on the external or internal surface of a cone or frustum of a cone. A thread formed on a cylinder is known as a "straight" or "parallel" thread, to distinguish it from a "taper" thread which is formed on a cone or frustum of a cone. All left-hand threads are designated LH.

SPIRAL POINT. A supplementary fluting, cut at an angle to the main fluting in the cutting face of the land. It is slightly longer than the chamfer on the tap and in the opposite hand to that of cutting rotation.

SIZE—BASIC. The theoretical size from which the limits of size for that dimension are derived by the application of the allowance and tolerances.

SIZE—NOMINAL. The designation used for general identification.

THREAD—SINGLE. A thread in which the lead is equal to the pitch.

THREAD—MULTIPLE. A thread in which the lead is an integral multiple of the pitch. On a double thread, the lead is equal to twice the pitch; on a triple thread, the lead is equal to three times the pitch, etc. Such threads have starting points relative to their multiple equally spaced around their circumference. For example, a double thread has two starting points 180° apart, etc.

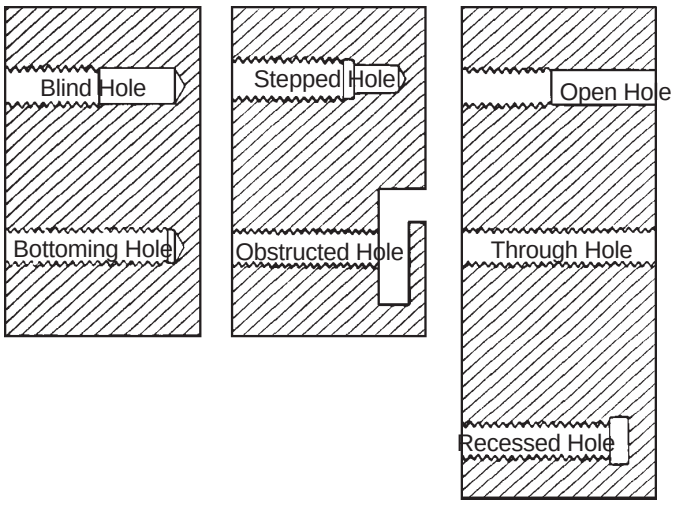
THREAD—DRUNKEN. A thread in which the advance of the thread helix is irregular.

TOLERANCE. The amount of variation permitted in any dimension. Tolerance may be expressed as plus, minus, or both. A total tolerance is the sum of a plus and minus tolerance. Complete tolerances on threads include those for major diameter, minor diameter, pitch diameter, lead, half angle, and full angle. (See ALLOWANCE and LIMITS)

TRUNCATION—CREST. The distance measured perpendicular to the axis, between the sharp crest (or crest apex) and the cylinder or cone which bounds the crest.

TRUNCATION—ROOT. The distance, measured perpendicular to the axis, between the sharp root (or root apex) and the cylinder or cone which bounds the root.

Types of Tapped Holes



VERMONT TAP & DIE

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Metalcutting Safety (read this before using VERMONT TAP & DIE products)

Modern metalcutting operations involve high energy, high spindle or cutter speeds, and high temperatures and cutting forces. Hot, flying chips may be projected from the workpiece during metalcutting. Although advanced cutting tool materials are designed and manufactured to withstand the high cutting forces and temperatures that normally occur in these operations, they are susceptible to fragmenting in service, particularly if they are subjected to over-stress, severe impact or otherwise abused. Therefore, precautions should be taken to adequately protect workers, observers and equipment against hot, flying chips, fragmented cutting tools, broken workpieces or other similar projectiles. Machines should be fully guarded and personal protective equipment should be used at all times.

When grinding advanced cutting tool materials, a suitable means for collection and disposal of dust, mist or sludge should be provided. Overexposure to dust or mist containing metallic particles can be hazardous to health particularly if exposure continues over an extended period of time and may cause eye, skin and mucous membrane irritation and temporary or permanent respiratory disease. Certain existing pulmonary and skin conditions may be aggravated by exposure to dust or mist. Adequate ventilation, respiratory protection and eye protection should be provided when grinding and workers should avoid breathing of and prolonged skin contact with dust or mist. General Industry Safety and Health Regulations, Part 1910. U.S. Department of Labor, published in Title 29 of the Code of Federal Regulations should be consulted. Obtain from VERMONT TAP & DIE and read the applicable Material Safety Data Sheet before grinding.

Cutting tools are only one part of the worker-machine-tool system. Many variables exist in machining operations, including the metal removal rate; the workpiece size, shape, strength and rigidity; the chucking and fixturing; the load carrying capability of centers; the cutter and spindle speed and torque limitations; the holder and boring bar overhang; the available power; and the condition of the tooling and the machine. A safe metalcutting operation must take all of these variables, and others, into consideration.

VERMONT TAP & DIE has no control over the end use of its products or the environment into which those products are placed. VERMONT TAP & DIE urges that its customers adhere to the recommended standards of use of their metalcutting machines and tools, and that they follow procedures that ensure safe metalcutting operations. The information included throughout this catalog under the heading “Technical Data” and other recommendations on machining practices referred to herein are only advisory in nature and *do not* constitute representations or warranties and are not necessarily appropriate for any particular work environment or application.

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