



The Right Tool at the Right Time

DORMER

A fresh new look for 2012....

The 2012 Precision Dormer catalog has been completely redesigned for 2012.

Never has tool selection been this easy!



Some key added features that you will find in this catalog:

- Increased use of text to help describe the features and applications of a product
- Reduced icons to describe the basic features of the products, eliminating unnecessary and confusing icons
- Similar products grouped together
- Several indices to find the product by your preferred method:
 - By List Number
 - By EDP Number
 - By Text Description
- A comprehensive technical section including troubleshooting guides, decimal equivalent charts, and cutting tool terminology
- Cutting data (speeds and feeds) all grouped together, by list number, immediately following the technical section.
- 3 separate languages: Available in English, French, or Spanish
- Assistance with choosing the most “popular” item where there are many options, such as in hand taps
- Additional column for package quantity information

Of course, our dedicated and knowledgeable customer service and technical field representatives are always available to assist you should you have any questions.

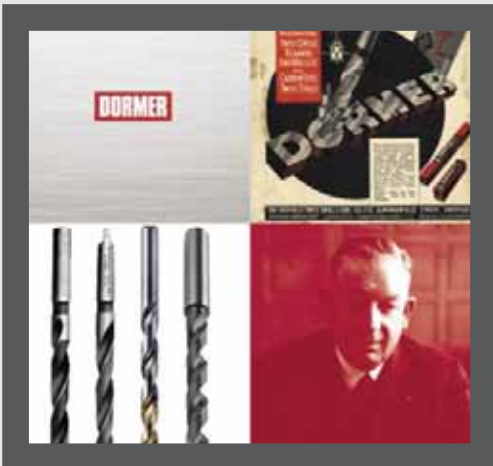
We hope that you enjoy using the newly designed Precision Dormer catalog and we thank you for your continued dedication and support.

Our Brands



Founded in Crystal Lake, IL in 1952, Precision has been developing high quality drills for over 60 years. Over time, the product range has been expanded to include solid carbide end mills. The Precision brand represents the majority of our drill offering for all your general purpose needs.

The drill program offers jobber, screw machine length, taper length, extra length, aircraft extension, combined drills and countersinks (center), spotting, reduced shank, taper shank, and sets. The range includes High Speed Steel, High Speed Cobalt, and Solid Carbide substrates for light to heavy-duty general purpose machining.












Founded in Sheffield, England in 1913, the Dormer brand has grown into one of the world's largest producers of High Speed Steel cutting tools in the world. With nearly 600 employees in over 40 countries, and sales in over 100 countries, Dormer truly is a brand with a global presence. New product innovation and development are of the outmost importance to Dormer.

The core product program consists of drills, taps, end mills, reamers, and countersinks in both High Speed Steel/High Speed Cobalt, and Solid Carbide. Tools are designed for general purpose machining and for multi-application production environments.



With roots dating back to 1895, the Union Butterfield brand has undergone a series of changes in its storied history. The one constant that has remained is an exceptional product offering that continues to develop with the changes in technology. The new APPLIX range of cut taps and threadformers is a prime example. Advanced technologies and leading edge coatings have been incorporated into the design to make the new APPLIX range the ideal solution for your threading needs.

Union Butterfield today offers taps and tapping accessories, end mills, dies, reamers, countersinks, counterbores, and cutting fluids for general purpose, multi-application, and material specific applications. The Flashtap program is available with short lead times on semi-standard taps.

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High Performance

Hydra Replaceable Head

Heads	10-15
3 X D Bodies	16-18
5 X D Bodies	19-21
8 X D Bodies	22-24
Screws & Screw Drivers	25

Screw Machine Length (Stub)/Short Length

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MPX Carbide	29-32
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PFX Cobalt Parabolic Flute	52-56

Jobber Length/Standard Length

CDX Carbide	33-34
MPX Carbide	35-38
ADX Solid Design	39-41
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PFX Cobalt Parabolic Flute	44-48

Taper Length

PFX Cobalt Parabolic Flute	58-60
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Extra Length

PFX Cobalt Parabolic Flute	61-63
--------------------------------------	-------

General Purpose

Jobber Length

HSS	
General Purpose	64-72
TiN Tipped	64-72
Left Hand	73
Quick Spiral	83-85
Aircraft Type A, 118° Split Point	77-79
Aircraft Type B, 135° Split Point	80-82
HX Heavy Duty, 135° Split Point	74-76
Parabolic Flute	86-90
Cobalt	
NAS Type J, 135° Split Point	91-95
NAS Type D, 135° Split Point	96-97
Sets	179-187

Screw Machine Length (Stub)

HSS	
General Purpose	98-100
TiN Tipped	101-103
NAS Type C, 135° Split Point	104-108
Parabolic Flute	109-110
Cobalt	
Heavy Duty, 135° Split Point	111-114
Sets	188-191

Taper Length

HSS	
General Purpose	115-120
Parabolic	122-125
High Helix	121
Cobalt	
Heavy Duty	126-127

Extra Length

HSS	
Overall Length - 8"	128-129
Overall Length - 12"	128-129
Overall Length - 15"	130-134
Overall Length - 18"	130-134
Parabolic	135-136

Aircraft Extension

HSS, Type B	
Overall Length - 6"	137-139
Overall Length - 12"	140-141
Cobalt, Type B	
Overall Length - 6"	142-143
Overall Length - 12"	142-143

Taper Shank

HSS, General Purpose		
Regular	144-150	
TiN coated	147-150	
Undersize	144-146	
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High Performance

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HSS and Cobalt Finishing End Mills

2-Flute

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HSS and Cobalt Finishing End Mills (Continued)

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* Denotes high performance product

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HIGH PERFORMANCE HYDRA DRILL



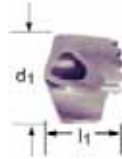
Hydra Drill Head

R950

1.1 1.2 1.3 1.4 1.5 1.6

Replaceable heads in tough micro-grain carbide for quick and easy tool changes. High productivity in a wide range of steels. Superior hole accuracy and precise repeatable tolerances. Special Ti-phos coating for longer tool life.

* New larger diameter heads now available.



R950

Coolant Through

HM



15/32 - 42.00

* For more benefits on Hydra, see page 195

d ₁ Ø Inch	d ₁ Ø mm	d ₁ decimal Inch	l ₁ mm	Pack Qty	R950
15/32	11.91	0.4689	9.1	1	0010860
	12.00	0.4724	9.1	1	0010877
	12.10	0.4764	9.1	1	0037904
	12.20	0.4803	9.1	1	0037911
31/64	12.30	0.4843	9.1	1	0010884
	12.50	0.4921	9.4	1	0010907
	12.60	0.4961	9.4	1	0037928
1/2	12.70	0.5000	9.4	1	0010914
	12.80	0.5039	9.4	1	0037935
	12.90	0.5079	9.4	1	0037942
	13.00	0.5118	9.7	1	0010921
33/64	13.10	0.5157	9.7	1	0010938
	13.20	0.5197	9.7	1	0037959
17/32	13.49	0.5311	9.7	1	0010945
	13.50	0.5315	10.3	1	0010952
	13.60	0.5354	10.3	1	0037966
	13.70	0.5394	10.3	1	0037973
	13.80	0.5433	10.3	1	0037980
35/64	13.89	0.5469	10.3	1	0010969
	14.00	0.5512	10.3	1	0010983
	14.10	0.5551	10.3	1	0037997
	14.20	0.5591	10.3	1	0038000
9/16	14.29	0.5626	10.3	1	0011003
	14.50	0.5709	10.3	1	0011010
	14.60	0.5748	11.0	1	0038017
37/64	14.68	0.5780	11.0	1	0011140
	14.70	0.5787	11.0	1	0038024
	14.80	0.5827	11.0	1	0038031
	15.00	0.5906	11.0	1	0011201
19/32	15.08	0.5937	11.0	1	0011218
	15.10	0.5945	11.0	1	0038048
	15.20	0.5984	11.0	1	0038055



HIGH PERFORMANCE HYDRA DRILL

d ₁ Ø Inch	d ₁ Ø mm	d ₁ decimal Inch	l ₁ mm	Pack Qty	R950
	15.24	0.6000	11.0	1	0032268
39/64	15.48	0.6094	11.0	1	0011232
	15.50	0.6102	11.0	1	0011362
	15.60	0.6142	11.6	1	0038062
	15.70	0.6181	11.6	1	0038079
5/8	15.87	0.6248	11.6	1	0011379
	16.00	0.6299	11.6	1	0011386
	16.08	0.6331	11.6	1	0032275
	16.10	0.6339	11.6	1	0038086
	16.20	0.6378	11.6	1	0038093
41/64	16.27	0.6406	11.6	1	0011393
	16.30	0.6417	11.6	1	0032282
	16.50	0.6496	11.6	1	0011409
	16.60	0.6535	12.2	1	0038109
21/32	16.67	0.6563	12.2	1	0012161
	16.70	0.6575	12.2	1	0038116
	17.00	0.6693	12.2	1	0012185
43/64	17.06	0.6717	12.2	1	0012215
	17.10	0.6732	12.2	1	0038123
	17.20	0.6772	12.2	1	0038130
11/16	17.46	0.6874	12.2	1	0012239
	17.50	0.6890	12.2	1	0012253
	17.60	0.6929	12.9	1	0032299
	17.70	0.6969	12.9	1	0038147
45/64	17.86	0.7031	12.9	1	0012260
	18.00	0.7087	12.9	1	0012277
	18.10	0.7126	12.9	1	0038154
	18.20	0.7165	12.9	1	0038161
23/32	18.26	0.7189	12.9	1	0012284
	18.50	0.7283	12.9	1	0012307
	18.60	0.7323	13.5	1	0038178
47/64	18.65	0.7343	13.5	1	0012321
	18.70	0.7362	13.5	1	0038185
	18.90	0.7441	13.5	1	0038192
	19.00	0.7480	13.5	1	0012338
3/4	19.05	0.7500	13.5	1	0012345
	19.10	0.7520	13.5	1	0038208
	19.20	0.7559	13.5	1	0038215
	19.25	0.7579	13.5	1	0032305
	19.30	0.7598	13.5	1	0032312
	19.35	0.7618	13.5	1	0032329
49/64	19.45	0.7657	13.5	1	0012376
	19.50	0.7677	13.5	1	0012383
	19.60	0.7717	14.1	1	0038222
	19.70	0.7756	14.1	1	0038239
25/32	19.84	0.7811	14.1	1	0012406
	20.00	0.7874	14.1	1	0012413
51/64	20.24	0.7969	14.1	1	0012437
	20.50	0.8071	14.1	1	0012451
13/16	20.64	0.8126	14.8	1	0012468
	21.00	0.8268	14.8	1	0012475
53/64	21.03	0.8280	14.8	1	0012536
27/32	21.43	0.8437	14.8	1	0012550
	21.50	0.8465	14.8	1	0012574
55/64	21.83	0.8594	15.0	1	0012604
	22.00	0.8661	15.0	1	0012628
7/8	22.22	0.8748	15.0	1	0012635
	22.50	0.8858	15.0	1	0032336
57/64	22.62	0.8906	15.0	1	0012642
	22.70	0.8937	15.0	1	0038246
	23.00	0.9055	15.1	1	0012666
29/32	23.02	0.9063	15.1	1	0012673
59/64	23.42	0.9220	15.1	1	0012680

HIGH PERFORMANCE HYDRA DRILL



d ₁ Ø Inch	d ₁ Ø mm	d ₁ decimal Inch	l ₁ mm	Pack Qty	R950
	23.50	0.9252	15.1	1	0038253
15/16	23.81	0.9374	15.4	1	0012703
	24.00	0.9449	15.4	1	0012727
61/64	24.21	0.9531	15.4	1	0012741
	24.50	0.9646	15.4	1	0038260
31/32	24.61	0.9689	15.4	1	0012772
63/64	25.00	0.9843	15.8	1	0012826
	25.00	0.9843	15.8	1	0012819
1"	25.40	1.0000	15.8	1	0012833
	25.50	1.0039	15.8	1	0038277
	25.65	1.0098	15.8	1	0032343
1.1/64	25.80	1.0157	15.8	1	0012840
	26.00	1.0236	16.4	1	0013090
1.1/32	26.19	1.0311	16.4	1	0013120
	26.50	1.0433	16.4	1	0038284
1.3/64	26.59	1.0469	16.4	1	0013229
1.1/16	26.99	1.0626	17.1	1	0013243
	27.00	1.0630	17.1	1	0013267
1.5/64	27.38	1.0780	17.1	1	0013274
	27.50	1.0827	17.1	1	0038291
1.3/32	27.78	1.0937	17.1	1	0013281
	28.00	1.1024	17.7	1	0013304
1.7/64	28.18	1.1094	17.7	1	0013311
	28.50	1.1220	17.7	1	0038307
1.1/8	28.57	1.1248	17.7	1	0013328
1.9/64	28.97	1.1406	18.3	1	0013342
	29.00	1.1417	18.3	1	0013366
1.5/32	29.37	1.1563	18.3	1	0013380
	29.50	1.1614	18.3	1	0038314
1.11/64	29.77	1.1720	18.3	1	0013427
	30.00	1.1811	19.0	1	0013434
1.3/16	30.16	1.1874	19.0	1	0013441
	30.50	1.2008	19.0	1	0013465
1.7/32	30.96	1.2189	21.0	1	46104481
	31.00	1.2205	21.0	1	46104482
1.1/4	31.75	1.2500	21.0	1	46104483
	32.00	1.2598	21.0	1	46104484
	32.50	1.2795	21.0	1	46104485
1.19/64	32.94	1.2969	21.0	1	46104486
	33.00	1.2992	21.0	1	46104487
	33.50	1.3189	21.0	1	46104488
	34.00	1.3386	23.0	1	46104489
1.11/32	34.13	1.3437	23.0	1	46104530
	34.50	1.3583	23.0	1	46104531
1.3/8	34.93	1.3752	23.0	1	46104532
	35.00	1.3780	23.0	1	46104533
	36.00	1.4173	23.0	1	46104534
1.27/64	36.12	1.4220	23.0	1	46104535
	36.50	1.4370	23.0	1	46104536
	37.00	1.4567	25.0	1	46104537
1.15/32	37.31	1.4689	25.0	1	46104538
	37.50	1.4764	25.0	1	46104539
	38.00	1.4961	25.0	1	46104540
1.1/2	38.10	1.5000	25.0	1	46104541
	38.50	1.5157	25.0	1	46104542
1.17/32	38.89	1.5311	25.0	1	46104543
	39.00	1.5354	25.0	1	46104544
	39.50	1.5551	25.0	1	46104545
1.9/16	39.69	1.5626	27.0	1	46104546
	40.00	1.5748	27.0	1	46104547
	41.00	1.6142	27.0	1	46104548
1.5/8	41.28	1.6252	27.0	1	46104549
	42.00	1.6535	27.0	1	46104550

Hydra Drill Head



R960

- 2.1
2.2
2.3
2.4
3.1
3.2
3.3
3.4
4.1
4.2
4.3
5.1
5.2
5.3

Replaceable heads in tough micro-grain carbide for quick and easy tool changes. High productivity across a wide range of stainless steel, cast iron & heat resistant materials. Superior hole accuracy and precise repeatable tolerances. Special Ti-phos coating for longer tool life.



R960
Coolant Through

HM



15/32 - 30.50

* For more benefits on Hydra, see page 195

d_1 Ø Inch	d_1 Ø mm	d_1 decimal Inch	l_1 mm	Pack Qty	R960
15/32	11.91	0.4689	9.1	1	0013472
	12.00	0.4724	9.1	1	0013489
	12.10	0.4764	9.1	1	0038338
	12.20	0.4803	9.1	1	0038376
31/64	12.30	0.4843	9.1	1	0013496
	12.50	0.4921	9.4	1	0013519
	12.60	0.4961	9.4	1	0038413
1/2	12.70	0.5000	9.4	1	0013526
	12.80	0.5039	9.4	1	0038437
	12.90	0.5079	9.4	1	0038451
	13.00	0.5118	9.7	1	0013533
33/64	13.10	0.5157	9.7	1	0013540
	13.20	0.5197	9.7	1	0038468
17/32	13.49	0.5311	9.7	1	0013557
	13.50	0.5315	10.3	1	0016022
	13.60	0.5354	10.3	1	0038499
	13.70	0.5394	10.3	1	0038529
	13.80	0.5433	10.3	1	0038543
35/64	13.89	0.5469	10.3	1	0016039
	14.00	0.5512	10.3	1	0016046
	14.10	0.5551	10.3	1	0038567
	14.20	0.5591	10.3	1	0038574
9/16	14.29	0.5626	10.3	1	0016053
	14.50	0.5709	10.3	1	0016060
	14.60	0.5748	11.0	1	0038581
37/64	14.68	0.5780	11.0	1	0016077
	14.70	0.5787	11.0	1	0039601
	14.80	0.5827	11.0	1	0039618
	15.00	0.5906	11.0	1	0016084
19/32	15.08	0.5937	11.0	1	0016091
	15.10	0.5945	11.0	1	0039625
	15.20	0.5984	11.0	1	0039632

HIGH PERFORMANCE HYDRA DRILL



d ₁ Ø Inch	d ₁ Ø mm	d ₁ decimal Inch	l ₁ mm	Pack Qty	R960
	15.24	0.6000	11.0	1	0032350
39/64	15.48	0.6094	11.0	1	0016107
	15.50	0.6102	11.0	1	0016114
	15.60	0.6142	11.6	1	0039649
	15.70	0.6181	11.6	1	0039656
5/8	15.87	0.6248	11.6	1	0016121
	16.00	0.6299	11.6	1	0016138
	16.08	0.6331	11.6	1	0032367
	16.10	0.6339	11.6	1	0039663
	16.20	0.6378	11.6	1	0039670
41/64	16.27	0.6406	11.6	1	0016145
	16.30	0.6417	11.6	1	0032374
	16.50	0.6496	11.6	1	0016152
	16.60	0.6535	12.2	1	0039687
21/32	16.67	0.6563	12.2	1	0016169
	16.70	0.6575	12.2	1	0039694
	17.00	0.6693	12.2	1	0016176
43/64	17.06	0.6717	12.2	1	0016183
	17.10	0.6732	12.2	1	0039700
	17.20	0.6772	12.2	1	0039717
11/16	17.46	0.6874	12.2	1	0016190
	17.50	0.6890	12.2	1	0016503
	17.60	0.6929	12.9	1	0032381
	17.70	0.6969	12.9	1	0039724
45/64	17.86	0.7031	12.9	1	0016640
	18.00	0.7087	12.9	1	0016664
	18.10	0.7126	12.9	1	0039731
	18.20	0.7165	12.9	1	0039748
23/32	18.26	0.7189	12.9	1	0016671
	18.50	0.7283	12.9	1	0016688
	18.60	0.7323	13.5	1	0039755
47/64	18.65	0.7343	13.5	1	0016695
	18.70	0.7362	13.5	1	0039762
	18.90	0.7441	13.5	1	0039779
	19.00	0.7480	13.5	1	0016817
3/4	19.05	0.7500	13.5	1	0016879
	19.10	0.7520	13.5	1	0039786
	19.20	0.7559	13.5	1	0039793
	19.25	0.7579	13.5	1	0032398
	19.30	0.7598	13.5	1	0032404
	19.35	0.7618	13.5	1	0032411
49/64	19.45	0.7657	13.5	1	0016886
	19.50	0.7677	13.5	1	0016947
	19.60	0.7717	14.1	1	0039809
	19.70	0.7756	14.1	1	0039816
25/32	19.84	0.7811	14.1	1	0016954
	20.00	0.7874	14.1	1	0017111
51/64	20.24	0.7969	14.1	1	0017128
	20.50	0.8071	14.1	1	0017159
13/16	20.64	0.8126	14.8	1	0017197
	21.00	0.8268	14.8	1	0017166
53/64	21.03	0.8280	14.8	1	0017203
27/32	21.43	0.8437	14.8	1	0017227
	21.50	0.8465	14.8	1	0017234
55/64	21.83	0.8594	15.0	1	0017241
	22.00	0.8661	15.0	1	0017258
7/8	22.22	0.8748	15.0	1	0017371
	22.50	0.8858	15.0	1	0032428
57/64	22.62	0.8906	15.0	1	0017401
	22.70	0.8937	15.0	1	0039823
	23.00	0.9055	15.1	1	0017425
29/32	23.02	0.9063	15.1	1	0017432
59/64	23.42	0.9220	15.1	1	0017456
	23.50	0.9252	15.1	1	0039830
15/16	23.81	0.9374	15.4	1	0017562



HIGH PERFORMANCE HYDRA DRILL

d_1 Ø Inch	d_1 Ø mm	d_1 decimal Inch	l_1 mm	Pack Qty	R960
	24.00	0.9449	15.4	1	0017579
61/64	24.21	0.9531	15.4	1	0017586
	24.50	0.9646	15.4	1	0039847
31/32	24.61	0.9689	15.4	1	0017593
63/64	25.00	0.9843	15.8	1	0017746
	25.00	0.9843	15.8	1	0017722
1"	25.40	1.0000	15.8	1	0017753
	25.50	1.0039	15.8	1	0039854
	25.65	1.0098	15.8	1	0032435
1.1/64	25.80	1.0157	15.8	1	0018958
	26.00	1.0236	16.4	1	0018965
1.1/32	26.19	1.0311	16.4	1	0018972
	26.50	1.0433	16.4	1	0039878
1.3/64	26.59	1.0469	16.4	1	0018989
1.1/16	26.99	1.0626	17.1	1	0018996
	27.00	1.0630	17.1	1	0019009
1.5/64	27.38	1.0780	17.1	1	0019016
	27.50	1.0827	17.1	1	0039885
1.3/32	27.78	1.0937	17.1	1	0019023
	28.00	1.1024	17.7	1	0019030
1.7/64	28.18	1.1094	17.7	1	0019047
	28.50	1.1220	17.7	1	0039892
1.1/8	28.57	1.1248	17.7	1	0019054
1.9/64	28.97	1.1406	18.3	1	0019061
	29.00	1.1417	18.3	1	0019078
1.5/32	29.37	1.1563	18.3	1	0019085
	29.50	1.1614	18.3	1	0039908
1.11/64	29.77	1.1720	18.3	1	0019092
	30.00	1.1811	19.0	1	0019108
1.3/16	30.16	1.1874	19.0	1	0019115
	30.50	1.2008	19.0	1	0019122

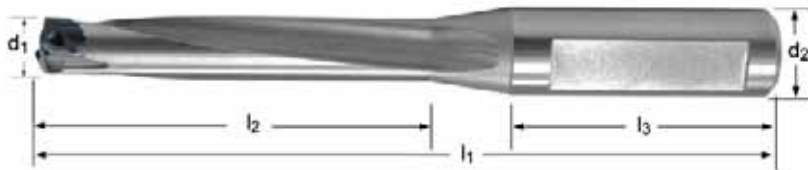
HIGH PERFORMANCE HYDRA DRILL



3xD Hydra Bodies

H853

Cylindrical shank with flat for multi-purpose tool holding. Allows accurate clamping for reliable use of internal coolant.



Four (4) screws and one (1) screwdriver are included with a drill body

H853
Coolant Through

DIN
6535
HE

DIN
6535HB

3XD

HSS

140°

15/32 - 42.00

* For more benefits on Hydra, see page 195

Hydra Head d ₁ Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	3xD Hydra Body - Fractional Shank					3xD Hydra Body - Metric Shank				
			d ₂ Ø inch	l ₂ mm	l ₁ mm	l ₃ mm	H853 EDP#	d ₂ Ø mm	l ₂ mm	l ₁ mm	l ₃ mm	H853 EDP#
15/32	0010860	0013472	5/8	44.0	105.0	48.0	0033043	16.0	44.0	105.0	48.0	0017777
12.0	0010877	0013489	5/8	44.0	105.0	48.0	0033043	16.0	44.0	105.0	48.0	0017777
12.1	0037904	0038338	5/8	44.0	105.0	48.0	0033043	16.0	44.0	105.0	48.0	0017777
12.2	0037911	0038376	5/8	44.0	105.0	48.0	0033043	16.0	44.0	105.0	48.0	0017777
31/64	0010884	0013496	5/8	44.0	105.0	48.0	0033043	16.0	44.0	105.0	48.0	0017777
12.5	0010907	0013519	5/8	44.0	105.0	48.0	0033050	16.0	44.0	105.0	48.0	0017791
12.6	0037928	0038413	5/8	44.0	105.0	48.0	0033050	16.0	44.0	105.0	48.0	0017791
1/2	0010914	0013526	5/8	44.0	105.0	48.0	0033050	16.0	44.0	105.0	48.0	0017791
12.8	0037935	0038437	5/8	44.0	105.0	48.0	0033050	16.0	44.0	105.0	48.0	0017791
12.9	0037942	0038451	5/8	44.0	105.0	48.0	0033050	16.0	44.0	105.0	48.0	0017791
13.0	0010921	0013533	5/8	47.0	110.0	48.0	0033067	16.0	47.0	110.0	48.0	0017906
33/64	0010938	0013540	5/8	47.0	110.0	48.0	0033067	16.0	47.0	110.0	48.0	0017906
13.2	0037959	0038468	5/8	47.0	110.0	48.0	0033067	16.0	47.0	110.0	48.0	0017906
17/32	0010945	0013557	5/8	47.0	110.0	48.0	0033067	16.0	47.0	110.0	48.0	0017906
13.5	0010952	0016022	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
13.6	0037966	0038499	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
13.7	0037973	0038529	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
13.8	0037980	0038543	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
35/64	0010969	0016039	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
14.0	0010983	0016046	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
14.1	0037997	0038567	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
14.2	0038000	0038574	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
9/16	0011003	0016053	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
14.5	0011010	0016060	3/4	52.5	116.5	48.0	0033074	16.0	52.5	116.5	48.0	0017913
14.6	0038017	0038581	3/4	55.5	126.5	50.0	0033081	20.0	55.5	126.5	50.0	0018293
37/64	0011140	0016077	3/4	55.5	126.5	50.0	0033081	20.0	55.5	126.5	50.0	0018293
14.7	0038024	0039601	3/4	55.5	126.5	50.0	0033081	20.0	55.5	126.5	50.0	0018293
14.8	0038031	0039618	3/4	55.5	126.5	50.0	0033081	20.0	55.5	126.5	50.0	0018293
15.0	0011201	0016084	3/4	55.5	126.5	50.0	0033081	20.0	55.5	126.5	50.0	0018293
19/32	0011218	0016091	3/4	55.5	126.5	50.0	0033081	20.0	55.5	126.5	50.0	0018293

HIGH PERFORMANCE HYDRA DRILL



DRILLS

Hydra Head d ₁ Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	3xD Hydra Body - Fractional Shank					3xD Hydra Body - Metric Shank				
			d ₂ Ø inch	l ₂ mm	l ₁ mm	l ₃ mm	H853 EDP#	d ₂ Ø mm	l ₂ mm	l ₁ mm	l ₃ mm	H853 EDP#
23.5	0038253	0039830	1	82.5	160.5	56.0	0033166	25.0	82.5	160.5	56.0	0018385
15/16	0012703	0017562	1	86.2	170.2	60.0	0033173	32.0	86.2	170.2	60.0	0018392
24.0	0012727	0017579	1	86.2	170.2	60.0	0033173	32.0	86.2	170.2	60.0	0018392
61/64	0012741	0017586	1	86.2	170.2	60.0	0033173	32.0	86.2	170.2	60.0	0018392
24.5	0038260	0039847	1	86.2	170.2	60.0	0033173	32.0	86.2	170.2	60.0	0018392
31/32	0012772	0017593	1	86.2	170.2	60.0	0033173	32.0	86.2	170.2	60.0	0018392
25.0	0012819	0017722	1.1/4	88.0	170.0	60.0	0033180	32.0	88.0	170.0	60.0	0018408
63/64	0012826	0017746	1.1/4	88.0	170.0	60.0	0033180	32.0	88.0	170.0	60.0	0018408
1	0012833	0017753	1.1/4	88.0	170.0	60.0	0033180	32.0	88.0	170.0	60.0	0018408
25.5	0038277	0039854	1.1/4	88.0	170.0	60.0	0033180	32.0	88.0	170.0	60.0	0018408
25.65	0032343	0032435	1.1/4	88.0	170.0	60.0	0033180	32.0	88.0	170.0	60.0	0018408
1.1/64	0012840	0018958	1.1/4	88.0	170.0	60.0	0033180	32.0	88.0	170.0	60.0	0018408
26.0	0013090	0018965	1.1/4	92.0	175.0	60.0	0033197	32.0	92.0	175.0	60.0	0018415
1.1/32	0013120	0018972	1.1/4	92.0	175.0	60.0	0033197	32.0	92.0	175.0	60.0	0018415
26.5	0038284	0039878	1.1/4	92.0	175.0	60.0	0033197	32.0	92.0	175.0	60.0	0018415
1.3/64	0013229	0018989	1.1/4	92.0	175.0	60.0	0033197	32.0	92.0	175.0	60.0	0018415
1.1/16	0013243	0018996	1.1/4	94.0	175.0	60.0	0033210	32.0	94.0	175.0	60.0	0018422
27.0	0013267	0019009	1.1/4	94.0	175.0	60.0	0033210	32.0	94.0	175.0	60.0	0018422
1.5/64	0013274	0019016	1.1/4	94.0	175.0	60.0	0033210	32.0	94.0	175.0	60.0	0018422
27.5	0038291	0039885	1.1/4	94.0	175.0	60.0	0033210	32.0	94.0	175.0	60.0	0018422
1.3/32	0013281	0019023	1.1/4	94.0	175.0	60.0	0033210	32.0	94.0	175.0	60.0	0018422
28.0	0013304	0019030	1.1/4	97.0	180.0	60.0	0033227	32.0	97.0	180.0	60.0	0018439
1.7/64	0013311	0019047	1.1/4	97.0	180.0	60.0	0033227	32.0	97.0	180.0	60.0	0018439
28.5	0038307	0039892	1.1/4	97.0	180.0	60.0	0033227	32.0	97.0	180.0	60.0	0018439
1.1/8	0013328	0019054	1.1/4	97.0	180.0	60.0	0033227	32.0	97.0	180.0	60.0	0018439
1.9/64	0013342	0019061	1.1/4	100.0	185.0	60.0	0033234	32.0	100.0	185.0	60.0	0018446
29.0	0013366	0019078	1.1/4	100.0	185.0	60.0	0033234	32.0	100.0	185.0	60.0	0018446
1.5/32	0013380	0019085	1.1/4	100.0	185.0	60.0	0033234	32.0	100.0	185.0	60.0	0018446
29.5	0038314	0039908	1.1/4	100.0	185.0	60.0	0033234	32.0	100.0	185.0	60.0	0018446
1.11/64	0013427	0019092	1.1/4	100.0	185.0	60.0	0033234	32.0	100.0	185.0	60.0	0018446
30.0	0013434	0019108	1.1/4	104.0	185.0	60.0	0033425	32.0	104.0	185.0	60.0	0018453
1.3/16	0013441	0019115	1.1/4	104.0	185.0	60.0	0033425	32.0	104.0	185.0	60.0	0018453
30.5	0013465	0019122	1.1/4	104.0	185.0	60.0	0033425	32.0	104.0	185.0	60.0	0018453
1.7/32	46104481	-	-	-	-	-	-	32.0	111.5	196.5	60.0	46111405
31.00	46104482	-	-	-	-	-	-	32.0	111.5	196.5	60.0	46111405
1.1/4	46104483	-	-	-	-	-	-	32.0	111.5	196.5	60.0	46111405
32.00	46104484	-	-	-	-	-	-	32.0	111.5	196.5	60.0	46111405
32.50	46104485	-	-	-	-	-	-	40.0	116.5	201.5	60.0	46111406
1.19/64	46104486	-	-	-	-	-	-	40.0	116.5	201.5	60.0	46111406
33.00	46104487	-	-	-	-	-	-	40.0	116.5	201.5	60.0	46111406
33.50	46104488	-	-	-	-	-	-	40.0	116.5	201.5	60.0	46111406
34.00	46104489	-	-	-	-	-	-	40.0	121.5	216.5	70.0	46111407
1.11/32	46104530	-	-	-	-	-	-	40.0	121.5	216.5	70.0	46111407
34.50	46104531	-	-	-	-	-	-	40.0	121.5	216.5	70.0	46111407
1.3/8	46104532	-	-	-	-	-	-	40.0	121.5	216.5	70.0	46111407
35.00	46104533	-	-	-	-	-	-	40.0	121.5	216.5	70.0	46111407
36.00	46104534	-	-	-	-	-	-	40.0	125.5	221.5	70.0	46111408
1.27/64	46104535	-	-	-	-	-	-	40.0	125.5	221.5	70.0	46111408
36.50	46104536	-	-	-	-	-	-	40.0	125.5	221.5	70.0	46111408
37.00	46104537	-	-	-	-	-	-	40.0	131.5	226.5	70.0	46111409
1.15/32	46104538	-	-	-	-	-	-	40.0	131.5	226.5	70.0	46111409
37.50	46104539	-	-	-	-	-	-	40.0	131.5	226.5	70.0	46111409
38.00	46104540	-	-	-	-	-	-	40.0	131.5	226.5	70.0	46111409
1.1/2	45104541	-	-	-	-	-	-	40.0	136.5	231.5	70.0	46111410
38.50	46104542	-	-	-	-	-	-	40.0	136.5	231.5	70.0	46111410
1.17/32	46104543	-	-	-	-	-	-	40.0	136.5	231.5	70.0	46111410
39.00	46104544	-	-	-	-	-	-	40.0	136.5	231.5	70.0	46111410
39.50	46104545	-	-	-	-	-	-	40.0	136.5	231.5	70.0	46111410
1.9/16	46104546	-	-	-	-	-	-	40.0	146.5	246.5	70.0	46111411
40.00	46104547	-	-	-	-	-	-	40.0	146.5	246.5	70.0	46111411
41.00	46104548	-	-	-	-	-	-	40.0	146.5	246.5	70.0	46111411
1.5/8	46104549	-	-	-	-	-	-	40.0	151.5	251.5	70.0	46111412
42.00	46104550	-	-	-	-	-	-	40.0	151.5	251.5	70.0	46111412

5xD Hydra Bodies

H855

Cylindrical shank with flat for multi-purpose tool holding. Allows accurate clamping for reliable use of internal coolant.



Four (4) screws and one (1) screwdriver are included with a drill body

* For more benefits on Hydra, see page 195

H855
Coolant Through

DIN
6535
HE

DIN
6535HB
9

5XD

HSS

140

15/32 - 42.00

Hydra Head $d_1 \text{ } \varnothing$	Hydra Head R950 EDP#	Hydra Head R960 EDP#	5xD Hydra Body - Fractional Shank					5xD Hydra Body - Metric Shank				
			$d_2 \text{ } \varnothing$ inch	l_2 mm	l_1 mm	l_3 mm	H855 EDP#	$d_2 \text{ } \varnothing$ mm	l_2 mm	l_1 mm	l_3 mm	H855 EDP#
15/32	0010860	0013472	5/8	69.0	130.0	48.0	0033586	16.0	69.0	130.0	48.0	0018460
12.0	0010877	0013489	5/8	69.0	130.0	48.0	0033586	16.0	69.0	130.0	48.0	0018460
12.1	0037904	0038338	5/8	69.0	130.0	48.0	0033586	16.0	69.0	130.0	48.0	0018460
12.2	0037911	0038376	5/8	69.0	130.0	48.0	0033586	16.0	69.0	130.0	48.0	0018460
31/64	0010884	0013496	5/8	69.0	130.0	48.0	0033586	16.0	69.0	130.0	48.0	0018460
12.5	0010907	0013519	5/8	69.0	130.0	48.0	0034095	16.0	69.0	130.0	48.0	0018477
12.6	0037928	0038413	5/8	69.0	130.0	48.0	0034095	16.0	69.0	130.0	48.0	0018477
1/2	0010914	0013526	5/8	69.0	130.0	48.0	0034095	16.0	69.0	130.0	48.0	0018477
12.8	0037935	0038437	5/8	69.0	130.0	48.0	0034095	16.0	69.0	130.0	48.0	0018477
12.9	0037942	0038451	5/8	69.0	130.0	48.0	0034095	16.0	69.0	130.0	48.0	0018477
13.0	0010921	0013533	5/8	74.0	140.0	48.0	0034132	16.0	74.0	140.0	48.0	0018484
33/64	0010938	0013540	5/8	74.0	140.0	48.0	0034132	16.0	74.0	140.0	48.0	0018484
13.2	0037959	0038468	5/8	74.0	140.0	48.0	0034132	16.0	74.0	140.0	48.0	0018484
17/32	0010945	0013557	5/8	74.0	140.0	48.0	0034132	16.0	74.0	140.0	48.0	0018484
13.5	0010952	0016022	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
13.6	0037966	0038499	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
13.7	0037973	0038529	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
13.8	0037980	0038543	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
35/64	0010969	0016039	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
14.0	0010983	0016046	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
14.1	0037997	0038567	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
14.2	0038000	0038574	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
9/16	0011003	0016053	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
14.5	0011010	0016060	3/4	81.5	146.5	48.0	0034699	16.0	81.5	146.5	48.0	0018491
14.6	0038017	0038581	3/4	86.5	156.5	50.0	0034705	20.0	86.5	156.5	50.0	0018507
37/64	0011140	0016077	3/4	86.5	156.5	50.0	0034705	20.0	86.5	156.5	50.0	0018507
14.7	0038024	0039601	3/4	86.5	156.5	50.0	0034705	20.0	86.5	156.5	50.0	0018507
14.8	0038031	0039618	3/4	86.5	156.5	50.0	0034705	20.0	86.5	156.5	50.0	0018507
15.0	0011201	0016084	3/4	86.5	156.5	50.0	0034705	20.0	86.5	156.5	50.0	0018507
19/32	0011218	0016091	3/4	86.5	156.5	50.0	0034705	20.0	86.5	156.5	50.0	0018507



HIGH PERFORMANCE HYDRA DRILL

Hydra Head $d_1 \varnothing$	Hydra Head R950 EDP#	Hydra Head R960 EDP#	5xD Hydra Body - Fractional Shank					5xD Hydra Body - Metric Shank				
			$d_2 \varnothing$ inch	l_2 mm	l_1 mm	l_3 mm	H855 EDP#	$d_2 \varnothing$ mm	l_2 mm	l_1 mm	l_3 mm	H855 EDP#
23.5	0038253	0039830	1	129.5	210.5	56.0	0034842	25.0	129.5	210.5	56.0	0018583
15/16	0012703	0017562	1	135.2	220.2	60.0	0034859	32.0	135.2	220.2	60.0	0018590
24.0	0012727	0017579	1	135.2	220.2	60.0	0034859	32.0	135.2	220.2	60.0	0018590
61/64	0012741	0017586	1	135.2	220.2	60.0	0034859	32.0	135.2	220.2	60.0	0018590
24.5	0038260	0039847	1	135.2	220.2	60.0	0034859	32.0	135.2	220.2	60.0	0018590
31/32	0012772	0017593	1	135.2	220.2	60.0	0034859	32.0	135.2	220.2	60.0	0018590
25.0	0012819	0017722	1.1/4	140.0	225.0	60.0	0034866	32.0	140.0	225.0	60.0	0018606
63/64	0012826	0017746	1.1/4	140.0	225.0	60.0	0034866	32.0	140.0	225.0	60.0	0018606
1	0012833	0017753	1.1/4	140.0	225.0	60.0	0034866	32.0	140.0	225.0	60.0	0018606
25.5	0038277	0039854	1.1/4	140.0	225.0	60.0	0034866	32.0	140.0	225.0	60.0	0018606
25.65	0032343	0032435	1.1/4	140.0	225.0	60.0	0034866	32.0	140.0	225.0	60.0	0018606
1.1/64	0012840	0018958	1.1/4	140.0	225.0	60.0	0034866	32.0	140.0	225.0	60.0	0018606
26.0	0013090	0018965	1.1/4	146.0	230.0	60.0	0034873	32.0	146.0	230.0	60.0	0018613
1.1/32	0013120	0018972	1.1/4	146.0	230.0	60.0	0034873	32.0	146.0	230.0	60.0	0018613
26.5	0038284	0039878	1.1/4	146.0	230.0	60.0	0034873	32.0	146.0	230.0	60.0	0018613
1.3/64	0013229	0018989	1.1/4	146.0	230.0	60.0	0034873	32.0	146.0	230.0	60.0	0018613
1.1/16	0013243	0018996	1.1/4	151.0	235.0	60.0	0034897	32.0	151.0	235.0	60.0	0018620
27.0	0013267	0019009	1.1/4	151.0	235.0	60.0	0034897	32.0	151.0	235.0	60.0	0018620
1.5/64	0013274	0019016	1.1/4	151.0	235.0	60.0	0034897	32.0	151.0	235.0	60.0	0018620
27.5	0038291	0039885	1.1/4	151.0	235.0	60.0	0034897	32.0	151.0	235.0	60.0	0018620
1.3/32	0013281	0019023	1.1/4	151.0	235.0	60.0	0034897	32.0	151.0	235.0	60.0	0018620
28.0	0013304	0019030	1.1/4	157.0	240.0	60.0	0034903	32.0	157.0	240.0	60.0	0018637
1.7/64	0013311	0019047	1.1/4	157.0	240.0	60.0	0034903	32.0	157.0	240.0	60.0	0018637
28.5	0038307	0039892	1.1/4	157.0	240.0	60.0	0034903	32.0	157.0	240.0	60.0	0018637
1.1/8	0013328	0019054	1.1/4	157.0	240.0	60.0	0034903	32.0	157.0	240.0	60.0	0018637
1.9/64	0013342	0019061	1.1/4	162.0	245.0	60.0	0034934	32.0	162.0	245.0	60.0	0018644
29.0	0013366	0019078	1.1/4	162.0	245.0	60.0	0034934	32.0	162.0	245.0	60.0	0018644
1.5/32	0013380	0019085	1.1/4	162.0	245.0	60.0	0034934	32.0	162.0	245.0	60.0	0018644
29.5	0038314	0039908	1.1/4	162.0	245.0	60.0	0034934	32.0	162.0	245.0	60.0	0018644
1.11/64	0013427	0019092	1.1/4	162.0	245.0	60.0	0034934	32.0	162.0	245.0	60.0	0018644
30.0	0013434	0019108	1.1/4	167.0	255.0	60.0	0034965	32.0	167.0	255.0	60.0	0018651
1.3/16	0013441	0019115	1.1/4	167.0	255.0	60.0	0034965	32.0	167.0	255.0	60.0	0018651
30.5	0013465	0019122	1.1/4	167.0	255.0	60.0	0034965	32.0	167.0	255.0	60.0	0018651
1.7/32	46104481	-	-	-	-	-	-	32.0	176.5	261.5	60.0	46111413
31.00	46104482	-	-	-	-	-	-	32.0	176.5	261.5	60.0	46111413
1.1/4	46104483	-	-	-	-	-	-	32.0	176.5	261.5	60.0	46111413
32.00	46104484	-	-	-	-	-	-	32.0	176.5	261.5	60.0	46111413
32.50	46104485	-	-	-	-	-	-	40.0	186.5	271.5	60.0	46111414
1.19/64	46104486	-	-	-	-	-	-	40.0	186.5	271.5	60.0	46111414
33.00	46104487	-	-	-	-	-	-	40.0	186.5	271.5	60.0	46111414
33.50	46104488	-	-	-	-	-	-	40.0	186.5	271.5	60.0	46111414
34.00	46104489	-	-	-	-	-	-	40.0	196.5	291.5	70.0	46111415
1.11/32	46104530	-	-	-	-	-	-	40.0	196.5	291.5	70.0	46111415
34.50	46104531	-	-	-	-	-	-	40.0	196.5	291.5	70.0	46111415
1.3/8	46104532	-	-	-	-	-	-	40.0	196.5	291.5	70.0	46111415
35.00	46104533	-	-	-	-	-	-	40.0	196.5	291.5	70.0	46111415
36.00	46104534	-	-	-	-	-	-	40.0	201.5	296.5	70.0	46111416
1.27/64	46104535	-	-	-	-	-	-	40.0	201.5	296.5	70.0	46111416
36.50	46104536	-	-	-	-	-	-	40.0	201.5	296.5	70.0	46111416
37.00	46104537	-	-	-	-	-	-	40.0	211.5	306.5	70.0	46111417
1.15/32	46104538	-	-	-	-	-	-	40.0	211.5	306.5	70.0	46111417
37.50	46104539	-	-	-	-	-	-	40.0	211.5	306.5	70.0	46111417
38.00	46104540	-	-	-	-	-	-	40.0	211.5	306.5	70.0	46111417
1.1/2	45104541	-	-	-	-	-	-	40.0	211.5	316.5	70.0	46111418
38.50	46104542	-	-	-	-	-	-	40.0	211.5	316.5	70.0	46111418
1.17/32	46104543	-	-	-	-	-	-	40.0	211.5	316.5	70.0	46111418
39.00	46104544	-	-	-	-	-	-	40.0	211.5	316.5	70.0	46111418
39.50	46104545	-	-	-	-	-	-	40.0	211.5	316.5	70.0	46111418
1.9/16	46104546	-	-	-	-	-	-	40.0	226.5	325.5	70.0	46111419
40.00	46104547	-	-	-	-	-	-	40.0	226.5	325.5	70.0	46111419
41.00	46104548	-	-	-	-	-	-	40.0	226.5	325.5	70.0	46111419
1.5/8	46104549	-	-	-	-	-	-	40.0	236.5	336.5	70.0	46111420
42.00	46104550	-	-	-	-	-	-	40.0	236.5	336.5	70.0	46111420

DRILLS

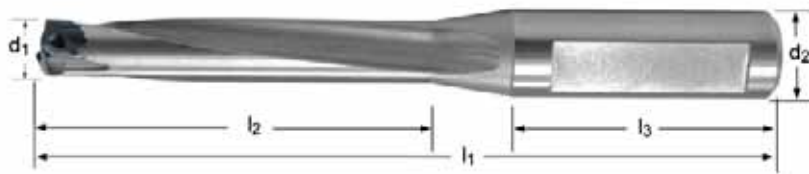
HIGH PERFORMANCE HYDRA DRILL



8xD Hydra Bodies

H858

Cylindrical shank with flat for multi-purpose tool holding. Allows accurate clamping for reliable use of internal coolant.



Four (4) screws and one (1) screwdriver are included with a drill body

H858
Coolant Through

DIN
6535
HE

8XD

HSS

140

13.5 - 42.00

* For more benefits on Hydra, see page 195

Hydra Head $d_1 \text{ } \varnothing$	Hydra Head R950 EDP#	Hydra Head R960 EDP#	8xD Hydra Body - Metric Shank				H858 EDP#
			$d_2 \text{ } \varnothing$ mm	l_2 mm	l_1 mm	l_3 mm	
13.5	0010952	0016022	16.0	124.5	191.5	48.0	0018668
13.6	0037966	0038499	16.0	124.5	191.5	48.0	0018668
13.7	0037973	0038529	16.0	124.5	191.5	48.0	0018668
13.8	0037980	0038543	16.0	124.5	191.5	48.0	0018668
35/64	0010969	0016039	16.0	124.5	191.5	48.0	0018668
14.0	0010983	0016046	16.0	124.5	191.5	48.0	0018668
14.1	0037997	0038567	16.0	124.5	191.5	48.0	0018668
14.2	0038000	0038574	16.0	124.5	191.5	48.0	0018668
9/16	0011003	0016053	16.0	124.5	191.5	48.0	0018668
14.5	0011010	0016060	16.0	124.5	191.5	48.0	0018668
14.6	0038017	0038581	20.0	133.5	201.5	50.0	0018675
37/64	0011140	0016077	20.0	86.5	156.5	50.0	0018675
14.7	0038024	0039601	20.0	86.5	156.5	50.0	0018675
14.8	0038031	0039618	20.0	86.5	156.5	50.0	0018675
15.0	0011201	0016084	20.0	86.5	156.5	50.0	0018675
19/32	0011218	0016091	20.0	86.5	156.5	50.0	0018675
15.1	0038048	0039625	20.0	86.5	156.5	50.0	0018675
15.2	0038055	0039632	20.0	86.5	156.5	50.0	0018675
15.24	0032268	0032350	20.0	86.5	156.5	50.0	0018675
39/64	0011232	0016107	20.0	86.5	156.5	50.0	0018675
15.5	0011362	0016114	20.0	86.5	156.5	50.0	0018675
15.6	0038062	0039649	20.0	92.5	166.5	50.0	0018682
15.7	0038079	0039656	20.0	92.5	166.5	50.0	0018682
5/8	0011379	0016121	20.0	92.5	166.5	50.0	0018682
16.0	0011386	0016138	20.0	92.5	166.5	50.0	0018682
16.08	0032275	0032367	20.0	92.5	166.5	50.0	0018682
16.1	0038086	0039663	20.0	92.5	166.5	50.0	0018682
16.2	0038093	0039670	20.0	92.5	166.5	50.0	0018682
41/64	0011393	0016145	20.0	92.5	166.5	50.0	0018682
16.3	0032282	0032374	20.0	92.5	166.5	50.0	0018682



HIGH PERFORMANCE HYDRA DRILL

Hydra Head d ₁ Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	8xD Hydra Body - Metric Shank				
			d ₂ Ø mm	l ₂ mm	l ₁ mm	l ₃ mm	H858 EDP#
16.5	0011409	0016152	20.0	92.5	166.5	50.0	0018514
16.6	0038109	0039687	20.0	97.5	171.5	50.0	0018699
21/32	0012161	0016169	20.0	97.5	171.5	50.0	0018699
16.7	0038116	0039694	20.0	97.5	171.5	50.0	0018699
17.0	0012185	0016176	20.0	97.5	171.5	50.0	0018699
43/64	0012215	0016183	20.0	97.5	171.5	50.0	0018699
17.1	0038123	0039700	20.0	97.5	171.5	50.0	0018699
17.2	0038130	0039717	20.0	97.5	171.5	50.0	0018699
11/16	0012239	0016190	20.0	97.5	171.5	50.0	0018699
17.5	0012253	0016503	20.0	97.5	171.5	50.0	0018699
17.6	0032299	0032381	20.0	103.5	176.5	50.0	0018705
17.7	0038147	0039724	20.0	103.5	176.5	50.0	0018705
45/64	0012260	0016640	20.0	103.5	176.5	50.0	0018705
18.0	0012277	0016664	20.0	103.5	176.5	50.0	0018705
18.1	0038154	0039731	20.0	103.5	176.5	50.0	0018705
18.2	0038161	0039748	20.0	103.5	176.5	50.0	0018705
23/32	0012284	0016671	20.0	103.5	176.5	50.0	0018705
18.5	0012307	0016688	20.0	103.5	176.5	50.0	0018705
18.6	0038178	0039755	25.0	108.5	191.5	56.0	0018712
47/64	0012321	0016695	25.0	108.5	191.5	56.0	0018712
18.7	0038185	0039762	25.0	108.5	191.5	56.0	0018712
18.9	0038192	0039779	25.0	108.5	191.5	56.0	0018712
19.0	0012338	0016817	25.0	108.5	191.5	56.0	0018712
3/4	0012345	0016879	25.0	108.5	191.5	56.0	0018712
19.1	0038208	0039786	25.0	108.5	191.5	56.0	0018712
19.2	0038215	0039793	25.0	108.5	191.5	56.0	0018712
19.25	0032305	0032398	25.0	108.5	191.5	56.0	0018712
19.3	0032312	0032404	25.0	108.5	191.5	56.0	0018712
19.35	0032329	0032411	25.0	108.5	191.5	56.0	0018712
49/64	0012376	0016886	25.0	108.5	191.5	56.0	0018712
19.5	0012383	0016947	25.0	108.5	191.5	56.0	0018712
19.6	0038222	0039809	25.0	114.5	196.5	56.0	0018729
19.7	0038239	0039816	25.0	114.5	196.5	56.0	0018729
25/32	0012406	0016954	25.0	114.5	196.5	56.0	0018729
20.0	0012413	0017111	25.0	114.5	196.5	56.0	0018729
51/64	0012437	0017128	25.0	114.5	196.5	56.0	0018729
20.5	0012451	0017159	25.0	114.5	196.5	56.0	0018729
13/16	0012468	0017197	25.0	119.5	196.5	56.0	0018736
21.0	0012475	0017166	25.0	119.5	196.5	56.0	0018736
53/64	0012536	0017203	25.0	119.5	196.5	56.0	0018736
27/32	0012550	0017227	25.0	119.5	196.5	56.0	0018736
21.5	0012574	0017234	25.0	119.5	196.5	56.0	0018736
55/64	0012604	0017241	25.0	192.1	271.1	56.0	0018743
22.0	0012628	0017258	25.0	192.1	271.1	56.0	0018743
7/8	0012635	0017371	25.0	192.1	271.1	56.0	0018743
22.5	0032336	0032428	25.0	192.1	271.1	56.0	0018743
57/64	0012642	0017401	25.0	192.1	271.1	56.0	0018743
22.7	0038246	0039823	25.0	192.1	271.1	56.0	0018743
23.0	0012666	0017425	25.0	200.5	280.5	56.0	0018750
29/32	0012673	0017432	25.0	200.5	280.5	56.0	0018750
59/64	0012680	0017456	25.0	200.5	280.5	56.0	0018750
23.5	0038253	0039830	25.0	200.5	280.5	56.0	0018750
15/16	0012703	0017562	32.0	208.2	295.2	60.0	0018767
24.0	0012727	0017579	32.0	208.2	295.2	60.0	0018767
61/64	0012741	0017586	32.0	208.2	295.2	60.0	0018767
24.5	0038260	0039847	32.0	208.2	295.2	60.0	0018767
31/32	0012772	0017593	32.0	208.2	295.2	60.0	0018767
25.0	0012819	0017722	32.0	217.0	300.0	60.0	0018774
63/64	0012826	0017746	32.0	217.0	300.0	60.0	0018774
1	0012833	0017753	32.0	217.0	300.0	60.0	0018774
25.5	0038277	0039854	32.0	217.0	300.0	60.0	0018774
25.65	0032343	0032435	32.0	217.0	300.0	60.0	0018774
1.1/64	0012840	0018958	32.0	217.0	300.0	60.0	0018774
26.0	0013090	0018965	32.0	225.0	310.0	60.0	0018781

DRILLS

HIGH PERFORMANCE HYDRA DRILL



Hydra Head d ₁ Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	8xD Hydra Body - Metric Shank				
			d ₂ Ø mm	l ₂ mm	l ₁ mm	l ₃ mm	H858 EDP#
1.1/32	0013120	0018972	32.0	225.0	310.0	60.0	0018781
26.5	0038284	0039878	32.0	225.0	310.0	60.0	0018781
1.3/64	0013229	0018989	32.0	225.0	310.0	60.0	0018781
1.1/16	0013243	0018996	32.0	234.0	320.0	60.0	0018798
27.0	0013267	0019009	32.0	234.0	320.0	60.0	0018798
1.5/64	0013274	0019016	32.0	234.0	320.0	60.0	0018798
27.5	0038291	0039885	32.0	234.0	320.0	60.0	0018798
1.3/32	0013281	0019023	32.0	234.0	320.0	60.0	0018798
28.0	0013304	0019030	32.0	242.0	325.0	60.0	0018804
1.7/64	0013311	0019047	32.0	242.0	325.0	60.0	0018804
28.5	0038307	0039892	32.0	242.0	325.0	60.0	0018804
1.1/8	0013328	0019054	32.0	242.0	325.0	60.0	0018804
1.9/64	0013342	0019061	32.0	251.0	335.0	60.0	0018811
29.0	0013366	0019078	32.0	251.0	335.0	60.0	0018811
1.5/32	0013380	0019085	32.0	251.0	335.0	60.0	0018811
29.5	0038314	0039908	32.0	251.0	335.0	60.0	0018811
1.11/64	0013427	0019092	32.0	251.0	335.0	60.0	0018811
30.0	0013434	0019108	32.0	259.0	345.0	60.0	0018828
1.3/16	0013441	0019115	32.0	259.0	345.0	60.0	0018828
30.5	0013465	0019122	32.0	259.0	345.0	60.0	0018828
1.7/32	46104481	-	32.0	271.5	356.5	60.0	46111421
31.00	46104482	-	32.0	271.5	356.5	60.0	46111421
1.1/4	46104483	-	32.0	271.5	356.5	60.0	46111421
32.00	46104484	-	32.0	271.5	356.5	60.0	46111421
32.50	46104485	-	40.0	286.5	371.5	60.0	46111422
1.19/64	46104486	-	40.0	286.5	371.5	60.0	46111422
33.00	46104487	-	40.0	286.5	371.5	60.0	46111422
33.50	46104488	-	40.0	286.5	371.5	60.0	46111422
34.00	46104489	-	40.0	301.5	396.5	70.0	46111423
1.11/32	46104530	-	40.0	301.5	396.5	70.0	46111423
34.50	46104531	-	40.0	301.5	396.5	70.0	46111423
1.3/8	46104532	-	40.0	301.5	396.5	70.0	46111423
35.00	46104533	-	40.0	301.5	396.5	70.0	46111423
36.00	46104534	-	40.0	311.5	406.5	70.0	46111424
1.27/64	46104535	-	40.0	311.5	406.5	70.0	46111424
36.50	46104536	-	40.0	311.5	406.5	70.0	46111424
37.00	46104537	-	40.0	326.5	421.5	70.0	46111425
1.15/32	46104538	-	40.0	326.5	421.5	70.0	46111425
37.50	46104539	-	40.0	326.5	421.5	70.0	46111425
38.00	46104540	-	40.0	326.5	421.5	70.0	46111425
1.1/2	45104541	-	40.0	336.5	431.5	70.0	46111426
38.50	46104542	-	40.0	336.5	431.5	70.0	46111426
1.17/32	46104543	-	40.0	336.5	431.5	70.0	46111426
39.00	46104544	-	40.0	336.5	431.5	70.0	46111426
39.50	46104545	-	40.0	336.5	431.5	70.0	46111426
1.9/16	46104546	-	40.0	351.5	451.5	70.0	46111427
40.00	46104547	-	40.0	351.5	451.5	70.0	46111427
41.00	46104548	-	40.0	351.5	451.5	70.0	46111427
1.5/8	46104549	-	40.0	361.5	461.5	70.0	46111428
42.00	46104550	-	40.0	361.5	461.5	70.0	46111428

Screws & Screw Driver

H860

Set of 2 Hydra Screws



H861

Hydra Drill Screw Driver



NOTE: Four (4) screws and one (1) screwdriver are included with a drill body



For Hydra Head Range	Pack Qty	H860	H861
15/32 - 15.5	1	0018835	0018897
15.6 - 18.5	1	0018842	0018903
18.6 - 21.5	1	0018859	0018910
55/64 - 31/32	1	0018866	0018910
25.0 - 1.3/32	1	0018873	0018927
28.0 - 33.5	1	0018880	0018934
34.0 - 42.0	1	46111949	46260354

HIGH PERFORMANCE SOLID CARBIDE DRILL



CDX Multi-Application, Screw Machine Length, Parallel Shank

R520

1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 2.1 3.1 3.2 3.3 3.4 4.1 4.2
4.3 5.1 7.1 7.2 7.3 7.4 8.1 8.2

Heavy-Duty design. Self centering Split Point for easier penetration. TiN coating increases wear resistance and improves tool life.

CDX

R520

DIN
6539

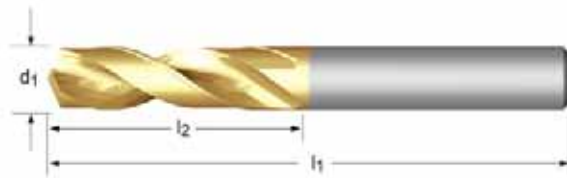
2.5XD

HM

λ 130°



3.00 - 16.50



d_1 Øh ₇ Inch	d_1 Øh ₇ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	R520
	3.00	0.1181	16	46	1	0116067
	3.10	0.1220	18	49	1	0116074
1/8	3.18	0.1252	18	49	1	0210666
	3.20	0.1260	18	49	1	0116081
	3.30	0.1299	18	49	1	0116098
	3.40	0.1339	20	52	1	0116104
	3.50	0.1378	20	52	1	0116111
9/64	3.57	0.1406	20	52	1	0210673
	3.60	0.1417	20	52	1	0116128
	3.70	0.1457	20	52	1	0116135
	3.80	0.1496	22	55	1	0116142
	3.90	0.1535	22	55	1	0116159
5/32	3.97	0.1563	22	55	1	0210680
	4.00	0.1575	22	55	1	0116166
	4.10	0.1614	22	55	1	0116173
	4.20	0.1654	22	55	1	0116180
	4.30	0.1693	24	58	1	0116197
11/64	4.37	0.1720	24	58	1	0210697
	4.40	0.1732	24	58	1	0116203
	4.50	0.1772	24	58	1	0116210
	4.60	0.1811	24	58	1	0116227
	4.70	0.1850	24	58	1	0116234
3/16	4.76	0.1874	26	62	1	0210703
	4.80	0.1890	26	62	1	0116241
	4.90	0.1929	26	62	1	0116258
	5.00	0.1969	26	62	1	0116265
	5.10	0.2008	26	62	1	0116272
13/64	5.16	0.2031	26	62	1	0210710
	5.20	0.2047	26	62	1	0116289
	5.30	0.2087	26	62	1	0116296
	5.40	0.2126	28	66	1	0116302
	5.50	0.2165	28	66	1	0116319
7/32	5.56	0.2189	28	66	1	0210727



HIGH PERFORMANCE SOLID CARBIDE DRILL

d ₁ Øh ₇ Inch	d ₁ Øh ₇ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	R520
	5.60	0.2205	28	66	1	0116326
	5.70	0.2244	28	66	1	0116333
	5.80	0.2283	28	66	1	0116340
	5.90	0.2323	28	66	1	0116357
15/64	5.95	0.2343	28	66	1	0210734
	6.00	0.2362	28	66	1	0116364
	6.10	0.2402	31	70	1	0116371
	6.20	0.2441	31	70	1	0116388
	6.30	0.2480	31	70	1	0116395
1/4	6.35	0.2500	31	70	1	0210741
	6.40	0.2520	31	70	1	0116401
	6.50	0.2559	31	70	1	0116418
	6.60	0.2598	31	70	1	0346402
	6.70	0.2638	31	70	1	0346419
17/64	6.75	0.2657	34	74	1	0210758
	6.80	0.2677	34	74	1	0116425
	6.90	0.2717	34	74	1	0116432
	7.00	0.2756	34	74	1	0116449
	7.10	0.2795	34	74	1	0346426
9/32	7.14	0.2811	34	74	1	0210765
	7.20	0.2835	34	74	1	0346433
	7.30	0.2874	34	74	1	0116456
	7.40	0.2913	34	74	1	0116463
	7.50	0.2953	34	74	1	0116470
19/64	7.54	0.2969	37	79	1	0210772
	7.60	0.2992	37	79	1	0346440
	7.70	0.3031	37	79	1	0346457
	7.80	0.3071	37	79	1	0116487
	7.90	0.3110	37	79	1	0346464
5/16	7.94	0.3126	37	79	1	0210789
	8.00	0.3150	37	79	1	0116494
	8.10	0.3189	37	79	1	0346471
	8.20	0.3228	37	79	1	0346488
	8.30	0.3268	37	79	1	0346495
21/64	8.33	0.3280	37	79	1	0210796
	8.40	0.3307	37	79	1	0346501
	8.50	0.3346	37	79	1	0116500
	8.60	0.3386	40	84	1	0346518
	8.70	0.3425	40	84	1	0216866
11/32	8.73	0.3437	40	84	1	0210802
	8.80	0.3465	40	84	1	0346525
	8.90	0.3504	40	84	1	0346532
	9.00	0.3543	40	84	1	0116517
	9.10	0.3583	40	84	1	0346549
23/64	9.13	0.3594	40	84	1	0210819
	9.20	0.3622	40	84	1	0116524
	9.30	0.3661	40	84	1	0116531
	9.40	0.3701	40	84	1	0216873
	9.50	0.3740	40	84	1	0116548
3/8	9.52	0.3748	43	89	1	0210826
	9.60	0.3780	43	89	1	0346556
	9.70	0.3819	43	89	1	0346563
	9.80	0.3858	43	89	1	0346570
	9.90	0.3898	43	89	1	0346587
25/64	9.92	0.3906	43	89	1	0210833
	10.00	0.3937	43	89	1	0115923
	10.10	0.3976	43	89	1	0346778
	10.20	0.4016	43	89	1	0115930
	10.30	0.4055	43	89	1	0216880
13/32	10.32	0.4063	43	89	1	0210840
	10.40	0.4094	43	89	1	0115947
	10.50	0.4134	43	89	1	0115954
27/64	10.72	0.4220	47	95	1	0210857
	11.00	0.4331	47	95	1	0115961
7/16	11.11	0.4374	47	95	1	0210864
	11.20	0.4409	47	95	1	0216897

DRILLS

HIGH PERFORMANCE SOLID CARBIDE DRILL



d_1 $\varnothing h_7$ Inch	d_1 $\varnothing h_7$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	R520
	11.50	0.4528	47	95	1	0115978
29/64	11.51	0.4531	47	95	1	0210871
15/32	11.91	0.4689	51	102	1	0210888
	12.00	0.4724	51	102	1	0115985
31/64	12.30	0.4843	51	102	1	0210895
	12.50	0.4921	51	102	1	0115992
1/2	12.70	0.5000	51	102	1	0210901
	13.00	0.5118	51	102	1	0116005
	13.50	0.5315	54	107	1	0216903
	14.00	0.5512	54	107	1	0116012
	14.20	0.5591	56	111	1	0216910
	14.25	0.5610	56	111	1	0216927
9/16	14.29	0.5626	56	111	1	0210918
	14.50	0.5709	56	111	1	0116029
	15.00	0.5906	56	111	1	0116036
	15.10	0.5945	58	115	1	0216934
5/8	15.88	0.6252	58	115	1	0210925
	16.00	0.6299	58	115	1	0116043
	16.50	0.6496	60	119	1	0116050

DRILLS

MPX Multi-Application, Short Length, Reinforced Shank

R458

1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 2.1 2.2 2.3 2.4 3.1 3.2 3.3
3.4 4.1 4.2 4.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4

Self centering Split Point for enhanced penetration rate. TiAlN-Top coating increases wear resistance, improves tool life at high RPM.

R457

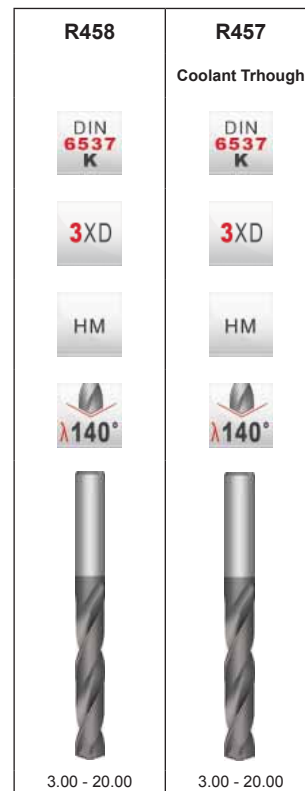
1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 2.1 2.2 2.3 3.1 3.2 3.3 3.4
4.1 4.2 4.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4

Coolant thru clears chips away from cutting edge. Self centering Split Point for enhanced penetration rates. TiAlN-Top coating increases surface hardness, improves tool life at high RPM.

High productivity in a wide range of materials



MP-X



d_1 Ø "/Nr./letter	d_1 Ø _{m7} mm	d_1 decimal Inch	l_2 mm	l_1 mm	l_3 mm	d_2 Ø _{h6} mm	Pack Qty	R458	R457
	3.00	0.1181	20	62	36	6	1	0615324	0614884
	3.10	0.1220	20	62	36	6	1	0626443	0626115
1/8	3.18	0.1252	20	62	36	6	1	0624845	0624432
	3.20	0.1260	20	62	36	6	1	0626450	0626122
30	3.26	0.1283	20	62	36	6	1	0042267	0041833
	3.30	0.1299	20	62	36	6	1	0615331	0614891
	3.40	0.1339	20	62	36	6	1	0615348	0614907
29	3.45	0.1358	20	62	36	6	1	0042274	0041840
	3.50	0.1378	20	62	36	6	1	0615355	0614914
28	3.57	0.1406	20	62	36	6	1	0042281	0041857
9/64	3.57	0.1406	20	62	36	6	1	0625224	0624814
	3.60	0.1417	20	62	36	6	1	0626467	0626139
27	3.66	0.1441	20	62	36	6	1	0042298	0041864
	3.70	0.1457	20	62	36	6	1	0626474	0626146
	3.73	0.1469	24	66	36	6	1	0626481	—
26	3.73	0.1469	24	66	36	6	1	0042304	0041871
25	3.80	0.1496	24	66	36	6	1	0626498	0626153
24	3.86	0.1520	24	66	36	6	1	0042328	0041895
	3.90	0.1535	24	66	36	6	1	0626504	0626160
23	3.91	0.1539	24	66	36	6	1	0042335	0041901
5/32	3.97	0.1563	24	66	36	6	1	0625163	0624753
22	3.99	0.1571	24	66	36	6	1	0042342	0041918
	4.00	0.1575	24	66	36	6	1	0615362	0614921
21	4.04	0.1591	24	66	36	6	1	0042359	0041925
	4.05	0.1594	24	66	36	6	1	—	0626177
20	4.09	0.1610	24	66	36	6	1	0042366	0041932
	4.10	0.1614	24	66	36	6	1	0626511	0626184
	4.20	0.1654	24	66	36	6	1	0615379	0614938
19	4.22	0.1661	24	66	36	6	1	0042373	0041949
	4.30	0.1693	24	66	36	6	1	0615386	0614945
18	4.31	0.1697	24	66	36	6	1	0042380	0041956
11/64	4.37	0.1720	24	66	36	6	1	0624876	0624463
17	4.39	0.1728	24	66	36	6	1	0042397	0041963

HIGH PERFORMANCE SOLID CARBIDE DRILL



d_1 Ø "/Nr./letter	d_1 Ø _{m7} mm	d_1 decimal Inch	l_2 mm	l_1 mm	l_3 mm	d_2 Ø _{h6} mm	Pack Qty	R458	R457
	4.40	0.1732	24	66	36	6	1	0135013	0134832
	4.50	0.1772	24	66	36	6	1	0615393	0614952
16	4.50	0.1772	24	66	36	6	1	0042403	0041970
15	4.57	0.1799	24	66	36	6	1	0042410	0041987
	4.60	0.1811	24	66	36	6	1	0626528	0626191
14	4.62	0.1819	24	66	36	6	1	0042427	0041994
13	4.70	0.1850	24	66	36	6	1	0135020	0626207
3/16	4.76	0.1874	28	66	36	6	1	0625033	0624623
	4.80	0.1890	28	66	36	6	1	0135037	0134849
12	4.80	0.1890	28	66	36	6	1	0042441	0042014
11	4.85	0.1909	28	66	36	6	1	0042458	0042021
	4.90	0.1929	28	66	36	6	1	0135044	0622070
10	4.92	0.1937	28	66	36	6	1	0042465	0042038
9	4.98	0.1961	28	66	36	6	1	0042472	0042045
	5.00	0.1969	28	66	36	6	1	0615409	0614969
	5.05	0.1988	28	66	36	6	1	—	0626214
8	5.06	0.1992	28	66	36	6	1	0042489	0042052
	5.10	0.2008	28	66	36	6	1	0615416	0614976
7	5.11	0.2012	28	66	36	6	1	0042496	0042069
13/64	5.16	0.2031	28	66	36	6	1	0624890	0624487
6	5.18	0.2039	28	66	36	6	1	0042502	0042076
	5.20	0.2047	28	66	36	6	1	0135051	0134856
5	5.22	0.2055	28	66	36	6	1	0042519	0042083
4	5.31	0.2091	28	66	36	6	1	0042526	0042090
3	5.41	0.2130	28	66	36	6	1	0042533	0042106
	5.50	0.2165	28	66	36	6	1	0615423	0614983
7/32	5.56	0.2189	28	66	36	6	1	0625194	0624784
	5.60	0.2205	28	66	36	6	1	0626535	0626221
2	5.61	0.2209	28	66	36	6	1	0042540	0042113
	5.70	0.2244	28	66	36	6	1	0626542	0626238
1	5.79	0.2280	28	66	36	6	1	0042557	0042120
	5.80	0.2283	28	66	36	6	1	0626559	0626245
A	5.94	0.2339	28	66	36	6	1	0042564	0042137
15/64	5.95	0.2343	28	66	36	6	1	0624913	0624500
	6.00	0.2362	28	66	36	6	1	0615430	0614990
	6.05	0.2382	34	79	36	8	1	—	0626252
	6.10	0.2402	34	79	36	8	1	0626566	0626269
	6.20	0.2441	34	79	36	8	1	0135068	0134863
D	6.25	0.2461	34	79	36	8	1	0042571	0042144
	6.30	0.2480	34	79	36	8	1	0626573	0626276
1/4	6.35	0.2500	34	79	36	8	1	0624838	0624425
	6.40	0.2520	34	79	36	8	1	0135075	0134870
	6.50	0.2559	34	79	36	8	1	0615447	0615003
	6.60	0.2598	34	79	36	8	1	0626580	0626283
	6.70	0.2638	34	79	36	8	1	0135082	0134887
17/64	6.75	0.2657	34	79	36	8	1	0624937	0624524
H	6.76	0.2661	34	79	36	8	1	0042588	0042151
	6.80	0.2677	34	79	36	8	1	0615454	0615010
	6.90	0.2717	34	79	36	8	1	0615461	0615027
	7.00	0.2756	34	79	36	8	1	0615478	0615034
	7.10	0.2795	41	79	36	8	1	0626597	0626290
9/32	7.14	0.2811	41	79	36	8	1	0625217	0624807
	7.30	0.2874	41	79	36	8	1	0626603	0626306
L	7.37	0.2902	41	79	36	8	1	0042595	0042168
	7.40	0.2913	41	79	36	8	1	0615485	0615041
M	7.49	0.2949	41	79	36	8	1	0042601	0042175
	7.50	0.2953	41	79	36	8	1	0615492	0615058
19/64	7.54	0.2969	41	79	36	8	1	0624951	0624548
	7.60	0.2992	41	79	36	8	1	0626610	0626313
N	7.67	0.3020	41	79	36	8	1	0042618	0042182
	7.70	0.3031	41	79	36	8	1	0135099	0134894
	7.80	0.3071	41	79	36	8	1	0626627	0626320
	7.90	0.3110	41	79	36	8	1	0135105	0134900
5/16	7.94	0.3126	41	79	36	8	1	0625156	0624746
	8.00	0.3150	41	79	36	8	1	0615508	0615065
O	8.03	0.3161	47	89	40	10	1	0042625	0042199

d ₁ Ø "/Nr./letter	d ₁ Ø _{m7} mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	l ₃ mm	d ₂ Ø _{h6} mm	Pack Qty	R458	R457
	8.05	0.3169	47	89	40	10	1	—	0626337
	8.10	0.3189	47	89	40	10	1	0626634	0626689
	8.20	0.3228	47	89	40	10	1	0135112	0134917
21/64	8.33	0.3280	47	89	40	10	1	0624975	0624562
	8.40	0.3307	47	89	40	10	1	0135129	0134924
Q	8.43	0.3319	47	89	40	10	1	0042632	0042205
	8.50	0.3346	47	89	40	10	1	0615515	0615072
	8.60	0.3386	47	89	40	10	1	0615522	0615089
	8.70	0.3425	47	89	40	10	1	0615539	0615096
11/32	8.73	0.3437	47	89	40	10	1	0624869	0624456
	8.80	0.3465	47	89	40	10	1	0626641	0626344
	8.90	0.3504	47	89	40	10	1	—	0134931
	9.00	0.3543	47	89	40	10	1	0615546	0615102
T	9.09	0.3579	47	89	40	10	1	0042649	0042212
	9.10	0.3583	47	89	40	10	1	0626658	0626351
23/64	9.13	0.3594	47	89	40	10	1	0624999	0624586
	9.30	0.3661	47	89	40	10	1	0615553	0615119
U	9.35	0.3681	47	89	40	10	1	0042656	0042229
	9.40	0.3701	47	89	40	10	1	0135136	0134948
	9.50	0.3740	47	89	40	10	1	0615560	0615126
3/8	9.52	0.3748	47	89	40	10	1	0625057	0624647
	9.60	0.3780	47	89	40	10	1	0626665	0626368
	9.70	0.3819	47	89	40	10	1	0135143	0629062
	9.80	0.3858	47	89	40	10	1	0626672	0626375
	9.90	0.3898	47	89	40	10	1	0135150	0134955
25/64	9.92	0.3906	47	89	40	10	1	0625002	0624593
	10.00	0.3937	47	89	40	10	1	0615133	0614693
	10.05	0.3957	55	102	45	12	1	—	0625958
X	10.08	0.3969	55	102	45	12	1	0042663	0042236
	10.10	0.3976	55	102	45	12	1	0626382	0625965
	10.20	0.4016	55	102	45	12	1	0615140	0614709
Y	10.26	0.4039	55	102	45	12	1	0042670	0042243
	10.30	0.4055	55	102	45	12	1	0615157	0614716
13/32	10.32	0.4063	55	102	45	12	1	0624883	0624470
	10.40	0.4094	55	102	45	12	1	0615164	0614723
Z	10.49	0.4130	55	102	45	12	1	0042687	0042250
	10.50	0.4134	55	102	45	12	1	0615171	0614730
	10.60	0.4173	55	102	45	12	1	0626399	0625972
27/64	10.72	0.4220	55	102	45	12	1	0625019	0624609
	10.80	0.4252	55	102	45	12	1	0042694	—
	11.00	0.4331	55	102	45	12	1	0615188	0614747
7/16	11.11	0.4374	55	102	45	12	1	0625187	0624777
	11.20	0.4409	55	102	45	12	1	0615195	0614754
	11.40	0.4488	55	102	45	12	1	0135167	0134962
	11.50	0.4528	55	102	45	12	1	0615201	0614761
29/64	11.51	0.4531	55	102	45	12	1	0625026	0624616
	11.60	0.4567	55	102	45	12	1	0135174	0134979
	11.80	0.4646	55	102	45	12	1	0626405	0625989
15/32	11.91	0.4689	55	102	45	12	1	0624906	0624494
	12.00	0.4724	55	102	45	12	1	0615218	0614778
	12.05	0.4744	60	107	45	14	1	—	0625996
	12.10	0.4764	60	107	45	14	1	0626412	0626009
	12.20	0.4803	60	107	45	14	1	0615225	0614785
31/64	12.30	0.4843	60	107	45	14	1	0625064	0624654
	12.50	0.4921	60	107	45	14	1	0615232	0614792
	12.70	0.5000	60	107	45	14	1	0626429	0626016
1/2	12.70	0.5000	60	107	45	14	1	0624821	0624418
	12.80	0.5039	60	107	45	14	1	0135181	0134986
	13.00	0.5118	60	107	45	14	1	0615249	0614808
33/64	13.10	0.5157	60	107	45	14	1	0625071	0624661
17/32	13.49	0.5311	60	107	45	14	1	0624920	0624517
	13.50	0.5315	60	107	45	14	1	0615256	0614815
	13.80	0.5433	60	107	45	14	1	0135198	0134993
35/64	13.89	0.5469	60	107	45	14	1	0625088	0624678
	14.00	0.5512	60	107	45	14	1	0615263	0614822
	14.25	0.5610	65	115	48	16	1	0615270	0614839

HIGH PERFORMANCE SOLID CARBIDE DRILL



d_1 Ø "/Nr./letter	d_1 Ø _{m7} mm	d_1 decimal Inch	l_2 mm	l_1 mm	l_3 mm	d_2 Ø _{h6} mm	Pack Qty	R458	R457
9/16	14.29	0.5626	65	115	48	16	1	0625200	0624791
	14.50	0.5709	65	115	48	16	1	0615287	0614846
37/64	14.68	0.5780	65	115	48	16	1	0625095	0624685
	14.80	0.5827	65	115	48	16	1	0622032	0135006
	15.00	0.5906	65	115	48	16	1	0615294	0614853
19/32	15.08	0.5937	65	115	48	16	1	0624944	0624531
	15.10	0.5945	65	115	48	16	1	0626436	0626023
39/64	15.48	0.6094	65	115	48	16	1	0625101	0624692
	15.50	0.6102	65	115	48	16	1	0615300	0614860
5/8	15.80	0.6220	65	115	48	16	1	0135204	0622049
	15.88	0.6252	65	115	48	16	1	0625170	0624760
	16.00	0.6299	65	115	48	16	1	0615317	0614877
41/64	16.27	0.6406	73	123	48	18	1	0625118	0624708
	16.50	0.6496	73	123	48	18	1	0135211	0626030
21/32	16.67	0.6563	73	123	48	18	1	0624968	0624555
	17.00	0.6693	73	123	48	18	1	0135228	0626047
43/64	17.07	0.6720	73	123	48	18	1	0625125	0624715
11/16	17.46	0.6874	73	123	48	18	1	0624852	0624449
	17.50	0.6890	73	123	48	18	1	0135235	0626054
	17.80	0.7008	73	123	48	18	1	0135273	—
45/64	17.86	0.7031	73	123	48	18	1	0625132	0624722
	18.00	0.7087	73	123	48	18	1	0135280	0626061
23/32	18.26	0.7189	79	131	50	20	1	0624982	0624579
	18.50	0.7283	79	131	50	20	1	0135297	0626078
47/64	18.65	0.7343	79	131	50	20	1	0625149	0624739
	18.80	0.7402	79	131	50	20	1	—	0622056
	19.00	0.7480	79	131	50	20	1	0135327	0626085
	19.05	0.7500	79	131	50	20	1	0625040	—
3/4	19.05	0.7500	79	131	50	20	1	—	0624630
	19.50	0.7677	79	131	50	20	1	0135334	0626092
	19.80	0.7795	79	131	50	20	1	0135341	0622063
	20.00	0.7874	79	131	50	20	1	0135358	0626108



HIGH PERFORMANCE SOLID CARBIDE DRILL

CDX Multi-Application, Jobber Length, Parallel Shank

CDX

R510

- 1.1
 - 1.2
 - 1.3
 - 1.4
 - 1.5
 - 1.6
 - 1.7
 - 1.8
 - 2.1
 - 3.1
 - 3.2
 - 3.3
 - 3.4
 - 4.1
 - 5.1
- 7.1
 - 7.2
 - 7.3
 - 7.4
 - 8.1
 - 8.2

Heavy-Duty design. Self centering Split Point for easier penetration.
TiN coating increases wear resistance and improves tool life.



R510

3.00 - 14.25

DRILLS

d ₁ Øh ₇ Inch	d ₁ Øh ₇ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	R510
	3.00	0.1181	33	61	1	0115657
1/8	3.18	0.1252	36	65	1	0380802
	3.20	0.1260	36	65	1	0148990
	3.30	0.1299	36	65	1	0115664
	3.40	0.1339	39	70	1	0115671
	3.50	0.1378	39	70	1	0115688
9/64	3.57	0.1406	39	70	1	0381014
	3.70	0.1457	39	70	1	0216781
	3.90	0.1535	43	75	1	0345245
5/32	3.97	0.1563	43	75	1	0380970
	4.00	0.1575	43	75	1	0115695
	4.10	0.1614	43	75	1	0115701
	4.20	0.1654	43	75	1	0115718
	4.30	0.1693	47	80	1	0115725
11/64	4.37	0.1720	47	80	1	0380826
	4.50	0.1772	47	80	1	0115732
	4.60	0.1811	47	80	1	0216798
	4.70	0.1850	47	80	1	0216804
3/16	4.76	0.1874	52	86	1	0380949
	4.90	0.1929	52	86	1	0115749
	5.00	0.1969	52	86	1	0115756
	5.10	0.2008	52	86	1	0115763
13/64	5.16	0.2031	52	86	1	0380840
	5.50	0.2165	57	93	1	0115770
7/32	5.56	0.2189	57	93	1	0380994
	5.60	0.2205	57	93	1	0216811
	5.70	0.2244	57	93	1	0216828
	6.00	0.2362	57	93	1	0115787
15/64	5.95	0.2343	57	93	1	0380864
1/4	6.35	0.2500	63	101	1	0381038
	6.50	0.2559	63	101	1	0115794
	6.60	0.2598	63	101	1	0345252
17/64	6.75	0.2657	69	109	1	0380871

HIGH PERFORMANCE SOLID CARBIDE DRILL



d_1 $\varnothing h_7$ Inch	d_1 $\varnothing h_7$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	R510
	6.80	0.2677	69	109	1	0115800
	6.90	0.2717	69	109	1	0115817
	7.00	0.2756	69	109	1	0115824
9/32	7.14	0.2811	69	109	1	0381007
	7.30	0.2874	69	109	1	0115831
	7.40	0.2913	69	109	1	0115848
	7.50	0.2953	69	109	1	0115855
19/64	7.54	0.2969	75	117	1	0380888
	7.80	0.3071	75	117	1	0345269
	7.90	0.3110	75	117	1	0345276
5/16	7.94	0.3126	75	117	1	0380963
	8.00	0.3150	75	117	1	0115862
21/64	8.33	0.3280	75	117	1	0380895
	8.50	0.3346	75	117	1	0115879
	8.70	0.3425	81	125	1	0149003
11/32	8.73	0.3437	81	125	1	0380819
	8.80	0.3465	81	125	1	0345283
	9.00	0.3543	81	125	1	0115886
23/64	9.13	0.3594	81	125	1	0380901
	9.20	0.3622	81	125	1	0115893
	9.30	0.3661	81	125	1	0115909
	9.40	0.3701	81	125	1	0216835
	9.50	0.3740	81	125	1	0115916
3/8	9.52	0.3748	87	133	1	0381045
	9.90	0.3898	87	133	1	0345290
25/64	9.92	0.3906	87	133	1	0380918
	10.00	0.3937	87	133	1	0115558
	10.20	0.4016	87	133	1	0115565
	10.30	0.4055	87	133	1	0216842
13/32	10.32	0.4063	87	133	1	0380833
	10.40	0.4094	87	133	1	0115572
	10.50	0.4134	87	133	1	0115589
27/64	10.72	0.4220	94	142	1	0380925
	10.80	0.4252	94	142	1	0345306
	11.00	0.4331	94	142	1	0115596
7/16	11.11	0.4374	94	142	1	0380987
	11.20	0.4409	94	142	1	0216859
	11.50	0.4528	94	142	1	0115602
29/64	11.51	0.4531	94	142	1	0380932
15/32	11.91	0.4689	101	151	1	0380857
	12.00	0.4724	101	151	1	0115619
31/64	12.30	0.4843	101	151	1	0380956
1/2	12.70	0.5000	101	151	1	0381021
	13.00	0.5118	101	151	1	0115626
	14.00	0.5512	108	160	1	0115633
	14.25	0.5610	114	169	1	0115640



HIGH PERFORMANCE SOLID CARBIDE DRILL

MPX Multi-Application, Standard Length, Reinforced Shank

R454 Self centering Split Point for enhanced penetration rate. TiAlN-Top coating increases wear resistance, improves tool life at high RPM.

1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 2.1 2.2 2.3 2.4 3.1 3.2 3.3
3.4 4.1 4.2 4.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4

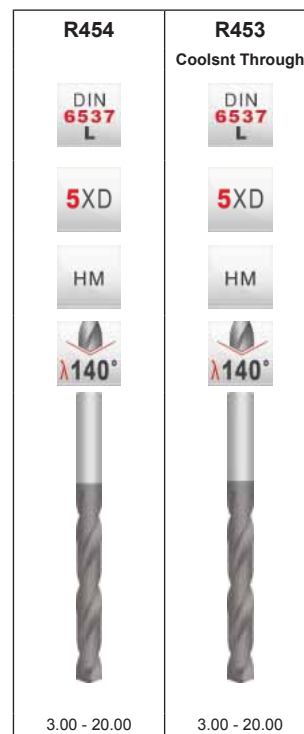
R453 Coolant thru clears chips away from cutting edge. Self centering Split Point for enhanced penetration rates. TiAlN-Top coating increases surface hardness, improves tool life at high RPM.

1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 2.1 2.2 2.3 2.4 3.1 3.2 3.3
3.4 4.1 4.2 4.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4

High productivity in a wide range of materials



MP-X



d ₁ Ø "/Nr./letter	d ₁ Øm ₇ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	l ₃ mm	d ₂ Øh ₆ mm	Pack Qty	R454	R453
	3.00	0.1181	28	66	36	6	1	0614433	0614051
	3.10	0.1220	28	66	36	6	1	0625712	0625385
1/8	3.18	0.1252	28	66	36	6	1	0624029	0623619
	3.20	0.1260	28	66	36	6	1	0625729	0625392
30	3.26	0.1283	28	66	36	6	1	0041406	0040393
	3.30	0.1299	28	66	36	6	1	0614440	0616147
	3.40	0.1339	28	66	36	6	1	0614457	0614068
29	3.45	0.1358	28	66	36	6	1	0041413	0040409
	3.50	0.1378	28	66	36	6	1	0614464	0614075
28	3.57	0.1406	28	66	36	6	1	0041420	0040416
9/64	3.57	0.1406	28	66	36	6	1	0624401	0623992
	3.60	0.1417	28	66	36	6	1	0625736	0625408
27	3.66	0.1441	28	66	36	6	1	0041437	0040423
	3.70	0.1457	28	66	36	6	1	0625743	0625415
26	3.73	0.1469	36	74	36	6	1	0041444	0040430
25	3.80	0.1496	36	74	36	6	1	0041451	0040447
	3.80	0.1496	36	74	36	6	1	0625750	0625422
24	3.86	0.1520	36	74	36	6	1	0041468	0040454
	3.90	0.1535	36	74	36	6	1	0625767	0628911
23	3.91	0.1539	36	74	36	6	1	0041475	0040461
5/32	3.97	0.1563	36	74	36	6	1	0624340	0623930
22	3.99	0.1571	36	74	36	6	1	0041482	0040478
	4.00	0.1575	36	74	36	6	1	0614471	0614082
21	4.04	0.1591	36	74	36	6	1	0041499	0040485
	4.05	0.1594	36	74	36	6	1	—	0625439
20	4.09	0.1610	36	74	36	6	1	0041505	0040492
	4.10	0.1614	36	74	36	6	1	0625774	0625446
	4.20	0.1654	36	74	36	6	1	0614488	0616154
19	4.22	0.1661	36	74	36	6	1	0041512	0040508
	4.30	0.1693	36	74	36	6	1	0614495	0614099
18	4.31	0.1697	36	74	36	6	1	0041529	0040515
11/64	4.37	0.1720	36	74	36	6	1	0624050	0623640
17	4.39	0.1728	36	74	36	6	1	0041536	0040522

DRILLS

HIGH PERFORMANCE SOLID CARBIDE DRILL



d_1 Ø "/Nr./letter	d_1 Ø _{m7} mm	d_1 decimal Inch	l_2 mm	l_1 mm	l_3 mm	d_2 Ø _{h6} mm	Pack Qty	R454	R453
	4.40	0.1732	36	74	36	6	1	0134450	0134191
	4.50	0.1772	36	74	36	6	1	0614501	0614105
16	4.50	0.1772	36	74	36	6	1	0041543	0040539
15	4.57	0.1799	36	74	36	6	1	0041550	0040546
	4.60	0.1811	36	74	36	6	1	0625781	0625453
14	4.62	0.1819	36	74	36	6	1	0041567	0040553
13	4.70	0.1850	36	74	36	6	1	0041574	0040560
	4.70	0.1850	36	74	36	6	1	0625798	0625460
3/16	4.76	0.1874	44	82	36	6	1	0624210	0623800
12	4.80	0.1890	44	82	36	6	1	0041581	0134207
	4.80	0.1890	44	82	36	6	1	0134467	0040577
11	4.85	0.1909	44	82	36	6	1	0041598	0040584
	4.90	0.1929	44	82	36	6	1	0134474	0134214
10	4.92	0.1937	44	82	36	6	1	0041604	0040591
9	4.98	0.1961	44	82	36	6	1	0041611	0040607
	5.00	0.1969	44	82	36	6	1	0614518	0614112
	5.05	0.1988	44	82	36	6	1	—	0625477
8	5.06	0.1992	44	82	36	6	1	0041628	0040614
	5.10	0.2008	44	82	36	6	1	0614525	0614129
7	5.11	0.2012	44	82	36	6	1	0041635	0040621
13/64	5.16	0.2031	44	82	36	6	1	0624074	0623664
6	5.18	0.2039	44	82	36	6	1	0041642	0040638
	5.20	0.2047	44	82	36	6	1	0134481	0134221
5	5.22	0.2055	44	82	36	6	1	0041659	0040645
4	5.31	0.2091	44	82	36	6	1	0041666	0040652
3	5.41	0.2130	44	82	36	6	1	0041673	0040669
	5.50	0.2165	44	82	36	6	1	0614532	0614136
7/32	5.56	0.2189	44	82	36	6	1	0624371	0623961
	5.60	0.2205	44	82	36	6	1	0625804	0625484
2	5.61	0.2209	44	82	36	6	1	0041680	0040676
	5.70	0.2244	44	82	36	6	1	0625811	0625491
1	5.79	0.2280	44	82	36	6	1	0041697	0040683
	5.80	0.2283	44	82	36	6	1	0625828	0625507
A	5.94	0.2339	44	82	36	6	1	0041703	0040690
15/64	5.95	0.2343	44	82	36	6	1	0624098	0623688
	6.00	0.2362	44	82	36	6	1	0614549	0614143
	6.05	0.2382	53	91	36	8	1	—	0625514
	6.10	0.2402	53	91	36	8	1	0625835	0625521
	6.20	0.2441	53	91	36	8	1	0134498	0134238
D	6.25	0.2461	53	91	36	8	1	0041710	0040706
	6.30	0.2480	53	91	36	8	1	0625842	0625538
1/4	6.35	0.2500	53	91	36	8	1	0624012	0623602
	6.40	0.2520	53	91	36	8	1	0134504	0134245
	6.50	0.2559	53	91	36	8	1	0614556	0614150
	6.60	0.2598	53	91	36	8	1	0625859	0625545
	6.70	0.2638	53	91	36	8	1	0614563	0134252
17/64	6.75	0.2657	53	91	36	8	1	0624111	0623701
H	6.76	0.2661	53	91	36	8	1	0041727	0041291
	6.80	0.2677	53	91	36	8	1	0614570	0616116
	6.90	0.2717	53	91	36	8	1	0614587	0614167
	7.00	0.2756	53	91	36	8	1	0614594	0614174
	7.10	0.2795	53	91	36	8	1	0625866	0625552
9/32	7.14	0.2811	53	91	36	8	1	0624395	0623985
	7.30	0.2874	53	91	36	8	1	0625873	0625569
L	7.37	0.2902	53	91	36	8	1	0041734	0041307
	7.40	0.2913	53	91	36	8	1	0614600	0616161
M	7.49	0.2949	53	91	36	8	1	0041741	0041314
	7.50	0.2953	53	91	36	8	1	0614617	0614181
19/64	7.54	0.2969	53	91	36	8	1	0624135	0623725
	7.60	0.2992	53	91	36	8	1	0625880	0625576
N	7.67	0.3020	53	91	36	8	1	0041758	0041321
	7.70	0.3031	53	91	36	8	1	0134511	0134306
	7.80	0.3071	53	91	36	8	1	0625897	0625583
	7.90	0.3110	53	91	36	8	1	0134528	0134313
5/16	7.94	0.3126	53	91	36	8	1	0624333	0623923
	8.00	0.3150	53	91	36	8	1	0614624	0614198

d ₁ Ø "/Nr./letter	d ₁ Ø _{m7} mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	l ₃ mm	d ₂ Ø _{h6} mm	Pack Qty	R454	R453
O	8.03	0.3161	61	103	40	10	1	0041765	0041338
	8.05	0.3169	61	103	40	10	1	—	0625590
	8.10	0.3189	61	103	40	10	1	0625903	0625606
	8.20	0.3228	61	103	40	10	1	0134535	0134320
21/64	8.33	0.3280	61	103	40	10	1	0624159	0623749
	8.40	0.3307	61	103	40	10	1	0134542	0134337
Q	8.43	0.3319	61	103	40	10	1	0041772	0041345
	8.50	0.3346	61	103	40	10	1	0614631	0614204
	8.60	0.3386	61	103	40	10	1	0614648	0616178
	8.70	0.3425	61	103	40	10	1	0614655	0614211
11/32	8.73	0.3437	61	103	40	10	1	0624043	0623633
	8.80	0.3465	61	103	40	10	1	0625910	0625613
	8.90	0.3504	61	103	40	10	1	0134559	0134344
	9.00	0.3543	61	103	40	10	1	0614662	0614228
T	9.09	0.3579	61	103	40	10	1	0041789	0041352
	9.10	0.3583	61	103	40	10	1	0625927	0625620
23/64	9.13	0.3594	61	103	40	10	1	0624173	0623763
	9.30	0.3661	61	103	40	10	1	0614679	0616123
	9.35	0.3681	61	103	40	10	1	0041796	0041369
U	9.40	0.3701	61	103	40	10	1	0134566	0134351
	9.50	0.3740	61	103	40	10	1	0614686	0614235
	9.52	0.3748	61	103	40	10	1	0624234	0623824
	9.60	0.3780	61	103	40	10	1	0625934	0625637
3/8	9.70	0.3819	61	103	40	10	1	0134573	0629055
	9.80	0.3858	61	103	40	10	1	0625941	0625644
	9.90	0.3898	61	103	40	10	1	0134580	0134368
	9.92	0.3906	61	103	40	10	1	0624180	0623770
	10.00	0.3937	61	103	40	10	1	0614242	0613870
	10.05	0.3957	70	118	45	12	1	—	0625231
X	10.08	0.3969	70	118	45	12	1	0041802	0041376
	10.10	0.3976	70	118	45	12	1	0625651	0625248
	10.20	0.4016	70	118	45	12	1	0614259	0613887
Y	10.26	0.4039	70	118	45	12	1	0041819	0041383
	10.30	0.4055	70	118	45	12	1	0614266	0613894
13/32	10.32	0.4063	70	118	45	12	1	0624067	0623657
	10.40	0.4094	70	118	45	12	1	0614273	0616130
	10.49	0.4130	70	118	45	12	1	0041826	0041390
Z	10.50	0.4134	70	118	45	12	1	0614280	0613900
	10.60	0.4173	70	118	45	12	1	0625668	0625255
	10.72	0.4220	70	118	45	12	1	0624197	0623787
27/64	11.00	0.4331	70	118	45	12	1	0614297	0613917
	11.11	0.4374	70	118	45	12	1	0624364	0623954
7/16	11.20	0.4409	70	118	45	12	1	0614303	0613924
	11.40	0.4488	70	118	45	12	1	0134597	0134375
	11.50	0.4528	70	118	45	12	1	0614310	0613931
	11.51	0.4531	70	118	45	12	1	0624203	0623794
29/64	11.60	0.4567	70	118	45	12	1	0134603	0134382
	11.80	0.4646	70	118	45	12	1	0625675	0625262
	11.91	0.4689	70	118	45	12	1	0624081	0623671
15/32	12.00	0.4724	70	118	45	12	1	0614327	0613948
	12.05	0.4744	76	124	45	14	1	—	0625279
	12.10	0.4764	76	124	45	14	1	0625682	—
	12.20	0.4803	76	124	45	14	1	0614334	0613955
	12.30	0.4843	76	124	45	14	1	0624241	0623831
31/64	12.50	0.4921	76	124	45	14	1	0614341	0613962
	12.70	0.5000	76	124	45	14	1	0625699	0625286
	12.70	0.5000	76	124	45	14	1	0624005	0623596
1/2	12.80	0.5039	76	124	45	14	1	0134610	0134399
	13.00	0.5118	76	124	45	14	1	0614358	0613979
	13.10	0.5157	76	124	45	14	1	0624258	0623848
	13.49	0.5311	76	124	45	14	1	0624104	0623695
17/32	13.50	0.5315	76	124	45	14	1	0614365	0613986
	13.80	0.5433	76	124	45	14	1	0134627	0134405
	13.89	0.5469	76	124	45	14	1	0624265	0623855
35/64	14.00	0.5512	76	124	45	14	1	0614372	0613993
	14.25	0.5610	82	133	48	16	1	0614389	0614006

HIGH PERFORMANCE SOLID CARBIDE DRILL



d_1 Ø "/Nr./letter	d_1 Ø _{m₇} mm	d_1 decimal Inch	l_2 mm	l_1 mm	l_3 mm	d_2 Ø _{h₆} mm	Pack Qty	R454	R453
9/16	14.29	0.5626	82	133	48	16	1	0624388	0623978
	14.50	0.5709	82	133	48	16	1	0614396	0614013
37/64	14.68	0.5780	82	133	48	16	1	0624272	0623862
	14.80	0.5827	82	133	48	16	1	0134634	0134412
19/32	15.00	0.5906	82	133	48	16	1	0614402	0614020
	15.08	0.5937	82	133	48	16	1	0624128	0623718
39/64	15.10	0.5945	82	133	48	16	1	0625705	0625293
	15.48	0.6094	82	133	48	16	1	0624289	0623879
5/8	15.50	0.6102	82	133	48	16	1	0614419	0614037
	15.80	0.6220	82	133	48	16	1	0134641	0134429
41/64	15.88	0.6252	82	133	48	16	1	0624357	0623947
	16.00	0.6299	82	133	48	16	1	0614426	0614044
21/32	16.27	0.6406	91	143	48	18	1	0624296	0623886
	16.50	0.6496	91	143	48	18	1	0134658	0625309
43/64	16.67	0.6563	91	143	48	18	1	0624142	0623732
	17.00	0.6693	91	143	48	18	1	0134665	0625316
11/16	17.07	0.6720	91	143	48	18	1	0624302	0623893
	17.46	0.6874	91	143	48	18	1	0624036	0623626
45/64	17.50	0.6890	91	143	48	18	1	0134672	0625323
	17.80	0.7008	91	143	48	18	1	0134689	0134436
23/32	17.86	0.7031	91	143	48	18	1	0624319	0623909
	18.00	0.7087	91	143	48	18	1	0134696	0625330
47/64	18.26	0.7189	99	153	50	20	1	0624166	0623756
	18.50	0.7283	99	153	50	20	1	0134702	0625347
3/4	18.65	0.7343	99	153	50	20	1	0624326	0623916
	19.00	0.7480	99	153	50	20	1	0134719	0625354
	19.05	0.7500	99	153	50	20	1	0624227	0623817
	19.50	0.7677	99	153	50	20	1	0134726	0625361
	19.80	0.7795	99	153	50	20	1	0134733	0134443
	20.00	0.7874	99	153	50	20	1	0134740	0625378

ADX Multi-Application, Jobber Length

A510

- 1.1
- 1.2
- 1.3
- 1.4
- 1.5
- 1.6
- 2.1
- 2.2
- 2.3
- 3.1
- 3.2
- 3.3
- 3.4
- 4.1
- 4.2
- 4.3
- 5.1
- 5.2
- 5.3
- 6.1
- 6.2
- 6.3
- 6.4
- 7.1
- 7.2
- 7.3
- 7.4
- 8.1
- 8.2
- 8.3

Low thrust design. Notched point improves chip formation for enhanced penetration rate. TiN coating increases wear resistance and improves tool life.



ADX

A510

3.00 - 14.00

DRILLS

d_1 Øh ₈ Inch	d_1 Øh ₈ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A510
	3.00	0.1181	33	61	1	0036495
	3.10	0.1220	36	65	1	0036501
1/8	3.18	0.1252	36	65	1	0168974
	3.20	0.1260	36	65	1	0036518
	3.30	0.1299	36	65	1	0036525
	3.40	0.1339	39	70	1	0036532
	3.50	0.1378	39	70	1	0036549
9/64	3.57	0.1406	39	70	1	0168981
	3.60	0.1417	39	70	1	0036556
	3.70	0.1457	39	70	1	0036563
	3.80	0.1496	43	75	1	0036570
	3.90	0.1535	43	75	1	0036587
5/32	3.97	0.1563	43	75	1	0168998
	4.00	0.1575	43	75	1	0036594
	4.10	0.1614	43	75	1	0036600
	4.20	0.1654	43	75	1	0036617
	4.30	0.1693	47	80	1	0036624
11/64	4.37	0.1720	47	80	1	0169001
	4.40	0.1732	47	80	1	0036631
	4.50	0.1772	47	80	1	0036648
	4.60	0.1811	47	80	1	0036655
	4.70	0.1850	47	80	1	0036662
3/16	4.76	0.1874	52	86	1	0169018
	4.80	0.1890	52	86	1	0036679
	4.90	0.1929	52	86	1	0036686
	5.00	0.1969	52	86	1	0036693
	5.10	0.2008	52	86	1	0036709
13/64	5.16	0.2031	52	86	1	0169025
	5.20	0.2047	52	86	1	0036716
	5.30	0.2087	52	86	1	0036723
	5.40	0.2126	57	93	1	0036730
	5.50	0.2165	57	93	1	0036747
7/32	5.56	0.2189	57	93	1	0169032

HIGH PERFORMANCE JOBBER LENGTH DRILL



d_1 \varnothing_{h_8} Inch	d_1 \varnothing_{h_8} mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A510
	5.60	0.2205	57	93	1	0036754
	5.70	0.2244	57	93	1	0036761
	5.80	0.2283	57	93	1	0036778
	5.90	0.2323	57	93	1	0036785
15/64	5.95	0.2343	57	93	1	0169049
	6.00	0.2362	57	93	1	0036792
	6.10	0.2402	63	101	1	0036808
	6.20	0.2441	63	101	1	0036815
	6.30	0.2480	63	101	1	0036822
1/4	6.35	0.2500	63	101	1	0169056
	6.40	0.2520	63	101	1	0036839
	6.50	0.2559	63	101	1	0036846
	6.60	0.2598	63	101	1	0036853
	6.70	0.2638	63	101	1	0036860
17/64	6.75	0.2657	69	109	1	0169063
	6.80	0.2677	69	109	1	0036877
	6.90	0.2717	69	109	1	0036884
	7.00	0.2756	69	109	1	0036891
	7.10	0.2795	69	109	1	0036907
9/32	7.14	0.2811	69	109	1	0169070
	7.20	0.2835	69	109	1	0036914
	7.30	0.2874	69	109	1	0036921
	7.40	0.2913	69	109	1	0036938
	7.50	0.2953	69	109	1	0036945
19/64	7.54	0.2969	75	117	1	0169087
	7.60	0.2992	75	117	1	0036952
	7.70	0.3031	75	117	1	0036969
	7.80	0.3071	75	117	1	0036976
	7.90	0.3110	75	117	1	0036983
5/16	7.94	0.3126	75	117	1	0169094
	8.00	0.3150	75	117	1	0036990
	8.10	0.3189	75	117	1	0037003
	8.20	0.3228	75	117	1	0037010
	8.30	0.3268	75	117	1	0037027
21/64	8.33	0.3280	75	117	1	0169100
	8.40	0.3307	75	117	1	0037034
	8.50	0.3346	75	117	1	0037041
	8.60	0.3386	81	125	1	0037058
	8.70	0.3425	81	125	1	0037065
11/32	8.73	0.3437	81	125	1	0169117
	8.80	0.3465	81	125	1	0037072
	8.90	0.3504	81	125	1	0037089
	9.00	0.3543	81	125	1	0037096
	9.10	0.3583	81	125	1	0037102
23/64	9.13	0.3594	81	125	1	0169124
	9.20	0.3622	81	125	1	0037119
	9.30	0.3661	81	125	1	0037126
	9.40	0.3701	81	125	1	0037133
	9.50	0.3740	81	125	1	0037140
3/8	9.52	0.3748	87	133	1	0169131
	9.60	0.3780	87	133	1	0037157
	9.70	0.3819	87	133	1	0037164
	9.80	0.3858	87	133	1	0037171
	9.90	0.3898	87	133	1	0037188
25/64	9.92	0.3906	87	133	1	0169148
	10.00	0.3937	87	133	1	0036174
	10.10	0.3976	87	133	1	0036181
	10.20	0.4016	87	133	1	0036198
	10.30	0.4055	87	133	1	0036204
13/32	10.32	0.4063	87	133	1	0169155
	10.40	0.4094	87	133	1	0036211
	10.50	0.4134	87	133	1	0036228
	10.60	0.4173	87	133	1	0036235
	10.70	0.4213	94	142	1	0036242
27/64	10.72	0.4220	94	142	1	0169162
	10.80	0.4252	94	142	1	0036259



HIGH PERFORMANCE JOBBER LENGTH DRILL

d ₁ Øh ₈ Inch	d ₁ Øh ₈ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	A510
	10.90	0.4291	94	142	1	0036266
	11.00	0.4331	94	142	1	0036273
	11.10	0.4370	94	142	1	0036280
7/16	11.11	0.4374	94	142	1	0169179
	11.20	0.4409	94	142	1	0036297
	11.30	0.4449	94	142	1	0036303
	11.40	0.4488	94	142	1	0036310
	11.50	0.4528	94	142	1	0036327
29/64	11.51	0.4531	94	142	1	0169186
	11.60	0.4567	94	142	1	0036334
	11.70	0.4606	94	142	1	0036341
	11.80	0.4646	94	142	1	0036358
	11.90	0.4685	101	151	1	0036365
15/32	11.91	0.4689	101	151	1	0169193
	12.00	0.4724	101	151	1	0036372
	12.10	0.4764	101	151	1	0036389
	12.20	0.4803	101	151	1	0036396
	12.30	0.4843	101	151	1	0036402
31/64	12.30	0.4843	101	151	1	0169209
	12.40	0.4882	101	151	1	0036419
	12.50	0.4921	101	151	1	0036426
	12.60	0.4961	101	151	1	0036433
	12.70	0.5000	101	151	1	0036440
1/2	12.70	0.5000	101	151	1	0169216
	12.80	0.5039	101	151	1	0036457
	12.90	0.5079	101	151	1	0036464
	13.00	0.5118	101	151	1	0036471
	14.00	0.5512	108	160	1	0036488

DRILLS

HIGH PERFORMANCE STANDARD LENGTH DRILL



ADX Multi-Application, Premium Cobalt Coolant Feed w/ Reinforced Shank

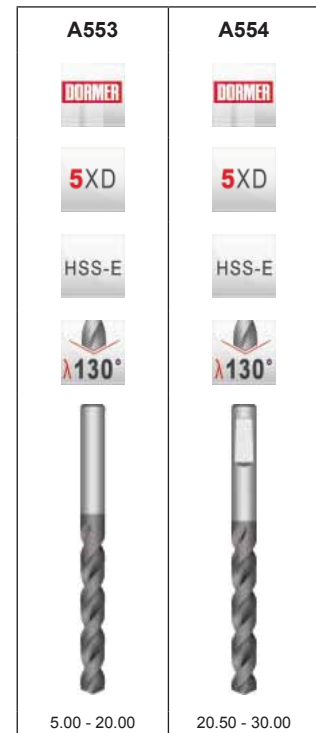
ADX

A553 Step shank (DIN 6535HA)

A554 Step shank (DIN 6535HE)
>20.0mm with flat on shank for secure tool holding in large diameter holes

Notched point improves chip formation. Low thrust design.
Cobalt base material & TiAlN-Top coating increases wear resistance and improves tool life.

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2
4.3 5.1 5.2 5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1



d ₁ Øh ₈ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	l ₃ mm	d ₂ Øh ₆ mm	Pack Qty	A553	A554
5.00	0.1969	36	79	36	6	1	0391204	—
5.20	0.2047	38	79	36	6	1	0391228	—
5.50	0.2165	40	79	36	6	1	0391242	—
6.00	0.2362	43	79	36	6	1	0391280	—
6.30	0.2480	46	87	36	8	1	0391297	—
6.50	0.2559	47	87	36	8	1	0391303	—
6.80	0.2677	48	87	36	8	1	0391327	—
6.90	0.2717	48	87	36	8	1	0391334	—
7.00	0.2756	48	87	36	8	1	0391341	—
7.40	0.2913	54	94	36	8	1	0391365	—
7.50	0.2953	54	94	36	8	1	0391372	—
8.00	0.3150	58	94	36	8	1	0391402	—
8.50	0.3346	75	130	40	10	1	0391419	—
8.70	0.3425	75	130	40	10	1	0391426	—
9.00	0.3543	75	130	40	10	1	0391433	—
9.50	0.3740	75	130	40	10	1	0391457	—
10.00	0.3937	75	130	40	10	1	0390795	—
10.20	0.4016	87	150	45	12	1	0390801	—
10.30	0.4055	87	150	45	12	1	0390818	—
10.50	0.4134	87	150	45	12	1	0390825	—
11.00	0.4330	94	150	45	12	1	0390849	—
11.30	0.4449	94	150	45	12	1	0390856	—
11.50	0.4528	94	150	45	12	1	0390863	—
12.00	0.4724	94	150	45	12	1	0390870	—
12.50	0.4921	101	160	45	14	1	0390887	—
13.00	0.5118	101	160	45	14	1	0390894	—
13.50	0.5315	101	160	45	14	1	0390924	—
14.00	0.5512	101	160	45	14	1	0390948	—
14.25	0.5610	108	170	48	16	1	0390955	—
14.50	0.5709	108	170	48	16	1	0390962	—
15.00	0.5906	108	170	48	16	1	0390986	—
15.25	0.6004	108	170	48	16	1	0391006	—
15.50	0.6102	108	170	48	16	1	0391013	—



HIGH PERFORMANCE STANDARD LENGTH DRILL

d_1 \varnothing_{h_8} mm	d_1 decimal Inch	l_2 mm	l_1 mm	l_3 mm	d_2 \varnothing_{h_8} mm	Pack Qty	A553	A554
16.00	0.6299	108	170	48	16	1	0391037	—
16.50	0.6496	125	190	48	18	1	0391051	—
17.00	0.6693	125	190	48	18	1	0391075	—
17.50	0.6890	130	190	48	18	1	0391099	—
17.75	0.6988	130	190	48	18	1	0391105	—
18.00	0.7087	130	190	48	18	1	0391112	—
19.00	0.7480	135	200	50	20	1	0391150	—
19.25	0.7579	140	200	50	20	1	0391167	—
20.00	0.7874	140	200	50	20	1	0391198	—
20.50	0.8071	141	219	56	25	1	—	0391877
21.00	0.8268	141	219	56	25	1	—	0391891
21.50	0.8465	148	226	56	25	1	—	0391907
22.00	0.8661	148	226	56	25	1	—	0391914
22.50	0.8858	155	233	56	25	1	—	0391938
23.00	0.9055	155	233	56	25	1	—	0391945
24.00	0.9449	162	240	56	25	1	—	0391976
24.50	0.9646	168	240	56	25	1	—	0391983
25.00	0.9843	168	246	56	25	1	—	0391990
26.00	1.0236	175	257	60	32	1	—	0392003
26.50	1.0433	182	264	60	32	1	—	0392010
27.00	1.0630	182	264	60	32	1	—	0392027
28.00	1.1024	189	271	60	32	1	—	0392034
29.00	1.1417	195	277	60	32	1	—	0392041
29.50	1.1614	202	284	60	32	1	—	0392058
30.00	1.1811	202	284	60	32	1	—	0392065

HIGH PERFORMANCE JOBBER LENGTH DRILL



PFX Premium Cobalt Jobber Length - Parabolic Flute for Advanced Chip Removal

A900

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2

4.3 5.1 5.2 5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2

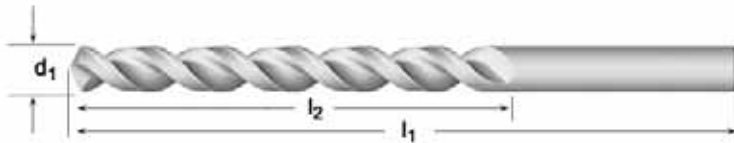
Heavy-Duty parabolic flute design allows greater drilling depths in one pass. Notched Point improves chip formation. Premium cobalt base material increases wear resistance. Bright finish improves chip flow in soft or non-ferrous materials.

A901

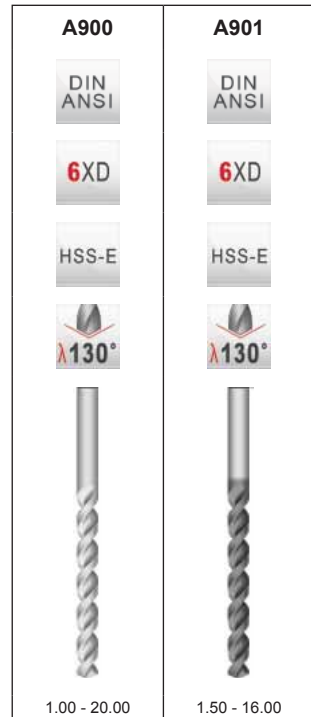
1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2

4.3 5.1 5.2 5.3 6.3 6.4 7.4

Heavy-Duty parabolic flute design allows greater drilling depths in one pass. Notched point improves chip formation. Premium Cobalt base material combined with AlCrN coating increases lubricity and wear resistance which improves tool life.



PFX



d_1 Øh ₈ "/Nr./Letter	d_1 Øh ₈ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A900	A901
	1.00	0.0394	12	34	1	0046289	—
60	1.02	0.0402	17	41	1	0633496	—
59	1.04	0.0409	17	41	1	0633502	—
58	1.07	0.0421	17	41	1	0633519	—
57	1.09	0.0429	19	44	1	0633526	—
	1.10	0.0433	14	36	1	0046296	—
56	1.18	0.0465	19	44	1	0633533	—
3/64	1.19	0.0469	19	44	1	0633540	—
	1.20	0.0472	16	38	1	0046302	—
	1.25	0.0492	16	36	1	0633557	—
	1.30	0.0512	16	38	1	0046319	—
55	1.32	0.0520	22	48	1	0633564	—
	1.35	0.0531	18	40	1	0633571	—
	1.40	0.0551	18	40	1	0046326	—
	1.45	0.0571	18	40	1	0633588	—
	1.50	0.0591	18	40	1	0046333	0047781
53	1.51	0.0594	22	48	1	0633595	0634530
	1.55	0.0610	20	43	1	0633601	0634547
1/16	1.59	0.0626	22	48	1	0046340	0634554
	1.60	0.0630	20	43	1	0046357	0634561
52	1.61	0.0634	22	48	1	0633618	0634578
	1.70	0.0669	20	43	1	0046364	—
51	1.70	0.0669	25	51	1	—	0634585
	1.75	0.0689	22	46	1	0633625	0634592
50	1.78	0.0701	25	51	1	0633632	0634608
	1.80	0.0709	22	46	1	0046371	0634615
49	1.85	0.0728	25	51	1	0633649	0634622
	1.90	0.0748	22	46	1	0046388	0634639
48	1.93	0.0760	25	51	1	0633656	0634646
5/64	1.98	0.0780	25	51	1	0046395	0634653
47	1.99	0.0783	25	51	1	0633663	0634660
	2.00	0.0787	24	49	1	0046401	0047798
46	2.06	0.0811	29	54	1	0633670	0634677

d_1 $\varnothing h_8$ "/Nr./Letter	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A900	A901
45	2.08	0.0819	29	54	1	0633687	0634684
	2.10	0.0827	24	49	1	0046418	0634691
	2.15	0.0846	27	53	1	0633694	0634707
44	2.18	0.0858	29	54	1	0633700	0634714
	2.20	0.0866	27	53	1	0046425	—
43	2.26	0.0890	32	57	1	0633717	0634721
	2.30	0.0906	27	53	1	0046432	—
	2.35	0.0925	27	53	1	0633724	0634738
42	2.38	0.0937	32	57	1	0633731	0634745
3/32	2.38	0.0937	32	57	1	0046449	0634752
	2.40	0.0945	30	57	1	0046456	0634769
41	2.44	0.0961	35	60	1	0633748	0634776
40	2.49	0.0980	35	60	1	0633755	0634783
	2.50	0.0984	30	57	1	0046463	0047804
39	2.53	0.0996	35	60	1	0633762	0634790
38	2.58	0.1016	37	64	1	0633779	0634806
	2.60	0.1024	30	57	1	0046470	0047811
37	2.64	0.1039	37	64	1	0633786	0634813
	2.70	0.1063	33	61	1	0046487	0634820
36	2.71	0.1067	37	64	1	0633793	0634837
7/64	2.78	0.1094	38	67	1	0046494	0634844
35	2.79	0.1098	38	67	1	0633809	0634851
	2.80	0.1102	33	61	1	0046500	—
34	2.82	0.1110	38	67	1	0633816	0634868
33	2.87	0.1130	38	67	1	0633823	0634875
	2.90	0.1142	33	61	1	0046517	0634882
32	2.95	0.1161	41	70	1	0633830	0634899
	3.00	0.1181	33	61	1	0046524	0047828
31	3.05	0.1201	41	70	1	0633847	0634905
	3.10	0.1220	36	65	1	0046531	0047835
1/8	3.18	0.1252	41	70	1	0046548	0634912
	3.20	0.1260	36	65	1	0046555	0047842
30	3.26	0.1283	41	70	1	0633854	0634929
	3.30	0.1299	36	65	1	0046562	0047859
	3.40	0.1339	39	70	1	0046579	0047866
29	3.45	0.1358	44	73	1	0633861	0634936
	3.50	0.1378	39	70	1	0046586	0047873
9/64	3.57	0.1406	44	73	1	0046593	0634943
	3.60	0.1417	39	70	1	0046609	0047880
27	3.66	0.1441	48	76	1	0633878	0634950
	3.70	0.1457	39	70	1	0046616	0047897
26	3.73	0.1469	48	76	1	0633885	0634967
	3.80	0.1496	43	75	1	0046623	0047903
24	3.86	0.1520	51	79	1	0633892	0634974
	3.90	0.1535	43	75	1	0046630	0047910
23	3.91	0.1539	51	79	1	0633908	0634981
5/32	3.97	0.1563	51	79	1	0046647	0634998
22	3.99	0.1571	51	79	1	0633915	0635001
	4.00	0.1575	43	75	1	0046654	0047927
21	4.04	0.1591	54	83	1	0633922	0635018
20	4.09	0.1610	54	83	1	0633939	0635025
	4.10	0.1614	43	75	1	0046661	0047934
	4.20	0.1654	43	75	1	0046678	0047941
19	4.22	0.1661	54	83	1	0633946	0635032
	4.30	0.1693	47	80	1	0046685	0047958
18	4.31	0.1697	54	83	1	0633953	0635049
11/64	4.37	0.1720	54	83	1	0046692	0635056
17	4.39	0.1728	56	86	1	0633960	0635063
	4.40	0.1732	47	80	1	0046708	0047965
	4.50	0.1772	47	80	1	0046715	0047972
15	4.57	0.1799	56	86	1	0633977	0635070
	4.60	0.1811	47	80	1	0046722	0047989
14	4.62	0.1819	56	86	1	0633984	0635087
	4.70	0.1850	47	80	1	0046739	0047996
3/16	4.76	0.1874	59	89	1	0046746	0635094
	4.80	0.1890	52	86	1	0046753	0048009

HIGH PERFORMANCE JOBBER LENGTH DRILL



d ₁ Øh ₈ "/Nr./Letter	d ₁ Øh ₈ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	A900	A901
11	4.85	0.1909	59	89	1	0633991	0635100
	4.90	0.1929	52	86	1	0046760	0048016
10	4.92	0.1937	62	92	1	0634004	0635117
9	4.98	0.1961	62	92	1	0634011	0635124
	5.00	0.1969	52	86	1	0046777	0048023
8	5.06	0.1992	62	92	1	0634028	0635131
	5.10	0.2008	52	86	1	0046784	0048030
7	5.11	0.2012	62	92	1	0046791	0635148
13/64	5.16	0.2031	62	92	1	0046807	0635155
6	5.18	0.2039	64	95	1	0634035	0635162
	5.20	0.2047	52	86	1	0046814	0048047
5	5.22	0.2055	64	95	1	0634042	0635179
	5.30	0.2087	52	86	1	0046821	0048054
4	5.31	0.2091	64	95	1	0634059	0635186
	5.40	0.2126	57	93	1	0046838	0048061
3	5.41	0.2130	64	95	1	0634066	0635193
	5.50	0.2165	57	93	1	0046845	0048078
7/32	5.56	0.2189	64	95	1	0046852	0635209
	5.60	0.2205	57	93	1	0046869	0048085
2	5.61	0.2209	67	98	1	0634073	0635216
	5.70	0.2244	57	93	1	0046876	0048092
1	5.79	0.2280	67	98	1	0634080	0635223
	5.80	0.2283	57	93	1	0046883	0048108
	5.90	0.2323	57	93	1	0046890	0048115
A	5.94	0.2339	67	98	1	0634097	0635230
15/64	5.95	0.2343	67	98	1	0046906	0635247
	6.00	0.2362	57	93	1	0046913	0048122
B	6.03	0.2374	70	102	1	0634103	0635254
	6.10	0.2402	63	101	1	0046920	0048139
C	6.15	0.2421	70	102	1	0634110	0635261
	6.20	0.2441	63	101	1	0046937	0048146
D	6.25	0.2461	70	102	1	0634127	0635278
	6.30	0.2480	63	101	1	0046944	0048153
1/4	6.35	0.2500	70	102	1	0046951	0635285
	6.40	0.2520	63	101	1	0046968	0048160
	6.50	0.2559	63	101	1	0046975	0048177
F	6.53	0.2571	73	105	1	0046982	0635292
	6.60	0.2598	63	101	1	0046999	0048184
G	6.63	0.2610	73	105	1	0634134	0635308
	6.70	0.2638	63	101	1	0047002	0048191
17/64	6.75	0.2657	73	105	1	0047019	0635315
H	6.76	0.2661	73	105	1	0634141	0635322
	6.80	0.2677	69	109	1	0047026	0048207
	6.90	0.2717	69	109	1	0047033	0048214
I	6.91	0.2720	73	105	1	0047040	0635339
	7.00	0.2756	69	109	1	0047057	0048221
J	7.04	0.2772	73	105	1	0634158	0635346
	7.10	0.2795	69	109	1	0047064	0048238
9/32	7.14	0.2811	75	108	1	0047071	0635353
	7.20	0.2835	69	109	1	0047088	0048245
	7.30	0.2874	69	109	1	0047095	0048252
L	7.37	0.2902	75	108	1	0634165	0635360
	7.40	0.2913	69	109	1	0047101	0048269
M	7.49	0.2949	78	111	1	0634172	0635377
	7.50	0.2953	69	109	1	0047118	0048276
19/64	7.54	0.2969	78	111	1	0047125	0635384
	7.60	0.2992	75	117	1	0047132	0048283
N	7.67	0.3020	78	111	1	0634189	0635391
	7.70	0.3031	75	117	1	0047149	0048290
	7.80	0.3071	75	117	1	0047156	0048306
	7.90	0.3110	75	117	1	0047163	0048313
5/16	7.94	0.3126	81	114	1	0047170	0635407
	8.00	0.3150	75	117	1	0047187	0048320
O	8.03	0.3161	81	114	1	0634196	0635414
	8.10	0.3189	75	117	1	0047194	0048337
	8.20	0.3228	75	117	1	0047200	0048344



HIGH PERFORMANCE JOBBER LENGTH DRILL

d ₁ Øh ₈ "/Nr./Letter	d ₁ Øh ₈ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	A900	A901
	8.30	0.3268	75	117	1	0047217	0048351
21/64	8.33	0.3280	84	117	1	0047224	0635421
	8.40	0.3307	75	117	1	0047231	0048368
Q	8.43	0.3319	87	121	1	0047248	0635438
	8.50	0.3346	75	117	1	0047255	0048375
	8.60	0.3386	81	125	1	0047262	0048382
R	8.61	0.3390	87	121	1	0047279	0635445
	8.70	0.3425	81	125	1	0047286	0048399
11/32	8.73	0.3437	87	121	1	0047293	0635452
	8.80	0.3465	81	125	1	0047309	0048405
S	8.84	0.3480	89	124	1	0634202	0635469
	8.90	0.3504	81	125	1	0047316	0048412
	9.00	0.3543	81	125	1	0047323	0048429
T	9.09	0.3579	89	124	1	0634219	0635476
	9.10	0.3583	81	125	1	0047330	0048436
23/64	9.13	0.3594	89	124	1	0047347	0635483
	9.20	0.3622	81	125	1	0047354	0048443
	9.30	0.3661	81	125	1	0047361	0048450
U	9.35	0.3681	92	127	1	0634226	0635490
	9.40	0.3701	81	125	1	0047378	0048467
	9.50	0.3740	81	125	1	0047385	0048474
3/8	9.52	0.3748	92	127	1	0047392	0635506
V	9.58	0.3772	92	127	1	0634233	0635513
	9.60	0.3780	87	133	1	0047408	0048481
	9.70	0.3819	87	133	1	0047415	0048498
	9.80	0.3858	87	133	1	0047422	0048504
	9.90	0.3898	87	133	1	0047439	0048627
25/64	9.92	0.3906	95	130	1	0047446	0635520
	10.00	0.3937	87	133	1	0047453	0048641
X	10.08	0.3969	95	130	1	0634240	0635537
	10.20	0.4016	87	133	1	0047460	0048863
Y	10.26	0.4039	98	133	1	0634257	0635544
	10.30	0.4055	87	133	1	0047477	0048870
13/32	10.32	0.4063	98	133	1	0047484	0635551
	10.40	0.4094	87	133	1	0047491	0048955
Z	10.49	0.4130	98	133	1	0634264	0635568
	10.50	0.4134	87	133	1	0047507	0049013
27/64	10.72	0.4220	100	137	1	0047514	0635575
	10.75	0.4232	94	142	1	0634271	0635582
	10.80	0.4252	94	142	1	0047521	0049198
	11.00	0.4331	94	142	1	0047538	0049235
7/16	11.11	0.4374	103	140	1	0047545	0635599
	11.20	0.4409	94	142	1	0047552	0049242
	11.25	0.4429	94	142	1	0634288	0635605
	11.50	0.4528	94	142	1	0047569	0049280
29/64	11.51	0.4531	106	143	1	0047576	0635612
	11.80	0.4646	94	142	1	0047583	0049297
15/32	11.91	0.4689	110	146	1	0047590	0635629
	12.00	0.4724	101	151	1	0047606	0049303
	12.20	0.4803	101	151	1	0047613	0049587
31/64	12.30	0.4843	111	149	1	0047620	0635636
	12.50	0.4921	101	151	1	0047637	0049594
1/2	12.70	0.5000	101	151	1	—	46073789
1/2	12.70	0.5000	114	152	1	0047644	—
	12.75	0.5020	101	151	1	0634295	0635643
	12.80	0.5039	101	151	1	0047651	0049600
	12.90	0.5079	101	151	1	0634301	—
	13.00	0.5118	101	151	1	0047668	0049655
33/64	13.10	0.5157	122	168	1	0634318	0635650
	13.50	0.5315	108	160	1	0047675	0049662
35/64	13.89	0.5469	122	168	1	0634325	0635667
	14.00	0.5512	108	160	1	0047682	0049686
9/16	14.29	0.5626	122	168	1	0634332	0635674
	14.50	0.5709	114	169	1	0047699	0049709
37/64	14.68	0.5780	122	168	1	0634349	0635681
	14.75	0.5807	114	169	1	0634356	0635698

HIGH PERFORMANCE JOBBER LENGTH DRILL



d_1 $\varnothing h_8$ "/Nr./Letter	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A900	A901
	15.00	0.5906	114	169	1	0047705	0049723
19/32	15.08	0.5937	132	181	1	0634363	0635704
39/64	15.48	0.6094	132	181	1	0634370	0635711
	15.50	0.6102	120	178	1	0047712	0050132
5/8	15.88	0.6252	132	181	1	0634387	0635728
	16.00	0.6299	120	178	1	0047729	0050170
41/64	16.27	0.6406	132	181	1	0634394	—
	16.50	0.6496	125	184	1	0634400	—
21/32	16.67	0.6563	132	181	1	0634417	—
	16.75	0.6594	125	184	1	0634424	—
	17.00	0.6693	125	184	1	0047736	—
43/64	17.07	0.6720	143	194	1	0634431	—
11/16	17.46	0.6874	143	194	1	0634448	—
	17.50	0.6890	130	191	1	0047743	—
45/64	17.86	0.7031	130	191	1	0634455	—
	18.00	0.7087	130	191	1	0047750	—
23/32	18.26	0.7189	130	191	1	0634462	—
	18.50	0.7283	135	198	1	0634479	—
47/64	18.65	0.7343	135	198	1	0634486	—
	19.00	0.7480	135	198	1	0047767	—
3/4	19.05	0.7500	135	198	1	0634493	—
49/64	19.45	0.7657	135	198	1	0634509	—
	19.50	0.7677	140	205	1	0634516	—
25/32	19.84	0.7811	140	205	1	0634523	—
	20.00	0.7874	140	205	1	0047774	—

DRILLS

ADX Multi-Application, Screw Machine Length

ADX

A520

- 1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2
4.3 5.1 5.2 5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2 8.3

Low thrust design. Notched point improves chip formation for enhanced penetration rate. TiN coating increases wear resistance and improves tool life.



A520

DIN 1897

2.5XD

HSS

130°

3.00 - 13.00

DRILLS

d_1 \varnothing_{h_8} Inch	d_1 \varnothing_{h_8} mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A520
	3.00	0.1181	16	46	1	0038901
	3.10	0.1220	18	49	1	0038918
1/8	3.18	0.1252	18	49	1	0171264
	3.20	0.1260	18	49	1	0038925
	3.30	0.1299	18	49	1	0038932
	3.40	0.1339	20	52	1	0038949
	3.50	0.1378	20	52	1	0038956
9/64	3.57	0.1406	20	52	1	0171271
	3.60	0.1417	20	52	1	0038963
	3.70	0.1457	20	52	1	0038970
	3.80	0.1496	22	55	1	0038987
	3.90	0.1535	22	55	1	0038994
5/32	3.97	0.1563	22	55	1	0171288
	4.00	0.1575	22	55	1	0039007
	4.10	0.1614	22	55	1	0039014
	4.20	0.1654	22	55	1	0039021
	4.30	0.1693	24	58	1	0039038
11/64	4.37	0.1720	24	58	1	0171295
	4.40	0.1732	24	58	1	0039045
	4.50	0.1772	24	58	1	0039052
	4.60	0.1811	24	58	1	0039069
	4.70	0.1850	24	58	1	0039076
3/16	4.76	0.1874	26	62	1	0171301
	4.80	0.1890	26	62	1	0039083
	4.90	0.1929	26	62	1	0039090
	5.00	0.1969	26	62	1	0039106
	5.10	0.2008	26	62	1	0039113
13/64	5.16	0.2031	26	62	1	0171318
	5.20	0.2047	26	62	1	0039120
	5.30	0.2087	26	62	1	0039137
	5.40	0.2126	28	66	1	0039144
	5.50	0.2165	28	66	1	0039151
7/32	5.56	0.2189	28	66	1	0171325

HIGH PERFORMANCE SCREW MACHINE DRILL



d_1 \varnothing_{h_8} Inch	d_1 \varnothing_{h_8} mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A520
	5.60	0.2205	28	66	1	0039168
	5.70	0.2244	28	66	1	0039175
	5.80	0.2283	28	66	1	0039182
	5.90	0.2323	28	66	1	0039199
15/64	5.95	0.2343	28	66	1	0171332
	6.00	0.2362	28	66	1	0039205
	6.10	0.2402	31	70	1	0039212
	6.20	0.2441	31	70	1	0039229
	6.30	0.2480	31	70	1	0039236
1/4	6.35	0.2500	31	70	1	0171349
	6.40	0.2520	31	70	1	0039243
	6.50	0.2559	31	70	1	0039250
	6.60	0.2598	31	70	1	0039267
	6.70	0.2638	31	70	1	0039274
17/64	6.75	0.2657	34	74	1	0171356
	6.80	0.2677	34	74	1	0039281
	6.90	0.2717	34	74	1	0039298
	7.00	0.2756	34	74	1	0039304
	7.10	0.2795	34	74	1	0039311
9/32	7.14	0.2811	34	74	1	0171363
	7.20	0.2835	34	74	1	0039328
	7.30	0.2874	34	74	1	0039335
	7.40	0.2913	34	74	1	0039342
	7.50	0.2953	34	74	1	0039359
19/64	7.54	0.2969	37	79	1	0171370
	7.60	0.2992	37	79	1	0039366
	7.70	0.3031	37	79	1	0039373
	7.80	0.3071	37	79	1	0039380
	7.90	0.3110	37	79	1	0039397
5/16	7.94	0.3126	37	79	1	0171387
	8.00	0.3150	37	79	1	0039403
	8.10	0.3189	37	79	1	0039410
	8.20	0.3228	37	79	1	0039427
	8.30	0.3268	37	79	1	0039434
21/64	8.33	0.3280	37	79	1	0171394
	8.40	0.3307	37	79	1	0039441
	8.50	0.3346	37	79	1	0039458
	8.60	0.3386	40	84	1	0039465
	8.70	0.3425	40	84	1	0039472
11/32	8.73	0.3437	40	84	1	0171400
	8.80	0.3465	40	84	1	0039489
	8.90	0.3504	40	84	1	0039496
	9.00	0.3543	40	84	1	0039502
	9.10	0.3583	40	84	1	0039519
23/64	9.13	0.3594	40	84	1	0171417
	9.20	0.3622	40	84	1	0039526
	9.30	0.3661	40	84	1	0039533
	9.40	0.3701	40	84	1	0039540
	9.50	0.3740	40	84	1	0039557
3/8	9.52	0.3748	43	89	1	0171424
	9.60	0.3780	43	89	1	0039564
	9.70	0.3819	43	89	1	0039571
	9.80	0.3858	43	89	1	0039588
	9.90	0.3898	43	89	1	0039595
25/64	9.92	0.3906	43	89	1	0171431
	10.00	0.3937	43	89	1	0038598
	10.10	0.3976	43	89	1	0038604
	10.20	0.4016	43	89	1	0038611
	10.30	0.4055	43	89	1	0038628
13/32	10.32	0.4063	43	89	1	0171448
	10.40	0.4094	43	89	1	0038635
	10.50	0.4134	43	89	1	0038642
	10.60	0.4173	43	89	1	0038659
	10.70	0.4213	47	95	1	0038666
27/64	10.72	0.4220	47	95	1	0171455
	10.80	0.4252	47	95	1	0038673



HIGH PERFORMANCE SCREW MACHINE DRILL

d_1 $\varnothing h_8$ Inch	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A520
	10.90	0.4291	47	95	1	0038680
	11.00	0.4331	47	95	1	0038697
	11.10	0.4370	47	95	1	0038703
7/16	11.11	0.4374	47	95	1	0171462
	11.20	0.4409	47	95	1	0038710
	11.30	0.4449	47	95	1	0038727
	11.40	0.4488	47	95	1	0038734
	11.50	0.4528	47	95	1	0038741
29/64	11.51	0.4531	47	95	1	0171479
	11.60	0.4567	47	95	1	0038758
	11.70	0.4606	47	95	1	0038765
	11.80	0.4646	47	95	1	0038772
	11.90	0.4685	51	102	1	0038789
15/32	11.91	0.4689	51	102	1	0171486
	12.00	0.4724	51	102	1	0038796
	12.10	0.4764	51	102	1	0038802
	12.20	0.4803	51	102	1	0038819
	12.30	0.4843	51	102	1	0038826
31/64	12.30	0.4843	51	102	1	0171493
	12.40	0.4882	51	102	1	0038833
	12.50	0.4921	51	102	1	0038840
	12.60	0.4961	51	102	1	0038857
	12.70	0.5000	51	102	1	0038864
1/2	12.70	0.5000	51	102	1	0171509
	12.80	0.5039	51	102	1	0038871
	12.90	0.5079	51	102	1	0038888
	13.00	0.5118	51	102	1	0038895

HIGH PERFORMANCE SCREW MACHINE DRILL



PFX Multi-Application, Premium Cobalt Screw Machine Length - Parabolic Flute for Advanced Chip Removal

A920

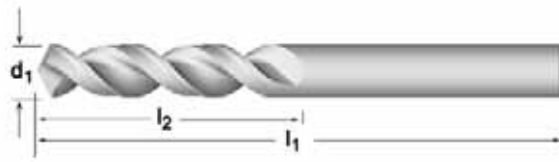
1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2
4.3 5.1 5.2 5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2

Heavy-Duty parabolic flute design allows greater drilling depths in one pass. Notched point improves chip formation. Premium cobalt base material increases wear resistance. Bright finish improves chip flow in soft or non-ferrous materials.

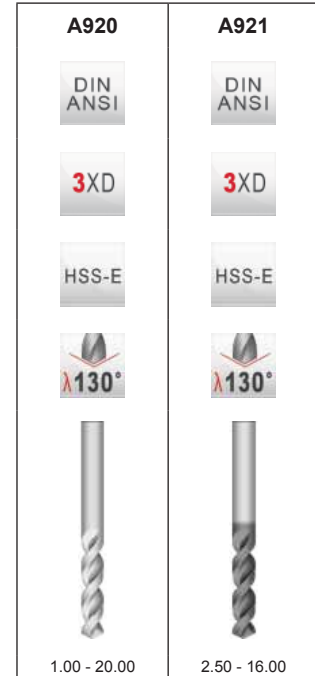
A921

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2
4.3 5.1 5.2 5.3 6.3 6.4 7.4

Heavy-Duty parabolic flute design allows greater drilling depths in one pass. Notched Point improves chip formation. Premium cobalt base material combined with AlCrN coating increases lubricity and wear resistance which improves tool life.



PFX



d_1 Ø _{h8} "/Nr./Letter	d_1 Ø _{h8} mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A920	A921
	1.00	0.0394	6	26	1	0050217	—
60	1.02	0.0402	13	35	1	0197639	—
59	1.04	0.0409	13	35	1	0211380	—
58	1.07	0.0421	13	35	1	0211397	—
57	1.09	0.0429	13	35	1	0211403	—
	1.10	0.0433	7	28	1	0050262	—
56	1.18	0.0465	13	35	1	0211410	—
3/64	1.19	0.0469	13	35	1	0211427	—
	1.20	0.0472	8	30	1	0050309	—
	1.25	0.0492	8	30	1	0211434	—
	1.30	0.0512	8	30	1	0050316	—
55	1.32	0.0520	16	41	1	0211441	—
	1.35	0.0531	9	32	1	0211458	—
	1.40	0.0551	9	32	1	0050323	—
	1.45	0.0571	9	32	1	0211465	—
	1.50	0.0591	9	32	1	0050347	—
53	1.51	0.0594	16	41	1	0211472	—
	1.55	0.0610	10	34	1	0211489	—
1/16	1.59	0.0626	16	41	1	0050644	—
	1.60	0.0630	10	34	1	0050668	—
52	1.61	0.0634	17	43	1	0211496	—
	1.70	0.0669	10	34	1	0050675	—
	1.75	0.0689	11	36	1	0211502	—
50	1.78	0.0701	17	43	1	0211519	—
	1.80	0.0709	11	36	1	0050682	—
49	1.85	0.0728	17	43	1	0211526	—
	1.90	0.0748	11	36	1	0050699	—
48	1.93	0.0760	17	43	1	0211533	—
5/64	1.98	0.0780	17	43	1	0050705	—
47	1.99	0.0783	17	43	1	0211540	—
	2.00	0.0787	12	38	1	0050712	—
46	2.06	0.0811	19	44	1	0211557	—
45	2.08	0.0819	19	44	1	0211564	—

d_1 $\varnothing h_8$ "/Nr./Letter	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A920	A921
	2.10	0.0827	12	38	1	0050729	—
	2.15	0.0846	13	40	1	0211571	—
44	2.18	0.0858	19	44	1	0211588	—
	2.20	0.0866	13	40	1	0050743	—
43	2.26	0.0890	19	44	1	0211595	—
	2.30	0.0906	13	40	1	0050750	—
	2.35	0.0925	14	43	1	0211601	—
42	2.38	0.0937	19	44	1	0211618	—
3/32	2.38	0.0937	19	41	1	0050767	—
	2.40	0.0945	14	43	1	0050781	—
41	2.44	0.0961	21	46	1	0211625	—
40	2.49	0.0980	21	46	1	0211632	—
	2.50	0.0984	14	43	1	0050804	0052488
39	2.53	0.0996	21	46	1	0211649	0212479
38	2.58	0.1016	21	46	1	0211656	0212486
	2.60	0.1024	14	43	1	0050811	0052495
37	2.64	0.1039	21	46	1	0211663	0212493
	2.65	0.1043	14	43	1	0211670	—
	2.70	0.1063	16	46	1	0050828	0212509
36	2.71	0.1067	21	46	1	0211687	0212516
7/64	2.78	0.1094	21	46	1	0050835	0212523
35	2.79	0.1098	22	48	1	0211694	0212530
	2.80	0.1102	16	46	1	0050842	—
34	2.82	0.1110	22	48	1	0211700	0212547
33	2.87	0.1130	22	48	1	0211717	0212554
	2.90	0.1142	16	46	1	0050859	0212561
32	2.95	0.1161	22	48	1	0211724	0212578
	3.00	0.1181	16	46	1	0050866	0052501
31	3.05	0.1201	22	48	1	0211731	0212585
	3.10	0.1220	18	49	1	0050873	0052518
1/8	3.18	0.1252	22	48	1	0050880	0212592
	3.20	0.1260	18	49	1	0050897	0052525
30	3.26	0.1283	24	49	1	0211748	0212608
	3.30	0.1299	18	49	1	0050903	0052532
	3.40	0.1339	20	52	1	0050910	0052549
29	3.45	0.1358	24	49	1	0211755	0212615
	3.50	0.1378	20	52	1	0050927	0052556
9/64	3.57	0.1406	24	49	1	0050934	0212622
	3.60	0.1417	20	52	1	0050941	0052563
27	3.66	0.1441	25	52	1	0211762	0212639
	3.70	0.1457	20	52	1	0050958	0052570
26	3.73	0.1469	25	52	1	0211779	0212646
	3.80	0.1496	22	55	1	0050965	0052587
24	3.86	0.1520	25	52	1	0211786	0212653
	3.90	0.1535	22	55	1	0050972	0052594
23	3.91	0.1539	25	52	1	0211793	0212660
5/32	3.97	0.1563	25	52	1	0050989	0212677
22	3.99	0.1571	27	54	1	0211809	0215562
	4.00	0.1575	22	55	1	0051009	0052600
21	4.04	0.1591	27	54	1	0211816	0215579
20	4.09	0.1610	27	54	1	0211823	0216040
	4.10	0.1614	22	55	1	0051016	0052617
	4.20	0.1654	22	55	1	0051023	0052624
19	4.22	0.1661	27	54	1	0211830	0217924
	4.30	0.1693	24	58	1	0051030	0052631
18	4.31	0.1697	27	54	1	0211847	0283936
11/64	4.37	0.1720	27	54	1	0051047	0286012
17	4.39	0.1728	29	56	1	0211854	0287668
	4.40	0.1732	24	58	1	0051054	0052648
	4.50	0.1772	24	58	1	0051061	0052655
15	4.57	0.1799	29	56	1	0211861	0299340
	4.60	0.1811	24	58	1	0051078	0052662
14	4.62	0.1819	29	56	1	0211878	0303436
	4.70	0.1850	24	58	1	0051085	0052679
3/16	4.76	0.1874	29	56	1	0051092	0335635
	4.80	0.1890	26	62	1	0051108	0052686

HIGH PERFORMANCE SCREW MACHINE DRILL



d ₁ Øh ₈ "/Nr./Letter	d ₁ Øh ₈ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	A920	A921
11	4.85	0.1909	30	57	1	0211885	0335642
	4.90	0.1929	26	62	1	0051115	0052693
10	4.92	0.1937	30	57	1	0211892	0374351
9	4.98	0.1961	30	57	1	0211908	0386637
	5.00	0.1969	26	62	1	0051122	0052709
8	5.06	0.1992	30	57	1	0211915	0388679
	5.10	0.2008	26	62	1	0051139	0052716
7	5.11	0.2012	30	57	1	0211922	0441312
13/64	5.16	0.2031	30	57	1	0051146	0441336
6	5.18	0.2039	32	60	1	0211939	0441343
	5.20	0.2047	26	62	1	0051153	0052723
5	5.22	0.2055	32	60	1	0211946	0441350
	5.30	0.2087	26	62	1	0051160	0052730
4	5.31	0.2091	32	60	1	0211953	0441367
	5.40	0.2126	28	66	1	0051177	0052747
3	5.41	0.2130	32	60	1	0211960	0632949
	5.50	0.2165	28	66	1	0051191	0052754
7/32	5.56	0.2189	32	60	1	0051207	0632956
	5.60	0.2205	28	66	1	0051214	0052761
2	5.61	0.2209	33	62	1	0211977	0632963
	5.70	0.2244	28	66	1	0051221	0052778
1	5.79	0.2280	33	62	1	0211984	0632970
	5.80	0.2283	28	66	1	0051238	0052785
	5.90	0.2323	28	66	1	0051245	0052792
A	5.94	0.2339	33	62	1	0211991	0632987
15/64	5.95	0.2343	33	62	1	0051269	0632994
	6.00	0.2362	28	66	1	0051276	0052808
B	6.03	0.2374	35	64	1	0212004	0633007
	6.10	0.2402	31	70	1	0051283	0052815
C	6.15	0.2421	35	64	1	0212011	0633014
	6.20	0.2441	31	70	1	0051290	0052822
D	6.25	0.2461	35	64	1	0212028	0633021
	6.30	0.2480	31	70	1	0051306	0052839
1/4	6.35	0.2500	35	64	1	0051313	0633038
	6.40	0.2520	31	70	1	0051320	0052846
F	6.50	0.2559	31	70	1	0051337	0052853
	6.53	0.2571	37	67	1	0212035	0633045
G	6.60	0.2598	31	70	1	0051344	0052860
	6.63	0.2610	37	67	1	0212042	0633052
17/64	6.70	0.2638	31	70	1	0051351	0052877
	6.75	0.2657	37	67	1	0051368	0633069
H	6.76	0.2661	38	68	1	0212059	0633076
	6.80	0.2677	34	74	1	0051375	0052884
I	6.90	0.2717	34	74	1	0051382	0052891
	6.91	0.2720	38	68	1	0212066	0633083
J	7.00	0.2756	34	74	1	0051429	0052907
	7.04	0.2772	38	68	1	0212073	0633090
9/32	7.10	0.2795	34	74	1	0051436	0052914
	7.14	0.2811	38	68	1	0051443	0633106
L	7.20	0.2835	34	74	1	0051450	0052921
	7.30	0.2874	34	74	1	0051467	0052938
M	7.37	0.2902	40	70	1	0212080	0633113
	7.40	0.2913	34	74	1	0051474	0052945
19/64	7.49	0.2949	40	70	1	0212097	0633120
	7.50	0.2953	34	74	1	0051481	0052952
N	7.54	0.2969	40	70	1	0051498	0633137
	7.60	0.2992	37	79	1	0051504	0052969
5/16	7.67	0.3020	41	71	1	0212103	0633144
	7.70	0.3031	37	79	1	0051511	0052976
	7.80	0.3071	37	79	1	0051528	0053089
	7.90	0.3110	37	79	1	0051535	0053096
O	7.94	0.3126	41	71	1	0051542	0633151
	8.00	0.3150	37	79	1	0051566	0053102
8.03	8.03	0.3161	43	76	1	0212110	0633168
	8.10	0.3189	37	79	1	0051580	0053119
8.20	0.3228	37	79	1	0051603	0053133	

d ₁ Øh ₈ "/Nr./Letter	d ₁ Øh ₈ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	A920	A921
	8.30	0.3268	37	79	1	0051610	0053157
21/64	8.33	0.3280	43	75	1	0051627	0633175
	8.40	0.3307	37	79	1	0051634	0053249
Q	8.43	0.3319	43	76	1	0212127	0633182
	8.50	0.3346	37	79	1	0051658	0053256
	8.60	0.3386	40	84	1	0051665	0053263
R	8.61	0.3390	43	76	1	0212134	0633199
	8.70	0.3425	40	84	1	0051672	0053270
11/32	8.73	0.3437	43	76	1	0051689	0633205
	8.80	0.3465	40	84	1	0051702	0053287
S	8.84	0.3480	44	78	1	0212141	0633212
	8.90	0.3504	40	84	1	0051719	0053294
	9.00	0.3543	40	84	1	0051726	0053300
T	9.09	0.3579	44	78	1	0212158	0633229
	9.10	0.3583	40	84	1	0051733	0053317
23/64	9.13	0.3594	44	78	1	0051740	0633236
	9.20	0.3622	40	84	1	0051757	0053324
	9.30	0.3661	40	84	1	0051764	0053331
U	9.35	0.3681	46	79	1	0212165	0633243
	9.40	0.3701	40	84	1	0051771	0053348
	9.50	0.3740	40	84	1	0051788	0053355
3/8	9.52	0.3748	46	79	1	0051795	0633250
V	9.58	0.3772	48	83	1	0212172	0633267
	9.60	0.3780	43	89	1	0051801	0053362
	9.70	0.3819	43	89	1	0051818	0053379
	9.80	0.3858	43	89	1	0051825	0053386
	9.90	0.3898	43	89	1	0051832	0053393
25/64	9.92	0.3906	48	83	1	0051849	0633274
	10.00	0.3937	43	89	1	0051856	0053409
X	10.08	0.3969	49	84	1	0212189	0633281
	10.20	0.4016	43	89	1	0051863	0053416
Y	10.26	0.4039	49	84	1	0212196	0633298
	10.30	0.4055	43	89	1	0051870	0053423
13/32	10.32	0.4063	49	84	1	0051887	0633304
	10.40	0.4094	43	89	1	0051894	0053430
Z	10.49	0.4130	51	86	1	0212202	0633311
	10.50	0.4134	43	89	1	0051900	0053447
27/64	10.72	0.4220	51	86	1	0051917	0633328
	10.75	0.4232	47	95	1	0212219	0633335
	10.80	0.4252	47	95	1	0051924	0053454
	11.00	0.4331	47	95	1	0051931	0053461
7/16	11.11	0.4374	52	87	1	0051948	0633342
	11.20	0.4409	47	95	1	0051955	0053478
	11.25	0.4429	47	95	1	0212226	0633359
	11.50	0.4528	47	95	1	0051962	0053485
29/64	11.51	0.4531	54	90	1	0051979	0633366
	11.80	0.4646	47	95	1	0051986	0053492
15/32	11.91	0.4689	54	92	1	0051993	0633373
	12.00	0.4724	51	102	1	0052006	0053508
	12.20	0.4803	51	102	1	0052013	0053515
31/64	12.30	0.4843	56	94	1	0052020	0633380
	12.50	0.4921	51	102	1	0052037	0053522
1/2	12.70	0.5000	57	95	1	0052044	0633397
	12.75	0.5020	51	102	1	0212233	0633403
	12.80	0.5039	51	102	1	0052051	0053539
	12.90	0.5079	51	102	1	0212240	—
	13.00	0.5118	51	102	1	0052068	0053546
33/64	13.10	0.5157	60	98	1	0212257	0633410
	13.50	0.5315	54	107	1	0052075	0053553
35/64	13.89	0.5469	64	102	1	0212264	0633427
	14.00	0.5512	54	107	1	0052082	0053560
9/16	14.29	0.5626	64	102	1	0212271	0633434
	14.50	0.5709	56	111	1	0052099	0053577
37/64	14.68	0.5780	67	105	1	0212288	0633441
	14.75	0.5807	56	111	1	0212295	0633458

HIGH PERFORMANCE SCREW MACHINE DRILL



d_1 $\varnothing h_8$ "/Nr./Letter	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A920	A921
	15.00	0.5906	56	111	1	0052105	0053584
19/32	15.08	0.5937	67	105	1	0212301	0633465
39/64	15.48	0.6094	70	108	1	0212318	0633472
	15.50	0.6102	58	115	1	0052112	0053591
5/8	15.88	0.6252	70	108	1	0212325	0633489
	16.00	0.6299	58	115	1	0052129	0053607
41/64	16.27	0.6406	73	114	1	0212332	—
	16.50	0.6496	60	119	1	0212349	—
21/32	16.67	0.6563	73	114	1	0212356	—
	16.75	0.6594	60	119	1	0212363	—
	17.00	0.6693	60	119	1	0052136	—
43/64	17.07	0.6720	73	117	1	0212370	—
11/16	17.46	0.6874	73	117	1	0212387	—
	17.50	0.6890	62	123	1	0052143	—
45/64	17.86	0.7031	76	121	1	0212394	—
	18.00	0.7087	62	123	1	0052457	—
23/32	18.26	0.7189	76	121	1	0212400	—
	18.50	0.7283	64	127	1	0212417	—
47/64	18.65	0.7343	79	127	1	0212424	—
	19.00	0.7480	64	127	1	0052464	—
3/4	19.05	0.7500	79	127	1	0212431	—
49/64	19.45	0.7657	83	130	1	0212448	—
	19.50	0.7677	66	131	1	0212455	—
25/32	19.84	0.7811	83	130	1	0212462	—
	20.00	0.7874	66	131	1	0052471	—

DRILLS

MICRO - Screw Machine Length Drills

A720

- 1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2
4.3 5.1 5.2 5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2

Smallest size range available. Bright finish improves chip flow in soft or non-ferrous materials. Good wear resistance in abrasive or hard materials.



A720

DIN 1899

2.5XD

HSS-E

λ118°



0.15 - 1.40

d ₁ Ø mm	d ₁ decimal inch	l ₂ mm	l ₁ mm	d ₂ Ø mm	Pack Qty	A720
0.15	0.0059	1.0	25	1	10	0044988
0.16	0.0063	1.4	25	1	10	0566961
0.17	0.0067	1.4	25	1	10	0612057
0.18	0.0070	1.4	25	1	10	0044995
0.20	0.0078	1.8	25	1	10	0045008
0.22	0.0087	1.8	25	1	10	0045015
0.25	0.0098	2.2	25	1	10	0045022
0.27	0.0106	2.2	25	1	10	0566978
0.28	0.0110	2.2	25	1	10	0045039
0.30	0.0118	2.2	25	1	10	0045046
0.35	0.0138	2.8	25	1	10	0045053
0.38	0.0150	2.8	25	1	10	0045060
0.39	0.0154	3.6	25	1	10	0045077
0.40	0.0157	3.6	25	1	10	0045084
0.45	0.0177	3.6	25	1	10	0045107
0.50	0.0197	4.0	25	1	10	0045114
0.55	0.0217	4.5	25	1	10	0612064
0.60	0.0236	4.5	25	1	10	0045121
0.62	0.0244	5.0	25	1	10	0612071
0.65	0.0256	5.0	25	1	10	0612088
0.70	0.0276	5.6	25	1	10	0615577
0.75	0.0295	5.6	25	1	10	0612101
0.80	0.0315	6.3	25	1.5	10	0615584
0.85	0.0335	6.3	25	1.5	10	0612125
0.90	0.0354	7.1	25	1.5	10	0615591
0.95	0.0374	7.1	25	1.5	10	0612149
1.00	0.0394	8.0	25	1.5	10	0615607
1.05	0.0413	8.0	25	1.5	10	0612163
1.10	0.0433	9.0	25	1.5	10	0615614
1.20	0.0472	10.0	25	1.5	10	0615621
1.30	0.0512	10.0	25	1.5	10	0615638
1.40	0.0551	11.2	25	1.5	10	0615645

HIGH PERFORMANCE TAPER LENGTH DRILL



PFX Premium Cobalt, Taper Length - Parabolic Flute for Advanced Chip Removal

A940

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.2 3.3 3.4 4.1 4.2 4.3

6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2

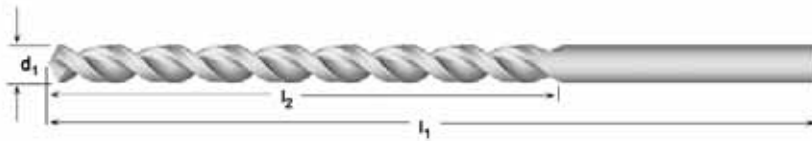
Heavy-Duty parabolic flute design allows greater drilling depths in one pass. Notched point improves chip formation. Premium cobalt material increases wear resistance. Bright finish improves chip flow in soft or non-ferrous materials.

A941

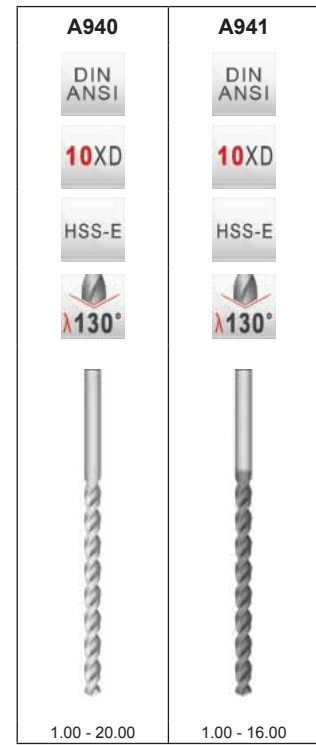
1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2

4.3 6.3 6.4 7.4

Heavy-Duty parabolic flute design allows greater drilling depths in one pass. Notched point improves chip formation. Premium cobalt base material combined with AlCrN Coating increases lubricity and wear resistance which improves tool life.



PFX



d_1 Øh ₈ Inch	d_1 Øh ₈ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A940	A941
	1.00	0.0394	33	56	1	0053614	0059371
	1.10	0.0433	37	60	1	0053621	—
3/64	1.19	0.0469	29	57	1	0635735	0635803
	1.20	0.0472	41	65	1	0053638	—
	1.30	0.0512	41	65	1	0053645	—
	1.40	0.0551	45	70	1	0053751	—
	1.50	0.0591	45	70	1	0053768	0059388
1/16	1.59	0.0626	44	76	1	0053775	0635810
	1.60	0.0630	50	76	1	0054253	—
	1.70	0.0669	50	76	1	0054260	—
	1.80	0.0709	53	80	1	0054383	—
	1.90	0.0748	53	80	1	0054390	—
5/64	1.98	0.0780	51	95	1	0054406	0635827
	2.00	0.0787	56	85	1	0054604	0059401
	2.10	0.0827	56	85	1	0054611	—
	2.20	0.0866	59	90	1	0054628	—
	2.30	0.0906	59	90	1	0054710	—
3/32	2.38	0.0937	57	108	1	0054727	0635834
	2.40	0.0945	62	95	1	0054734	—
	2.50	0.0984	62	95	1	0054789	0059418
	2.60	0.1024	62	95	1	0054796	—
	2.70	0.1063	66	100	1	0054802	—
7/64	2.78	0.1094	64	117	1	0054833	0635841
	2.80	0.1102	66	100	1	0054840	—
	2.90	0.1142	66	100	1	0054857	—
	3.00	0.1181	66	100	1	0054871	0059432
	3.10	0.1220	69	106	1	0055465	0059449
1/8	3.18	0.1252	70	130	1	0055472	0635858
	3.20	0.1260	69	106	1	0055533	0059463
	3.30	0.1299	69	106	1	0055540	0059654
	3.40	0.1339	73	112	1	0055588	0059661
	3.50	0.1378	73	112	1	0055595	0059838
9/64	3.57	0.1406	76	137	1	0055618	0635865



HIGH PERFORMANCE TAPER LENGTH DRILL

d_1 $\varnothing h_8$ Inch	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A940	A941
	3.60	0.1417	73	112	1	0055625	0059944
	3.70	0.1457	73	112	1	0055632	0059968
	3.80	0.1496	78	119	1	0056011	0059982
	3.90	0.1535	78	119	1	0056028	0060216
5/32	3.97	0.1563	76	137	1	0056165	0635872
	4.00	0.1575	78	119	1	0056172	0060223
	4.10	0.1614	78	119	1	0056226	0060315
	4.20	0.1654	78	119	1	0056233	0060322
	4.30	0.1693	82	126	1	0056257	0060377
11/64	4.37	0.1720	86	146	1	0056264	0635889
	4.40	0.1732	82	126	1	0056271	0060384
	4.50	0.1772	82	126	1	0056288	0060414
	4.60	0.1811	82	126	1	0056295	0060421
	4.70	0.1850	82	126	1	0056301	0060445
3/16	4.76	0.1874	86	146	1	0056318	0635896
	4.80	0.1890	87	132	1	0056561	0060452
	4.90	0.1929	87	132	1	0056615	0060476
	5.00	0.1969	87	132	1	0056646	0060490
	5.10	0.2008	87	132	1	0056820	0060513
13/64	5.16	0.2031	92	152	1	0056882	0635902
	5.20	0.2047	87	132	1	0056974	0060605
	5.30	0.2087	87	132	1	0057001	0060612
	5.40	0.2126	91	139	1	0057056	0060674
	5.50	0.2165	91	139	1	0057780	0060681
7/32	5.56	0.2189	92	152	1	0057797	0635919
	5.60	0.2205	91	139	1	0057810	0060728
	5.70	0.2244	91	139	1	0057827	0060735
	5.80	0.2283	91	139	1	0057834	0060766
	5.90	0.2323	91	139	1	0057841	0060773
15/64	5.95	0.2343	95	156	1	0057858	0635926
	6.00	0.2362	91	139	1	0057865	0060797
	6.10	0.2402	97	148	1	0057872	0060889
	6.20	0.2441	97	148	1	0058145	0060940
	6.30	0.2480	97	148	1	0058152	0060995
1/4	6.35	0.2500	95	156	1	0058169	0635933
	6.40	0.2520	97	148	1	0058176	0061022
	6.50	0.2559	97	148	1	0058183	0061046
	6.60	0.2598	97	148	1	0058190	0061053
	6.70	0.2638	97	148	1	0058206	0061091
17/64	6.75	0.2657	98	159	1	0058213	0635940
	6.80	0.2677	102	156	1	0058220	0061107
	6.90	0.2717	102	156	1	0058237	0061114
	7.00	0.2756	102	156	1	0058244	0061121
	7.10	0.2795	102	156	1	0058251	0061138
9/32	7.14	0.2811	98	159	1	0058268	0635957
	7.20	0.2835	102	156	1	0058275	0061145
	7.30	0.2874	102	156	1	0058282	0061152
	7.40	0.2913	102	156	1	0058299	0061169
	7.50	0.2953	102	156	1	0058305	0061176
19/64	7.54	0.2969	102	162	1	0058312	0635964
	7.60	0.2992	109	165	1	0058343	0061183
	7.70	0.3031	109	165	1	0058350	0061190
	7.80	0.3071	109	165	1	0058374	0061206
	7.90	0.3110	109	165	1	0058381	0061213
5/16	7.94	0.3126	102	162	1	0058398	0635971
	8.00	0.3150	109	165	1	0058404	0061220
	8.10	0.3189	109	165	1	0058411	0061237
	8.20	0.3228	109	165	1	0058435	0061244
	8.30	0.3268	109	165	1	0058442	0061251
21/64	8.33	0.3280	105	165	1	0058473	0635988
	8.40	0.3307	109	165	1	0058503	0061268
	8.50	0.3346	109	165	1	0058510	0061275
	8.60	0.3386	115	175	1	0058558	0061282
	8.70	0.3425	115	175	1	0058572	0061299
11/32	8.73	0.3437	105	165	1	0058589	0635995
	8.80	0.3465	115	175	1	0058596	0061305

DRILLS

HIGH PERFORMANCE TAPER LENGTH DRILL



d_1 $\varnothing h_8$ Inch	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A940	A941
	8.90	0.3504	115	175	1	0058602	0061312
	9.00	0.3543	115	175	1	0058626	0061329
	9.10	0.3583	115	175	1	0058633	0061336
23/64	9.13	0.3594	108	171	1	0058640	0063608
	9.20	0.3622	115	175	1	0058657	0061343
	9.30	0.3661	115	175	1	0058664	0061350
	9.40	0.3701	115	175	1	0058671	0061367
	9.50	0.3740	115	175	1	0058688	0061374
3/8	9.52	0.3748	108	171	1	0058695	00636015
	9.60	0.3780	121	184	1	0058701	0061381
	9.70	0.3819	121	184	1	0058718	0061398
	9.80	0.3858	121	184	1	0058725	0061404
	9.90	0.3898	121	184	1	0058732	0061411
25/64	9.92	0.3906	111	178	1	0058749	00636022
	10.00	0.3937	121	184	1	0058756	0061428
	10.20	0.4016	121	184	1	0058763	0061435
	10.30	0.4055	121	184	1	0058770	0061442
13/32	10.32	0.4063	111	178	1	0058787	00636039
	10.40	0.4094	121	184	1	0058794	0061459
	10.50	0.4134	121	184	1	0058800	0061466
27/64	10.72	0.4220	117	184	1	0058817	00636046
	10.80	0.4252	128	195	1	0058824	0061473
	11.00	0.4331	128	195	1	0058831	0061480
7/16	11.11	0.4374	117	184	1	0058855	00636053
	11.20	0.4409	128	195	1	0058862	0061497
	11.50	0.4528	128	195	1	0058886	0061633
29/64	11.51	0.4531	121	190	1	0058893	00636060
	11.80	0.4646	128	195	1	0058909	0061657
15/32	11.91	0.4689	121	190	1	0058916	00636077
	12.00	0.4724	134	205	1	0058923	0061688
	12.20	0.4803	134	205	1	0058930	0061718
31/64	12.30	0.4843	121	197	1	0058978	00636084
	12.50	0.4921	134	205	1	0058985	0061749
1/2	12.70	0.5000	121	197	1	0058992	00636091
	12.80	0.5039	134	205	1	0059005	0061770
	13.00	0.5118	134	205	1	0059012	0061817
33/64	13.10	0.5157	121	203	1	0059043	00636107
17/32	13.49	0.5311	121	203	1	0059050	—
	13.50	0.5315	140	214	1	0059067	0061848
35/64	13.89	0.5469	124	210	1	0635742	00636114
	14.00	0.5512	140	214	1	0059081	0061862
9/16	14.29	0.5626	124	210	1	0059111	00636121
	14.50	0.5709	144	220	1	0059128	0061886
37/64	14.68	0.5780	124	222	1	0059166	00636138
	15.00	0.5906	144	220	1	0059180	0061909
19/32	15.08	0.5937	124	222	1	0059203	00636145
39/64	15.48	0.6094	124	222	1	0635759	00636152
	15.50	0.6102	149	227	1	0059210	0061916
5/8	15.88	0.6252	124	222	1	0059227	00636169
	16.00	0.6299	149	227	1	0059234	0061930
41/64	16.27	0.6406	130	229	1	0635766	—
	16.50	0.6496	154	235	1	0059241	—
21/32	16.67	0.6563	130	229	1	0059258	—
	17.00	0.6693	154	235	1	0059265	—
43/64	17.07	0.6720	137	235	1	0635773	—
11/16	17.46	0.6874	137	235	1	0059272	—
	17.50	0.6890	158	241	1	0059289	—
45/64	17.86	0.7031	143	241	1	0059296	—
	18.00	0.7087	158	241	1	0059302	—
23/32	18.26	0.7189	143	241	1	0059326	—
47/64	18.65	0.7343	149	248	1	0059333	—
	19.00	0.7480	162	247	1	0059340	—
3/4	19.05	0.7500	149	248	1	0059357	—
49/64	19.45	0.7657	152	251	1	0635780	—
25/32	19.84	0.7811	152	251	1	0635797	—
	20.00	0.7874	166	254	1	0059364	—

PFX Premium Cobalt, Extra Length - Parabolic Flute for Advanced Chip Removal

A976

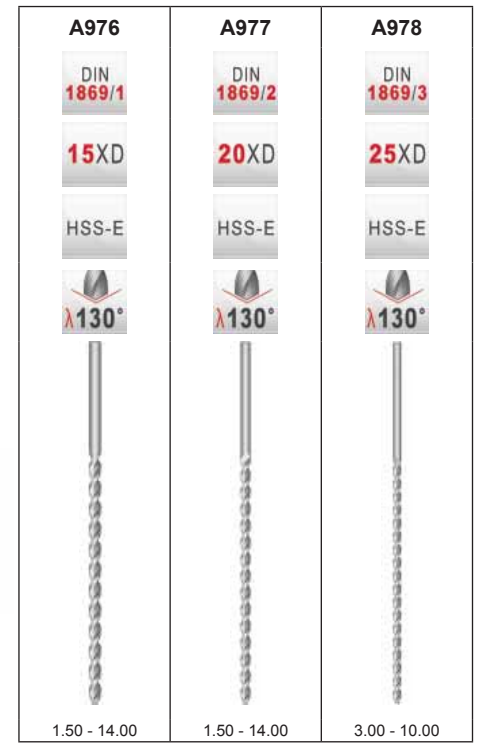
A977

A978

Heavy-Duty parabolic flute design allows greater drilling depths in one pass. Notched point improves chip formation. Premium cobalt base material increases wear resistance. Bright finish improves chip flow in soft or non-ferrous materials.

- 1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.2 3.3 3.4 4.1 4.2 4.3
6.3 6.4 7.4

PFX



d_1 $\varnothing h_8$ Inch	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A976	A977	A978
	1.50	0.0591	100	150	1	—	0347386 ¹⁾	—
	1.50	0.0591	75	115	1	0347362	—	—
1/16	1.59	0.0626	100	150	1	—	0347393 ¹⁾	—
	2.00	0.0787	110	160	1	—	0347409 ¹⁾	—
	2.00	0.0787	85	125	1	0148501	—	—
	2.10	0.0827	85	125	1	0279724	—	—
	2.20	0.0866	90	135	1	0148518	—	—
	2.30	0.0906	90	135	1	0279717	—	—
3/32	2.38	0.0937	115	170	1	—	0347416 ¹⁾	—
	2.40	0.0945	95	140	1	0279731	—	—
	2.50	0.0984	95	140	1	0148525	—	—
	2.60	0.1024	95	140	1	0279748	—	—
	2.70	0.1063	100	150	1	0279755	—	—
	2.80	0.1102	100	150	1	0279762	—	—
	2.90	0.1142	100	150	1	0279779	—	—
	3.00	0.1181	100	150	1	0148532	—	—
	3.00	0.1181	130	190	1	—	0148709	—
	3.00	0.1181	160	240	1	—	—	0347324 ¹⁾
	3.10	0.1220	105	155	1	0279786	—	—
1/8	3.18	0.1252	105	155	1	0347072	—	—
1/8	3.18	0.1252	135	200	1	—	0347218	—
	3.20	0.1260	105	155	1	0279793	—	—
	3.30	0.1299	105	155	1	0148549	—	—
	3.40	0.1339	115	165	1	0279809	—	—
	3.50	0.1378	115	165	1	0148556	—	—
	3.50	0.1378	145	210	1	—	0148716	—
	3.50	0.1378	180	265	1	—	—	0148853
	3.60	0.1417	115	165	1	0279816	—	—
	3.70	0.1457	115	165	1	0148563	—	—
	3.80	0.1496	120	175	1	0279823	—	—
	3.90	0.1535	120	175	1	0279830	—	—
5/32	3.97	0.1563	120	175	1	0347089	—	—

¹⁾ Dormer Standard

HIGH PERFORMANCE EXTRA LENGTH DRILL



d_1 $\varnothing h_8$ Inch	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A976	A977	A978
	4.00	0.1575	120	175	1	0148570	—	—
	4.00	0.1575	150	220	1	—	0148723	—
	4.00	0.1575	190	280	1	—	—	0148860
	4.10	0.1614	120	175	1	0279847	—	—
	4.20	0.1654	120	175	1	0279854	—	—
	4.30	0.1693	125	185	1	0279861	—	—
	4.40	0.1732	125	185	1	0279878	—	—
	4.50	0.1772	125	185	1	0148587	—	—
	4.50	0.1772	160	235	1	—	0148730	—
	4.50	0.1772	200	295	1	—	—	0148877
	4.60	0.1811	125	185	1	0279885	—	—
	4.70	0.1850	125	185	1	0279892	—	—
3/16	4.76	0.1874	135	195	1	0347935	—	—
3/16	4.76	0.1874	170	245	1	—	0347225	—
	4.80	0.1890	135	195	1	0279908	—	—
	4.90	0.1929	135	195	1	0279915	—	—
	5.00	0.1969	135	195	1	0148594	—	—
	5.00	0.1969	170	245	1	—	0148747	—
	5.00	0.1969	210	315	1	—	—	0148884
	5.10	0.2008	135	195	1	0279922	—	—
	5.20	0.2047	135	195	1	0279939	—	—
	5.30	0.2087	135	195	1	0279946	—	—
	5.40	0.2126	140	205	1	0279953	—	—
	5.50	0.2165	140	205	1	0148600	—	—
	5.50	0.2165	180	260	1	—	0148754	—
	5.50	0.2165	225	330	1	—	—	0148891
	5.60	0.2205	140	205	1	0279960	—	—
	5.70	0.2244	140	205	1	0279977	—	—
	5.80	0.2283	140	205	1	0279984	—	—
	5.90	0.2323	140	205	1	0279991	—	—
	6.00	0.2362	140	205	1	0148617	—	—
	6.00	0.2362	180	260	1	—	0148761	—
	6.00	0.2362	225	330	1	—	—	0148907
	6.10	0.2402	150	215	1	0280003	—	—
	6.20	0.2441	150	215	1	0280010	—	—
	6.30	0.2480	150	215	1	0280027	—	—
1/4	6.35	0.2500	150	215	1	0347096	—	—
1/4	6.35	0.2500	190	275	1	—	0347232	—
1/4	6.35	0.2500	235	350	1	—	—	0347331
	6.40	0.2520	150	215	1	0280034	—	—
	6.50	0.2559	150	215	1	0148624	—	—
	6.50	0.2559	190	275	1	—	0148778	—
	6.50	0.2559	235	350	1	—	—	0148914
	6.60	0.2598	150	215	1	0280041	—	—
	6.70	0.2638	150	215	1	0280058	—	—
	6.80	0.2677	155	225	1	0280065	—	—
	6.90	0.2717	155	225	1	0280072	—	—
	7.00	0.2756	155	225	1	0148631	—	—
	7.00	0.2756	200	290	1	—	0148785	—
	7.00	0.2756	250	370	1	—	—	0148921
	7.50	0.2953	155	225	1	0148648	—	—
	7.50	0.2953	200	290	1	—	0148792	—
	7.50	0.2953	250	370	1	—	—	0148938
5/16	7.94	0.3126	165	240	1	0347102	—	—
	8.00	0.3150	165	240	1	0148655	—	—
	8.00	0.3150	210	305	1	—	0148808	—
	8.00	0.3150	265	390	1	—	—	0148945
	8.50	0.3346	165	240	1	0148662	—	—
	8.50	0.3346	210	305	1	—	0148815	—
	8.50	0.3346	265	390	1	—	—	0148952
11/32	8.73	0.3437	175	250	1	0347119	—	—
11/32	8.73	0.3437	220	320	1	—	0347249	—
	9.00	0.3543	175	250	1	0148679	—	—
	9.00	0.3543	220	320	1	—	0148822	—
	9.00	0.3543	280	410	1	—	—	0148969
	9.50	0.3740	175	250	1	0148686	—	—

d ₁ Øh ₈ Inch	d ₁ Øh ₈ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	A976	A977	A978
3/8	9.50	0.3740	220	320	1	—	0148839	—
	9.50	0.3740	280	410	1	—	—	0148976
	9.52	0.3748	185	265	1	0347126	—	—
	10.00	0.3937	185	265	1	0148693	—	—
	10.00	0.3937	235	340	1	—	0148846	—
	10.00	0.3937	295	430	1	—	—	0148983
7/16	10.50	0.4134	185	265	1	0347133	—	—
	10.50	0.4134	235	340	1	—	0347256	—
	11.00	0.4331	195	280	1	0347140	—	—
	11.00	0.4331	250	365	1	—	0347263	—
	11.11	0.4374	195	280	1	0347379	—	—
	11.50	0.4528	195	280	1	0347157	—	—
	11.50	0.4528	250	365	1	—	0347270	—
	12.00	0.4724	205	295	1	0347164	—	—
	12.00	0.4724	260	375	1	—	0347287	—
	12.50	0.4921	205	295	1	0347171	—	—
1/2	12.50	0.4921	260	375	1	—	0347294	—
	12.70	0.5000	205	295	1	0347188	—	—
	13.00	0.5118	205	295	1	0347195	—	—
	13.00	0.5118	260	375	1	—	0347300	—
	14.00	0.5512	215	310	1	0347201 ¹⁾	—	—
	14.00	0.5512	270	390	1	—	0347317	—

¹⁾ Dormer Standard

General Purpose Jobber Length, Fractional

* Sets available on pgs. 179-182

R10P - Fractional Sizes

R15P - Letter Sizes

R18P - Wire Gauge Sizes

Bright Finish improves chip flow in soft or non-ferrous materials

R10 - Fractional Sizes

R15 - Letter Sizes

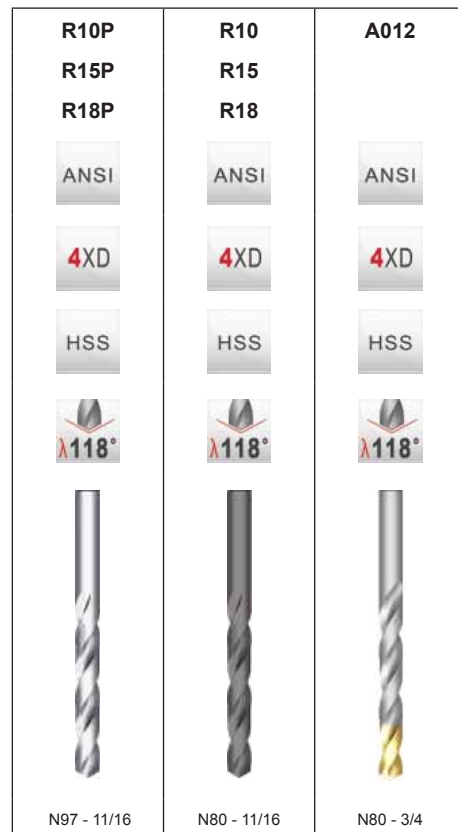
R18 - Wire Gauge Sizes

Steam Oxide reduces wear and chip welding in harder ferrous materials for increased wear resistance and lubricity.

A012

Low thrust design self centering Split Point for easier penetration. TiN Coated Tip increases surface hardness and improves tool life.

* Bright Below N46



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	R10P R15P R18P	R10 R15 R18	A012
97	0.0059	1/16	3/4	018697	—	—
96	0.0063	1/16	3/4	018696	—	—
95	0.0067	1/16	3/4	018695	—	—
94	0.0071	1/16	3/4	018694	—	—
93	0.0075	1/16	3/4	018693	—	—
92	0.0079	1/16	3/4	018692	—	—
91	0.0083	5/64	3/4	018691	—	—
90	0.0087	5/64	3/4	018690	—	—
89	0.0091	5/64	3/4	018689	—	—
88	0.0095	5/64	3/4	018688	—	—
87	0.0100	5/64	3/4	018687	—	—
86	0.0105	3/32	3/4	018686	—	—
85	0.0110	3/32	3/4	018685	—	—
84	0.0115	3/32	3/4	018684	—	—
83	0.0120	3/32	3/4	018683	—	—
82	0.0125	3/32	3/4	018682	—	—
81	0.0130	3/32	3/4	018681	—	—
80	0.0135	1/8	3/4	018680	018080	0574256
79	0.0145	1/8	3/4	018679	018079	0574249
1/64	0.0156	3/16	3/4	010601	010001	0573952
78	0.0160	3/16	7/8	018678	018078	0574232
77	0.0180	3/16	7/8	018677	018077	0574225
76	0.0200	3/16	7/8	018676	018076	0574218
75	0.0210	1/4	1"	018675	018075	0574201
74	0.0225	1/4	1"	018674	018074	0574195
73	0.0240	5/16	1.1/8	018673	018073	0574188
72	0.0250	5/16	1.1/8	018672	018072	0574171
71	0.0260	3/8	1.1/4	018671	018071	0574164
70	0.0280	3/8	1.1/4	018670	018070	0574157
69	0.0292	1/2	1.3/8	018669	018069	0574140

Package quantities: **R10P, R15P, R18P, R10, R15, R18**: N97 to letter N = 12; 5/16" to 1/2" = 6; Above 1/2" = 1

A012: N80 to Z = 10; 27/64" to 1/2" = 5; Above 1/2" = 1



JOBBER DRILL



d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	R10P R15P R18P	R10 R15 R18	A012
68	0.0310	1/2	1.3/8	018668	018068	0574133
1/32	0.0313	1/2	1.3/8	010602	010002	0573969
67	0.0320	1/2	1.3/8	018667	018067	0574126
66	0.0330	1/2	1.3/8	018666	018066	0574119
65	0.0350	5/8	1.1/2	018665	018065	0574102
64	0.0360	5/8	1.1/2	018664	018064	0574096
63	0.0370	5/8	1.1/2	018663	018063	0574089
62	0.0380	5/8	1.1/2	018662	018062	0574072
61	0.0390	11/16	1.5/8	018661	018061	0574065
60	0.0400	11/16	1.5/8	018660	018060	0574058
59	0.0410	11/16	1.5/8	018659	018059	0574041
58	0.0420	11/16	1.5/8	018658	018058	0574034
57	0.0430	3/4	1.3/4	018657	018057	0574027
56	0.0465	3/4	1.3/4	018656	018056	0574010
3/64	0.0469	3/4	1.3/4	010603	010003	0573976
55	0.0520	7/8	1.7/8	018655	018055	0574003
54	0.0550	7/8	1.7/8	018654	018054	0573990
53	0.0595	7/8	1.7/8	018653	018053	0573983
1/16	0.0625	7/8	1.7/8	010604	010004	0578636
52	0.0635	7/8	1.7/8	018652	018052	0578704
51	0.0670	1"	2"	018651	018051	0578698
50	0.0700	1"	2"	018650	018050	0578681
49	0.0730	1"	2"	018649	018049	0578674
48	0.0760	1"	2"	018648	018048	0578667
5/64	0.0781	1"	2"	010605	010005	0578643
47	0.0785	1"	2"	018647	018047	0578650
46	0.0810	1.1/8	2.1/8	018646	018046	0571705
45	0.0820	1.1/8	2.1/8	018645	018045	0571699
44	0.0860	1.1/8	2.1/8	018644	018044	0571682
43	0.0890	1.1/4	2.1/4	018643	018043	0571675
42	0.0935	1.1/4	2.1/4	018642	018042	0571668
3/32	0.0938	1.1/4	2.1/4	010606	010006	0572061
41	0.0960	1.3/8	2.3/8	018641	018041	0571651
40	0.0980	1.3/8	2.3/8	018640	018040	0571644
39	0.0995	1.3/8	2.3/8	018639	018039	0571620
38	0.1015	1.7/16	2.1/2	018638	018038	0571613
37	0.1040	1.7/16	2.1/2	018637	018037	0571606
36	0.1065	1.7/16	2.1/2	018636	018036	0571590
7/64	0.1094	1.1/2	2.5/8	010607	010007	0572184
35	0.1100	1.1/2	2.5/8	018635	018035	0571583
34	0.1110	1.1/2	2.5/8	018634	018034	0571576
33	0.1130	1.1/2	2.5/8	018633	018033	0571569
32	0.1160	1.5/8	2.3/4	018632	018032	0571552
31	0.1200	1.5/8	2.3/4	018631	018031	0571545
1/8	0.1250	1.5/8	2.3/4	010608	010008	0571897
30	0.1285	1.5/8	2.3/4	018630	018030	0571538
29	0.1360	1.3/4	2.7/8	018629	018029	0571514
28	0.1405	1.3/4	2.7/8	018628	018028	0571507
9/64	0.1406	1.3/4	2.7/8	010609	010009	0572214
27	0.1440	1.7/8	3"	018627	018027	0571491
26	0.1470	1.7/8	3"	018626	018026	0571484
25	0.1495	1.7/8	3"	018625	018025	0571477
24	0.1520	2"	3.1/8	018624	018024	0571460
23	0.1540	2"	3.1/8	018623	018023	0571453
5/32	0.1563	2"	3.1/8	010610	010010	0572146
22	0.1570	2"	3.1/8	018622	018022	0571446
21	0.1590	2.1/8	3.1/4	018621	018021	0571439
20	0.1610	2.1/8	3.1/4	018620	018020	0571422
19	0.1660	2.1/8	3.1/4	018619	018019	0571408
18	0.1695	2.1/8	3.1/4	018618	018018	0571392
11/64	0.1719	2.1/8	3.1/4	010611	010011	0571910
17	0.1730	2.3/16	3.3/8	018617	018017	0571385
16	0.1770	2.3/16	3.3/8	018616	018016	0571378
15	0.1800	2.3/16	3.3/8	018615	018015	0571361

Package quantites: **R10P, R15P, R18P, R10, R15, R18:** N97 to letter N = 12; 5/16" to 1/2" = 6; Above 1/2" = 1

A012: N80 to Z = 10; 27/64" to 1/2" = 5; Above 1/2" = 1

d ₁ Ø " / Nr. / letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	R10P R15P R18P	R10 R15 R18	A012
14	0.1820	2.3/16	3.3/8	018614	018014	0571354
13	0.1850	2.5/16	3.1/2	018613	018013	0571347
3/16	0.1875	2.5/16	3.1/2	010612	010012	0572054
12	0.1890	2.5/16	3.1/2	018612	018012	0571330
11	0.1910	2.5/16	3.1/2	018611	018011	0571323
10	0.1935	2.7/16	3.5/8	018610	018010	0571316
9	0.1960	2.7/16	3.5/8	018609	018009	0571750
8	0.1990	2.7/16	3.5/8	018608	018008	0571743
7	0.2010	2.7/16	3.5/8	018607	018007	0571736
13/64	0.2031	2.7/16	3.5/8	010613	010013	0571934
6	0.2040	2.1/2	3.3/4	018606	018006	0571729
5	0.2055	2.1/2	3.3/4	018605	018005	0571712
4	0.2090	2.1/2	3.3/4	018604	018004	0571637
3	0.2130	2.1/2	3.3/4	018603	018003	0571521
7/32	0.2188	2.1/2	3.3/4	010614	010014	0572177
2	0.2210	2.5/8	3.7/8	018602	018002	0571415
1	0.2280	2.5/8	3.7/8	018601	018001	0571309
A	0.2340	2.5/8	3.7/8	015601	015001	0571163
15/64	0.2344	2.5/8	3.7/8	010615	010015	0571958
B	0.2374	2.3/4	4"	015602	015002	0571170
C	0.2421	2.3/4	4"	015603	015003	0571187
D	0.2461	2.3/4	4"	015604	015004	0571194
E	0.2500	2.3/4	4"	015605	015005	0571200
1/4	0.2500	2.3/4	4"	010616	010016	0571125
F	0.2571	2.7/8	4.1/8	015606	015006	0571217
G	0.2610	2.7/8	4.1/8	015607	015007	0571224
17/64	0.2656	2.7/8	4.1/8	010617	010017	0571972
H	0.2661	2.7/8	4.1/8	015608	015008	0571231
I	0.2720	2.7/8	4.1/8	015609	015009	0571248
J	0.2772	2.7/8	4.1/8	015610	015010	0571255
K	0.2811	2.15/16	4.1/4	015611	015011	0571262
9/32	0.2813	2.15/16	4.1/4	010618	010018	0572207
L	0.2902	2.15/16	4.1/4	015612	015012	0571279
M	0.2949	3.1/16	4.3/8	015613	015013	0571286
19/64	0.2969	3.1/16	4.3/8	010619	010019	0571996
N	0.3020	3.1/16	4.3/8	015614	015014	0571293
5/16	0.3125	3.3/16	4.1/2	010620	010020	0572139
O	0.3161	3.3/16	4.1/2	015615	015015	0571767
P	0.3228	3.5/16	4.5/8	015616	015016	0571774
21/64	0.3281	3.5/16	4.5/8	010621	010021	0572009
Q	0.3319	3.7/16	4.3/4	015617	015017	0571781
R	0.3390	3.7/16	4.3/4	015618	015018	0571798
11/32	0.3437	3.7/16	4.3/4	010622	010022	0571903
S	0.3480	3.1/2	4.7/8	015619	015019	0571804
T	0.3580	3.1/2	4.7/8	015620	015020	0571811
23/64	0.3594	3.1/2	4.7/8	010623	010023	0572016
U	0.3680	3.5/8	5"	015621	015021	0571828
3/8	0.3750	3.5/8	5"	010624	010024	0572078
V	0.3772	3.5/8	5"	015622	015022	0571835
W	0.3858	3.3/4	5.1/8	015623	015023	0571842
25/64	0.3906	3.3/4	5.1/8	010625	010025	0572023
X	0.3969	3.3/4	5.1/8	015624	015024	0571859
Y	0.4039	3.7/8	5.1/4	015625	015025	0571866
13/32	0.4063	3.7/8	5.1/4	010626	010026	0571927
Z	0.4130	3.7/8	5.1/4	015626	015026	0571873
27/64	0.4219	3.15/16	5.3/8	010627	010027	0572030
7/16	0.4375	4.1/16	5.1/2	010628	010028	0572160
29/64	0.4531	4.3/16	5.5/8	010629	010029	0572047
15/32	0.4687	4.5/16	5.3/4	010630	010030	0571941
31/64	0.4844	4.3/8	5.7/8	010631	010031	0572085
1/2	0.5000	4.1/2	6"	010632	010032	0571880
33/64	0.5156	4.13/16	6.5/8	010633	010033	0572092
17/32	0.5313	4.13/16	6.5/8	010634	010034	0571965
35/64	0.5469	4.13/16	6.5/8	010635	010035	0572108

Package quantities: **R10P, R15P, R18P, R10, R15, R18:** N97 to letter N = 12; 5/16" to 1/2" = 6; Above 1/2" = 1

A012: N80 to Z = 10; 27/64" to 1/2" = 5; Above 1/2" = 1



JOBBER DRILL



d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	R10P R15P R18P	R10 R15 R18	A012
9/16	0.5625	4.13/16	6.5/8	010636	010036	0572191
37/64	0.5781	4.13/16	6.5/8	010637	010037	0572115
19/32	0.5937	5.3/16	7.1/8	010638	010038	0571989
39/64	0.6094	5.3/16	7.1/8	010639	010039	0572122
5/8	0.6250	5.3/16	7.1/8	010640	010040	0572153
41/64	0.6406	5.3/16	7.1/8	010641	010041	—
21/32	0.6563	5.3/16	7.1/8	010642	010042	0578728
43/64	0.6719	5.5/8	7.5/8	010643	010043	—
11/16	0.6875	5.5/8	7.5/8	010644	010044	0578711
45/64	0.7031	5.5/8	7.5/8	—	—	0578742
23/32	0.7189	5.5/8	7.5/8	—	—	0578735
47/64	0.7343	6"	8"	—	—	0578766
3/4	0.7500	6"	8"	—	—	0578759

Package quantities: **R10P, R15P, R18P, R10, R15, R18:** N97 to letter N = **12**; 5/16" to 1/2" = **6**; Above 1/2" = **1**

A012: N80 to Z = **10**; 27/64" to 1/2" = **5**; Above 1/2" = **1**

General Purpose Jobber Length, Metric

* Sets available on pg. 183

- 2A** Bright Finish improves chip flow in soft or non-ferrous materials
- 2AB** Steam Oxide for increased wear resistance & lubricity.
- A100**
- A108** Low thrust design self centering Split Point for easier penetration. Steam Oxide for increased wear resistance & lubricity. Fast spiral for stainless.
- A002** Low thrust design self centering Split Point for easier penetration. TiN Coated Tip increases wear resistance and improves tool life.
* Bright Below 2mm



d_1 Ø mm	d_1 decimal Inch	l_2 mm	l_1 mm	2A	2AB	A100	A108	A002
0.15	0.0059	1.5	19	016215	—	—	—	—
0.16	0.0063	1.5	19	016216	—	—	—	—
0.17	0.0067	1.5	19	016217	—	—	—	—
0.18	0.0070	1.5	19	016218	—	—	—	—
0.19	0.0075	1.5	19	016219	—	—	—	—
0.20	0.0078	2.5	19	016002	—	0000021	—	—
0.21	0.0083	2.5	19	016221	—	—	—	—
0.22	0.0087	2.5	19	016222	—	—	—	—
0.23	0.0091	2.5	19	016223	—	—	—	—
0.24	0.0094	2.5	19	016224	—	—	—	—
0.25	0.0098	3	19	016225	—	0000038	—	—
0.26	0.0102	3	19	016226	—	—	—	—
0.27	0.0106	3	19	016227	—	—	—	—
0.28	0.0110	3	19	016228	—	—	—	—
0.29	0.0114	3	19	016229	—	—	—	—
0.30	0.0118	3	19	016003	—	0000045	—	—
0.32	0.0126	4	19	016232	—	0000052	—	—
0.34	0.0134	4	19	016234	—	—	—	—
0.35	0.0138	4	19	016235	—	0000069	—	—
0.36	0.0142	4	19	016236	—	—	—	—
0.38	0.0150	4	19	016238	—	0000076	—	—
0.40	0.0157	5	20	016004	—	0000083	—	—
0.42	0.0165	5	20	016242	—	0000090	—	—
0.44	0.0173	5	20	016244	—	—	—	—
0.45	0.0177	5	20	016245	—	—	—	—
0.46	0.0181	5	20	016246	—	—	—	—
0.48	0.0189	5	20	016248	—	0000113	—	—
0.50	0.0197	6	22	016005	—	0000120	—	—
0.52	0.0205	6	22	—	—	0000137	—	—
0.55	0.0217	7	24	016250	—	0000144	—	—

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = 12; 8.00mm - 12.50mm = 6; 12.70mm and above = 1

A100, A108, and A002: 0.20mm - 10.00mm = 10; 10.10mm - 14.00mm = 5; 14.25mm and above = 1



JOBBER DRILL



d ₁ Ø mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	2A	2AB	A100	A108	A002
0.58	0.0228	7	24	—	—	0000151	—	—
0.60	0.0236	7	24	016006	—	0000168	—	—
0.62	0.0244	8	26	—	—	0000175	—	—
0.65	0.0256	8	26	016251	—	0000182	—	—
0.68	0.0268	9	28	—	—	0000199	—	—
0.70	0.0276	9	28	016007	—	0000205	—	—
0.72	0.0283	9	28	—	—	0000212	—	—
0.75	0.0295	9	28	016252	—	0000229	—	—
0.78	0.0307	10	30	—	—	0000236	—	—
0.80	0.0315	10	30	016008	—	0000243	—	—
0.82	0.0323	10	30	—	—	0000250	—	—
0.85	0.0335	10	30	016253	—	0000267	—	—
0.88	0.0346	11	32	—	—	0000274	—	—
0.90	0.0354	11	32	016009	—	0000281	—	—
0.92	0.0362	11	32	—	—	0000298	—	—
0.95	0.0374	11	32	016254	—	0000304	—	—
0.98	0.0386	12	34	—	—	0000311	—	—
1.00	0.0394	12	34	016010	029010	0000328	0007549	0376782
1.05	0.0413	12	34	—	—	0000335	—	—
1.10	0.0433	14	36	016011	029011	0000342	0007556	0376799
1.15	0.0453	14	36	016256	029256	0000359	—	—
1.20	0.0472	16	38	016012	029012	0000366	0007563	0376805
1.25	0.0492	16	38	016257	029257	0000373	—	—
1.30	0.0512	16	38	016013	029013	0000380	0007570	0376812
1.35	0.0531	18	40	016258	029258	0000397	—	—
1.40	0.0551	18	40	016014	029014	0000403	0007587	0376829
1.45	0.0571	18	40	016259	029259	0000410	—	—
1.50	0.0591	18	40	016015	029015	0000427	0007594	0376836
1.55	0.0610	20	43	016260	029260	0000434	—	—
1.60	0.0630	20	43	016016	029016	0000441	0007600	0376843
1.65	0.0650	20	43	016261	—	0000458	—	—
1.70	0.0669	20	43	016017	029017	0000465	0007617	0376850
1.75	0.0689	22	46	016262	029262	0000472	—	—
1.80	0.0709	22	46	016018	029018	0000489	0007624	0376867
1.85	0.0728	22	46	—	—	0000496	—	—
1.90	0.0748	22	46	016019	029019	0000502	0007631	0376874
1.95	0.0768	24	49	016264	029264	0000519	—	—
2.00	0.0787	24	49	016020	029020	0001332	0007969	0376041
2.05	0.0807	24	49	—	—	0001349	—	—
2.10	0.0827	24	49	016021	029021	0001356	0007976	0376058
2.15	0.0846	27	53	016266	—	0001363	—	—
2.20	0.0866	27	53	016022	029022	0001370	0007983	0376898
2.25	0.0886	27	53	016267	—	0001387	—	—
2.30	0.0906	27	53	016023	029023	0001394	0007990	0376904
2.35	0.0925	27	53	016268	029268	0001400	—	—
2.40	0.0945	30	57	016024	029024	0001417	0008003	0376911
2.45	0.0965	30	57	—	—	0001424	—	—
2.50	0.0984	30	57	016025	029025	0001431	0008010	0376065
2.55	0.1004	30	57	—	—	0001448	—	—
2.60	0.1024	30	57	016026	029026	0001455	0008027	0376072
2.65	0.1043	30	57	—	—	0001462	—	—
2.70	0.1063	33	61	016027	029027	0001479	0008034	0376089
2.75	0.1083	33	61	016270	—	0001486	—	—
2.80	0.1102	33	61	—	—	0001493	0008041	0376096
2.85	0.1122	33	61	—	—	0001509	—	—
2.90	0.1142	33	61	016029	029029	0001516	0008058	0376102
2.95	0.1161	33	61	—	—	0001523	—	—
3.00	0.1181	33	61	016030	029030	0001608	0008119	0350577
3.10	0.1220	36	65	016031	029031	0001615	0008126	0350584
3.15	0.1240	36	65	—	—	0001622	—	—
3.20	0.1260	36	65	016032	029032	0001639	0008133	0350607
3.25	0.1280	36	65	016271	029271	0001646	—	0605356
3.30	0.1299	36	65	016033	029033	0001653	0008140	0350614

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = **12**; 8.00mm - 12.50mm = **6**; 12.70mm and above = **1**
A100, A108, and A002: 0.20mm - 10.00mm = **10**; 10.10mm - 14.00mm = **5**; 14.25mm and above = **1**

d ₁ ∅ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	2A	2AB	A100	A108	A002
3.40	0.1339	39	70	016034	029034	0001660	0008157	0350621
3.50	0.1378	39	70	016035	029035	0001677	0008164	0350638
3.60	0.1417	39	70	016036	029036	0001684	0008171	0350652
3.70	0.1457	39	70	016037	029037	0001691	0008188	0350669
3.75	0.1476	39	70	—	—	0001707	—	—
3.80	0.1496	43	75	—	—	0001714	0008195	0350676
3.90	0.1535	43	75	—	—	0001721	0008201	0350683
4.00	0.1575	43	75	016040	029040	0001820	0008256	0350706
4.10	0.1614	43	75	016041	029041	0001837	0008263	0350713
4.20	0.1654	43	75	016042	029042	0001844	0008270	0350720
4.25	0.1673	43	75	—	—	0001851	—	—
4.30	0.1693	47	80	016043	029043	0001868	0008287	0350737
4.40	0.1732	47	80	016044	029044	0001875	0008294	0350751
4.50	0.1772	47	80	016045	029045	0001882	0008300	0350768
4.60	0.1811	47	80	016046	029046	0001899	0008317	0350775
4.70	0.1850	47	80	—	—	0001905	0008324	0350782
4.75	0.1870	47	80	—	—	0001912	—	—
4.80	0.1890	52	86	016048	029048	0001929	0008331	0350805
4.90	0.1929	52	86	—	—	0001936	0008348	0350812
5.00	0.1969	52	86	016050	029050	0001967	0008355	0350829
5.10	0.2008	52	86	016051	029051	0001974	0008362	0350836
5.20	0.2047	52	86	016052	029052	0001981	0008379	0350850
5.25	0.2067	52	86	—	—	0001998	—	—
5.30	0.2087	52	86	016053	029053	0002001	0008386	0350867
5.40	0.2126	57	93	016054	029054	0002018	0008393	0350874
5.50	0.2165	57	93	016055	029055	0002025	0008409	0350881
5.60	0.2205	57	93	016056	029056	0002032	0008416	0350904
5.70	0.2244	57	93	016057	029057	0002049	0008423	0350911
5.75	0.2264	57	93	016276	029276	0002056	—	—
5.80	0.2283	57	93	016058	029058	0002063	0008430	0350928
5.90	0.2323	57	93	—	—	0002070	0008447	0350935
6.00	0.2362	57	93	016060	029060	0002124	0008485	0350959
6.10	0.2402	63	101	016061	029061	0002131	0008492	0350966
6.20	0.2441	63	101	016062	029062	0002148	0008508	0350973
6.25	0.2461	63	101	—	—	0002155	—	—
6.30	0.2480	63	101	016063	029063	0002162	0008515	0350980
6.40	0.2520	63	101	016064	029064	0002179	0008522	0351000
6.50	0.2559	63	101	016065	029065	0002186	0008539	0351017
6.60	0.2598	63	101	016066	029066	0002193	0008546	0351024
6.70	0.2638	63	101	016067	029067	0002209	0008553	0351031
6.75	0.2657	69	109	016278	029278	0002216	—	—
6.80	0.2677	69	109	016068	029068	0002223	0008560	0351055
6.90	0.2717	69	109	—	—	0002230	0008577	0351062
7.00	0.2756	69	109	016070	029070	0002247	0008584	0351079
7.10	0.2795	69	109	—	—	0002254	0008591	0351086
7.20	0.2835	69	109	016072	029072	0002261	0008607	0351109
7.25	0.2854	69	109	016279	029279	0002278	—	—
7.30	0.2874	69	109	016073	029073	0002285	0008614	0351116
7.40	0.2913	69	109	016074	029074	0002292	0008621	0351123
7.50	0.2953	69	109	016075	029075	0002308	0008638	0351130
7.60	0.2992	75	117	016076	029076	0002315	0008645	0351154
7.70	0.3031	75	117	—	—	0002322	0008652	0351161
7.75	0.3051	75	117	—	—	0002339	—	—
7.80	0.3071	75	117	016078	029078	0002346	0008669	0351178
7.85	0.3091	75	117	—	029281	—	—	—
7.90	0.3110	75	117	016079	029079	0002353	0008676	0351185
8.00	0.3150	75	117	016080	029080	0002391	0008713	0351208
8.10	0.3189	75	117	016081	029081	0002407	0008720	0351215
8.20	0.3228	75	117	016082	029082	0002414	0008737	0351222
8.25	0.3248	75	117	016282	029282	0002421	—	—
8.30	0.3268	75	117	—	—	0002438	0008744	0351239
8.40	0.3307	75	117	016084	029084	0002445	0008751	0351253
8.50	0.3346	75	117	016085	029085	0002452	0008768	0351260
8.60	0.3386	81	125	016086	029086	0002469	0008775	0351277

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = **12**; 8.00mm - 12.50mm = **6**; 12.70mm and above = **1**
A100, A108, and A002: 0.20mm - 10.00mm = **10**; 10.10mm - 14.00mm = **5**; 14.25mm and above = **1**



JOBBER DRILL



d ₁ Ø mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	2A	2AB	A100	A108	A002
8.70	0.3425	81	125	016087	029087	0002476	0008782	0351284
8.75	0.3445	81	125	016283	029283	0002483	—	—
8.80	0.3465	81	125	016088	029088	0002490	0008799	0351307
8.90	0.3504	81	125	016089	029089	0002506	0008805	0351314
9.00	0.3543	81	125	016090	029090	0002513	0008812	0351321
9.10	0.3583	81	125	—	—	0002520	0008829	0351338
9.20	0.3622	81	125	—	—	0002537	0008836	0351352
9.25	0.3642	81	125	—	—	0002544	—	—
9.30	0.3661	81	125	016093	029093	0002551	0008843	0351369
9.40	0.3701	81	125	016094	029094	0002568	0008850	0351376
9.50	0.3740	81	125	016095	029095	0002575	0008867	0351383
9.60	0.3780	87	133	016096	029096	0002582	0008874	0351406
9.70	0.3819	87	133	016097	029097	0002599	0008881	0351413
9.75	0.3839	87	133	—	—	0002605	—	—
9.80	0.3858	87	133	016098	029098	0002612	0008898	0351420
9.90	0.3898	87	133	016099	029099	0002629	0008904	0351437
10.00	0.3937	87	133	016100	029100	0000526	0007648	0351451
10.10	0.3976	87	133	—	—	0000533	—	0351468
10.20	0.4016	87	133	016102	029102	0000540	0007655	0351475
10.25	0.4035	87	133	—	—	0000557	—	—
10.30	0.4055	87	133	016103	029103	0000564	—	0351482
10.40	0.4094	87	133	—	—	0000571	—	0351505
10.50	0.4134	87	133	016105	029105	0000588	0007662	0351512
10.60	0.4173	87	133	016106	—	0000595	—	0351529
10.70	0.4213	94	142	—	—	0000601	—	0351536
10.75	0.4232	94	142	—	—	0000618	—	—
10.80	0.4252	94	142	016108	029108	0000625	0007679	0351550
10.90	0.4291	94	142	016109	029109	0000632	—	0351567
11.00	0.4331	94	142	016110	029110	0000649	0007686	0351574
11.10	0.4370	94	142	—	—	0000656	—	0351581
11.20	0.4409	94	142	016112	029112	0000663	—	0351604
11.25	0.4429	94	142	—	—	0000670	—	—
11.30	0.4449	94	142	016113	029113	0000687	—	0351611
11.40	0.4488	94	142	016114	029114	0000694	—	0351628
11.50	0.4528	94	142	016115	029115	0000700	0007693	0351635
11.60	0.4567	94	142	—	—	0000717	—	0351659
11.70	0.4606	94	142	016117	029117	0000724	—	0351666
11.75	0.4626	94	142	—	—	0000731	—	—
11.80	0.4646	94	142	016118	029118	0000748	0007709	0351673
11.90	0.4685	101	151	—	—	0000755	—	0351680
12.00	0.4724	101	151	016120	029120	0000816	0007754	0351703
12.10	0.4764	101	151	016121	029121	0000823	—	0351710
12.20	0.4803	101	151	016122	029122	0000830	—	0351727
12.25	0.4823	101	151	—	—	0000847	—	—
12.30	0.4843	101	151	—	—	0000854	—	0351734
12.40	0.4882	101	151	—	—	0000861	—	0351758
12.50	0.4921	101	151	016125	029125	0000878	0007778	0351765
12.60	0.4961	101	151	—	—	0000885	—	0351772
12.70	0.5000	101	151	016127	029127	0000892	—	0351796
12.75	0.5020	101	151	—	—	0000908	—	—
12.80	0.5039	101	151	016128	029128	0000915	0007785	0351802
12.90	0.5079	101	151	016129	029129	0000922	0007792	0351819
13.00	0.5118	101	151	016130	029130	0000939	0007808	0351826
13.10	0.5157	101	151	—	—	0000946	—	0385180
13.20	0.5197	101	151	—	—	0000953	—	0385524
13.25	0.5217	108	160	—	—	0000960	—	0385579
13.30	0.5236	108	160	—	—	0000977	—	0385197
13.40	0.5276	108	160	—	—	0000984	—	0385531
13.50	0.5315	108	160	034135	016135	0000991	0007815	0385548
13.60	0.5354	108	160	—	—	0001004	—	0385203
13.70	0.5394	108	160	—	—	0001011	—	0385210
13.75	0.5413	108	160	—	—	0001028	—	0385586
13.80	0.5433	108	160	—	—	0001035	—	0385227
13.90	0.5472	108	160	—	—	0001042	—	0385494

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = **12**; 8.00mm - 12.50mm = **6**; 12.70mm and above = **1**
A100, A108, and A002: 0.20mm - 10.00mm = **10**; 10.10mm - 14.00mm = **5**; 14.25mm and above = **1**

DRILLS



JOBBER DRILL



d ₁ Ø mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	2A	2AB	A100	A108	A002
14.00	0.5512	108	160	034140	016140	0001097	0007853	0384497
14.25	0.5610	114	169	—	—	0001103	—	0385234
14.50	0.5709	114	169	034145	016145	0001110	0007860	0385241
14.75	0.5807	114	169	—	—	0001127	—	0385258
15.00	0.5906	114	169	034150	016150	0001134	0007877	0385265
15.25	0.6004	120	178	—	—	0001141	0007884	0385272
15.50	0.6102	120	178	—	016155	0001158	0007891	0385289
15.75	0.6201	120	178	—	—	0001165	—	0385296
16.00	0.6299	120	178	—	016160	0001196	0007921	0385302
16.50	0.6496	125	184	—	016165	0001202	—	—
17.00	0.6693	125	184	—	016170	0001226	—	—
17.50	0.6890	130	191	—	016175	0001233	—	—
18.00	0.7087	130	191	—	—	0001271	—	—
18.50	0.7283	135	198	—	—	0001288	—	—
19.00	0.7480	135	198	—	—	0001295	—	—
19.50	0.7677	140	205	—	—	0001301	—	—
20.00	0.7874	140	205	—	—	0001530	—	—

DRILLS

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = **12**; 8.00mm - 12.50mm = **6**; 12.70mm and above = **1**
A100, A108, and A002: 0.20mm - 10.00mm = **10**; 10.10mm - 14.00mm = **5**; 14.25mm and above = **1**



JOBBER DRILL

General Purpose Jobber Length - Left Hand

L10 Left hand helix for use in machines where spindle is counter-clockwise & can be used to remove broken parts without damaging threaded holes. Bright Finish improves chip flow in soft or non-ferrous materials



L10

ANSI

4XD

HSS

118°

1/32 - 1/2

d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	L10
1/32	0.0313	1/2	1.3/8	12	010902
3/64	0.0469	3/4	1.3/4	12	010903
1/16	0.0625	7/8	1.7/8	12	010904
5/64	0.0781	1"	2"	12	010905
3/32	0.0938	1.1/4	2.1/4	12	010906
7/64	0.1094	1.1/2	2.5/8	12	010907
1/8	0.1250	1.5/8	2.3/4	12	010908
9/64	0.1406	1.3/4	2.7/8	12	010909
5/32	0.1563	2"	3.1/8	12	010910
11/64	0.1719	2.1/8	3.1/4	12	010911
3/16	0.1875	2.5/16	3.1/2	12	010912
13/64	0.2031	2.7/16	3.5/8	12	010913
7/32	0.2188	2.1/2	3.3/4	12	010914
15/64	0.2344	2.5/8	3.7/8	12	010915
1/4	0.2500	2.3/4	4"	12	010916
17/64	0.2656	2.7/8	4.1/8	12	010917
9/32	0.2813	2.15/16	4.1/4	12	010918
19/64	0.2969	3.1/16	4.3/8	12	010919
5/16	0.3125	3.3/16	4.1/2	6	010920
21/64	0.3281	3.5/16	4.5/8	6	010921
11/32	0.3437	3.7/16	4.3/4	6	010922
23/64	0.3594	3.1/2	4.7/8	6	010923
3/8	0.3750	3.5/8	5"	6	010924
25/64	0.3906	3.3/4	5.1/8	6	010925
13/32	0.4063	3.7/8	5.1/4	6	010926
27/64	0.4219	3.15/16	5.3/8	6	010927
7/16	0.4375	4.1/16	5.1/2	6	010928
29/64	0.4531	4.3/16	5.5/8	6	010929
15/32	0.4687	4.5/16	5.3/4	6	010930
31/64	0.4844	4.3/8	5.7/8	6	010931
1/2	0.5000	4.1/2	6"	6	010932

JOBBER DRILL



Heavy Duty Jobber Length (HX Series)

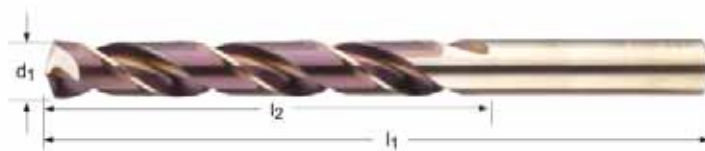
* HX10 set available on pg. 185

HX10 - Fractional Sizes

HX18 - Wire Gauge Sizes

HX15 - Letter Sizes

Low thrust design self centering Split Point for easier penetration. Stronger and more Rigid. Unique surface treatment for improved wear resistance in hard ferrous alloys.



HX10

HX15

HX18

ANSI

4XD

HSS

135°



1/16 - 1/2

d_1 Ø "Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	HX10 HX15 HX18
1/16	0.0625	7/8	1.7/8	12	022004
52	0.0635	7/8	1.7/8	12	022152
51	0.0670	1"	2"	12	022151
50	0.0700	1"	2"	12	022150
49	0.0730	1"	2"	12	022149
48	0.0760	1"	2"	12	022148
5/64	0.0781	1"	2"	12	022005
47	0.0785	1"	2"	12	022147
46	0.0810	1.1/8	2.1/8	12	022146
45	0.0820	1.1/8	2.1/8	12	022145
44	0.0860	1.1/8	2.1/8	12	022144
43	0.0890	1.1/4	2.1/4	12	022143
42	0.0935	1.1/4	2.1/4	12	022142
3/32	0.0938	1.1/4	2.1/4	12	022006
41	0.0960	1.3/8	2.3/8	12	022141
40	0.0980	1.3/8	2.3/8	12	022140
39	0.0995	1.3/8	2.3/8	12	022139
38	0.1015	1.7/16	2.1/2	12	022138
37	0.1040	1.7/16	2.1/2	12	022137
36	0.1065	1.7/16	2.1/2	12	022136
7/64	0.1094	1.1/2	2.5/8	12	022007
35	0.1100	1.1/2	2.5/8	12	022135
34	0.1110	1.1/2	2.5/8	12	022134
33	0.1130	1.1/2	2.5/8	12	022133
32	0.1160	1.5/8	2.3/4	12	022132
31	0.1200	1.5/8	2.3/4	12	022131
1/8	0.1250	1.5/8	2.3/4	12	022008
30	0.1285	1.5/8	2.3/4	12	022130
29	0.1360	1.3/4	2.7/8	12	022129
28	0.1405	1.3/4	2.7/8	12	022128
9/64	0.1406	1.3/4	2.7/8	12	022009
27	0.1440	1.7/8	3"	12	022127
26	0.1470	1.7/8	3"	12	022126



JOBBER DRILL

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	HX10 HX15 HX18
25	0.1495	1.7/8	3"	12	022125
24	0.1520	2"	3.1/8	12	022124
23	0.1540	2"	3.1/8	12	022123
5/32	0.1563	2"	3.1/8	12	022010
22	0.1570	2"	3.1/8	12	022122
21	0.1590	2.1/8	3.1/4	12	022121
20	0.1610	2.1/8	3.1/4	12	022120
19	0.1660	2.1/8	3.1/4	12	022119
18	0.1695	2.1/8	3.1/4	12	022118
11/64	0.1719	2.1/8	3.1/4	12	022011
17	0.1730	2.3/16	3.3/8	12	022117
16	0.1770	2.3/16	3.3/8	12	022116
15	0.1800	2.3/16	3.3/8	12	022115
14	0.1820	2.3/16	3.3/8	12	022114
13	0.1850	2.5/16	3.1/2	12	022113
3/16	0.1875	2.5/16	3.1/2	12	022012
12	0.1890	2.5/16	3.1/2	12	022112
11	0.1910	2.5/16	3.1/2	12	022111
10	0.1935	2.7/16	3.5/8	12	022110
9	0.1960	2.7/16	3.5/8	12	022109
8	0.1990	2.7/16	3.5/8	12	022108
7	0.2010	2.7/16	3.5/8	12	022107
13/64	0.2031	2.7/16	3.5/8	12	022013
6	0.2040	2.1/2	3.3/4	12	022106
5	0.2055	2.1/2	3.3/4	12	022105
4	0.2090	2.1/2	3.3/4	12	022104
3	0.2130	2.1/2	3.3/4	12	022103
7/32	0.2188	2.1/2	3.3/4	12	022014
2	0.2210	2.5/8	3.7/8	12	022102
1	0.2280	2.5/8	3.7/8	12	022101
A	0.2340	2.5/8	3.7/8	12	022201
15/64	0.2344	2.5/8	3.7/8	12	022015
B	0.2374	2.3/4	4"	12	022202
C	0.2421	2.3/4	4"	12	022203
D	0.2461	2.3/4	4"	12	022204
E	0.2500	2.3/4	4"	12	022205
1/4	0.2500	2.3/4	4"	12	022016
F	0.2571	2.7/8	4.1/8	12	022206
G	0.2610	2.7/8	4.1/8	12	022207
17/64	0.2656	2.7/8	4.1/8	12	022017
H	0.2661	2.7/8	4.1/8	12	022208
I	0.2720	2.7/8	4.1/8	12	022209
J	0.2772	2.7/8	4.1/8	12	022210
K	0.2811	2.15/16	4.1/4	12	022211
9/32	0.2813	2.15/16	4.1/4	12	022018
L	0.2902	2.15/16	4.1/4	12	022212
M	0.2949	3.1/16	4.3/8	12	022213
19/64	0.2969	3.1/16	4.3/8	12	022019
N	0.3020	3.1/16	4.3/8	12	022214
5/16	0.3125	3.3/16	4.1/2	6	022020
O	0.3161	3.3/16	4.1/2	6	022215
P	0.3228	3.5/16	4.5/8	6	022216
21/64	0.3281	3.5/16	4.5/8	6	022021
Q	0.3319	3.7/16	4.3/4	6	022217
R	0.3390	3.7/16	4.3/4	6	022218
11/32	0.3437	3.7/16	4.3/4	6	022022
S	0.3480	3.1/2	4.7/8	6	022219
T	0.3580	3.1/2	4.7/8	6	022220
23/64	0.3594	3.1/2	4.7/8	6	022023
U	0.3680	3.5/8	5"	6	022221
3/8	0.3750	3.5/8	5"	6	022024
V	0.3772	3.5/8	5"	6	022222
W	0.3858	3.3/4	5.1/8	6	022223
25/64	0.3906	3.3/4	5.1/8	6	022025
X	0.3969	3.3/4	5.1/8	6	022224
Y	0.4039	3.7/8	5.1/4	6	022225

JOBBER DRILL



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	HX10 HX15 HX18
13/32	0.4063	3.7/8	5.1/4	6	022026
Z	0.4130	3.7/8	5.1/4	6	022226
27/64	0.4219	3.15/16	5.3/8	6	022027
7/16	0.4375	4.1/16	5.1/2	6	022028
29/64	0.4531	4.3/16	5.5/8	6	022029
15/32	0.4687	4.5/16	5.3/4	6	022030
31/64	0.4844	4.3/8	5.7/8	6	022031
1/2	0.5000	4.1/2	6"	6	022032

DRILLS



JOBBER DRILL

General Purpose Jobber Length (NAS 907 Type A)

R10A - Fractional Sizes

R18A - Wire Gauge Sizes

R15A - Letter Sizes

Low thrust design self centering 118° Split Point for easier penetration. Steam oxide surface treatment for increased wear resistance & lubricity



R10A

R15A

R18A

ANSI

4XD

HSS

118°



1/16 - 1/2

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R10A R15A R18A
1/16	0.0625	7/8	1.7/8	12	010104
52	0.0635	7/8	1.7/8	12	018152
51	0.0670	1"	2"	12	018151
50	0.0700	1"	2"	12	018150
49	0.0730	1"	2"	12	018149
48	0.0760	1"	2"	12	018148
5/64	0.0781	1"	2"	12	010105
47	0.0785	1"	2"	12	018147
46	0.0810	1.1/8	2.1/8	12	018146
45	0.0820	1.1/8	2.1/8	12	018145
44	0.0860	1.1/8	2.1/8	12	018144
43	0.0890	1.1/4	2.1/4	12	018143
42	0.0935	1.1/4	2.1/4	12	018142
3/32	0.0938	1.1/4	2.1/4	12	010106
41	0.0960	1.3/8	2.3/8	12	018141
40	0.0980	1.3/8	2.3/8	12	018140
39	0.0995	1.3/8	2.3/8	12	018139
38	0.1015	1.7/16	2.1/2	12	018138
37	0.1040	1.7/16	2.1/2	12	018137
36	0.1065	1.7/16	2.1/2	12	018136
7/64	0.1094	1.1/2	2.5/8	12	010107
35	0.1100	1.1/2	2.5/8	12	018135
34	0.1110	1.1/2	2.5/8	12	018134
33	0.1130	1.1/2	2.5/8	12	018133
32	0.1160	1.5/8	2.3/4	12	018132
31	0.1200	1.5/8	2.3/4	12	018131
1/8	0.1250	1.5/8	2.3/4	12	010108
30	0.1285	1.5/8	2.3/4	12	018130
29	0.1360	1.3/4	2.7/8	12	018129
28	0.1405	1.3/4	2.7/8	12	018128
9/64	0.1406	1.3/4	2.7/8	12	010109
27	0.1440	1.7/8	3"	12	018127
26	0.1470	1.7/8	3"	12	018126

JOBBER DRILL



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R10A R15A R18A
25	0.1495	1.7/8	3"	12	018125
24	0.1520	2"	3.1/8	12	018124
23	0.1540	2"	3.1/8	12	018123
5/32	0.1563	2"	3.1/8	12	010110
22	0.1570	2"	3.1/8	12	018122
21	0.1590	2.1/8	3.1/4	12	018121
20	0.1610	2.1/8	3.1/4	12	018120
19	0.1660	2.1/8	3.1/4	12	018119
18	0.1695	2.1/8	3.1/4	12	018118
11/64	0.1719	2.1/8	3.1/4	12	010111
17	0.1730	2.3/16	3.3/8	12	018117
16	0.1770	2.3/16	3.3/8	12	018116
15	0.1800	2.3/16	3.3/8	12	018115
14	0.1820	2.3/16	3.3/8	12	018114
13	0.1850	2.5/16	3.1/2	12	018113
3/16	0.1875	2.5/16	3.1/2	12	010112
12	0.1890	2.5/16	3.1/2	12	018112
11	0.1910	2.5/16	3.1/2	12	018111
10	0.1935	2.7/16	3.5/8	12	018110
9	0.1960	2.7/16	3.5/8	12	018109
8	0.1990	2.7/16	3.5/8	12	018108
7	0.2010	2.7/16	3.5/8	12	018107
13/64	0.2031	2.7/16	3.5/8	12	010113
6	0.2040	2.1/2	3.3/4	12	018106
5	0.2055	2.1/2	3.3/4	12	018105
4	0.2090	2.1/2	3.3/4	12	018104
3	0.2130	2.1/2	3.3/4	12	018103
7/32	0.2188	2.1/2	3.3/4	12	010114
2	0.2210	2.5/8	3.7/8	12	018102
1	0.2280	2.5/8	3.7/8	12	018101
A	0.2340	2.5/8	3.7/8	12	015101
15/64	0.2344	2.5/8	3.7/8	12	010115
B	0.2374	2.3/4	4"	12	015102
C	0.2421	2.3/4	4"	12	015103
D	0.2461	2.3/4	4"	12	015104
E	0.2500	2.3/4	4"	12	015105
1/4	0.2500	2.3/4	4"	12	010116
F	0.2571	2.7/8	4.1/8	12	015106
G	0.2610	2.7/8	4.1/8	12	015107
17/64	0.2656	2.7/8	4.1/8	12	010117
H	0.2661	2.7/8	4.1/8	12	015108
I	0.2720	2.7/8	4.1/8	12	015109
J	0.2772	2.7/8	4.1/8	12	015110
K	0.2811	2.15/16	4.1/4	12	015111
9/32	0.2813	2.15/16	4.1/4	12	010118
L	0.2902	2.15/16	4.1/4	12	015112
M	0.2949	3.1/16	4.3/8	12	015113
19/64	0.2969	3.1/16	4.3/8	12	010119
N	0.3020	3.1/16	4.3/8	12	015114
5/16	0.3125	3.3/16	4.1/2	6	010120
O	0.3161	3.3/16	4.1/2	6	015115
P	0.3228	3.5/16	4.5/8	6	015116
21/64	0.3281	3.5/16	4.5/8	6	010121
Q	0.3319	3.7/16	4.3/4	6	015117
R	0.3390	3.7/16	4.3/4	6	015118
11/32	0.3437	3.7/16	4.3/4	6	010122
S	0.3480	3.1/2	4.7/8	6	015119
T	0.3580	3.1/2	4.7/8	6	015120
23/64	0.3594	3.1/2	4.7/8	6	010123
U	0.3680	3.5/8	5"	6	015121
3/8	0.3750	3.5/8	5"	6	010124
V	0.3772	3.5/8	5"	6	015122
W	0.3858	3.3/4	5.1/8	6	015123
25/64	0.3906	3.3/4	5.1/8	6	010125
X	0.3969	3.3/4	5.1/8	6	015124
Y	0.4039	3.7/8	5.1/4	6	015125



JOBBER DRILL

d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R10A R15A R18A
13/32	0.4063	3.7/8	5.1/4	6	010126
Z	0.4130	3.7/8	5.1/4	6	015126
27/64	0.4219	3.15/16	5.3/8	6	010127
7/16	0.4375	4.1/16	5.1/2	6	010128
29/64	0.4531	4.3/16	5.5/8	6	010129
15/32	0.4687	4.5/16	5.3/4	6	010130
31/64	0.4844	4.3/8	5.7/8	6	010131
1/2	0.5000	4.1/2	6"	6	010132

JOBBER DRILL



Heavy Duty Jobber Length (NAS 907 Type B)

R10B - Fractional Sizes

R18B - Wire Gauge Sizes

R15B - Letter Sizes

Low thrust design self centering 135° Split Point for easier penetration.
Steam Oxide surface treatment for increased wear resistance & lubricity.
Recommended for tougher ferrous materials.



R10B

R15B

R18B

ANSI

4XD

HSS



1/16 - 1/2

d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R10B R15B R18B
1/16	0.0625	7/8	1.7/8	12	010204
52	0.0635	7/8	1.7/8	12	018252
51	0.0670	1"	2"	12	018251
50	0.0700	1"	2"	12	018250
49	0.0730	1"	2"	12	018249
48	0.0760	1"	2"	12	018248
5/64	0.0781	1"	2"	12	010205
47	0.0785	1"	2"	12	018247
46	0.0810	1.1/8	2.1/8	12	018246
45	0.0820	1.1/8	2.1/8	12	018245
44	0.0860	1.1/8	2.1/8	12	018244
43	0.0890	1.1/4	2.1/4	12	018243
42	0.0935	1.1/4	2.1/4	12	018242
3/32	0.0938	1.1/4	2.1/4	12	010206
41	0.0960	1.3/8	2.3/8	12	018241
40	0.0980	1.3/8	2.3/8	12	018240
39	0.0995	1.3/8	2.3/8	12	018239
38	0.1015	1.7/16	2.1/2	12	018238
37	0.1040	1.7/16	2.1/2	12	018237
36	0.1065	1.7/16	2.1/2	12	018236
7/64	0.1094	1.1/2	2.5/8	12	010207
35	0.1100	1.1/2	2.5/8	12	018235
34	0.1110	1.1/2	2.5/8	12	018234
33	0.1130	1.1/2	2.5/8	12	018233
32	0.1160	1.5/8	2.3/4	12	018232
31	0.1200	1.5/8	2.3/4	12	018231
1/8	0.1250	1.5/8	2.3/4	12	010208
30	0.1285	1.5/8	2.3/4	12	018230
29	0.1360	1.3/4	2.7/8	12	018229
28	0.1405	1.3/4	2.7/8	12	018228
9/64	0.1406	1.3/4	2.7/8	12	010209
27	0.1440	1.7/8	3"	12	018227
26	0.1470	1.7/8	3"	12	018226



JOBBER DRILL

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R10B R15B R18B
25	0.1495	1.7/8	3"	12	018225
24	0.1520	2"	3.1/8	12	018224
23	0.1540	2"	3.1/8	12	018223
5/32	0.1563	2"	3.1/8	12	010210
22	0.1570	2"	3.1/8	12	018222
21	0.1590	2.1/8	3.1/4	12	018221
20	0.1610	2.1/8	3.1/4	12	018220
19	0.1660	2.1/8	3.1/4	12	018219
18	0.1695	2.1/8	3.1/4	12	018218
11/64	0.1719	2.1/8	3.1/4	12	010211
17	0.1730	2.3/16	3.3/8	12	018217
16	0.1770	2.3/16	3.3/8	12	018216
15	0.1800	2.3/16	3.3/8	12	018215
14	0.1820	2.3/16	3.3/8	12	018214
13	0.1850	2.5/16	3.1/2	12	018213
3/16	0.1875	2.5/16	3.1/2	12	010212
12	0.1890	2.5/16	3.1/2	12	018212
11	0.1910	2.5/16	3.1/2	12	018211
10	0.1935	2.7/16	3.5/8	12	018210
9	0.1960	2.7/16	3.5/8	12	018209
8	0.1990	2.7/16	3.5/8	12	018208
7	0.2010	2.7/16	3.5/8	12	018207
13/64	0.2031	2.7/16	3.5/8	12	010213
6	0.2040	2.1/2	3.3/4	12	018206
5	0.2055	2.1/2	3.3/4	12	018205
4	0.2090	2.1/2	3.3/4	12	018204
3	0.2130	2.1/2	3.3/4	12	018203
7/32	0.2188	2.1/2	3.3/4	12	010214
2	0.2210	2.5/8	3.7/8	12	018202
1	0.2280	2.5/8	3.7/8	12	018201
A	0.2340	2.5/8	3.7/8	12	015201
15/64	0.2344	2.5/8	3.7/8	12	010215
B	0.2374	2.3/4	4"	12	015202
C	0.2421	2.3/4	4"	12	015203
D	0.2461	2.3/4	4"	12	015204
1/4	0.2500	2.3/4	4"	12	010216
E	0.2500	2.3/4	4"	12	015205
F	0.2571	2.7/8	4.1/8	12	015206
G	0.2610	2.7/8	4.1/8	12	015207
17/64	0.2656	2.7/8	4.1/8	12	010217
H	0.2661	2.7/8	4.1/8	12	015208
I	0.2720	2.7/8	4.1/8	12	015209
J	0.2772	2.7/8	4.1/8	12	015210
K	0.2811	2.15/16	4.1/4	12	015211
9/32	0.2813	2.15/16	4.1/4	12	010218
L	0.2902	2.15/16	4.1/4	12	015212
M	0.2949	3.1/16	4.3/8	12	015213
19/64	0.2969	3.1/16	4.3/8	12	010219
N	0.3020	3.1/16	4.3/8	12	015214
5/16	0.3125	3.3/16	4.1/2	6	010220
O	0.3161	3.3/16	4.1/2	6	015215
P	0.3228	3.5/16	4.5/8	6	015216
21/64	0.3281	3.5/16	4.5/8	6	010221
Q	0.3319	3.7/16	4.3/4	6	015217
R	0.3390	3.7/16	4.3/4	6	015218
11/32	0.3437	3.7/16	4.3/4	6	010222
S	0.3480	3.1/2	4.7/8	6	015219
T	0.3580	3.1/2	4.7/8	6	015220
23/64	0.3594	3.1/2	4.7/8	6	010223
U	0.3680	3.5/8	5"	6	015221
3/8	0.3750	3.5/8	5"	6	010224
V	0.3772	3.5/8	5"	6	015222
W	0.3858	3.3/4	5.1/8	6	015223
25/64	0.3906	3.3/4	5.1/8	6	010225
X	0.3969	3.3/4	5.1/8	6	015224
Y	0.4039	3.7/8	5.1/4	6	015225

JOBBER DRILL



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R10B R15B R18B
13/32	0.4063	3.7/8	5.1/4	6	010226
Z	0.4130	3.7/8	5.1/4	6	015226
27/64	0.4219	3.15/16	5.3/8	6	010227
7/16	0.4375	4.1/16	5.1/2	6	010228
29/64	0.4531	4.3/16	5.5/8	6	010229
15/32	0.4687	4.5/16	5.3/4	6	010230
31/64	0.4844	4.3/8	5.7/8	6	010231
1/2	0.5000	4.1/2	6"	6	010232

DRILLS

High Helix Jobber Length

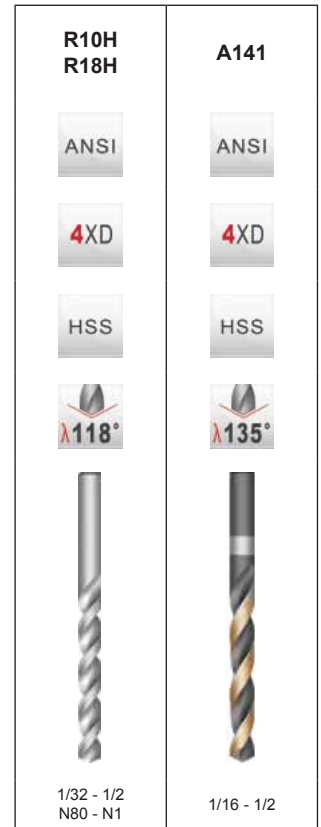
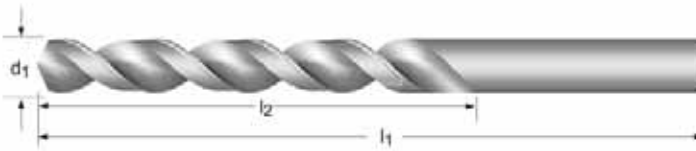
R10H - Fractional Sizes

R18H - Wire Gauge Sizes

High Helix and Bright Finish for better chip flow in soft or non-ferrous materials.

A141

Heavy Duty fast spiral design for stainless steel. Low thrust design self centering Split Point for easier penetration. High helix for improved chip flow. Black/ Bronze Steam Oxide surface treatment for increased wear resistance & lubricity



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R10H R18H	A141
80	0.0135	1/8	3/4	12	018580	—
79	0.0145	1/8	3/4	12	018579	—
78	0.0160	3/16	7/8	12	018578	—
77	0.0180	3/16	7/8	12	018577	—
76	0.0200	3/16	7/8	12	018576	—
75	0.0210	1/4	1"	12	018575	—
74	0.0225	1/4	1"	12	018574	—
73	0.0240	5/16	1.1/8	12	018573	—
72	0.0250	5/16	1.1/8	12	018572	—
71	0.0260	3/8	1.1/4	12	018571	—
70	0.0280	3/8	1.1/4	12	018570	—
69	0.0292	1/2	1.3/8	12	018569	—
68	0.0310	1/2	1.3/8	12	018568	—
1/32	0.0313	1/2	1.3/8	12	010502	—
67	0.0320	1/2	1.3/8	12	018567	—
66	0.0330	1/2	1.3/8	12	018566	—
65	0.0350	5/8	1.1/2	12	018565	—
64	0.0360	5/8	1.1/2	12	018564	—
63	0.0370	5/8	1.1/2	12	018563	—
62	0.0380	5/8	1.1/2	12	018562	—
61	0.0390	11/16	1.5/8	12	018561	—
60	0.0400	11/16	1.5/8	12	018560	—
59	0.0410	11/16	1.5/8	12	018559	—
58	0.0420	11/16	1.5/8	12	018558	—
57	0.0430	3/4	1.3/4	12	018557	—
56	0.0465	3/4	1.3/4	12	018556	—
3/64	0.0469	3/4	1.3/4	12	010503	—
55	0.0520	7/8	1.7/8	12	018555	—
54	0.0550	7/8	1.7/8	12	018554	—
53	0.0595	7/8	1.7/8	12	018553	—
1/16	0.0625	7/8	1.7/8	12	010504	—
1/16	0.0626	25/32	1.11/16	10	—	0423264
52	0.0635	7/8	1.7/8	12	018552	—

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R10H	R18H	A141
51	0.0670	1"	2"	12	—	018551	—
50	0.0700	1"	2"	12	—	018550	—
49	0.0730	1"	2"	12	—	018549	—
48	0.0760	1"	2"	12	—	018548	—
5/64	0.0780	15/16	1.15/16	10	—	—	0423486
5/64	0.0781	1"	2"	12	010505	—	—
47	0.0785	1"	2"	12	—	018547	—
46	0.0810	1.1/8	2.1/8	12	—	018546	—
45	0.0820	1.1/8	2.1/8	12	—	018545	—
44	0.0860	1.1/8	2.1/8	12	—	018544	—
43	0.0890	1.1/4	2.1/4	12	—	018543	—
42	0.0935	1.1/4	2.1/4	12	—	018542	—
3/32	0.0937	1.3/16	2.1/4	10	—	—	0423431
3/32	0.0938	1.1/4	2.1/4	12	010506	—	—
41	0.0960	1.3/8	2.3/8	12	—	018541	—
40	0.0980	1.3/8	2.3/8	12	—	018540	—
39	0.0995	1.3/8	2.3/8	12	—	018539	—
38	0.1015	1.7/16	2.1/2	12	—	018538	—
37	0.1040	1.7/16	2.1/2	12	—	018537	—
36	0.1065	1.7/16	2.1/2	12	—	018536	—
7/64	0.1094	1.1/2	2.5/8	12	010507	—	—
7/64	0.1094	1.5/16	2.13/32	10	—	—	0423516
35	0.1100	1.1/2	2.5/8	12	—	018535	—
34	0.1110	1.1/2	2.5/8	12	—	018534	—
33	0.1130	1.1/2	2.5/8	12	—	018533	—
32	0.1160	1.5/8	2.3/4	12	—	018532	—
31	0.1200	1.5/8	2.3/4	12	—	018531	—
1/8	0.1250	1.5/8	2.3/4	12	010508	—	—
1/8	0.1252	1.7/16	2.9/16	10	—	—	0423295
30	0.1285	1.5/8	2.3/4	12	—	018530	—
29	0.1360	1.3/4	2.7/8	12	—	018529	—
28	0.1405	1.3/4	2.7/8	12	—	018528	—
9/64	0.1406	1.3/4	2.7/8	12	010509	—	—
9/64	0.1406	1.17/32	2.3/4	10	—	—	0423530
27	0.1440	1.7/8	3"	12	—	018527	—
26	0.1470	1.7/8	3"	12	—	018526	—
25	0.1495	1.7/8	3"	12	—	018525	—
24	0.1520	2"	3.1/8	12	—	018524	—
23	0.1540	2"	3.1/8	12	—	018523	—
5/32	0.1563	2"	3.1/8	12	010510	—	—
5/32	0.1563	1.11/16	2.15/16	10	—	—	0423479
22	0.1570	2"	3.1/8	12	—	018522	—
21	0.1590	2.1/8	3.1/4	12	—	018521	—
20	0.1610	2.1/8	3.1/4	12	—	018520	—
19	0.1660	2.1/8	3.1/4	12	—	018519	—
18	0.1695	2.1/8	3.1/4	12	—	018518	—
11/64	0.1719	2.1/8	3.1/4	12	010511	—	—
11/64	0.1720	1.27/32	3.5/32	10	—	—	0423318
17	0.1730	2.3/16	3.3/8	12	—	018517	—
16	0.1770	2.3/16	3.3/8	12	—	018516	—
15	0.1800	2.3/16	3.3/8	12	—	018515	—
14	0.1820	2.3/16	3.3/8	12	—	018514	—
13	0.1850	2.5/16	3.1/2	12	—	018513	—
3/16	0.1874	2.1/16	3.3/8	10	—	—	0423424
3/16	0.1875	2.5/16	3.1/2	12	010512	—	—
12	0.1890	2.5/16	3.1/2	12	—	018512	—
11	0.1910	2.5/16	3.1/2	12	—	018511	—
10	0.1935	2.7/16	3.5/8	12	—	018510	—
10	0.1937	2.1/16	3.3/8	10	—	—	0423257
9	0.1960	2.7/16	3.5/8	12	—	018509	—
8	0.1990	2.7/16	3.5/8	12	—	018508	—
7	0.2010	2.7/16	3.5/8	12	—	018507	—
13/64	0.2031	2.7/16	3.5/8	12	010513	—	—
13/64	0.2031	2.1/16	3.3/8	10	—	—	0423332
6	0.2040	2.1/2	3.3/4	12	—	018506	—
5	0.2055	2.1/2	3.3/4	12	—	018505	—



JOBBER DRILL



d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R10H	R18H	A141
4	0.2090	2.1/2	3.3/4	12	—	018504	—
3	0.2130	2.1/2	3.3/4	12	—	018503	—
7/32	0.2188	2.1/2	3.3/4	12	010514	—	—
7/32	0.2189	2.1/4	3.21/32	10	—	—	0423509
2	0.2210	2.5/8	3.7/8	12	—	018502	—
1	0.2280	2.5/8	3.7/8	12	—	018501	—
15/64	0.2343	2.1/4	3.21/32	10	—	—	0423547
15/64	0.2344	2.5/8	3.7/8	12	010515	—	—
1/4	0.2500	2.3/4	4"	12	010516	—	—
1/4	0.2500	2.1/2	3.31/32	10	—	—	0423288
17/64	0.2656	2.7/8	4.1/8	12	010517	—	—
17/64	0.2657	2.23/32	4.9/32	10	—	—	0423356
9/32	0.2811	2.23/32	4.9/32	10	—	—	0423523
9/32	0.2813	2.15/16	4.1/4	12	010518	—	—
19/64	0.2969	3.1/16	4.3/8	12	010519	—	—
19/64	0.2969	2.15/16	4.19/32	10	—	—	0423363
5/16	0.3125	3.3/16	4.1/2	6	010520	—	—
5/16	0.3126	2.15/16	4.19/32	10	—	—	0423462
21/64	0.3280	2.15/16	4.19/32	10	—	—	0423370
21/64	0.3281	3.5/16	4.5/8	6	010521	—	—
11/32	0.3437	3.7/16	4.3/4	6	010522	—	—
11/32	0.3437	3.3/16	4.29/32	10	—	—	0423301
23/64	0.3594	3.1/2	4.7/8	6	010523	—	—
23/64	0.3594	3.3/16	4.29/32	10	—	—	0423387
3/8	0.3748	3.7/16	5.1/4	10	—	—	0423448
3/8	0.3750	3.5/8	5"	6	010524	—	—
25/64	0.3906	3.3/4	5.1/8	6	010525	—	—
25/64	0.3906	3.7/16	5.1/4	10	—	—	0423394
13/32	0.4063	3.7/8	5.1/4	6	010526	—	—
13/32	0.4063	3.7/16	5.1/4	5	—	—	0423325
27/64	0.4219	3.15/16	5.3/8	6	010527	—	—
27/64	0.4220	3.11/16	5.19/32	5	—	—	0423400
7/16	0.4374	3.11/16	5.19/32	5	—	—	0423493
7/16	0.4375	4.1/16	5.1/2	6	010528	—	—
29/64	0.4531	4.3/16	5.5/8	6	010529	—	—
29/64	0.4531	3.11/16	5.19/32	5	—	—	0423417
15/32	0.4687	4.5/16	5.3/4	6	010530	—	—
15/32	0.4689	3.31/32	5.15/16	5	—	—	0423349
31/64	0.4843	3.31/32	5.15/16	5	—	—	0423455
31/64	0.4844	4.3/8	5.7/8	6	010531	—	—
1/2	0.5000	4.1/2	6"	6	010532	—	—
1/2	0.5000	3.31/32	5.15/16	5	—	—	0423271

JOBBER DRILL

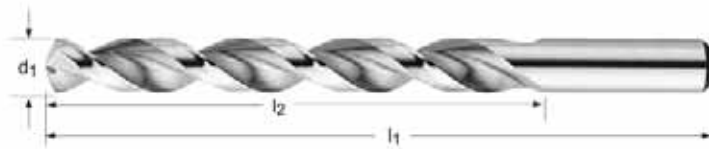


General Purpose Jobber Length Parabolic Flute

Heavy-Duty Parabolic Flute design for efficient chip removal. Allows greater drilling depths in one pass. Low thrust design self centering Split Point for easier penetration.

QC21P Bright Finish improves chip flow in soft or non-ferrous materials.

QC21G TiN Coating increases wear resistance and improves tool life.



d_1 Ø " / Nr. / letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	QC21P	QC21G
1/16	0.0625	7/8	1.7/8	12	015804	081704
52	0.0635	7/8	1.7/8	12	019452	080552
51	0.0670	1"	2"	12	019451	080551
50	0.0700	1"	2"	12	019450	080550
49	0.0730	1"	2"	12	019449	080549
48	0.0760	1"	2"	12	019448	080548
5/64	0.0781	1"	2"	12	015805	081705
47	0.0785	1"	2"	12	019447	080547
46	0.0810	1.1/8	2.1/8	12	019446	080546
45	0.0820	1.1/8	2.1/8	12	019445	080545
44	0.0860	1.1/8	2.1/8	12	019444	080544
43	0.0890	1.1/4	2.1/4	12	019443	080543
42	0.0935	1.1/4	2.1/4	12	019442	080542
3/32	0.0938	1.1/4	2.1/4	12	015806	081706
41	0.0960	1.3/8	2.3/8	12	019441	080541
40	0.0980	1.3/8	2.3/8	12	019440	080540
39	0.0995	1.3/8	2.3/8	12	019439	080539
38	0.1015	1.7/16	2.1/2	12	019438	080538
37	0.1040	1.7/16	2.1/2	12	019437	080537
36	0.1065	1.7/16	2.1/2	12	019436	080536
7/64	0.1094	1.1/2	2.5/8	12	015807	081707
35	0.1100	1.1/2	2.5/8	12	019435	080535
34	0.1110	1.1/2	2.5/8	12	019434	080534
33	0.1130	1.1/2	2.5/8	12	019433	080533
32	0.1160	1.5/8	2.3/4	12	019432	080532
31	0.1200	1.5/8	2.3/4	12	019431	080531
1/8	0.1250	1.5/8	2.3/4	12	015808	081708
30	0.1285	1.5/8	2.3/4	12	019430	080530
29	0.1360	1.3/4	2.7/8	12	019429	080529
28	0.1405	1.3/4	2.7/8	12	019428	080528
9/64	0.1406	1.3/4	2.7/8	12	015809	081709
27	0.1440	1.7/8	3"	12	019427	080527
26	0.1470	1.7/8	3"	12	019426	080526



JOBBER DRILL

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	QC21P	QC21G
25	0.1495	1.7/8	3"	12	019425	080525
24	0.1520	2"	3.1/8	12	019424	080524
23	0.1540	2"	3.1/8	12	019423	080523
5/32	0.1563	2"	3.1/8	12	015810	081710
22	0.1570	2"	3.1/8	12	019422	080522
21	0.1590	2.1/8	3.1/4	12	019421	080521
20	0.1610	2.1/8	3.1/4	12	019420	080520
19	0.1660	2.1/8	3.1/4	12	019419	080519
18	0.1695	2.1/8	3.1/4	12	019418	080518
11/64	0.1719	2.1/8	3.1/4	12	015811	081711
17	0.1730	2.3/16	3.3/8	12	019417	080517
16	0.1770	2.3/16	3.3/8	12	019416	080516
15	0.1800	2.3/16	3.3/8	12	019415	080515
14	0.1820	2.3/16	3.3/8	12	019414	080514
13	0.1850	2.5/16	3.1/2	12	019413	080513
3/16	0.1875	2.5/16	3.1/2	12	015812	081712
12	0.1890	2.5/16	3.1/2	12	019412	080512
11	0.1910	2.5/16	3.1/2	12	019411	080511
10	0.1935	2.7/16	3.5/8	12	019410	080510
9	0.1960	2.7/16	3.5/8	12	019409	080509
8	0.1990	2.7/16	3.5/8	12	019408	080508
7	0.2010	2.7/16	3.5/8	12	019407	080507
13/64	0.2031	2.7/16	3.5/8	12	015813	081713
6	0.2040	2.1/2	3.3/4	12	019406	080506
5	0.2055	2.1/2	3.3/4	12	019405	080505
4	0.2090	2.1/2	3.3/4	12	019404	080504
3	0.2130	2.1/2	3.3/4	12	019403	080503
7/32	0.2188	2.1/2	3.3/4	12	015814	081714
2	0.2210	2.5/8	3.7/8	12	019402	080502
1	0.2280	2.5/8	3.7/8	12	019401	080501
A	0.2340	2.5/8	3.7/8	12	019301	—
15/64	0.2344	2.5/8	3.7/8	12	015815	081715
B	0.2374	2.3/4	4"	12	019302	—
C	0.2421	2.3/4	4"	12	019303	—
D	0.2461	2.3/4	4"	12	019304	—
1/4	0.2500	2.3/4	4"	12	015816	081716
E	0.2500	2.3/4	4"	12	019305	—
F	0.2571	2.7/8	4.1/8	12	019306	—
G	0.2610	2.7/8	4.1/8	12	019307	—
17/64	0.2656	2.7/8	4.1/8	12	015817	081717
H	0.2661	2.7/8	4.1/8	12	019308	—
I	0.2720	2.7/8	4.1/8	12	019309	—
J	0.2772	2.7/8	4.1/8	12	019310	—
K	0.2811	2.15/16	4.1/4	12	019311	—
9/32	0.2813	2.15/16	4.1/4	12	015818	081718
L	0.2902	2.15/16	4.1/4	12	019312	—
M	0.2949	3.1/16	4.3/8	12	019313	—
19/64	0.2969	3.1/16	4.3/8	12	015819	081719
N	0.3020	3.1/16	4.3/8	12	019314	—
5/16	0.3125	3.3/16	4.1/2	6	015820	081720
O	0.3161	3.3/16	4.1/2	6	019315	—
P	0.3228	3.5/16	4.5/8	6	019316	—
21/64	0.3281	3.5/16	4.5/8	6	015821	081721
Q	0.3319	3.7/16	4.3/4	6	019317	—
R	0.3390	3.7/16	4.3/4	6	019318	—
11/32	0.3437	3.7/16	4.3/4	6	015822	081722
S	0.3480	3.1/2	4.7/8	6	019319	—
T	0.3580	3.1/2	4.7/8	6	019320	—
23/64	0.3594	3.1/2	4.7/8	6	015823	081723
U	0.3680	3.5/8	5"	6	019321	—
3/8	0.3750	3.5/8	5"	6	015824	081724
V	0.3772	3.5/8	5"	6	019322	—
W	0.3858	3.3/4	5.1/8	6	019323	—
25/64	0.3906	3.3/4	5.1/8	6	015825	081725
X	0.3969	3.3/4	5.1/8	6	019324	—
Y	0.4039	3.7/8	5.1/4	6	019325	—

JOBBER DRILL



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	QC21P	QC21G
13/32	0.4063	3.7/8	5.1/4	6	015826	081726
Z	0.4130	3.7/8	5.1/4	6	019326	—
27/64	0.4219	3.15/16	5.3/8	6	015827	081727
7/16	0.4375	4.1/16	5.1/2	6	015828	081728
29/64	0.4531	4.3/16	5.5/8	6	015829	081729
15/32	0.4687	4.5/16	5.3/4	6	015830	081730
31/64	0.4844	4.3/8	5.7/8	6	015831	081731
1/2	0.5000	4.1/2	6"	6	015832	081732
33/64	0.5156	4.13/16	6.5/8	1	015833	—
17/32	0.5313	4.13/16	6.5/8	1	015834	—
35/64	0.5469	4.13/16	6.5/8	1	015835	—
9/16	0.5625	4.13/16	6.5/8	1	015836	—
37/64	0.5781	4.13/16	6.5/8	1	015837	—
19/32	0.5937	5.3/16	7.1/8	1	015838	—
39/64	0.6094	5.3/16	7.1/8	1	015839	—
5/8	0.6250	5.3/16	7.1/8	1	015840	—
41/64	0.6406	5.3/16	7.1/8	1	015841	—
21/32	0.6563	5.3/16	7.1/8	1	015842	—
43/64	0.6719	5.5/8	7.5/8	1	015843	—
11/16	0.6875	5.5/8	7.5/8	1	015844	—

DRILLS



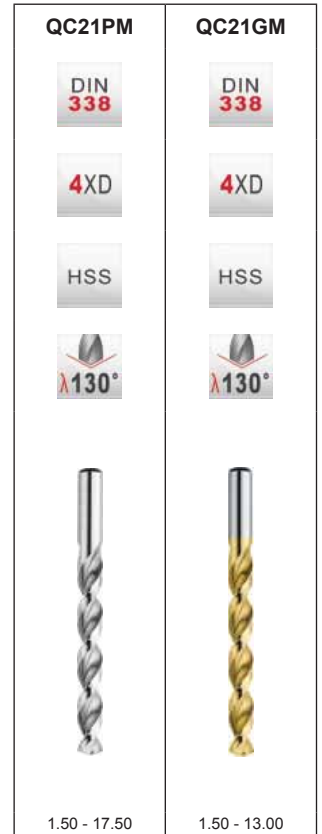
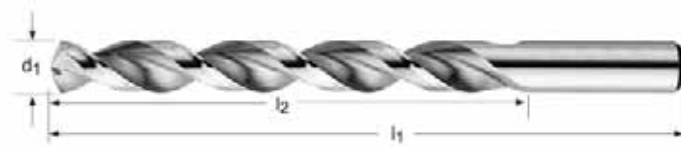
JOBBER DRILL

General Purpose Jobber Length Parabolic Flute, Metric

Heavy-Duty Parabolic Flute design for efficient chip removal. Allows greater drilling depths in one pass. Low thrust design self centering Split Point for easier penetration.

QC21PM Bright Finish improves chip flow in soft or non-ferrous materials.

QC21GM TiN Coating increases wear resistance and improves tool life.



d_1 Ø mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	QC21PM	QC21GM
1.50	0.0591	18	40	12	013115	019815
2.00	0.0787	24	49	12	013120	019820
2.50	0.0984	30	57	12	013125	019825
3.00	0.1181	33	61	12	013130	019830
3.50	0.1378	39	70	12	013135	019835
4.00	0.1575	43	75	12	013140	019840
4.50	0.1772	47	80	12	013145	019845
5.00	0.1969	52	86	12	013150	019850
5.20	0.2047	52	86	12	013152	019852
5.50	0.2165	57	93	12	013155	019855
5.60	0.2205	57	93	12	013156	019856
6.00	0.2362	57	93	12	013160	019860
6.50	0.2559	63	101	12	013165	019865
6.80	0.2677	69	109	12	013168	019868
7.00	0.2756	69	109	12	013170	019870
7.50	0.2953	69	109	12	013175	019875
8.00	0.3150	75	117	6	013180	019880
8.20	0.3228	75	117	6	013182	019882
8.50	0.3346	75	117	6	013185	019885
8.60	0.3386	81	125	6	013186	019886
9.00	0.3543	81	125	6	013190	019890
9.50	0.3740	81	125	6	013195	019895
10.00	0.3937	87	133	6	014900	019900
10.50	0.4134	87	133	6	014905	019905
11.00	0.4331	94	142	6	014910	019910
11.50	0.4528	94	142	6	014915	019915
12.00	0.4724	101	151	6	014920	019920
12.50	0.4921	101	151	6	014925	019925
13.00	0.5118	101	151	1	014930	019930
13.50	0.5315	108	160	1	014935	—
14.00	0.5512	108	160	1	014940	—
14.50	0.5709	114	169	1	014945	—
15.00	0.5906	114	169	1	014950	—

JOBBER DRILL



d_1 Ø mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	QC21PM	QC21GM
15.50	0.6102	120	178	1	014955	—
16.00	0.6299	120	178	1	014960	—
16.50	0.6496	125	184	1	014965	—
17.00	0.6693	125	184	1	014970	—
17.50	0.6890	130	191	1	014975	—

DRILLS



COBALT JOBBER DRILL

Heavy Duty Jobber Length (NAS 907 Type J)

R10CO - Fractional Sizes

R18CO - Wire Gauge Sizes

R15CO - Letter Sizes

2ACO - Metric Sizes

Low thrust design self centering Split Point for easier penetration. Cobalt base material with Bronze Oxide for wear resistance & lubricity. For enhanced tool life in ferrous materials



R10CO	2ACO
R15CO	
R18CO	
ANSI	DIN 338
4XD	4XD
HSS-E	HSS-E
λ135°	λ135°
1/64 - 11/16 A - Z N80 - N1	1.00 - 13.00

d ₁ Ø " / Nr. / letter	d ₁ Ø mm	d ₁ decimal Inch	l ₂ Inch	l ₂ mm	l ₁ Inch	l ₁ mm	Pack Qty	R10CO R15CO R18CO	2ACO
80		0.0135	1/8		3/4		12	018380	—
79		0.0145	1/8		3/4		12	018379	—
1/64		0.0156	3/16		3/4		12	010301	—
78		0.0160	3/16		7/8		12	018378	—
77		0.0180	3/16		7/8		12	018377	—
76		0.0200	3/16		7/8		12	018376	—
75		0.0210	1/4		1"		12	018375	—
74		0.0225	1/4		1"		12	018374	—
73		0.0240	5/16		1.1/8		12	018373	—
72		0.0250	5/16		1.1/8		12	018372	—
71		0.0260	3/8		1.1/4		12	018371	—
70		0.0280	3/8		1.1/4		12	018370	—
69		0.0292	1/2		1.3/8		12	018369	—
68		0.0310	1/2		1.3/8		12	018368	—
1/32		0.0313	1/2		1.3/8		12	010302	—
67		0.0320	1/2		1.3/8		12	018367	—
66		0.0330	1/2		1.3/8		12	018366	—
65		0.0350	5/8		1.1/2		12	018365	—
64		0.0360	5/8		1.1/2		12	018364	—
63		0.0370	5/8		1.1/2		12	018363	—
62		0.0380	5/8		1.1/2		12	018362	—
61		0.0390	11/16		1.5/8		12	018361	—
	1.00	0.0394		12		34	12	—	016410
60		0.0400	11/16		1.5/8		12	018360	—
59		0.0410	11/16		1.5/8		12	018359	—
	1.05	0.0413		12		34	12	—	016355
58		0.0420	11/16		1.5/8		12	018358	—
57		0.0430	3/4		1.3/4		12	018357	—
	1.10	0.0433		14		36	12	—	016411
	1.15	0.0453		14		36	12	—	016356
56		0.0465	3/4		1.3/4		12	018356	—
3/64		0.0469	3/4		1.3/4		12	010303	—

¹⁾ Not Split Point

COBALT JOBBER DRILL



d ₁ Ø "/Nr./letter	d ₁ Ø mm	d ₁ decimal Inch	l ₂ Inch	l ₂ mm	l ₁ Inch	l ₁ mm	Pack Qty	R10CO R15CO R18CO	2ACO
	1.20	0.0472		16		38	12	—	016412
	1.25	0.0492		16		38	12	—	016357
	1.30	0.0512		16		38	12	—	016413
55		0.0520	7/8		1.7/8		12	018355	—
	1.35	0.0531		18		40	12	—	016358
	1.40	0.0551		18		40	12	—	016414
54		0.0550	7/8		1.7/8		12	018354	—
	1.45	0.0571		18		40	12	—	016359
	1.50	0.0591		18		40	12	—	016415
53		0.0595	7/8		1.7/8		12	018353	—
	1.55	0.0610		20		43	12	—	016360
1/16		0.0625	7/8		1.7/8		12	010304	—
	1.60	0.0630		20		43	12	—	016416
52		0.0635	7/8		1.7/8		12	018352	—
	1.65	0.0650		20		43	12	—	016361
	1.70	0.0669		20		43	12	—	016417
51		0.0670	1"		2"		12	018351	—
	1.75	0.0689		22		46	12	—	016362
50		0.0700	1"		2"		12	018350	—
	1.80	0.0709		22		46	12	—	016418
	1.85	0.0728		22		46	12	—	016363
49		0.0730	1"		2"		12	018349	—
	1.90	0.0748		22		46	12	—	016419
48		0.0760	1"		2"		12	018348	—
	1.95	0.0768		24		49	12	—	016364
5/64		0.0781	1"		2"		12	010305	—
47		0.0785	1"		2"		12	018347	—
	2.00	0.0787		24		49	12	—	016420
	2.05	0.0807		24		49	12	—	016365
46		0.0810	1.1/8		2.1/8		12	018346	—
45		0.0820	1.1/8		2.1/8		12	018345	—
	2.10	0.0827		24		49	12	—	016421
44		0.0860	1.1/8		2.1/8		12	018344	—
	2.20	0.0866		27		53	12	—	016422
43		0.0890	1.1/4		2.1/4		12	018343	—
	2.30	0.0906		27		53	12	—	016423
	2.35	0.0925		27		53	12	—	016368
42		0.0935	1.1/4		2.1/4		12	018342	—
3/32		0.0938	1.1/4		2.1/4		12	010306	—
	2.40	0.0945		30		57	12	—	016424
41		0.0960	1.3/8		2.3/8		12	018341	—
40		0.0980	1.3/8		2.3/8		12	018340	—
	2.50	0.0984		30		57	12	—	016425
39		0.0995	1.3/8		2.3/8		12	018339	—
38		0.1015	1.7/16		2.1/2		12	018338	—
	2.60	0.1024		30		57	12	—	016426
37		0.1040	1.7/16		2.1/2		12	018337	—
	2.70	0.1063		33		61	12	—	016427
36		0.1065	1.7/16		2.1/2		12	018336	—
7/64		0.1094	1.1/2		2.5/8		12	010307	—
35		0.1100	1.1/2		2.5/8		12	018335	—
	2.80	0.1102		33		61	12	—	016428
34		0.1110	1.1/2		2.5/8		12	018334	—
33		0.1130	1.1/2		2.5/8		12	018333	—
	2.90	0.1142		33		61	12	—	016429
32		0.1160	1.5/8		2.3/4		12	018332	—
	3.00	0.1181		33		61	12	—	016430
31		0.1200	1.5/8		2.3/4		12	018331	—
	3.10	0.1220		36		65	12	—	016431
1/8		0.1250	1.5/8		2.3/4		12	010308	—
	3.20	0.1260		36		65	12	—	016432
	3.25	0.1280		36		65	12	—	016371
30		0.1285	1.5/8		2.3/4		12	018330	—
	3.30	0.1299		36		65	12	—	016433
	3.40	0.1339		39		70	12	—	016434



COBALT JOBBER DRILL

d ₁ Ø "/Nr./letter	d ₁ Ø mm	d ₁ decimal Inch	l ₂ Inch	l ₂ mm	l ₁ Inch	l ₁ mm	Pack Qty	R10CO R15CO R18CO	2ACO
29		0.1360	1.3/4		2.7/8		12	018329	—
	3.50	0.1378		39		70	12	—	016435
28		0.1405	1.3/4		2.7/8		12	018328	—
9/64		0.1406	1.3/4		2.7/8		12	010309	—
	3.60	0.1417		39		70	12	—	016436
27		0.1440	1.7/8		3"		12	018327	—
	3.70	0.1457		39		70	12	—	016437
26		0.1470	1.7/8		3"		12	018326	—
	3.75	0.1476		39		70	12	—	016372
	3.80	0.1496		43		75	12	—	016438
25		0.1495	1.7/8		3"		12	018325	—
24		0.1520	2"		3.1/8		12	018324	—
23		0.1540	2"		3.1/8		12	018323	—
5/32		0.1563	2"		3.1/8		12	010310	—
22		0.1570	2"		3.1/8		12	018322	—
	4.00	0.1575		43		75	12	—	016440
21		0.1590	2.1/8		3.1/4		12	018321	—
20		0.1610	2.1/8		3.1/4		12	018320	—
	4.10	0.1614		43		75	12	—	016441
	4.20	0.1654		43		75	12	—	016442
19		0.1660	2.1/8		3.1/4		12	018319	—
	4.25	0.1673		43		75	12	—	016373
	4.30	0.1693		47		80	12	—	016443
18		0.1695	2.1/8		3.1/4		12	018318	—
11/64		0.1719	2.1/8		3.1/4		12	010311	—
17		0.1730	2.3/16		3.3/8		12	018317	—
	4.40	0.1732		47		80	12	—	016444
	4.50	0.1772		47		80	12	—	016445
16		0.1770	2.3/16		3.3/8		12	018316	—
15		0.1800	2.3/16		3.3/8		12	018315	—
14		0.1820	2.3/16		3.3/8		12	018314	—
	4.70	0.1850		47		80	12	—	016447
13		0.1850	2.5/16		3.1/2		12	018313	—
3/16		0.1875	2.5/16		3.1/2		12	010312	—
	4.80	0.1890		52		86	12	—	016448
12		0.1890	2.5/16		3.1/2		12	018312	—
11		0.1910	2.5/16		3.1/2		12	018311	—
10		0.1935	2.7/16		3.5/8		12	018310	—
9		0.1960	2.7/16		3.5/8		12	018309	—
	5.00	0.1969		52		86	12	—	016450
8		0.1990	2.7/16		3.5/8		12	018308	—
	5.10	0.2008		52		86	12	—	016451
7		0.2010	2.7/16		3.5/8		12	018307	—
13/64		0.2031	2.7/16		3.5/8		12	010313	—
6		0.2040	2.1/2		3.3/4		12	018306	—
	5.20	0.2047		52		86	12	—	016452
5		0.2055	2.1/2		3.3/4		12	018305	—
	5.25	0.2067		52		86	12	—	016375
	5.30	0.2087		52		86	12	—	016453
4		0.2090	2.1/2		3.3/4		12	018304	—
3		0.2130	2.1/2		3.3/4		12	018303	—
	5.50	0.2165		57		93	12	—	016455
7/32		0.2188	2.1/2		3.3/4		12	010314	—
	5.60	0.2205		57		93	12	—	016456
2		0.2210	2.5/8		3.7/8		12	018302	—
	5.70	0.2244		57		93	12	—	016457
1		0.2280	2.5/8		3.7/8		12	018301	—
	5.90	0.2323		57		93	12	—	016459
A		0.2340	2.5/8		3.7/8		12	015301	—
15/64		0.2344	2.5/8		3.7/8		12	010315	—
	6.00	0.2362		57		93	12	—	016460
B		0.2374	2.3/4		4"		12	015302	—
	6.10	0.2402		63		101	12	—	016461
C		0.2421	2.3/4		4"		12	015303	—
	6.20	0.2441		63		101	12	—	016462

COBALT JOBBER DRILL



d ₁ Ø "Nr./letter	d ₁ Ø mm	d ₁ decimal Inch	l ₂ Inch	l ₂ mm	l ₁ Inch	l ₁ mm	Pack Qty	R10CO R15CO R18CO	2ACO
D		0.2461	2.3/4		4"		12	015304	—
	6.30	0.2480		63		101	12	—	016463
E		0.2500	2.3/4		4"		12	015305	—
1/4		0.2500	2.3/4		4"		12	010316	—
	6.40	0.2520		63		101	12	—	016464
	6.50	0.2559		63		101	12	—	016465
F		0.2571	2.7/8		4.1/8		12	015306	—
	6.60	0.2598		63		101	12	—	016466
G		0.2610	2.7/8		4.1/8		12	015307	—
	6.70	0.2638		63		101	12	—	016467
17/64		0.2656	2.7/8		4.1/8		12	010317	—
H		0.2661	2.7/8		4.1/8		12	015308	—
	6.80	0.2677		69		109	12	—	016468
	6.90	0.2717		69		109	12	—	016469
I		0.2720	2.7/8		4.1/8		12	015309	—
	7.00	0.2756		69		109	12	—	016470
J		0.2772	2.7/8		4.1/8		12	015310	—
	7.10	0.2795		69		109	12	—	016471
K		0.2811	2.15/16		4.1/4		12	015311	—
9/32		0.2813	2.15/16		4.1/4		12	010318	—
	7.20	0.2835		69		109	12	—	016472
	7.25	0.2854		69		109	12	—	016379
	7.30	0.2874		69		109	12	—	016473
L		0.2902	2.15/16		4.1/4		12	015312	—
M		0.2949	3.1/16		4.3/8		12	015313	—
	7.50	0.2953		69		109	12	—	016475
19/64		0.2969	3.1/16		4.3/8		12	010319	—
N		0.3020	3.1/16		4.3/8		12	015314	—
	7.80	0.3071		75		117	12	—	016478
	7.90	0.3110		75		117	12	—	016479
5/16		0.3125	3.3/16		4.1/2		6	010320	—
	8.00	0.3150		75		117	6	—	016480
O		0.3161	3.3/16		4.1/2		6	015315	—
	8.20	0.3228		75		117	6	—	016482
P		0.3228	3.5/16		4.5/8		6	015316	—
21/64		0.3281	3.5/16		4.5/8		6	010321	—
	8.40	0.3307		75		117	6	—	016484
Q		0.3319	3.7/16		4.3/4		6	015317	—
	8.50	0.3346		75		117	6	—	016485
R		0.3390	3.7/16		4.3/4		6	015318	—
11/32		0.3437	3.7/16		4.3/4		6	010322	—
	8.80	0.3465		81		125	6	—	016488
S		0.3480	3.1/2		4.7/8		6	015319	—
	8.90	0.3504		81		125	6	—	016489
	9.00	0.3543		81		125	6	—	016490
T		0.3580	3.1/2		4.7/8		6	015320	—
	9.10	0.3583		81		125	6	—	016491
23/64		0.3594	3.1/2		4.7/8		6	010323	—
	9.20	0.3622		81		125	6	—	016492
	9.30	0.3661		81		125	6	—	016493
U		0.3680	3.5/8		5"		6	015321	—
	9.40	0.3701		81		125	6	—	016494
	9.50	0.3740		81		125	6	—	016495
3/8		0.3750	3.5/8		5"		6	010324	—
V		0.3772	3.5/8		5"		6	015322	—
	9.60	0.3780		87		133	6	—	016496
	9.70	0.3819		87		133	6	—	016497
	9.80	0.3858		87		133	6	—	016498
W		0.3858	3.3/4		5.1/8		6	015323	—
25/64		0.3906	3.3/4		5.1/8		6	010325	—
	10.00	0.3937		87		133	6	—	016300
		0.3969	3.3/4		5.1/8		6	015324	—
	10.20	0.4016		87		133	6	—	016302
		0.4039	3.7/8		5.1/4		6	015325	—
13/32		0.4063	3.7/8		5.1/4		6	010326	—



COBALT JOBBER DRILL

d ₁ Ø "/Nr./letter	d ₁ Ø mm	d ₁ decimal Inch	l ₂ Inch	l ₂ mm	l ₁ Inch	l ₁ mm	Pack Qty	R10CO R15CO R18CO	2ACO
Z		0.4130	3.7/8		5.1/4		6	015326	—
	10.50	0.4134		87		133	6	—	016305
27/64		0.4219	3.15/16		5.3/8		6	010327	—
	10.80	0.4252		94		142	6	—	016308
	11.00	0.4331		94		142	6	—	016310
7/16		0.4375	4.1/16		5.1/2		6	010328	—
	11.20	0.4409		94		142	6	—	016312
	11.50	0.4528		94		142	6	—	016315
29/64		0.4531	4.3/16		5.5/8		6	010329	—
	11.80	0.4646		94		142	6	—	016318
15/32		0.4687	4.5/16		5.3/4		6	010330	—
	12.00	0.4724		101		151	6	—	016320
	12.20	0.4803		101		151	6	—	016322
31/64		0.4844	4.3/8		5.7/8		6	010331	—
	12.50	0.4921		101		151	6	—	016325
1/2		0.5000	4.1/2		6"		6	010332	—
	13.00	0.5118		101		151	1	—	016330
33/64		0.5156	4.13/16		6.5/8		1	010333	—
17/32		0.5313	4.13/16		6.5/8		1	010334	—
35/64		0.5469	4.13/16		6.5/8		1	010335	—
9/16		0.5625	4.13/16		6.5/8		1	010336	—
37/64		0.5781	4.13/16		6.5/8		1	010337	—
19/32		0.5937	5.3/16		7.1/8		1	010338	—
39/64		0.6094	5.3/16		7.1/8		1	010339	—
5/8		0.6250	5.3/16		7.1/8		1	010340	—
41/64		0.6406	5.3/16		7.1/8		1	010341	—
21/32		0.6563	5.3/16		7.1/8		1	010342	—
43/64		0.6719	5.5/8		7.5/8		1	010343	—
11/16		0.6875	5.5/8		7.5/8		1	010344	—

COBALT JOBBER DRILL



Heavy Duty Jobber Length (NAS 907 Type D)

R88CO - Fractional Sizes

R89CO - Wire Gauge Sizes

Low thrust design self centering 135° Split Point for easier penetration. Shorter Flute Lengths. Cobalt base material with Bronze Oxide for wear resistance and lubricity.



R88CO

R89CO

ANSI

3XD

HSS-E

135°



1/16 - 1/2
N52 - N3

d ₁ Ø "/Nr.	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R88CO R89CO
1/16	0.0625	7/16	1.7/8	12	058704
52	0.0635	7/16	1.7/8	12	058852
51	0.0670	1/2	2"	12	058851
50	0.0700	1/2	2"	12	058850
49	0.0730	1/2	2"	12	058849
5/64	0.0781	1/2	2"	12	058705
46	0.0810	9/16	2.1/8	12	058846
45	0.0820	9/16	2.1/8	12	058845
44	0.0860	9/16	2.1/8	12	058844
43	0.0890	5/8	2.1/4	12	058843
42	0.0935	5/8	2.1/4	12	058842
3/32	0.0938	5/8	2.1/4	12	058706
41	0.0960	5/8	2.3/8	12	058841
40	0.0980	13/16	2.3/8	12	058840
39	0.0995	13/16	2.3/8	12	058839
36	0.1065	13/16	2.1/2	12	058836
7/64	0.1094	13/16	2.5/8	12	058707
31	0.1200	7/8	2.3/4	12	058831
1/8	0.1250	7/8	2.3/4	12	058708
30	0.1285	15/16	2.3/4	12	058830
29	0.1360	15/16	2.7/8	12	058829
9/64	0.1406	15/16	2.7/8	12	058709
27	0.1440	1"	3"	12	058827
26	0.1470	1"	3"	12	058826
25	0.1495	1"	3"	12	058825
24	0.1520	1"	3.1/8	12	058824
5/32	0.1563	1"	3.1/8	12	058710
22	0.1570	1.1/16	3.1/8	12	058822
21	0.1590	1.1/16	3.1/4	12	058821
20	0.1610	1.1/16	3.1/4	12	058820
11/64	0.1719	1.1/16	3.1/4	12	058711
16	0.1770	1.1/8	3.3/8	12	058816
13	0.1850	1.1/8	3.1/2	12	058813



COBALT JOBBER DRILL

d ₁ Ø "/Nr.	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R88CO R89CO
3/16	0.1875	1.1/8	3.1/2	12	058712
12	0.1890	1.1/8	3.1/2	12	058812
11	0.1910	1.3/16	3.1/2	12	058811
10	0.1935	1.3/16	3.5/8	12	058810
9	0.1960	1.3/16	3.5/8	12	058809
8	0.1990	1.3/16	3.5/8	12	058808
7	0.2010	1.3/16	3.5/8	12	058807
13/64	0.2031	1.3/16	3.5/8	12	058713
6	0.2040	1.1/4	3.3/4	12	058806
5	0.2055	1.1/4	3.3/4	12	058805
3	0.2130	1.1/4	3.3/4	12	058803
7/32	0.2188	1.1/4	3.3/4	12	058714
15/64	0.2344	1.5/16	3.7/8	12	058715
1/4	0.2500	1.3/8	4"	12	058716
17/64	0.2656	1.7/16	4.1/8	12	058717
9/32	0.2813	1.1/2	4.1/4	12	058718
19/64	0.2969	1.9/16	4.3/8	12	058719
5/16	0.3125	1.5/8	4.1/2	6	058720
21/64	0.3281	1.11/16	4.5/8	6	058721
11/32	0.3437	1.11/16	4.3/4	6	058722
23/64	0.3594	1.3/4	4.7/8	6	058723
3/8	0.3750	1.13/16	5"	6	058724
25/64	0.3906	1.7/8	5.1/8	6	058725
13/32	0.4063	1.15/16	5.1/4	6	058726
27/64	0.4219	2"	5.3/8	6	058727
7/16	0.4375	2.1/16	5.1/2	6	058728
29/64	0.4531	2.1/8	5.5/8	6	058729
15/32	0.4687	2.1/8	5.3/4	6	058730
31/64	0.4844	2.3/16	5.7/8	6	058731
1/2	0.5000	2.1/4	6"	6	058732

SCREW MACHINE DRILL



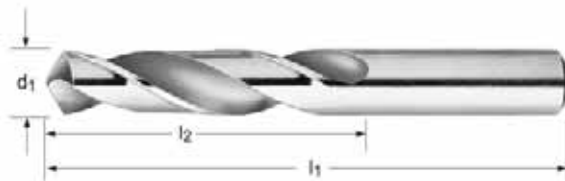
General Purpose Screw Machine Length

R40 - Fractional Sizes

R41 - Wire Gauge Sizes

R42 - Letter Sizes

Bright Finish improves chip flow in soft or non-ferrous materials



R40

R41

R42

ANSI

2.5XD

HSS



3/64 - 2"
N60 - N1
A - Z

d_1 Ø " / Nr. / letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R40 R41 R42
60	0.0400	1/2	1.3/8	12	041060
59	0.0410	1/2	1.3/8	12	041059
58	0.0420	1/2	1.3/8	12	041058
57	0.0430	1/2	1.3/8	12	041057
56	0.0465	1/2	1.3/8	12	041056
3/64	0.0469	1/2	1.3/8	12	040003
55	0.0520	5/8	1.5/8	12	041055
54	0.0550	5/8	1.5/8	12	041054
53	0.0595	5/8	1.5/8	12	041053
1/16	0.0625	5/8	1.5/8	12	040004
52	0.0635	11/16	1.11/16	12	041052
51	0.0670	11/16	1.11/16	12	041051
50	0.0700	11/16	1.11/16	12	041050
49	0.0730	11/16	1.11/16	12	041049
48	0.0760	11/16	1.11/16	12	041048
5/64	0.0781	11/16	1.11/16	12	040005
47	0.0785	11/16	1.11/16	12	041047
46	0.0810	3/4	1.3/4	12	041046
45	0.0820	3/4	1.3/4	12	041045
44	0.0860	3/4	1.3/4	12	041044
43	0.0890	3/4	1.3/4	12	041043
42	0.0935	3/4	1.3/4	12	041042
3/32	0.0938	3/4	1.3/4	12	040006
41	0.0960	13/16	1.13/16	12	041041
40	0.0980	13/16	1.13/16	12	041040
39	0.0995	13/16	1.13/16	12	041039
38	0.1015	13/16	1.13/16	12	041038
37	0.1040	13/16	1.13/16	12	041037
36	0.1065	13/16	1.13/16	12	041036
7/64	0.1094	13/16	1.13/16	12	040007
35	0.1100	7/8	1.7/8	12	041035
34	0.1110	7/8	1.7/8	12	041034
33	0.1130	7/8	1.7/8	12	041033



SCREW MACHINE DRILL

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R40 R41 R42
32	0.1160	7/8	1.7/8	12	041032
31	0.1200	7/8	1.7/8	12	041031
1/8	0.1250	7/8	1.7/8	12	040008
30	0.1285	15/16	1.15/16	12	041030
29	0.1360	15/16	1.15/16	12	041029
28	0.1405	15/16	1.15/16	12	041028
9/64	0.1406	15/16	1.15/16	12	040009
27	0.1440	1"	2.1/16	12	041027
26	0.1470	1"	2.1/16	12	041026
25	0.1495	1"	2.1/16	12	041025
24	0.1520	1"	2.1/16	12	041024
23	0.1540	1"	2.1/16	12	041023
5/32	0.1563	1"	2.1/16	12	040010
22	0.1570	1.1/16	2.1/8	12	041022
21	0.1590	1.1/16	2.1/8	12	041021
20	0.1610	1.1/16	2.1/8	12	041020
19	0.1660	1.1/16	2.1/8	12	041019
18	0.1695	1.1/16	2.1/8	12	041018
11/64	0.1719	1.1/16	2.1/8	12	040011
17	0.1730	1.1/8	2.3/16	12	041017
16	0.1770	1.1/8	2.3/16	12	041016
15	0.1800	1.1/8	2.3/16	12	041015
14	0.1820	1.1/8	2.3/16	12	041014
13	0.1850	1.1/8	2.3/16	12	041013
3/16	0.1875	1.1/8	2.3/16	12	040012
12	0.1890	1.3/16	2.1/4	12	041012
11	0.1910	1.3/16	2.1/4	12	041011
10	0.1935	1.3/16	2.1/4	12	041010
9	0.1960	1.3/16	2.1/4	12	041009
8	0.1990	1.3/16	2.1/4	12	041008
7	0.2010	1.3/16	2.1/4	12	041007
13/64	0.2031	1.3/16	2.1/4	12	040013
6	0.2040	1.1/4	2.3/8	12	041006
5	0.2055	1.1/4	2.3/8	12	041005
4	0.2090	1.1/4	2.3/8	12	041004
3	0.2130	1.1/4	2.3/8	12	041003
7/32	0.2188	1.1/4	2.3/8	12	040014
2	0.2210	1.5/16	2.7/16	12	041002
1	0.2280	1.5/16	2.7/16	12	041001
A	0.2340	1.5/16	2.7/16	12	042001
15/64	0.2344	1.5/16	2.7/16	12	040015
B	0.2374	1.3/8	2.1/2	12	042002
C	0.2421	1.3/8	2.1/2	12	042003
D	0.2461	1.3/8	2.1/2	12	042004
E	0.2500	1.3/8	2.1/2	12	042005
1/4	0.2500	1.3/8	2.1/2	12	040016
F	0.2571	1.7/16	2.5/8	12	042006
G	0.2610	1.7/16	2.5/8	12	042007
17/64	0.2656	1.7/16	2.5/8	12	040017
H	0.2661	1.1/2	2.11/16	12	042008
I	0.2720	1.1/2	2.11/16	12	042009
J	0.2772	1.1/2	2.11/16	12	042010
K	0.2811	1.1/2	2.11/16	12	042011
9/32	0.2813	1.1/2	2.11/16	12	040018
L	0.2902	1.9/16	2.3/4	12	042012
M	0.2949	1.9/16	2.3/4	12	042013
19/64	0.2969	1.9/16	2.3/4	12	040019
N	0.3020	1.5/8	2.13/16	12	042014
5/16	0.3125	1.5/8	2.13/16	6	040020
O	0.3161	1.11/16	2.15/16	6	042015
P	0.3228	1.11/16	2.15/16	6	042016
21/64	0.3281	1.11/16	2.15/16	6	040021
Q	0.3319	1.11/16	3"	6	042017
R	0.3390	1.11/16	3"	6	042018
11/32	0.3437	1.11/16	3"	6	040022
S	0.3480	1.3/4	3.1/16	6	042019

SCREW MACHINE DRILL

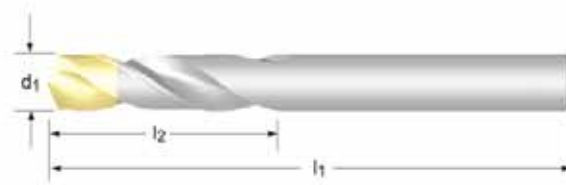


d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R40 R41 R42
T	0.3580	1.3/4	3.1/16	6	042020
23/64	0.3594	1.3/4	3.1/16	6	040023
U	0.3680	1.13/16	3.1/8	6	042021
3/8	0.3750	1.13/16	3.1/8	6	040024
V	0.3772	1.7/8	3.1/4	6	042022
W	0.3858	1.7/8	3.1/4	6	042023
25/64	0.3906	1.7/8	3.1/4	6	040025
X	0.3969	1.15/16	3.5/16	6	042024
Y	0.4039	1.15/16	3.5/16	6	042025
13/32	0.4063	1.15/16	3.5/16	6	040026
Z	0.4130	2"	3.3/8	6	042026
27/64	0.4219	2"	3.3/8	6	040027
7/16	0.4375	2.1/16	3.7/16	6	040028
29/64	0.4531	2.1/8	3.9/16	6	040029
15/32	0.4687	2.1/8	3.5/8	6	040030
31/64	0.4844	2.3/16	3.11/16	6	040031
1/2	0.5000	2.1/4	3.3/4	6	040032
33/64	0.5156	2.3/8	3.7/8	1	040033
17/32	0.5313	2.3/8	3.7/8	1	040034
35/64	0.5469	2.1/2	4"	1	040035
9/16	0.5625	2.1/2	4"	1	040036
37/64	0.5781	2.5/8	4.1/8	1	040037
19/32	0.5937	2.5/8	4.1/8	1	040038
39/64	0.6094	2.3/4	4.1/4	1	040039
5/8	0.6250	2.3/4	4.1/4	1	040040
41/64	0.6406	2.7/8	4.1/2	1	040041
21/32	0.6563	2.7/8	4.1/2	1	040042
43/64	0.6719	2.7/8	4.5/8	1	040043
11/16	0.6875	2.7/8	4.5/8	1	040044
45/64	0.7031	3"	4.3/4	1	040545
23/32	0.7188	3"	4.3/4	1	040546
47/64	0.7344	3.1/8	5"	1	040547
3/4	0.7500	3.1/8	5"	1	040548
49/64	0.7656	3.1/4	5.1/8	1	040549
25/32	0.7813	3.1/4	5.1/8	1	040550
51/64	0.7969	3.3/8	5.1/4	1	040551
13/16	0.8125	3.3/8	5.1/4	1	040552
53/64	0.8281	3.1/2	5.3/8	1	040553
27/32	0.8438	3.1/2	5.3/8	1	040554
55/64	0.8594	3.1/2	5.1/2	1	040555
7/8	0.8750	3.1/2	5.1/2	1	040556
57/64	0.8906	3.5/8	5.5/8	1	040557
29/32	0.9063	3.5/8	5.5/8	1	040558
59/64	0.9219	3.3/4	5.3/4	1	040559
15/16	0.9375	3.3/4	5.3/4	1	040560
61/64	0.9531	3.7/8	5.7/8	1	040561
31/32	0.9688	3.7/8	5.7/8	1	040562
63/64	0.9844	4"	6"	1	040563
1"	1.0000	4"	6"	1	040600
1.1/16	1.0626	4"	6.1/4	1	040604
1.1/8	1.1250	4"	6.3/8	1	040608
1.3/16	1.1875	4.1/4	6.5/8	1	040612
1.1/4	1.2500	4.3/8	6.3/4	1	040616
1.5/16	1.3125	4.3/8	7"	1	040620
1.3/8	1.3750	4.1/2	7.1/8	1	040624
1.7/16	1.4375	4.3/4	7.3/8	1	040628
1.1/2	1.5000	4.7/8	7.1/2	1	040632
1.9/16	1.5625	4.7/8	7.3/4	1	040636
1.5/8	1.6250	4.7/8	7.3/4	1	040640
1.11/16	1.6875	5.1/8	8"	1	040644
1.3/4	1.7500	5.1/8	8"	1	040648
1.13/16	1.8125	5.3/8	8.1/4	1	040652
1.7/8	1.8750	5.3/8	8.1/4	1	040656
1.15/16	1.9375	5.5/8	8.1/2	1	040660
2"	2.0000	5.5/8	8.1/2	1	040700

General Purpose Screw Machine Length

A022 Low thrust design self centering Split Point for easier penetration. TiN Coated Tip increases wear resistance and improves tool life.

Metric sizes to DIN1897 lengths.
Fractional sizes to ANSI lengths.



A022

DIN
ANSI

2.5XD

HSS

135°



0.50 - 16.00

d_1 $\varnothing h_8$ Inch	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A022
	0.50	0.0197	3	20	10	0600382
	0.60	0.0236	3.5	21	10	0600399
	0.70	0.0276	4.5	23	10	0600405
1/32	0.79	0.0311	13	35	10	0600542
	0.80	0.0315	5	24	10	0600412
	0.90	0.0354	5.5	25	10	0600429
	1.00	0.0394	6	26	10	0600436
	1.10	0.0433	7	28	10	0600443
3/64	1.19	0.0469	13	35	10	0600559
	1.20	0.0472	8	30	10	0600450
	1.30	0.0512	8	30	10	0600467
	1.40	0.0551	9	32	10	0600474
	1.50	0.0591	9	32	10	0600481
1/16	1.59	0.0626	16	41	10	0600535
	1.60	0.0630	10	34	10	0600498
	1.70	0.0669	10	34	10	0600504
	1.80	0.0709	11	36	10	0600511
	1.90	0.0748	11	36	10	0600528
5/64	1.98	0.0780	17	43	10	0600566
	2.00	0.0787	12	38	10	0600115
	2.10	0.0827	12	38	10	0600122
	2.20	0.0866	13	40	10	0600139
	2.25	0.0886	13	40	10	0600146
	2.30	0.0906	13	40	10	0600153
3/32	2.38	0.0937	20	45	10	0600238
	2.40	0.0945	14	43	10	0600160
	2.50	0.0984	14	43	10	0600177
	2.60	0.1024	14	43	10	0600184
	2.65	0.1043	14	43	10	0600191
	2.70	0.1063	16	46	10	0600207
7/64	2.78	0.1094	22	47	10	0600245
	2.80	0.1102	16	46	10	0600214
	2.90	0.1142	16	46	10	0600221

SCREW MACHINE DRILL



d_1 \varnothing_{h_8} Inch	d_1 \varnothing_{h_8} mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A022
	3.00	0.1181	16	46	10	0588697
	3.10	0.1220	18	49	10	0589083
1/8	3.18	0.1252	23	49	10	0588727
	3.20	0.1260	18	49	10	0589090
	3.25	0.1280	18	49	10	0589106
	3.30	0.1299	18	49	10	0589113
	3.40	0.1339	20	52	10	0589120
	3.50	0.1378	20	52	10	0589137
9/64	3.57	0.1406	25	50	10	0589878
	3.60	0.1417	20	52	10	0589144
	3.70	0.1457	20	52	10	0589151
	3.80	0.1496	22	55	10	0589168
	3.90	0.1535	22	55	10	0589175
5/32	3.97	0.1563	26	53	10	0589410
	4.00	0.1575	22	55	10	0589205
	4.10	0.1614	22	55	10	0589212
	4.20	0.1654	22	55	10	0589229
	4.30	0.1693	24	58	10	0589236
11/64	4.37	0.1720	28	55	10	0588932
	4.40	0.1732	24	58	10	0589243
	4.50	0.1772	24	58	10	0589250
	4.60	0.1811	24	58	10	0589267
	4.70	0.1850	24	58	10	0589274
3/16	4.76	0.1874	30	57	10	0589182
	4.80	0.1890	26	62	10	0589281
	4.90	0.1929	26	62	10	0589298
	5.00	0.1969	26	62	10	0589304
	5.10	0.2008	26	62	10	0589311
13/64	5.16	0.2031	31	58	10	0589014
	5.20	0.2047	26	62	10	0589328
	5.30	0.2087	26	62	10	0589335
	5.40	0.2126	28	66	10	0589342
	5.50	0.2165	28	66	10	0589359
7/32	5.56	0.2189	33	61	10	0589649
	5.60	0.2205	28	66	10	0589366
	5.70	0.2244	28	66	10	0589373
	5.80	0.2283	28	66	10	0589380
	5.90	0.2323	28	66	10	0589397
15/64	5.95	0.2343	34	63	10	0589069
	6.00	0.2362	28	66	10	0589434
	6.10	0.2402	31	70	10	0589441
	6.20	0.2441	31	70	10	0589458
	6.30	0.2480	31	70	10	0589465
1/4	6.35	0.2500	36	65	10	0588710
	6.40	0.2520	31	70	10	0589472
	6.50	0.2559	31	70	10	0589489
	6.60	0.2598	31	70	10	0589496
	6.70	0.2638	31	70	10	0589502
	6.80	0.2677	34	74	10	0589519
	6.90	0.2717	34	74	10	0589526
	7.00	0.2756	34	74	10	0589533
	7.10	0.2795	34	74	10	0589540
9/32	7.14	0.2811	40	70	10	0589861
	7.20	0.2835	34	74	10	0589557
	7.30	0.2874	34	74	10	0589564
	7.40	0.2913	34	74	10	0589571
	7.50	0.2953	34	74	10	0589588
	7.60	0.2992	37	79	10	0589595
	7.70	0.3031	37	79	10	0589601
	7.80	0.3071	37	79	10	0589618
	7.90	0.3110	37	79	10	0589625
5/16	7.94	0.3126	43	73	10	0589403
	8.00	0.3150	37	79	10	0589656
	8.10	0.3189	37	79	10	0589663
	8.20	0.3228	37	79	10	0589670
	8.30	0.3268	37	79	10	0589687

SCREW MACHINE DRILL

d_1 $\varnothing h_8$ Inch	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	A022
	8.40	0.3307	37	79	10	0589694
	8.50	0.3346	37	79	10	0589700
	8.60	0.3386	40	84	10	0589717
	8.70	0.3425	40	84	10	0589724
11/32	8.73	0.3437	45	78	10	0588925
	8.80	0.3465	40	84	10	0589731
	8.90	0.3504	40	84	10	0589748
	9.00	0.3543	40	84	10	0589755
	9.10	0.3583	40	84	10	0589762
	9.20	0.3622	40	84	10	0589779
	9.30	0.3661	40	84	10	0589786
	9.40	0.3701	40	84	10	0589793
	9.50	0.3740	40	84	10	0589809
3/8	9.52	0.3748	48	81	10	0589199
	9.60	0.3780	43	89	10	0589816
	9.70	0.3819	43	89	10	0589823
	9.80	0.3858	43	89	10	0589830
	9.90	0.3898	43	89	10	0589847
	10.00	0.3937	43	89	10	0588734
	10.10	0.3976	43	89	5	0588741
	10.20	0.4016	43	89	5	0588758
	10.30	0.4055	43	89	5	0588765
13/32	10.32	0.4063	51	86	5	0589007
	10.40	0.4094	43	89	5	0588772
	10.50	0.4134	43	89	5	0588789
	10.60	0.4173	43	89	5	0588796
	10.70	0.4213	47	95	5	0588802
	10.80	0.4252	47	95	5	0588819
	10.90	0.4291	47	95	5	0588826
	11.00	0.4331	47	95	5	0588833
	11.10	0.4370	47	95	5	0588840
7/16	11.11	0.4374	54	89	5	0589632
	11.20	0.4409	47	95	5	0588857
	11.30	0.4449	47	95	5	0588864
	11.50	0.4528	47	95	5	0588871
	11.60	0.4567	47	95	5	0588888
	11.70	0.4606	47	95	5	0588895
	11.80	0.4646	47	95	5	0588901
	11.90	0.4685	51	102	5	0588918
	12.00	0.4724	51	102	5	0588949
	12.10	0.4764	51	102	5	0588956
	12.20	0.4803	51	102	5	0588963
	12.50	0.4921	51	102	5	0588970
1/2	12.70	0.5000	60	98	5	0588703
	13.00	0.5118	51	102	5	0588987
	13.50	0.5315	54	107	1	0588994
	14.00	0.5512	54	107	1	0589021
9/16	14.29	0.5626	67	105	1	0589854
	14.50	0.5709	56	111	1	0589038
	15.00	0.5906	56	111	1	0589045
	15.50	0.6102	58	115	1	0589052
5/8	15.88	0.6252	73	111	1	0589427
	16.00	0.6299	58	115	1	0589076

SCREW MACHINE DRILL



Heavy Duty Screw Machine Length (NAS 907 Type C)

R40C - Fractional Sizes

R41C - Wire Gauge Sizes

R42C - Letter Sizes

Low thrust design self centering Split Point for easier penetration.
Steam Oxide surface treatment for increased wear resistance and lubricity.



R40C

R41C

R42C

ANSI

2.5XD

HSS



1/16 - 1/2
N60 - N1
A - Z

d_1 Ø "Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R40C R41C R42C
60	0.0400	1/2	1.3/8	12	041860 ¹⁾
59	0.0410	1/2	1.3/8	12	041859 ¹⁾
58	0.0420	1/2	1.3/8	12	041858 ¹⁾
57	0.0430	1/2	1.3/8	12	041857 ¹⁾
56	0.0465	1/2	1.3/8	12	041856 ¹⁾
55	0.0520	5/8	1.5/8	12	041855 ¹⁾
54	0.0550	5/8	1.5/8	12	041854 ¹⁾
53	0.0595	5/8	1.5/8	12	041853 ¹⁾
1/16	0.0625	5/8	1.5/8	12	040804
52	0.0635	11/16	1.11/16	12	041852
51	0.0670	11/16	1.11/16	12	041851
50	0.0700	11/16	1.11/16	12	041850
49	0.0730	11/16	1.11/16	12	041849
48	0.0760	11/16	1.11/16	12	041848
5/64	0.0781	11/16	1.11/16	12	040805
47	0.0785	11/16	1.11/16	12	041847
46	0.0810	3/4	1.3/4	12	041846
45	0.0820	3/4	1.3/4	12	041845
44	0.0860	3/4	1.3/4	12	041844
43	0.0890	3/4	1.3/4	12	041843
42	0.0935	3/4	1.3/4	12	041842
3/32	0.0938	3/4	1.3/4	12	040806
41	0.0960	13/16	1.13/16	12	041841
40	0.0980	13/16	1.13/16	12	041840
39	0.0995	13/16	1.13/16	12	041839
38	0.1015	13/16	1.13/16	12	041838
37	0.1040	13/16	1.13/16	12	041837
36	0.1065	13/16	1.13/16	12	041836
7/64	0.1094	13/16	1.13/16	12	040807
35	0.1100	7/8	1.7/8	12	041835
34	0.1110	7/8	1.7/8	12	041834
33	0.1130	7/8	1.7/8	12	041833

¹⁾ Not Split Point

DRILLS



SCREW MACHINE DRILL

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R40C R41C R42C
32	0.1160	7/8	1.7/8	12	041832
31	0.1200	7/8	1.7/8	12	041831
1/8	0.1250	7/8	1.7/8	12	040808
30	0.1285	15/16	1.15/16	12	041830
29	0.1360	15/16	1.15/16	12	041829
28	0.1405	15/16	1.15/16	12	041828
9/64	0.1406	15/16	1.15/16	12	040809
27	0.1440	1"	2.1/16	12	041827
26	0.1470	1"	2.1/16	12	041826
25	0.1495	1"	2.1/16	12	041825
24	0.1520	1"	2.1/16	12	041824
23	0.1540	1"	2.1/16	12	041823
5/32	0.1563	1"	2.1/16	12	040810
22	0.1570	1.1/16	2.1/8	12	041822
21	0.1590	1.1/16	2.1/8	12	041821
20	0.1610	1.1/16	2.1/8	12	041820
19	0.1660	1.1/16	2.1/8	12	041819
18	0.1695	1.1/16	2.1/8	12	041818
11/64	0.1719	1.1/16	2.1/8	12	040811
17	0.1730	1.1/8	2.3/16	12	041817
16	0.1770	1.1/8	2.3/16	12	041816
15	0.1800	1.1/8	2.3/16	12	041815
14	0.1820	1.1/8	2.3/16	12	041814
13	0.1850	1.1/8	2.3/16	12	041813
3/16	0.1875	1.1/8	2.3/16	12	040812
12	0.1890	1.3/16	2.1/4	12	041812
11	0.1910	1.3/16	2.1/4	12	041811
10	0.1935	1.3/16	2.1/4	12	041810
9	0.1960	1.3/16	2.1/4	12	041809
8	0.1990	1.3/16	2.1/4	12	041808
7	0.2010	1.3/16	2.1/4	12	041807
13/64	0.2031	1.3/16	2.1/4	12	040813
6	0.2040	1.1/4	2.3/8	12	041806
5	0.2055	1.1/4	2.3/8	12	041805
4	0.2090	1.1/4	2.3/8	12	041804
3	0.2130	1.1/4	2.3/8	12	041803
7/32	0.2188	1.1/4	2.3/8	12	040814
2	0.2210	1.5/16	2.7/16	12	041802
1	0.2280	1.5/16	2.7/16	12	041801
A	0.2340	1.5/16	2.7/16	12	042801
15/64	0.2344	1.5/16	2.7/16	12	040815
B	0.2374	1.3/8	2.1/2	12	042802
C	0.2421	1.3/8	2.1/2	12	042803
D	0.2461	1.3/8	2.1/2	12	042804
E	0.2500	1.3/8	2.1/2	12	042805
1/4	0.2500	1.3/8	2.1/2	12	040816
F	0.2571	1.7/16	2.5/8	12	042806
G	0.2610	1.7/16	2.5/8	12	042807
17/64	0.2656	1.7/16	2.5/8	12	040817
H	0.2661	1.1/2	2.11/16	12	042808
I	0.2720	1.1/2	2.11/16	12	042809
J	0.2772	1.1/2	2.11/16	12	042810
K	0.2811	1.1/2	2.11/16	12	042811
9/32	0.2813	1.1/2	2.11/16	12	040818
L	0.2992	1.9/16	2.3/4	12	042812
M	0.2949	1.9/16	2.3/4	12	042813
19/64	0.2969	1.9/16	2.3/4	12	040819
N	0.3020	1.5/8	2.13/16	12	042814
5/16	0.3125	1.5/8	2.13/16	6	040820
O	0.3161	1.11/16	2.15/16	6	042815
P	0.3228	1.11/16	2.15/16	6	042816
21/64	0.3281	1.11/16	2.15/16	6	040821
Q	0.3319	1.11/16	3"	6	042817
R	0.3390	1.11/16	3"	6	042818
11/32	0.3437	1.11/16	3"	6	040822

SCREW MACHINE DRILL



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R40C R41C R42C
S	0.3480	1.3/4	3.1/16	6	042819
T	0.3580	1.3/4	3.1/16	6	042820
23/64	0.3594	1.3/4	3.1/16	6	040823
U	0.3680	1.13/16	3.1/8	6	042821
3/8	0.3750	1.13/16	3.1/8	6	040824
V	0.3772	1.7/8	3.1/4	6	042822
W	0.3858	1.7/8	3.1/4	6	042823
25/64	0.3906	1.7/8	3.1/4	6	040825
X	0.3969	1.15/16	3.5/16	6	042824
Y	0.4039	1.15/16	3.5/16	6	042825
13/32	0.4063	1.15/16	3.5/16	6	040826
Z	0.4130	2"	3.3/8	6	042826
27/64	0.4219	2"	3.3/8	6	040827
7/16	0.4375	2.1/16	3.7/16	6	040828
29/64	0.4531	2.1/8	3.9/16	6	040829
15/32	0.4687	2.1/8	3.5/8	6	040830
31/64	0.4844	2.3/16	3.11/16	6	040831
1/2	0.5000	2.1/4	3.3/4	6	040832

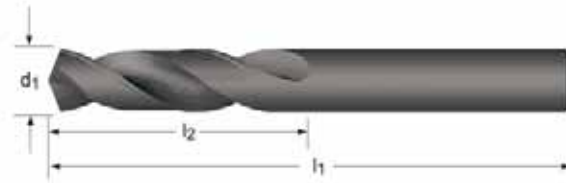
DRILLS



SCREW MACHINE DRILL

Heavy Duty Screw Machine Length (NAS 907 Type C), Metric

4ASM Low thrust design self centering Split Point for easier penetration.
Steam Oxide surface treatment for increased wear resistance & lubricity.



4ASM

DIN
1897

2.5XD

HSS

135°



1.00 - 12.50

d ₁ Ø mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	4ASM
1.00	0.0394	6	22	12	046100 ¹⁾
1.25	0.0492	8	30	12	046125 ¹⁾
1.30	0.0512	8	30	12	046130 ¹⁾
1.65	0.0650	11	34	12	046165
2.00	0.0787	12	38	12	046200
2.30	0.0906	13	40	12	046230
2.40	0.0945	14	43	12	046240
2.50	0.0984	14	43	12	046250
3.00	0.1181	16	46	12	046300
3.10	0.1220	18	49	12	046310
3.20	0.1260	18	49	12	046320
3.30	0.1299	18	49	12	046330
3.40	0.1339	20	52	12	046340
3.50	0.1378	20	52	12	046350
3.70	0.1457	20	52	12	046370
4.00	0.1575	22	55	12	046400
4.20	0.1654	22	55	12	046420
4.50	0.1772	24	58	12	046450
5.00	0.1969	26	62	12	046500
5.50	0.2165	28	66	12	046550
5.70	0.2244	28	66	12	046570
5.80	0.2283	28	66	12	046580
6.00	0.2362	28	66	12	046600
6.20	0.2441	31	70	12	046620
6.40	0.2520	31	70	12	046640
6.50	0.2559	31	70	12	046650
6.60	0.2598	31	70	12	046660
6.80	0.2677	34	74	12	046680
6.90	0.2717	34	74	12	046690
7.00	0.2756	34	74	12	046700
7.20	0.2835	34	74	12	046720
7.50	0.2953	37	79	12	046750

¹⁾ Not Split Point

SCREW MACHINE DRILL



d_1 Ø mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	4ASM
8.00	0.3150	37	79	6	046800
8.10	0.3189	37	79	6	046810
8.40	0.3307	37	79	6	046840
8.50	0.3346	37	79	6	046850
8.70	0.3425	40	84	6	046870
9.00	0.3543	40	84	6	046900
9.10	0.3583	40	84	6	046910
9.20	0.3622	40	84	6	046920
9.30	0.3661	40	84	6	046930
9.50	0.3740	40	84	6	046950
9.70	0.3819	43	89	6	046970
10.00	0.3937	43	89	6	047000
10.20	0.4016	43	89	6	047002
10.50	0.4134	43	89	6	047005
10.80	0.4252	47	95	6	047008
11.00	0.4331	47	95	6	047110
11.20	0.4409	47	95	6	047112
11.50	0.4528	47	95	6	047115
11.80	0.4646	47	95	6	047118
12.00	0.4724	51	102	6	047200
12.20	0.4803	51	102	6	047220
12.50	0.4921	51	102	6	047250

DRILLS



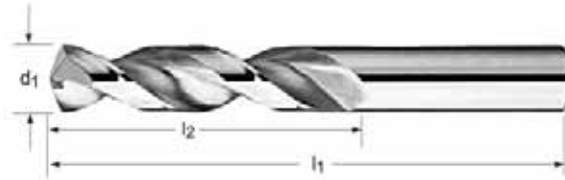
SCREW MACHINE DRILL

General Purpose Screw Machine Length Parabolic Flute

Heavy-Duty Parabolic Flute design for efficient chip removal.
Allows greater drilling depths in one pass. Low thrust design self centering Split Point for easier penetration.

QC41P Bright Finish improves chip flow in soft or non-ferrous materials.

QC41G TiN Coating increases wear resistance and improves tool life.



QC41P	QC41G
1/16 - 11/16	1/16 - 1/2

d ₁ Ø "/Nr.	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	QC41P	QC41G
1/16	0.0625	5/8	1.5/8	12	058304	062304
5/64	0.0781	11/16	1.11/16	12	058305	062305
3/32	0.0938	3/4	1.3/4	12	058306	062306
40	0.0980	13/16	1.13/16	12	060040	061440
39	0.0995	13/16	1.13/16	12	060039	061439
38	0.1015	13/16	1.13/16	12	060038	061438
37	0.1040	13/16	1.13/16	12	060037	061437
36	0.1065	13/16	1.13/16	12	060036	061436
7/64	0.1094	13/16	1.13/16	12	058307	062307
35	0.1100	7/8	1.7/8	12	060035	061435
34	0.1110	7/8	1.7/8	12	060034	061434
33	0.1130	7/8	1.7/8	12	060033	061433
32	0.1160	7/8	1.7/8	12	060032	061432
31	0.1200	7/8	1.7/8	12	060031	061431
1/8	0.1250	7/8	1.7/8	12	058308	062308
30	0.1285	15/16	1.15/16	12	060030	061430
29	0.1360	15/16	1.15/16	12	060029	061429
28	0.1405	15/16	1.15/16	12	060028	061428
9/64	0.1406	15/16	1.15/16	12	058309	062309
27	0.1440	1"	2.1/16	12	060027	061427
26	0.1470	1"	2.1/16	12	060026	061426
25	0.1495	1"	2.1/16	12	060025	061425
24	0.1520	1"	2.1/16	12	060024	061424
23	0.1540	1"	2.1/16	12	060023	061423
5/32	0.1563	1"	2.1/16	12	058310	062310
22	0.1570	1.1/16	2.1/8	12	060022	061422
21	0.1590	1.1/16	2.1/8	12	060021	061421
20	0.1610	1.1/16	2.1/8	12	060020	061420
19	0.1660	1.1/16	2.1/8	12	060019	061419
18	0.1695	1.1/16	2.1/8	12	060018	061418
11/64	0.1719	1.1/16	2.1/8	12	058311	062311
17	0.1730	1.1/8	2.3/16	12	060017	061417
16	0.1770	1.1/8	2.3/16	12	060016	061416

SCREW MACHINE DRILL



d ₁ Ø "/Nr.	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	QC41P	QC41G
15	0.1800	1.1/8	2.3/16	12	060015	061415
14	0.1820	1.1/8	2.3/16	12	060014	061414
13	0.1850	1.1/8	2.3/16	12	060013	061413
3/16	0.1875	1.1/8	2.3/16	12	058312	062312
12	0.1890	1.3/16	2.1/4	12	060012	061412
11	0.1910	1.3/16	2.1/4	12	060011	061411
10	0.1935	1.3/16	2.1/4	12	060010	061410
9	0.1960	1.3/16	2.1/4	12	060009	061409
8	0.1990	1.3/16	2.1/4	12	060008	061408
7	0.2010	1.3/16	2.1/4	12	060007	061407
13/64	0.2031	1.3/16	2.1/4	12	058313	062313
6	0.2040	1.1/4	2.3/8	12	060006	061406
5	0.2055	1.1/4	2.3/8	12	060005	061405
4	0.2090	1.1/4	2.3/8	12	060004	061404
3	0.2130	1.1/4	2.3/8	12	060003	061403
7/32	0.2188	1.1/4	2.3/8	12	058314	062314
2	0.2210	1.5/16	2.7/16	12	060002	061402
1	0.2280	1.5/16	2.7/16	12	060001	061401
15/64	0.2344	1.5/16	2.7/16	12	058315	062315
1/4	0.2500	1.3/8	2.1/2	12	058316	062316
17/64	0.2656	1.7/16	2.5/8	12	058317	062317
9/32	0.2812	1.1/2	2.11/16	12	058318	062318
19/64	0.2969	1.9/16	2.3/4	12	058319	062319
5/16	0.3125	1.5/8	2.13/16	6	058320	062320
21/64	0.3281	1.11/16	2.15/16	6	058321	062321
11/32	0.3437	1.11/16	3"	6	058322	062322
23/64	0.3594	1.3/4	3.1/16	6	058323	062323
3/8	0.3750	1.13/16	3.1/8	6	058324	062324
25/64	0.3906	1.7/8	3.1/4	6	058325	062325
13/32	0.4063	1.15/16	3.5/16	6	058326	062326
27/64	0.4219	2"	3.3/8	6	058327	062327
7/16	0.4375	2.1/16	3.7/16	6	058328	062328
29/64	0.4531	2.1/8	3.9/16	6	058329	062329
15/32	0.4687	2.1/8	3.5/8	6	058330	062330
31/64	0.4844	2.3/16	3.3/4	6	058331	062331
1/2	0.5000	2.1/4	3.3/4	6	058332	062332
33/64	0.5156	2.3/8	3.7/8	1	058333	—
17/32	0.5313	2.3/8	3.7/8	1	058334	—
35/64	0.5469	2.1/2	4"	1	058335	—
9/16	0.5625	2.1/2	4"	1	058336	—
37/64	0.5781	2.5/8	4.1/8	1	058337	—
19/32	0.5937	2.5/8	4.1/8	1	058338	—
39/64	0.6094	2.3/4	4.1/4	1	058339	—
5/8	0.6250	2.3/4	4.1/4	1	058340	—
41/64	0.6406	2.7/8	4.1/2	1	058341	—
21/32	0.6563	2.7/8	4.1/2	1	058342	—
43/64	0.6719	2.7/8	4.5/8	1	058343	—
11/16	0.6875	2.7/8	4.5/8	1	058344	—



COBALT SCREW MACHINE DRILL

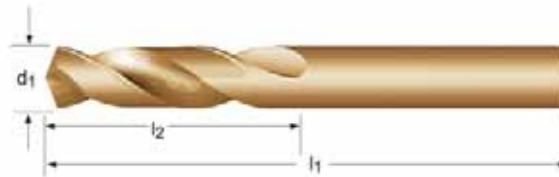
Heavy Duty Screw Machine Length

M40CO - Fractional Sizes

M41CO - Wire Gauge Sizes

M42CO - Letter Sizes

Low thrust design self centering 135° Split Point for easier penetration. Cobalt base material with Bronze Oxide for wear resistance and lubricity.



M40CO
M41CO
M42CO

ANSI
2.5XD
HSS-E
135°

1/16 - 3/4
N60 - N1
A - Z

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	M40CO M41CO M42CO
60	0.0400	1/2	1.3/8	12	041360 ¹⁾
59	0.0410	1/2	1.3/8	12	041359 ¹⁾
58	0.0420	1/2	1.3/8	12	041358 ¹⁾
57	0.0430	1/2	1.3/8	12	041357 ¹⁾
56	0.0465	1/2	1.3/8	12	041356 ¹⁾
55	0.0520	5/8	1.5/8	12	041355 ¹⁾
54	0.0550	5/8	1.5/8	12	041354 ¹⁾
53	0.0595	5/8	1.5/8	12	041353 ¹⁾
1/16	0.0625	5/8	1.5/8	12	040304
52	0.0635	11/16	1.11/16	12	041352
51	0.0670	11/16	1.11/16	12	041351
50	0.0700	11/16	1.11/16	12	041350
49	0.0730	11/16	1.11/16	12	041349
48	0.0760	11/16	1.11/16	12	041348
5/64	0.0781	11/16	1.11/16	12	040305
47	0.0785	11/16	1.11/16	12	041347
46	0.0810	3/4	1.3/4	12	041346
45	0.0820	3/4	1.3/4	12	041345
44	0.0860	3/4	1.3/4	12	041344
43	0.0890	3/4	1.3/4	12	041343
42	0.0935	3/4	1.3/4	12	041342
3/32	0.0938	3/4	1.3/4	12	040306
41	0.0960	13/16	1.13/16	12	041341
40	0.0980	13/16	1.13/16	12	041340
39	0.0995	13/16	1.13/16	12	041339
38	0.1015	13/16	1.13/16	12	041338
37	0.1040	13/16	1.13/16	12	041337
36	0.1065	13/16	1.13/16	12	041336
7/64	0.1094	13/16	1.13/16	12	040307
35	0.1100	7/8	1.7/8	12	041335
34	0.1110	7/8	1.7/8	12	041334
33	0.1130	7/8	1.7/8	12	041333

¹⁾ Not Split Point

COBALT SCREW MACHINE DRILL



d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	M40CO M41CO M42CO
32	0.1160	7/8	1.7/8	12	041332
31	0.1200	7/8	1.7/8	12	041331
1/8	0.1250	7/8	1.7/8	12	040308
30	0.1285	15/16	1.15/16	12	041330
29	0.1360	15/16	1.15/16	12	041329
28	0.1405	15/16	1.15/16	12	041328
9/64	0.1406	15/16	1.15/16	12	040309
27	0.1440	1"	2.1/16	12	041327
26	0.1470	1"	2.1/16	12	041326
25	0.1495	1"	2.1/16	12	041325
24	0.1520	1"	2.1/16	12	041324
23	0.1540	1"	2.1/16	12	041323
5/32	0.1563	1"	2.1/16	12	040310
22	0.1570	1.1/16	2.1/8	12	041322
21	0.1590	1.1/16	2.1/8	12	041321
20	0.1610	1.1/16	2.1/8	12	041320
19	0.1660	1.1/16	2.1/8	12	041319
18	0.1695	1.1/16	2.1/8	12	041318
11/64	0.1719	1.1/16	2.1/8	12	040311
17	0.1730	1.1/8	2.3/16	12	041317
16	0.1770	1.1/8	2.3/16	12	041316
15	0.1800	1.1/8	2.3/16	12	041315
14	0.1820	1.1/8	2.3/16	12	041314
13	0.1850	1.1/8	2.3/16	12	041313
3/16	0.1875	1.1/8	2.3/16	12	040312
12	0.1890	1.3/16	2.1/4	12	041312
11	0.1910	1.3/16	2.1/4	12	041311
10	0.1935	1.3/16	2.1/4	12	041310
9	0.1960	1.3/16	2.1/4	12	041309
8	0.1990	1.3/16	2.1/4	12	041308
7	0.2010	1.3/16	2.1/4	12	041307
13/64	0.2031	1.3/16	2.1/4	12	040313
6	0.2040	1.1/4	2.3/8	12	041306
5	0.2055	1.1/4	2.3/8	12	041305
4	0.2090	1.1/4	2.3/8	12	041304
3	0.2130	1.1/4	2.3/8	12	041303
7/32	0.2188	1.1/4	2.3/8	12	040314
2	0.2210	1.5/16	2.7/16	12	041302
1	0.2280	1.5/16	2.7/16	12	041301
A	0.2340	1.5/16	2.7/16	12	042301
15/64	0.2344	1.5/16	2.7/16	12	040315
B	0.2374	1.3/8	2.1/2	12	042302
C	0.2421	1.3/8	2.1/2	12	042303
D	0.2461	1.3/8	2.1/2	12	042304
E	0.2500	1.3/8	2.1/2	12	042305
1/4	0.2500	1.3/8	2.1/2	12	040316
F	0.2571	1.7/16	2.5/8	12	042306
G	0.2610	1.7/16	2.5/8	12	042307
17/64	0.2656	1.7/16	2.5/8	12	040317
H	0.2661	1.1/2	2.11/16	12	042308
I	0.2720	1.1/2	2.11/16	12	042309
J	0.2772	1.1/2	2.11/16	12	042310
K	0.2811	1.1/2	2.11/16	12	042311
9/32	0.2813	1.1/2	2.11/16	12	040318
L	0.2902	1.9/16	2.3/4	12	042312
M	0.2949	1.9/16	2.3/4	12	042313
19/64	0.2969	1.9/16	2.3/4	12	040319
N	0.3020	1.5/8	2.13/16	12	042314
5/16	0.3125	1.5/8	2.13/16	6	040320
O	0.3160	1.11/16	2.15/16	6	042315
P	0.3228	1.11/16	2.15/16	6	042316
21/64	0.3281	1.11/16	2.15/16	6	040321
Q	0.3319	1.11/16	3"	6	042317
R	0.3390	1.11/16	3"	6	042318
11/32	0.3437	1.11/16	3"	6	040322
S	0.3480	1.3/4	3.1/16	6	042319



COBALT SCREW MACHINE DRILL

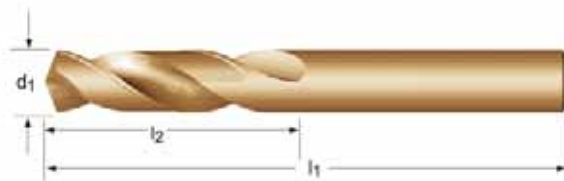
d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	M40CO M41CO M42CO
T	0.3580	1.3/4	3.1/16	6	042320
23/64	0.3594	1.3/4	3.1/16	6	040323
U	0.3680	1.13/16	3.1/8	6	042321
3/8	0.3750	1.13/16	3.1/8	6	040324
V	0.3772	1.7/8	3.1/4	6	042322
W	0.3858	1.7/8	3.1/4	6	042323
25/64	0.3906	1.7/8	3.1/4	6	040325
X	0.3969	1.15/16	3.5/16	6	042324
Y	0.4039	1.15/16	3.5/16	6	042325
13/32	0.4063	1.15/16	3.5/16	6	040326
Z	0.4130	2"	3.3/8	6	042326
27/64	0.4219	2"	3.3/8	6	040327
7/16	0.4375	2.1/16	3.7/16	6	040328
29/64	0.4531	2.1/8	3.9/16	6	040329
15/32	0.4687	2.1/8	3.5/8	6	040330
31/64	0.4844	2.3/16	3.11/16	6	040331
1/2	0.5000	2.1/4	3.3/4	6	040332
33/64	0.5156	2.3/8	3.7/8	1	046033
17/32	0.5313	2.3/8	3.7/8	1	046034
35/64	0.5469	2.1/2	4"	1	046035
9/16	0.5625	2.1/2	4"	1	046036
37/64	0.5781	2.5/8	4.1/8	1	046037
19/32	0.5937	2.5/8	4.1/8	1	046038
39/64	0.6094	2.3/4	4.1/4	1	046039
5/8	0.6250	2.3/4	4.1/4	1	046040
41/64	0.6406	2.7/8	4.1/2	1	046041
21/32	0.6563	2.7/8	4.1/2	1	046042
43/64	0.6719	2.7/8	4.5/8	1	046043
11/16	0.6875	2.7/8	4.5/8	1	046044
45/64	0.7031	3"	4.3/4	1	046045
23/32	0.7188	3"	4.3/4	1	046046
47/64	0.7344	3.1/8	5"	1	046047
3/4	0.7500	3.1/8	5"	1	046048

COBALT SCREW MACHINE DRILL



Heavy Duty Screw Machine Length, Metric

4ASMCO Low thrust design self centering 135° Split Point for easier penetration. Cobalt base material with Bronze Oxide for wear resistance and lubricity.



4ASMCO

DIN
1897

2.5XD

HSS-E

λ 135°



2.30 - 12.00

d_1 Ø mm	d_1 decimal Inch	l_2 mm	l_1 mm	Pack Qty	4ASMCO
2.30	0.0906	13	40	12	032230
2.50	0.0984	14	43	12	032250
3.00	0.1181	16	46	12	032300
3.10	0.1220	18	49	12	032310
3.20	0.1260	18	49	12	032320
3.30	0.1299	18	49	12	032330
3.40	0.1339	20	52	12	032340
3.50	0.1378	20	52	12	032350
3.60	0.1417	20	52	12	032360
3.70	0.1457	20	52	12	032370
4.00	0.1575	22	55	12	032400
4.10	0.1614	22	55	12	032410
4.20	0.1654	22	55	12	032420
4.70	0.1850	24	58	12	032470
4.80	0.1890	26	62	12	032480
4.90	0.1929	26	62	12	032490
5.00	0.1969	26	62	12	032500
5.10	0.2008	26	62	12	032510
5.50	0.2165	28	66	12	032550
5.70	0.2244	28	66	12	032570
6.00	0.2362	28	66	12	032600
6.40	0.2520	31	70	12	032640
6.50	0.2559	31	70	12	032650
6.80	0.2677	34	74	12	032680
7.00	0.2756	34	74	12	032700
8.00	0.3150	37	79	6	032800
8.50	0.3346	37	79	6	032850
9.50	0.3740	40	84	6	032950
9.80	0.3858	43	89	6	032980
10.00	0.3937	43	89	6	033000
10.20	0.4016	43	89	6	033002
10.50	0.4134	43	89	6	033005
11.00	0.4331	47	95	6	033110
11.20	0.4409	47	95	6	033112
11.50	0.4528	47	95	6	033115
12.00	0.4724	51	102	6	033200



TAPER LENGTH DRILL

General Purpose Taper Length

R51 - Fractional Sizes

R52 - Wire Gauge Sizes

R55 - Letter Sizes

Bright finish improves chip flow in soft or non-ferrous materials.
Longer flute and Overall length for depth and reach.



R51

R52

R55

ANSI

6XD

HSS

118°



1/64 - 1.3/4
N80 - N1
A - Z

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R51 R52 R55
80	0.0135	5/16	1.1/2	12	052080
79	0.0145	5/16	1.1/2	12	052079
1/64	0.0156	5/16	1.1/2	12	051001
78	0.0160	5/16	1.1/2	12	052078
77	0.0180	5/16	1.1/2	12	052077
76	0.0200	5/16	1.1/2	12	052076
75	0.0210	5/16	1.1/2	12	052075
74	0.0225	5/16	1.1/2	12	052074
73	0.0240	5/16	1.1/2	12	052073
72	0.0250	5/16	1.1/2	12	052072
71	0.0260	3/4	2"	12	052071
70	0.0280	3/4	2"	12	052070
69	0.0292	3/4	2"	12	052069
68	0.0310	3/4	2"	12	052068
1/32	0.0313	3/4	2"	12	051002
67	0.0320	3/4	2"	12	052067
66	0.0330	3/4	2"	12	052066
65	0.0350	3/4	2"	12	052065
64	0.0360	3/4	2"	12	052064
63	0.0370	3/4	2"	12	052063
62	0.0380	3/4	2"	12	052062
61	0.0390	1.1/8	2.1/4	12	052061
60	0.0400	1.1/8	2.1/4	12	052060
59	0.0410	1.1/8	2.1/4	12	052059
58	0.0420	1.1/8	2.1/4	12	052058
57	0.0430	1.1/8	2.1/4	12	052057
56	0.0465	1.1/8	2.1/4	12	052056
3/64	0.0469	1.1/8	2.1/4	12	051003
55	0.0520	1.3/4	3"	12	052055
54	0.0550	1.3/4	3"	12	052054
53	0.0595	1.3/4	3"	12	052053
1/16	0.0625	1.3/4	3"	12	051004
52	0.0635	2"	3.3/4	12	052052

TAPER LENGTH DRILL



d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R51 R52 R55
51	0.0670	2"	3.3/4	12	052051
50	0.0700	2"	3.3/4	12	052050
49	0.0730	2"	3.3/4	12	052049
48	0.0760	2"	3.3/4	12	052048
5/64	0.0781	2"	3.3/4	12	051005
47	0.0785	2.1/4	4.1/4	12	052047
46	0.0810	2.1/4	4.1/4	12	052046
45	0.0820	2.1/4	4.1/4	12	052045
44	0.0860	2.1/4	4.1/4	12	052044
43	0.0890	2.1/4	4.1/4	12	052043
42	0.0935	2.1/4	4.1/4	12	052042
3/32	0.0938	2.1/4	4.1/4	12	051006
41	0.0960	2.1/2	4.5/8	12	052041
40	0.0980	2.1/2	4.5/8	12	052040
39	0.0995	2.1/2	4.5/8	12	052039
38	0.1015	2.1/2	4.5/8	12	052038
37	0.1040	2.1/2	4.5/8	12	052037
36	0.1065	2.1/2	4.5/8	12	052036
7/64	0.1094	2.1/2	4.5/8	12	051007
35	0.1100	2.3/4	5.1/8	12	052035
34	0.1110	2.3/4	5.1/8	12	052034
33	0.1130	2.3/4	5.1/8	12	052033
32	0.1160	2.3/4	5.1/8	12	052032
31	0.1200	2.3/4	5.1/8	12	052031
1/8	0.1250	2.3/4	5.1/8	12	051008
30	0.1285	3"	5.3/8	12	052030
29	0.1360	3"	5.3/8	12	052029
28	0.1405	3"	5.3/8	12	052028
9/64	0.1406	3"	5.3/8	12	051009
27	0.1440	3"	5.3/8	12	052027
26	0.1470	3"	5.3/8	12	052026
25	0.1495	3"	5.3/8	12	052025
24	0.1520	3"	5.3/8	12	052024
23	0.1540	3"	5.3/8	12	052023
5/32	0.1563	3"	5.3/8	12	051010
22	0.1570	3.3/8	5.3/4	12	052022
21	0.1590	3.3/8	5.3/4	12	052021
20	0.1610	3.3/8	5.3/4	12	052020
19	0.1660	3.3/8	5.3/4	12	052019
18	0.1695	3.3/8	5.3/4	12	052018
11/64	0.1719	3.3/8	5.3/4	12	051011
17	0.1730	3.3/8	5.3/4	12	052017
16	0.1770	3.3/8	5.3/4	12	052016
15	0.1800	3.3/8	5.3/4	12	052015
14	0.1820	3.3/8	5.3/4	12	052014
13	0.1850	3.3/8	5.3/4	12	052013
3/16	0.1875	3.3/8	5.3/4	12	051012
12	0.1890	3.5/8	6"	12	052012
11	0.1910	3.5/8	6"	12	052011
10	0.1935	3.5/8	6"	12	052010
9	0.1960	3.5/8	6"	12	052009
8	0.1990	3.5/8	6"	12	052008
7	0.2010	3.5/8	6"	12	052007
13/64	0.2031	3.5/8	6"	12	051013
6	0.2040	3.5/8	6"	12	052006
5	0.2055	3.5/8	6"	12	052005
4	0.2090	3.5/8	6"	12	052004
3	0.2130	3.5/8	6"	12	052003
7/32	0.2188	3.5/8	6"	12	051014
2	0.2210	3.3/4	6.1/8	12	052002
1	0.2280	3.3/4	6.1/8	12	052001
A	0.2340	3.3/4	6.1/8	12	055001
15/64	0.2344	3.3/4	6.1/8	12	051015
B	0.2374	3.3/4	6.1/8	12	055002
C	0.2421	3.3/4	6.1/8	12	055003
D	0.2461	3.3/4	6.1/8	12	055004



TAPER LENGTH DRILL

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	R51 R52 R55
E	0.2500	3.3/4	6.1/8	12	055005
1/4	0.2500	3.3/4	6.1/8	12	051016
F	0.2571	3.7/8	6.1/4	12	055006
G	0.2610	3.7/8	6.1/4	6	055007
17/64	0.2656	3.7/8	6.1/4	6	051017
H	0.2661	3.7/8	6.1/4	6	055008
I	0.2720	3.7/8	6.1/4	6	055009
J	0.2772	3.7/8	6.1/4	6	055010
K	0.2811	3.7/8	6.1/4	6	055011
9/32	0.2813	3.7/8	6.1/4	6	051018
L	0.2992	4"	6.3/8	6	055012
M	0.2949	4"	6.3/8	6	055013
19/64	0.2969	4"	6.3/8	6	051019
N	0.3020	4"	6.3/8	6	055014
5/16	0.3125	4"	6.3/8	6	051020
O	0.3161	4.1/8	6.1/2	6	055015
P	0.3228	4.1/8	6.1/2	6	055016
21/64	0.3281	4.1/8	6.1/2	6	051021
Q	0.3319	4.1/8	6.1/2	6	055017
R	0.3390	4.1/8	6.1/2	6	055018
11/32	0.3437	4.1/8	6.1/2	6	051022
S	0.3480	4.1/4	6.3/4	6	055019
T	0.3580	4.1/4	6.3/4	6	055020
23/64	0.3594	4.1/4	6.3/4	6	051023
U	0.3680	4.1/4	6.3/4	6	055021
3/8	0.3750	4.1/4	6.3/4	6	051024
V	0.3772	4.3/8	7"	6	055022
W	0.3858	4.3/8	7"	6	055023
25/64	0.3906	4.3/8	7"	6	051025
X	0.3969	4.3/8	7"	6	055024
Y	0.4039	4.3/8	7"	6	055025
13/32	0.4063	4.3/8	7"	6	051026
Z	0.4130	4.5/8	7.1/4	6	055026
27/64	0.4219	4.5/8	7.1/4	6	051027
7/16	0.4375	4.5/8	7.1/4	6	051028
29/64	0.4531	4.3/4	7.1/2	6	051029
15/32	0.4687	4.3/4	7.1/2	6	051030
31/64	0.4844	4.3/4	7.3/4	6	051031
1/2	0.5000	4.3/4	7.3/4	6	051032
33/64	0.5156	4.3/4	8"	1	051033
17/32	0.5313	4.3/4	8"	1	051034
35/64	0.5469	4.7/8	8.1/4	1	051035
9/16	0.5625	4.7/8	8.1/4	1	051036
37/64	0.5781	4.7/8	8.3/4	1	051037
19/32	0.5937	4.7/8	8.3/4	1	051038
39/64	0.6094	4.7/8	8.3/4	1	051039
5/8	0.6250	4.7/8	8.3/4	1	051040
41/64	0.6406	5.1/8	9"	1	051041
21/32	0.6563	5.1/8	9"	1	051042
43/64	0.6719	5.3/8	9.1/4	1	051043
11/16	0.6875	5.3/8	9.1/4	1	051044
45/64	0.7031	5.5/8	9.1/2	1	051045
23/32	0.7188	5.5/8	9.1/2	1	051046
47/64	0.7344	5.7/8	9.3/4	1	051047
3/4	0.7500	5.7/8	9.3/4	1	051048
49/64	0.7656	6"	9.7/8	1	051049
25/32	0.7813	6"	9.7/8	1	051050
51/64	0.7969	6.1/8	10"	1	051051
13/16	0.8125	6.1/8	10"	1	051052
53/64	0.8281	6.1/8	10"	1	051053
27/32	0.8438	6.1/8	10"	1	051054
55/64	0.8594	6.1/8	10"	1	051055
7/8	0.8750	6.1/8	10"	1	051056
57/64	0.8906	6.1/8	10"	1	051057
29/32	0.9063	6.1/8	10"	1	051058
59/64	0.9219	6.1/8	10.3/4	1	051059

TAPER LENGTH DRILL



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R51 R52 R55
15/16	0.9375	6.1/8	10.3/4	1	051060
61/64	0.9531	6.3/8	11"	1	051061
31/32	0.9688	6.3/8	11"	1	051062
63/64	0.9844	6.3/8	11"	1	051063
1"	1.0000	6.3/8	11"	1	051100
1.1/64	1.0156	6.1/2	11.1/8	1	051101
1.1/32	1.0312	6.1/2	11.1/8	1	051102
1.3/64	1.0469	6.5/8	11.1/4	1	051103
1.1/16	1.0626	6.5/8	11.1/4	1	051104
1.5/64	1.0781	6.7/8	11.1/2	1	051105
1.3/32	1.0937	6.7/8	11.1/2	1	051106
1.7/64	1.1094	7.1/8	11.3/4	1	051107
1.1/8	1.1250	7.1/8	11.3/4	1	051108
1.9/64	1.1406	7.1/4	11.7/8	1	051109
1.5/32	1.1563	7.1/4	11.7/8	1	051110
1.11/64	1.1719	7.3/8	12"	1	051111
1.3/16	1.1875	7.3/8	12"	1	051112
1.13/64	1.2031	7.1/2	12.1/8	1	051113
1.7/32	1.2187	7.1/2	12.1/8	1	051114
1.15/64	1.2344	7.7/8	12.1/2	1	051115
1.1/4	1.2500	7.7/8	12.1/2	1	051116
1.5/16	1.3125	8.5/8	14.1/4	1	051120
1.3/8	1.3750	8.7/8	14.1/2	1	051124
1.7/16	1.4375	9.1/8	14.3/4	1	051128
1.1/2	1.5000	9.3/8	15"	1	051132
1.9/16	1.5625	9.5/8	15.1/4	1	051136
1.5/8	1.6250	9.7/8	15.5/8	1	051140
1.3/4	1.7500	10.1/2	16.1/4	1	051148

DRILLS



TAPER LENGTH DRILL

General Purpose Taper Length, Metric

5ATL Bright Finish improves chip flow in soft or non-ferrous materials. Longer Flute and Overall length for depth and reach.




5ATL

DIN 340

6XD

HSS

λ118°



1.00 - 31.00

d ₁ Ø mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	5ATL
1.00	0.0394	33	56	12	056100
1.20	0.0472	41	65	12	056120
1.25	0.0492	41	65	12	056125
1.30	0.0512	41	65	12	056130
1.40	0.0551	45	70	12	056140
1.50	0.0591	45	70	12	056150
1.60	0.0630	50	76	12	056160
1.70	0.0669	50	76	12	056170
1.80	0.0709	53	80	12	056180
1.90	0.0748	53	80	12	056190
2.00	0.0787	56	85	12	056200
2.10	0.0827	56	85	12	056210
2.15	0.0846	59	90	12	056215
2.20	0.0866	59	90	12	056220
2.30	0.0906	59	90	12	056230
2.40	0.0945	62	95	12	056240
2.50	0.0984	62	95	12	056250
3.00	0.1181	66	100	12	056300
3.10	0.1220	69	106	12	056310
3.20	0.1260	69	106	12	056320
3.30	0.1299	69	106	12	056330
3.40	0.1339	73	112	12	056340
3.50	0.1378	73	112	12	056350
3.60	0.1417	73	112	12	056360
3.70	0.1457	73	112	12	056370
3.80	0.1496	78	119	12	056380
4.00	0.1575	78	119	12	056400
4.20	0.1654	78	119	12	056420
4.30	0.1693	82	126	12	056430
4.50	0.1772	82	126	12	056450
4.60	0.1811	82	126	12	056460
4.80	0.1890	87	132	12	056480
5.00	0.1969	87	132	12	056500

TAPER LENGTH DRILL



d ₁ Ø mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	5ATL
5.50	0.2165	91	139	12	056550
5.60	0.2205	91	139	12	056560
5.70	0.2244	91	139	12	056570
6.00	0.2362	91	139	12	056600
6.40	0.2520	97	148	6	056640
6.50	0.2559	97	148	6	056650
6.80	0.2677	102	156	6	056680
7.00	0.2756	102	156	6	056770
7.20	0.2835	102	156	6	056720
7.50	0.2953	102	156	6	056750
7.80	0.3071	109	165	6	056780
8.00	0.3150	109	165	6	056800
8.20	0.3228	109	165	6	056820
8.50	0.3346	109	165	6	056850
9.00	0.3543	115	175	6	056900
9.20	0.3622	115	175	6	056920
9.50	0.3740	115	175	6	056950
9.80	0.3858	121	184	6	056980
10.00	0.3937	121	184	6	057100
10.20	0.4016	121	184	6	057102
10.50	0.4134	121	184	6	057105
11.00	0.4331	128	195	6	057110
11.20	0.4409	128	195	6	057112
11.50	0.4528	128	195	6	057115
12.00	0.4724	134	205	6	057120
12.50	0.4921	134	205	6	057125
13.00	0.5118	134	205	1	057130
13.50	0.5315	140	214	1	057135
13.80	0.5433	140	214	1	057138
14.00	0.5512	140	214	1	057140
14.50	0.5709	144	220	1	057145
15.00	0.5906	144	220	1	057150
15.50	0.6102	149	227	1	057155
16.00	0.6299	149	227	1	057160
16.50	0.6496	154	235	1	057165
17.00	0.6693	154	235	1	057170
17.50	0.6890	158	241	1	057175
18.00	0.7087	158	241	1	057180
18.50	0.7283	162	247	1	057185
19.00	0.7480	162	247	1	057190
19.50	0.7677	166	254	1	057195
20.00	0.7874	166	254	1	057200
20.50	0.8071	171	261	1	057205
21.00	0.8268	171	261	1	057210
21.50	0.8465	176	268	1	057215
22.00	0.8661	176	268	1	057220
22.50	0.8858	180	275	1	057225
23.00	0.9055	180	275	1	057230
23.50	0.9252	180	275	1	057235
24.00	0.9449	185	282	1	057240
24.50	0.9646	185	282	1	057245
25.00	0.9843	185	282	1	057250
25.50	1.0039	190	290	1	057255
26.00	1.0236	190	290	1	057260
26.50	1.0433	190	290	1	057265
27.00	1.0630	195	298	1	057270
28.00	1.1024	195	298	1	057280
28.50	1.1220	201	307	1	057285
29.00	1.1417	201	307	1	057290
29.50	1.1614	201	307	1	057295
30.00	1.1811	201	307	1	057300
30.50	1.2008	207	316	1	057305
31.00	1.2205	207	316	1	057310

DRILLS



TAPER LENGTH DRILL

High Helix Taper Length

R51FS High Helix and Bright Finish for better chip flow in soft or non-ferrous materials. Longer Flute and Overall length for depth and reach.



R51FS

ANSI

6XD

HSS



1/16 - 1/2

d_1 Ø Inch	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	R51FS
1/16	0.0625	1.3/4	3"	12	051504
5/64	0.0781	2"	3.3/4	12	051505
3/32	0.0938	2.1/4	4.1/4	12	051506
7/64	0.1094	2.1/2	4.5/8	12	051507
1/8	0.1250	2.3/4	5.1/8	12	051508
9/64	0.1406	3"	5.3/8	12	051509
5/32	0.1563	3"	5.3/8	12	051510
11/64	0.1719	3.3/8	5.3/4	12	051511
3/16	0.1875	3.3/8	5.3/4	12	051512
13/64	0.2031	3.5/8	6"	12	051513
7/32	0.2188	3.5/8	6"	12	051514
15/64	0.2344	3.3/4	6.1/8	12	051515
1/4	0.2500	3.3/4	6.1/8	12	051516
17/64	0.2656	3.7/8	6.1/4	6	051517
9/32	0.2813	3.7/8	6.1/4	6	051518
19/64	0.2969	4"	6.3/8	6	051519
5/16	0.3125	4"	6.3/8	6	051520
21/64	0.3281	4.1/8	6.1/2	6	051521
11/32	0.3437	4.1/8	6.1/2	6	051522
23/64	0.3594	4.1/4	6.3/4	6	051523
3/8	0.3750	4.1/4	6.3/4	6	051524
25/64	0.3906	4.3/8	7"	6	051525
13/32	0.4063	4.3/8	7"	6	051526
27/64	0.4219	4.5/8	7.1/4	6	051527
7/16	0.4375	4.5/8	7.1/4	6	051528
29/64	0.4531	4.3/4	7.1/2	6	051529
15/32	0.4687	4.3/4	7.1/2	6	051530
31/64	0.4844	4.3/4	7.3/4	6	051531
1/2	0.5000	4.3/4	7.3/4	6	051532

TAPER LENGTH DRILL

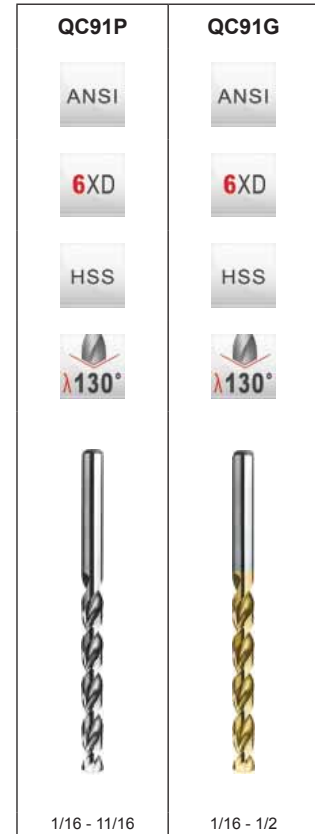


General Purpose Taper Length Parabolic Flute

Heavy-Duty Parabolic Flute design for efficient chip removal. Allows greater drilling depths in one pass. Low thrust design self centering Split Point for easier penetration.

QC91P Bright Finish improves chip flow in soft or non-ferrous materials.

QC91G TiN Coating increases wear resistance and improves tool life.



d_1 Ø "/Nr.	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	QC91P	QC91G
1/16	0.0625	1.3/4	3"	12	057904	055904
52	0.0635	2"	3.3/4	12	059452	050952
51	0.0670	2"	3.3/4	12	059451	050951
50	0.0700	2"	3.3/4	12	059450	050950
49	0.0730	2"	3.3/4	12	059449	050949
48	0.0760	2"	3.3/4	12	059448	050948
5/64	0.0781	2"	3.3/4	12	057905	055905
47	0.0785	2.1/4	4.1/4	12	059447	050947
46	0.0810	2.1/4	4.1/4	12	059446	050946
45	0.0820	2.1/4	4.1/4	12	059445	050945
44	0.0860	2.1/4	4.1/4	12	059444	050944
43	0.0890	2.1/4	4.1/4	12	059443	050943
42	0.0935	2.1/4	4.1/4	12	059442	050942
3/32	0.0938	2.1/4	4.1/4	12	057906	055906
41	0.0960	2.1/2	4.5/8	12	059441	050941
40	0.0980	2.1/2	4.5/8	12	059440	050940
39	0.0995	2.1/2	4.5/8	12	059439	050939
38	0.1015	2.1/2	4.5/8	12	059438	050938
37	0.1040	2.1/2	4.5/8	12	059437	050937
36	0.1065	2.1/2	4.5/8	12	059436	050936
7/64	0.1094	2.1/2	4.5/8	12	057907	055907
35	0.1100	2.3/4	5.1/8	12	059435	050935
34	0.1110	2.3/4	5.1/8	12	059434	050934
33	0.1130	2.3/4	5.1/8	12	059433	050933
32	0.1160	2.3/4	5.1/8	12	059432	050932
31	0.1200	2.3/4	5.1/8	12	059431	050931
1/8	0.1250	2.3/4	5.1/8	12	057908	055908
30	0.1285	3"	5.3/8	12	059430	050930
29	0.1360	3"	5.3/8	12	059429	050929
28	0.1405	3"	5.3/8	12	059428	050928
9/64	0.1406	3"	5.3/8	12	057909	055909
27	0.1440	3"	5.3/8	12	059427	050927
26	0.1470	3"	5.3/8	12	059426	050926



TAPER LENGTH DRILL

d ₁ Ø "/Nr.	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	QC91P	QC91G
25	0.1495	3"	5.3/8	12	059425	050925
24	0.1520	3"	5.3/8	12	059424	050924
23	0.1540	3"	5.3/8	12	059423	050923
5/32	0.1563	3"	5.3/8	12	057910	055910
22	0.1570	3.3/8	5.3/4	12	059422	050922
21	0.1590	3.3/8	5.3/4	12	059421	050921
20	0.1610	3.3/8	5.3/4	12	059420	050920
19	0.1660	3.3/8	5.3/4	12	059419	050919
18	0.1695	3.3/8	5.3/4	12	059418	050918
11/64	0.1719	3.3/8	5.3/4	12	057911	055911
17	0.1730	3.3/8	5.3/4	12	059417	050917
16	0.1770	3.3/8	5.3/4	12	059416	050916
15	0.1800	3.3/8	5.3/4	12	059415	050915
14	0.1820	3.3/8	5.3/4	12	059414	050914
13	0.1850	3.3/8	5.3/4	12	059413	050913
3/16	0.1875	3.3/8	5.3/4	12	057912	055912
12	0.1890	3.5/8	6"	12	059412	050912
11	0.1910	3.5/8	6"	12	059411	050911
10	0.1935	3.5/8	6"	12	059410	050910
9	0.1960	3.5/8	6"	12	059409	050909
8	0.1990	3.5/8	6"	12	059408	050908
7	0.2010	3.5/8	6"	12	059407	050907
13/64	0.2031	3.5/8	6"	12	057913	055913
6	0.2040	3.5/8	6"	12	059406	050906
5	0.2055	3.5/8	6"	12	059405	050905
4	0.2090	3.5/8	6"	12	059404	050904
3	0.2130	3.5/8	6"	12	059403	050903
7/32	0.2188	3.5/8	6"	12	057914	055914
2	0.2210	3.3/4	6.1/8	12	059402	050902
1	0.2280	3.3/4	6.1/8	12	059401	050901
15/64	0.2344	3.3/4	6.1/8	12	057915	055915
1/4	0.2500	3.3/4	6.1/8	12	057916	055916
17/64	0.2656	3.7/8	6.1/4	6	057917	055917
9/32	0.2813	3.7/8	6.1/4	6	057918	055918
19/64	0.2969	4"	6.3/8	6	057919	055919
5/16	0.3125	4"	6.3/8	6	057920	055920
21/64	0.3281	4.1/8	6.1/2	6	057921	055921
11/32	0.3437	4.1/8	6.1/2	6	057922	055922
23/64	0.3594	4.1/4	6.3/4	6	057923	055923
3/8	0.3750	4.1/4	6.3/4	6	057924	055924
25/64	0.3906	4.3/8	7"	6	057925	055925
13/32	0.4063	4.3/8	7"	6	057926	055926
27/64	0.4219	4.5/8	7.1/4	6	057927	055927
7/16	0.4375	4.5/8	7.1/4	6	057928	055928
29/64	0.4531	4.3/4	7.1/2	6	057929	055929
15/32	0.4687	4.3/4	7.1/2	6	057930	055930
31/64	0.4844	4.3/4	7.3/4	6	057931	055931
1/2	0.5000	4.3/4	7.3/4	6	057932	055932
33/64	0.5156	4.3/4	8"	1	057933	—
17/32	0.5313	4.3/4	8"	1	057934	—
35/64	0.5469	4.7/8	8.1/4	1	057935	—
9/16	0.5625	4.7/8	8.1/4	1	057936	—
37/64	0.5781	4.7/8	8.3/4	1	057937	—
19/32	0.5937	4.7/8	8.3/4	1	057938	—
39/64	0.6094	4.7/8	8.3/4	1	057939	—
5/8	0.6250	4.7/8	8.3/4	1	057940	—
41/64	0.6406	5.1/8	9"	1	057941	—
21/32	0.6563	5.1/8	9"	1	057942	—
43/64	0.6719	5.3/8	9.1/4	1	057943	—
11/16	0.6875	5.3/8	9.1/4	1	057944	—

TAPER LENGTH DRILL

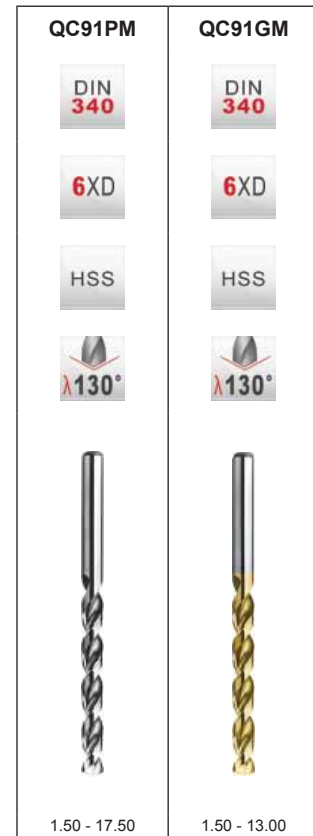


General Purpose Taper Length Parabolic Flute, Metric

Heavy-Duty Parabolic Flute design for efficient chip evacuation. Allows greater drilling depths in one pass. Low thrust design self centering Split Point for easier penetration.

QC91PM Bright Finish improves chip flow in soft or non-ferrous materials.

QC91GM TiN Coating increases wear resistance and improves tool life.



d_1 Ø mm	d_1 decimal inch	l_2 mm	l_1 mm	Pack Qty	QC91PM	QC91GM
1.50	0.0591	45	70	12	050015	050215
2.00	0.0787	56	85	12	050020	050220
2.50	0.0984	62	95	12	050025	050225
3.00	0.1181	66	100	12	050030	050230
3.50	0.1378	73	112	12	050035	050235
4.00	0.1575	78	119	12	050040	050240
4.50	0.1772	82	126	12	050045	050245
5.00	0.1969	87	132	12	050050	050250
5.20	0.2047	87	132	12	050052	050252
5.50	0.2165	91	139	12	050055	050255
5.60	0.2205	91	139	12	050056	050256
6.00	0.2362	91	139	12	050060	050260
6.50	0.2559	97	148	6	050065	050265
6.80	0.2677	102	156	6	050068	050268
7.00	0.2756	102	156	6	050070	050270
7.50	0.2953	102	156	6	050075	050275
8.00	0.3150	109	165	6	050080	050280
8.20	0.3228	109	165	6	050082	050282
8.50	0.3346	109	165	6	050085	050285
8.60	0.3386	115	175	6	050086	050286
9.00	0.3543	115	175	6	050090	050290
9.50	0.3740	115	175	6	050095	050295
10.00	0.3937	121	184	6	050100	050300
10.50	0.4134	121	184	6	050105	050305
11.00	0.4331	128	195	6	050110	050310
11.50	0.4528	128	195	6	050115	050315
12.00	0.4724	134	205	6	050120	050320
12.50	0.4921	134	205	6	050125	050325
13.00	0.5118	134	205	1	050130	050330
13.50	0.5315	140	214	1	050135	—
14.00	0.5512	140	214	1	050140	—
14.50	0.5709	144	220	1	050145	—



TAPER LENGTH DRILL

d ₁ Ø mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	Pack Qty	QC91PM	QC91GM
15.00	0.5906	144	220	1	050150	—
15.50	0.6102	149	227	1	050155	—
16.00	0.6299	149	227	1	050160	—
16.50	0.6496	154	235	1	050165	—
17.00	0.6693	154	235	1	050170	—
17.50	0.6890	158	241	1	050175	—

COBALT TAPER LENGTH DRILL



Heavy Duty Taper Length

M51CO - Fractional Sizes

M52CO - Wire Gauge Sizes

Low thrust design Heavy Duty self centering 135° Split Point for easier penetration. Cobalt base material with Bronze Oxide for wear resistance and lubricity.



M51CO

M52CO

ANSI

6XD

HSS-E

λ135°



1/16 - 1"

d ₁ Ø "/Nr.	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	M51CO M52CO
1/16	0.0625	1.3/4	3"	12	051304
5/64	0.0781	2"	3.3/4	12	051305
3/32	0.0938	2.1/4	4.1/4	12	051306
40	0.0980	2.1/2	4.5/8	12	052340
39	0.0995	2.1/2	4.5/8	12	052339
36	0.1065	2.1/2	4.5/8	12	052336
7/64	0.1094	2.1/2	4.5/8	12	051307
35	0.1100	2.3/4	5.1/8	12	052335
34	0.1110	2.3/4	5.1/8	12	052334
33	0.1130	2.3/4	5.1/8	12	052333
32	0.1160	2.3/4	5.1/8	12	052332
31	0.1200	2.3/4	5.1/8	12	052331
1/8	0.1250	2.3/4	5.1/8	12	051308
30	0.1285	3"	5.3/8	12	052330
29	0.1360	3"	5.3/8	12	052329
28	0.1405	3"	5.3/8	12	052328
9/64	0.1406	3"	5.3/8	12	051309
27	0.1440	3"	5.3/8	12	052327
26	0.1470	3"	5.3/8	12	052326
25	0.1495	3"	5.3/8	12	052325
24	0.1520	3"	5.3/8	12	052324
5/32	0.1563	3"	5.3/8	12	051310
22	0.1570	3.3/8	5.3/4	12	052322
21	0.1590	3.3/8	5.3/4	12	052321
20	0.1610	3.3/8	5.3/4	12	052320
19	0.1660	3.3/8	5.3/4	12	052319
18	0.1695	3.3/8	5.3/4	12	052318
11/64	0.1719	3.3/8	5.3/4	12	051311
17	0.1730	3.3/8	5.3/4	12	052317
16	0.1770	3.3/8	5.3/4	12	052316
15	0.1800	3.3/8	5.3/4	12	052315
14	0.1820	3.3/8	5.3/4	12	052314
13	0.1850	3.3/8	5.3/4	12	052313



COBALT TAPER LENGTH DRILL

d ₁ Ø "/Nr.	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	M51CO M52CO
3/16	0.1875	3.3/8	5.3/4	12	051312
12	0.1890	3.5/8	6"	12	052312
11	0.1910	3.5/8	6"	12	052311
10	0.1935	3.5/8	6"	12	052310
9	0.1960	3.5/8	6"	12	052309
8	0.1990	3.5/8	6"	12	052308
7	0.2010	3.5/8	6"	12	052307
13/64	0.2031	3.5/8	6"	12	051313
5	0.2055	3.5/8	6"	12	052305
4	0.2090	3.5/8	6"	12	052304
3	0.2130	3.5/8	6"	12	052303
7/32	0.2188	3.5/8	6"	12	051314
2	0.2210	3.3/4	6.1/8	12	052302
1	0.2280	3.3/4	6.1/8	12	052301
15/64	0.2344	3.3/4	6.1/8	12	051315
1/4	0.2500	3.3/4	6.1/8	12	051316
17/64	0.2656	3.7/8	6.1/4	6	051317
9/32	0.2813	3.7/8	6.1/4	6	051318
19/64	0.2969	4"	6.3/8	6	051319
5/16	0.3125	4"	6.3/8	6	051320
21/64	0.3281	4.1/8	6.1/2	6	051321
11/32	0.3437	4.1/8	6.1/2	6	051322
23/64	0.3594	4.1/4	6.3/4	6	051323
3/8	0.3750	4.1/4	6.3/4	6	051324
25/64	0.3906	4.3/8	7"	6	051325
13/32	0.4063	4.3/8	7"	6	051326
27/64	0.4219	4.5/8	7.1/4	6	051327
7/16	0.4375	4.5/8	7.1/4	6	051328
29/64	0.4531	4.3/4	7.1/2	6	051329
15/32	0.4687	4.3/4	7.1/2	6	051330
31/64	0.4844	4.3/4	7.3/4	6	051331
1/2	0.5000	4.3/4	7.3/4	6	051332
33/64	0.5156	4.3/4	8"	1	051333 ¹⁾
17/32	0.5313	4.3/4	8"	1	051334 ¹⁾
35/64	0.5469	4.7/8	8.1/4	1	051335 ¹⁾
9/16	0.5625	4.7/8	8.1/4	1	051336 ¹⁾
37/64	0.5781	4.7/8	8.3/4	1	051337 ¹⁾
19/32	0.5937	4.7/8	8.3/4	1	051338 ¹⁾
39/64	0.6094	4.7/8	8.3/4	1	051339 ¹⁾
5/8	0.6250	4.7/8	8.3/4	1	051340 ¹⁾
41/64	0.6406	5.1/8	9"	1	051341 ¹⁾
21/32	0.6563	5.1/8	9"	1	051342 ¹⁾
43/64	0.6719	5.3/8	9.1/4	1	051343 ¹⁾
11/16	0.6875	5.3/8	9.1/4	1	051344 ¹⁾
45/64	0.7031	5.5/8	9.1/2	1	051345 ¹⁾
23/32	0.7188	5.5/8	9.1/2	1	051346 ¹⁾
47/64	0.7344	5.7/8	9.3/4	1	051347 ¹⁾
3/4	0.7500	5.7/8	9.3/4	1	051348 ¹⁾
49/64	0.7656	6"	9.7/8	1	051349 ¹⁾
25/32	0.7813	6"	9.7/8	1	051350 ¹⁾
51/64	0.7969	6.1/8	10"	1	051351 ¹⁾
13/16	0.8125	6.1/8	10"	1	051352 ¹⁾
53/64	0.8281	6.1/8	10"	1	051353 ¹⁾
27/32	0.8438	6.1/8	10"	1	051354 ¹⁾
55/64	0.8594	6.1/8	10"	1	051355 ¹⁾
7/8	0.8750	6.1/8	10"	1	051356 ¹⁾
57/64	0.8906	6.1/8	10"	1	051357 ¹⁾
29/32	0.9063	6.1/8	10"	1	051358 ¹⁾
59/64	0.9219	6.1/8	10.3/4	1	051359 ¹⁾
15/16	0.9375	6.1/8	10.3/4	1	051360 ¹⁾
61/64	0.9531	6.3/8	11"	1	051361 ¹⁾
31/32	0.9688	6.3/8	11"	1	051362 ¹⁾
63/64	0.9844	6.3/8	11"	1	051363 ¹⁾
1"	1.0000	6.3/8	11"	1	051364 ¹⁾

¹⁾ Notched Point

EXTRA LENGTH DRILL



General Purpose Extra Length

0860 8" Overall length

1290 12" Overall length

Bright Finish improves chip flow in soft or non-ferrous materials



d_1 Ø Inch	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	0860	1290
1/8	0.1250	6"	8"	1	057408	—
1/8	0.1250	9"	12"	1	—	059608
9/64	0.1406	9"	12"	1	—	059609
5/32	0.1563	6"	8"	1	057410	—
5/32	0.1563	9"	12"	1	—	059610
11/64	0.1719	9"	12"	1	—	059611
3/16	0.1875	6"	8"	1	057412	—
3/16	0.1875	9"	12"	1	—	059612
13/64	0.2031	9"	12"	1	—	059613
7/32	0.2188	6"	8"	1	057414	—
7/32	0.2188	9"	12"	1	—	059614
15/64	0.2344	9"	12"	1	—	059615
1/4	0.2500	6"	8"	1	057416	—
1/4	0.2500	9"	12"	1	—	059616
17/64	0.2656	9"	12"	1	—	059617
9/32	0.2813	6"	8"	1	057418	—
9/32	0.2813	9"	12"	1	—	059618
19/64	0.2969	9"	12"	1	—	059619
5/16	0.3125	6"	8"	1	057420	—
5/16	0.3125	9"	12"	1	—	059620
21/64	0.3281	9"	12"	1	—	059621
11/32	0.3437	6"	8"	1	057422	—
11/32	0.3437	9"	12"	1	—	059622
23/64	0.3594	9"	12"	1	—	059623
3/8	0.3750	6"	8"	1	057424	—
3/8	0.3750	9"	12"	1	—	059624
25/64	0.3906	9"	12"	1	—	059625
13/32	0.4063	6"	8"	1	057426	—
13/32	0.4063	9"	12"	1	—	059626
27/64	0.4219	9"	12"	1	—	059627
7/16	0.4375	6"	8"	1	057428	—
7/16	0.4375	9"	12"	1	—	059628
29/64	0.4531	9"	12"	1	—	059629



EXTRA LENGTH DRILL

d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	0860	1290
15/32	0.4687	6"	8"	1	057430	—
15/32	0.4687	9"	12"	1	—	059630
31/64	0.4844	9"	12"	1	—	059631
1/2	0.5000	6"	8"	1	057432	—
1/2	0.5000	9"	12"	1	—	059632
33/64	0.5156	9"	12"	1	—	059633
17/32	0.5313	9"	12"	1	—	059634
35/64	0.5469	9"	12"	1	—	059635
9/16	0.5625	9"	12"	1	—	059636
37/64	0.5781	9"	12"	1	—	059637
19/32	0.5937	9"	12"	1	—	059638
39/64	0.6094	9"	12"	1	—	059639
5/8	0.6250	9"	12"	1	—	059640
21/32	0.6563	9"	12"	1	—	059642
11/16	0.6875	9"	12"	1	—	059644
23/32	0.7188	9"	12"	1	—	059646
3/4	0.7500	9"	12"	1	—	059648

EXTRA LENGTH DRILL



General Purpose Extra Length

1511 Bright Finish improves chip flow in soft or non-ferrous materials

1813

A125 Steam Oxide for increased wear resistance & lubricity.



d_1 Ø Inch	d_1 decimal Inch	d_1 Ø _{h8} mm	l_2 Inch	l_1 Inch	l_2 mm	l_1 mm	Pack Qty	1511	1813	A125
	0.0551	1.40			100	160	1	—	—	0019832
	0.0591	1.50			100	160	1	—	—	0019856
	0.0591	1.50			80	125	1	—	—	0019849
1/16	0.0626	1.59			100	160	1	—	—	0173664
1/16	0.0626	1.59			80	125	1	—	—	0173657
	0.0709	1.80			100	160	1	—	—	0019863
5/64	0.0780	1.98			100	160	1	—	—	0173688
5/64	0.0780	1.98			80	125	1	—	—	0173671
	0.0787	2.00			100	160	1	—	—	0020074
	0.0787	2.00			80	125	1	—	—	0020067
	0.0866	2.20			100	160	1	—	—	0020036
3/32	0.0937	2.38			100	160	1	—	—	0173701
3/32	0.0937	2.38			80	125	1	—	—	0173695
	0.0984	2.50			100	160	1	—	—	0020050
	0.0984	2.50			80	125	1	—	—	0020043
7/64	0.1094	2.78			100	160	1	—	—	0173725
7/64	0.1094	2.78			80	125	1	—	—	0173718
	0.1181	3.00			100	160	1	—	—	0020128
	0.1181	3.00			150	200	1	—	—	0020135
	0.1181	3.00			200	250	1	—	—	0020142
1/8	0.1252	3.18			100	160	1	—	—	0173732
1/8	0.1252	3.18			150	200	1	—	—	0173749
1/8	0.1252	3.18			200	250	1	—	—	0173756
1/8	0.1252	3.18			250	315	1	—	—	0173763
	0.1299	3.30			100	160	1	—	—	0020081
	0.1378	3.50			100	160	1	—	—	0020098
	0.1378	3.50			150	200	1	—	—	0020104
	0.1378	3.50			200	250	1	—	—	0020111
9/64	0.1406	3.57			100	160	1	—	—	0173770
9/64	0.1406	3.57			150	200	1	—	—	0173787
9/64	0.1406	3.57			250	315	1	—	—	0214398
5/32	0.1563	3.97			100	160	1	—	—	0173794
5/32	0.1563	3.97			150	200	1	—	—	0173800



EXTRA LENGTH DRILL

d ₁ Ø Inch	d ₁ decimal Inch	d ₁ Øh ₈ mm	l ₂ Inch	l ₁ Inch	l ₂ mm	l ₁ mm	Pack Qty	1511	1813	A125
5/32	0.1563	3.97			200	250	1	—	—	0173817
5/32	0.1563	3.97			250	315	1	—	—	0173824
	0.1575	4.00			100	160	1	—	—	0020197
	0.1575	4.00			150	200	1	—	—	0020203
	0.1575	4.00			200	250	1	—	—	0020210
	0.1575	4.00			250	315	1	—	—	0020227
11/64	0.1720	4.37			100	160	1	—	—	0173831
11/64	0.1720	4.37			150	200	1	—	—	0173848
11/64	0.1720	4.37			250	315	1	—	—	0214404
	0.1772	4.50			100	160	1	—	—	0020159
	0.1772	4.50			150	200	1	—	—	0020166
	0.1772	4.50			200	250	1	—	—	0020173
	0.1772	4.50			250	315	1	—	—	0020180
3/16	0.1874	4.76			100	160	1	—	—	0173855
3/16	0.1874	4.76			150	200	1	—	—	0173862
3/16	0.1874	4.76			200	250	1	—	—	0173879
3/16	0.1874	4.76			250	315	1	—	—	0173886
3/16	0.1874	4.76			300	400	1	—	—	0173893
3/16	0.1875		11"	15"			1	059512	—	—
	0.1969	5.00			100	160	1	—	—	0020265
	0.1969	5.00			150	200	1	—	—	0020272
	0.1969	5.00			200	250	1	—	—	0020289
	0.1969	5.00			250	315	1	—	—	0020296
	0.1969	5.00			300	400	1	—	—	0020302
13/64	0.2031	5.16			150	200	1	—	—	0173909
13/64	0.2031	5.16			200	250	1	—	—	0173916
13/64	0.2031	5.16			250	315	1	—	—	0173923
	0.2165	5.50			150	200	1	—	—	0020234
	0.2165	5.50			200	250	1	—	—	0020241
	0.2165	5.50			250	315	1	—	—	0020258
7/32	0.2189	5.56			150	200	1	—	—	0173930
7/32	0.2189	5.56			200	250	1	—	—	0173947
7/32	0.2189	5.56			250	315	1	—	—	0173954
15/64	0.2343	5.95			150	200	1	—	—	0173961
15/64	0.2343	5.95			200	250	1	—	—	0173978
15/64	0.2343	5.95			250	315	1	—	—	0214442
	0.2362	6.00			150	200	1	—	—	0020340
	0.2362	6.00			200	250	1	—	—	0020357
	0.2362	6.00			250	315	1	—	—	0020364
	0.2362	6.00			300	400	1	—	—	0020371
1/4	0.2500	6.35			150	200	1	—	—	0173985
1/4	0.2500	6.35			200	250	1	—	—	0173992
1/4	0.2500	6.35			250	315	1	—	—	0174005
1/4	0.2500	6.35			300	400	1	—	—	0174012
1/4	0.2500	6.35			400	500	1	—	—	0174029
1/4	0.2500		11"	15"			1	059516	—	—
1/4	0.2500		13"	18"			1	—	059716	—
	0.2559	6.50			150	200	1	—	—	0020319
	0.2559	6.50			200	250	1	—	—	0020326
	0.2559	6.50			250	315	1	—	—	0020333
17/64	0.2657	6.75			150	200	1	—	—	0174036
17/64	0.2657	6.75			200	250	1	—	—	0174043
17/64	0.2657	6.75			400	500	1	—	—	0214466
17/64	0.2656		13"	18"			1	—	059717	—
	0.2756	7.00			150	200	1	—	—	0020418
	0.2756	7.00			200	250	1	—	—	0020425
	0.2756	7.00			250	315	1	—	—	0020432
9/32	0.2811	7.14			150	200	1	—	—	0174050
9/32	0.2811	7.14			200	250	1	—	—	0174067
9/32	0.2811	7.14			250	315	1	—	—	0174074
9/32	0.2811	7.14			400	500	1	—	—	0214473
9/32	0.2813		13"	18"			1	—	059718	—
	0.2953	7.50			150	200	1	—	—	0020388
	0.2953	7.50			200	250	1	—	—	0020395
	0.2953	7.50			250	315	1	—	—	0020401
19/64	0.2969	7.54			250	315	1	—	—	0214480

EXTRA LENGTH DRILL



d ₁ Ø Inch	d ₁ decimal Inch	d ₁ Øh ₈ mm	l ₂ Inch	l ₁ Inch	l ₂ mm	l ₁ mm	Pack Qty	1511	1813	A125
19/64	0.2969	7.54			400	500	1	—	—	0214497
19/64	0.2969		13"	18"			1	—	059719	—
5/16	0.3126	7.94			150	200	1	—	—	0174081
5/16	0.3126	7.94			200	250	1	—	—	0174098
5/16	0.3126	7.94			250	315	1	—	—	0174104
5/16	0.3126	7.94			300	400	1	—	—	0174111
5/16	0.3126	7.94			400	500	1	—	—	0174128
5/16	0.3125		11"	15"			1	059520	—	—
5/16	0.3125		13"	18"			1	—	059720	—
	0.3150	8.00			200	250	1	—	—	0020463
	0.3150	8.00			250	315	1	—	—	0020470
	0.3150	8.00			300	400	1	—	—	0020487
21/64	0.3280	8.33			250	315	1	—	—	0174135
21/64	0.3280	8.33			400	500	1	—	—	0214503
21/64	0.3281		13"	18"			1	—	059721	—
	0.3346	8.50			200	250	1	—	—	0020449
	0.3346	8.50			250	315	1	—	—	0020456
11/32	0.3437	8.73			200	250	1	—	—	0174142
11/32	0.3437	8.73			250	315	1	—	—	0174159
11/32	0.3437	8.73			300	400	1	—	—	0174166
11/32	0.3437	8.73			400	500	1	—	—	0214510
11/32	0.3437		11"	15"			1	059522	—	—
11/32	0.3437		13"	18"			1	—	059722	—
	0.3543	9.00			200	250	1	—	—	0020517
	0.3543	9.00			250	315	1	—	—	0020524
	0.3543	9.00			300	400	1	—	—	0020531
23/64	0.3594	9.13			250	315	1	—	—	0174180
23/64	0.3594	9.13			400	500	1	—	—	0214527
23/64	0.3594		13"	18"			1	—	059723	—
	0.3740	9.50			200	250	1	—	—	0020494
	0.3740	9.50			250	315	1	—	—	0020500
3/8	0.3748	9.52			200	250	1	—	—	0174197
3/8	0.3748	9.52			250	315	1	—	—	0174203
3/8	0.3748	9.52			300	400	1	—	—	0174210
3/8	0.3748	9.52			400	500	1	—	—	0174227
3/8	0.3750		11"	15"			1	059524	—	—
3/8	0.3750		13"	18"			1	—	059724	—
25/64	0.3906	9.92			250	315	1	—	—	0214534
25/64	0.3906	9.92			400	500	1	—	—	0214541
25/64	0.3906		13"	18"			1	—	059725	—
	0.3937	10.00			200	250	1	—	—	0019900
	0.3937	10.00			250	315	1	—	—	0019917
	0.3937	10.00			300	400	1	—	—	0019924
13/32	0.4063	10.32			200	250	1	—	—	0174234
13/32	0.4063	10.32			250	315	1	—	—	0174241
13/32	0.4063	10.32			400	500	1	—	—	0214558
13/32	0.4063		13"	18"			1	—	059726	—
	0.4134	10.50			200	250	1	—	—	0019870
	0.4134	10.50			250	315	1	—	—	0019887
	0.4134	10.50			300	400	1	—	—	0019894
27/64	0.4220	10.72			250	315	1	—	—	0214565
27/64	0.4219		13"	18"			1	—	059727	—
	0.4331	11.00			200	250	1	—	—	0019931
	0.4331	11.00			250	315	1	—	—	0019948
	0.4331	11.00			300	400	1	—	—	0019955
7/16	0.4374	11.11			200	250	1	—	—	0174265
7/16	0.4374	11.11			250	315	1	—	—	0174272
7/16	0.4374	11.11			300	400	1	—	—	0174289
7/16	0.4374	11.11			400	500	1	—	—	0214589
7/16	0.4375		11"	15"			1	059528	—	—
7/16	0.4375		13"	18"			1	—	059728	—
29/64	0.4531	11.51			250	315	1	—	—	0214596
29/64	0.4531	11.51			400	500	1	—	—	0214602
29/64	0.4531		13"	18"			1	—	059729	—
15/32	0.4689	11.91			200	250	1	—	—	0174296
15/32	0.4689	11.91			250	315	1	—	—	0174302



EXTRA LENGTH DRILL

d ₁ Ø Inch	d ₁ decimal Inch	d ₁ Øh ₈ mm	l ₂ Inch	l ₁ Inch	l ₂ mm	l ₁ mm	Pack Qty	1511	1813	A125
15/32	0.4689	11.91			400	500	1	—	—	0214619
15/32	0.4687		13"	18"			1	—	059730	—
	0.4724	12.00			200	250	1	—	—	0019962
	0.4724	12.00			250	315	1	—	—	0019979
	0.4724	12.00			300	400	1	—	—	0019986
31/64	0.4843	12.30			250	315	1	—	—	0214626
31/64	0.4843	12.30			400	500	1	—	—	0214633
31/64	0.4844		13"	18"			1	—	059731	—
1/2	0.5000	12.70			200	250	1	—	—	0174319
1/2	0.5000	12.70			250	315	1	—	—	0174326
1/2	0.5000	12.70			300	400	1	—	—	0174333
1/2	0.5000	12.70			400	500	1	—	—	0174340
1/2	0.5000		11"	15"			1	059532	—	—
1/2	0.5000		13"	18"			1	—	059732	—
	0.5118	13.00			250	315	1	—	—	0019993
	0.5118	13.00			300	400	1	—	—	0020005
33/64	0.5157	13.10			250	315	1	—	—	0214640
33/64	0.5157	13.10			400	500	1	—	—	0214657
33/64	0.5156		13"	18"			1	—	059733	—
17/32	0.5311	13.49			250	315	1	—	—	0214664
17/32	0.5311	13.49			400	500	1	—	—	0214671
17/32	0.5313		11"	15"			1	059534	—	—
17/32	0.5313		13"	18"			1	—	059734	—
35/64	0.5469	13.89			250	315	1	—	—	0214688
35/64	0.5469	13.89			400	500	1	—	—	0214695
35/64	0.5469		13"	18"			1	—	059735	—
	0.5512	14.00			250	315	1	—	—	0020012
	0.5512	14.00			300	400	1	—	—	0020029
9/16	0.5626	14.29			250	315	1	—	—	0214701
9/16	0.5626	14.29			400	500	1	—	—	0214718
9/16	0.5625		11"	15"			1	059536	—	—
9/16	0.5625		13"	18"			1	—	059736	—
37/64	0.5780	14.68			250	315	1	—	—	0214725
37/64	0.5781		13"	18"			1	—	059737	—
19/32	0.5937	15.08			250	315	1	—	—	0214749
19/32	0.5937	15.08			400	500	1	—	—	0214756
19/32	0.5937		13"	18"			1	—	059738	—
39/64	0.6094	15.48			250	315	1	—	—	0214763
39/64	0.6094	15.48			400	500	1	—	—	0214770
39/64	0.6094		13"	18"			1	—	059739	—
5/8	0.6252	15.88			250	315	1	—	—	0214787
5/8	0.6252	15.88			400	500	1	—	—	0214794
5/8	0.6250		11"	15"			1	059540	—	—
5/8	0.6250		13"	18"			1	—	059740	—
21/32	0.6563	16.67			250	315	1	—	—	0214800
21/32	0.6563	16.67			400	500	1	—	—	0214817
21/32	0.6563		11"	15"			1	059542	—	—
21/32	0.6563		13"	18"			1	—	059742	—
11/16	0.6874	17.46			250	315	1	—	—	0214824
11/16	0.6874	17.46			400	500	1	—	—	0214831
11/16	0.6875		11"	15"			1	059544	—	—
11/16	0.6875		13"	18"			1	—	059744	—
23/32	0.7189	18.26			250	315	1	—	—	0214848
23/32	0.7189	18.26			400	500	1	—	—	0214855
23/32	0.7188		11"	15"			1	059546	—	—
23/32	0.7188		13"	18"			1	—	059746	—
3/4	0.7500	19.05			250	315	1	—	—	0214862
3/4	0.7500	19.05			400	500	1	—	—	0214879
3/4	0.7500		11"	15"			1	059548	—	—
3/4	0.7500		13"	18"			1	—	059748	—
25/32	0.7811	19.84			400	500	1	—	—	0214886
25/32	0.7813		11"	15"			1	059550	—	—
25/32	0.7813		13"	18"			1	—	059750	—
13/16	0.8126	20.64			400	500	1	—	—	0214893
13/16	0.8125		11"	15"			1	059552	—	—
13/16	0.8125		13"	18"			1	—	059752	—

EXTRA LENGTH DRILL



d ₁ Ø Inch	d ₁ decimal Inch	d ₁ Øh ₈ mm	l ₂ Inch	l ₁ Inch	l ₂ mm	l ₁ mm	Pack Qty	1511	1813	A125
7/8	0.8748	22.22			400	500	1	—	—	0214909
7/8	0.8750		11"	15"			1	059554	—	—
7/8	0.8750		13"	18"			1	—	059756	—
15/16	0.9374	23.81			400	500	1	—	—	0214916
15/16	0.9375		11"	15"			1	059556	—	—
15/16	0.9375		13"	18"			1	—	059760	—
1"	1.0000	25.40			400	500	1	—	—	0214923
1"	1.0000		11"	15"			1	059558	—	—
1"	1.0000		13"	18"			1	—	059764	—

DRILLS



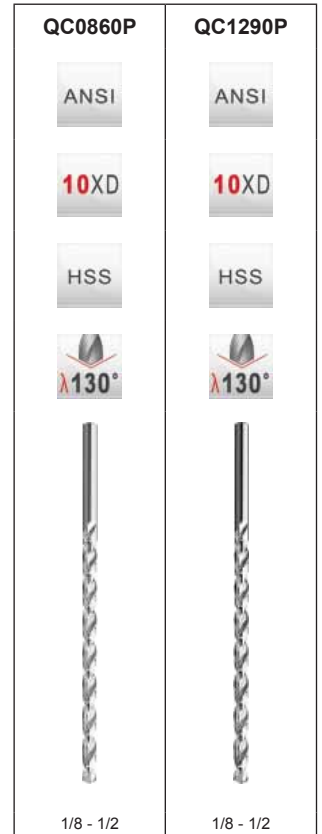
EXTRA LENGTH DRILL

General Purpose Extra Length Parabolic Flute

QC0860P 8" Overall length

QC1290P 12" Overall length

Heavy-Duty Parabolic Flute design for efficient chip removal. Allows greater drilling depths in one pass. Low thrust design self centering Split Point for easier penetration. Bright Finish improves chip flow in soft or non-ferrous materials.



d_1 Ø Inch	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	QC0860P	QC1290P
1/8	0.1250	6"	8"	1	055608	—
1/8	0.1250	9"	12"	1	—	060308
9/64	0.1406	6"	8"	1	055609	—
9/64	0.1406	9"	12"	1	—	060309
5/32	0.1563	6"	8"	1	055610	—
5/32	0.1563	9"	12"	1	—	060310
11/64	0.1719	6"	8"	1	055611	—
11/64	0.1719	9"	12"	1	—	060311
3/16	0.1875	6"	8"	1	055612	—
3/16	0.1875	9"	12"	1	—	060312
13/64	0.2031	6"	8"	1	055613	—
13/64	0.2031	9"	12"	1	—	060313
7/32	0.2188	6"	8"	1	055614	—
7/32	0.2188	9"	12"	1	—	060314
15/64	0.2344	6"	8"	1	055615	—
15/64	0.2344	9"	12"	1	—	060315
1/4	0.2500	6"	8"	1	055616	—
1/4	0.2500	9"	12"	1	—	060316
17/64	0.2656	6"	8"	1	055617	—
17/64	0.2656	9"	12"	1	—	060317
9/32	0.2812	6"	8"	1	055618	—
9/32	0.2813	9"	12"	1	—	060318
19/64	0.2969	6"	8"	1	055619	—
19/64	0.2969	9"	12"	1	—	060319
5/16	0.3125	6"	8"	1	055620	—
5/16	0.3125	9"	12"	1	—	060320
21/64	0.3281	6"	8"	1	055621	—
21/64	0.3281	9"	12"	1	—	060321
11/32	0.3437	6"	8"	1	055622	—
11/32	0.3437	9"	12"	1	—	060322
23/64	0.3594	6"	8"	1	055623	—
23/64	0.3594	9"	12"	1	—	060323
3/8	0.3750	6"	8"	1	055624	—

EXTRA LENGTH DRILL



d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	QC0860P	QC1290P
3/8	0.3750	9"	12"	1	—	060324
25/64	0.3906	6"	8"	1	055625	—
25/64	0.3906	9"	12"	1	—	060325
13/32	0.4063	6"	8"	1	055626	—
13/32	0.4063	9"	12"	1	—	060326
27/64	0.4219	6"	8"	1	055627	—
27/64	0.4219	9"	12"	1	—	060327
7/16	0.4375	6"	8"	1	055628	—
7/16	0.4375	9"	12"	1	—	060328
29/64	0.4531	6"	8"	1	055629	—
29/64	0.4531	9"	12"	1	—	060329
15/32	0.4687	6"	8"	1	055630	—
15/32	0.4687	9"	12"	1	—	060330
31/64	0.4844	6"	8"	1	055631	—
31/64	0.4844	9"	12"	1	—	060331
1/2	0.5000	6"	8"	1	055632	—
1/2	0.5000	9"	12"	1	—	060332

DRILLS



AIRCRAFT EXTENSION DRILL

Aircraft Extension (NAS 907 Type B)

500-6 - Fractional Sizes

501-6 - Wire Gauge Sizes

502-6 - Letter Sizes

Low thrust design self centering 135° Split Point for easier penetration.
 Steam Oxide for increased wear resistance & lubricity.
 6" overall length.



500-6
501-6
502-6

ANSI

4XD

HSS

λ135°



3/64 - 1/2
 N60 - N1
 A - Z

d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	500-6 501-6 502-6
60	0.0400	11/16	6"	12	058160 ¹⁾
59	0.0410	11/16	6"	12	058159 ¹⁾
58	0.0420	11/16	6"	12	058158 ¹⁾
57	0.0430	3/4	6"	12	058157 ¹⁾
56	0.0465	3/4	6"	12	058156 ¹⁾
3/64	0.0469	3/4	6"	12	058003 ¹⁾
55	0.0520	7/8	6"	12	058155 ¹⁾
54	0.0550	7/8	6"	12	058154 ¹⁾
53	0.0595	7/8	6"	12	058153 ¹⁾
1/16	0.0625	7/8	6"	12	058004
52	0.0635	7/8	6"	12	058152
51	0.0670	1"	6"	12	058151
50	0.0700	1"	6"	12	058150
49	0.0730	1"	6"	12	058149
48	0.0760	1"	6"	12	058148
5/64	0.0781	1"	6"	12	058005
47	0.0785	1"	6"	12	058147
46	0.0810	1.1/8	6"	12	058146
45	0.0820	1.1/8	6"	12	058145
44	0.0860	1.1/8	6"	12	058144
43	0.0890	1.1/4	6"	12	058143
42	0.0935	1.1/4	6"	12	058142
3/32	0.0938	1.1/4	6"	12	058006
41	0.0960	1.3/8	6"	12	058141
40	0.0980	1.3/8	6"	12	058140
39	0.0995	1.3/8	6"	12	058139
38	0.1015	1.7/16	6"	12	058138
37	0.1040	1.7/16	6"	12	058137
36	0.1065	1.7/16	6"	12	058136
7/64	0.1094	1.1/2	6"	12	058007
35	0.1100	1.1/2	6"	12	058135
34	0.1110	1.1/2	6"	12	058134

¹⁾ Not Split Point

AIRCRAFT EXTENSION DRILL



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	500-6 501-6 502-6
33	0.1130	1.1/2	6"	12	058133
32	0.1160	1.5/8	6"	12	058132
31	0.1200	1.5/8	6"	12	058131
1/8	0.1250	1.5/8	6"	12	058008
30	0.1285	1.5/8	6"	12	058130
29	0.1360	1.3/4	6"	12	058129
28	0.1405	1.3/4	6"	12	058128
9/64	0.1406	1.3/4	6"	12	058009
27	0.1440	1.7/8	6"	12	058127
26	0.1470	1.7/8	6"	12	058126
25	0.1495	1.7/8	6"	12	058125
24	0.1520	2"	6"	12	058124
23	0.1540	2"	6"	12	058123
5/32	0.1563	2"	6"	12	058010
22	0.1570	2"	6"	12	058122
21	0.1590	2.1/8	6"	12	058121
20	0.1610	2.1/8	6"	12	058120
19	0.1660	2.1/8	6"	12	058119
18	0.1695	2.1/8	6"	12	058118
11/64	0.1719	2.1/8	6"	12	058011
17	0.1730	2.3/16	6"	12	058117
16	0.1770	2.3/16	6"	12	058116
15	0.1800	2.3/16	6"	12	058115
14	0.1820	2.3/16	6"	12	058114
13	0.1850	2.5/16	6"	12	058113
3/16	0.1875	2.5/16	6"	12	058012
12	0.1890	2.5/16	6"	12	058112
11	0.1910	2.5/16	6"	12	058111
10	0.1935	2.7/16	6"	12	058110
9	0.1960	2.7/16	6"	12	058109
8	0.1990	2.7/16	6"	12	058108
7	0.2010	2.7/16	6"	12	058107
13/64	0.2031	2.7/16	6"	12	058013
6	0.2040	2.1/2	6"	12	058106
5	0.2055	2.1/2	6"	12	058105
4	0.2090	2.1/2	6"	12	058104
3	0.2130	2.1/2	6"	12	058103
7/32	0.2188	2.1/2	6"	12	058014
2	0.2210	2.5/8	6"	12	058102
1	0.2280	2.5/8	6"	12	058101
A	0.2340	2.5/8	6"	12	058201
15/64	0.2344	2.5/8	6"	12	058015
B	0.2374	2.3/4	6"	12	058202
C	0.2421	2.3/4	6"	12	058203
D	0.2461	2.3/4	6"	12	058204
E	0.2500	2.3/4	6"	12	058205
1/4	0.2500	2.3/4	6"	12	058016
F	0.2571	2.7/8	6"	12	058206
G	0.2610	2.7/8	6"	6	058207
17/64	0.2656	2.7/8	6"	6	058017
H	0.2661	2.7/8	6"	6	058208
I	0.2720	2.7/8	6"	6	058209
J	0.2772	2.7/8	6"	6	058210
K	0.2811	2.15/16	6"	6	058211
9/32	0.2813	2.15/16	6"	6	058018
L	0.2902	2.15/16	6"	6	058212
M	0.2949	3.1/16	6"	6	058213
19/64	0.2969	3.1/16	6"	6	058019
N	0.3020	3.1/16	6"	6	058214
5/16	0.3125	3.3/16	6"	6	058020
O	0.3161	3.3/16	6"	6	058215
P	0.3228	3.5/16	6"	6	058216
21/64	0.3281	3.5/16	6"	6	058021
Q	0.3319	3.7/16	6"	6	058217
R	0.3390	3.7/16	6"	6	058218
11/32	0.3437	3.7/16	6"	6	058022



AIRCRAFT EXTENSION DRILL

d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	500-6 501-6 502-6
S	0.3480	3.1/2	6"	6	058219
T	0.3580	3.1/2	6"	6	058220
23/64	0.3594	3.1/2	6"	6	058023
U	0.3680	3.5/8	6"	6	058221
3/8	0.3750	3.5/8	6"	6	058024
V	0.3772	3.5/8	6"	6	058222
W	0.3858	3.3/4	6"	6	058223
25/64	0.3906	3.3/4	6"	6	058025
X	0.3969	3.3/4	6"	6	058224
Y	0.4039	3.7/8	6"	6	058225
13/32	0.4063	3.7/8	6"	6	058026
Z	0.4130	3.7/8	6"	6	058226
27/64	0.4219	3.15/16	6"	6	058027
7/16	0.4375	4.1/16	6"	6	058028
29/64	0.4531	4.3/16	6"	6	058029
15/32	0.4687	4.5/16	6"	6	058030
31/64	0.4844	4.3/8	6"	6	058031
1/2	0.5000	4.1/2	6"	6	058032

AIRCRAFT EXTENSION DRILL



Aircraft Extension (NAS 907 Type B)

500-12 - Fractional Sizes

501-12 - Wire Gauge Sizes

502-12 - Letter Sizes

Low thrust design self centering 135° Split Point for easier penetration.
Steam Oxide for increased wear resistance & lubricity.
12" Over All Length



500-12

501-12

502-12

ANSI

4XD

HSS



3/64 - 1/2
N50 - N1
A - Z

d_1 Ø " / Nr. / letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	500-12 501-12 502-12
3/64	0.0469	3/4	12"	12	059003 ¹⁾
1/16	0.0625	7/8	12"	12	059004
50	0.0700	1"	12"	12	059150
49	0.0730	1"	12"	12	059149
48	0.0760	1"	12"	12	059148
5/64	0.0781	1"	12"	12	059005
47	0.0785	1"	12"	12	059147
46	0.0810	1.1/8	12"	12	059146
45	0.0820	1.1/8	12"	12	059145
44	0.0860	1.1/8	12"	12	059144
43	0.0890	1.1/4	12"	12	059143
42	0.0935	1.1/4	12"	12	059142
3/32	0.0938	1.1/4	12"	12	059006
41	0.0960	1.3/8	12"	12	059141
40	0.0980	1.3/8	12"	12	059140
39	0.0995	1.3/8	12"	12	059139
38	0.1015	1.7/16	12"	12	059138
37	0.1040	1.7/16	12"	12	059137
36	0.1065	1.7/16	12"	12	059136
7/64	0.1094	1.1/2	12"	12	059007
31	0.1200	1.5/8	12"	12	059131
1/8	0.1250	1.5/8	12"	12	059008
30	0.1285	1.5/8	12"	12	059130
29	0.1360	1.3/4	12"	12	059129
9/64	0.1406	1.3/4	12"	12	059009
27	0.1440	1.7/8	12"	12	059127
26	0.1470	1.7/8	12"	12	059126
25	0.1495	1.7/8	12"	12	059125
23	0.1540	2"	12"	12	059123
5/32	0.1563	2"	12"	12	059010
22	0.1570	2"	12"	12	059122
21	0.1590	2.1/8	12"	12	059121

¹⁾ Not Split Point



AIRCRAFT EXTENSION DRILL

d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	500-12 501-12 502-12
20	0.1610	2.1/8	12"	12	059120
19	0.1660	2.1/8	12"	12	059119
18	0.1695	2.1/8	12"	12	059118
11/64	0.1719	2.1/8	12"	12	059011
17	0.1730	2.3/16	12"	12	059117
16	0.1770	2.3/16	12"	12	059116
13	0.1850	2.5/16	12"	12	059113
3/16	0.1875	2.5/16	12"	6	059012
12	0.1890	2.5/16	12"	6	059112
11	0.1910	2.5/16	12"	6	059111
10	0.1935	2.7/16	12"	6	059110
9	0.1960	2.7/16	12"	6	059109
7	0.2010	2.7/16	12"	6	059107
13/64	0.2031	2.7/16	12"	6	059013
5	0.2055	2.1/2	12"	6	059105
4	0.2090	2.1/2	12"	6	059104
3	0.2130	2.1/2	12"	6	059103
7/32	0.2188	2.1/2	12"	6	059014
1	0.2280	2.5/8	12"	6	059101
A	0.2340	2.5/8	12"	6	059201
15/64	0.2344	2.5/8	12"	6	059015
B	0.2374	2.3/4	12"	6	059202
C	0.2421	2.3/4	12"	6	059203
D	0.2461	2.3/4	12"	6	059204
E	0.2500	2.3/4	12"	6	059205
1/4	0.2500	2.3/4	12"	6	059016
F	0.2571	2.7/8	12"	6	059206
G	0.2610	2.7/8	12"	6	059207
17/64	0.2656	2.7/8	12"	6	059017
H	0.2661	2.7/8	12"	6	059208
I	0.2720	2.7/8	12"	6	059209
J	0.2772	2.7/8	12"	6	059210
K	0.2811	2.15/16	12"	6	059211
9/32	0.2813	2.15/16	12"	6	059018
L	0.2902	2.15/16	12"	6	059212
M	0.2949	3.1/16	12"	6	059213
19/64	0.2969	3.1/16	12"	6	059019
N	0.3020	3.1/16	12"	6	059214
5/16	0.3125	3.3/16	12"	6	059020
O	0.3161	3.3/16	12"	6	059215
P	0.3228	3.5/16	12"	6	059216
21/64	0.3281	3.5/16	12"	6	059021
Q	0.3319	3.7/16	12"	6	059217
R	0.3390	3.7/16	12"	6	059218
11/32	0.3437	3.7/16	12"	6	059022
S	0.3480	3.1/2	12"	3	059219
T	0.3580	3.1/2	12"	3	059220
23/64	0.3594	3.1/2	12"	3	059023
U	0.3680	3.5/8	12"	3	059221
3/8	0.3750	3.5/8	12"	3	059024
V	0.3772	3.5/8	12"	3	059222
W	0.3858	3.3/4	12"	3	059223
25/64	0.3906	3.3/4	12"	3	059025
X	0.3969	3.3/4	12"	3	059224
Y	0.4039	3.7/8	12"	3	059225
13/32	0.4063	3.7/8	12"	3	059026
Z	0.4130	3.7/8	12"	3	059226
27/64	0.4219	3.15/16	12"	3	059027
7/16	0.4375	4.1/16	12"	3	059028
29/64	0.4531	4.3/16	12"	3	059029
15/32	0.4687	4.5/16	12"	3	059030
31/64	0.4844	4.3/8	12"	3	059031
1/2	0.5000	4.1/2	12"	3	059032

AIRCRAFT EXTENSION DRILL



Heavy Duty Cobalt Aircraft Extension (NAS 907 Type J)

CO500-6 - Fractional Sizes, 6" Over All Length

CO501-6 - Wire Gauge Sizes, 6" Over All Length

CO500-12 - Fractional Sizes, 12" Over All Length

CO501-12 - Wire Gauge Sizes, 12" Over All Length

Low thrust design self centering 135° Split Point for easier penetration. Low thrust design. Cobalt base material with Bronze Oxide for wear resistance and lubricity. For enhanced tool life in ferrous materials.



d_1 Ø "/Nr.	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	CO500-6 CO501-6	CO500-12 CO501-12
1/16	0.0625	7/8	12"	12	—	052604
1/16	0.0625	7/8	6"	12	053604	—
52	0.0635	7/8	6"	12	053752	—
51	0.0670	1"	6"	12	053751	—
50	0.0700	1"	6"	12	053750	—
49	0.0730	1"	6"	12	053749	—
48	0.0760	1"	6"	12	053748	—
5/64	0.0781	1"	12"	12	—	052605
5/64	0.0781	1"	6"	12	053605	—
47	0.0785	1"	6"	12	053747	—
46	0.0810	1.1/8	6"	12	053746	—
45	0.0820	1.1/8	6"	12	053745	—
44	0.0860	1.1/8	6"	12	053744	—
43	0.0890	1.1/4	6"	12	053743	—
42	0.0935	1.1/4	6"	12	053742	—
3/32	0.0938	1.1/4	12"	12	—	052606
3/32	0.0938	1.1/4	6"	12	053606	—
41	0.0960	1.3/8	6"	12	053741	—
40	0.0980	1.3/8	12"	12	—	052840
40	0.0980	1.3/8	6"	12	053740	—
39	0.0995	1.3/8	6"	12	053739	—
38	0.1015	1.7/16	6"	12	053738	—
37	0.1040	1.7/16	6"	12	053737	—
36	0.1065	1.7/16	6"	12	053736	—
7/64	0.1094	1.1/2	12"	12	—	052607
7/64	0.1094	1.1/2	6"	12	053607	—
35	0.1100	1.1/2	6"	12	053735	—
34	0.1110	1.1/2	6"	12	053734	—
33	0.1130	1.1/2	12"	12	—	052833
33	0.1130	1.1/2	6"	12	053733	—
32	0.1160	1.5/8	6"	12	053732	—
31	0.1200	1.5/8	6"	12	053731	—
1/8	0.1250	1.5/8	12"	12	—	052608



AIRCRAFT EXTENSION DRILL

d ₁ Ø "/Nr.	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	CO500-6 CO501-6	CO500-12 CO501-12
1/8	0.1250	1.5/8	6"	12	053608	—
30	0.1285	1.5/8	12"	12	—	052830
30	0.1285	1.5/8	6"	12	053730	—
29	0.1360	1.3/4	12"	12	—	052829
29	0.1360	1.3/4	6"	12	053729	—
28	0.1405	1.3/4	6"	12	053728	—
9/64	0.1406	1.3/4	12"	12	—	052609
9/64	0.1406	1.3/4	6"	12	053609	—
27	0.1440	1.7/8	12"	12	—	052827
27	0.1440	1.7/8	6"	12	053727	—
26	0.1470	1.7/8	6"	12	053726	—
25	0.1495	1.7/8	6"	12	053725	—
24	0.1520	2"	6"	12	053724	—
23	0.1540	2"	6"	12	053723	—
5/32	0.1563	2"	12"	12	—	052610
5/32	0.1563	2"	6"	12	053610	—
22	0.1570	2"	6"	12	053722	—
21	0.1590	2.1/8	12"	12	—	052821
21	0.1590	2.1/8	6"	12	053721	—
20	0.1610	2.1/8	12"	12	—	052820
20	0.1610	2.1/8	6"	12	053720	—
19	0.1660	2.1/8	12"	12	—	052819
19	0.1660	2.1/8	6"	12	053719	—
18	0.1695	2.1/8	6"	12	053718	—
11/64	0.1719	2.1/8	12"	12	—	052611
11/64	0.1719	2.1/8	6"	12	053611	—
17	0.1730	2.3/16	6"	12	053717	—
16	0.1770	2.3/16	12"	12	—	052816
16	0.1770	2.3/16	6"	12	053716	—
15	0.1800	2.3/16	6"	12	053715	—
14	0.1820	2.3/16	6"	12	053714	—
13	0.1850	2.5/16	6"	12	053713	—
3/16	0.1875	2.5/16	12"	6	—	052612
3/16	0.1875	2.5/16	6"	12	053612	—
12	0.1890	2.5/16	6"	12	053712	—
11	0.1910	2.5/16	12"	12	—	052811
11	0.1910	2.5/16	6"	12	053711	—
10	0.1935	2.7/16	12"	6	—	052810
10	0.1935	2.7/16	6"	12	053710	—
9	0.1960	2.7/16	6"	12	053709	—
8	0.1990	2.7/16	6"	12	053708	—
7	0.2010	2.7/16	6"	12	053707	—
13/64	0.2031	2.7/16	12"	6	—	052613
13/64	0.2031	2.7/16	6"	12	053613	—
6	0.2040	2.1/2	6"	12	053706	—
5	0.2055	2.1/2	6"	12	053705	—
4	0.2090	2.1/2	6"	12	053704	—
3	0.2130	2.1/2	6"	12	053703	—
7/32	0.2188	2.1/2	12"	6	—	052614
7/32	0.2188	2.1/2	6"	12	053614	—
2	0.2210	2.5/8	12"	6	—	052802
2	0.2210	2.5/8	6"	12	053702	—
1	0.2280	2.5/8	6"	12	053701	—
15/64	0.2344	2.5/8	12"	6	—	052615
15/64	0.2344	2.5/8	6"	12	053615	—
1/4	0.2500	2.3/4	12"	6	—	052616
1/4	0.2500	2.3/4	6"	12	053616	—

TAPER SHANK DRILL



General Purpose Taper Shank

209 Standard Taper Type

S209 Small Taper Type

Steam Oxide for increased tool life & lubricity.



209

S209

ANSI

4XD

HSS

118°



1/8 - 2"
31/64 - 2"

d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	MTS	Pack Qty	209 S209
1/8	0.1250	1.7/8	5.1/8	1	1	020008
9/64	0.1406	2.1/8	5.3/8	1	1	020009
5/32	0.1563	2.1/8	5.3/8	1	1	020010
11/64	0.1719	2.1/2	5.3/4	1	1	020011
3/16	0.1875	2.1/2	5.3/4	1	1	020012
13/64	0.2031	2.3/4	6"	1	1	020013
7/32	0.2188	2.3/4	6"	1	1	020014
15/64	0.2344	2.7/8	6.1/8	1	1	020015
1/4	0.2500	2.7/8	6.1/8	1	1	020016
17/64	0.2656	3"	6.1/4	1	1	020017
9/32	0.2813	3"	6.1/4	1	1	020018
19/64	0.2969	3.1/8	6.3/8	1	1	020019
5/16	0.3125	3.1/8	6.3/8	1	1	020020
21/64	0.3281	3.1/4	6.1/2	1	1	020021
11/32	0.3437	3.1/4	6.1/2	1	1	020022
23/64	0.3594	3.1/2	6.3/4	1	1	020023
3/8	0.3750	3.1/2	6.3/4	1	1	020024
25/64	0.3906	3.5/8	7"	1	1	020025
13/32	0.4063	3.5/8	7"	1	1	020026
27/64	0.4219	3.7/8	7.1/4	1	1	020027
7/16	0.4375	3.7/8	7.1/4	1	1	020028
29/64	0.4531	4.1/8	7.1/2	1	1	020029
15/32	0.4687	4.1/8	7.1/2	1	1	020030
31/64	0.4844	4.3/8	7.3/4	1	1	023031
31/64	0.4844	4.3/8	8.1/4	2	1	020031
1/2	0.5000	4.3/8	7.3/4	1	1	023032
1/2	0.5000	4.3/8	8.1/4	2	1	020032
33/64	0.5156	4.5/8	8"	1	1	023033
33/64	0.5156	4.5/8	8.1/2	2	1	020033
17/32	0.5313	4.5/8	8"	1	1	023034
17/32	0.5313	4.5/8	8.1/2	2	1	020034
35/64	0.5469	4.7/8	8.1/4	1	1	023035
35/64	0.5469	4.7/8	8.3/4	2	1	020035



TAPER SHANK DRILL

d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	MTS	Pack Qty	209 S209
9/16	0.5625	4.7/8	8.1/4	1	1	023036
9/16	0.5625	4.7/8	8.3/4	2	1	020036
37/64	0.5781	4.7/8	8.3/4	2	1	020037
19/32	0.5937	4.7/8	8.3/4	2	1	020038
39/64	0.6094	4.7/8	8.3/4	2	1	020039
5/8	0.6250	4.7/8	8.3/4	2	1	020040
41/64	0.6406	5.1/8	9"	2	1	020041
21/32	0.6563	5.1/8	9"	2	1	020042
43/64	0.6719	5.3/8	9.1/4	2	1	020043
11/16	0.6875	5.3/8	9.1/4	2	1	020044
45/64	0.7031	5.5/8	9.1/2	2	1	020045
23/32	0.7188	5.5/8	9.1/2	2	1	020046
47/64	0.7344	5.7/8	9.3/4	2	1	020047
3/4	0.7500	5.7/8	9.3/4	2	1	020048
49/64	0.7656	6"	9.7/8	2	1	020049
25/32	0.7813	6"	9.7/8	2	1	020050
51/64	0.7969	6.1/8	10"	2	1	023051
51/64	0.7969	6.1/8	10.3/4	3	1	020051
13/16	0.8125	6.1/8	10"	2	1	023052
13/16	0.8125	6.1/8	10.3/4	3	1	020052
53/64	0.8281	6.1/8	10"	2	1	023053
53/64	0.8281	6.1/8	10.3/4	3	1	020053
27/32	0.8438	6.1/8	10"	2	1	023054
27/32	0.8438	6.1/8	10.3/4	3	1	020054
55/64	0.8594	6.1/8	10"	2	1	023055
55/64	0.8594	6.1/8	10.3/4	3	1	020055
7/8	0.8750	6.1/8	10"	2	1	023056
7/8	0.8750	6.1/8	10.3/4	3	1	020056
57/64	0.8906	6.1/8	10"	2	1	023057
57/64	0.8906	6.1/8	10.3/4	3	1	020057
29/32	0.9063	6.1/8	10"	2	1	023058
29/32	0.9063	6.1/8	10.3/4	3	1	020058
59/64	0.9219	6.1/8	10.3/4	3	1	020059
15/16	0.9375	6.1/8	10.3/4	3	1	020060
61/64	0.9531	6.3/8	11"	3	1	020061
31/32	0.9688	6.3/8	11"	3	1	020062
63/64	0.9844	6.3/8	11"	3	1	020063
1"	1.0000	6.3/8	11"	3	1	020100
1.1/64	1.0156	6.1/2	11.1/8	3	1	020101
1.1/32	1.0312	6.1/2	11.1/8	3	1	020102
1.3/64	1.0469	6.5/8	11.1/4	3	1	020103
1.1/16	1.0626	6.5/8	11.1/4	3	1	020104
1.5/64	1.0781	6.7/8	11.1/2	3	1	023105
1.5/64	1.0781	6.7/8	12.1/2	4	1	020105
1.3/32	1.0937	6.7/8	11.1/2	3	1	023106
1.3/32	1.0937	6.7/8	12.1/2	4	1	020106
1.7/64	1.1094	7.1/8	11.3/4	3	1	023107
1.7/64	1.1094	7.1/8	12.3/4	4	1	020107
1.1/8	1.1250	7.1/8	11.3/4	3	1	023108
1.1/8	1.1250	7.1/8	12.3/4	4	1	020108
1.9/64	1.1406	7.1/4	11.7/8	3	1	023109
1.9/64	1.1406	7.1/4	12.7/8	4	1	020109
1.5/32	1.1563	7.1/4	11.7/8	3	1	023110
1.5/32	1.1563	7.1/4	12.7/8	4	1	020110
1.11/64	1.1719	7.3/8	12"	3	1	023111
1.11/64	1.1719	7.3/8	13"	4	1	020111
1.3/16	1.1875	7.3/8	12"	3	1	023112
1.3/16	1.1875	7.3/8	13"	4	1	020112
1.13/64	1.2031	7.1/2	12.1/8	3	1	023113
1.13/64	1.2031	7.1/2	13.1/8	4	1	020113
1.7/32	1.2187	7.1/2	12.1/8	3	1	023114
1.7/32	1.2187	7.1/2	13.1/8	4	1	020114
1.15/64	1.2344	7.7/8	12.1/2	3	1	023115
1.15/64	1.2344	7.7/8	13.1/2	4	1	020115
1.1/4	1.2500	7.7/8	12.1/2	3	1	023116
1.1/4	1.2500	7.7/8	13.1/2	4	1	020116

DRILLS

TAPER SHANK DRILL



d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	MTS	Pack Qty	209 S209
1.17/64	1.2656	8.1/2	14.1/8	4	1	020117
1.9/32	1.2813	8.1/2	14.1/8	4	1	020118
1.19/64	1.2969	8.5/8	14.1/4	4	1	020119
1.5/16	1.3125	8.5/8	14.1/4	4	1	020120
1.21/64	1.3281	8.3/4	14.3/8	4	1	020121
1.11/32	1.3437	8.3/4	14.3/8	4	1	020122
1.23/64	1.3594	8.7/8	14.1/2	4	1	020123
1.3/8	1.3750	8.7/8	14.1/2	4	1	020124
1.25/64	1.3906	9"	14.5/8	4	1	020125
1.13/32	1.4063	9"	14.5/8	4	1	020126
1.27/64	1.4219	9.1/8	14.3/4	4	1	020127
1.7/16	1.4375	9.1/8	14.3/4	4	1	020128
1.29/64	1.4531	9.1/4	14.7/8	4	1	020129
1.15/32	1.4687	9.1/4	14.7/8	4	1	020130
1.31/64	1.4844	9.3/8	15"	4	1	020131
1.1/2	1.5000	9.3/8	15"	4	1	020132
1.33/64	1.5156	9.3/8	15"	4	1	023133
1.17/32	1.5313	9.3/8	15"	4	1	023134
1.17/32	1.5313	9.3/8	16.3/8	5	1	020134
1.35/64	1.5469	9.5/8	15.1/4	4	1	023135
1.9/16	1.5625	9.5/8	15.1/4	4	1	023136
1.9/16	1.5625	9.5/8	16.5/8	5	1	020136
1.37/64	1.5781	9.7/8	15.1/2	4	1	023137
1.19/32	1.5937	9.7/8	15.1/2	4	1	023138
1.19/32	1.5937	9.7/8	16.7/8	5	1	020138
1.39/64	1.6094	10"	15.5/8	4	1	023139
1.5/8	1.6250	10"	15.5/8	4	1	023140
1.5/8	1.6250	10"	17"	5	1	020140
1.41/64	1.6406	10.1/8	15.3/4	4	1	023141
1.21/32	1.6563	10.1/8	15.3/4	4	1	023142
1.21/32	1.6563	10.1/8	17.1/8	5	1	020142
1.43/64	1.6719	10.1/8	15.3/4	4	1	023143
1.11/16	1.6875	10.1/8	15.3/4	4	1	023144
1.11/16	1.6875	10.1/8	17.1/8	5	1	020144
1.45/64	1.7031	10.1/8	15.3/4	4	1	023145
1.23/32	1.7188	10.1/8	15.3/4	4	1	023146
1.23/32	1.7188	10.1/8	17.1/8	5	1	020146
1.47/64	1.7344	10.3/8	16.1/4	4	1	023147
1.3/4	1.7500	10.1/8	17.1/8	5	1	020148
1.3/4	1.7500	10.3/8	16.1/4	4	1	023148
1.25/32	1.7813	10.1/8	17.1/8	5	1	020150
1.25/32	1.7813	10.3/8	16.1/4	4	1	023150
1.13/16	1.8125	10.1/8	17.1/8	5	1	020152
1.13/16	1.8125	10.3/8	16.1/4	4	1	023152
1.27/32	1.8437	10.1/8	17.1/8	5	1	020154
1.27/32	1.8437	10.3/8	16.1/4	4	1	023154
1.7/8	1.8750	10.1/2	16.1/2	4	1	023156
1.7/8	1.8750	10.3/8	17.3/8	5	1	020156
1.29/32	1.9063	10.1/2	16.1/2	4	1	023158
1.29/32	1.9063	10.3/8	17.3/8	5	1	020158
1.15/16	1.9375	10.3/8	17.3/8	5	1	020160
1.15/16	1.9375	10.5/8	16.5/8	4	1	023160
1.31/32	1.9687	10.3/8	17.3/8	5	1	020162
1.31/32	1.9687	10.5/8	16.5/8	4	1	023162
2"	2.0000	10.3/8	17.3/8	5	1	020200
2"	2.0000	10.5/8	16.5/8	4	1	023200



TAPER SHANK DRILL

General Purpose Taper Shank, Metric

5ATS Steam Oxide for increased wear resistance & lubricity.

Thinned Point design reduces thrust and improves chip formation.

A530 TiN Coating increases wear resistance and improves tool life.

A350 Long series. Steam Oxide for increased wear resistance & lubricity.



d_1 Ø mm	d_1 decimal Inch	l_2 mm	l_1 mm	MTS	Pack Qty	5ATS	A530	A350
5.00	0.1969	74	155	1	1	—	—	0034071
5.00	0.1969	52	133	1	1	026050	—	—
5.50	0.2165	80	161	1	1	—	—	0034088
5.50	0.2165	57	138	1	1	026055	—	—
6.00	0.2362	80	161	1	1	—	—	0034118
6.00	0.2362	57	138	1	1	026060	—	—
6.50	0.2559	63	144	1	1	026065	—	—
6.70	0.2638	86	167	1	1	—	—	0034125
6.80	0.2677	93	174	1	1	—	—	0034149
6.80	0.2677	69	150	1	1	026068	—	—
7.00	0.2756	93	174	1	1	—	—	0034156
7.00	0.2756	69	150	1	1	026070	—	—
7.50	0.2953	93	174	1	1	—	—	0034163
7.50	0.2953	69	150	1	1	026075	—	—
8.00	0.3150	100	181	1	1	—	—	0034187
8.00	0.3150	75	156	1	1	026080	—	—
8.40	0.3307	100	181	1	1	—	—	0034200
8.50	0.3346	100	181	1	1	—	—	0034217
8.50	0.3346	75	156	1	1	—	0041277	—
8.50	0.3346	75	156	1	1	026085	—	—
8.75	0.3445	107	188	1	1	—	—	0034224
9.00	0.3543	107	188	1	1	—	—	0034248
9.00	0.3543	81	162	1	1	—	0041284	—
9.00	0.3543	81	162	1	1	026090	—	—
9.50	0.3740	107	188	1	1	—	—	0034279
9.50	0.3740	81	162	1	1	026095	—	—
9.80	0.3858	116	197	1	1	—	—	0034293
10.00	0.3937	116	197	1	1	—	—	0033241
10.00	0.3937	87	168	1	1	—	0040713	—
10.00	0.3937	87	168	1	1	026100	—	—
10.20	0.4016	116	197	1	1	—	—	0033265
10.20	0.4016	87	168	1	1	—	0040720	—
10.20	0.4016	87	168	1	1	026102	—	—

TAPER SHANK DRILL



d ₁ Ø	d ₁ decimal Inch	l ₂ mm	l ₁ mm	MTS	Pack Qty	5ATS	A530	A350
10.50	0.4134	116	197	1	1	—	—	0033289
10.50	0.4134	87	168	1	1	—	0040737	—
10.50	0.4134	87	168	1	1	026105	—	—
10.70	0.4213	125	206	1	1	—	—	0033296
11.00	0.4331	125	206	1	1	—	—	0033319
11.00	0.4331	94	175	1	1	—	0040744	—
11.00	0.4331	94	175	1	1	026110	—	—
11.50	0.4527	94	175	1	1	—	0040751	—
11.50	0.4528	125	206	1	1	—	—	0033333
11.50	0.4528	94	175	1	1	026115	—	—
11.75	0.4626	125	206	1	1	—	—	0033340
11.75	0.4626	94	175	1	1	—	0040768	—
11.80	0.4646	125	206	1	1	—	—	0033357
12.00	0.4724	101	182	1	1	—	0040775	—
12.00	0.4724	134	215	1	1	—	—	0033364
12.00	0.4724	101	182	1	1	026120	—	—
12.20	0.4803	101	182	1	1	026122	—	—
12.50	0.4921	101	182	1	1	—	0040799	—
12.50	0.4921	134	215	1	1	—	—	0033395
12.50	0.4921	101	182	1	1	026125	—	—
12.80	0.5039	101	182	1	1	026128	—	—
13.00	0.5118	101	182	1	1	—	0040812	—
13.00	0.5118	134	215	1	1	—	—	0033401
13.00	0.5118	101	182	1	1	026130	—	—
13.50	0.5315	108	189	1	1	—	0040829	—
13.50	0.5315	142	223	1	1	—	—	0033418
13.50	0.5315	108	189	1	1	026135	—	—
13.80	0.5433	108	189	1	1	026138	—	—
14.00	0.5512	108	189	1	1	—	0040836	—
14.00	0.5512	142	223	1	1	—	—	0033432
14.00	0.5512	108	189	1	1	026140	—	—
14.25	0.5610	147	245	2	1	—	—	0033449
14.25	0.5610	114	212	2	1	026142	—	—
14.50	0.5709	114	212	2	1	—	0040850	—
14.50	0.5709	147	245	2	1	—	—	0033456
14.50	0.5709	114	212	2	1	026145	—	—
14.75	0.5807	147	245	2	1	—	—	0033463
14.75	0.5807	114	212	2	1	026147	—	—
15.00	0.5906	114	212	2	1	—	0040874	—
15.00	0.5906	147	245	2	1	—	—	0033470
15.00	0.5906	114	212	2	1	026150	—	—
15.25	0.6004	120	218	2	1	—	0040881	—
15.25	0.6004	153	251	2	1	—	—	0033487
15.25	0.6004	120	218	2	1	026152	—	—
15.50	0.6102	120	218	2	1	—	0040898	—
15.50	0.6102	153	251	2	1	—	—	0033494
15.50	0.6102	120	218	2	1	026155	—	—
15.75	0.6201	153	251	2	1	—	—	0033500
15.75	0.6201	120	218	2	1	026157	—	—
16.00	0.6299	120	218	2	1	—	0040911	—
16.00	0.6299	153	251	2	1	—	—	0033517
16.00	0.6299	120	218	2	1	026160	—	—
16.25	0.6398	159	257	2	1	—	—	0033524
16.25	0.6398	125	223	2	1	026162	—	—
16.50	0.6496	125	223	2	1	—	0040935	—
16.50	0.6496	159	257	2	1	—	—	0033531
16.50	0.6496	125	223	2	1	026165	—	—
16.75	0.6594	159	257	2	1	—	—	0033548
16.75	0.6594	125	223	2	1	026167	—	—
17.00	0.6693	125	223	2	1	—	0040942	—
17.00	0.6693	159	257	2	1	—	—	0033555
17.00	0.6693	125	223	2	1	026170	—	—
17.25	0.6791	165	263	2	1	—	—	0033562
17.25	0.6791	130	228	2	1	026172	—	—
17.50	0.6890	130	228	2	1	—	0040966	—
17.50	0.6890	165	263	2	1	—	—	0033579



TAPER SHANK DRILL

d ₁ Ø	d ₁ decimal Inch	l ₂ mm	l ₁ mm	MTS	Pack Qty	5ATS	A530	A350
17.50	0.6890	130	228	2	1	026175	—	—
18.00	0.7087	130	228	2	1	—	0040980	—
18.00	0.7087	165	263	2	1	—	—	0033593
18.00	0.7087	130	228	2	1	026180	—	—
18.50	0.7283	135	233	2	1	—	0040997	—
18.50	0.7283	171	269	2	1	—	—	0033616
18.50	0.7283	135	233	2	1	026185	—	—
19.00	0.7480	135	233	2	1	—	0041017	—
19.00	0.7480	171	269	2	1	—	—	0033623
19.00	0.7480	135	233	2	1	026190	—	—
19.50	0.7677	140	238	2	1	—	0041024	—
19.50	0.7677	177	275	2	1	—	—	0033647
19.50	0.7677	140	238	2	1	026195	—	—
19.75	0.7776	177	275	2	1	—	—	0033654
20.00	0.7874	140	238	2	1	—	0041048	—
20.00	0.7874	177	275	2	1	—	—	0033661
20.00	0.7874	140	238	2	1	026200	—	—
20.25	0.7972	184	282	2	1	—	—	0033678
20.50	0.8071	145	243	2	1	—	0041055	—
20.50	0.8071	184	282	2	1	—	—	0033685
20.50	0.8071	145	243	2	1	026205	—	—
21.00	0.8268	145	243	2	1	—	0041062	—
21.00	0.8268	184	282	2	1	—	—	0033692
21.00	0.8268	145	243	2	1	026210	—	—
21.50	0.8465	150	248	2	1	—	0041079	—
21.50	0.8465	191	289	2	1	—	—	0033708
21.50	0.8465	150	248	2	1	026215	—	—
22.00	0.8661	150	248	2	1	—	0041086	—
22.00	0.8661	191	289	2	1	—	—	0033715
22.00	0.8661	150	248	2	1	026220	—	—
22.50	0.8858	155	253	2	1	—	0041093	—
22.50	0.8858	198	296	2	1	—	—	0033722
22.50	0.8858	155	253	2	1	026225	—	—
23.00	0.9055	155	253	2	1	—	0041109	—
23.00	0.9055	198	296	2	1	—	—	0033739
23.00	0.9055	155	253	2	1	026230	—	—
23.50	0.9252	155	276	3	1	—	0041116	—
23.50	0.9252	198	319	3	1	—	—	0033746
23.50	0.9252	155	276	3	1	026235	—	—
24.00	0.9449	160	281	3	1	—	0041123	—
24.00	0.9449	206	327	3	1	—	—	0033753
24.00	0.9449	160	281	3	1	026240	—	—
24.50	0.9646	160	281	3	1	—	0041130	—
24.50	0.9646	206	327	3	1	—	—	0033760
24.50	0.9646	160	281	3	1	026245	—	—
25.00	0.9843	160	281	3	1	—	0041147	—
25.00	0.9843	206	327	3	1	—	—	0033777
25.00	0.9843	160	281	3	1	026250	—	—
25.50	1.0039	165	286	3	1	—	0041154	—
25.50	1.0039	214	335	3	1	—	—	0033784
25.50	1.0039	165	286	3	1	026255	—	—
26.00	1.0236	165	286	3	1	—	0041161	—
26.00	1.0236	214	335	3	1	—	—	0033791
26.00	1.0236	165	286	3	1	026260	—	—
26.50	1.0433	165	286	3	1	—	0041178	—
26.50	1.0433	214	335	3	1	—	—	0033807
26.50	1.0433	165	286	3	1	026265	—	—
27.00	1.0630	170	291	3	1	—	0041185	—
27.00	1.0630	222	343	3	1	—	—	0033814
27.00	1.0630	170	291	3	1	026270	—	—
27.50	1.0827	170	291	3	1	—	0041192	—
27.50	1.0827	222	343	3	1	—	—	0033821
27.50	1.0827	170	291	3	1	026275	—	—
28.00	1.1024	170	291	3	1	—	0041208	—
28.00	1.1024	222	343	3	1	—	—	0033838
28.00	1.1024	170	291	3	1	026280	—	—

TAPER SHANK DRILL



d ₁ Ø	d ₁ decimal Inch	l ₂ mm	l ₁ mm	MTS	Pack Qty	5ATS	A530	A350
28.50	1.1220	175	296	3	1	—	0041215	—
28.50	1.1220	175	296	3	1	026285	—	—
29.00	1.1417	175	296	3	1	—	0041222	—
29.00	1.1417	230	351	3	1	—	—	0033845
29.00	1.1417	175	296	3	1	026290	—	—
29.50	1.1614	175	296	3	1	—	0041239	—
29.50	1.1614	175	296	3	1	026295	—	—
30.00	1.1811	175	296	3	1	—	0041246	—
30.00	1.1811	230	351	3	1	—	—	0033852
30.00	1.1811	175	296	3	1	026300	—	—
30.50	1.2008	239	360	3	1	—	—	0033869
30.50	1.2008	180	301	3	1	026305	—	—
31.00	1.2205	180	301	3	1	—	0041253	—
31.00	1.2205	239	360	3	1	—	—	0033876
31.00	1.2205	180	301	3	1	026310	—	—
31.50	1.2402	239	360	3	1	—	—	0033883
31.50	1.2402	180	301	3	1	026315	—	—
32.00	1.2598	185	334	4	1	—	0041260	—
32.00	1.2598	248	397	4	1	—	—	0033890
32.00	1.2598	185	334	4	1	026320	—	—
32.50	1.2795	185	334	4	1	026325	—	—
33.00	1.2992	185	334	4	1	—	0148433	—
33.00	1.2992	248	397	4	1	—	—	0033906
33.00	1.2992	185	334	4	1	026330	—	—
33.50	1.3189	185	334	4	1	026335	—	—
34.00	1.3386	257	406	4	1	—	—	0033913
34.00	1.3386	190	339	4	1	026340	—	—
34.50	1.3583	190	339	4	1	026345	—	—
35.00	1.3780	190	339	4	1	—	0148457	—
35.00	1.3780	257	406	4	1	—	—	0033920
35.00	1.3780	190	339	4	1	026350	—	—
35.50	1.3976	190	339	4	1	026355	—	—
36.00	1.4173	267	416	4	1	—	—	0033937
36.00	1.4173	195	344	4	1	026360	—	—
36.50	1.4370	195	344	4	1	026365	—	—
37.00	1.4567	267	416	4	1	—	—	0033944
37.00	1.4567	195	344	4	1	026370	—	—
37.50	1.4764	195	344	4	1	026375	—	—
38.00	1.4961	277	426	4	1	—	—	0033951
38.00	1.4961	200	349	4	1	026380	—	—
39.00	1.5354	277	426	4	1	—	—	0033968
39.00	1.5354	200	349	4	1	026390	—	—
40.00	1.5748	200	349	4	1	—	0148471	—
40.00	1.5748	277	426	4	1	—	—	0033975
40.00	1.5748	200	349	4	1	026400	—	—
41.00	1.6142	287	436	4	1	—	—	0033982
41.00	1.6142	205	354	4	1	026410	—	—
42.00	1.6535	287	436	4	1	—	—	0033999
42.00	1.6535	205	354	4	1	026420	—	—
43.00	1.6929	298	447	4	1	—	—	0034002
43.00	1.6929	210	359	4	1	026430	—	—
44.00	1.7323	298	447	4	1	—	—	0034019
44.00	1.7323	210	359	4	1	026440	—	—
45.00	1.7717	298	447	4	1	—	—	0034026
45.00	1.7717	210	359	4	1	026450	—	—
46.00	1.8110	310	459	4	1	—	—	0034033
47.00	1.8504	310	459	4	1	—	—	0034040
47.00	1.8504	215	364	4	1	026470	—	—
48.00	1.8898	321	470	4	1	—	—	0034057
48.00	1.8898	220	369	4	1	026480	—	—
49.00	1.9291	220	369	4	1	026490	—	—
50.00	1.9685	321	470	4	1	—	—	0034101
50.00	1.9685	220	369	4	1	026500	—	—

General Purpose Taper Shank - Extra Length

A345 Steam Oxide for increase wear resistance & lubricity.



d_1 $\varnothing h_8$ Inch	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	MTS	Pack Qty	A345
	8.00	0.3150	165	265	1	1	0418383
	8.50	0.3346	165	265	1	1	0418390
	9.00	0.3543	175	275	1	1	0418406
	9.50	0.3740	175	275	1	1	0420201
3/8	9.52	0.3748	185	285	1	1	0418307
	10.00	0.3937	185	285	1	1	0418062
13/32	10.32	0.4063	185	285	1	1	0418116
	10.50	0.4134	185	285	1	1	0420171
	11.00	0.4331	195	300	1	1	0418079
7/16	11.11	0.4374	195	300	1	1	0418369
	11.50	0.4528	195	300	1	1	0419564
29/64	11.51	0.4531	205	310	1	1	0418284
	12.00	0.4724	205	310	1	1	0418093
	12.50	0.4921	205	310	1	1	0419571
1/2	12.70	0.5000	205	310	1	1	0418055
	13.00	0.5118	205	310	1	1	0418109
17/32	13.49	0.5311	220	325	1	1	0418161
	13.50	0.5315	220	325	1	1	0419588
	14.00	0.5512	220	325	1	1	0418123
9/16	14.29	0.5626	220	340	2	1	0418413
37/64	14.68	0.5780	220	340	2	1	0418321
	15.00	0.5906	220	340	2	1	0418130
39/64	15.48	0.6094	230	355	2	1	0418338
	15.50	0.6102	230	355	2	1	0419601
5/8	15.88	0.6252	230	355	2	1	0418352
	16.00	0.6299	230	355	2	1	0418147
41/64	16.27	0.6406	230	355	2	1	0418345
	16.50	0.6496	230	355	2	1	0419618
21/32	16.67	0.6563	230	355	2	1	0418215
	17.00	0.6693	230	355	2	1	0418154
11/16	17.46	0.6874	245	370	2	1	0418086
	17.50	0.6890	245	370	2	1	0419625
	18.00	0.7087	245	370	2	1	0418178

TAPER SHANK DRILL

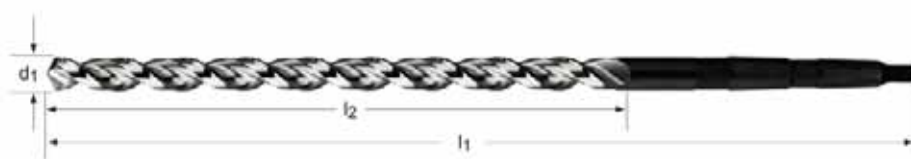


d_1 $\varnothing h_8$ Inch	d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	MTS	Pack Qty	A345
3/4	18.50	0.7283	245	370	2	1	0419632
	19.00	0.7480	245	370	2	1	0418185
	19.05	0.7500	260	385	2	1	0418291
	19.50	0.7677	260	385	2	1	0419649
	20.00	0.7874	260	385	2	1	0418192
	20.50	0.8709	260	385	2	1	0419656
	21.00	0.8268	260	385	2	1	0418208
7/8	21.50	0.8465	270	405	2	1	0419663
	22.00	0.8661	270	405	2	1	0418222
	22.22	0.8748	270	405	2	1	0418376
	22.50	0.8858	270	405	3	1	0419670
	23.00	0.9055	270	405	3	1	0419687
	23.50	0.9252	270	425	3	1	0419694
	24.00	0.9449	290	440	3	1	0418239
	24.50	0.9646	290	440	3	1	0419700
	25.00	0.9843	290	440	3	1	0418246
	25.40	1.0000	290	440	3	1	0418031
1"	25.50	1.0039	290	440	3	1	0419717
	26.00	1.0236	290	440	3	1	0418253
	26.50	1.0433	290	440	3	1	0419724
	27.00	1.0630	305	460	3	1	0418260
	28.00	1.1024	305	460	3	1	0418277
	29.00	1.1417	305	460	3	1	0419731
	30.00	1.1811	305	460	3	1	0418314
	31.75	1.2500	320	480	3	1	0418048
	31.00	1.2205	320	480	3	1	0419748
	32.00	1.2598	320	505	4	1	0419755
1.1/4	33.00	1.2992	320	505	4	1	0422564
	34.00	1.3386	340	530	4	1	0419762
	35.00	1.3780	340	530	4	1	0419779
	36.00	1.4173	340	530	4	1	0419786
	37.00	1.4567	340	530	4	1	0419793
	38.00	1.4961	360	555	4	1	0419809
	38.10	1.5000	360	555	4	1	0419540
	39.00	1.5354	360	555	4	1	0419816
	40.00	1.5748	360	555	4	1	0419823
	41.00	1.6142	360	555	4	1	0419830
1.1/2	42.00	1.6535	360	555	4	1	0419847
	44.45	1.7500	385	585	4	1	0419557
	45.00	1.7717	385	585	4	1	0419854
	48.00	1.8898	405	605	4	1	0419861
	50.00	1.9685	405	605	4	1	0419878

General Purpose Parabolic Flute Taper Shank - Extra Length, Metric

- A951** Parabolic Flute design for efficient chip removal. Allows greater drilling depths in one pass. Bright Finish in flutes improves chip flow for soft or non-ferrous materials.
- A952** Parabolic Flute design for efficient chip removal. Allows greater drilling depths in one pass. Bright Finish in flutes improves chip flow for soft or non-ferrous materials.

* Lands are steam oxide for increased wear resistance & lubricity.



d_1 $\varnothing h_8$ mm	d_1 decimal Inch	l_2 mm	l_1 mm	MTS	Pack Qty	A951	A952
8.00	0.3150	210	330	1	1	—	0423639
8.50	0.3346	210	330	1	1	—	0423646
9.00	0.3543	220	345	1	1	—	0423653
10.00	0.3937	185	285	1	1	0418420	—
10.00	0.3937	235	360	1	1	—	0419885
10.50	0.4134	235	360	1	1	—	0419892
11.00	0.4331	195	300	1	1	0418437	—
11.00	0.4331	250	375	1	1	—	0419908
11.50	0.4528	250	375	1	1	—	0419915
12.00	0.4724	205	310	1	1	0418444	—
12.00	0.4724	260	395	1	1	—	0419922
12.50	0.4921	205	310	1	1	0418451	—
12.50	0.4921	260	395	1	1	—	0419939
13.00	0.5118	205	310	1	1	0418468	—
13.00	0.5118	260	395	1	1	—	0420188
13.50	0.5315	220	325	1	1	0418475	—
13.50	0.5315	275	410	1	1	—	0419946
14.00	0.5512	220	325	1	1	0418482	—
14.00	0.5512	275	410	1	1	—	0419953
14.50	0.5709	220	340	2	1	0418499	—
14.50	0.5709	275	425	2	1	—	0419960
15.00	0.5906	220	340	2	1	0418505	—
15.00	0.5906	275	425	2	1	—	0419977
15.50	0.6102	230	355	2	1	0418512	—
15.50	0.6102	295	445	2	1	—	0419984
16.00	0.6299	230	355	2	1	0418529	—
16.00	0.6299	295	445	2	1	—	0420195
16.50	0.6496	230	355	2	1	0418536	—
16.50	0.6496	295	445	2	1	—	0419991
17.00	0.6693	230	355	2	1	0418543	—
17.00	0.6693	295	445	2	1	—	0420003
17.50	0.6890	245	370	2	1	0418550	—
17.50	0.6890	310	465	2	1	—	0420010

TAPER SHANK DRILL



d ₁ Øh ₈ mm	d ₁ decimal Inch	l ₂ mm	l ₁ mm	MTS	Pack Qty	A951	A952
18.00	0.7087	245	370	2	1	0418567	—
18.00	0.7087	310	465	2	1	—	0420027
18.50	0.7283	245	370	2	1	0418574	—
18.50	0.7283	310	465	2	1	—	0420034
19.00	0.7480	245	370	2	1	0418581	—
19.00	0.7480	310	465	2	1	—	0420041
19.50	0.7677	260	385	2	1	0418598	—
19.50	0.7677	325	490	2	1	—	0420058
20.00	0.7874	260	385	2	1	0418604	—
20.00	0.7874	325	490	2	1	—	0420065
21.00	0.8268	260	385	2	1	0418611	—
21.00	0.8268	325	490	2	1	—	0420072
22.00	0.8661	270	405	2	1	0418628	—
22.00	0.8661	345	515	2	1	—	0420089
23.00	0.9055	270	405	2	1	0418635	—
23.00	0.9055	345	515	2	1	—	0420096
24.00	0.9449	290	440	3	1	0418642	—
24.00	0.9449	365	555	3	1	—	0420102
25.00	0.9843	290	440	3	1	0418659	—
25.00	0.9843	365	555	3	1	—	0420119
26.00	1.0236	290	440	3	1	0418666	—
26.00	1.0236	365	555	3	1	—	0420126
27.00	1.0630	305	460	3	1	0418673	—
27.00	1.0630	385	580	3	1	—	0420133
28.00	1.1024	305	460	3	1	0418680	—
28.00	1.1024	385	580	3	1	—	0420140
29.00	1.1417	305	460	3	1	0418697	—
29.00	1.1417	385	580	3	1	—	0420157
30.00	1.1811	305	460	3	1	0418703	—
30.00	1.1811	385	580	3	1	—	0420164
31.00	1.2205	410	610	3	1	—	0423585
32.00	1.2598	410	635	4	1	—	0423592
33.00	1.2992	410	635	4	1	—	0423608
34.00	1.3386	430	665	4	1	—	0423660
35.00	1.3780	430	665	4	1	—	0423677
38.00	1.4961	460	695	4	1	—	0423615
40.00	1.5748	460	695	4	1	—	0423622

DRILLS



COBALT TAPER SHANK DRILL

Cobalt Heavy Duty Taper Shank

209CO Thinned Point reduces thrust. Cobalt base material with Bronze Oxide for wear resistance and lubricity. Suitable for ferrous materials.



209CO

ANSI

4XD

HSS-E

λ135°



1/4 - 1 1/2

d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	MTS	Pack Qty	209CO
1/4	0.2500	2.7/8	6.1/8	1	1	021316
9/32	0.2813	3"	6.1/4	1	1	021318
5/16	0.3125	3.1/8	6.3/8	1	1	021320
11/32	0.3437	3.1/4	6.1/2	1	1	021322
3/8	0.3750	3.1/2	7.3/8	2	1	021324
13/32	0.4063	3.5/8	7.1/2	2	1	021326
27/64	0.4219	3.7/8	7.3/4	2	1	021327
7/16	0.4375	3.7/8	7.3/4	2	1	021328
29/64	0.4531	4.1/8	8"	2	1	021329
15/32	0.4687	4.1/8	8"	2	1	021330
31/64	0.4844	4.3/8	8.1/4	2	1	021331
1/2	0.5000	4.3/8	8.1/4	2	1	021332
33/64	0.5156	4.5/8	8.1/2	2	1	021333
17/32	0.5313	4.5/8	8.1/2	2	1	021334
35/64	0.5469	4.7/8	8.3/4	2	1	021335
9/16	0.5625	4.7/8	8.3/4	2	1	021336
37/64	0.5781	4.7/8	8.3/4	2	1	021337
19/32	0.5937	4.7/8	8.3/4	2	1	021338
39/64	0.6094	4.7/8	8.3/4	2	1	021339
5/8	0.6250	4.7/8	8.3/4	2	1	021340
41/64	0.6406	5.1/8	9"	2	1	021341
21/32	0.6563	5.1/8	9.3/4	3	1	021342
43/64	0.6719	5.3/8	10"	3	1	021343
11/16	0.6875	5.3/8	10"	3	1	021344
45/64	0.7031	5.5/8	10.1/4	3	1	021345
23/32	0.7188	5.5/8	10.1/4	3	1	021348
47/64	0.7344	5.7/8	10.1/2	3	1	021347
3/4	0.7500	5.7/8	10.1/2	3	1	021350
49/64	0.7656	6"	10.5/8	3	1	021349
25/32	0.7813	6"	10.5/8	3	1	021352
51/64	0.7969	6.1/8	10.3/4	3	1	021351
13/16	0.8125	6.1/8	10.3/4	3	1	021354
53/64	0.8281	6.1/8	10.3/4	3	1	021353

COBALT TAPER SHANK DRILL



d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	MTS	Pack Qty	209CO
27/32	0.8438	6.1/8	10.3/4	3	1	021355
55/64	0.8594	6.1/8	10.3/4	3	1	021357
7/8	0.8750	6.1/8	10.3/4	3	1	021356
57/64	0.8906	6.1/8	10.3/4	3	1	021358
29/32	0.9063	6.1/8	10.3/4	3	1	021359
59/64	0.9219	6.1/8	10.3/4	3	1	021362
15/16	0.9375	6.1/8	10.3/4	3	1	021360
61/64	0.9531	6.3/8	11"	3	1	021363
31/32	0.9688	6.3/8	11"	3	1	021364
63/64	0.9844	6.3/8	11"	3	1	021365
1"	1.0000	6.3/8	11"	3	1	021400
1.1/64	1.0156	6.1/2	12.1/8	4	1	021401
1.1/32	1.0312	6.1/2	12.1/8	4	1	021402
1.1/16	1.0626	6.5/8	12.1/4	4	1	021404
1.3/32	1.0937	6.7/8	12.1/2	4	1	021406
1.7/64	1.1094	7.1/8	12.3/4	4	1	021407
1.1/8	1.1250	7.1/8	12.3/4	4	1	021408
1.9/64	1.1406	7.1/4	12.7/8	4	1	021409
1.5/32	1.1563	7.1/4	12.7/8	4	1	021410
1.11/64	1.1719	7.3/8	13"	4	1	021411
1.3/16	1.1875	7.3/8	13"	4	1	021412
1.7/32	1.2187	7.1/2	13.1/8	4	1	021414
1.15/64	1.2344	7.7/8	13.1/2	4	1	021415
1.1/4	1.2500	7.7/8	13.1/2	4	1	021416
1.9/32	1.2813	8.1/2	14.1/8	4	1	021418
1.19/64	1.2969	8.5/8	14.1/4	4	1	021419
1.5/16	1.3125	8.5/8	14.1/4	4	1	021420
1.11/32	1.3437	8.3/4	14.3/8	4	1	021422
1.23/64	1.3594	8.7/8	14.1/2	4	1	021423
1.3/8	1.3750	8.7/8	14.1/2	4	1	021424
1.27/64	1.4219	9.1/8	14.3/4	4	1	021427
1.7/16	1.4375	9.1/8	14.3/4	4	1	021428
1.15/32	1.4687	9.1/4	14.7/8	4	1	021430
1.31/64	1.4844	9.3/8	15"	4	1	021431
1.1/2	1.5000	9.3/8	15"	4	1	021432

DRILLS



REDUCED SHANK DRILL

General Purpose Reduced Shank - 1/2" Shank

R56 Silver & Deming Drills. Steam Oxide for increased wear resistance & lubricity.



R56

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33/64 - 1.1/2

d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	d ₂ Ø Inch	Pack Qty	R56
33/64	0.5156	3"	6"	1/2	1	091433
17/32	0.5313	3"	6"	1/2	1	091434
35/64	0.5469	3"	6"	1/2	1	091435
9/16	0.5625	3"	6"	1/2	1	091436
37/64	0.5781	3"	6"	1/2	1	091437
19/32	0.5937	3"	6"	1/2	1	091438
39/64	0.6094	3"	6"	1/2	1	091439
5/8	0.6250	3"	6"	1/2	1	091440
41/64	0.6406	3"	6"	1/2	1	091441
21/32	0.6563	3"	6"	1/2	1	091442
43/64	0.6719	3"	6"	1/2	1	091443
11/16	0.6875	3"	6"	1/2	1	091444
45/64	0.7031	3"	6"	1/2	1	091445
23/32	0.7188	3"	6"	1/2	1	091446
47/64	0.7344	3"	6"	1/2	1	091447
3/4	0.7500	3"	6"	1/2	1	091448
49/64	0.7656	3"	6"	1/2	1	091449
25/32	0.7813	3"	6"	1/2	1	091450
51/64	0.7969	3"	6"	1/2	1	091451
13/16	0.8125	3"	6"	1/2	1	091452
53/64	0.8281	3"	6"	1/2	1	091453
27/32	0.8438	3"	6"	1/2	1	091454
55/64	0.8594	3"	6"	1/2	1	091455
7/8	0.8750	3"	6"	1/2	1	091456
57/64	0.8906	3"	6"	1/2	1	091457
29/32	0.9063	3"	6"	1/2	1	091458
59/64	0.9219	3"	6"	1/2	1	091459
15/16	0.9375	3"	6"	1/2	1	091460
61/64	0.9531	3"	6"	1/2	1	091461
31/32	0.9688	3"	6"	1/2	1	091462
63/64	0.9844	3"	6"	1/2	1	091463
1"	1.0000	3"	6"	1/2	1	091464
1.1/64	1.0156	3"	6"	1/2	1	091465

REDUCED SHANK DRILL



d_1 Ø Inch	d_1 decimal Inch	l_2 Inch	l_1 Inch	d_2 Ø Inch	Pack Qty	R56
1.1/32	1.0312	3"	6"	1/2	1	091486
1.3/64	1.0469	3"	6"	1/2	1	091467
1.1/16	1.0626	3"	6"	1/2	1	091468
1.5/64	1.0781	3"	6"	1/2	1	091469
1.3/32	1.0937	3"	6"	1/2	1	091470
1.7/64	1.1094	3"	6"	1/2	1	091471
1.1/8	1.1250	3"	6"	1/2	1	091472
1.9/64	1.1406	3"	6"	1/2	1	091473
1.5/32	1.1563	3"	6"	1/2	1	091487
1.11/64	1.1719	3"	6"	1/2	1	091474
1.3/16	1.1875	3"	6"	1/2	1	091476
1.13/64	1.2031	3"	6"	1/2	1	091475
1.7/32	1.2187	3"	6"	1/2	1	091488
1.15/64	1.2344	3"	6"	1/2	1	091477
1.1/4	1.2500	3"	6"	1/2	1	091480
1.9/32	1.2813	3"	6"	1/2	1	091479
1.5/16	1.3125	3"	6"	1/2	1	091482
1.11/32	1.3437	3"	6"	1/2	1	091497
1.3/8	1.3750	3"	6"	1/2	1	091483
1.13/32	1.4063	3"	6"	1/2	1	091492
1.7/16	1.4375	3"	6"	1/2	1	091484
1.15/32	1.4687	3"	6"	1/2	1	091495
1.1/2	1.5000	3"	6"	1/2	1	091485

DRILLS



REDUCED SHANK DRILL

General Purpose Reduced Shank - 1/2" Shank with 3-Flats

R57 Silver & Deming Drills with 3-Flat Shank. Steam Oxide for increased wear resistance & lubricity.



R57

ANSI

4XD

HSS



33/64 - 1.1/2

d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	d ₂ Ø Inch	Pack Qty	R57
33/64	0.5156	3"	6"	1/2	1	091533
17/32	0.5313	3"	6"	1/2	1	091534
35/64	0.5469	3"	6"	1/2	1	091535
9/16	0.5625	3"	6"	1/2	1	091536
37/64	0.5781	3"	6"	1/2	1	091537
19/32	0.5937	3"	6"	1/2	1	091538
39/64	0.6094	3"	6"	1/2	1	091539
5/8	0.6250	3"	6"	1/2	1	091540
41/64	0.6406	3"	6"	1/2	1	091541
21/32	0.6563	3"	6"	1/2	1	091542
43/64	0.6719	3"	6"	1/2	1	091543
11/16	0.6875	3"	6"	1/2	1	091544
45/64	0.7031	3"	6"	1/2	1	091545
23/32	0.7188	3"	6"	1/2	1	091546
47/64	0.7344	3"	6"	1/2	1	091547
3/4	0.7500	3"	6"	1/2	1	091548
49/64	0.7656	3"	6"	1/2	1	091549
25/32	0.7813	3"	6"	1/2	1	091550
51/64	0.7969	3"	6"	1/2	1	091551
13/16	0.8125	3"	6"	1/2	1	091552
53/64	0.8281	3"	6"	1/2	1	091553
27/32	0.8438	3"	6"	1/2	1	091554
55/64	0.8594	3"	6"	1/2	1	091555
7/8	0.8750	3"	6"	1/2	1	091556
57/64	0.8906	3"	6"	1/2	1	091557
29/32	0.9063	3"	6"	1/2	1	091558
59/64	0.9219	3"	6"	1/2	1	091559
15/16	0.9375	3"	6"	1/2	1	091560
61/64	0.9531	3"	6"	1/2	1	091561
31/32	0.9688	3"	6"	1/2	1	091562
63/64	0.9844	3"	6"	1/2	1	091563
1"	1.0000	3"	6"	1/2	1	091564
1.1/64	1.0156	3"	6"	1/2	1	091565

REDUCED SHANK DRILL



d_1 Ø Inch	d_1 decimal Inch	l_2 Inch	l_1 Inch	d_2 Ø Inch	Pack Qty	R57
1.1/32	1.0312	3"	6"	1/2	1	091586
1.3/64	1.0469	3"	6"	1/2	1	091567
1.1/16	1.0626	3"	6"	1/2	1	091568
1.5/64	1.0781	3"	6"	1/2	1	091569
1.3/32	1.0937	3"	6"	1/2	1	091570
1.7/64	1.1094	3"	6"	1/2	1	091571
1.1/8	1.1250	3"	6"	1/2	1	091572
1.9/64	1.1406	3"	6"	1/2	1	091573
1.5/32	1.1563	3"	6"	1/2	1	091587
1.11/64	1.1719	3"	6"	1/2	1	091575
1.3/16	1.1875	3"	6"	1/2	1	091576
1.13/64	1.2031	3"	6"	1/2	1	091577
1.7/32	1.2187	3"	6"	1/2	1	091588
1.15/64	1.2344	3"	6"	1/2	1	091579
1.1/4	1.2500	3"	6"	1/2	1	091580
1.9/32	1.2813	3"	6"	1/2	1	091589
1.5/16	1.3125	3"	6"	1/2	1	091582
1.11/32	1.3437	3"	6"	1/2	1	091592
1.3/8	1.3750	3"	6"	1/2	1	091583
1.13/32	1.4063	3"	6"	1/2	1	091595
1.7/16	1.4375	3"	6"	1/2	1	091584
1.15/32	1.4687	3"	6"	1/2	1	091598
1.1/2	1.5000	3"	6"	1/2	1	091585

DRILLS



REDUCED SHANK DRILL

General Purpose Reduced Shank - 3/4" Shank

R58 Silver & Deming Drills. Steam Oxide for increased wear resistance & lubricity



R58

ANSI

1.5XD

HSS

118°



1" - 2"

d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	d ₂ Ø Inch	Pack Qty	R58
1"	1.0000	3"	6"	3/4	1	091264
1.1/32	1.0312	3"	6"	3/4	1	091266
1.1/16	1.0626	3"	6"	3/4	1	091268
1.3/32	1.0937	3"	6"	3/4	1	091270
1.1/8	1.1250	3"	6"	3/4	1	091272
1.5/32	1.1563	3"	6"	3/4	1	091274
1.3/16	1.1875	3"	6"	3/4	1	091276
1.7/32	1.2187	3"	6"	3/4	1	091278
1.1/4	1.2500	3"	6"	3/4	1	091280
1.9/32	1.2813	3"	6"	3/4	1	091282
1.5/16	1.3125	3"	6"	3/4	1	091284
1.11/32	1.3437	3"	6"	3/4	1	091286
1.3/8	1.3750	3"	6"	3/4	1	091288
1.13/32	1.4063	3"	6"	3/4	1	091290
1.7/16	1.4375	3"	6"	3/4	1	091292
1.15/32	1.4687	3"	6"	3/4	1	091294
1.1/2	1.5000	3"	6"	3/4	1	091296
1.9/16	1.5625	3"	6"	3/4	1	091298
1.5/8	1.6250	3"	6"	3/4	1	091300
1.11/16	1.6875	3"	6"	3/4	1	091302
1.3/4	1.7500	3"	6"	3/4	1	091304
1.13/16	1.8125	3"	6"	3/4	1	091306
1.7/8	1.8750	3"	6"	3/4	1	091308
1.15/16	1.9375	3"	6"	3/4	1	091310
2"	2.0000	3"	6"	3/4	1	091312

REDUCED SHANK DRILL



Cobalt, Heavy Duty, Reduced Shank - 1/2" Shank

R56CO Silver & Deming Drills. Self centering Split Point reduces thrust. Cobalt base material with Bronze/Steam Oxide for wear resistance and lubricity. Suitable for ferrous materials.

R56CO

ANSI

4XD

HSS-E

λ 118°



33/64 - 1"



d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	d ₂ Ø Inch	Pack Qty	R56CO
33/64	0.5156	3"	6"	1/2	1	092333
17/32	0.5313	3"	6"	1/2	1	092334
35/64	0.5469	3"	6"	1/2	1	092335
9/16	0.5625	3"	6"	1/2	1	092336
37/64	0.5781	3"	6"	1/2	1	092337
19/32	0.5937	3"	6"	1/2	1	092338
39/64	0.6094	3"	6"	1/2	1	092339
5/8	0.6250	3"	6"	1/2	1	092340
41/64	0.6406	3"	6"	1/2	1	092341
21/32	0.6563	3"	6"	1/2	1	092342
43/64	0.6719	3"	6"	1/2	1	092343
11/16	0.6875	3"	6"	1/2	1	092344
45/64	0.7031	3"	6"	1/2	1	092345
23/32	0.7188	3"	6"	1/2	1	092346
47/64	0.7344	3"	6"	1/2	1	092347
3/4	0.7500	3"	6"	1/2	1	092348
49/64	0.7656	3"	6"	1/2	1	092349
25/32	0.7813	3"	6"	1/2	1	092350
51/64	0.7969	3"	6"	1/2	1	092351
13/16	0.8125	3"	6"	1/2	1	092352
53/64	0.8281	3"	6"	1/2	1	092353
27/32	0.8438	3"	6"	1/2	1	092354
55/64	0.8594	3"	6"	1/2	1	092355
7/8	0.8750	3"	6"	1/2	1	092356
57/64	0.8906	3"	6"	1/2	1	092357
29/32	0.9063	3"	6"	1/2	1	092358
59/64	0.9219	3"	6"	1/2	1	092359
15/16	0.9375	3"	6"	1/2	1	092360
61/64	0.9531	3"	6"	1/2	1	092361
31/32	0.9688	3"	6"	1/2	1	092362
63/64	0.9844	3"	6"	1/2	1	092363
1"	1.0000	3"	6"	1/2	1	092364



SPECIAL PURPOSE DRILL

Jobber Length Carbide Tipped

D444 Heavy-Duty Brazed Carbide Tipped for abrasive materials or non-ferrous materials.



D444

4XD

HSS
HM

118°



N32 - 1/2

d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	D444
32	0.1160	1.5/8	2.3/4	1	034632
1/8	0.1250	1.5/8	2.3/4	1	034408
30	0.1285	1.5/8	2.3/4	1	034630
29	0.1360	1.3/4	2.7/8	1	034629
9/64	0.1406	1.3/4	2.7/8	1	034409
25	0.1495	1.7/8	3"	1	034625
5/32	0.1563	2"	3.1/8	1	034410
21	0.1590	2.1/8	3.1/4	1	034621
20	0.1610	2.1/8	3.1/4	1	034620
19	0.1660	2.1/8	3.1/4	1	034619
18	0.1695	2.1/8	3.1/4	1	034618
11/64	0.1719	2.1/8	3.1/4	1	034411
17	0.1730	2.3/16	3.3/8	1	034617
15	0.1800	2.3/16	3.3/8	1	034615
14	0.1820	2.3/16	3.3/8	1	034614
13	0.1850	2.5/16	3.1/2	1	034613
3/16	0.1875	2.5/16	3.1/2	1	034412
11	0.1910	2.5/16	3.1/2	1	034611
10	0.1935	2.7/16	3.5/8	1	034610
9	0.1960	2.7/16	3.5/8	1	034609
7	0.2010	2.7/16	3.5/8	1	034607
13/64	0.2031	2.7/16	3.5/8	1	034413
3	0.2130	2.1/2	3.3/4	1	034603
7/32	0.2188	2.1/2	3.3/4	1	034414
1	0.2280	2.5/8	3.7/8	1	034601
15/64	0.2344	2.5/8	3.7/8	1	034415
B	0.2374	2.3/4	4"	1	034502
C	0.2421	2.3/4	4"	1	034503
E	0.2500	2.3/4	4"	1	034505
1/4	0.2500	2.3/4	4"	1	034416
F	0.2571	2.7/8	4.1/8	1	034506
G	0.2610	2.7/8	4.1/8	1	034507
17/64	0.2656	2.7/8	4.1/8	1	034417

SPECIAL PURPOSE DRILL



d_1 Ø "/Nr./letter	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	D444
H	0.2661	2.7/8	4.1/8	1	034508
I	0.2720	2.7/8	4.1/8	1	034509
J	0.2772	2.7/8	4.1/8	1	034510
K	0.2811	2.15/16	4.1/4	1	034511
9/32	0.2813	2.15/16	4.1/4	1	034418
L	0.2902	2.15/16	4.1/4	1	034512
19/64	0.2969	3.1/16	4.3/8	1	034419
N	0.3020	3.1/16	4.3/8	1	034514
5/16	0.3125	3.3/16	4.1/2	1	034420
O	0.3161	3.3/16	4.1/2	1	034515
P	0.3228	3.5/16	4.5/8	1	034516
21/64	0.3281	3.5/16	4.5/8	1	034421
Q	0.3319	3.7/16	4.3/4	1	034517
R	0.3390	3.7/16	4.3/4	1	034518
11/32	0.3437	3.7/16	4.3/4	1	034422
S	0.3480	3.1/2	4.7/8	1	034519
T	0.3580	3.1/2	4.7/8	1	034520
23/64	0.3594	3.1/2	4.7/8	1	034423
U	0.3680	3.5/8	5"	1	034521
3/8	0.3750	3.5/8	5"	1	034424
25/64	0.3906	3.3/4	5.1/8	1	034425
13/32	0.4063	3.7/8	5.1/4	1	034426
Z	0.4130	3.7/8	5.1/4	1	034526
27/64	0.4219	3.15/16	5.3/8	1	034427
7/16	0.4375	4.1/16	5.1/2	1	034428
29/64	0.4531	4.3/16	5.5/8	1	034429
15/32	0.4687	4.5/16	5.3/4	1	034430
31/64	0.4844	4.3/8	5.7/8	1	034431
1/2	0.5000	4.1/2	6"	1	034432

DRILLS



SPECIAL PURPOSE DRILL

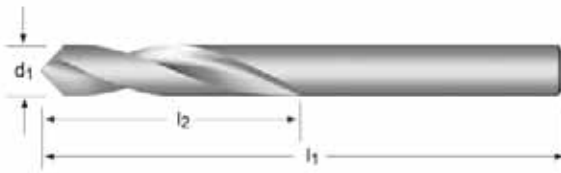
Spotting Drill - Short Length

SPS-90 Bright Finish improves chip flow in soft or non-ferrous materials

SPSG-90 TiN Coating for increased wear resistance and improved tool life.

SPS-120 Bright Finish improves chip flow in soft or non-ferrous materials

SPSG-120 TiN Coating for increased wear resistance and improved tool life.



SPS-90	SPSG-90	SPS-120	SPSG-120
1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 1"

d_1 Ø Inch	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	SPS-90	SPSG-90	SPS-120	SPSG-120
1/4	0.2500	3/4	2.1/2	1	087900	087906	087950	087956
3/8	0.3750	1.1/8	3.1/8	1	087901	087907	087951	087957
1/2	0.5000	1.3/8	3.3/4	1	087902	087908	087952	087958
5/8	0.6250	1.5/8	4.3/8	1	087903	087909	087953	087959
3/4	0.7500	1.7/8	5"	1	087904	087910	087954	087960
1"	1.0000	2.1/4	6"	1	087905	087911	087955	087961

SPECIAL PURPOSE DRILL



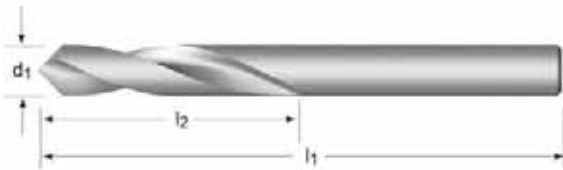
Spotting Drill - Regular Length

SPR-90 Bright Finish improves chip flow in soft or non-ferrous materials

SPRG-90 TiN Coating for increased wear resistance and improved tool life.

SPR-120 Bright Finish improves chip flow in soft or non-ferrous materials

SPRG-120 TiN Coating for increased wear resistance and improved tool life.



SPR-90	SPRG-90	SPR-120	SPRG-120
1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 1"

d_1 Ø Inch	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	SPR-90	SPRG-90	SPR-120	SPRG-120
1/4	0.2500	3/4	4"	1	087912	087918	087962	087968
3/8	0.3750	1.1/8	5"	1	087913	087919	087963	087969
1/2	0.5000	1.3/8	6"	1	087914	087920	087964	087970
5/8	0.6250	1.5/8	7"	1	087915	087921	087965	087971
3/4	0.7500	1.7/8	8"	1	087916	087922	087966	087972
1"	1.0000	2.1/4	8"	1	087917	087923	087967	087973



SPECIAL PURPOSE DRILL

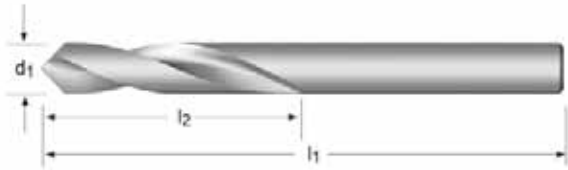
Spotting Drill - Long Length

SPL-90 Bright Finish improves chip flow in soft or non-ferrous materials

SPLG-90 TiN Coating for increased wear resistance and improved tool life.

SPL-120 Bright Finish improves chip flow in soft or non-ferrous materials

SPLG-120 TiN Coating for increased wear resistance and improved tool life.



SPL-90	SPLG-90	SPL-120	SPLG-120
1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 1"

d_1 Ø Inch	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	SPL-90	SPLG-90	SPL-120	SPLG-120
1/4	0.2500	3/4	6"	1	087924	087930	087974	087980
3/8	0.3750	1.1/8	7"	1	087925	087931	087975	087981
1/2	0.5000	1.3/8	8"	1	087926	087932	087976	087982
5/8	0.6250	1.5/8	9"	1	087927	087933	087977	087983
3/4	0.7500	1.7/8	10"	1	087928	087934	087978	087984
1"	1.0000	2.1/4	10"	1	087929	087935	087979	087985

SPECIAL PURPOSE DRILL



General Purpose Combined Drill and Countersink (Center Drill)

76HA 60° C'sink. Bright Finish improves chip flow in soft or non-ferrous materials



76HA

ANSI

1XD

HSS



N000 - N8

Nr.	d ₁ Ø Inch	l ₂ Inch	l ₁ Inch	d ₂ Ø Inch	Pack Qty	76HA
000	0.0200	0.0300	1.1/4	1/8	12	097630
00	0.0250	0.0300	1.1/8	1/8	12	097620
0	1/32	0.0380	1.1/8	1/8	12	097610
1	3/64	3/64	1.1/4	1/8	12	097601
2	5/64	5/64	1.7/8	3/16	12	097602
3	7/64	7/64	2"	1/4	12	097603
4	1/8	1/8	2.1/8	5/16	12	097604
5	3/16	3/16	2.3/4	7/16	6	097605
6	7/32	7/32	3"	1/2	6	097606
7	1/4	1/4	3.1/4	5/8	3	097607
8	5/16	5/16	3.1/2	3/4	3	097608

General Purpose Combined Drill and Countersink (Center Drill)

A225 60° C'sink. Bright Finish improves chip flow in soft or non-ferrous materials

A217 82° C'sink. Bright Finish improves chip flow in soft or non-ferrous materials

A218 90° C'sink. Bright Finish improves chip flow in soft or non-ferrous materials



A225	A217	A218
3/64 - 5/16	N1 - N8	N1 - N8

Nr.	d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	d ₂ Ø Inch	l ₁ Inch	l ₂ max/min Inch	Pack Qty	A225	A217	A218
BS1	3/64	0.0469		1/8	1.1/2	5/64 - 1/16	1	0172988	—	—
BS2	1/16	0.0625		3/16	1.3/4	3/32 - 5/64	1	0172995	—	—
BS3	3/32	0.0938		1/4	2"	5/32 - 1/8	1	0173008	—	—
BS4	1/8	0.1250		5/16	2.1/4	3/16 - 5/32	1	0173015	—	—
BS5	3/16	0.1875		7/16	2.1/2	9/32 - 1/4	1	0173022	—	—
BS5A	7/32	0.2188		1/2	2.3/4	5/16 - 9/32	1	0173039	—	—
BS6	1/4	0.2500		5/8	3"	3/8 - 5/16	1	0173046	—	—
BS7	5/16	0.3125		3/4	3.1/2	15/32 - 13/32	1	0173053	—	—
1		0.0469	3/8	1/8	1.1/4		1	—	0239216	0239292
2		0.0781	33/64	3/16	1.7/8		1	—	0239223	0239308
3		0.1094	5/8	1/4	2"		1	—	0239230	0239315
4		0.1250	45/64	5/16	2.1/8		1	—	0239247	0239322
5		0.1875	1"	7/16	2.3/4		1	—	0239254	0239339
6		0.2188	1"	1/2	3"		1	—	0239261	0239346
7		0.2500	1.13/64	5/8	3.1/4		1	—	0239278	0239353
8		0.3125	1.11/32	3/4	3.1/2		1	—	0239285	0239360

SPECIAL PURPOSE DRILL



Cobalt Combined Drill and Countersink (Center Drill)

A221 60° C'sink. Cobalt base material for wear resistance. Bright Finish improves chip flow in soft or non-ferrous materials



A221

ANSI

1.5XD

HSS-E



N00 - 5/16

Nr.	d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	d ₂ Ø Inch	Pack Qty	A221
00	0.025	0.0250	0.0300	1.1/8	1/8	1	0241851 ¹⁾
0	1/32	0.0313	0.0380	1.1/8	1/8	1	0241844 ¹⁾
1	3/64	0.0469	3/64	1.1/4	1/8	1	0241868
2	5/64	0.0781	5/64	1.7/8	3/16	1	0241875
3	7/64	0.1094	7/64	2"	1/4	1	0241882
4	1/8	0.1250	1/8	2.1/8	5/16	1	0241899
5	3/16	0.1875	3/16	2.3/4	7/16	1	0241905
6	7/32	0.2188	7/32	3"	1/2	1	0241912
7	1/4	0.2500	1/4	3.1/4	5/8	1	0241929
8	5/16	0.3125	5/16	3.1/2	3/4	1	0241936

¹⁾ Single Ended Only



SPECIAL PURPOSE DRILL

Threaded Hex Shank Drills

TS41 - Stub, Wire Gauge Sizes

TS10 - Short, Fractional Sizes

TS18 - Short, Wire Gauge Sizes

TS51 - Long, Fractional Sizes

TS52 - Long, Wire Gauge Sizes

NAS-965 Steam Oxide for increased wear resistance & lubricity. Shank design for drilling in confined spaces. Low thrust design self centering Split Point for easier penetration.



TS41	TS10 TS18	TS51 TS52
HSS	HSS	HSS
N40 - N10	1/8 - 1/4 N40 - N10	1/8 - 1/4 N40 - N10

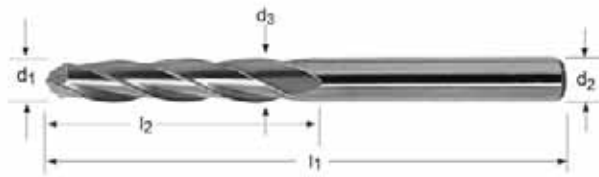
d_1 Ø "/Nr.	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	TS41	TS10 TS18	TS51 TS52
40	0.0980	7/8	2.1/8	1	—	—	017940
40	0.0980	5/16	1/2	1	045840	—	—
40	0.0980	9/16	1"	1	—	045640	—
1/8	0.1250	7/8	2.1/8	1	—	—	017958
1/8	0.1250	9/16	1"	1	—	045708	—
30	0.1285	1.1/8	2.1/8	1	—	—	017930
30	0.1285	5/16	9/16	1	045830	—	—
30	0.1285	9/16	1.1/4	1	—	045630	—
5/32	0.1563	1.1/8	2.1/8	1	—	—	017960
5/32	0.1563	9/16	1.1/4	1	—	045710	—
21	0.1610	1.1/8	2.1/8	1	—	—	017921
21	0.1590	9/16	1.1/4	1	—	045621	—
20	0.1590	1.1/8	2.1/8	1	—	—	017920
20	0.1610	5/16	9/16	1	045820	—	—
20	0.1610	9/16	1.1/4	1	—	045620	—
3/16	0.1875	1.1/8	2.1/8	1	—	—	017962
3/16	0.1875	9/16	1.1/4	1	—	045712	—
11	0.1910	1.1/8	2.1/8	1	—	—	017911
11	0.1910	5/16	9/16	1	045811	—	—
11	0.1910	9/16	1.1/4	1	—	045611	—
10	0.1935	1.1/8	2.1/8	1	—	—	017910
10	0.1935	5/16	9/16	1	045810	—	—
10	0.1935	9/16	1.1/4	1	—	045610	—
7/32	0.2188	1.1/8	2.1/8	1	—	—	017964
7/32	0.2188	9/16	1.1/4	1	—	045714	—
1/4	0.2500	1.1/8	2.1/8	1	—	—	017966
1/4	0.2500	9/16	1.1/4	1	—	045716	—

SPECIAL PURPOSE DRILL



3-Flute Tapered Aircraft Router

ATR41 For cutting, trimming and routing without pre-drilling. 1/4" Taper per foot. Bright Finish improves chip flow in soft or non-ferrous materials



ATR41

4XD

HSS



N1 - N4

d_1 Ø	d_1 decimal Inch	Shank Ø Inch	l_2 Inch	l_1 Inch	Small End Ø Inch	Large End Ø Inch	Pack Qty	ATR41
1	0.0810	0.0980	13/16	2"	0.0810	0.0980	12	041701
2	0.1100	0.1280	7/8	2.1/4	0.1100	0.1280	12	041702
3	0.1650	0.1875	1.1/16	2.1/2	0.1650	0.1875	12	041703
4	0.2240	0.2500	1.1/4	2.3/4	0.2240	0.2500	12	041704



SOLID CARBIDE DRILL

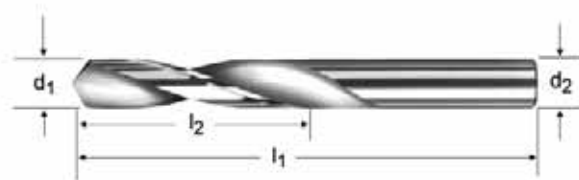
General Purpose Solid Carbide Jobber Length

D33F - Fractional Sizes

D33W - Wire Gauge Sizes

D33L - Letter Sizes

Self Centering Point. Low thrust design. For abrasive or non-ferrous materials.



D33F
D33W
D33L

3XD

HM

λ 118°

1/32 - 1/2
N68 - N1
A - Z

d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	D33F D33W D33L
68	0.0310	1/2	1.1/4	1	003500
1/32	0.0313	1/2	1.1/4	1	003501
67	0.0320	1/2	1.1/4	1	003502
66	0.0330	1/2	1.1/4	1	003503
65	0.0350	5/8	1.3/8	1	003504
64	0.0360	5/8	1.3/8	1	003505
63	0.0370	5/8	1.3/8	1	003506
62	0.0380	5/8	1.3/8	1	003507
61	0.0390	5/8	1.3/8	1	003508
60	0.0400	3/4	1.1/2	1	003509
59	0.0410	3/4	1.1/2	1	003510
58	0.0420	3/4	1.1/2	1	003511
57	0.0430	3/4	1.1/2	1	003512
56	0.0465	3/4	1.1/2	1	003513
3/64	0.0469	3/4	1.1/2	1	003514
55	0.0520	3/4	1.1/2	1	003515
54	0.0550	3/4	1.1/2	1	003516
53	0.0595	3/4	1.1/2	1	003517
1/16	0.0625	3/4	1.1/2	1	003518
52	0.0635	3/4	1.1/2	1	003519
51	0.0670	3/4	1.1/2	1	003520
50	0.0700	7/8	1.3/4	1	003521
49	0.0730	7/8	1.3/4	1	003522
48	0.0760	7/8	1.3/4	1	003523
5/64	0.0781	7/8	1.3/4	1	003524
47	0.0785	7/8	1.3/4	1	003525
46	0.0810	7/8	1.3/4	1	003526
45	0.0820	7/8	1.3/4	1	003527
44	0.0860	1"	2"	1	003528
43	0.0890	1"	2"	1	003529
42	0.0935	1"	2"	1	003530
3/32	0.0938	1"	2"	1	003531
41	0.0960	1"	2"	1	003532

SOLID CARBIDE DRILL



d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	D33F D33W D33L
40	0.0980	1"	2"	1	003533
39	0.0995	1.1/4	2.1/4	1	003534
38	0.1015	1.1/4	2.1/4	1	003535
37	0.1040	1.1/4	2.1/4	1	003536
36	0.1065	1.1/4	2.1/4	1	003537
7/64	0.1094	1.1/4	2.1/4	1	003538
35	0.1100	1.1/4	2.1/4	1	003539
34	0.1110	1.1/4	2.1/4	1	003540
33	0.1130	1.1/4	2.1/4	1	003541
32	0.1160	1.1/4	2.1/4	1	003542
31	0.1200	1.1/4	2.1/4	1	003543
1/8	0.1250	1.1/4	2.1/4	1	003544
30	0.1285	1.1/4	2.1/4	1	003545
29	0.1360	1.3/8	2.1/2	1	003546
28	0.1405	1.3/8	2.1/2	1	003547
9/64	0.1406	1.3/8	2.1/2	1	003548
27	0.1440	1.3/8	2.1/2	1	003549
26	0.1470	1.3/8	2.1/2	1	003550
25	0.1495	1.3/8	2.1/2	1	003551
24	0.1520	1.3/8	2.1/2	1	003552
23	0.1540	1.3/8	2.1/2	1	003553
5/32	0.1563	1.3/8	2.1/2	1	003554
22	0.1570	1.3/8	2.1/2	1	003555
21	0.1590	1.3/8	2.1/2	1	003556
20	0.1610	1.3/8	2.1/2	1	003557
19	0.1660	1.5/8	2.3/4	1	003558
18	0.1695	1.5/8	2.3/4	1	003559
11/64	0.1719	1.5/8	2.3/4	1	003560
17	0.1730	1.5/8	2.3/4	1	003561
16	0.1770	1.5/8	2.3/4	1	003562
15	0.1800	1.5/8	2.3/4	1	003563
14	0.1820	1.5/8	2.3/4	1	003564
13	0.1850	1.5/8	2.3/4	1	003565
3/16	0.1875	1.5/8	2.3/4	1	003566
12	0.1890	1.5/8	2.3/4	1	003567
11	0.1910	1.5/8	2.3/4	1	003568
10	0.1935	1.5/8	2.3/4	1	003569
9	0.1960	1.3/4	3"	1	003570
8	0.1990	1.3/4	3"	1	003571
7	0.2010	1.3/4	3"	1	003572
13/64	0.2031	1.3/4	3"	1	003573
6	0.2040	1.3/4	3"	1	003574
5	0.2055	1.3/4	3"	1	003575
4	0.2090	1.3/4	3"	1	003576
3	0.2130	1.3/4	3"	1	003577
7/32	0.2188	1.3/4	3"	1	003578
2	0.2210	1.3/4	3"	1	003579
1	0.2280	1.3/4	3"	1	003580
A	0.2340	2"	3.1/4	1	003581
15/64	0.2344	2"	3.1/4	1	003582
B	0.2374	2"	3.1/4	1	003583
C	0.2421	2"	3.1/4	1	003584
D	0.2461	2"	3.1/4	1	003585
1/4	0.2500	2"	3.1/4	1	003586
F	0.2571	2"	3.1/4	1	003587
G	0.2610	2.1/8	3.1/2	1	003588
17/64	0.2656	2.1/8	3.1/2	1	003589
H	0.2661	2.1/8	3.1/2	1	003590
I	0.2720	2.1/8	3.1/2	1	003591
J	0.2772	2.1/8	3.1/2	1	003592
K	0.2811	2.1/8	3.1/2	1	003593
9/32	0.2813	2.1/8	3.1/2	1	003594
L	0.2902	2.1/8	3.1/2	1	003595
M	0.2949	2.3/8	3.3/4	1	003596
19/64	0.2969	2.3/8	3.3/4	1	003597
N	0.3020	2.3/8	3.3/4	1	003598



SOLID CARBIDE DRILL

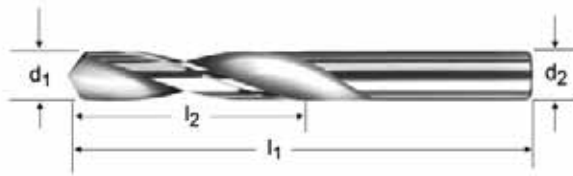
d ₁ Ø "/Nr./letter	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	Pack Qty	D33F D33W D33L
5/16	0.3125	2.3/8	3.3/4	1	003599
O	0.3161	2.3/8	3.3/4	1	003600
P	0.3228	2.3/8	3.3/4	1	003601
21/64	0.3281	2.1/2	4"	1	003602
Q	0.3319	2.1/2	4"	1	003603
R	0.3390	2.1/2	4"	1	003604
11/32	0.3437	2.1/2	4"	1	003605
S	0.3480	2.1/2	4"	1	003606
T	0.3580	2.1/2	4"	1	003607
23/64	0.3594	2.3/4	4.1/4	1	003608
U	0.3680	2.3/4	4.1/4	1	003609
3/8	0.3750	2.3/4	4.1/4	1	003610
V	0.3772	2.3/4	4.1/4	1	003611
W	0.3858	2.7/8	4.1/2	1	003612
25/64	0.3906	2.7/8	4.1/2	1	003613
X	0.3969	2.7/8	4.1/2	1	003614
Y	0.4039	2.7/8	4.1/2	1	003615
13/32	0.4063	2.7/8	4.1/2	1	003616
Z	0.4130	2.7/8	4.1/2	1	003617
27/64	0.4219	2.7/8	4.1/2	1	003618
7/16	0.4375	2.7/8	4.1/2	1	003619
29/64	0.4531	3"	4.3/4	1	003620
15/32	0.4687	3"	4.3/4	1	003621
31/64	0.4844	3"	4.3/4	1	003622
1/2	0.5000	3"	4.3/4	1	003623

SOLID CARBIDE DRILL



General Purpose Solid Carbide Jobber Length, Metric

D33M Self Centering Point. Low thrust design. For abrasive or non-ferrous materials.



D33M

3XD

HM

λ 118°



0.80 - 12.00

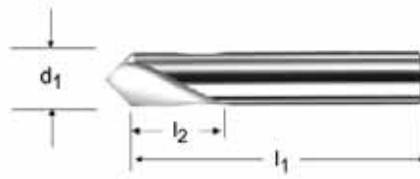
d ₁ Ø mm	d ₁ decimal inch	l ₂ mm	l ₁ mm	Pack Qty	D33M
0.80	0.0315	10	30	1	003470
0.90	0.0354	13	32	1	003471
1.00	0.0394	13	32	1	003472
1.50	0.0591	19	38	1	003473
2.00	0.0787	22	44	1	003474
2.05	0.0807	22	44	1	003475
2.50	0.0984	25	50	1	003476
3.00	0.1181	32	57	1	003477
3.30	0.1299	32	57	1	003624
3.50	0.1378	35	63	1	003478
4.00	0.1575	35	63	1	003626
4.50	0.1772	41	70	1	003479
5.00	0.1969	44	75	1	003630
5.50	0.2165	44	75	1	003480
6.00	0.2362	50	82	1	003481
6.50	0.2559	50	82	1	003482
7.00	0.2756	54	89	1	003483
7.50	0.2953	60	95	1	003484
8.00	0.3150	60	95	1	003485
8.50	0.3346	63	100	1	003486
9.00	0.3543	70	108	1	003487
9.50	0.3740	70	108	1	003488
10.00	0.3937	73	114	1	003631
10.50	0.4134	73	114	1	003489
10.75	0.4232	73	114	1	003490
11.00	0.4331	73	114	1	003491
11.50	0.4528	76	120	1	003492
12.00	0.4724	76	120	1	003493



SOLID CARBIDE DRILL

General Purpose Solid Carbide Standard Length - Spotting Drill

DS-90 Provides spot location or chamfer for follow-up drilling operations.



DS-90

1XD

HM



1/8 - 1/2

d_1 Ø Inch	d_1 decimal Inch	l_2 Inch	l_1 Inch	Pack Qty	DS-90
1/8	0.1250	9/16	2"	1	003332
3/16	0.1875	3/4	3"	1	003334
1/4	0.2500	1"	3"	1	003336
5/16	0.3125	1"	2.1/2	1	003338
3/8	0.3750	1"	3"	1	003340
1/2	0.5000	1.1/4	4"	1	003342

SOLID CARBIDE DRILL



General Purpose Combined Drill and Countersink (Center Drill)

DC 60° C'sink. Better abrasion resistance / Longer tool life. Bright Finish improves chip flow in soft or non-ferrous materials



DC

1XD

HM



N0 - N3

Nr.	d ₁ Inch	l ₂ Inch	l ₁ Inch	d ₂ Ø Inch	Pack Qty	DC
0	1/32	0.0380	1.1/4	1/8	1	003251
1	3/64	3/64	1.1/4	1/8	1	003252
2	5/64	5/64	1.7/8	3/16	1	003253
3	7/64	7/64	2"	1/4	1	003254
4	1/8	1/8	2.1/8	5/16	1	003255
5	3/16	3/16	2.3/4	7/16	1	003256
6	7/32	7/32	3"	1/2	1	003257



JOBBER DRILL SETS

General Purpose Jobber Length Sets

C13R10P

C15R10P

C21R10P

C29R10P

Bright Finish improves chip flow in soft or non-ferrous materials



C13R10

C15R10

C21R10

C29R10

Steam Oxide reduces wear and chip welding in harder ferrous materials.



C13R10P	C13R10
C15R10P	C15R10
C21R10P	C21R10
C29R10P	C29R10
ANSI	ANSI
4XD	4XD
HSS	HSS
118°	118°
Set	Set

Nr.	Tool Style	Pieces per Set	Sizes	Pack Qty	R10P Sets	R10 Sets
C13R10P	R10P	13	1/16 - 1/4 x 64ths	1	090164	—
C15R10P	R10P	15	1/16 - 1/2 x 32nds	1	090163	—
C21R10P	R10P	21	1/16 - 3/8 x 64ths	1	090165	—
C29R10P	R10P	29	1/16 - 1/2 x 64ths	1	090162	—
C13R10	R10	13	1/16 - 1/4 x 64ths	1	—	099979
C15R10	R10	15	1/16 - 1/2 x 32nds	1	—	099978
C21R10	R10	21	1/16 - 3/8 x 64ths	1	—	099980
C29R10	R10	29	1/16 - 1/2 x 64ths	1	—	099977

General Purpose Jobber Length Sets

A097 Self centering Split Point, low thrust design. TiN Coated Tip increases surface hardness and improves tool life.



C20R18P Bright Finish improves chip flow in soft or non-ferrous materials
C60R18P



C20R18 Steam Oxide for increased wear resistance & lubricity.
C60R18



A097	C20R18P C60R18P	C20R18 C60R18
ANSI	ANSI	ANSI
4XD	4XD	4XD
HSS	HSS	HSS
118°	118°	118°
Set	Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	A097 (A012 set)	R18P Set	R18 Set
12	A012	60	Nr.1 - Nr.60	1	0574324	—	—
14	A012	26	A - Z	1	0574331	—	—
18	A012	29	1/16 - 1/2 x 1/64	1	0574317	—	—
20	A012	15	1/16 - 1/2 x 1/32	1	0574348	—	—
30	A012	115	1/16 - 1/2 x 1/64, Nr.1 - Nr.60, A-Z	1	0574362	—	—
60	A012	13	1/16 - 1/4 x 1/64	1	0574355	—	—
C20R18P	R18P	20	N61 - N80	1	—	090161	—
C60R18P	R18P	60	N1 - N60	1	—	090101	—
C20R18	R18	20	N61 - N80	1	—	—	099981
C60R18	R18	60	N1 - N60	1	—	—	099976



JOBBER DRILL SETS

General Purpose Jobber Length and Combination Sets

C26R15P

Bright Finish improves chip flow in soft or non-ferrous materials



C26R15

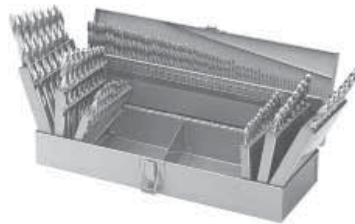
Steam Oxide for increased wear resistance & lubricity.



C115COMBP

Bright Finish improves chip flow in soft or non-ferrous materials

C114COMBP



C26R15P	C26R15	C115COMBP	C114COMBP
Set	Set	Set	Set

Nr.	Style	Pieces in Set	Sizes	Pack Qty	C26R15P	C26R15	C115COMBP	C114COMBP
C26R15	R15	26	A-Z	1	—	099983	—	—
C26R15P	R15P	26	A-Z	1	090126	—	—	—
C114COMBP	R10P, R18P, R10PM	114	1/16-1/2 x 64ths, N1-N60, 1-13mm x .5 mm	1	—	—	—	090114
C115COMBP	R10P, R18P, R15P	115	1/16-1/2 x 64ths, N1-N60, A-Z	1	—	—	090123	—

JOBBER DRILL SETS



General Purpose Jobber Length Combination Sets

C114COMB

Steam Oxide for increased wear resistance & lubricity.

C115COMB



C114COMB	C115COMB
Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C114COMB	C115COMB
C114COMB	R10, R18, 2AB	114	1/16-1/2 x 64ths, N1-N60, 1-13mm x .5 mm	1	099990	—
C115COMB	R10, R18, R15	115	1/16-1/2 x 64ths, N1-N60, A-Z	1	—	099982

DRILLS

General Purpose Jobber Length Metric Sets

A191 Steam Oxide for increased wear resistance & lubricity.
A190



C252A
C412A
C502A Bright Finish improves chip flow in soft or non-ferrous materials



C252AB
C412AB
C502AB Steam Oxide for increased wear resistance & lubricity.



A191	A190	C252A C412A C502A	C252AB C412AB C502AB
Set	Set	Set	Set

Nr.	Style	Pieces in Set	Sizes	Pack Qty	A191	A190	C252A C412A C502A	C252AB C412AB C502AB
12	A100	60	Nr.1 - Nr.60	1	—	0179437	—	—
14	A100	26	A - Z	1	—	0179444	—	—
18	A100	29	1/16 - 1/2 x 1/64	1	—	0179451	—	—
20	A100	15	1/16 - 1/2 x 1/32	1	—	0179468	—	—
200	A100	24	1.0 mm - 10.5 mm x 0.5 mm + 3.3 - 4.2 - 6.8 - 10.2 mm	1	—	0030530	—	—
201	A100	19	1.0 mm - 10.0 mm x 0.5 mm	1	—	0030547	—	—
202	A100	51	1.0 mm - 6.0 mm x 0.1 mm	1	—	0030554	—	—
203	A100	41	6.0 mm - 10.0 mm x 0.1 mm	1	—	0030561	—	—
204	A100	25	1.0 mm - 13.0 mm x 0.5 mm	1	—	0030578	—	—
206	A100	29	1.0 mm - 13.0 mm x 0.5 mm + 3.3 - 4.2 - 6.8 - 10.2 mm	1	—	0030585	—	—
209	A100	91	1.0 mm - 10.0 mm x 0.1 mm	1	—	0179482	—	—
3	A100	21	1/16 - 3/8 x 1/64	1	—	0179413	—	—
31M	A100	20	0.3 mm - 1.0 mm x 0.05 mm + 0.38 - 0.52 - 0.58 - 0.78 - 0.82 mm	1	0149133	—	—	—
413	A100	13	1.5 mm - 6.5 mm x 0.5 mm + 3.3 - 4.2 mm	1	0030608	—	—	—
419	A100	19	1.0 mm - 10.0 mm x 0.5 mm	1	0030615	—	—	—
61-80	A100	20	N61 - N80	1	0179499	—	—	—
C252A	2A	25	1.0mm - 13mm x .5mm	1	—	—	099987	—
C412A	2A	41	6.0mm - 10mm x .1mm	1	—	—	099986	—
C502A	2A	50	1.0mm - 5.9mm x .1mm	1	—	—	099984	—
C252AB	2AB	25	1.0mm - 13mm x .5mm	1	—	—	—	099988
C412AB	2AB	41	6.0mm - 10mm x .1mm	1	—	—	—	099989
C502AB	2AB	50	1.0mm - 5.9mm x .1mm	1	—	—	—	099985

JOBBER DRILL SETS



General Purpose Jobber Length Left Hand Sets

C15L10 Bright Finish improves chip flow in soft or
C29L10 non-ferrous materials



C15L10	C29L10
Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C15L10	C29L10
C15L10	L10	15	1/16-1/2 x 32nds, Left Hand	1	099955	—
C29L10	L10	29	1/16 - 1/2 x 64ths, Left Hand	1	—	099935



JOBBER DRILL SETS

Heavy Duty Jobber Length Set

C29HX10 Low thrust design self centering Split Point for easier penetration. Stronger and more Rigid. Unique surface treatment for improved wear resistance.



C29HX10

ANSI

4XD

HSS



Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C29HX10
C29HX10	HX10	29	1/16 - 1/2 x 64ths	1	091010

JOBBER DRILL SETS



Heavy Duty Cobalt Jobber Length Sets (NAS 907 Type J)

- C13R10CO**
- C15R10CO**
- C21R10CO**
- C26R15CO**
- C29R10CO**
- C60R18CO**

Low thrust design self centering 135° Split Point for easier penetration. Cobalt base material with Bronze Oxide for wear resistance and lubricity. Suitable for ferrous materials.



- C13R10CO**
- C15R10CO**
- C21R10CO**
- C29R10CO**
- C60R18CO**
- C26R15CO**

ANSI

4XD

HSS-E



Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	R10CO Sets
C13R10CO	R10CO	13	1/16-1/4x 64ths	1	099944
C15R10CO	R10CO	15	1/16-1/2 x 32nds	1	090291
C21R10CO	R10CO	21	1/16-3/8 x 64ths	1	099701
C26R15CO	R15CO	26	A - Z	1	090292
C29R10CO	R10CO	29	1/16 - 1/2 x 64ths	1	090290
C60R18CO	R18CO	60	N1 - N60	1	090600



JOBBER DRILL SETS

Heavy Duty Cobalt Jobber Length Combination Sets (NAS 907 Type J)

C114COMBC Low thrust design self centering 135° Split Point for easier penetration. Cobalt base material with Bronze Oxide for wear resistance and lubricity. Suitable for ferrous materials.

C115COMBC



C115COMBC	C114COMBC
Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C115COMBC	C114COMBC
C114COMBC	R10CO, R18CO, 2ACO	114	1/16-1/2 x 64ths, N1-N60, 1-13mm x .5 mm	1	—	099705
C115COMBC	R10CO, R18CO, R15CO	115	1/16-1/2 x 64ths, N1-N60, A-Z	1	099706	—

SCREW MACHINE DRILL SETS



General Purpose Screw Machine Drill Sets

C29R40
C60R41
C26R42

Bright Finish improves chip flow in soft or non-ferrous materials



C29R40	C60R41	C26R42
Set	Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C29R40	C60R41	C26R42
C26R42	R42	26	A - Z	1	—	—	090173
C29R40	R40	29	1/16-1/2 x 64ths	1	090170	—	—
C60R41	R41	60	N1 - N60	1	—	090174	—

General Purpose Screw Machine Drill Set

A088

Low thrust design self centering Split Point for easier penetration. TiN Coated Tip increases wear resistance and improves tool life.



A088

DIN ANSI

2.5XD

HSS

135°



Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	A088
200S	A022	24	1.0 mm - 10.5 mm x 0.5 mm + 3.3 - 4.2 - 6.8 - 10.2 mm	1	0616185

SCREW MACHINE DRILL SETS



Heavy Duty Screw Machine Drill Set

C29R40C Low thrust design self centering Split Point for easier penetration. Steam Oxide for increased wear resistance & lubricity.

C60R41C



C29R40C	C60R41C
ANSI	ANSI
2.5XD	2.5XD
HSS	HSS
$\lambda 135^\circ$	$\lambda 135^\circ$
Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C29R40C	C60R41C
C29R40C	R40C	29	1/16 - 1/2 x 64ths	1	099903	—
C60R41C	R41C	60	N1 - N60	1	—	099930



SCREW MACHINE DRILL SETS

Cobalt Heavy Duty Screw Machine Drill Sets

C29M40CO Low thrust design self centering Split Point for easier penetration. Cobalt base material with Bronze Oxide for wear resistance and lubricity. Suitable for ferrous materials.

C60M41CO

C26M42CO



C29M40CO	C60M41CO	C26M42CO
Set	Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C29M40CO	C60M41CO	C26M42CO
C26M42CO	M42CO	26	A - Z	1	—	—	099961
C29M40CO	M40CO	29	1/16 - 1/2 x 64ths	1	099962	—	—
C60M41CO	M41CO	60	N1 - N60	1	—	099960	—

TAPER LENGTH DRILL SETS



General Purpose Taper Length Drill Sets

C29R51 Bright Finish improves chip flow in soft or non-ferrous materials. Longer Flute and Overall length for depth and reach.
C60R52



C29R51	C60R52
Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C29R51	C60R52
C29R51	R51	29	1/16 - 1/2 x 64ths	1	090154	—
C60R52	R52	60	N1 - N60	1	—	090155

DRILLS

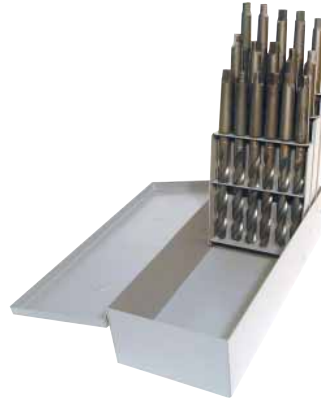


TAPER SHANK DRILL SETS

General Purpose Taper Shank Drill Set

C16A209 Steam Oxide for increased wear resistance & lubricity.

C16B209



C16A209	C16B209
Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C16A209	C16B209
C16A209	209	16	33/64 - 3/4 x 64ths	1	090131	—
C16B209	209	16	49/64 - 1" x 64ths	1	—	090133

REDUCED SHANK DRILL SETS



Reduced Shank Drill Sets

C8R56 Silver & Deming Drills. Steam Oxide for increased wear resistance & lubricity.
C33R56



C8R57 Silver & Deming Drills with **Tri-Flat** Shank. Steam Oxide for increased wear resistance & lubricity.

C8R56CO Heavy Duty Cobalt Silver & Deming Drills. Self centering 118° Split Point reduces thrust. Cobalt base material with Bronze/Steam Oxide for wear resistance and lubricity. Suitable for ferrous materials.

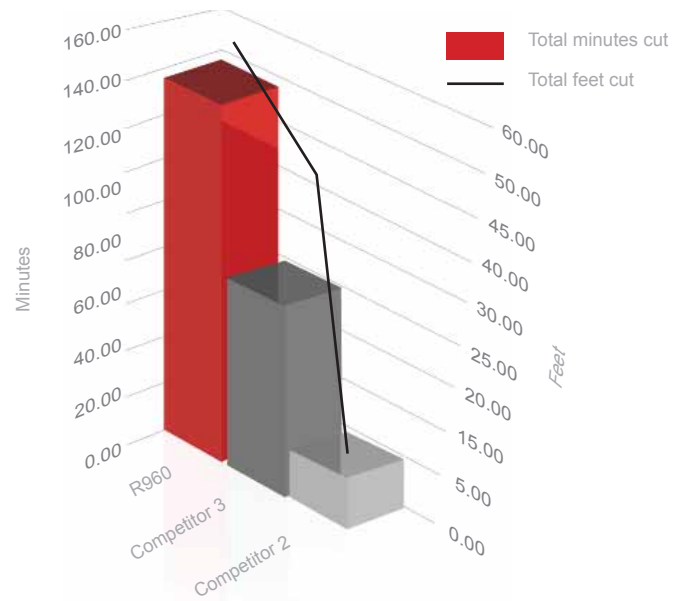


C8R56 C33R56	C8R57	C8R56CO
Set	Set	Set

Nr.	Style	Pieces per Set	Sizes	Pack Qty	C8R56 C33R56	C8R57	C8R56CO
C33R56	R56	33	1/2" Reduced Shank, 1/2 - 1" x 64ths, S&D	1	090231	—	—
C8R56	R56	8	1/2" Reduced Shank, 9/16 - 1" x 16ths, S&D	1	090556	—	—
C8R56CO	R56CO	8	1/2" Reduced Shank, 9/16 - 1" x 16ths, S&D	1	—	—	090328
C8R57	R57	8	1/2" Reduced Shank, 9/16 - 1" x 16ths, S&D	1	—	090558	—

- High productivity across a wide range of materials, including carbon and alloy steels, stainless steel, titanium, nickel and cast iron.
- Two head types available - the R960 head has been developed specifically to give optimum performance in stainless steel and cast iron. The R950 head is recommended for steels.
- Consistently high performance, even after numerous head changes.
- Reduction in inventory costs – one drill body fits multiple head sizes.
- Easy and quick head changes with minimal interruptions to the production process. Heads can be changed without removing the body from the machine.
- Exact fit of head to body maximises tool rigidity for superior hole accuracy and precise tolerances.
- Shank design allows for versatile tool holding.
- A choice of drilling depths, up to 8 x diameter.
- Internal coolant channels provide optimised coolant direction and pressure to give efficient chip evacuation and longer tool life.

Test *Results*



The Hydra for stainless steel head was also tested against 2 competitors at manufacturers' recommended cutting conditions in AMG 2.2. Again, 12mm diameter drills were used to a drilling depth of 5xD. The R960 performance exceeded the nearest competitor, in terms of tool life.





High Performance

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Fractional/Machine Screw 209
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HIGH PERFORMANCE SPIRAL POINT TAPS

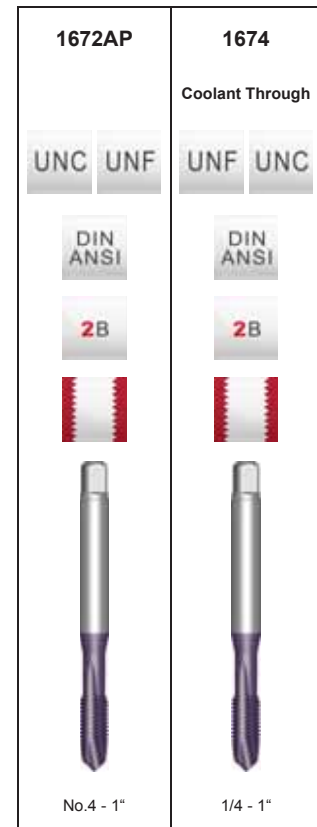


MXP Multi-Application

1672AP Designed for through hole tapping in a variety of materials with a hardness up to 36 Rc. The premium substrate and TiCN coating combine to offer superior abrasion resistance, higher operating speeds, improved thread quality, reduced cycle times, and longer tool life.

1674 Coolant thru design allows higher tapping speeds and eliminates the problems associated with inadequate coolant in horizontal or deep hole applications.

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3 4.1 4.2 5.1 5.2
6.1 6.2 6.3 7.1 7.2 7.3 7.4



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch	a Inch	l ₄ Inch	No. of Flutes	Pack Qty	1672AP	1674
4	40		2.205	0.433	0.141	0.110	0.709	2	1	46204859	—
6	32		2.205	0.472	0.141	0.110	0.787	2	1	46204864	—
8	32		2.480	0.512	0.168	0.131	0.827	3	1	46204869	—
10	24		2.756	0.591	0.194	0.152	0.984	3	1	46204851	—
10		32	2.756	0.512	0.194	0.152	0.984	3	1	46204852	—
1/4	20		3.150	0.669	0.255	0.191	1.181	3	1	46204849	1716510
1/4		28	3.150	0.669	0.255	0.191	1.181	3	1	46204850	1716512
5/16	18		3.543	0.787	0.318	0.238	1.378	3	1	46204860	1716514
5/16		24	3.543	0.669	0.318	0.238	1.378	3	1	46204861	1716516
3/8	16		3.937	0.866	0.381	0.286	1.535	3	1	46204857	1716518
3/8		24	3.937	0.709	0.381	0.286	1.535	3	1	46204858	1716520
7/16	14		3.937	0.866	0.323	0.242		3	1	46204865	1716530
7/16		20	3.937	0.866	0.323	0.242		3	1	46204866	1716532
1/2	13		4.331	0.984	0.367	0.275		3	1	46204847	1716534
1/2		20	3.937	0.866	0.397	0.275		3	1	46204848	1716536
5/8	11		4.331	1.063	0.480	0.360		4	1	46204862	1716538
5/8		18	3.937	0.866	0.480	0.360		4	1	46204863	1716540
3/4	10		4.921	1.181	0.590	0.442		4	1	46204855	1716542
3/4		16	4.331	0.984	0.590	0.442		4	1	46204856	1716544
7/8	9		5.512	1.260	0.697	0.523		4	1	46204868	46204889
7/8		14	4.921	1.024	0.697	0.523		4	1	46204867	46204888
1"	8		6.299	1.417	0.800	0.600		4	1	46204854	1716546
1"		12	5.512	1.102	0.800	0.600		4	1	46204853	1716548

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24

Multi-Application

**E025/
E035** Premium substrate for through hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials.

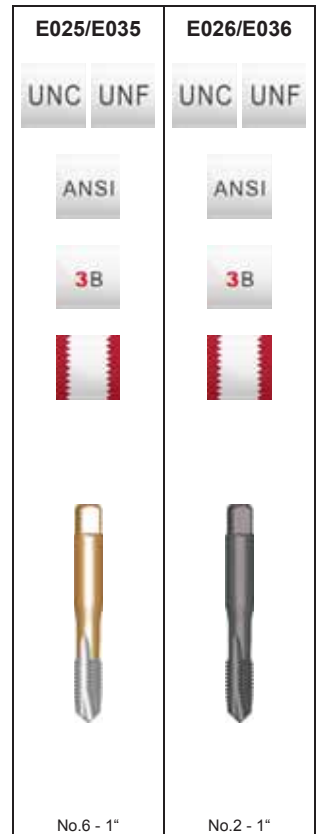
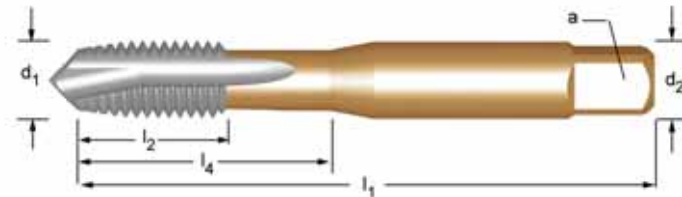
E025 = UNC Sizes, E035 = UNF Sizes

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6.2 6.3 7.1 7.2 7.3 7.4 8.1

**E026/
E036** Premium substrate with steam oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

E026 = UNC Sizes, E036 = UNF Sizes

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4




Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	a Inch	No. of Flutes	Limits	↔	↔	l ₄ Inch	Pack Qty	E025 E035	E026 E036
2	56		1.3/4	0.3140	0.1410	0.1100	2	H2	N50	1.80	0.3140	1	—	0583203
4	40		1.7/8	0.6091	0.1410	0.1100	2	H2	N43	2.35	0.6091	1	—	0581254
5	40		1.15/16	0.7404	0.1410	0.1100	2	H2	N38	2.65	0.7404	1	—	0581261
6	32		2"	0.2610	0.1410	0.1100	2	H2	N36	2.85	0.5938	1	0581070	0581278
6		40	2"	0.2610	0.1410	0.1100	2	H2	N33	2.95	0.5938	1	0581957	—
8	32		2.1/8	0.2484	0.1680	0.1310	2	H2	N29	3.50	0.6526	1	0581087	0581285
8		36	2.1/8	0.2484	0.1680	0.1310	2	H2	N29	3.50	0.6526	1	0581964	—
10	24		2.3/8	0.4303	0.1940	0.1520	2	H3	N25	3.90	0.8434	1	0581094	0581292
10		32	2.3/8	0.4303	0.1940	0.1520	2	H2	N21	4.10	0.8434	1	0581971	0582145
12	24		2.3/8	0.4173	0.2200	0.1650	2	H3	N16	4.50	0.8848	1	0581100	0581308
12		28	2.3/8	0.4173	0.2200	0.1650	2	H3	N14	4.70	0.8848	1	0581988	0582152
1/4	20		2.1/2	0.5075	0.2550	0.1910	2	H3	N7	5.10	1.0073	1	0581117	0581315
1/4	20		2.1/2	0.5075	0.2550	0.1910	3	H3	N7	5.10	1.0073	1	0581124	0581339
1/4	20		2.1/2	0.5075	0.2550	0.1910	3	H11	N7	5.10	1.0073	1	—	0581322 ¹⁾
1/4		28	2.1/2	0.5075	0.2550	0.1910	2	H3	N3	5.50	1.0073	1	0581995	0582169
1/4		28	2.1/2	0.5075	0.2550	0.1910	3	H3	N3	5.50	1.0073	1	0582008	0582176
5/16	18		2.23/32	0.5939	0.3180	0.2380	2	H3	F	6.60	1.1891	1	0581131	0581346
5/16	18		2.23/32	0.5939	0.3180	0.2380	3	H3	F	6.60	1.1891	1	0581148	0581360
5/16	18		2.23/32	0.5939	0.3180	0.2380	3	H11	F	6.60	1.1891	1	—	0581353 ¹⁾
5/16		24	2.23/32	0.5939	0.3180	0.2380	2	H3	I	6.90	1.1891	1	0582015	0582183
5/16		24	2.23/32	0.5939	0.3180	0.2380	3	H3	I	6.90	1.1891	1	0582022	0582190
3/8	16		2.15/16	0.6020	0.3810	0.2860	2	H3	5/16	8.00	1.2915	1	0581155	0581377
3/8	16		2.15/16	0.6020	0.3810	0.2860	3	H3	5/16	8.00	1.2915	1	0581162	0581391
3/8	16		2.15/16	0.6020	0.3810	0.2860	3	H11	5/16	8.00	1.2915	1	—	0581384 ¹⁾
3/8		24	2.15/16	0.6020	0.3810	0.2860	2	H3	Q	8.50	1.2915	1	0582039	0582206
3/8		24	2.15/16	0.6020	0.3810	0.2860	3	H3	Q	8.50	1.2915	1	0582046	0582213
7/16	14		3.5/32	0.9055	0.3230	0.2420	3	H3	U	9.40		1	0581179	0581407
7/16		20	3.5/32	0.9055	0.3230	0.2420	3	H3	25/64	9.90		1	0582053	0582220
1/2	13		3.3/8	0.9055	0.3670	0.2750	2	H3	27/64	10.80		1	0581186	0581414
1/2	13		3.3/8	0.9055	0.3670	0.2750	3	H3	27/64	10.80		1	0581193	0581438
1/2	13		3.3/8	0.9055	0.3670	0.2750	3	H11	27/64	10.80		1	—	0581421 ¹⁾
1/2		20	3.3/8	0.9055	0.3670	0.2750	3	H3	29/64	11.50		1	0582077	0582244

¹⁾ Oversize +.005", not 3B

HIGH PERFORMANCE SPIRAL POINT TAPS



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ ∅ Inch /	a Inch	No. of Flutes	Limits			Pack Qty	E025/E035	E026/E036
									l ₃ Inch	l ₄ Inch			
1/2		20	3.3/8	0.9055	0.3670	0.2750	2	H3	29/64	11.50	1	0582060	0582237
9/16	12		3.19/32	0.9843	0.4290	0.3220	3	H3	31/64	12.20	1	0581209	0581445
9/16		18	3.19/32	0.9843	0.4290	0.3220	3	H3	33/64	12.90	1	0582084	0582251
5/8	11		3.13/16	0.9843	0.4800	0.3600	3	H3	17/32	13.50	1	0581216	0581469
5/8		11	3.13/16	0.9843	0.4800	0.3600	3	H11	17/32	13.50	1	—	0581452 ¹⁾
5/8		18	3.13/16	0.9843	0.4800	0.3600	3	H3	37/64	14.50	1	0582091	0582268
3/4	10		4.1/4	1.1614	0.5900	0.4420	3	H4	21/32	16.50	1	0581223	0581476
3/4		16	4.1/4	1.1614	0.5900	0.4420	3	H3	11/16	17.50	1	0582107	0582275
7/8	9		4.11/16	1.1614	0.6970	0.5230	3	H4	49/64	19.50	1	0581230	0581483
7/8		14	4.11/16	1.1614	0.6970	0.5230	3	H4	13/16	20.40	1	0582114	0582282
1"	8		5.1/8	1.3976	0.8000	0.6000	3	H4	7/8	22.25	1	0581247	0581490
1"		12	5.1/8	1.3976	0.8000	0.6000	3	H4	59/64	23.25	1	0582121	0582299
1"		14	5.1/8	1.3976	0.8000	0.6000	3	H4	59/64	23.50	1	0582138	0582305

¹⁾ Oversize +.005", not 3B

Multi-Application

**EP20/
EP30**

Premium substrate for through hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials.

EP20 = UNC Sizes, EP30 = UNF Sizes

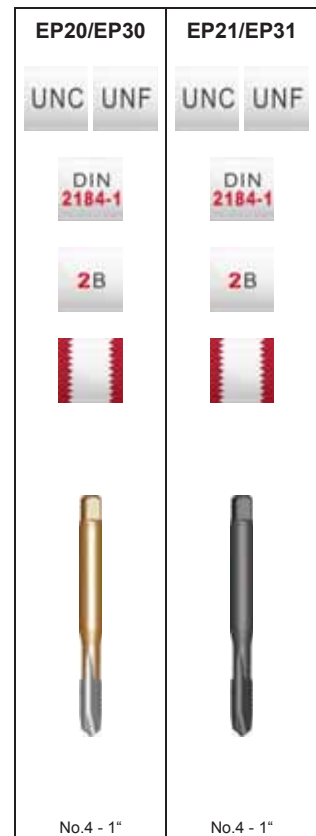
- 1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 5.1 5.2 6.1
6.2 6.3 7.1 7.2 7.3 7.4 8.1

**EP21/
EP31**

Premium substrate with steam oxide surface treatment reduces wear and chip welding in abrasive or harder ferrous materials.

EP21 = UNC Sizes, EP31 = UNF Sizes

- 1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4



Nominal d ₁	TPI UNC	TPI UNF	l ₁ mm	l ₂ mm	d ₂ Ø mm	a mm	l ₃ mm	No. of Flutes	l ₄ mm	Pack Qty	No. 4 - 1"		
											EP20/EP30	EP21/EP31	
4	40		56	9	3.5	2.7	6	3	2.35	18	1	0138021	0138175
5	40		56	10	3.5	2.7	6	3	2.65	18	1	0138038	0138182
6	32		56	11	4.0	3.0	6	3	2.85	20	1	0138045	0138199
8	32		63	12	4.5	3.4	8	3	3.5	21	1	0138052	0138205
8		36	63	12	4.5	3.4	8	3	3.5	21	1	0138366	0138472
10	24		70	13	6.0	4.9	8	3	3.9	25	1	0138069	0138212
10		32	70	13	6.0	4.9	8	3	4.1	25	1	0138373	0138489
12	24		80	15	6.0	4.9	8	3	4.5	30	1	0138076	0138229
1/4	20		80	15	7.0	5.5	8	3	5.1	30	1	0138083	0138274
1/4		28	80	15	7.0	5.5	8	3	5.5	30	1	0138380	0138496
5/16	18		90	18	8.0	6.2	9	3	6.6	35	1	0138090	0138281
5/16		24	90	18	8.0	6.2	9	3	6.9	35	1	0138397	0138502
3/8	16		100	20	10.0	8.0	11	3	8	39	1	0138106	0138298
3/8		24	100	20	10.0	8.0	11	3	8.5	39	1	0138403	0138519
7/16	14		100	20	8.0	6.2	9	3	9.4		1	0138113	0138304
7/16		20	100	20	8.0	6.2	9	3	9.9		1	0138410	0138526
1/2	13		110	23	9.0	7.0	10	3	10.8		1	0138120	0138311
1/2		20	110	23	9.0	7.0	10	3	11.5		1	0138427	0138533
5/8	11		110	25	12.0	9.0	12	3	13.5		1	0138137	0138328
5/8		18	110	25	12.0	9.0	12	3	14.5		1	0138434	0138540
3/4	10		125	30	14.0	11.0	14	4	16.5		1	0138144	0138335
3/4		16	125	30	14.0	11.0	14	4	17.5		1	0138441	0138557
7/8	9		140	34	18.0	14.5	17	4	19.5		1	0138151	0138342
7/8		14	140	34	18.0	14.5	17	4	20.4		1	0138458	0138564
1"	8		160	38	18.0	14.5	17	4	22.25		1	0138168	0138359
1"		12	160	38	18.0	14.5	17	4	23.25		1	0138465	0138571

Note: DIN shank and square dimensions will necessitate metric holders

HIGH PERFORMANCE SPIRAL POINT TAPS



Multi-Application

E020/ E030 Premium substrate for through hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials.

E020 = UNC Sizes, E030 = UNF Sizes

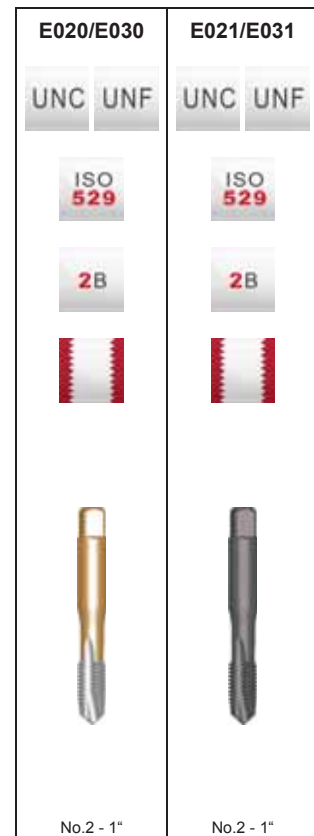
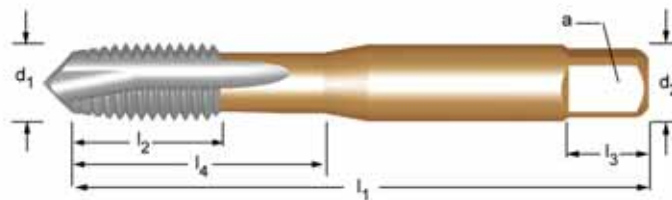
1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 5.1 5.2 6.1

6.2 6.3 7.1 7.2 7.3 7.4 8.1

E021/ E031 Premium substrate with steam oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

E021 = UNC Sizes, E031 = UNF Sizes

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4



Nominal d ₁	TPI UNC	TPI UNF	l ₁ mm	l ₂ mm	d ₂ Ø mm	a mm	l ₃ mm	No. of Flutes	Flute Width	l ₄ mm	Pack Qty	E020/E030	E021/E031
2	56		44.5	9.5	2.80	2.24	5	3	1.85	9.5	1	0010280	0010396
4	40		48	14	3.15	2.50	5	3	2.35	14	1	0568965	0569108
5	40		48	12.5	3.15	2.50	5	3	2.65	12.5	1	0010365	0010419
6	32		50	16	3.55	2.80	5	3	2.85	16	1	0568972	0569115
8	32		53	9.5	4.50	3.55	6	3	3.50	17	1	0568989	0569122
8		36	53	9.5	4.50	3.55	6	3	3.50	17	1	0569528	0569641
10	24		58	11	5.00	4.00	7	3	3.90	20	1	0568996	0569139
10		32	58	11	5.00	4.00	7	3	4.10	20	1	0569535	0569658
12	24		62	12	5.60	4.50	7	3	4.50	21	1	0569009	0569146
1/4	20		66	13	6.30	5.00	8	3	5.10	26	1	0569016	0569153
1/4		28	66	13	6.30	5.00	8	3	5.50	26	1	0569542	0569665
5/16	18		72	16	8.00	6.30	9	3	6.60	29	1	0569023	0569160
5/16		24	72	16	8.00	6.30	9	3	6.90	29	1	0569559	0569672
3/8	16		80	18	10.00	8.00	11	3	8.00	32	1	0569030	0569177
3/8		24	80	18	10.00	8.00	11	3	8.50	32	1	0569566	0569689
7/16	14		85	19	8.00	6.30	9	3	9.40		1	0569047	0569184
7/16		20	85	19	8.00	6.30	9	3	9.90		1	0569573	0569696
1/2	13		89	22	9.00	7.10	10	3	10.80		1	0569054	0569191
1/2		20	89	22	9.00	7.10	10	3	11.50		1	0569580	0569702
9/16		18	95	24	11.20	9.00	12	3	12.90		1	0569597	0569719
5/8	11		102	24	12.50	10.00	13	3	13.50		1	0569061	0569207
5/8		18	102	24	12.50	10.00	13	3	14.50		1	0569603	0569726
3/4	10		112	29	14.00	11.20	14	4	16.50		1	0569078	0569214
3/4		16	112	29	14.00	11.20	14	4	17.50		1	0569610	0569733
7/8	9		118	29	16.00	12.50	16	4	19.50		1	0569085	0569221
7/8		14	118	29	16.00	12.50	16	4	20.40		1	0569627	0569740
1"	8		130	35	18.00	14.00	18	4	22.25		1	0569092	0569238
1"		12	130	35	18.00	14.00	18	4	23.25		1	0569634	0569757

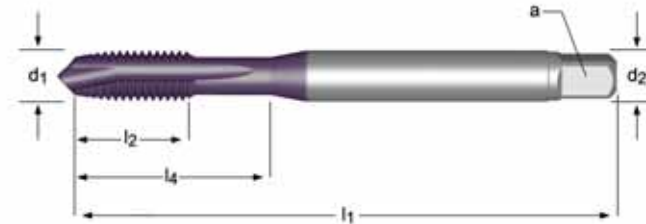
Note: ISO shank and square dimensions will necessitate metric holders

MXP Multi-Application

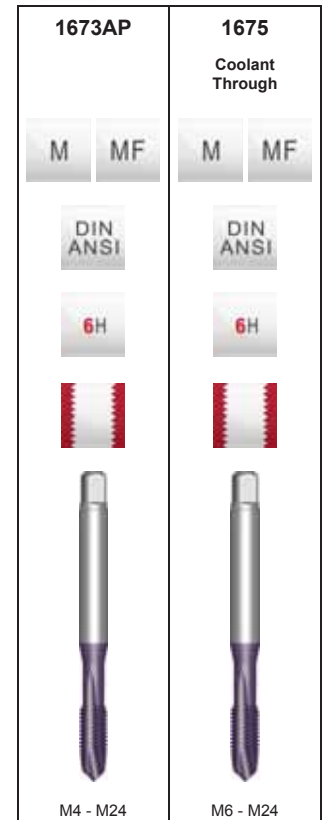
1673AP Designed for through hole tapping in a variety of materials with a hardness up to 36 Rc. The premium substrate and TiCN coating combine to offer superior abrasion resistance, higher operating speeds, improved thread quality, reduced cycle times, and longer tool life.

1675 Coolant thru design allows higher tapping speeds and eliminates the problems associated with inadequate coolant in horizontal or deep hole applications.

- 1.1 1.2 1.3 1.4 1.5 2.1 2.2 4.1 4.2 5.1 5.2 6.1
6.2 6.3 7.1 7.2 7.3 7.4



APPLIX



Nominal d ₁	Pitch M	Pitch MF	l ₁ mm	l ₂ mm	d ₂ Ø Inch	a Inch	l ₄ mm	No. of Flutes	Pack Qty	1673AP	1675
4	0.70		63	13	0.168	0.131	21	3	1	46204884	—
5	0.80		70	15	0.194	0.152	25	3	1	46204885	—
6	1.00		80	17	0.255	0.191	30	3	1	46204886	1716704
8	1.25		90	20	0.318	0.238	35	3	1	46204887	1716706
8		1.00	80	17	0.318	0.238	35	3	1	46205008	—
10	1.50		100	22	0.381	0.286	39	3	1	46204871	1716710
10		1.25	100	16	0.381	0.286	39	3	1	46204870	1716708
12	1.75		110	24	0.367	0.275		3	1	46204873	1716722
12		1.25	100	21	0.367	0.275		3	1	46205009	—
12		1.50	100	22	0.367	0.275		3	1	46204872	1716720
14	2.00		110	26	0.429	0.322		4	1	46204875	1716726
14		1.50	100	22	0.429	0.322		4	1	46204874	1716724
16	2.00		110	27	0.480	0.360		4	1	46204877	1716730
16		1.50	100	22	0.480	0.360		4	1	46204876	1716728
18	2.50		125	30	0.542	0.406		4	1	46204879	1716734
18		1.50	110	25	0.542	0.406		4	1	46204878	1716732
20	2.50		140	32	0.652	0.489		4	1	46204881	1716738
20		1.50	120	25	0.652	0.489		4	1	46204880	1716736
24	3.00		160	34	0.760	0.570		4	1	46204883	1716742
24		2.00	140	27	0.760	0.570		4	1	46204882	1716740

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24

HIGH PERFORMANCE SPIRAL POINT TAPS



Multi-Application

**E005/
E015** Premium substrate for through hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials.

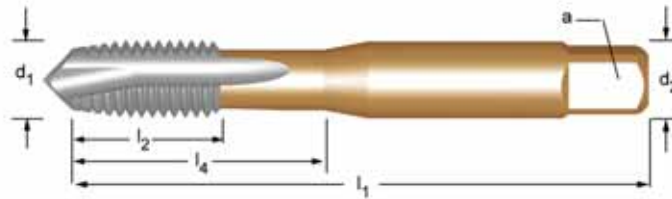
E005 = Metric Coarse, E015 = Metric Fine

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 5.1 5.2 6.1
6.2 6.3 7.1 7.2 7.3 7.4 8.1

**E006/
E016** Premium substrate with steam oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

E006 = Metric Coarse, E016 = Metric Fine

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4



Nominal d_1	Pitch M	Pitch MF	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	\square a Inch	No. of Flutes	l_4 Inch		Pack Qty	E005/E015	E006/E016	
4	0.70		2.1/8	0.2484	0.1680	0.1310	2	3.30	0.6526	N30	1	0580301	0580462
4	0.70		2.1/8	0.2484	0.1680	0.1310	3	3.30	0.6526	N30	1	0580318	0583180
5	0.80		2.3/8	0.4303	0.1940	0.1520	2	4.20	0.8434	N19	1	0580325	0580479
5	0.80		2.3/8	0.4303	0.1940	0.1520	3	4.20	0.8434	N19	1	0580332	0580486
6	1.00		2.1/2	0.5075	0.2550	0.1910	2	5.00	1.0073	N9	1	0580349	0580493
6	1.00		2.1/2	0.5075	0.2550	0.1910	3	5.00	1.0073	N9	1	0580356	0580509
8	1.25		2.23/32	0.5939	0.3180	0.2380	2	6.80	1.1891	H	1	0580363	0580516
8	1.25		2.23/32	0.5939	0.3180	0.2380	3	6.80	1.1891	H	1	0580370	0583197
8		1.00	2.23/32	0.5939	0.3180	0.2380	3	7.00	1.1891	J	1	0580912	0580950
10	1.50		2.15/16	0.6020	0.3810	0.2860	2	8.50	1.2915	Q	1	0580387	0580523
10	1.50		2.15/16	0.6020	0.3810	0.2860	3	8.50	1.2915	Q	1	0580394	0580530
10		1.00	2.15/16	0.6020	0.3810	0.2860	3	9.00	1.2915	T	1	0580929	0580967
12	1.75		3.3/8	0.9055	0.3670	0.2750	2	10.30		Y	1	0580400	0580547
12	1.75		3.3/8	0.9055	0.3670	0.2750	3	10.30		Y	1	0580417	0580554
14	2.00		3.19/32	0.9843	0.4290	0.3220	3	12.00		15/32	1	0580424	0580561
14		1.50	3.19/32	0.9843	0.4290	0.3220	3	12.50		31/64	1	0580936	0580974
16	2.00		3.13/16	0.9843	0.4800	0.3600	3	14.00		35/64	1	0580431	0580578
18	2.50		4.1/32	1.1614	0.5420	0.4060	3	15.50		39/64	1	0580448	0580585
18		1.50	4.1/32	1.1614	0.5420	0.4060	3	16.50		41/64	1	0580943	0580981
20	2.50		4.15/32	1.1614	0.6520	0.4890	3	17.50		11/16	1	0580455	0580592

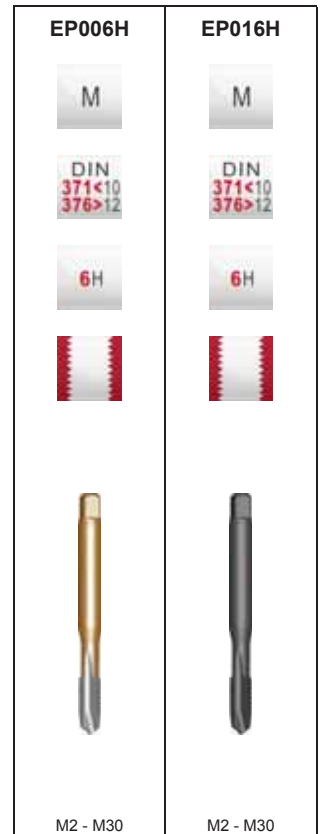
Multi-Application

EP006H Premium substrate for through hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 5.1 5.2 6.1
6.2 6.3 7.1 7.2 7.3 7.4 8.1

EP016H Premium substrate with steam oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4



Nominal d ₁	Pitch M	l ₁ mm	l ₂ mm	d ₂ Ø mm	□ a mm	l ₃ mm	No. of Flutes	Flute Width	l ₄ mm	Pack Qty	EP006H	EP016H
2	0.40	50	6	2.8	2.1	5	3	1.6	9	1	0137239	0137253
2.5	0.45	50	8	2.8	2.1	5	3	2.1	12.5	1	0137246	0137291
3	0.50	56	10	2.2	1.8	4	3	2.5		1	0135716	0136126
3	0.50	56	9	3.5	2.7	6	3	2.5	18	1	0135709	0136119
3.5	0.60	56	11	4.0	3.0	6	3	2.9	20	1	0135723	0136133
4	0.70	63	12	2.8	2.1	5	3	3.3		1	0135747	0136157
4	0.70	63	12	4.5	3.4	6	3	3.3	21	1	0135730	0136140
4.5	0.75	70	13	6.0	4.9	8	3	3.8	25	1	0135754	0136164
5	0.80	70	13	3.5	2.7	6	3	4.2		1	0135853	0136188
5	0.80	70	13	6.0	4.9	8	3	4.2	25	1	0135846	0136171
6	1.00	80	15	4.5	3.4	6	3	5		1	0135877	0136201
6	1.00	80	15	6.0	4.9	8	3	5	30	1	0135860	0136195
7	1.00	80	15	7.0	5.5	8	3	6	30	1	0135884	0136218
8	1.25	90	18	6.0	4.9	8	3	6.8		1	0135907	0136232
8	1.25	90	18	8.0	6.2	9	3	6.8	35	1	0135891	0136225
10	1.50	100	20	10.0	8.0	11	3	8.5	39	1	0135914	0136249
10	1.50	100	20	7.0	5.5	8	3	8.5		1	0135921	0136256
12	1.75	110	23	9.0	7.0	10	3	10.3		1	0135938	0136263
14	2.00	110	25	11.0	9.0	12	3	12		1	0135945	0136317
16	2.00	110	25	12.0	9.0	12	3	14		1	0135952	0136324
18	2.50	125	30	14.0	11.0	14	4	15.5		1	0135969	0136331
20	2.50	140	30	16.0	12.0	15	4	17.5		1	0135976	0136348
22	2.50	140	34	18.0	14.5	17	4	19.5		1	0135983	0136355
24	3.00	160	38	18.0	14.5	17	4	21		1	0135990	0136362
27	3.00	160	38	20.0	16.0	19	4	24		1	0136003	0136379
30	3.50	180	45	22.0	18.0	21	4	26.5		1	0136010	0136386

Note: DIN shank and square dimensions will necessitate metric holders

HIGH PERFORMANCE SPIRAL POINT TAPS



Multi-Application

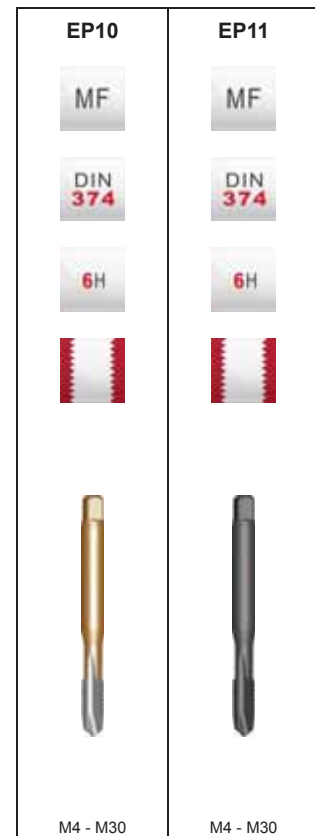
EP10 Premium substrate for through hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 5.1 5.2 6.1

6.2 6.3 7.1 7.2 7.3 7.4 8.1

EP11 Premium substrate with steam oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4



Nominal d ₁	Pitch MF	l ₁ mm	l ₂ mm	d ₂ Ø mm	□ a mm	l ₃ mm	No. of Flutes		Pack Qty	EP10	EP11
4	0.50	63	12	2.8	2.1	5	3	3.5	1	0137345	0137642
5	0.50	70	13	3.5	2.7	6	3	4.5	1	0137352	0137659
6	0.75	80	15	4.5	3.4	6	3	5.3	1	0137369	0137666
8	0.75	80	15	6.0	4.9	8	3	7.3	1	0137376	0137673
8	1.00	90	18	6.0	4.9	8	3	7	1	0137383	0137680
10	0.75	90	18	7.0	5.5	8	3	9.3	1	0137390	0137697
10	1.00	90	18	7.0	5.5	8	3	9	1	0137406	0137703
10	1.25	100	20	7.0	5.5	8	3	8.8	1	0137413	0137710
12	1.00	100	21	9.0	7.0	10	3	11	1	0137420	0137727
12	1.25	100	21	9.0	7.0	10	3	10.8	1	0137437	0137819
12	1.50	100	21	9.0	7.0	10	3	10.5	1	0137444	0137826
14	1.00	100	21	11.0	9.0	12	3	13	1	0137451	0137833
14	1.25	100	21	11.0	9.0	12	3	13	1	0137468	0137840
14	1.50	100	21	11.0	9.0	12	3	12.5	1	0137475	0137857
16	1.00	100	21	12.0	9.0	12	3	15	1	0137482	0137864
16	1.50	100	21	12.0	9.0	12	3	14.5	1	0137499	0137871
18	1.00	110	24	14.0	11.0	14	4	17	1	0137505	0137888
18	1.50	110	24	14.0	11.0	14	4	16.5	1	0137512	0137895
20	1.00	125	24	16.0	12.0	15	4	19	1	0137529	0137901
20	1.50	125	24	16.0	12.0	15	4	18.5	1	0137536	0137918
22	1.50	125	25	18.0	14.5	17	4	20.5	1	0137543	0137925
24	1.50	140	28	18.0	14.5	17	4	22.5	1	0137550	0137932
24	2.00	140	28	18.0	14.5	17	4	22	1	0137567	0137949
25	1.50	140	28	18.0	14.5	17	4	23.5	1	0137574	0137956
26	1.50	140	28	18.0	14.5	17	4	24.5	1	0137581	0137963
27	1.50	140	28	20.0	16.0	19	4	25.5	1	0137598	0137970
27	2.00	140	28	20.0	16.0	19	4	25	1	0137604	0137987
28	1.50	140	28	20.0	16.0	19	4	26.5	1	0137611	0137994
30	1.50	150	28	22.0	18.0	21	4	28.5	1	0137628	0138007
30	2.00	150	28	22.0	18.0	21	4	28	1	0137635	0138014

Note: DIN shank and square dimensions will necessitate metric holders

Multi-Application

E000/ E010 Premium substrate for through hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials.

E000 = Metric Coarse, E010 = Metric Fine

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 5.1 5.2 6.1
6.2 6.3 7.1 7.2 7.3 7.4 8.1

E001/ E011 Premium substrate with steam oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

E001 = Metric Coarse, E011 = Metric Fine

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4




Note: ISO shank and square dimensions will necessitate metric holders



Nominal d ₁	Pitch M	Pitch MF	l ₁ mm	l ₂ mm	d ₂ Ø mm	□ a mm	l ₃ mm	No. of Flutes	↔	l ₄ mm	Pack Qty	E000/E010	E001/E011
1.6	0.35		41	7	2.50	2.00	4	3	1.25	7	1	0168769	0168790
2	0.40		41	8	2.50	2.00	4	3	1.6	8	1	0168776	0168806
2.5	0.45		44.5	9.5	2.80	2.24	5	3	2.05	9.5	1	0168783	0168813
3	0.50		48	15	3.15	2.50	5	3	2.5	15	1	0567586	0567722
3.5	0.60		50	16	3.55	2.80	5	3	2.9	16	1	0567593	0567739
4	0.70		53	17	4.00	3.15	6	3	3.3	17	1	0567609	0567746
4		0.50	53	17	4.00	3.15	6	3	3.5	17	1	0568149	0568385
5	0.80		58	11	5.00	4.00	7	3	4.2	22	1	0567616	0567753
5		0.50	58	11	5.00	4.00	7	3	4.5	22	1	0568156	0568392
6	1.00		66	13	6.30	5.00	8	3	5.0	26	1	0567623	0567760
6		0.50	66	13	6.30	5.00	8	3	5.5	26	1	0568163	0568408
6		0.75	66	13	6.30	5.00	8	3	5.3	26	1	0568170	0568415
7	1.00		66	13	7.10	5.60	8	3	6.0	26	1	0636176	0636183
8	1.25		72	16	8.00	6.30	9	3	6.8	29	1	0567630	0567777
8		0.75	72	16	8.00	6.30	9	3	7.3	29	1	0568187	0568422
8		1.00	72	16	8.00	6.30	9	3	7.0	29	1	0568194	0568439
10	1.50		80	18	10.00	8.00	11	3	8.5	34	1	0567647	0567784
10		1.00	80	18	10.00	8.00	11	3	9.0	34	1	0568200	0568446
10		1.25	80	18	10.00	8.00	11	3	8.8	34	1	0568217	0568453
12	1.75		89	22	9.00	7.10	10	3	10.3		1	0567654	0567791
12		1.00	89	22	9.00	7.10	10	3	11.0		1	0568224	0568460
12		1.25	89	22	9.00	7.10	10	3	10.8		1	0568231	0568477
12		1.50	89	22	9.00	7.10	10	3	10.5		1	0568248	0568484
14	2.00		95	24	11.20	9.00	12	3	12.0		1	0567661	0567807
14		1.00	95	24	11.20	9.00	12	3	13.0		1	0568255	0568491
14		1.25	95	24	11.20	9.00	12	3	12.8		1	0568262	0568507
14		1.50	95	24	11.20	9.00	12	3	12.5		1	0568279	0568514
16	2.00		102	24	12.50	10.00	13	3	14.0		1	0567678	0567814
16		1.00	102	24	12.50	10.00	13	3	15.0		1	0568286	0568521
16		1.50	102	24	12.50	10.00	13	3	14.5		1	0568293	0568538
18	2.50		112	29	14.00	11.20	14	4	15.5		1	0567685	0567821
18		1.00	112	29	14.00	11.20	14	4	17.0		1	0568309	0568545
	18	1.50	112	29	14.00	11.20	14	4	16.5		1	0568316	0568552

HIGH PERFORMANCE SPIRAL POINT TAPS



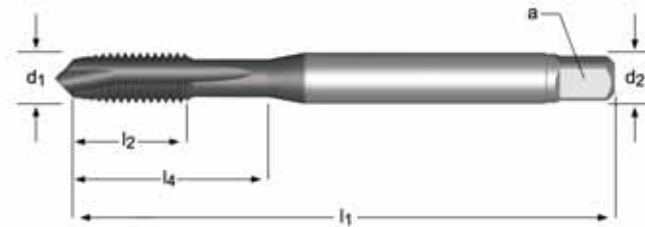
Nominal d ₁	Pitch M	Pitch MF	l ₁ mm	l ₂ mm	d ₂ ∅ mm	□ a mm	l ₃ mm	No. of Flutes		l ₄ mm	Pack Qty	E000/E010	E001/E011
20	2.50		112	29	14.00	11.20	14	4	17.5		1	0567692	0567838
20		1.00	112	29	14.00	11.20	14	4	19.0		1	0568323	0568569
20		1.50	112	29	14.00	11.20	14	4	18.5		1	0568330	0568576
20		2.00	112	29	14.00	11.20	14	4	18.0		1	0568347	0568583
22	2.50		118	29	16.00	12.50	16	4	19.5		1	0567708	0567845
22		1.50	118	29	16.00	12.50	16	4	20.5		1	0568354	0568590
24	3.00		130	35	18.00	14.00	18	4	21.0		1	0567715	0567852
24		1.50	130	35	18.00	14.00	18	4	22.5		1	0568361	0568606
24		2.00	130	35	18.00	14.00	18	4	22.0		1	0568378	0568613

Note: ISO shank and square dimensions will necessitate metric holders

HMD Hard Materials / Cast Iron

1629AP Designed for through hole tapping materials with a hardness of >38 Rc. Premium substrate provides superior abrasion resistance and edge strength. TiAlN-Top coating lowers the coefficient of friction, improves thread quality, affords higher operating speeds, and longer tool life.

1.5 1.6 2.4 3.1 3.2 3.3 3.4 4.3 5.3 6.4



1629AP

UNC
UNF

DIN
ANSI

2B

No. 4 - 1"

Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch	∠ a Inch	l ₄ Inch	No. of Flutes	Pack Qty	1629AP
4	40		2.205	0.472	0.141	0.110	.709	2	1	46204796
6	32		2.205	0.472	0.141	0.110	.787	3	1	46204801
8	32		2.480	0.512	0.168	0.131	.827	3	1	46204805
10	24		2.756	0.591	0.194	0.152	.984	3	1	46204758
10		32	2.756	0.512	0.194	0.152	.984	3	1	46204759
1/4	20		3.150	0.669	0.255	0.191	1.181	3	1	46204756
1/4		28	3.150	0.669	0.255	0.191	1.181	3	1	46204757
5/16	18		3.543	0.787	0.318	0.238	1.378	3	1	46204797
5/16		24	3.543	0.669	0.318	0.238	1.378	3	1	46204798
3/8	16		3.937	0.866	0.381	0.286	1.535	3	1	46204794
3/8		24	3.937	0.709	0.381	0.286	1.535	3	1	46204795
7/16	14		3.937	0.866	0.323	0.242		3	1	46204802
7/16		20	3.937	0.866	0.323	0.242		3	1	46204803
1/2	13		4.331	0.984	0.367	0.275		3	1	46204754
1/2		20	3.937	0.866	0.367	0.275		3	1	46204755
5/8	11		4.331	1.063	0.480	0.360		3	1	46204799
5/8		18	3.937	0.866	0.480	0.360		3	1	46204800
3/4	10		4.921	1.181	0.590	0.442		3	1	46204792
3/4		16	4.331	0.984	0.590	0.442		4	1	46204793
7/8	9		5.512	1.260	0.697	0.523		3	1	46204804
7/8		14	4.921	1.024	0.697	0.523		4	1	46205011
1"	8		6.299	1.417	0.800	0.600		3	1	46204791
1"		12	5.512	1.102	0.800	0.600		4	1	46204790

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
 Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24

HIGH PERFORMANCE SPIRAL POINT TAPS



HMD Hard Materials / Cast Iron

1659AP Designed for through hole tapping materials with a hardness of >38 Rc. Premium substrate provides superior abrasion resistance and edge strength. TiAlN-Top coating lowers the coefficient of friction, improves thread quality, affords higher operating speeds, and longer tool life.

1.5 1.6 2.4 3.1 3.2 3.3 3.4 4.3 5.3 6.4



1659AP

M
MF

M3 - M12

Nominal d_1	Pitch M	Pitch MF	l_1 mm	l_2 mm	d_2 Ø Inch	a Inch	l_4 mm	No. of Flutes	Pack Qty	1659AP
3	0.50		56	11	0.141	0.110	18	3	1	46204832
4	0.70		63	13	0.168	0.131	21	3	1	46204833
5	0.80		70	15	0.194	0.152	25	3	1	46204834
6	1.00		80	17	0.255	0.191	30	3	1	46204835
8	1.25		90	20	0.318	0.238	35	3	1	46204837
8		1.00	90	17	0.318	0.238	35	3	1	46204836
10	1.50		100	22	0.381	0.286	39	3	1	46204829
12	1.75		110	24	0.367	0.275		3	1	46204831
12		1.50	100	22	0.367	0.275		3	1	46204830

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
 Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24

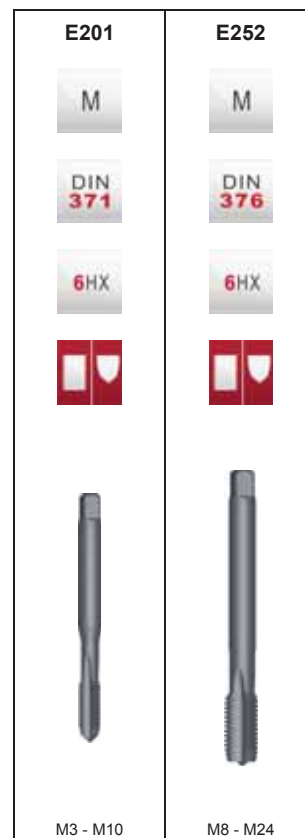
For Cast Iron

E201

E252

Designed for through or blind hole tapping with a specific geometry for cast iron and those materials producing broken, powdery chips. Also ideal for non-metallics, cast brass, and other brass materials. Nitride and steam oxide coating reduces wear and chip welding in abrasive materials.

3.1 3.2 3.3 3.4 6.2 6.4 7.4 8.2



Nominal d_1	Pitch M	l_1 mm	l_2 mm	d_2 \varnothing mm	\square a mm	l_3 mm	No. of Flutes		l_4 mm	Pack Qty	E201	E252
3	0.50	56	9	3.5	2.7	6	3	2.5	18	1	0165607	—
4	0.70	63	12	4.5	3.4	6	4	3.3	21	1	0085196	—
5	0.80	70	13	6.0	4.9	8	4	4.2	25	1	0085202	—
6	1.00	80	15	6.0	4.9	8	4	5	30	1	0085219	—
8	1.25	90	18	6	4.9	8	4	6.8		1	—	0087343
8	1.25	90	18	8.0	6.2	9	4	6.8	35	1	0085226	—
10	1.50	100	20	10.0	8.0	11	4	8.5	39	1	0085189	—
10	1.50	100	20	7	5.5	8	4	8.5		1	—	0087268
12	1.75	110	23	9	7.0	10	4	10.3		1	—	0087275
14	2.00	110	25	11	9.0	12	4	12		1	—	0087282
16	2.00	110	25	12	9.0	12	4	14		1	—	0087299
18	2.50	125	30	14	11.0	14	4	15.5		1	—	0087305
20	2.50	140	30	16	12.0	15	4	17.5		1	—	0087312
22	2.50	140	34	18	14.5	17	4	19.5		1	—	0087329
24	3.00	160	38	18	14.5	17	4	21		1	—	0087336

Note: DIN shank and square dimensions will necessitate metric holders

HIGH PERFORMANCE SPIRAL POINT TAPS



DDX, High Hook

1985 Type DDX taps feature a special O.D. and P.D. relief and increased back taper. Intended for use in through hole applications where a free cutting action is desirable. Designed to produce a class 2B fit. Sizes No.4 - 3/8" are 'necked' to allow for use in deep hole applications. Steam oxide reduces wear and prevents chip welding when through hole tapping in abrasive or harder ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 4.1 4.2 4.3 5.1 5.2 5.3



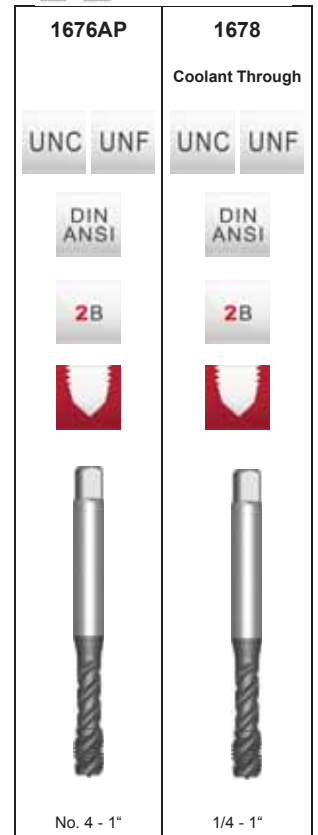
Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ ∅ Inch /	∠ a Inch	l ₃ Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1985
4	40		1.7/8	9/16	0.1410	0.1100	3/16	2	2B	Plug	1	1013037
4		48	1.7/8	9/16	0.1410	0.1100	3/16	2	2B	Plug	1	1013038
5	40		1.15/16	5/8	0.1410	0.1100	3/16	2	2B	Plug	1	1013039
5		44	1.15/16	5/8	0.1410	0.1100	3/16	2	2B	Plug	1	1013040
6	32		2"	11/16	0.1410	0.1100	3/16	2	2B	Plug	1	1013041
6		40	2"	11/16	0.1410	0.1100	3/16	2	2B	Plug	1	1013042
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	2B	Plug	1	1013043
8		36	2.1/8	3/4	0.1680	0.1310	1/4	2	2B	Plug	1	1013044
10	24		2.3/8	7/8	0.1940	0.1520	1/4	2	2B	Plug	1	1013045
10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	2B	Plug	1	1013046
12	24		2.3/8	15/16	0.2200	0.1650	9/32	2	2B	Plug	1	1013047
12		28	2.3/8	15/16	0.2200	0.1650	9/32	2	2B	Plug	1	1013048
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	2B	Plug	1	1013049
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	2B	Plug	1	1013050
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	2B	Plug	1	1013051
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	2B	Plug	1	1013052
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	2B	Plug	1	1013053
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	2B	Plug	1	1013054
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	2B	Plug	1	1013055
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	2B	Plug	1	1013056
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	2B	Plug	1	1013057
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	2B	Plug	1	1013058
9/16	12		3.19/32	1.21/32	0.4290	0.3220	1/2	3	2B	Plug	1	1013059
9/16		18	3.19/32	1.21/32	0.4290	0.3220	1/2	3	2B	Plug	1	1013060
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	3	2B	Plug	1	1013061
5/8		18	3.13/16	1.13/16	0.4800	0.3600	9/16	3	2B	Plug	1	1013062
3/4	10		4.1/4	2"	0.5900	0.4420	11/16	3	2B	Plug	1	1013065
3/4		16	4.1/4	2"	0.5900	0.4420	11/16	3	2B	Plug	1	1013066
7/8	9		4.11/16	2.7/32	0.6970	0.5230	3/4	4	2B	Plug	1	1013067
7/8		14	4.11/16	2.7/32	0.6970	0.5230	3/4	4	2B	Plug	1	1013068
1"	8		5.1/8	2.1/2	0.8000	0.6000	13/16	4	2B	Plug	1	1013069

MXL Multi-Application

1676AP Designed for blind hole tapping in a variety of materials with a hardness up to 36 Rc. The premium substrate and TiCN coating combine to offer superior abrasion resistance, higher operating speeds, improved thread quality, reduced cycle times, and longer tool life.

1678 Coolant thru design allows higher tapping speeds and eliminates the problems associated with inadequate coolant in horizontal or deep hole applications.

- 1.1
- 1.2
- 1.3
- 1.4
- 1.5
- 2.1
- 2.2
- 2.3
- 4.1
- 4.2
- 5.1
- 5.2
- 6.1
- 6.2
- 6.3
- 7.1
- 7.2
- 7.3
- 7.4



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch	a Inch	l ₄ Inch	No. of Flutes	Pack Qty	1676AP	1678
4	40		2.205	0.236	0.141	0.110	.709	3	1	46204902	—
6	32		2.205	0.236	0.141	0.110	.787	3	1	46204907	—
8	32		2.480	0.236	0.168	0.131	.827	3	1	46204912	—
10	24		2.756	0.354	0.194	0.152	.984	3	1	46204894	—
10		32	2.756	0.354	0.194	0.152	.984	3	1	46204895	—
1/4	20		3.150	0.433	0.255	0.191	1.181	3	1	46204892	1717510
1/4		28	3.150	0.433	0.255	0.191	1.181	3	1	46204893	1717512
5/16	18		3.543	0.472	0.318	0.238	1.378	3	1	46204903	1717514
5/16		24	3.543	0.472	0.318	0.238	1.378	3	1	46204904	1717516
3/8	16		3.937	0.551	0.381	0.286	1.535	3	1	46204900	1717518
3/8		24	3.937	0.551	0.381	0.286	1.535	3	1	46204901	1717520
7/16	14		3.937	0.591	0.323	0.242		3	1	46204908	1717530
7/16		20	3.937	0.591	0.323	0.242		3	1	46204909	1717532
1/2	13		4.331	0.630	0.367	0.367		3	1	46204890	1717534
1/2		20	3.937	0.630	0.397	0.275		3	1	46204891	1717536
5/8	11		4.331	0.745	0.480	0.360		3	1	46204905	1717538
5/8		18	3.937	0.745	0.480	0.360		3	1	46204906	1717540
3/4	10		4.921	0.820	0.590	0.442		3	1	46204898	1717542
3/4		16	4.331	0.820	0.590	0.442		3	1	46204899	1717544
7/8	9		5.512	0.910	0.697	0.523		4	1	46204911	46204932
7/8		14	4.921	0.910	0.697	0.523		4	1	46204910	46204931
1"	8		6.299	1.025	0.800	0.600		4	1	46204897	1717546
1"		12	5.512	1.025	0.800	0.600		4	1	46204896	1717548

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
 Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24

HIGH PERFORMANCE SPIRAL FLUTE TAPS (48°)



Multi-Application

E027/ E037 Premium substrate for blind hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft and non-ferrous materials.

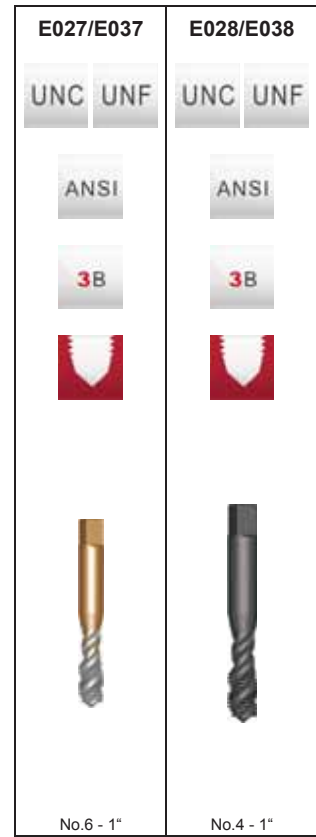
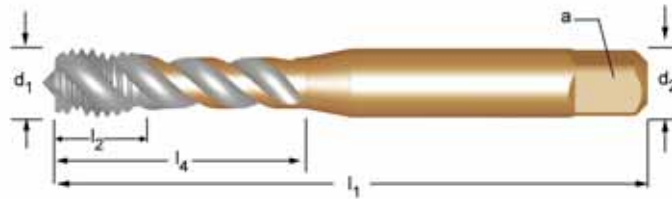
E027 = UNC Sizes, E037 = UNF Sizes

1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 6.1 6.2 6.3 7.1 7.2 7.3 7.4 8.1

E028/ E038 Premium substrate with Steam Oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

E028 = UNC Sizes, E038 = UNF Sizes

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch	a Inch	No. of Flutes	Limits	N	l ₄ Inch	Pack Qty	Series		
												E027/E037	E028/E038	
4	40		1.7/8	0.6091	0.1410	0.1100	3	H2	N43	2.35	0.6091	1	—	0581643
5	40		1.5/16	0.7404	0.1410	0.1100	3	H2	N38	2.65	0.7404	1	—	0581650
6	32		2"	0.2610	0.1410	0.1100	3	H2	N36	2.85	0.5938	1	0581506	0581667
8	32		2.1/8	0.2484	0.1680	0.1310	3	H2	N29	3.50	0.6526	1	0581513	0581674
10	24		2.3/8	0.2650	0.1940	0.1520	3	H3	N25	3.90	0.8434	1	0581520	0581681
10		32	2.3/8	0.2650	0.1940	0.1520	3	H2	N21	4.10	0.8434	1	0582312	0582435
12	24		2.3/8	0.2520	0.2200	0.1650	3	H3	N16	4.50	0.8848	1	0581537	0581698
1/4	20		2.1/2	0.3937	0.2550	0.1910	3	H3	N7	5.10	1.0993	1	0581544	0581704
1/4		28	2.1/2	0.3937	0.2550	0.1910	3	H3	N3	5.50	1.0993	1	0582329	0582442
5/16	18		2.23/32	0.4567	0.3180	0.2380	3	H3	F	6.60	1.3094	1	0581551	0581711
5/16		24	2.23/32	0.4567	0.3180	0.2380	3	H3	I	6.90	1.3094	1	0582336	0582459
3/8	16		2.15/16	0.5315	0.3810	0.2860	3	H3	5/16	8.00	1.4415	1	0581568	0581728
3/8	16		2.15/16	0.5315	0.3810	0.2860	3	H5	5/16	8.00	1.4415	1	—	0581735
3/8		24	2.15/16	0.5315	0.3810	0.2860	3	H3	Q	8.50	1.4415	1	0582343	0582466
7/16	14		3.5/32	0.6299	0.3230	0.2420	3	H3	U	9.40		1	0581575	0581742
7/16		20	3.5/32	0.6299	0.3230	0.2420	3	H3	25/64	9.90		1	0582350	0582473
1/2	13		3.3/8	0.6890	0.3670	0.2750	3	H3	27/64	10.80		1	0581582	0581759
1/2		20	3.3/8	0.6890	0.3670	0.2750	3	H3	29/64	11.50		1	0582367	0582480
9/16	12		3.19/32	0.7087	0.4290	0.3220	3	H3	31/64	12.20		1	0581599	0581766
9/16		18	3.19/32	0.7087	0.4290	0.3220	3	H3	33/64	12.90		1	0582374	0582497
5/8	11		3.13/16	0.7087	0.4800	0.3600	3	H3	17/32	13.50		1	0581605	0581773
5/8		18	3.13/16	0.7087	0.4800	0.3600	3	H3	37/64	14.50		1	0582381	0582503
3/4	10		4.1/4	0.8858	0.5900	0.4420	3	H4	21/32	16.50		1	0581612	0581780
3/4		16	4.1/4	0.8858	0.5900	0.4420	3	H3	11/16	17.50		1	0582398	0582510
7/8	9		4.11/16	0.9843	0.6970	0.5230	3	H4	49/64	19.50		1	0581629	0581797
7/8		14	4.11/16	0.9843	0.6970	0.5230	3	H4	13/16	20.40		1	0582404	0582527
1"	8		5.1/8	1.1811	0.8000	0.6000	3	H4	7/8	22.25		1	0581636	0581803
1"		12	5.1/8	1.1811	0.8000	0.6000	3	H4	59/64	23.25		1	0582411	0582534
1"		14	5.1/8	1.1811	0.8000	0.6000	3	H4	59/64	23.50		1	0582428	0582541

¹⁾ Class of fit: 2B

Multi-Application

EX20/ EX30 Premium substrate for blind hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft and non-ferrous materials.

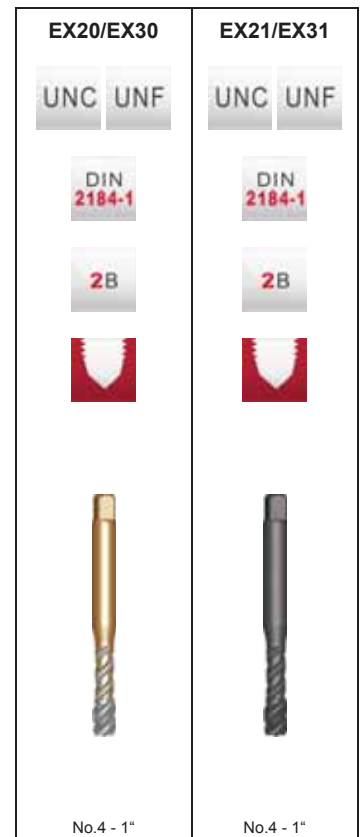
EX20 = UNC Sizes, EX30 = UNF Sizes

1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 7.1 7.2 7.3 7.4

EX21/ EX31 Premium substrate with Steam Oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

EX21 = UNC Sizes, EX31 = UNF Sizes

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



Nominal d ₁	TPI UNC	TPI UNF	l ₁ mm	l ₂ mm	d ₂ ∅ mm	a mm	l ₃ mm	No. of Flutes	l ₄ mm	Pack Qty	Series		
											EX20/EX30	EX21/EX31	
4	40		56	6	3.5	2.7	6	3	2.35	18	1	0150269	0150412
5	40		56	6	3.5	2.7	6	3	2.65	18	1	0150276	0150429
6	32		56	7	4.0	3.0	6	3	2.85	20	1	0150283	0150436
8	32		63	7	4.5	3.4	8	3	3.5	21	1	0150290	0150443
8		36	63	7	4.5	3.4	8	3	3.5	21	1	0168325	0168431
10	24		70	8	6.0	4.9	8	3	3.9	25	1	0150306	0150450
10		32	70	8	6.0	4.9	8	3	4.1	25	1	0168332	0168448
12	24		80	10	6.0	4.9	8	3	4.5	30	1	0150313	0150467
1/4	20		80	10	7.0	5.5	8	3	5.1	30	1	0150320	0150474
1/4		28	80	10	7.0	5.5	8	3	5.5	30	1	0168349	0168455
5/16	18		90	12	8.0	6.2	9	3	6.6	35	1	0150337	0150627
5/16		24	90	12	8.0	6.2	9	3	6.9	35	1	0168356	0168462
3/8	16		100	15	10.0	8.0	11	3	8	39	1	0150344	0151945
3/8		24	100	15	10.0	8.0	11	3	8.5	39	1	0168363	0168479
7/16	14		100	15	8.0	6.2	9	3	9.4		1	0150351	0159507
7/16		20	100	15	8.0	6.2	9	3	9.9		1	0168370	0168486
1/2	13		110	18	9.0	7.0	10	3	10.8		1	0150368	0159514
1/2		20	110	18	9.0	7.0	10	3	11.5		1	0168387	0168493
5/8	11		110	20	12.0	9.0	12	4	13.5		1	0150375	0159552
5/8		18	110	20	12.0	9.0	12	4	14.5		1	0168394	0168509
3/4	10		125	25	14.0	11.0	14	4	16.5		1	0150382	0159576 ¹⁾
3/4		16	125	25	14.0	11.0	14	4	17.5		1	0168400	0168516 ¹⁾
7/8	9		140	25	18.0	14.5	17	4	19.5		1	0150399	0159590 ¹⁾
7/8		14	140	25	18.0	14.5	17	4	20.4		1	0168417	0168523 ¹⁾
1"	8		160	30	18.0	14.5	17	4	22.25		1	0150405	0168318 ¹⁾
1"		12	160	30	18.0	14.5	17	4	23.25		1	0168424	0168530 ¹⁾

Note: DIN shank and square dimensions will necessitate metric holders

¹⁾ Steel HSCo

HIGH PERFORMANCE SPIRAL FLUTE TAPS (48°)



Multi-Application

E022/ E032 Premium substrate for blind hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft and non-ferrous materials.

E022 = UNC Sizes, E032 = UNF Sizes

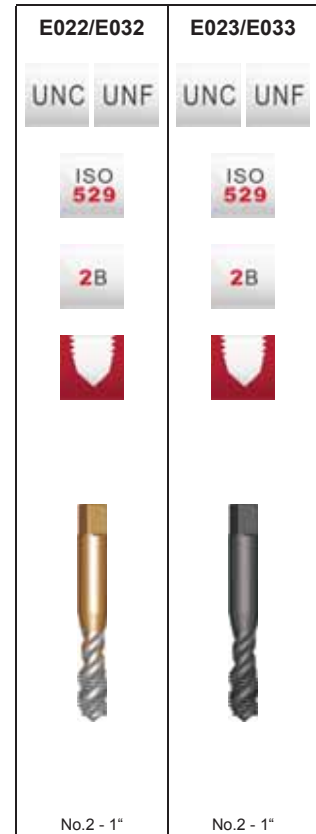
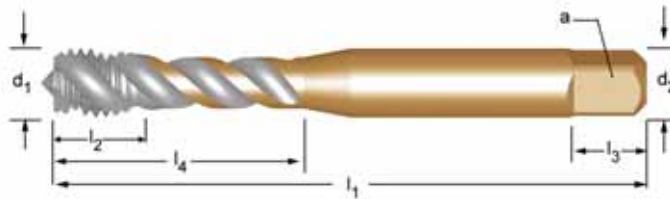
1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 6.1 6.2 6.3 7.1 7.2 7.3

7.4 8.1

E023/ E033 Premium substrate with Steam Oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

E023 = UNC Sizes, E033 = UNF Sizes

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



Nominal d ₁	TPI UNC	TPI UNF	l ₁ mm	l ₂ mm	d ₂ ∅ mm	a mm	l ₃ mm	No. of Flutes	Flute Width	l ₄ mm	Pack Qty	E022/E032	E023/E033
2	56		44.5	9.5	2.80	2.24	5	2	1.85	9.5	1	0010426	0010440
4	40		48	6	3.15	2.50	5	3	2.35	14	1	0569245	0569382
5	40		48	6	3.15	2.50	5	3	2.65	12.5	1	0010433	0010471
6	32		50	6	3.55	2.80	5	3	2.85	16	1	0569252	0569399
8	32		53	7	4.50	3.55	6	3	3.50	17	1	0569269	0569405
8		36	53	7	4.50	3.55	6	3	3.50	17	1	0569962	0570081
10	24		58	8	5.00	4.00	7	3	3.90	20	1	0569276	0569412
10		32	58	8	5.00	4.00	7	3	4.10	20	1	0569979	0570098
12	24		62	12	5.60	4.50	7	3	4.50	21	1	0569283	0569429
1/4	20		66	10	6.30	5.00	8	3	5.10	28	1	0569290	0569436
1/4		28	66	10	6.30	5.00	8	3	5.50	28	1	0569986	0570104
5/16	18		72	12	8.00	6.30	9	3	6.60	31	1	0569306	0569443
5/16		24	72	12	8.00	6.30	9	3	6.90	31	1	0569993	0570111
3/8	16		80	15	10.00	8.00	11	3	8.00	34	1	0569313	0569450
3/8		24	80	15	10.00	8.00	11	3	8.50	34	1	0570005	0570128
7/16	14		85	19	8.00	6.30	9	3	9.40		1	0569320	0569467
7/16		20	85	19	8.00	6.30	9	3	9.90		1	0570012	0570135
1/2	13		89	19	9.00	7.10	10	3	10.80		1	0569337	0569474
1/2		20	89	22	9.00	7.10	10	3	11.50		1	0570029	0570142
9/16		18	95	24	11.20	9.00	12	3	12.90		1	0570036	0570159
5/8	11		102	24	12.50	10.00	13	4	13.50		1	0569344	0569481
5/8		18	102	24	12.50	10.00	13	4	14.50		1	0570043	0570166
3/4	10		112	29	14.00	11.20	14	4	16.50		1	0569351	0569498
3/4		16	112	29	14.00	11.20	14	4	17.50		1	0570050	0570173
7/8	9		118	29	16.00	12.50	16	4	19.50		1	0569368	0569504
7/8		14	118	29	16.00	12.50	16	4	20.40		1	0570067	0570180
1"	8		130	35	18.00	14.00	18	4	22.25		1	0569375	0569511
1"		12	130	35	18.00	14.00	18	4	23.25		1	0570074	0570197

Note: ISO shank and square dimensions will necessitate metric holders

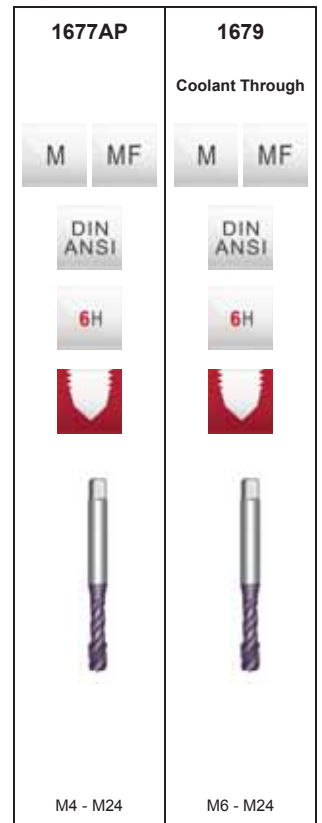
MXL Multi-Application



1677AP Designed for blind hole tapping in a variety of materials with a hardness up to 36 Rc. The premium substrate and TiCN coating combine to offer superior abrasion resistance, higher operating speeds, improved thread quality, reduced cycle times, and longer tool life.

1679 Coolant thru design allows higher tapping speeds and eliminates the problems associated with inadequate coolant in horizontal or deep hole applications.

- 1.1
- 1.2
- 1.3
- 1.4
- 1.5
- 2.1
- 2.2
- 2.3
- 4.1
- 4.2
- 5.1
- 5.2
- 6.1
- 6.2
- 6.3
- 7.1
- 7.2
- 7.3
- 7.4



Nominal	Pitch	Pitch	l_1	l_2	d_2	\square	l_4	No. of	Pack	1677AP	1679
d_1	M	MF	mm	mm	Ø	a	mm	Flutes	Qty		
4	0.70		63	6	0.168	0.131	21	3	1	46204927	—
5	0.80		70	9	0.194	0.152	25	3	1	46204928	—
6	1.00		80	11	0.255	0.191	30	3	1	46204929	1717704
8	1.25		90	12	0.318	0.238	35	3	1	46204930	1717706
8		1.00	90	12	0.318	0.238	35	3	1	46205010	—
10	1.50		100	14	0.381	0.286	39	3	1	46204914	1717710
10		1.25	100	14	0.381	0.286	39	3	1	46204913	1717708
12	1.75		110	16	0.367	0.275		3	1	46204916	1717722
12		1.50	100	16	0.367	0.275		3	1	46204915	1717720
14	2.00		110	18	0.429	0.322		3	1	46204918	1717726
14		1.50	100	18	0.429	0.322		3	1	46204917	1717724
16	2.00		110	19	0.480	0.360		3	1	46204920	1717730
16		1.50	100	19	0.480	0.360		3	1	46204919	1717728
18	2.50		125	21	0.542	0.406		3	1	46204922	1717734
18		1.50	110	21	0.542	0.406		3	1	46204921	1717732
20	2.50		140	21	0.652	0.489		3	1	46204924	1717738
20		1.50	125	21	0.652	0.489		3	1	46204923	1717736
24	3.00		160	26	0.760	0.570		4	1	46204926	1717742
24		2.00	140	26	0.760	0.570		4	1	46204925	1717740

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
 Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24

HIGH PERFORMANCE SPIRAL FLUTE TAPS (48°)



Multi-Application

E007/ E017 Premium substrate for blind hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft and non-ferrous materials.

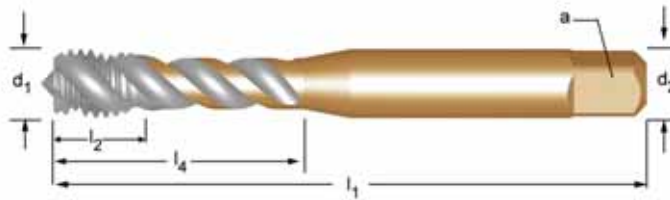
E007 = Metric Coarse, E017 = Metric Fine

1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 7.1 7.2 7.3 7.4

E008/ E018 Premium substrate with Steam Oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

E008 = Metric Coarse, E018 = Metric Fine

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



Nominal d_1	Pitch M	Pitch MF	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	a Inch	No. of Flutes			l_4 Inch	Pack Qty	E007/E017	E008/E018
4	0.70		2.1/8	0.2484	0.1680	0.1310	3	3.30	N30	0.6526	1	0580608	0580707
5	0.80		2.3/8	0.2650	0.1940	0.1520	3	4.20	N19	0.8434	1	0580615	0580714
6	1.00		2.1/2	0.3937	0.2550	0.1910	3	5.00	N9	1.0993	1	0580622	0580721
8	1.25		2.23/32	0.4567	0.3180	0.2380	3	6.80	H	1.3094	1	0580639	0580738
8		1.00	2.23/32	0.4567	0.3180	0.2380	3	7.00	J	1.3094	1	0580998	0581032
10	1.50		2.15/16	0.5315	0.3810	0.2860	3	8.50	Q	1.4415	1	0580646	0580745
10		1.00	2.15/16	0.5315	0.3810	0.2860	3	9.00	T	1.4415	1	0581001	0581049
12	1.75		3.3/8	0.6890	0.3670	0.2750	3	10.30	Y		1	0580653	0580752
14	2.00		3.19/32	0.7087	0.4290	0.3220	3	12.00	15/32		1	0580660	0580769
14		1.50	3.19/32	0.7087	0.4290	0.3220	3	12.50	31/64		1	0581018	0581056
16	2.00		3.13/16	0.7087	0.4800	0.3600	3	14.00	35/64		1	0580677	0580776
18	2.50		4.1/32	0.8858	0.5420	0.4060	3	15.50	39/64		1	0580684	0580783
18		1.50	4.1/32	0.8858	0.5420	0.4060	3	16.50	41/64		1	0581025	0581063
20	2.50		4.15/32	0.8858	0.6520	0.4890	3	17.50	11/16		1	0580691	0580790

TAPS

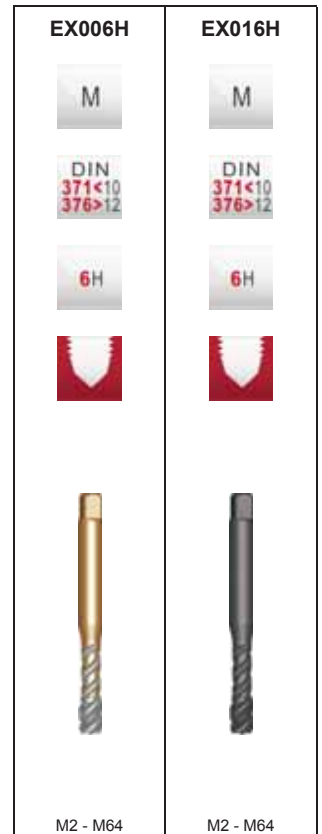
Multi-Application

EX006H Premium substrate for blind hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft and non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 7.1 7.2 7.3 7.4

EX016H Premium substrate with Steam Oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



Nominal d ₁	Pitch M	l ₁ mm	l ₂ mm	d ₂ Ø mm	a mm	l ₃ mm	No. of Flutes	l ₄ mm	Pack Qty	EX006H	EX016H	
2	0.40	45	4	2.8	2.1	5	3	1.6	9	1	0137307 ¹⁾	0137321 ¹⁾
2.5	0.45	50	4	2.8	2.1	5	3	2.05	12.5	1	0137314 ¹⁾	0137338 ¹⁾
3	0.50	56	6	3.5	2.7	6	3	2.5	18	1	0136591	0136942
3.5	0.60	56	7	4.0	3.0	6	3	2.9	20	1	0136607	0136966
4	0.70	63	7	4.5	3.4	6	3	3.3	21	1	0136614	0136973
5	0.80	70	8	6.0	4.9	8	3	4.2	25	1	0136621	0136980
6	1.00	80	10	4.5	3.4	6	3	5		1	0136645	0137000
6	1.00	80	10	6.0	4.9	8	3	5	31	1	0136638	0136997
7	1.00	80	10	7.0	5.5	8	3	6	31	1	0136652	0137017
8	1.25	90	12	8.0	6.2	9	3	6.8	35	1	0136669	0137024
8	1.25	90	13	6.0	4.9	8	3	6.8		1	0136676	0137031
10	1.50	100	15	10.0	8.0	11	3	8.5	39	1	0136683	0137048
10	1.50	100	15	7.0	5.5	8	3	8.5		1	0136690	0137055
12	1.75	110	16	9.0	7.0	10	3	10.3		1	0136706	0137062
14	2.00	110	20	11.0	9.0	12	3	12		1	0136713	0137079
16	2.00	110	20	12.0	9.0	12	4	14		1	0136720	0137086
18	2.50	125	25	14.0	11.0	14	4	15.5		1	0136737 ¹⁾	0137093 ¹⁾
20	2.50	140	25	16.0	12.0	15	4	17.5		1	0136744 ¹⁾	0137109 ¹⁾
22	2.50	140	25	18.0	14.5	17	4	19.5		1	0136829 ¹⁾	0137116 ¹⁾
24	3.00	160	30	18.0	14.5	17	4	21		1	0136836 ¹⁾	0137123 ¹⁾
27	3.00	160	30	20.0	16.0	19	4	24		1	0136843 ¹⁾	0137130 ¹⁾
30	3.50	180	36	22.0	18.0	21	4	26.5		1	0136850 ¹⁾	0137147 ¹⁾
33	3.50	180	36	25.0	20.0	23	4	29.5		1	0136867 ¹⁾	0137154 ¹⁾
36	4.00	200	40	28.0	22.0	25	4	32		1	0136874 ¹⁾	0137161 ¹⁾
39	4.00	200	40	32.0	24.0	27	4	35		1	0136881 ¹⁾	0137178 ¹⁾
42	4.50	200	45	32.0	24.0	27	4	37.5		1	0136898 ¹⁾	0137185 ¹⁾
48	5.00	250	50	36.0	29.0	32	4	43		1	0136904 ¹⁾	0137192 ¹⁾
52	5.00	250	50	40.0	32.0	35	5	47		1	0136911 ¹⁾	0137208 ¹⁾
56	5.50	250	55	40.0	32.0	35	5	50.5		1	0136928 ¹⁾	0137215 ¹⁾
64	6.00	315	60	50.0	39.0	42	6	58		1	0136935 ¹⁾	0137222 ¹⁾

Note: DIN shank and square dimensions will necessitate metric holders

¹⁾ Steel HSCo

HIGH PERFORMANCE SPIRAL FLUTE TAPS (45°)



Multi-Application

EX10 Premium substrate for blind hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft and non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 7.1 7.2 7.3 7.4

EX11 Premium substrate with Steam Oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



Nominal d ₁	Pitch MF	l ₁ mm	l ₂ mm	d ₂ Ø mm	□ a mm	l ₃ mm	No. of Flutes		Pack Qty	EX10	EX11
4	0.50	63	7	2.8	2.1	5	3	3.5	1	0149669	0149966
5	0.50	70	8	3.5	2.7	6	3	4.5	1	0149676	0149973
6	0.75	80	10	4.5	3.4	6	3	5.3	1	0149683	0149980
8	0.75	80	13	6.0	4.9	8	3	7.3	1	0149690	0149997
8	1.00	90	13	6.0	4.9	8	3	7	1	0149706	0150009
10	0.75	90	13	7.0	5.5	8	3	9.3	1	0149713	0150016
10	1.00	90	13	7.0	5.5	8	3	9	1	0149720	0150023
10	1.25	100	15	7.0	5.5	8	3	8.8	1	0149737	0150030
12	1.00	100	15	9.0	7.0	10	3	11	1	0149744	0150047
12	1.25	100	15	9.0	7.0	10	3	10.8	1	0149751	0150054
12	1.50	100	15	9.0	7.0	10	3	10.5	1	0149768	0150061
14	1.00	100	15	11.0	9.0	12	3	13	1	0149775	0150078
14	1.25	100	15	11.0	9.0	12	3	12.8	1	0149782	0150085
14	1.50	100	15	11.0	9.0	12	3	12.5	1	0149799	0150092
16	1.00	100	15	12.0	9.0	12	4	15	1	0149805	0150108
16	1.50	100	15	12.0	9.0	12	4	14.5	1	0149812	0150115
18	1.00	110	17	14.0	11.0	14	4	17	1	0149829 ¹⁾	0150122 ¹⁾
18	1.50	110	17	14.0	11.0	14	4	16.5	1	0149836 ¹⁾	0150139 ¹⁾
20	1.00	125	17	16.0	12.0	15	4	19	1	0149843 ¹⁾	0150146 ¹⁾
20	1.50	125	17	16.0	12.0	15	4	18.5	1	0149850 ¹⁾	0150153 ¹⁾
22	1.50	125	17	18.0	14.5	17	4	20.5	1	0149867 ¹⁾	0150160 ¹⁾
24	1.50	140	20	18.0	14.5	17	4	22.5	1	0149874 ¹⁾	0150177 ¹⁾
24	2.00	140	20	18.0	14.5	17	4	22	1	0149881 ¹⁾	0150184 ¹⁾
25	1.50	140	20	18.0	14.5	17	4	23.5	1	0149898 ¹⁾	0150191 ¹⁾
26	1.50	140	20	18.0	14.5	17	4	24.5	1	0149904 ¹⁾	0150207 ¹⁾
27	1.50	140	20	20.0	16.0	19	4	25.5	1	0149911 ¹⁾	0150214 ¹⁾
27	2.00	140	20	20.0	16.0	19	4	25	1	0149928 ¹⁾	0150221 ¹⁾
28	1.50	140	20	20.0	16.0	19	4	26.5	1	0149935 ¹⁾	0150238 ¹⁾
30	1.50	150	20	22.0	18.0	21	4	28.5	1	0149942 ¹⁾	0150245 ¹⁾
30	2.00	150	20	22.0	18.0	21	4	28	1	0149959 ¹⁾	0150252 ¹⁾

Note: DIN shank and square dimensions will necessitate metric holders

¹⁾ Steel HSCo

Multi-Application

E002/ E012

Premium substrate for blind hole tapping in tough or abrasive materials. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft and non-ferrous materials.

E002 = Metric Coarse, E012 = Metric Fine

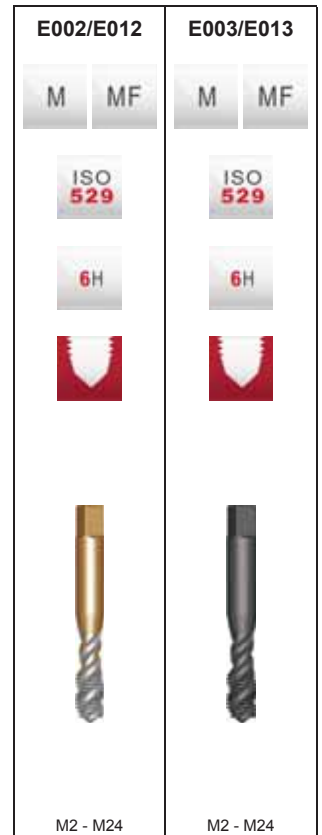
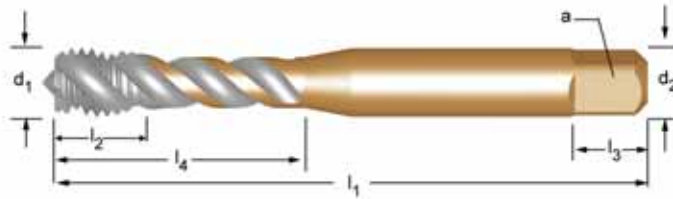
1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 7.1 7.2 7.3 7.4

E003/ E013

Premium substrate with Steam Oxide surface treatment reduces wear and prevents chip welding in abrasive or harder ferrous materials.

E003 = Metric Coarse, E013 = Metric Fine

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



Nominal d ₁	Pitch M	Pitch MF	l ₁ mm	l ₂ mm	d ₂ Ø mm	a mm	l ₃ mm	No. of Flutes	Flute Width mm	l ₄ mm	Pack Qty	E002/E012	E003/E013
2	0.40		41	8	2.50	2.00	4	3	1.6	8	1	0168820	0168844
2.5	0.45		44.5	9.5	2.80	2.24	5	3	2.05	9.5	1	0168837	0168851
3	0.50		48	6	3.15	2.50	5	3	2.5	12.5	1	0567869	0568002
3.5	0.60		50	16	3.55	2.80	5	3	2.9	16	1	0567876	0568019
4	0.70		53	7	4.00	3.15	6	3	3.3	19	1	0567883	0568026
4		0.50	53	7	4.0	3.15	6	3	3.5	19	1	0568620	0568798
5	0.80		58	8	5.00	4.00	7	3	4.2	22	1	0567890	0568033
5		0.50	58	8	5.0	4.0	7	3	4.5	22	1	0568637	0568804
6	1.00		66	10	6.30	5.00	8	3	5.0	27	1	0567906	0568040
6		0.50	66	10	6.3	5.0	8	3	5.5	27	1	0568644	0568811
6		0.75	66	10	6.3	5.0	8	3	5.3	27	1	0568651	0568828
7	1.00		66	13	7.10	5.60	8	3	6	26	1	0636190	0636206
8	1.25		72	12	8.00	6.30	9	3	6.8	31	1	0567913	0568057
8		0.75	72	12	8.0	6.3	9	3	7.3	31	1	0568668	0568835
8		1.00	72	12	8.0	6.3	9	3	7.0	31	1	0568675	0568842
10	1.50		80	15	10.00	8.00	11	3	8.5	35	1	0567920	0568064
10		1.00	80	15	10.0	8.0	11	3	9.0	35	1	0568682	0568859
10		1.25	80	15	10.0	8.0	11	3	8.8	35	1	0568699	0568866
12	1.75		89	16	9.00	7.10	10	3	10.3		1	0567937	0568071
12		1.00	89	16	9.0	7.1	10	3	11.0		1	0568705	0568873
12		1.25	89	16	9.0	7.1	10	3	10.8		1	0568712	0568880
12		1.50	89	16	9.0	7.1	10	3	10.5		1	0568729	0568897
14	2.00		95	18	11.20	9.00	12	3	12.0		1	0567944	0568088
14		1.50	95	18	11.2	9.0	12	3	12.5		1	0568736	0568903
16	2.00		102	18	12.50	10.00	13	4	14.0		1	0567951	0568095
16		1.00	102	18	12.5	10.0	13	4	15.0		1	0568743	0568910
16		1.50	102	18	12.5	10.0	13	4	14.5		1	0568750	0568927
18	2.50		112	29	14.00	11.20	14	4	15.5		1	0567968	0568101
18		1.50	112	29	14.0	11.2	14	4	16.5		1	0568767	0568934
20	2.50		112	29	14.00	11.20	14	4	17.5		1	0567975	0568118
20		1.50	112	29	14.0	11.2	14	4	18.5		1	0568774	0568941
22	2.50		118	29	16.00	12.50	16	4	19.5		1	0567982	0568125
22		1.50	118	29	16.0	12.5	16	4	20.5		1	0568781	0568958
24	3.00		130	35	18.00	14.00	18	4	21.0		1	0567999	0568132

Note: ISO shank and square dimensions will necessitate metric holders

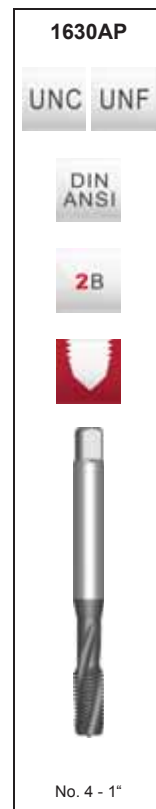
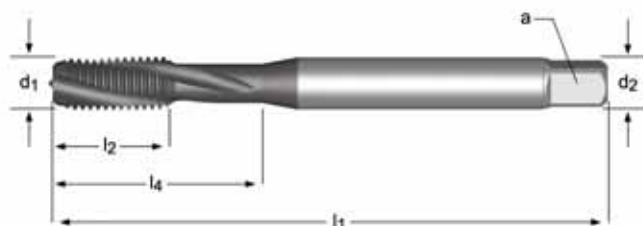
HIGH PERFORMANCE SPIRAL FLUTE TAP (16°-19°) **UNION BUTTERFIELD**

HMD Hard Materials / Cast Iron

APPLIX

1630AP Designed for blind hole tapping materials with a hardness of >38 Rc. Premium substrate provides superior abrasion resistance and edge strength. TiAlN-Top coating lowers the coefficient of friction, improves thread quality, affords higher operating speeds, and longer tool life.

1.5 1.6 2.4 3.1 3.2 3.3 3.4 4.3 5.3 6.4



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch	□ a Inch	l ₄ Inch	No. of Flutes	Pack Qty	1630AP
4	40		2.205	0.236	0.141	0.110	.709	2	1	46204818
6	32		2.205	0.236	0.141	0.110	.787	2	1	46204823
8	32		2.480	0.236	0.168	0.131	.827	2	1	46204828
10	24		2.756	0.354	0.194	0.152	.984	3	1	46204810
10		32	2.756	0.354	0.194	0.152	.984	3	1	46204811
1/4	20		3.150	0.433	0.255	0.191	1.181	3	1	46204808
1/4		28	3.150	0.433	0.255	0.191	1.181	3	1	46204809
5/16	18		3.543	0.472	0.318	0.238	1.378	3	1	46204819
5/16		24	3.543	0.472	0.318	0.238	1.378	3	1	46204820
3/8	16		3.937	0.551	0.381	0.286	1.535	3	1	46204816
3/8		24	3.937	0.551	0.381	0.286	1.535	3	1	46204817
7/16	14		3.937	0.591	0.323	0.242		3	1	46204824
7/16		20	3.937	0.591	0.323	0.242		3	1	46204825
1/2	13		4.331	0.630	0.367	0.275		3	1	46204806
1/2		20	3.937	0.630	0.367	0.275		3	1	46204807
5/8	11		4.331	0.745	0.480	0.360		4	1	46204821
5/8		18	3.937	0.745	0.480	0.360		4	1	46204822
3/4	10		4.921	0.820	0.590	0.442		4	1	46204814
3/4		16	4.331	0.820	0.590	0.442		4	1	46204815
7/8	9		5.512	0.910	0.697	0.523		4	1	46204827
7/8		14	4.921	0.910	0.697	0.523		4	1	46204826
1"	8		6.299	1.025	0.800	0.600		4	1	46204813
1"		12	5.512	1.025	0.800	0.600		4	1	46204812

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
 Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24

UNION BUTTERFIELD HIGH PERFORMANCE SPIRAL FLUTE TAP (16°-19°)

HMD Hard Materials / Cast Iron



1660AP Designed for blind hole tapping materials with a hardness of >38 Rc. Premium substrate provides superior abrasion resistance and edge strength. TiAlN-Top coating lowers the coefficient of friction, improves thread quality, affords higher operating speeds, and longer tool life.

1.5 1.6 2.4 3.1 3.2 3.3 3.4 4.3 5.3 6.4



1660AP

M
MF

DIN
ANSI

6H

M3 - M12

Nominal d ₁	Pitch M	Pitch MF	l ₁ mm	l ₂ mm	d ₂ Ø Inch	∟ a Inch	l ₄ mm	No. of Flutes	Pack Qty	1660AP
3	0.50		49	8	0.141	0.110	18	2	1	46204841
4	0.70		63	6	0.168	0.131	21	2	1	46204842
5	0.80		70	9	0.194	0.152	25	3	1	46204843
6	1.00		80	11	0.255	0.191	30	3	1	46204844
8	1.25		90	12	0.318	0.238	35	3	1	46204846
8		1.00	90	12	0.318	0.238	35	3	1	46204845
10	1.50		100	14	0.381	0.286	39	3	1	46204838
10		1.25	100	14	0.381	0.286	39	3	1	46205006
12	1.75		110	16	0.367	0.275		3	1	46204840
12		1.25	100	16	0.367	0.275		3	1	46205007
12		1.50	100	16	0.367	0.275		3	1	46204839

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
 Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24

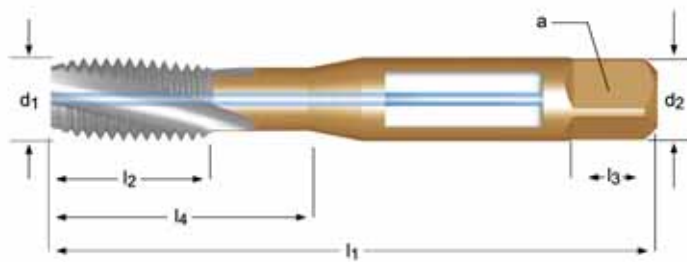
HIGH PERFORMANCE SPIRAL FLUTE TAPS (15°)




Multi-Application (Internal Coolant)

E044 Coolant feeding taps allow for higher tapping speeds in most materials up to 36 RC, also eliminating any problems associated with inadequate coolant in horizontal or deep hole applications. Maintains a lower cutting edge temperature during tapping which preserves cutting edge strength and lowers abrasion. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials. For tapping blind holes.

1.1 1.2 1.3 1.4 1.5 1.6 4.2 5.2



Nominal d_1	Pitch M	l_1 mm	l_2 mm	d_2 \varnothing mm	\square a mm	l_3 mm	No. of Flutes		l_4 mm	Pack Qty	E044
8	1.25	72	17	8.00	6.30	8	3	6.8	32	1	0605745
10	1.50	80	20	10.00	8.00	9	3	8.5	36	1	0605752
12	1.75	89	22	9.00	7.10	10	3	10.3		1	0605769
16	2.00	102	24	12.50	10.00	13	4	14		1	0605776
20	2.50	112	29	14.00	11.20	14	4	17.5		1	0605783

Note: ISO shank and square dimensions will necessitate metric holders

TAPS

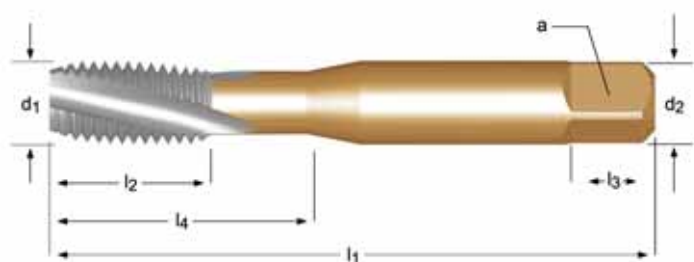


HIGH PERFORMANCE SPIRAL FLUTE TAPS (15°)

For Aluminum

E052 Designed primarily for use in aluminum. Bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials. For tapping blind holes.

1.1 1.2 1.3 1.4 1.5 6.1 6.2 6.3 7.1 7.2 7.3 7.4



Nominal d ₁	Pitch M	l ₁ mm	l ₂ mm	d ₂ ∅ mm	□ a mm	l ₃ mm	No. of Flutes		l ₄ mm	Pack Qty	E052
3	0.50	48	12.5	3.15	2.50	5	3	2.5	12.5	1	0606391
4	0.70	53	14	4.00	3.15	6	3	3.3	14	1	0606407
5	0.80	58	11	5.00	4.00	7	3	4.2	22	1	0606414
6	1.00	66	13	6.30	5.00	8	3	5	26	1	0606421
8	1.25	72	16	8.00	6.30	9	3	6.8	29	1	0606438
10	1.50	80	18	10.00	8.00	11	3	8.5	34	1	0606445
12	1.75	89	22	9.00	7.10	10	3	10.3		1	0606452
16	2.00	102	24	12.50	10.00	13	4	14		1	0606469

Note: ISO shank and square dimensions will necessitate metric holders

HIGH PERFORMANCE THREAD FORMING TAPS



Multi-Application / Lube Grooves

1641 Premium PM substrate provides superior abrasion resistance and edge strength. Multiple Lube Groove design assures lubrication in the forming zone and eliminates the build up of hydraulic pressure in blind holes. TiN coated for enhanced performance. The hard, smooth coating provides a greater lubricity, increases tool life, and improves thread flank finish.

The entry taper is bottoming style for blind hole tapping.



1641

UNC
UNF

ANSI

2B
3B

4 - 1/2

Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	Neck Length Inch	l ₃ Inch	d ₂ Ø Inch	□ a Inch	Limit	1641
4	40		1.7/8	5/16	1/4	3/16	0.141	0.110	H3	1712221
4	40		1.7/8	5/16	1/4	3/16	0.141	0.110	H5	1712223
5	40		1.15/16	5/16	5/16	3/16	0.141	0.110	H3	1712227
5	40		1.15/16	5/16	5/16	3/16	0.141	0.110	H5	1712229
6	32		2	3/8	5/16	3/16	0.141	0.110	H3	1712233
6	32		2	3/8	5/16	3/16	0.141	0.110	H5	1712235
8	32		2.1/8	3/8	3/8	1/4	0.141	0.110	H3	1712239
8	32		2.1/8	3/8	3/8	1/4	0.141	0.110	H5	1712241
8		36	2.1/8	3/8	3/8	1/4	0.141	0.110	H3	1712245
8		36	2.1/8	3/8	3/8	1/4	0.141	0.110	H5	1712247
10	24		2.3/8	1/2	3/8	1/4	0.194	0.152	H4	1712252
10	24		2.3/8	1/2	3/8	1/4	0.194	0.152	H6	1712254
10		32	2.3/8	1/2	3/8	1/4	0.194	0.152	H4	1712258
10		32	2.3/8	1/2	3/8	1/4	0.194	0.152	H6	1712260
1/4	20		2.1/2	5/8	3/8	5/16	0.255	0.191	H4	1712264
1/4	20		2.1/2	5/8	3/8	5/16	0.255	0.191	H6	1712266
1/4		28	2.1/2	5/8	3/8	5/16	0.255	0.191	H4	1712270
1/4		28	2.1/2	5/8	3/8	5/16	0.255	0.191	H6	1712272
5/16	18		2.23/32	11/16	7/16	3/8	0.318	0.238	H5	1712277
5/16	18		2.23/32	11/16	7/16	3/8	0.318	0.238	H7	1712279
5/16		24	2.23/32	11/16	7/16	3/8	0.318	0.238	H5	1712283
5/16		24	2.23/32	11/16	7/16	3/8	0.318	0.238	H7	1712285
3/8	16		2.15/16	3/4	1/2	7/16	0.381	0.286	H5	1712289
3/8	16		2.15/16	3/4	1/2	7/16	0.381	0.286	H7	1712291
3/8		24	2.15/16	3/4	1/2	7/16	0.381	0.286	H5	1712295
3/8		24	2.15/16	3/4	1/2	7/16	0.381	0.286	H7	1712297
7/16	14		2.23/32	11/16	7/16	3/8	0.318	0.238	H5	1712313
7/16	14		2.23/32	11/16	7/16	3/8	0.318	0.238	H8	1712316
7/16		20	3.5/32	7/8	9/16	13/32	0.323	0.242	H5	1712320

Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	Neck Length Inch	l ₃ Inch	d ₂ ∅ Inch	□ a Inch	Limit	1641
7/16		20	3.5/32	7/8	9/16	13/32	0.323	0.242	H8	1712322
1/2	13		3.3/8	15/16	23/32	7/16	0.367	0.275	H5	1712301
1/2	13		3.3/8	15/16	23/32	7/16	0.367	0.275	H8	1712304
1/2		20	3.3/8	15/16	23/32	7/16	0.367	0.275	H5	1712307
1/2		20	3.3/8	15/16	23/32	7/16	0.367	0.275	H8	1712310

HIGH PERFORMANCE THREAD FORMING TAPS UNION BUTTERFIELD

Multi-Application / Lube Grooves

1671 Premium PM substrate provides superior abrasion resistance and edge strength. Multiple Lube Groove design assures lubrication in the forming zone and eliminates the build up of hydraulic pressure in blind holes. TiN coated for enhanced performance. The hard, smooth coating provides a greater lubricity, increases tool life, and improves thread flank finish.

The entry taper is bottoming style for blind hole tapping.



1671

M

ANSI

6H



M3 - M12

Nominal d_1	Pitch M	l_1 Inch	l_2 Inch	Neck Length Inch	l_3 Inch	d_2 Ø Inch	\square a Inch	Limit	1671
3	0.50	1.15/16	5/16	3/16	3/16	0.141	0.110	D5	1713051
4	0.70	2.1/8	3/8	3/8	1/4	0.168	0.131	D6	1713052
5	0.80	2.3/8	1/2	3/8	1/4	0.194	0.152	D7	1713053
6	1.00	2.1/2	5/8	3/8	5/16	0.255	0.191	D8	1713054
8	1.00	2.23/32	11/16	7/16	3/8	0.318	0.238	D9	1713055
8	1.25	2.23/32	11/16	7/16	3/8	0.318	0.238	D9	1713056
10	1.50	2.15/16	3/4	1/2	7/16	0.381	0.286	D10	1713057
12	1.50	3.3/8	15/16	23/32	7/16	0.367	0.275	D11	1713058
12	1.75	3.3/8	15/16	23/32	7/16	0.367	0.275	D11	1713059

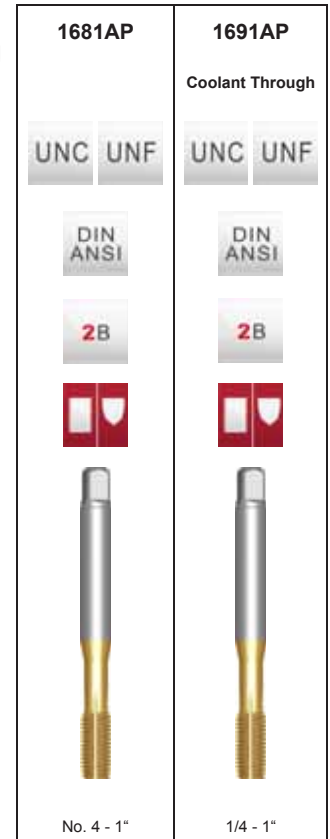
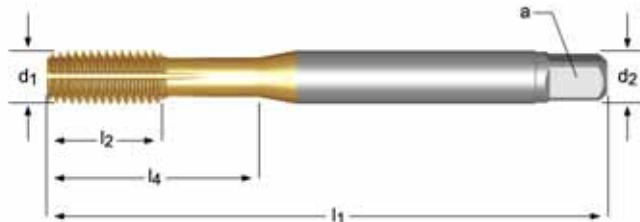
MXR Multi-Application / Lube Grooves



1681AP Premium PM substrate provides superior abrasion resistance and edge strength. Multiple Lube Groove design assures lubrication in the forming zone and eliminates the build up of hydraulic pressure in blind holes. The TiN-Top coating process reduces friction, prevents chip welding and improves chip flow. Features a semi-bottoming lead for improved performance and longer tool life. Can be used for either through or blind holes.

1691AP Coolant thru premium PM substrate allows higher tapping speeds in soft ferrous or non-ferrous materials. The TiN-Top coating process reduces friction, prevents chip welding and improves chip flow.

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3 4.1 5.1 6.1 6.2 6.3 7.1 7.2 7.3



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch	a Inch	l ₄ Inch	Pack Qty	1681AP	1691AP
4	40		2.205	0.433	0.141	0.110	.709	1	46204945	—
6	32		2.205	0.472	0.141	0.110	.787	1	46204950	—
8	32		2.480	0.512	0.168	0.131	.827	1	46204955	—
10	24		2.756	0.591	0.194	0.152	.984	1	46204937	—
10		32	2.756	0.512	0.194	0.152	.984	1	46204938	—
1/4	20		3.150	0.669	0.255	0.191	1.181	1	46204935	46204976
1/4		28	3.150	0.669	0.255	0.191	1.181	1	46204936	46204977
5/16	18		3.546	0.787	0.318	0.238	1.378	1	46204946	46204984
5/16		24	3.543	0.669	0.318	0.238	1.378	1	46204947	46204985
3/8	16		3.937	0.866	0.381	0.286	1.535	1	46204943	46204982
3/8		24	3.937	0.709	0.381	0.286	1.535	1	46204944	46204983
7/16	14		3.937	0.866	0.323	0.242		1	46204951	46204988
7/16		20	3.937	0.866	0.323	0.242		1	46204952	46204989
1/2	13		4.331	0.984	0.367	0.275		1	46204933	46204974
1/2		20	3.937	0.866	0.397	0.275		1	46204934	46204975
5/8	11		4.331	1.063	0.480	0.360		1	46204948	46204986
5/8		18	3.937	0.866	0.480	0.360		1	46204949	46204987
3/4	10		4.921	1.181	0.590	0.442		1	46204941	46204980
3/4		16	4.331	0.984	0.590	0.442		1	46204942	46204981
7/8	9		5.512	1.260	0.697	0.523		1	46204954	—
7/8		14	4.921	1.024	0.697	0.523		1	46204953	—
1"	8		6.299	1.417	0.800	0.600		1	46204940	46204979
1"		12	5.512	1.102	0.800	0.600		1	46204939	46204978

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24

HIGH PERFORMANCE THREAD FORMING TAPS UNION BUTTERFIELD

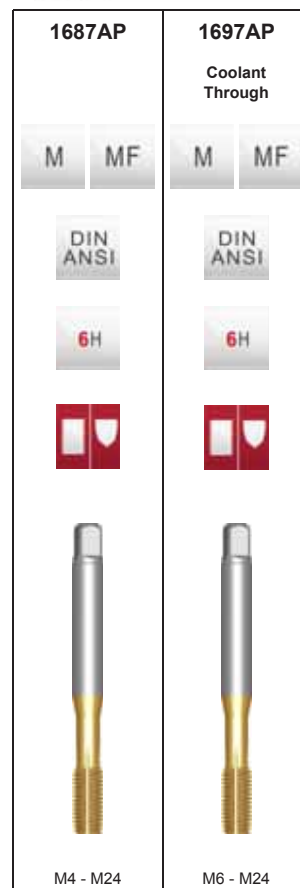
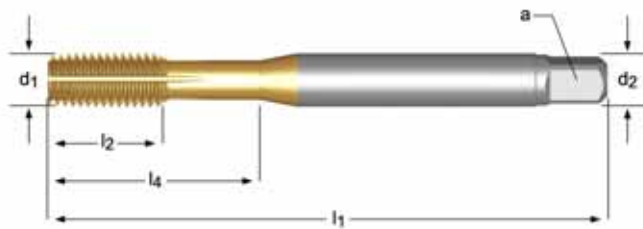
MXR Multi-Application / Lube Grooves

APPLIX

1687AP Premium PM substrate provides superior abrasion resistance and edge strength. Multiple Lube Groove design assures lubrication in the forming zone and eliminates the build up of hydraulic pressure in blind holes. The TiN-Top coating process reduces friction, prevents chip welding and improves chip flow. Features a semi-bottoming lead for improved performance and longer tool life. Can be used for through or blind holes.

1697AP Coolant thru premium PM substrate allows higher tapping speeds in soft ferrous or non-ferrous materials. The TiN-Top coating process reduces friction, prevents chip welding and improves chip flow.

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3 4.1 5.1 6.1 6.2 6.3 7.1 7.2 7.3



Nominal d ₁	Pitch M	Pitch MF	l ₁ mm	l ₂ mm	d ₂ Ø Inch	∠ a Inch	l ₄ mm	Pack Qty	1687AP	1697AP
4	0.70		63	13	0.168	0.131	21	1	46204970	—
5	0.80		70	15	0.194	0.152	25	1	46204971	—
6	1.00		80	17	0.255	0.191	30	1	46204972	46205004
8	1.25		90	20	0.318	0.238	35	1	46204973	46205005
10	1.50		100	22	0.381	0.286	39	1	46204957	46204991
10		1.25	100	16	0.381	0.286	39	1	46204956	46204990
12	1.75		110	24	0.367	0.275		1	46204959	46204993
12		1.50	100	22	0.367	0.275		1	46204958	46204992
14	2.00		110	26	0.429	0.322		1	46204961	46204995
14		1.50	100	22	0.429	0.322		1	46204960	46204994
16	2.00		110	27	0.480	0.360		1	46204963	46204997
16		1.50	100	22	0.480	0.360		1	46204962	46204996
18	2.50		125	30	0.542	0.406		1	46204965	46204999
18		1.50	110	25	0.542	0.406		1	46204964	46204998
20	2.50		140	32	0.652	0.489		1	46204967	46205001
20		1.50	125	25	0.652	0.489		1	46204966	46205000
24	3.00		160	34	0.760	0.570		1	46204969	46205003
24		2.00	140	27	0.760	0.570		1	46204968	46205002

Reinforced Shanks: Sizes No.4 thru 3/8 or M4 thru M10
Reduced Shanks: Sizes 7/16 thru 1" or M12 thru M24



HIGH PERFORMANCE PIPE TAPS, STRAIGHT FLUTE

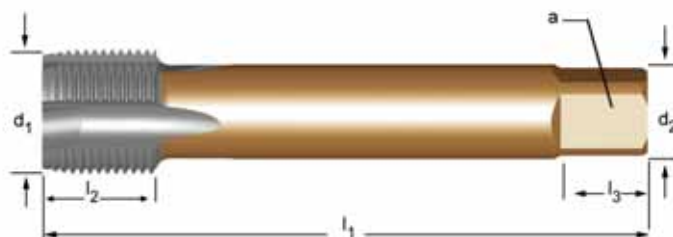
Parallel Thread, G (BSP)

EP40 Bronze oxide body and shank reduces rust and corrosion.
Bright flutes improve chip flow in soft or non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 5.1 5.2 6.1
6.2 6.3 7.1 7.2 7.3 7.4 8.1

EP41 Steam oxide surface treatment reduces wear and chip welding in abrasive or harder ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4



Nominal d_1	TPI	l_1 mm	l_2 mm	d_2 Ø mm	\square a mm	l_3 mm	No. of Flutes		Pack Qty	EP40	EP41
1/8	28	90	18	7	5.5	8	3	8.8	1	0138588	0138663
1/4	19	100	21	11	9.0	12	3	11.8	1	0138595	0138670
3/8	19	100	21	12	9.0	12	4	15.25	1	0138601	0138687
1/2	14	125	24	16	12.0	15	4	19	1	0138618	0138694
5/8	14	125	24	18	14.5	17	4	21	1	0138625	0138700
3/4	14	140	28	20	16.0	19	4	24.5	1	0138632	0147054
7/8	14	150	28	22	18.0	21	4	28.25	1	0138649	0149645
1"	11	160	30	25	20.0	23	4	30.75	1	0138656	0149652

Note: DIN shank and square dimensions will necessitate metric holders

HIGH PERFORMANCE PIPE TAPS, STRAIGHT FLUTE

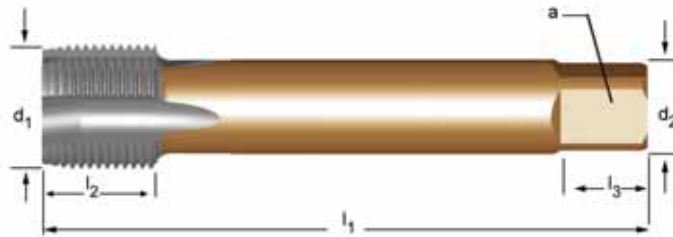
Parallel Thread, G(BSP)


E040 Bronze oxide body and shank reduces rust and corrosion. Bright flutes improve chip flow in soft or non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 5.1 5.2 6.1
6.2 6.3 7.1 7.2 7.3 7.4 8.1

E041 Steam oxide surface treatment reduces wear and chip welding in abrasive or harder ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4



Nominal d_1	TPI	l_1 mm	l_2 mm	d_2 Ø mm	a mm	l_3 mm	No. of Flutes		Pack Qty	E040	E041
1/8	28	90	15	8	6.3	9	3	8.80	1	0569764	0569818
1/4	19	100	19	10	8	11	3	11.80	1	0569771	0569825
3/8	19	100	21	12.5	10	13	3	15.25	1	0569788	0569832
1/2	14	125	26	16	12.5	16	4	19.00	1	0569795	0569849
3/4	14	140	28	20	16	20	4	24.50	1	0569801	0569856

Note: ISO shank and square dimensions will necessitate metric holders



HIGH PERFORMANCE PIPE TAPS, SPIRAL FLUTE

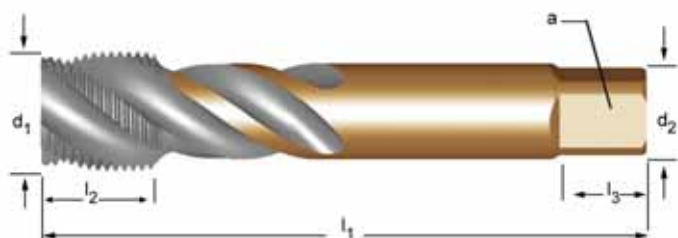
Parallel Thread, G(BSP)

EX40 Bronze oxide body and shank reduces rust and corrosion.
Bright flutes improve chip flow in soft or non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 7.1 7.2 7.3 7.4 8.1

EX41 Steam oxide surface treatment reduces wear and chip welding in abrasive or harder ferrous materials.

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



Nominal d_1	TPI	l_1 mm	l_2 mm	d_2 \emptyset mm	\square a mm	l_3 mm	No. of Flutes		Pack Qty	EX40	EX41
1/8	28	90	13	7	5.5	8	3	8.8	1	0168547	0168653
1/4	19	100	15	11	9.0	12	3	11.8	1	0168554	0168660
3/8	19	100	15	12	9.0	12	4	15.25	1	0168561	0168677
1/2	14	125	18	16	12.0	15	4	19	1	0168578	0168684
5/8	14	125	18	18	14.5	17	4	21	1	0168585	0168691
3/4	14	140	20	20	16.0	19	4	24.5	1	0168592	0168707
7/8	14	150	20	22	18.0	21	4	28.25	1	0168608	0168714
1"	11	160	22	25	20.0	23	4	30.75	1	0168615	0168721
1.1/8	11	170	22	28	22.0	25	4	35	1	0168622	0168738
1.1/4	11	170	22	32	24.0	27	4	39.5	1	0168639	0168745
1.1/2	11	190	23	36	29.0	32	4	45	1	0168646	0168752

Note: DIN shank and square dimensions will necessitate metric holders

HIGH PERFORMANCE PIPE TAPS, SPIRAL FLUTE



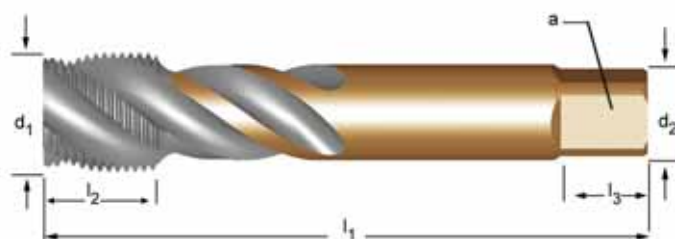
Parallel Thread, G(BSP)

E042 Bronze oxide body and shank reduces rust and corrosion. Bright flutes improve chip flow in soft or non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 7.1 7.2 7.3 7.4 8.1

E043 Steam oxide surface treatment reduces wear and chip welding in abrasive or harder ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3



Nominal d ₁	TPI	l ₁ mm	l ₂ mm	d ₂ Ø mm	□ a mm	l ₃ mm	No. of Flutes	↔	Pack Qty	E042	E043
1/8	28	90	15	8	6.3	9	3	8.80	1	0569863	0569917
1/4	19	100	19	10	8	11	3	11.80	1	0569870	0569924
3/8	19	100	21	12.5	10	13	4	15.25	1	0569887	0569931
1/2	14	125	26	16	12.5	16	4	19.00	1	0569894	0569948
3/4	14	140	28	20	16	20	4	24.50	1	0569900	0569955

Note: ISO shank and square dimensions will necessitate metric holders

General Purpose

1500/1528 The most versatile taps for hand use or machine tapping in a wide variety of materials in through or blind hole applications. Available in 3 chamfer lengths - taper, plug, and bottoming.

Taper - 7-10 pitch chamfer length

Plug - 3-5 pitch chamfer length

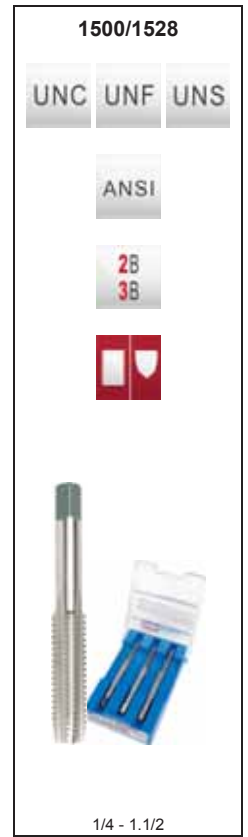
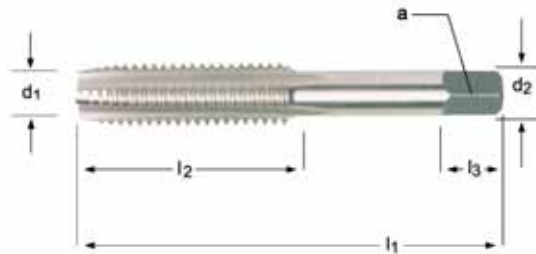
Bottoming - 1-2 pitch chamfer length

1500- Fractional sizes

1528- Machine screw sizes

Sets include 1 of each tap (Taper, Plug, and Bottoming)

Sizes in bold font indicate the most commonly used 'H' Limit for that size.



1/4 - 1.1/2

Nominal d ₁	TPI UNC	TPI UNF	TPI UNS	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	∠ a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Taper	Plug	Bottoming	Sets
0		80		1.5/8	5/16	0.1410	0.1100	3/16	2	H1	1	1010593	1010594	1010596	1010999
0		80		1.5/8	5/16	0.1410	0.1100	3/16	2	H2	1	—	1010595	1010597	—
1	64			1.11/16	3/8	0.1410	0.1100	3/16	2	H1	1	1010598	1010599	1010601	1011000
1	64			1.11/16	3/8	0.1410	0.1100	3/16	2	H2	1	—	1010600	—	—
1		72		1.11/16	3/8	0.1410	0.1100	3/16	2	H1	1	1010603	1010604	1010606	1011001
1		72		1.11/16	3/8	0.1410	0.1100	3/16	2	H2	1	—	1010605	1010607	—
2	56			1.3/4	7/16	0.1410	0.1100	3/16	2	H1	1	—	1010614	—	—
2	56			1.3/4	7/16	0.1410	0.1100	3/16	2	H2	1	—	1010615	1010617	—
2	56			1.3/4	7/16	0.1410	0.1100	3/16	3	H1	1	1010608	1010610	1010612	—
2	56			1.3/4	7/16	0.1410	0.1100	3/16	3	H2	1	1010609	1010611	1010613	1011003
2		64		1.3/4	7/16	0.1410	0.1100	3/16	3	H2	1	1010618	1010620	1010621	1011073
3	48			1.13/16	1/2	0.1410	0.1100	3/16	2	H2	1	—	1010631	—	—
3	48			1.13/16	1/2	0.1410	0.1100	3/16	3	H1	1	—	1010626	—	—
3	48			1.13/16	1/2	0.1410	0.1100	3/16	3	H2	1	1010625	1010627	1010629	1011005
3		56		1.13/16	1/2	0.1410	0.1100	3/16	3	H2	1	1010634	1010636	1010637	1011074
4	40			1.7/8	9/16	0.1410	0.1100	3/16	2	H1	1	—	1010649	—	—
4	40			1.7/8	9/16	0.1410	0.1100	3/16	2	H2	1	—	1010650	1010652	—
4	40			1.7/8	9/16	0.1410	0.1100	3/16	3	H1	1	1010643	1010645	1010647	—
4	40			1.7/8	9/16	0.1410	0.1100	3/16	3	H2	1	1010644	1010646	1010648	1011008
4		48		1.7/8	9/16	0.1410	0.1100	3/16	3	H2	1	1010653	1010655	1010656	1011075
4			36	1.7/8	9/16	0.1410	0.1100	3/16	3	H2	1	1010640	1010641	1010642	1011006
5	40			1.15/16	5/8	0.1410	0.1100	3/16	2	H2	1	—	1010666	—	—
5	40			1.15/16	5/8	0.1410	0.1100	3/16	3	H2	1	1010660	1010662	1010664	1011010
5		44		1.15/16	5/8	0.1410	0.1100	3/16	2	H2	1	—	1010673	—	—
5		44		1.15/16	5/8	0.1410	0.1100	3/16	3	H2	1	1010669	1010671	1010672	1011076
6	32			2"	11/16	0.1410	0.1100	3/16	2	H1	1	—	1010684	—	—
6	32			2"	11/16	0.1410	0.1100	3/16	2	H2	1	—	1010685	1010688	—
6	32			2"	11/16	0.1410	0.1100	3/16	2	H3	1	—	1010686	1010689	—
6	32			2"	11/16	0.1410	0.1100	3/16	3	H1	1	1010675	1010678	1010681	—
6	32			2"	11/16	0.1410	0.1100	3/16	3	H2	1	1010676	1010679	1010682	1011012
6	32			2"	11/16	0.1410	0.1100	3/16	3	H3	1	1010677	1010680	1010683	1011013
6		40		2"	11/16	0.1410	0.1100	3/16	2	H2	1	—	1010694	—	—
6		40		2"	11/16	0.1410	0.1100	3/16	3	H2	1	1010690	1010692	1010693	1011014

HAND TAPS



Nominal d ₁	TPI UNC	TPI UNF	TPI UNS	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Taper	Plug	Bottoming	Sets
8	32			2.1/8	3/4	0.1680	0.1310	1/4	2	H2	1	—	1010706	1010709	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	2	H3	1	—	1010707	1010710	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	3	H2	1	—	1010712	1010715	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	3	H3	1	—	1010713	1010716	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	4	H1	1	—	1010699	—	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	4	H2	1	1010697	1010700	1010703	1011016
8	32			2.1/8	3/4	0.1680	0.1310	1/4	4	H3	1	1010698	1010701	1010704	1011017
8		36		2.1/8	3/4	0.1680	0.1310	1/4	4	H2	1	1010717	1010719	1010720	1011018
10	24			2.3/8	7/8	0.1940	0.1520	1/4	2	H2	1	—	1010733	1010736	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	—	1010734	1010737	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	3	H1	1	—	1010738	—	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	3	H2	1	—	1010739	—	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	—	1010740	1010743	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	4	H1	1	—	1010726	—	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	4	H2	1	1010724	1010727	1010730	1011020
10	24			2.3/8	7/8	0.1940	0.1520	1/4	4	H3	1	1010725	1010728	1010731	1011021
10		32		2.3/8	7/8	0.1940	0.1520	1/4	2	H1	1	—	1010753	—	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	2	H2	1	—	1010754	1010757	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	—	1010755	1010758	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	3	H2	1	—	1010760	1010763	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	—	1010761	1010764	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	4	H1	1	—	1010747	—	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	4	H2	1	1010745	1010748	1010751	1011023
10		32		2.3/8	7/8	0.1940	0.1520	1/4	4	H3	1	1010746	1010749	1010752	1011024
12	24			2.3/8	15/16	0.2200	0.1650	9/32	4	H3	1	1010765	1010767	1010768	1011025
12		28		2.3/8	15/16	0.2200	0.1650	9/32	4	H3	1	1010769	1010771	1010772	1011026
1/4	20			2.1/2	1"	0.2550	0.1910	5/16	4	H1	1	1010001	1010004	1010008	—
1/4	20			2.1/2	1"	0.2550	0.1910	5/16	4	H2	1	1010002	1010005	1010009	—
1/4	20			2.1/2	1"	0.2550	0.1910	5/16	4	H3	1	1010003	1010006	1010010	1011029
1/4	20			2.1/2	1"	0.2550	0.1910	5/16	4	H5	1	—	1010007	1010011	—
1/4		28		2.1/2	1"	0.2550	0.1910	5/16	4	H1	1	—	1010015	1010019	—
1/4		28		2.1/2	1"	0.2550	0.1910	5/16	4	H2	1	—	1010016	1010020	—
1/4		28		2.1/2	1"	0.2550	0.1910	5/16	4	H3	1	1010014	1010017	1010021	1011032
1/4		28		2.1/2	1"	0.2550	0.1910	5/16	4	H4	1	—	1010018	1010022	—
5/16	18			2.23/32	1.1/8	0.3180	0.2380	3/8	4	H2	1	1010024	1010027	1010031	—
5/16	18			2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	1	1010025	1010028	1010032	1011035
5/16	18			2.23/32	1.1/8	0.3180	0.2380	3/8	4	H5	1	—	1010029	1010033	—
5/16		24		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H1	1	—	—	1010041	—
5/16		24		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H2	1	—	1010038	1010042	—
5/16		24		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	1	1010036	1010039	1010043	1011038
5/16		24		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H4	1	—	1010040	1010044	—
3/8	16			2.15/16	1.1/4	0.3810	0.2860	7/16	4	H2	1	1010046	1010049	1010053	—
3/8	16			2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	1010047	1010050	1010054	1011041
3/8	16			2.15/16	1.1/4	0.3810	0.2860	7/16	4	H5	1	—	1010051	1010055	—
3/8		24		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H2	1	—	1010060	1010064	—
3/8		24		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	1010058	1010061	1010065	1011044
3/8		24		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H4	1	—	1010062	1010066	—
7/16	14			3.5/32	1.7/16	0.3230	0.2420	13/32	4	H2	1	—	1010069	—	—
7/16	14			3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	1	1010067	1010070	1010074	1011045
7/16	14			3.5/32	1.7/16	0.3230	0.2420	13/32	4	H5	1	—	1010071	1010075	—
7/16		20		3.5/32	1.7/16	0.3230	0.2420	13/32	4	H2	1	—	1010078	—	—
7/16		20		3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	1	1010076	1010079	1010083	1011046
7/16		20		3.5/32	1.7/16	0.3230	0.2420	13/32	4	H5	1	—	1010080	1010084	—
1/2	13			3.3/8	1.21/32	0.3670	0.2750	7/16	4	H2	1	—	1010087	1010091	—
1/2	13			3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	1010085	1010088	1010092	1011047
1/2	13			3.3/8	1.21/32	0.3670	0.2750	7/16	4	H5	1	—	1010089	1010093	—
1/2		20		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H2	1	—	1010096	—	—
1/2		20		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	1010094	1010097	1010101	1011048
1/2		20		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H5	1	—	1010098	1010102	—
9/16	12			3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	1010103	1010106	1010108	1011049
9/16	12			3.19/32	1.21/32	0.4290	0.3220	1/2	4	H5	1	—	1010107	—	—
9/16		18		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H2	1	—	1010112	—	—
9/16		18		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	1010110	1010113	1010116	1011050
9/16		18		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H5	1	—	1010114	1010117	—
5/8	11			3.13/16	1.13/16	0.4800	0.3600	9/16	4	H2	1	—	1010120	—	—
5/8	11			3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	1	1010118	1010121	1010123	1011051

TAPS

HAND TAPS

Nominal d ₁	TPI UNC	TPI UNF	TPI UNS	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	☐ a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Taper	Plug	Bottoming	Sets
5/8	11			3.13/16	1.13/16	0.4800	0.3600	9/16	4	H5	1	—	1010122	1010124	—
5/8		18		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H2	1	—	1010127	—	—
5/8		18		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	1	1010125	1010128	1010131	1011052
5/8		18		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H5	1	—	1010129	1010132	—
11/16			11	4.1/32	1.13/16	0.5420	0.4060	5/8	4	H3	1	1010133	1010134	1010135	1011053
11/16			16	4.1/32	1.13/16	0.5420	0.4060	5/8	4	H3	1	1010136	1010137	1010138	1011054
3/4	10			4.1/4	2"	0.5900	0.4420	11/16	4	H2	1	—	1010141	—	—
3/4	10			4.1/4	2"	0.5900	0.4420	11/16	4	H3	1	1010139	1010142	1010144	1011055
3/4	10			4.1/4	2"	0.5900	0.4420	11/16	4	H5	1	—	1010143	1010145	—
3/4		16		4.1/4	2"	0.5900	0.4420	11/16	4	H2	1	—	1010148	—	—
3/4		16		4.1/4	2"	0.5900	0.4420	11/16	4	H3	1	1010146	1010149	1010152	1011056
3/4		16		4.1/4	2"	0.5900	0.4420	11/16	4	H5	1	—	1010150	1010153	—
7/8	9			4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	1	1010154	1010157	1010159	1011057
7/8	9			4.11/16	2.7/32	0.6970	0.5230	3/4	4	H6	1	—	1010158	—	—
7/8		14		4.11/16	2.7/32	0.6970	0.5230	3/4	4	H2	1	—	1010162	—	—
7/8		14		4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	1	1010160	1010163	1010166	1011058
7/8		14		4.11/16	2.7/32	0.6970	0.5230	3/4	4	H6	1	—	1010164	—	—
1"	8			5.1/8	2.1/2	0.8000	0.6000	13/16	4	H2	1	—	1010169	—	—
1"	8			5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	1	1010167	1010170	1010172	1011059
1"	8			5.1/8	2.1/2	0.8000	0.6000	13/16	4	H6	1	—	1010171	—	—
1"		12		5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	1	1010173	1010174	1010175	1011060
1"		12		5.1/8	2.1/2	0.8000	0.6000	13/16	4	H7	1	—	1013105	—	—
1"			14	5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	1	1010176	1010178	1010181	1011061
1.1/8	7			5.7/16	2.9/16	0.8960	0.6720	7/8	4	H4	1	1010182	1010183	1010184	1011062
1.1/8	7			5.7/16	2.9/16	0.8960	0.6720	7/8	4	H9	1	—	1013131	—	—
1.1/8		12		5.7/16	2.9/16	0.8960	0.6720	7/8	4	H4	1	1010185	1010186	1010187	1011063
1.1/8		12		5.7/16	2.9/16	0.8960	0.6720	7/8	4	H7	1	—	1013141	—	—
1.1/4	7			5.3/4	2.9/16	1.0210	0.7660	1"	4	H4	1	1010188	1010189	1010190	1011064
1.1/4	7			5.3/4	2.9/16	1.0210	0.7660	1"	4	H9	1	—	1013155	—	—
1.1/4		12		5.3/4	2.9/16	1.0210	0.7660	1"	6	H4	1	1010191	1010192	1010193	1011065
1.1/4		12		5.3/4	2.9/16	1.0210	0.7660	1"	4	H8	1	—	1013166	—	—
1.3/8	6			6.1/16	3"	1.1000	0.8310	1.1/16	4	H4	1	1010194	1010195	1010196	1011066
1.3/8	6			6.1/16	3"	1.1000	0.8310	1.1/16	4	H10	1	—	1013180	—	—
1.3/8		12		6.1/16	3"	1.1000	0.8310	1.1/16	6	H4	1	1010197	1010198	1010199	1011067
1.3/8		12		6.1/16	3"	1.1000	0.8310	1.1/16	4	H8	1	—	1013190	—	—
1.1/2	6			6.3/8	3"	1.2300	0.9250	1.1/8	4	H4	1	1010200	1010201	1010202	1011068
1.1/2	6			6.3/8	3"	1.2300	0.9250	1.1/8	4	H10	1	—	1013204	—	—
1.1/2		12		6.3/8	3"	1.2300	0.9250	1.1/8	6	H4	1	1010203	1010204	1010205	1011069
1.1/2		12		6.3/8	3"	1.2300	0.9250	1.1/8	6	H8	1	—	1013214	—	—

TAPS

HAND TAPS

General Purpose

1500A Similar in design to the standard 1500 series, but steam oxide treated to reduce wear and chip welding in harder ferrous materials. Not recommended for non-ferrous applications. For through or blind hole tapping.



1500A

UNC
UNF

ANSI

3B

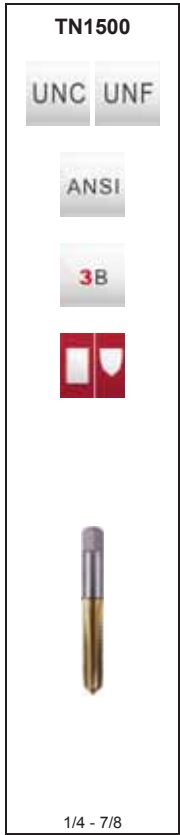
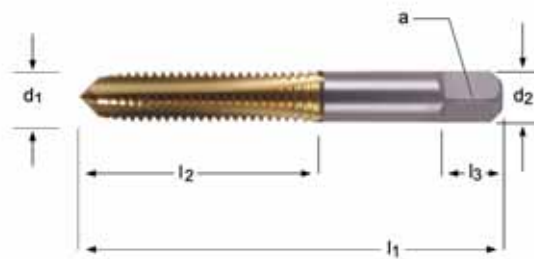
1/4 - 1"

Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	∠ a Inch	l ₃ Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1500A
1/4	20		2.1/2	1.000	0.2550	0.1910	5/16	4	H3	Plug	1	1050006
1/4		28	2.1/2	1.000	0.2550	0.1910	5/16	4	H3	Bottoming	1	1050021
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	1050028
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	1050039
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	1050050
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	1050061
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	1050070
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	1050079
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	1050088
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	1050097
9/16	12		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	Plug	1	1050106
9/16		18	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	Plug	1	1050113
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Plug	1	1050121
5/8		18	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Plug	1	1050128
3/4	10		4.1/4	2"	0.5900	0.4420	11/16	4	H3	Plug	1	1050142
3/4		16	4.1/4	2"	0.5900	0.4420	11/16	4	H3	Plug	1	1050149
7/8	9		4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	Plug	1	1050157
7/8		14	4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	Plug	1	1050163
1"	8		5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	Plug	1	1050170

TAPS

General Purpose

TN1500 Similar in design to the 1500 series but TiN coated for enhanced performance. The hard, smooth finish provides greater lubricity, increases tool life, improves thread flank finish, and allows higher tapping speeds. For through or blind hole tapping.



Nominal d_1	TPI UNC	TPI UNF	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	\square a Inch	l_3 Inch	No. of Flutes	Limits	Chamfer	Pack Qty	TN1500
1/4	20		2.1/2	1.0000	0.2550	0.1910	5/16	4	H3	Plug	1	1060006
1/4		28	2.1/2	1.0000	0.2550	0.1910	5/16	4	H3	Plug	1	1060017
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	1060028
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	1060039
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	1060050
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	1060061
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	1060070
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	1060079
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	1060088
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Bottoming	1	1060092
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	1060097
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Plug	1	1060121
5/8		11	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Bottoming	1	1060123
5/8		18	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Bottoming	1	1060131
3/4	10		4.1/4	2"	0.5900	0.4420	11/16	4	H3	Bottoming	1	1060144
3/4		16	4.1/4	2"	0.5900	0.4420	11/16	4	H3	Bottoming	1	1060152
7/8	9		4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	Plug	1	1060157

HAND TAPS



General Purpose

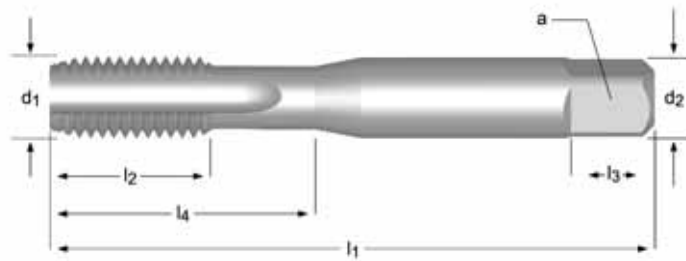
E500 The most versatile taps for hand use or machine tapping in a wide variety of materials in through or blind hole applications. Available in 3 chamfer lengths - taper, plug, and bottoming.

Taper - 7-10 pitch chamfer length

Plug - 3-5 pitch chamfer length

Bottoming - 1-2 pitch chamfer length

Sets include 1 of each tap (Taper, Plug, and Bottoming)



E500




M1 - M56

Note: ISO shank and square dimensions will necessitate metric holders

Nominal d ₁	Pitch M	l ₁ mm	l ₂ mm	d ₂ Ø mm	a mm	l ₃ mm	No. of Flutes	l ₄ mm	Pack Qty	Taper	Plug	Bottoming	Sets	
1	0.25	38	4.5	2.50	2.00	4	2	0.75	4.5	1	0160152	0160169	0122464	0263563
1.2	0.25	38	4.5	2.50	2.00	4	2	0.95	4.5	1	0160176	0160183	0122471	0263556
1.4	0.30	40	6	2.50	2.00	4	2	0.95	6	1	0160190	0160206	0122488	0263570
1.6	0.35	41	8	2.50	2.00	4	2	1.25	8	1	0155035	0139950	0093900	0155028
1.7	0.35	41	8	2.50	2.00	4	2	1.35	8	1	0155004	0093924	0093931	0154991
1.8	0.35	41	8	2.50	2.00	4	2	1.45	8	1	0154960	0093948	0093955	0154953
2	0.40	41	8	2.50	2.00	4	3	1.6	8	1	0094259	0094266	0094273	0154939
2	0.45	41	8	2.50	2.00	4	3	1.55	8	1	0160244	0160251	0160268	—
2.2	0.45	44.5	9.5	2.80	2.24	5	3	1.75	9.5	1	0154915	0094167	0094174	0154908
2.3	0.45	44.5	9.5	2.80	2.24	5	3	1.85	9.5	1	0154885	0094198	0094204	0154878
2.5	0.45	44.5	9.5	2.80	2.24	5	3	2.05	9.5	1	0154854	0094228	0094235	0154847
2.6	0.45	44.5	9.5	2.80	2.24	5	3	2.15	9.5	1	0156735	0156742	0122440	0156759
3	0.50	48	12.5	3.15	2.50	5	3	2.5	12.5	1	0154823	0094440	0094457	0094464
3	0.60	48	12.5	3.15	2.50	5	3	2.4	12.5	1	0159927	0159934	0159941	—
3.5	0.60	50	14	3.55	2.80	5	3	2.9	14	1	0094402	0094419	0094426	0154809
4	0.70	53	14	4.00	3.15	6	3	3.3	14	1	0154786	0094648	0094655	0094662
4	0.75	53	14	4.00	3.15	6	3	3.25	14	1	0160213	0160220	0160237	—
4.5	0.75	53	9.5	4.50	3.55	6	3	3.8	18	1	0154762	0094617	0094624	0154755
5	0.80	58	11	5.00	4.00	7	3	4.2	22	1	0154731	0094761	0094778	0154724
5	0.90	58	11	5.00	4.00	7	3	4.1	22	1	0159958	0159965	0159972	0159989
5.5	0.90	62	12	5.60	4.50	7	3	4.6	21	1	0159996	0160008	0160015	0160022
6	1.00	66	13	6.30	5.00	8	3	5	26	1	0094808	0094815	0094822	0154700
7	1.00	66	13	7.10	5.60	8	3	6	26	1	0154687	0139967	0094846	0094853
8	1.25	72	16	8.00	6.30	9	3	6.8	29	1	0154663	0094877	0094884	0094891
9	1.25	72	16	9.00	7.10	10	3	7.8	29	1	0154649	0152119	0094914	0154632
10	1.50	80	18	10.00	8.00	11	3	8.5	34	1	0153246	0093979	0093986	0154618
11	1.50	85	19	8.00	6.30	9	3	9.5		1	0154595	0094006	0094013	0154588
12	1.75	89	22	9.00	7.10	10	3	10.3		1	0154564	0094037	0094044	0094051
14	2.00	95	24	11.20	9.00	12	4	12		1	0152980	0094075	0094082	0154540
16	2.00	102	24	12.50	10.00	13	4	14		1	0154526	0094105	0094112	0154519
18	2.50	112	29	14.00	11.20	14	4	15.5		1	0154496	0094136	0094143	0154489
20	2.50	112	29	14.00	11.20	14	4	17.5		1	0154465	0150719	0094297	0154458

HAND TAPS

Nominal d ₁	Pitch M	l ₁ mm	l ₂ mm	d ₂ ∅ mm	□ a mm	l ₃ mm	No. of Flutes	 l ₄ mm	Pack Qty	Taper	Plug	Bottoming	Sets
22	2.50	118	29	16.00	12.50	16	4	19.5	1	0154434	0094310	0094327	0154427
24	3.00	130	35	18.00	14.00	18	4	21	1	0154403	0094341	0094358	0154397
27	3.00	135	35	20.00	16.00	20	4	24	1	0154366	0094365	0094372	—
30	3.50	138	41	20.00	16.00	20	4	26.5	1	0154359	0094488	0094495	—
33	3.50	151	41	22.40	18.00	22	4	29.5	1	0154342	0152225	0094525	—
36	4.00	162	47	25.00	20.00	24	4	32	1	0154335	0094549	0094556	—
39	4.00	170	47	28.00	22.40	26	4	35	1	0154328	0152232	0094587	—
42	4.50	170	53	28.00	22.40	26	6	37.5	1	0154311	0152249	0094686	—
45	4.50	187	54	31.50	25.00	28	6	40.5	1	0154304	0152256	0094709	—
48	5.00	187	60	31.50	25.00	28	6	43	1	0154298	0152263	0094730	—
52	5.00	200	60	35.50	28.00	31	6	47	1	0153253	0152270	0094792	—
56	5.50	200	60	35.50	28.00	31	6	50.5	1	—	—	0122457	—

Note: ISO shank and square dimensions will necessitate metric holders

HAND TAPS

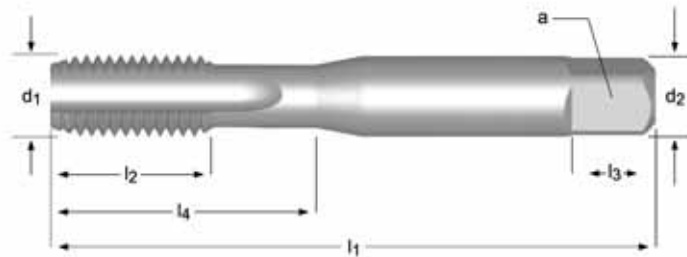


General Purpose

E513 The most versatile taps for hand use or machine tapping in a wide variety of materials in through or blind hole applications. Available in 3 chamfer lengths - taper, plug, and bottoming.

Taper - 7-10 pitch chamfer length
 Plug - 3-5 pitch chamfer length
 Bottoming - 1-2 pitch chamfer length

Sets include 1 of each tap (Taper, Plug, and Bottoming)



E513

MF


ISO
529


6H



M3 - M50

Note: ISO shank and square dimensions will necessitate metric holders

Nominal d ₁	Pitch MF	l ₁ mm	l ₂ mm	d ₂ Ø mm	∟ a mm	No. of Flutes	l ₃ mm		l ₄ mm	Pack Qty	Taper	Plug	Bottoming	Sets
3	0.35	48	12.5	3.15	2.50	3	5	2.65	12.5	1	0160039	0160046	0096567	-
3.5	0.35	48	12.5	3.15	2.50	3	5	3.2	12.5	1	-	-	0343111	-
4	0.50	53	14	4.00	3.15	3	6	3.5	14	1	0156766	0152454	0096680	-
5	0.50	58	11	5.00	4.00	3	7	4.5	22	1	0156728	0096727	0096734	-
5	0.75	58	11	5.00	4.00	3	7	4.3	22	1	0157046	0156773	0123027	-
6	0.50	66	13	6.30	5.00	3	8	5.5	26	1	0156780	0156797	0123034	-
6	0.75	66	13	6.30	5.00	3	8	5.3	26	1	0156803	0152461	0096765	-
7	0.75	66	13	7.10	5.60	3	8	6.3	26	1	0160053	0096789	0096796	-
8	0.50	72	16	8.00	6.30	3	9	7.5	29	1	0160060	0160077	0123058	-
8	0.75	72	16	8.00	6.30	3	9	7.3	29	1	0157053	0152478	0096802	-
8	1.00	72	16	8.00	6.30	3	9	7	29	1	0157060	0152485	0096826	-
9	0.75	72	16	9.00	7.10	3	10	8.3	29	1	-	-	0343128	-
9	1.00	72	16	9.00	7.10	3	10	8	29	1	0159644	0155752	0096833	-
10	0.50	80	18	10.00	8.00	3	11	9.5	34	1	-	-	0343135	-
10	0.75	80	18	10.00	8.00	3	11	9.3	34	1	0160084	0160091	0123065	-
10	1.00	80	18	10.00	8.00	3	11	9	34	1	0157077	0152492	0096086	0157084
10	1.25	80	18	10.00	8.00	3	11	8.8	34	1	0157091	0152508	0096079	0157107
11	0.75	85	19	8.00	6.30	3	9	10.3	-	1	0160107	0160114	0123072	-
11	1.00	85	19	8.00	6.30	3	9	10	-	1	0159651	0096093	0096109	-
11	1.25	85	19	8.00	6.30	3	9	9.8	-	1	-	-	0343142	-
12	0.75	89	22	9.00	7.10	3	10	11.3	-	1	-	-	0343166	-
12	1.00	89	22	9.00	7.10	3	10	11	-	1	0157114	0152515	0096154	-
12	1.25	89	22	9.00	7.10	3	10	10.8	-	1	0157121	0152522	0096116	0157138
12	1.50	89	22	9.00	7.10	3	10	10.5	-	1	0157145	0096130	0096147	0157152
13	1.50	89	22	9.00	7.10	3	10	11.5	-	1	-	-	0343173	-
14	1.00	95	24	11.20	9.00	4	12	13	-	1	0156810	0152539	0096185	-
14	1.25	95	24	11.20	9.00	4	12	12.8	-	1	0156827	0152546	0096161	0156834
14	1.50	95	24	11.20	9.00	4	12	12.5	-	1	0156841	0152553	0096178	0156858
15	1.50	95	24	11.20	9.00	4	12	13.5	-	1	-	0096192	0096208	-
16	1.00	102	24	12.50	10.00	4	13	15	-	1	0156865	0152560	0096246	-
16	1.25	102	24	12.50	10.00	4	13	14.8	-	1	-	-	0343203	-
16	1.50	102	24	12.50	10.00	4	13	14.5	-	1	0156872	0152577	0096222	0156889

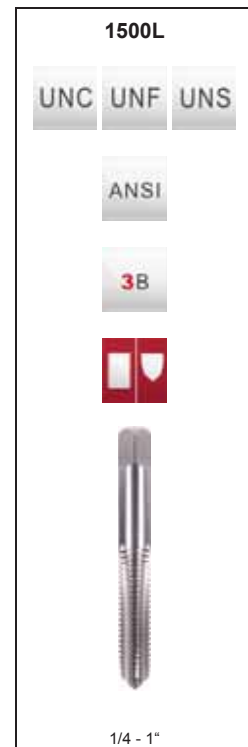
Nominal d ₁	Pitch MF	l ₁ mm	l ₂ mm	d ₂ Ø mm	□ a mm	No. of Flutes	l ₃ mm		l ₄ mm	Pack Qty	Taper	Plug	Bottoming	Sets
18	1.00	112	29	14.00	11.20	4	14	17		1	0156896	0096277	0096284	-
18	1.50	112	29	14.00	11.20	4	14	16.5		1	0156902	0152584	0096260	0156919
18	2.00	112	29	14.00	11.20	4	14	16		1	0156926	0096307	0096314	-
20	1.00	112	29	14.00	11.20	4	14	19		1	0156933	0096345	0096352	-
20	1.50	112	29	14.00	11.20	4	14	18.5		1	0156940	0152591	0096338	0156957
20	2.00	112	29	14.00	11.20	4	14	18		1	0156964	0096376	0096383	-
22	1.00	118	29	16.00	12.50	4	16	21		1	-	0096406	0096413	-
22	1.50	118	29	16.00	12.50	4	16	20.5		1	0156971	0152607	0096390	-
22	2.00	118	29	16.00	12.50	4	16	20		1	0156988	0096420	0096437	-
24	1.00	130	35	18.00	14.00	4	18	23		1	-	0096475	0096482	-
24	1.50	130	35	18.00	14.00	4	18	22.5		1	0156995	0152614	0096451	-
24	2.00	130	35	18.00	14.00	4	18	22		1	0157008	0096499	0096505	-
25	1.50	130	35	18.00	14.00	4	18	23.5		1	0157015	0152621	0096512	0157022
26	1.50	130	35	18.00	14.00	4	18	24.5		1	-	0096529	0096536	-
27	1.50	135	35	20.00	16.00	4	20	25.5		1	-	0155738	0123010	-
27	2.00	135	35	20.00	16.00	4	20	25		1	-	-	0123041	-
28	1.50	138	35	20.00	16.00	4	20	26.5		1	-	0096543	0096550	-
30	1.50	138	41	20.00	16.00	4	20	28.5		1	-	0096574	0096581	-
30	2.00	138	41	20.00	16.00	4	20	28		1	-	0155721	0123003	-
32	1.50	151	41	22.40	18.00	4	22	30.5		1	0157039	0155578	0096598	-
33	2.00	151	41	22.40	18.00	4	22	31		1	-	0096604	0096611	-
35	1.50	162	47	25.00	20.00	4	24	33.5		1	-	0096628	0096635	-
36	1.50	162	47	25.00	20.00	4	24	34.5		1	-	-	0343302	-
36	2.00	162	47	25.00	20.00	4	24	34		1	-	0152638	0096642	-
36	3.00	162	47	25.00	20.00	4	24	33		1	-	0096659	0096666	-
39	3.00	170	47	28.00	22.40	4	26	36		1	-	0152645	0096673	-
40	1.50	170	53	28.00	22.40	6	26	38.5		1	-	0155691	0096697	-
42	1.50	170	53	28.00	22.40	6	26	40.5		1	-	0155684	0096703	-
42	3.00	170	53	28.00	22.40	6	26	39		1	-	-	0343319	-
45	1.50	187	54	31.50	25.00	6	28	43.5		1	-	0155677	0096710	-
48	1.50	187	60	31.50	25.00	6	28	46.5		1	-	-	0343333	-
48	2.00	187	60	31.50	25.00	6	28	46		1	-	-	0343340	-
48	3.00	187	60	31.50	25.00	6	28	45		1	-	-	0343357	-
50	1.50	187	60	31.50	25.00	6	28	48.5		1	-	0155660	0096758	-

Note: ISO shank and square dimensions will necessitate metric holders

HAND TAPS

General Purpose, Left Hand

1500L Left Hand. Similar in design to the standard 1500 series but finished with left hand threads, which when viewed axially, wind in a counter-clockwise and receding direction. Available in plug chamfer. For through or blind hole applications.



Nominal d ₁	TPI UNC	TPI UNF	TPI UNS	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	l ₃ Inch	∠ a Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1500L
1/4	20			2.1/2	1"	0.2550	5/16	0.1910	4	H3	Plug	1	1011772
1/4		28		2.1/2	1"	0.2550	5/16	0.1910	4	H3	Plug	1	1011775
5/16	18			2.23/32	1.1/8	0.3180	3/8	0.2380	4	H3	Plug	1	1011778
5/16		24		2.23/32	1.1/8	0.3180	3/8	0.2380	4	H3	Plug	1	1011781
3/8	16			2.15/16	1.1/4	0.3810	7/16	0.2860	4	H3	Plug	1	1011784
3/8		24		2.15/16	1.1/4	0.3810	7/16	0.2860	4	H3	Plug	1	1011787
7/16	14			3.5/32	1.7/16	0.3230	13/32	0.2420	4	H3	Plug	1	1011790
7/16		20		3.5/32	1.7/16	0.3230	13/32	0.2420	4	H3	Plug	1	1011793
1/2	13			3.3/8	1.21/32	0.3670	7/16	0.2750	4	H3	Plug	1	1011796
9/16	12			3.19/32	1.21/32	0.4290	1/2	0.3220	4	H3	Plug	1	1011802
5/8	11			3.13/16	1.13/16	0.4800	9/16	0.3600	4	H3	Plug	1	1011808
3/4	10			4.1/4	2"	0.5900	11/16	0.4420	4	H3	Plug	1	1011820
3/4		16		4.1/4	2"	0.5900	11/16	0.4420	4	H3	Plug	1	1011823
7/8	9			4.11/16	2.7/32	0.6970	3/4	0.5230	4	H4	Plug	1	1011826
7/8		14		4.11/16	2.7/32	0.6970	3/4	0.5230	4	H4	Plug	1	1011829
1"	8			5.1/8	2.1/2	0.8000	13/16	0.6000	4	H4	Plug	1	1011832
1"		12		5.1/8	2.1/2	0.8000	13/16	0.6000	4	H4	Plug	1	1011835
1"			14	5.1/8	2.1/2	0.8000	13/16	0.6000	4	H4	Plug	1	1011838

General Purpose

E061/E071 The most versatile taps for hand use or machine tapping in a wide variety of materials in through or blind hole applications. Available in 3 chamfer lengths - taper, plug, and bottoming.

Taper - 7-10 pitch chamfer length

Plug - 3-5 pitch chamfer length

Bottoming - 1-2 pitch chamfer length

Premium substrate with bronze oxide body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft or non-ferrous materials.

E061 = UNC Sizes, E071 = UNF Sizes



Nominal d ₁	TP UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	a Inch	No. of Flutes	Limits	Flute Length		l ₄ Inch	Pack Qty	Taper	Plug	Bottoming	Sets
									↔	↔						
6	32	2"	0.5800	0.1410	0.1100	3	H3	36	2.85	0.5800	1	0348291	0348307	0348314	0348321	
6	40	2"	0.5800	0.1410	0.1100	3	H2	33	2.90	0.5800	1	0349427	0349434	0349441	0349458	
8	32	2.1/8	0.6500	0.1680	0.1310	4	H3	29	3.50	0.6500	1	0348284	0348338	0348345	0348352	
8	36	2.1/8	0.6500	0.1680	0.1310	4	H2	29	3.50	0.6500	1	0349465	0349472	0349489	0349496	
10	24	2.3/8	0.7600	0.1940	0.1520	4	H3	25	3.90	0.7600	1	0348369	0348376	0348383	0348390	
10	32	2.3/8	0.7600	0.1940	0.1520	4	H3	21	4.10	0.7600	1	0349502	0349519	0349526	0349533	
12	24	2.3/8	0.8100	0.2200	0.1650	4	H3	16	4.50	0.8100	1	0348406	0348413	0348420	0348437	
12	28	2.3/8	0.8100	0.2200	0.1650	4	H3	15	4.70	0.8100	1	0349540	0349557	0349564	0349571	
1/4	20	2.1/2	0.6500	0.2550	0.1910	4	H3	7	5.10	1.0630	1	0348444	0348451	0348468	0348475	
1/4	28	2.1/2	0.6500	0.2550	0.1910	4	H3	3	5.50	1.0630	1	0349588	0349595	0349601	0349618	
5/16	18	2.23/32	0.7700	0.3180	0.2380	4	H3	F	6.60	1.2598	1	0348482	0348499	0348505	0348512	
5/16	24	2.23/32	0.7700	0.3180	0.2380	4	H3	I	6.90	1.2598	1	0349625	0349632	0349649	0349656	
3/8	16	2.15/16	0.8100	0.3810	0.2860	4	H3	5/16	8.00	1.3780	1	0348529	0348536	0348543	0348550	
3/8	24	2.15/16	0.8100	0.3810	0.2860	4	H3	Q	8.50	1.3780	1	0349663	0349670	0349687	0349694	
7/16	14	3.5/32	0.9055	0.3230	0.2420	4	H3	U	9.40		1	0348567	0348574	0348581	0348598	
7/16	20	3.5/32	0.9055	0.3230	0.2420	4	H3	25/64	9.90		1	0349700	0349717	0349724	0349731	
1/2	13	3.3/8	0.9055	0.3670	0.2750	4	H3	27/64	10.80		1	0348604	0348611	0348628	0348635	
1/2	20	3.3/8	0.9055	0.3670	0.2750	4	H3	29/64	11.50		1	0349748	0349755	0349762	0349779	
9/16	12	3.19/32	0.9843	0.4290	0.3220	4	H3	27/64	12.20		1	0351833	0348642	0348659	0348666	
9/16	18	3.19/32	0.9843	0.4290	0.3220	4	H3	33/64	12.90		1	0349786	0349793	0349809	0349816	
5/8	11	3.13/16	0.9843	0.4800	0.3600	4	H3	17/32	13.50		1	0348673	0348680	0348697	0348703	
5/8	18	3.13/16	0.9843	0.4800	0.3600	4	H3	37/64	14.50		1	0349823	0349830	0349847	0349854	
3/4	10	4.1/4	1.1811	0.5900	0.4420	4	H3	21/32	16.50		1	0348710	0348727	0348734	0348741	
3/4	16	4.1/4	1.1811	0.5900	0.4420	4	H3	11/16	17.50		1	0349861	0349878	0349885	0351932	
7/8	9	4.11/16	1.1811	0.6970	0.5230	4	H4	49/64	19.50		1	0348758	0348765	0348772	0348789	
7/8	14	4.11/16	1.1811	0.6970	0.5230	4	H4	13/16	20.40		1	0349892	0349908	0349915	0349922	
1"	8	5.1/8	1.4173	0.8000	0.6000	4	H4	7/8	22.25		1	0348796	0348802	0348819	0348826 ¹⁾	
1"	12	5.1/8	1.4173	0.8000	0.6000	4	H4	59/64	23.25		1	0349939	0349946	0349953	0349960 ¹⁾	
1"	14	5.1/8	1.4173	0.8000	0.6000	4	H4	59/64	23.25		1	0349977	0349984	0349991	0350003 ¹⁾	
1.1/8	7	5.7/16	1.3976	0.8950	0.6710	4	H4	63/64	25.00		1	0388112	0388129	0388136	0259719 ¹⁾	
1.1/8	12	5.7/16	1.3976	0.8950	0.6710	4	H4	1.3/64	26.50		1	0388235	0388242	0388259	0259832 ¹⁾	
1.1/4	7	5.3/4	1.6338	1.0210	0.7650	4	H4	1.7/64	28.00		1	0388143	0388150	0388167	0259702 ¹⁾	
1.1/4	12	5.3/4	1.6338	1.0210	0.7650	4	H4	1.5/32	29.50		1	0388266	0388273	0388280	0259825 ¹⁾	
1.3/8	6	6.1/16	1.8700	1.1090	0.8300	4	H4	1.7/32	30.75		1	0388174	0388181	0388198	0259764 ¹⁾	
1.3/8	12	6.1/16	1.8700	1.1090	0.8300	4	H4	1.9/32	32.75		1	0388297	0388303	0388310	0259849 ¹⁾	
1.1/2	6	6.3/8	1.8700	1.2330	0.9520	4	H4	1.11/32	34.00		1	0388204	0388211	0388228	0259696 ¹⁾	
1.1/2	12	6.3/8	1.8700	1.2330	0.9250	4	H4	1.27/64	36.00		1	0388327	0388334	0388341	0259818 ¹⁾	

¹⁾ Bright Finish

HAND TAPS



General Purpose, Optional Flutes

1508 - *Optional 3 Flute*

1595 - *Optional 2 Flute*

Fewer flutes than standard, providing more space for chip evacuation and particularly when tapping holes greater than 1.5 tap diameters in depth. For through or blind hole applications.



Nominal d_1	TPI UNC	TPI UNF	l_1 Inch	l_2 Inch	d_2 Inch / Ø	\square a Inch	l_3 Inch	No. of Flutes	Limits	Pack Qty	1508 Plug	1508 Bottoming	1595 Plug	1595 Bottoming
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H3	1	—	—	1010206	1010207
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	1010216	1010219	—	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H3	1	—	—	1010208	1010209
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	1010223	1010226	—	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H3	1	—	—	1010210	1010211
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010230	1010233	—	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010236	1010237	—	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	1010240	1010243	—	—
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	1010246	1010247	—	—
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	1010248	—	—	—
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	1010250	—	—	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1010252	1010253	—	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1010254	—	—	—

General Purpose

1700(M) The most versatile taps for hand use or machine tapping in a wide variety of materials in through or blind hole applications. Available in 3 chamfer lengths - taper, plug, and bottoming.

Taper - 7-10 pitch chamfer length

Plug - 3-5 pitch chamfer length

Bottoming - 1-2 pitch chamfer length

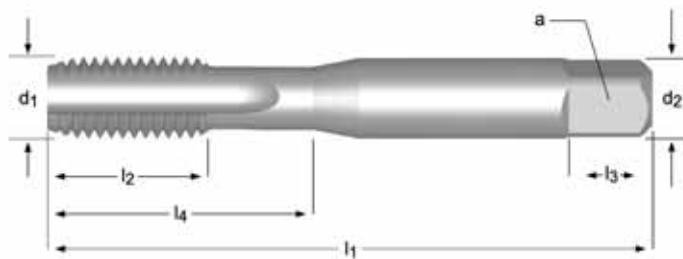
Sets include 1 of each tap (Taper, Plug, and Bottoming).



Nominal d ₁	Pitch M	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	l ₃ Inch	□ a Inch	No. of Flutes	Limits	Pack Qty	Taper	Plug	Bottoming	Sets
M1.6	0.35	1.5/8	5/16	0.1410	3/16	0.1100	2	D3	1	1012408	1012409	1012410	—
M1.8	0.35	1.11/16	3/8	0.1410	3/16	0.1100	2	D3	1	1012411	1012412	1012413	—
M2	0.40	1.3/4	7/16	0.1410	3/16	0.1100	3	D3	1	1012414	1012415	1012416	1012558
M2.3	0.40	1.3/4	7/16	0.1410	3/16	0.1100	3	D3	1	—	1012421	1012422	—
M2.5	0.45	1.13/16	1/2	0.1410	3/16	0.1100	3	D3	1	1012423	1012424	1012425	1012560
M2.6	0.45	1.13/16	1/2	0.1410	3/16	0.1100	3	D3	1	1012426	1012427	1012428	1012559
M3	0.50	1.15/16	5/8	0.1410	3/16	0.1100	3	D3	1	1012432	1012433	1012434	1012561
M3.5	0.60	2"	11/16	0.1410	3/16	0.1100	3	D4	1	1012435	1012436	1012437	1012562
M4	0.70	2.1/8	3/4	0.1680	1/4	0.1310	4	D4	1	1012441	1012442	1012443	1012563
M4.5	0.75	2.3/8	7/8	0.1940	1/4	0.1520	4	D4	1	1012444	1012445	1012446	—
M5	0.80	2.3/8	7/8	0.1940	1/4	0.1520	4	D4	1	1012453	1012454	1012455	1012564
M6	1.00	2.1/2	1"	0.2550	5/16	0.1910	4	D5	1	1012459	1012460	1012461	1012565
M7	1.00	2.23/32	1.1/8	0.3180	3/8	0.2380	4	D5	1	1012465	1012466	1012467	1012576
M8	1.00	2.23/32	1.1/8	0.3180	3/8	0.2380	4	D5	1	1012468	1012469	1012470	1012577
M8	1.25	2.23/32	1.1/8	0.3180	3/8	0.2380	4	D5	1	1012471	1012472	1012473	1012566
M9	1.25	2.15/16	1.1/4	0.3810	7/16	0.2860	4	D5	1	—	1012478	1012479	—
M10	1.25	2.15/16	1.1/4	0.3810	7/16	0.2860	4	D5	1	1012480	1012481	1012482	1012578
M10	1.50	2.15/16	1.1/4	0.3810	7/16	0.2860	4	D6	1	1012483	1012484	1012485	1012567
M11	1.50	3.5/32	1.7/16	0.3230	13/32	0.2420	4	D6	1	—	1012493	1012494	—
M12	1.25	3.3/8	1.21/32	0.3670	7/16	0.2750	4	D5	1	1012498	1012499	1012500	1012579
M12	1.75	3.3/8	1.21/32	0.3670	7/16	0.2750	4	D6	1	1012495	1012496	1012497	1012568
M14	1.50	3.19/32	1.21/32	0.4290	1/2	0.3220	4	D6	1	1012501	1012502	1012503	—
M14	2.00	3.19/32	1.21/32	0.4290	1/2	0.3220	4	D7	1	1012504	1012505	1012506	1012580
M16	1.50	3.13/16	1.13/16	0.4800	9/16	0.3600	4	D6	1	1012513	1012514	1012515	—
M16	2.00	3.13/16	1.13/16	0.4800	9/16	0.3600	4	D7	1	1012516	1012517	1012518	1012581
M18	1.50	4.1/32	1.13/16	0.5420	5/8	0.4060	4	D6	1	1012522	1012523	1012524	—
M18	2.50	4.1/32	1.13/16	0.5420	5/8	0.4060	4	D7	1	1012525	1012526	1012527	1012582
M20	1.50	4.15/32	2"	0.6520	11/16	0.4890	4	D6	1	1012534	1012535	1012536	—
M20	2.50	4.15/32	2"	0.6520	11/16	0.4890	4	D7	1	1012537	1012538	1012539	1012583
M22	1.50	4.11/16	2.7/32	0.6970	3/4	0.5230	4	D6	1	1012540	1012541	1012542	—
M22	2.50	4.11/16	2.7/32	0.6970	3/4	0.5230	4	D7	1	1012543	1012544	1012545	—
M24	2.00	4.29/32	2.7/32	0.7600	3/4	0.5700	4	D7	1	1012546	1012547	1012548	—
M24	3.00	4.29/32	2.7/32	0.7600	3/4	0.5700	4	D8	1	1012555	1012556	1012557	—
M30	3.50	5.7/16	2.9/16	1.0210	1"	0.7660	4	D9	1	1012570	1012571	1012572	—
M36	4.00	6.1/16	3"	1.2330	1.1/8	0.9250	4	D9	1	1012573	1012574	1012575	—

General Purpose, Left Hand

E501 Left Hand. Similar in design to the standard E500 series but finished with left hand threads, which when viewed axially, wind in a counter-clockwise and receding direction. Available in taper, plug, and bottoming chamfer. For through or blind hole applications.



E501

M

ISO
529

6H



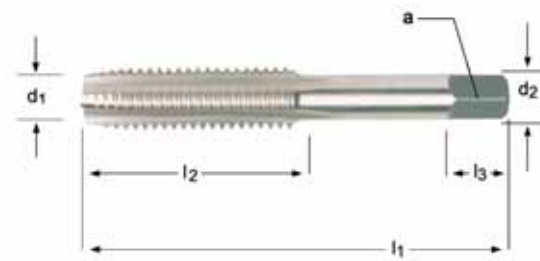
M3 - M24

Nominal d_1	Pitch M	l_1 mm	l_2 mm	d_2 Ø mm	\square a mm	l_3 mm	No. of Flutes	l_4 mm	Pack Qty	Taper	Plug	Bottoming	
3	0.50	48	12.5	3.15	2.50	5	3	2.5	12.5	1	0159828	0095058	0095065
4	0.70	53	14	4.00	3.15	6	3	3.3	14	1	0159835	0095072	0095089
5	0.80	58	11	5.00	4.00	7	3	4.2	22	1	0159842	0095096	0095102
6	1.00	66	13	6.30	5.00	8	3	5	26	1	0159859	0095119	0095126
8	1.25	72	16	8.00	6.30	9	3	6.8	29	1	0159866	0095133	0095140
10	1.50	80	18	10.00	8.00	11	3	8.5	34	1	0159873	0094938	0094945
12	1.75	89	22	9.00	7.10	10	3	10.3		1	0159880	0094952	0094969
14	2.00	95	24	11.20	9.00	12	4	12		1	0159897	0094976	0094983
16	2.00	102	24	12.50	10.00	13	4	14		1	0159903	0094990	0095003
18	2.50	112	29	14.00	11.20	14	4	15.5		1	—	0152423	0095010
20	2.50	112	29	14.00	11.20	14	4	17.5		1	0159910	0095027	0095034
22	2.50	118	29	16.00	12.50	16	4	19.5		1	—	0152430	0122495
24	3.00	130	35	18.00	14.00	18	4	21		1	—	0152447	0095041

Note: ISO shank and square dimensions will necessitate metric holders

General Purpose, Oversize

1500OV 0.005" oversize. Similar in design to the standard 1500 series, but with a pitch diameter which is 0.0050" to 0.0055" larger than the basic pitch diameter. Used primarily where a part will be plated or treated after tapping. Available as a standard with a plug chamfer. Oversize P.D. limits are equivalent to H11. For through or blind hole applications.



1500OV

UNC

ANSI



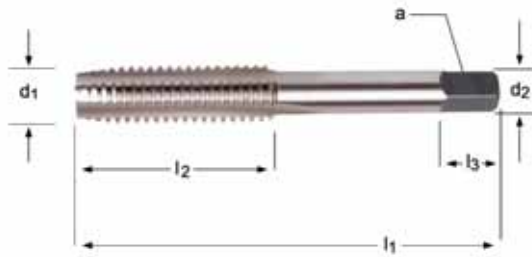
1/4 - 5/8

Nominal d_1	TPI UNC	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	\square a Inch	l_3 Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1500OV
1/4	20	2.1/2	1.000	0.2550	0.1910	5/16	4	H11	Plug	1	1011748
5/16	18	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H11	Plug	1	1011749
3/8	16	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H11	Plug	1	1011750
7/16	14	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H11	Plug	1	1011751
1/2	13	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H11	Plug	1	1011752
5/8	11	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H11	Plug	1	1011753

HAND TAPS

General Purpose, 8-Pitch

1505 Proven performers for manufacturers of oil field equipment, large valves, electric utilities, power generation machinery, and general construction. For through or blind hole applications.



1505

UNC
UNS

ANSI

2B

1.1/8- 3"

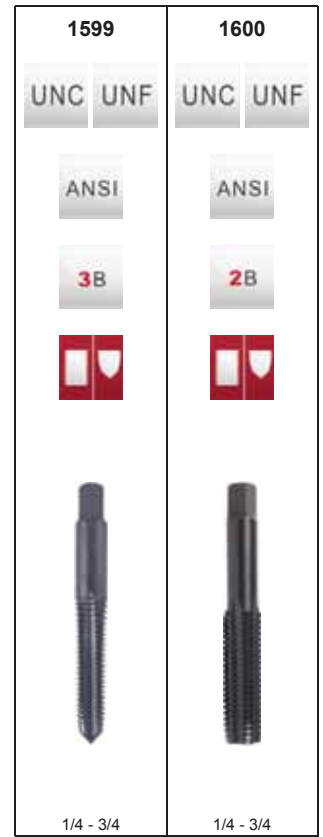
Nominal d ₁	TPI UNC/UNS	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Taper	Plug	Bottoming
1.1/8	8	5.7/16	2.9/16	0.8960	0.6720	7/8	4	H5	1	1013310	1013311	1013312
1.1/4	8	5.3/4	2.9/16	1.0210	0.7660	1"	4	H5	1	1013313	1013314	1013315
1.3/8	8	6.1/16	3"	1.1080	0.8310	1.1/16	4	H5	1	1013316	1013317	1013318
1.1/2	8	6.3/8	3"	1.2330	0.9250	1.1/8	6	H5	1	1013319	1013320	1013321
1.5/8	8	6.11/16	3.3/16	1.3050	0.9780	1.1/8	6	H6	1	1013322	1013323	1013324
1.3/4	8	7"	3.3/16	1.4300	1.0720	1.1/4	6	H6	1	1013325	1013326	1013327
1.7/8	8	7.5/16	3.9/16	1.5190	1.1390	1.1/4	6	H6	1	1013328	1013329	1013330
2"	8	7.5/8	3.9/16	1.6440	1.2330	1.3/8	6	H6	1	1013331	1013332	1013333
2.1/8	8	8"	3.9/16	1.7690	1.3270	1.3/8	6	H6	1	1013334	1013335	1013336
2.1/4	8	8.1/4	3.9/16	1.8940	1.4200	1.7/16	6	H6	1	1013337	1013338	1013339
2.3/8	8	8.1/2	4"	2.0190	1.5140	1.7/16	6	H6	1	1013340	1013341	1013342
2.1/2	8	8.3/4	4"	2.1000	1.5750	1.1/2	6	H6	1	1013343	1013344	1013345
2.5/8	8	8.3/4	4"	2.2250	1.6690	1.1/2	6	H8	1	1013346	1013347	1013348
2.3/4	8	9.1/4	4"	2.3500	1.7620	1.9/16	6	H8	1	1013349	1013350	1013351
2.7/8	8	9.1/4	4"	2.4750	1.8560	1.9/16	6	H8	1	1013352	1013353	1013354
3"	8	9.3/4	4.9/16	2.6680	2.0010	1.5/8	6	H8	1	1013355	1013356	1013357

For Cast Iron

1599/1600 Designed for through or blind hole tapping with a specific cutting geometry for gray cast irons and those materials producing broken, powdery chips. Also ideal for non-metallics, cast brass, and other brass materials producing broken powdery chips. Nitride and steam oxide coating reduces wear and chip welding in abrasive materials. For through or blind hole applications.

1599 - H3

1600 - H5



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	1599 Plug	1599 Bottoming	1600 Plug	1600 Bottoming
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	4	H3	1	1010256	1010257	—	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	4	H5	1	—	—	1011256	1011257
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	4	H3	1	1010258	1010259	—	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	4	H5	1	—	—	1011258	1011259
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	1	1010260	1010261	—	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H5	1	—	—	1011260	1011261
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	1	1010262	1010263	—	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H5	1	—	—	1011262	1011263
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	1010264	1010265	—	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H5	1	—	—	1011264	1011265
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	1010266	1010267	—	—
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H5	1	—	—	1011266	1011267
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	1	1010268	1010269	—	—
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	4	H5	1	—	—	1011268	1011269
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	1	1010270	1010271	—	—
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H5	1	—	—	1011270	1011271
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	1010272	1010273	—	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H5	1	—	—	1011272	1011273
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	1010274	1010275	—	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H5	1	—	—	1011274	1011275
9/16	12		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	1010276	1010277	—	—
9/16	12		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H5	1	—	—	1011276	1011277
9/16		18	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	1010278	1010279	—	—
9/16		18	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H5	1	—	—	1011278	1011279
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	1	1010280	1010281	—	—
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H5	1	—	—	1011280	1011281
5/8		18	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	1	1010282	1010283	—	—
5/8		18	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H5	1	—	—	1011282	1011283
3/4	10		4.1/4	2"	0.5900	0.4420	11/16	4	H3	1	1010284	1010285	—	—
3/4	10		4.1/4	2"	0.5900	0.4420	11/16	4	H5	1	—	—	1011284	1011285
3/4		16	4.1/4	2"	0.5900	0.4420	11/16	4	H3	1	1010286	1010287	—	—
3/4		16	4.1/4	2"	0.5900	0.4420	11/16	4	H5	1	—	—	1011286	1011287

HAND TAPS

For Cast Iron

1599M 1599SB

Designed for through or blind hole tapping with a specific cutting geometry for gray cast irons and those materials producing broken chips. Also ideal for non-metallics, cast brass, and other brass materials producing broken powdery chips. Nitride and steam oxide coating reduces wear and chip welding in abrasive materials. For through or blind hole applications.

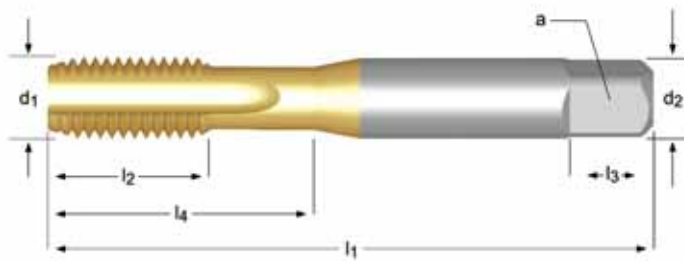


Nominal d_1	Pitch M	l_1 Inch	l_2 Inch	d_2 Ø Inch /	\square a Inch	l_3 Inch	No. of Flutes	Limits	Pack Qty	1599M Plug	1599M Bottoming	1599SB Semi- Bottoming
M6	1.00	2.1/2	1"	0.2550	0.1910	5/16	4	D5	1	1012256	1012266	1012276
M8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	4	D5	1	1012258	1012268	1012278
M10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	4	D6	1	1012260	1012270	1012280
M12	1.75	3.3/8	1.21/32	0.3670	0.2750	7/16	4	D6	1	1012262	1012272	1012282
M14	1.50	3.19/32	1.21/32	0.4290	0.3220	1/2	4	D4	1	1010288	—	—
M18	1.50	4.1/32	1.13/16	0.5420	0.4060	5/8	4	D4	1	1010289	—	—

For Cast Iron

E504

Designed for through or blind hole tapping with a specific cutting geometry for gray cast irons and those materials producing broken chips. Also ideal for non-metallics, cast brass, and other brass materials producing broken powdery chips. TiN coating increases the surface hardness and improves tool life.



Nominal d_1	Pitch M	l_1 mm	l_2 mm	d_2 \varnothing mm	\square a mm	l_3 mm	No. of Flutes	l_4 mm	Pack Qty	Plug	Bottoming
3	0.50	48	12.5	3.14	2.50	5	3	2.5	1	0160770	0122563
4	0.70	53	14	4.00	3.15	6	3	3.3	1	0159330	0122556
5	0.80	58	11	5.00	4.00	7	3	4.2	1	0159286	0122501
6	1.00	66	13	6.30	5.00	8	3	5	1	0159293	0122518
8	1.25	72	16	8.00	6.30	9	3	6.8	1	0159309	0122525
10	1.50	80	18	10.00	8.00	11	3	8.5	1	0159316	0122532
12	1.75	89	22	9.00	7.10	10	3	10.3	1	0159323	0122549
16	2.00	102	24	12.50	10.00	13	4	14	1	0160794	0122587
20	2.50	112	29	14.00	11.20	14	4	17.5	1	0160817	0122600
24	3.00	130	35	18.00	14.00	18	4	21	1	0160831	0122624

Note: ISO shank and square dimensions will necessitate metric holders

SPIRAL POINT TAPS



Relieved Style, Machine Screw Sizes

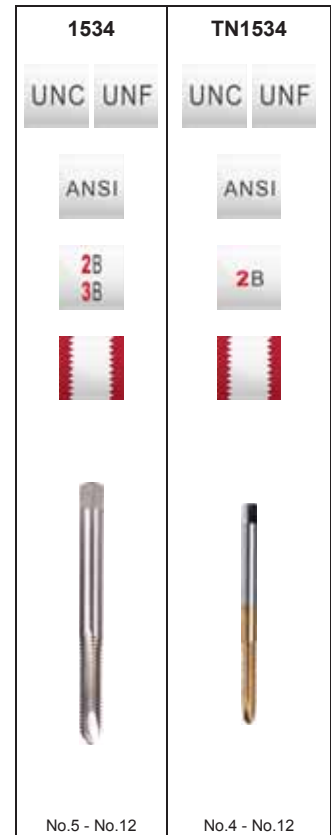
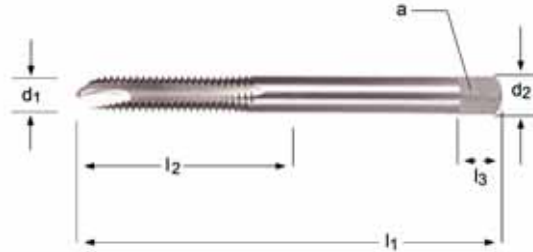
1534 TN1534

Spiral point taps are designed to solve the problem of tap breakage in through hole applications in a variety of materials. The angular flutes in the cutting face propel the chips ahead of the cutting zone, thus reducing loading and clogging in the flutes.

The 1534 style features eccentrically relieved threads with full pitch diameter relief. These taps are extremely free cutting, resulting in longer tool life. The use of rigid tapping equipment is highly recommended with this style of tap.

Bright finish - improves chip flow in soft or non-ferrous materials.
TiN Coating - increases surface hardness and improves tool life.

Sizes in bold font indicate the most commonly used flute and 'H' limit for that size.



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ ∅ Inch /	a Inch	l ₃ Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1534	TN1534
												—	1060805
4	40		1.7/8	9/16	0.1410	0.1100	3/16	2	H2	Plug	1	—	1060805
5	40		1.15/16	5/8	0.1410	0.1100	3/16	2	H1	Plug	1	1012700	—
5	40		1.15/16	5/8	0.1410	0.1100	3/16	2	H2	Plug	1	1012356	—
5	40		1.15/16	5/8	0.1410	0.1100	3/16	2	H2	Bottoming	1	1012357	—
5		44	1.15/16	5/8	0.1410	0.1100	3/16	2	H2	Plug	1	1012358	—
6	32		2"	11/16	0.1410	0.1100	3/16	2	H1	Plug	1	1012359	—
6	32		2"	11/16	0.1410	0.1100	3/16	2	H2	Plug	1	1012360	—
6	32		2"	11/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	1012363	—
6	32		2"	11/16	0.1410	0.1100	3/16	2	H3	Plug	1	1012361	1062361
6	32		2"	11/16	0.1410	0.1100	3/16	2	H3	Bottoming	1	1012364	—
6		40	2"	11/16	0.1410	0.1100	3/16	2	H2	Plug	1	1012366	—
6		40	2"	11/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	1012367	—
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H1	Plug	1	1012368	—
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Plug	1	1012369	—
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Bottoming	1	1012372	—
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H3	Plug	1	1012370	1062370
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H3	Bottoming	1	1012373	—
8		36	2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Plug	1	1012375	—
10	24		2.3/8	7/8	0.1940	0.1520	1/4	2	H1	Plug	1	1012376	—
10	24		2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Plug	1	1012377	—
10	24		2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Bottoming	1	1012379	—
10	24		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	1012378	1062378
10	24		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Bottoming	1	1012380	—
10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H1	Plug	1	1012381	—
10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Plug	1	1012382	—
10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Bottoming	1	1012385	—
10	32		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	1012383	1062383
10	32		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Bottoming	1	1012386	—
12	24		2.3/8	15/16	0.2200	0.1650	9/32	2	H3	Plug	1	1012389	1062389
12		28	2.3/8	15/16	0.2200	0.1650	9/32	2	H3	Plug	1	1012388	—

Relieved Style, Fractional Sizes

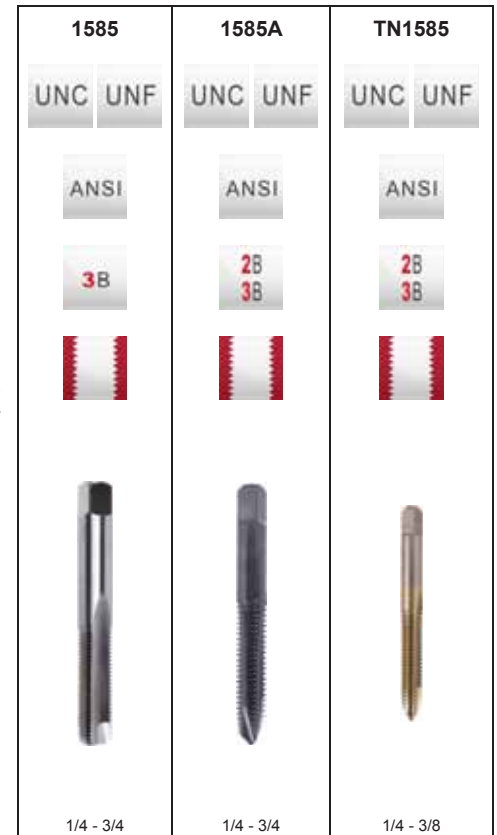
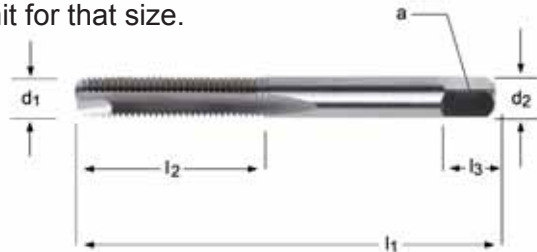
1585 Spiral point taps are designed to solve the problem of tap breakage in through hole applications in a variety of materials.
1585A
TN1585 The angular flutes in the cutting face propel the chips ahead of the cutting zone, thus reducing loading and clogging in the flutes.

The 1585 style features eccentrically relieved threads with full pitch diameter relief. These taps are extremely free cutting, resulting in longer tool life. The use of rigid tapping equipment is highly recommended with this style of tap.

Bright Finish - improves chip flow in soft or non-ferrous materials.
 Steam Oxide - reduces wear and prevents chip welding in harder ferrous materials.

TiN Coating - increases surface hardness and improves tool life.

Sizes in bold font indicate the most commonly used flute and 'H' limit for that size.



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ ∅ Inch /	a Inch	l ₃ Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1585	1585A	TN1585
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H1	Plug	1	1010290	—	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H2	Plug	1	1010291	—	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H3	Plug	1	1010292	1050292	1060292
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H3	Bottoming	1	1010294	—	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H5	Plug	1	1010293	—	1060293
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	3	H3	Plug	1	1010295	—	1060295
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	3	H5	Plug	1	1010296	—	1060296
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H1	Plug	1	1010297	—	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H2	Plug	1	1010298	—	—
1/4	28		2.1/2	1"	0.2550	0.1910	5/16	2	H3	Plug	1	1010299	1050299	1060299
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H3	Bottoming	1	1010301	—	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H4	Plug	1	1010300	—	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	3	H2	Plug	1	1010302	—	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	3	H4	Plug	1	1010303	—	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H1	Plug	1	1010304	—	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H2	Plug	1	1010305	—	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H3	Plug	1	1010306	1050306	1060306
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H3	Bottoming	1	1010308	—	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H5	Plug	1	1010307	—	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	Plug	1	1010309	—	1060309
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H5	Plug	1	1010310	—	1060310
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H1	Plug	1	1010311	—	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H2	Plug	1	1010312	—	—
5/16	24		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H3	Plug	1	1010313	1050313	1060313
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H3	Bottoming	1	1010315	—	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H4	Plug	1	1010314	—	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H2	Plug	1	1010316	—	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H4	Plug	1	1010317	—	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H1	Plug	1	1010318	—	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H2	Plug	1	1010319	—	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	Plug	1	1010320	1050320	1060320
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H5	Plug	1	1010321	—	1060321

SPIRAL POINT TAPS



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	No. of Flutes Limits Chamfer			Pack Qty	1585	1585A	TN1585
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H1	Plug	1	1010322	—	—
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H2	Plug	1	1010323	—	—
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	Plug	1	1010324	1050324	1060324
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H4	Plug	1	1010325	—	—
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H2	Plug	1	1010327	—	—
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	Plug	1	1010328	1050328	1060328
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H5	Plug	1	1010329	—	—
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H2	Plug	1	1010331	—	—
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	Plug	1	1010332	1050332	1060332
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H5	Plug	1	1010333	—	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H1	Plug	1	1010334	—	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H2	Plug	1	1010335	—	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	Plug	1	1010336	1050336	1060336
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H5	Plug	1	1010337	—	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H1	Plug	1	1010338	—	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H2	Plug	1	1010339	—	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	Plug	1	1010340	1050340	1060340
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H5	Plug	1	1010341	—	—
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	3	H3	Plug	1	1010342	1050342	—
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	3	H5	Plug	1	1010343	—	—
5/8		18	3.13/16	1.13/16	0.4800	0.3600	9/16	3	H3	Plug	1	1012774	1052774	—
3/4	10		4.1/4	2"	0.5900	0.4420	11/16	3	H3	Plug	1	1010344	1050344	—
3/4	10		4.1/4	2"	0.5900	0.4420	11/16	3	H5	Plug	1	1010345	—	—
3/4		16	4.1/4	2"	0.5900	0.4420	11/16	3	H3	Plug	1	1012775	1052775	—

TAPS

Relieved Style, Machine Screw Sizes

1634 Premium Cobalt substrate. Designed for tough jobs in high temperature alloys, stainless steel, cast iron, abrasive non-ferrous materials and other similar materials. Due to their premium steel content and special design, this range will effectively increase productivity through longer tool life. Ideally suited for through hole tapping.



1634

UNC
UNF

ANSI

3B

No. 4 - No. 8

Nominal d_1	TPI UNC	TPI UNF	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	\square a Inch	l_3 Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1634
4	40		1.7/8	9/16	0.1410	0.1100	3/16	2	H2	Plug	1	1011102
5	40		1.15/16	5/8	0.1410	0.1100	3/16	2	H2	Plug	1	1011103
6	32		2"	11/16	0.1410	0.1100	3/16	2	H2	Plug	1	1011104
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Plug	1	1011105
10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Plug	1	1011106

SPIRAL POINT TAPS



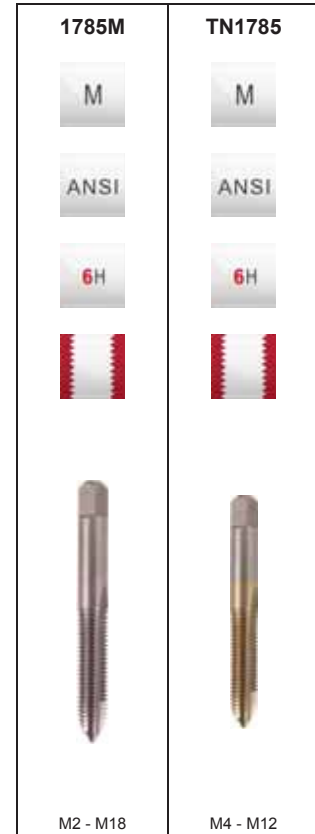
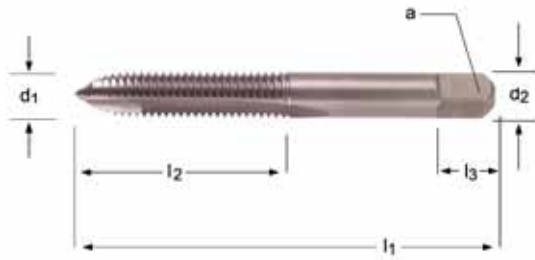
Relieved Style, Metric

1785M
TN1785

Spiral point taps are designed to solve the problem of tap breakage in through hole applications in a variety of materials. The angular flutes in the cutting face propel the chips ahead of the cutting zone, thus reducing loading and clogging in the flutes.

The 1785M style features eccentrically relieved threads with full pitch diameter relief. These taps are extremely free cutting, resulting in longer tool life. The use of rigid tapping equipment is highly recommended with this style of tap.

Bright Finish - improves chip flow in soft or non-ferrous materials.
TiN Coating - increases surface hardness and improves tool life.

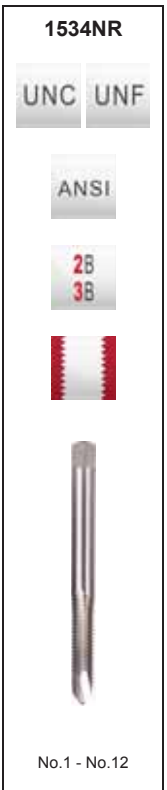
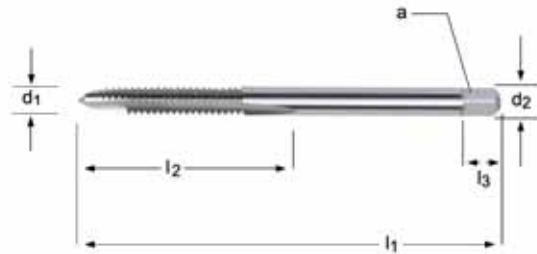


Nominal d ₁	Pitch M	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	∠ a Inch	l ₃ Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1785M	TN1785
M2	0.40	1.3/4	7/16	0.1410	0.1100	3/16	2	D3	Plug	1	1012659	—
M2.3	0.45	1.3/4	7/16	0.1410	0.1100	3/16	2	D3	Plug	1	1012661	—
M2.5	0.45	1.13/16	1/2	0.1410	0.1100	3/16	2	D3	Plug	1	1012662	—
M2.6	0.45	1.13/16	1/2	0.1410	0.1100	3/16	2	D3	Plug	1	1012663	—
M3	0.50	1.15/16	5/8	0.1410	0.1100	3/16	2	D3	Plug	1	1012664	—
M3.5	0.60	2"	11/16	0.1410	0.1100	3/16	2	D4	Plug	1	1012666	—
M4	0.70	2.1/8	3/4	0.1680	0.1310	1/4	2	D4	Plug	1	1012668	1062668
M4.5	0.75	2.3/8	7/8	0.1940	0.1520	1/4	2	D4	Plug	1	1012669	—
M5	0.80	2.3/8	7/8	0.1940	0.1520	1/4	2	D4	Plug	1	1012672	1062672
M6	1.00	2.1/2	1"	0.2550	0.1910	5/16	2	D5	Plug	1	1012674	1062674
M7	1.00	2.23/32	1.1/8	0.3180	0.2380	3/8	2	D5	Plug	1	1012676	—
M8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	2	D5	Plug	1	1012678	1062678
M9	1.25	2.15/16	1.1/4	0.3810	0.2860	7/16	3	D5	Plug	1	1012680	—
M10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	3	D5	Plug	1	1012682	1062682
M11	1.50	3.5/32	1.7/16	0.3230	0.2420	13/32	3	D6	Plug	1	1012685	—
M12	1.75	3.3/8	1.21/32	0.3670	0.2750	7/16	3	D6	Plug	1	1012686	1062686
M14	2.00	3.19/32	1.21/32	0.4290	0.3220	1/2	3	D7	Plug	1	1012689	—
M16	2.00	3.13/16	1.13/16	0.4800	0.3600	9/16	3	D7	Plug	1	1012693	—
M18	2.50	4.1/32	1.13/16	0.5420	0.4060	5/8	3	D7	Plug	1	1012696	—

TAPS

Non-Relieved Style, Machine Screw Sizes

1534NR Feature concentric threads with no pitch diameter relief. These taps are particularly recommended for applications requiring close gauging fits and in older equipment that is not sufficiently rigid to accommodate the free cutting action of the 1534/1585 series. For through hole applications. Sizes in bold font indicate the most commonly used flute and 'H' limit for that size.



Nominal d ₁	TPI UNC	TPI UNF	TPI UNS	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Plug	Bottoming
0		80		1.5/8	5/16	0.1410	0.1100	3/16	2	H1	1	1010775	—
0		80		1.5/8	5/16	0.1410	0.1100	3/16	2	H2	1	1010776	1010778
1	64			1.11/16	3/8	0.1410	0.1100	3/16	2	H1	1	1010779	—
1	64			1.11/16	3/8	0.1410	0.1100	3/16	2	H2	1	1010780	—
1		72		1.11/16	3/8	0.1410	0.1100	3/16	2	H1	1	1010783	—
1		72		1.11/16	3/8	0.1410	0.1100	3/16	2	H2	1	1010784	—
2	56			1.3/4	7/16	0.1410	0.1100	3/16	2	H1	1	1010787	—
2	56			1.3/4	7/16	0.1410	0.1100	3/16	2	H2	1	1010788	1010790
2		64		1.3/4	7/16	0.1410	0.1100	3/16	2	H1	1	1010791	—
2		64		1.3/4	7/16	0.1410	0.1100	3/16	2	H2	1	1010792	—
3	48			1.13/16	1/2	0.1410	0.1100	3/16	2	H2	1	1010796	1010798
3		56		1.13/16	1/2	0.1410	0.1100	3/16	2	H1	1	1010799	—
3		56		1.13/16	1/2	0.1410	0.1100	3/16	2	H2	1	1010800	—
4	40			1.7/8	9/16	0.1410	0.1100	3/16	2	H1	1	1010804	—
4	40			1.7/8	9/16	0.1410	0.1100	3/16	2	H2	1	1010805	1010807
4		48		1.7/8	9/16	0.1410	0.1100	3/16	2	H2	1	1010809	1010811
4			36	1.7/8	9/16	0.1410	0.1100	3/16	2	H2	1	1010803	—
5	40			1.15/16	5/8	0.1410	0.1100	3/16	2	H2	1	1010813	1010815
5		44		1.15/16	5/8	0.1410	0.1100	3/16	2	H2	1	1010817	—
6	32			2"	11/16	0.1410	0.1100	3/16	2	H1	1	1010818	—
6	32			2"	11/16	0.1410	0.1100	3/16	2	H2	1	1010819	1010822
6	32			2"	11/16	0.1410	0.1100	3/16	2	H3	1	1010820	1010823
6		40		2"	11/16	0.1410	0.1100	3/16	2	H2	1	1010825	1010827
8	32			2.1/8	3/4	0.1680	0.1310	1/4	2	H1	1	1010828	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	2	H2	1	1010829	1010832
8	32			2.1/8	3/4	0.1680	0.1310	1/4	2	H3	1	1010830	1010833
8		36		2.1/8	3/4	0.1680	0.1310	1/4	2	H2	1	1010835	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	2	H1	1	1010837	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	2	H2	1	1010838	1010841
10	24			2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	1010839	1010842
10		32		2.3/8	7/8	0.1940	0.1520	1/4	2	H1	1	1010843	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	2	H2	1	1010844	1010847
10	32			2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	1010845	1010848
12	24			2.3/8	15/16	0.2200	0.1650	9/32	2	H3	1	1011071	1011072
12		28		2.3/8	15/16	0.2200	0.1650	9/32	2	H3	1	1010853	—

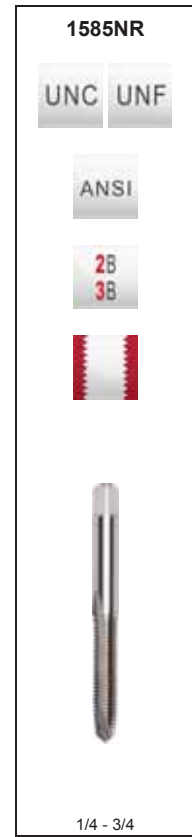
SPIRAL POINT TAPS



Non-Relieved Style, Fractional Sizes

1585NR

Feature concentric threads with no pitch diameter relief. These taps are particularly recommended for applications requiring close gauging fits and in older equipment that is not sufficiently rigid to accommodate the free cutting action of the regular 1534/1585 series. For through hole applications. Sizes in bold font indicate the most commonly used flute and 'H' limit for that size.



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	∠ a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Plug	Bottoming
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H1	1	1012813	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H2	1	1012814	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H3	1	1012815	1012817
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H5	1	1012816	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	1012818	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	3	H5	1	1012819	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H1	1	1012820	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H2	1	1012821	—
1/4	28		2.1/2	1"	0.2550	0.1910	5/16	2	H3	1	1012822	1012824
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H4	1	1012823	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	3	H2	1	1012825	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	3	H4	1	1012826	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H1	1	1012827	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H2	1	1012828	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H3	1	1012829	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H5	1	1012830	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1012832	1012831
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H5	1	1012833	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H1	1	1012834	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H2	1	1012835	—
5/16	24		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H3	1	1012836	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H4	1	1012837	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H2	1	1012839	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	—	1012838
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H4	1	1012840	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H1	1	1012841	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H2	1	1012842	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	1012843	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H5	1	1012844	—
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H1	1	1012845	—
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H2	1	1012846	—
3/8	24		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	1012847	—
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H4	1	1012848	—

SPIRAL POINT TAPS

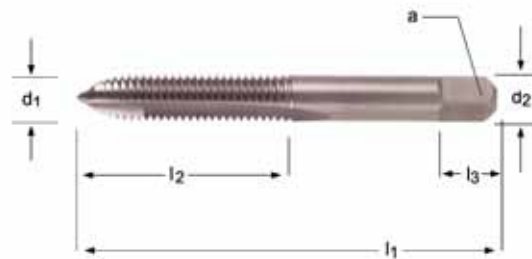
Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Plug	Bottoming
7/16	14		3.5/32	1.7/16	0.3230	0.2420	113/32	3	H2	1	1012849	—
7/16	14		3.5/32	1.7/16	0.3230	0.2420	113/32	3	H3	1	1012850	—
7/16	14		3.5/32	1.7/16	0.3230	0.2420	113/32	3	H5	1	1012851	—
7/16		20	3.5/32	1.7/16	0.3230	0.2420	113/32	3	H2	1	1012852	—
7/16		20	3.5/32	1.7/16	0.3230	0.2420	113/32	3	H3	1	1012853	—
7/16		20	3.5/32	1.7/16	0.3230	0.2420	113/32	3	H5	1	1012854	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H1	1	1012855	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H2	1	1012856	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1012857	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H5	1	1012858	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H1	1	1012859	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H2	1	1012860	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1012861	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H5	1	1012862	—
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	3	H3	1	1012863	—
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	3	H5	1	1012864	—
5/8		18	3.13/16	1.13/16	0.4800	0.3600	9/16	3	H3	1	1012867	—
3/4	10		4.1/2	2"	0.5900	0.4420	11/16	3	H3	1	1012865	—
3/4	10		4.1/2	2"	0.5900	0.4420	11/16	3	H5	1	1012866	—
3/4		16	4.1/2	2"	0.5900	0.4420	11/16	3	H3	1	1012868	—

SPIRAL POINT TAPS

Non-Relieved, Metric Sizes

1785NR

Feature concentric threads with no pitch diameter relief. These taps are particularly recommended for applications requiring close gauging fits and in older equipment that is not sufficiently rigid to accommodate the free cutting action of the regular 1785 series. For through hole applications.



1785NR

M

ANSI

6H

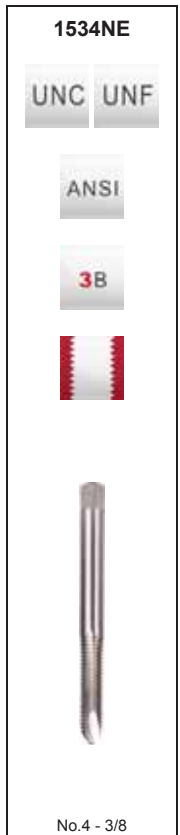
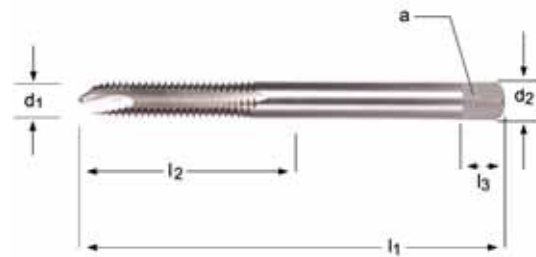


M1.6 - M20

Nominal d_1	Pitch M	l_1 Inch	l_2 Inch	l_3 Inch	d_2 Ø Inch	\square a Inch	No. of Flutes	Limits	Pack Qty	1785NR
1.6	0.35	1.5/8	5/16	3/16	0.1410	0.1100	2	D3	1	1012890
2	0.40	1.3/4	7/16	3/16	0.1410	0.1100	2	D3	1	1012891
2.3	0.40	1.3/4	7/16	3/16	0.1410	0.1100	2	D3	1	1012892
2.5	0.45	1.13/16	1/2	3/16	0.1410	0.1100	2	D3	1	1012893
2.6	0.45	1.13/16	1/2	3/16	0.1410	0.1100	2	D3	1	1012894
3	0.50	1.15/16	5/8	3/16	0.1410	0.1100	2	D3	1	1012896
3.5	0.60	2"	11/16	3/16	0.1410	0.1100	2	D4	1	1012897
4	0.70	2.1/8	3/4	1/4	0.1380	0.1310	2	D4	1	1012898
4.5	0.75	2.3/8	7/8	1/4	0.1940	0.1520	2	D4	1	1012899
5	0.80	2.3/8	7/8	1/4	0.1940	0.1520	2	D4	1	1012900
6	1.00	2.1/2	1"	5/16	0.2550	0.1910	2	D5	1	1012901
7	1.00	2.23/32	1.1/8	3/8	0.3180	0.2380	2	D5	1	1012902
8	1.25	2.23/32	1.1/8	3/8	0.3180	0.2380	2	D5	1	1012903
10	1.50	2.15/16	1.1/4	7/16	0.3810	0.2860	3	D6	1	1012904
12	1.75	3.3/8	1.21/32	7/16	0.3670	0.2750	3	D6	1	1012905
14	2.00	3.19/32	1.21/32	1/2	0.4290	0.3220	3	D7	1	1012906
16	2.00	3.13/16	1.13/16	9/16	0.4800	0.3600	3	D7	1	1012907
18	2.50	4.1/32	1.13/16	5/8	0.5420	0.4060	3	D7	1	1012908
20	2.50	4.15/32	2"	11/16	0.6520	0.4890	3	D7	1	1012909

Extension / Non-Relieved Style

1534NE Similar in design and thread geometries to the standard 1534NR series, but with a longer shank length. Bright finish improves chip flow in soft or non-ferrous materials. For through hole applications.



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1534NE
4	40		4"	9/16	0.1410	0.1100	3/16	2	H2	Plug	1	1020002
6	32		4"	11/16	0.1410	0.1100	3/16	2	H3	Plug	1	1020004
6	32		6"	11/16	0.1410	0.1100	3/16	2	H3	Plug	1	1020006
8	32		4"	3/4	0.1680	0.1310	1/4	2	H3	Plug	1	1020008
8	32		6"	3/4	0.1680	0.1310	1/4	2	H3	Plug	1	1020010
10	24		4"	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	1020012
10	24		6"	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	1020014
10		32	4"	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	1020016
10		32	6"	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	1020018
1/4	20		4"	1"	0.2550	0.1910	5/16	2	H3	Plug	1	1020020
1/4	20		6"	1"	0.2550	0.1910	5/16	2	H3	Plug	1	1020022
1/4		28	4"	1"	0.2550	0.1910	5/16	2	H3	Plug	1	1020024
1/4		28	6"	1"	0.2550	0.1910	5/16	2	H3	Plug	1	1020026
5/16	18		4"	1.1/8	0.3180	0.2380	3/8	2	H3	Plug	1	1020028
5/16	18		6"	1.1/8	0.3180	0.2380	3/8	2	H3	Plug	1	1020030
5/16		24	4"	1.1/8	0.3180	0.2380	3/8	2	H3	Plug	1	1020032
5/16		24	6"	1.1/8	0.3180	0.2380	3/8	2	H3	Plug	1	1020034
3/8	16		4"	1.1/4	0.3810	0.2860	7/16	3	H3	Plug	1	1020036
3/8	16		6"	1.1/4	0.3810	0.2860	7/16	3	H3	Plug	1	1020038
3/8		24	4"	1.1/4	0.3810	0.2860	7/16	3	H3	Plug	1	1020040
3/8		24	6"	1.1/4	0.3810	0.2860	7/16	3	H3	Plug	1	1020042
7/16	14		6"	1.7/16	0.3230	0.2420	13/32	3	H3	Plug	1	1020044
7/16		20	6"	1.7/16	0.3230	0.2420	13/32	3	H3	Plug	1	1020046
1/2	13		6"	1.21/32	0.3670	0.2750	7/16	3	H3	Plug	1	1020048
1/2		20	6"	1.21/32	0.3670	0.2750	7/16	3	H3	Plug	1	1020050

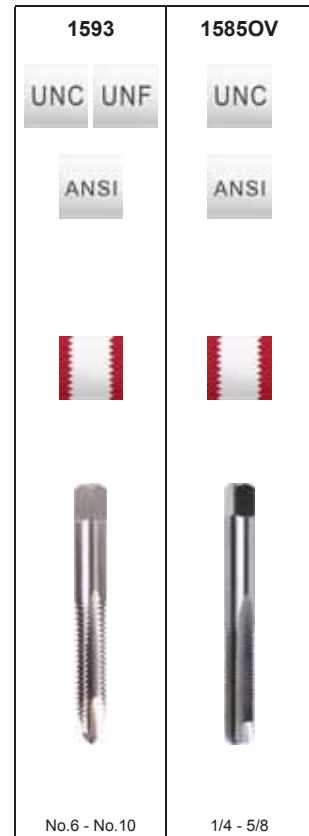
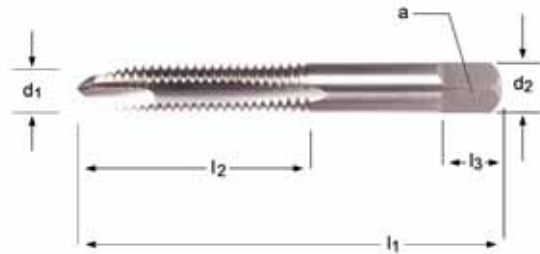
SPIRAL POINT TAPS



Oversize / Relieved Style

1593 Similar in design to the standard 1534/1585 series
1585OV but with a pitch diameter larger than the basic pitch diameter. Used primarily where a part will be plated or treated after tapping. For through hole applications.

1593: 0.003" - 0.0035" Oversize
 1585OV: 0.005" Oversize



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	a Inch	l ₃ Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1593		1585OV	
												1593	1585OV	1593	1585OV
6	32		2"	11/16	0.1410	0.1100	3/16	2	H7	Plug	1	1010877	—		
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H7	Plug	1	1010879	—		
10	24		2.3/8	7/8	0.1940	0.1520	1/4	2	H7	Plug	1	1010881	—		
10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H7	Plug	1	1010883	—		
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H11	Plug	1	—		1011754	
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H11	Plug	1	—		1011755	
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H11	Plug	1	—		1011756	
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H11	Plug	1	—		1011757	
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H11	Plug	1	—		1011758	
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	3	H11	Plug	1	—		1011759	

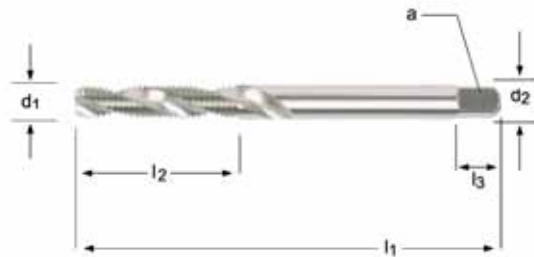
TAPS

Regular Spiral 30°

1582 - Machine Screw Sizes

1586 - Fractional Sizes

Generally used where chip disposal is a problem. The spiral flute design effectively draws chips out of the hole. Recommended for use when tapping blind holes in a variety of materials.



1582/1586

UNC UNF

ANSI

3B



No.4 - No.10

Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Plug	Bottoming
4	40		1.7/8	9/16	0.1410	0.1100	3/16	2	H2	1	1010905	1010906
5	40		1.15/16	5/8	0.1410	0.1100	3/16	2	H2	1	1010907	1010908
6	32		2"	11/16	0.1410	0.1100	3/16	2	H3	1	1010909	1010910
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H3	1	1010913	1010914
10	24		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	1010915	1010916
10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	1010917	1010918
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H3	1	1010346	1010347
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	1010348	1010349
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H3	1	1010350	1010351
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	1010352	1010353
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010354	1010355
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010356	1010357
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	1010358	1010359
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	1010360	1010361
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	1010362	1010363
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1010366	1010367
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1010368	1010369

SPIRAL FLUTE TAPS

High Spiral Helicut 52°

1587 - Machine Screw Sizes

1588 - Fractional Sizes

Similar to the regular spiral flute design of 1582/1586 except that the faster spiral improves the chip drawing action and permits the bridging of larger gaps inside a hole. For blind hole applications.



1587/1588

UNC UNF

ANSI

3B



No.3 - No.12

Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ ∅ Inch /	□ a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Plug	Bottoming
3	48		1.13/16	1/2	0.1410	0.1100	3/16	2	H2	1	1010885	1010886
4	40		1.7/8	9/16	0.1410	0.1100	3/16	2	H2	1	1010887	1010888
5	40		1.15/16	5/8	0.1410	0.1100	3/16	2	H2	1	1010889	1010890
6	32		2"	11/16	0.1410	0.1100	3/16	2	H3	1	1010891	1010892
8	32		2.1/8	3/4	0.1680	0.1310	1/4	3	H3	1	1010895	1010896
10	24		2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	1010897	1010898
10		32	2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	1010899	1010900
12	24		2.3/8	15/16	0.2200	0.1650	9/32	3	H3	1	1010901	1010902
1/4	20		2.1/2	1.000	0.2550	0.1910	5/16	3	H3	1	1010398	1010399
1/4		28	2.1/2	1.000	0.2550	0.1910	5/16	3	H3	1	1010400	1010401
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010402	1010403
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010404	1010405
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	1010406	1010407
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	1010408	1010409
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	1010410	1010411
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	1010412	1010413
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1010414	1010415
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1010416	1010417

Heavy Duty Spiral 40°

1590 - Machine Screw Sizes

1591 - Fractional Sizes

A slower helix angle, larger core diameter, three flutes and wider throat dimensions than the regular 1587/1588 series. Designed for tough blind hole tapping. Chip ejection is more efficient and problems such as chipping and breakage are largely eliminated. A steam oxide finish makes this tap ideal for use in ferrous materials and higher strength alloys.



1590/1591

UNC UNF

ANSI

2B
3B



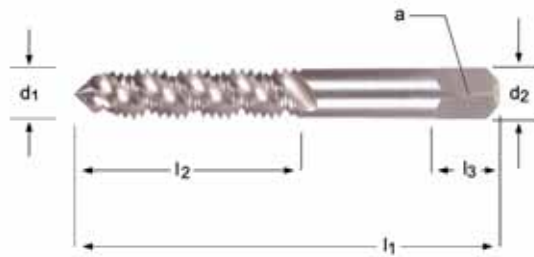
No.6 - 1/2

Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	Plug	Bottoming
6	32		2"	11/16	0.1410	0.1100	3/16	2	H3	1	1010937	1010938
6		40	2"	11/16	0.1410	0.1100	3/16	2	H3	1	1010939	1010940
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H3	1	1010941	1010942
8		36	2.1/8	3/4	0.1680	0.1310	1/4	2	H3	1	1010943	1010944
10	24		2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	1010945	1010946
10		32	2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	1010947	1010948
12	24		2.3/8	15/16	0.2200	0.1650	9/32	3	H3	1	1010949	1010950
12		28	2.3/8	15/16	0.2200	0.1650	9/32	3	H3	1	1010951	1010952
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	1010953	1010954
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	1010955	1010956
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010957	1010958
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010959	1010960
3/8	16		2.5/16	1.1.4	0.3810	0.2860	7/16	3	H3	1	1010961	1010962
3/8		24	2.5/16	1.1.4	0.3810	0.2860	7/16	3	H3	1	1010963	1010964
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	1010965	1010966
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	1010967	1010968
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1010969	1010970
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	1010971	1010972

SPIRAL FLUTE TAPS

High Spiral Helicut 52°, Metric

1788M Similar to the regular spiral flute design of 1582/1586 except that the faster spiral improves the chip drawing action and permits the bridging of larger gaps inside a hole. For blind hole applications.



1788M

M

ANSI

6H

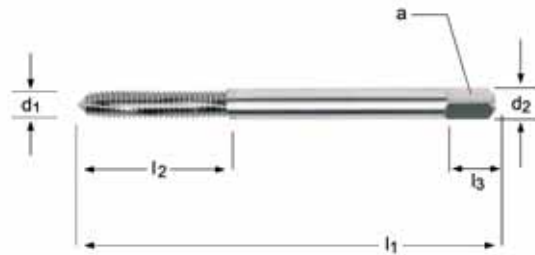


M3 - M12

Nominal d_1	Pitch M	l_1 Inch	l_2 Inch	d_2 \emptyset Inch /	\square a Inch	l_3 Inch	No. of Flutes	Limits	Pack Qty	Plug	Bottoming
M3	0.50	1.15/16	5/8	0.1410	0.1100	3/16	2	D3	1	1012920	1012940
M3.5	0.60	2"	11/16	0.1410	0.1100	3/16	2	D4	1	1012922	1012942
M4	0.70	2.1/8	3/4	0.1680	0.1310	1/4	3	D4	1	1012923	1012943
M4.5	0.75	2.3/8	7/8	0.1940	0.1520	1/4	3	D4	1	1012924	1012944
M5	0.80	2.3/8	7/8	0.1940	0.1520	1/4	3	D4	1	1012925	1012945
M6	1.00	2.1/2	1"	0.2550	0.1910	5/16	3	D5	1	1012926	1012946
M8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	3	D5	1	1012928	1012948
M10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	3	D6	1	1012930	1012950
M12	1.75	3.3/8	1.21/32	0.3670	0.2750	7/16	3	D6	1	1012932	1012952

Rol-Rite / Spiral Lobe

1580 The Rol-Rite style has a spiral lobe pattern and no oil or lubrication grooves. It is designed for general purpose applications and is particularly suited for through holes in thin sections and for interrupted holes. For through or blind hole applications.



1580

UNC
UNF

ANSI

2B
3B

No.1 - 3/8

Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ ∅ Inch /	∠ a Inch	l ₃ Inch	Limits	Pack Qty	Plug	Bottoming
0		80	1.5/8	5/16	0.1410	0.1100	3/16	H2	1	—	1310001
1	64		1.11/16	3/8	0.1410	0.1100	3/16	H2	1	—	1310002
1		72	1.11/16	3/8	0.1410	0.1100	3/16	H2	1	—	1310003
2	56		1.3/4	7/16	0.1410	0.1100	3/16	H2	1	—	1310004
2	56		1.3/4	7/16	0.1410	0.1100	3/16	H3	1	—	1310005
2		64	1.3/4	7/16	0.1410	0.1100	3/16	H2	1	—	1310006
2		64	1.3/4	7/16	0.1410	0.1100	3/16	H3	1	—	1310007
3	48		1.13/16	1/2	0.1410	0.1100	3/16	H2	1	—	1310008
3	48		1.13/16	1/2	0.1410	0.1100	3/16	H3	1	—	1310009
3		56	1.13/16	1/2	0.1410	0.1100	3/16	H2	1	—	1310010
3		56	1.13/16	1/2	0.1410	0.1100	3/16	H3	1	—	1310011
4	40		1.7/8	9/16	0.1410	0.1100	3/16	H3	1	1310012	1310014
4	40		1.7/8	9/16	0.1410	0.1100	3/16	H5	1	1310013	1310015
4		48	1.7/8	9/16	0.1410	0.1100	3/16	H3	1	1310016	1310018
5	40		1.15/16	5/8	0.1410	0.1100	3/16	H3	1	1310020	1310022
5	40		1.15/16	5/8	0.1410	0.1100	3/16	H5	1	1310021	1310023
5		44	1.15/16	5/8	0.1410	0.1100	3/16	H3	1	1310024	1310026
6	32		2"	11/16	0.1410	0.1100	3/16	H3	1	1310028	1310031
6	32		2"	11/16	0.1410	0.1100	3/16	H5	1	1310029	1310032
6		40	2"	11/16	0.1410	0.1100	3/16	H3	1	1310034	1310036
6		40	2"	11/16	0.1410	0.1100	3/16	H5	1	1310035	1310037
8	32		2.1/8	3/4	0.1680	0.1310	1/4	H3	1	1310038	1310041
8	32		2.1/8	3/4	0.1680	0.1310	1/4	H5	1	1310039	1310042
8		36	2.1/8	3/4	0.1680	0.1310	1/4	H3	1	1310044	1310046
10	24		2.3/8	7/8	0.1940	0.1520	1/4	H4	1	1310048	1310051
10	24		2.3/8	7/8	0.1940	0.1520	1/4	H6	1	1310049	1310052
10		32	2.3/8	7/8	0.1940	0.1520	1/4	H4	1	1310054	1310057
10		32	2.3/8	7/8	0.1940	0.1520	1/4	H6	1	1310055	1310058
12	24		2.3/8	15/16	0.2200	0.1650	9/32	H4	1	1310060	1310062
12	24		2.3/8	15/16	0.2200	0.1650	9/32	H6	1	—	1310063
12		28	2.3/8	15/16	0.2200	0.1650	9/32	H4	1	1310064	1310066
12		28	2.3/8	15/16	0.2200	0.1650	9/32	H6	1	—	1310067

THREAD FORMING TAPS



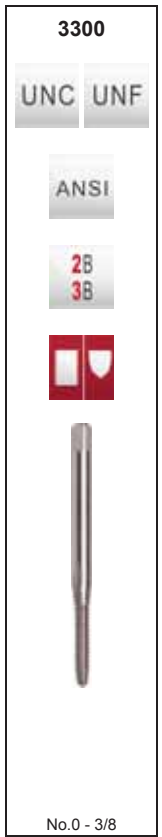
Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	Limits	Pack Qty	Plug	Bottoming
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	H4	1	1310068	1310071
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	H6	1	1310069	1310072
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	H4	1	1310074	1310076
5/16	18		2.23/32	1.1/8	0.3180	0.2380	7/16	H5	1	1310078	1310080
5/16	18		2.23/32	1.1/8	0.3180	0.2380	7/16	H7	1	—	1310081
5/16		24	2.23/32	1.1/8	0.3180	0.2380	7/16	H5	1	1310082	1310084
5/16		24	2.23/32	1.1/8	0.3180	0.2380	7/16	H7	1	—	1310085
3/8	16		2.15/16	1.1/4	0.3810	0.2860	1/2	H5	1	1310086	1310088
3/8		24	2.15/16	1.1/4	0.3810	0.2860	1/2	H5	1	1310090	1310092
7/16	14		3.5/32	1.7/16	0.3230	0.2420	9/16	H5	1	1310094	1310096
7/16		20	3.5/32	1.7/16	0.3230	0.2420	9/16	H5	1	1310098	1310100
1/2	13		3.3/8	1.21/32	0.3670	0.2750	23/32	H5	1	1310102	1310104
1/2		20	3.3/8	1.21/32	0.3670	0.2750	23/32	H5	1	1310106	1310108

TAPS

Rol-Form / Lube Grooves

3300

The Rol-Form style has 2-4 grooves (depending on size) extending the full length of thread to assure lubrication in the forming zone and to eliminate build up of the hydraulic pressure in blind holes. They are particularly suited to blind holes in thin walled die castings.



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	Limits	Pack Qty	Plug	Bottoming
0		80	1.5/8	5/16	0.1410	0.1100	3/16	H2	1	—	1310110
1	64		1.11/16	3/8	0.1410	0.1100	3/16	H2	1	—	1310111
1		72	1.11/16	3/8	0.1410	0.1100	3/16	H2	1	—	1310112
2	56		1.3/4	7/16	0.1410	0.1100	3/16	H2	1	—	1310113
2	56		1.3/4	7/16	0.1410	0.1100	3/16	H3	1	—	1310114
2		64	1.3/4	7/16	0.1410	0.1100	3/16	H2	1	—	1310115
2		64	1.3/4	7/16	0.1410	0.1100	3/16	H3	1	—	1310116
3	48		1.13/16	1/2	0.1410	0.1100	3/16	H3	1	—	1310118
3		56	1.13/16	1/2	0.1410	0.1100	3/16	H3	1	—	1310120
4	40		1.7/8	9/16	0.1410	0.1100	3/16	H3	1	1310121	1310123
4	40		1.7/8	9/16	0.1410	0.1100	3/16	H5	1	1310122	1310124
4		48	1.7/8	9/16	0.1410	0.1100	3/16	H3	1	1310125	1310127
5	40		1.15/16	5/8	0.1410	0.1100	3/16	H3	1	1310129	1310131
5	40		1.15/16	5/8	0.1410	0.1100	3/16	H5	1	1310130	1310132
5		44	1.15/16	5/8	0.1410	0.1100	3/16	H3	1	1310133	1310135
6	32		2"	11/16	0.1410	0.1100	3/16	H3	1	1310137	1310140
6	32		2"	11/16	0.1410	0.1100	3/16	H5	1	1310138	1310141
6		40	2"	11/16	0.1410	0.1100	3/16	H3	1	1310143	1310145
6		40	2"	11/16	0.1410	0.1100	3/16	H5	1	—	1310146
8	32		2.1/8	3/4	0.1680	0.1310	1/4	H3	1	1310147	1310150
8	32		2.1/8	3/4	0.1680	0.1310	1/4	H5	1	1310148	1310151
8		36	2.1/8	3/4	0.1680	0.1310	1/4	H3	1	1310153	1310155
10	24		2.3/8	7/8	0.1940	0.1520	1/4	H4	1	1310157	1310160
10	24		2.3/8	7/8	0.1940	0.1520	1/4	H6	1	1310158	1310161
10		32	2.3/8	7/8	0.1940	0.1520	1/4	H4	1	1310163	1310166
10		32	2.3/8	7/8	0.1940	0.1520	1/4	H6	1	1310164	1310167
12	24		2.3/8	15/16	0.2200	0.1650	9/32	H4	1	1310169	1310171
12	24		2.3/8	15/16	0.2200	0.1650	9/32	H6	1	—	1310172
12		28	2.3/8	15/16	0.2200	0.1650	9/32	H4	1	1310173	1310175
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	H4	1	1310177	1310180
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	H6	1	1310178	1310181
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	H4	1	1310183	1310185

THREAD FORMING TAPS

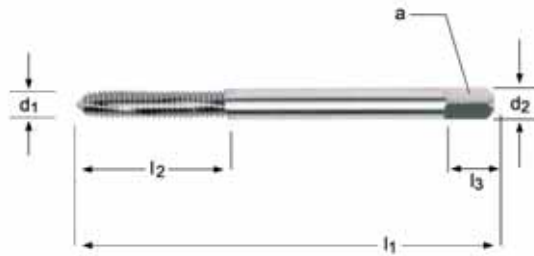


Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	Limits	Pack Qty	Plug	Bottoming
5/16	18		2.23/32	1.1/8	0.3180	0.2380	7/16	H5	1	1310187	1310189
5/16	18		2.23/32	1.1/8	0.3180	0.2380	7/16	H7	1	1310188	1310190
5/16		24	2.23/32	1.1/8	0.3180	0.2380	7/16	H5	1	1310191	1310193
5/16		24	2.23/32	1.1/8	0.3180	0.2380	7/16	H7	1	1310192	1310194
3/8	16		2.15/16	1.1/4	0.3810	0.2860	1/2	H5	1	1310195	1310197
3/8	16		2.15/16	1.1/4	0.3810	0.2860	1/2	H7	1	1310196	1310198
3/8		24	2.15/16	1.1/4	0.3810	0.2860	1/2	H5	1	1310199	1310201
3/8		24	2.15/16	1.1/4	0.3810	0.2860	1/2	H7	1	1310200	1310202
7/16	14		3.5/32	1.7/16	0.3230	0.2420	9/16	H5	1	1310203	1310205
7/16		20	3.5/32	1.7/16	0.3230	0.2420	9/16	H5	1	1310207	1310209
1/2	13		3.3/8	1.21/32	0.3670	0.2750	23/32	H5	1	1310211	1310213
1/2		20	3.3/8	1.21/32	0.3670	0.2750	23/32	H5	1	1310215	1310217

TAPS

Rol-Rite, Spiral Lobe

1580(M) The Rol-Rite style has a spiral lobe pattern and no oil or lubrication grooves. It is designed for general purpose applications and is particularly suited for through holes in thin sections and for interrupted holes.



1580(M)

M

ANSI

6H

M3 - M12

Nominal d ₁	Pitch M	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	Limits	Pack Qty	Plug	Bottoming
M3	0.50	1.15/16	5/8	0.1410	0.1100	3/16	D5	1	1310400	1310401
M4	0.70	2.1/8	3/4	0.1680	0.1310	1/4	D6	1	1310402	1310403
M5	0.80	2.3/8	7/8	0.1940	0.1520	1/4	D7	1	1310404	1310405
M6	1.00	2.1/2	1"	0.2550	0.1910	5/16	D8	1	1310406	1310407
M8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	D9	1	1310408	1310409
M10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	D10	1	1310410	1310411
M12	1.75	3.3/8	1.21/32	0.3670	0.2750	7/16	D11	1	1310412	1310413

THREAD FORMING TAPS

Rol-Form, Lube Grooves

3300(M) The Rol-Form style has 2-4 grooves (depending on size) extending the full length of thread to assure lubrication in the forming zone and to eliminate build up of the hydraulic pressure in blind holes. They are particularly suited to blind holes in thin walled die castings.



3300(M)

M

ANSI

6H



M3 - M12

Nominal d_1	Pitch M	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	\square a Inch	l_3 Inch	Limits	Pack Qty	Plug	Bottoming
M3	0.50	1.15/16	5/8	0.1410	0.1100	3/16	D5	1	1310500	1310501
M4	0.70	2.1/8	3/4	0.1680	0.1310	1/4	D6	1	1310502	1310503
M5	0.80	2.3/8	7/8	0.1940	0.1520	1/4	D7	1	1310504	1310505
M6	1.00	2.1/2	1"	0.2550	0.1910	5/16	D8	1	1310506	1310507
M8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	D9	1	1310508	1310509
M10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	D10	1	1310510	1310511
M12	1.75	3.3/8	1.21/32	0.3670	0.2750	7/16	D11	1	1310512	1310513

Extension Rol-Form / Lube Grooves

3306E Similar in design and thread geometries to the standard 3300 series but with longer shank lengths than standard.



3306E

UNC UNF

ANSI

2B

No.4 - 3/8

Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	Limits	Chamfer	Pack Qty	3306E
4	40		4"	9/16	0.1410	0.1100	3/16	H3	Bottoming	1	1321002
4	40		4"	9/16	0.1410	0.1100	3/16	H5	Bottoming	1	1321004
6	32		4"	11/16	0.1410	0.1100	3/16	H3	Bottoming	1	1321006
6	32		4"	11/16	0.1410	0.1100	3/16	H5	Bottoming	1	1321008
6	32		6"	11/16	0.1410	0.1100	3/16	H3	Bottoming	1	1321010
6	32		6"	11/16	0.1410	0.1100	3/16	H5	Bottoming	1	1321012
8	32		4"	3/4	0.1680	0.1310	1/4	H3	Bottoming	1	1321014
8	32		4"	3/4	0.1680	0.1310	1/4	H5	Bottoming	1	1321016
8	32		6"	3/4	0.1680	0.1310	1/4	H3	Bottoming	1	1321018
8	32		6"	3/4	0.1680	0.1310	1/4	H5	Bottoming	1	1321020
10	24		4"	7/8	0.1940	0.1520	1/4	H4	Bottoming	1	1321022
10	24		4"	7/8	0.1940	0.1520	1/4	H6	Bottoming	1	1321024
10	24		6"	7/8	0.1940	0.1520	1/4	H4	Bottoming	1	1321026
10	24		6"	7/8	0.1940	0.1520	1/4	H6	Bottoming	1	1321028
10		32	4"	7/8	0.1940	0.1520	1/4	H4	Bottoming	1	1321030
10		32	4"	7/8	0.1940	0.1520	1/4	H6	Bottoming	1	1321032
10		32	6"	7/8	0.1940	0.1520	1/4	H6	Bottoming	1	1321036
10		32	6"	7/8	0.1940	0.1520	1/4	H4	Bottoming	1	1321034
1/4	20		4"	1"	0.2550	0.1910	5/16	H4	Bottoming	1	1321038
1/4	20		4"	1"	0.2550	0.1910	5/16	H6	Bottoming	1	1321040
1/4	20		4"	1"	0.2550	0.1910	5/16	H8	Bottoming	1	1321042
1/4	20		6"	1"	0.2550	0.1910	5/16	H4	Bottoming	1	1321044
1/4	20		6"	1"	0.2550	0.1910	5/16	H6	Bottoming	1	1321046
1/4	20		6"	1"	0.2550	0.1910	5/16	H8	Bottoming	1	1321048
1/4		28	4"	1"	0.2550	0.1910	5/16	H4	Bottoming	1	1321050
1/4		28	4"	1"	0.2550	0.1910	5/16	H6	Bottoming	1	1321052
1/4		28	4"	1"	0.2550	0.1910	5/16	H8	Bottoming	1	1321054
1/4		28	6"	1"	0.2550	0.1910	5/16	H4	Bottoming	1	1321056
1/4		28	6"	1"	0.2550	0.1910	5/16	H6	Bottoming	1	1321058
1/4		28	6"	1"	0.2550	0.1910	5/16	H8	Bottoming	1	1321060
5/16	18		4"	1.1/8	0.3180	0.2380	3/8	H5	Bottoming	1	1321062
5/16	18		4"	1.1/8	0.3180	0.2380	3/8	H7	Bottoming	1	1321064
5/16	18		4"	1.1/8	0.3180	0.2380	3/8	H9	Bottoming	1	1321066

THREAD FORMING TAPS



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	Limits	Chamfer	Pack Qty	3306E
5/16	18		6"	1.1/8	0.3180	0.2380	3/8	H5	Bottoming	1	1321068
5/16	18		6"	1.1/8	0.3180	0.2380	3/8	H7	Bottoming	1	1321070
5/16	18		6"	1.1/8	0.3180	0.2380	3/8	H9	Bottoming	1	1321072
5/16		24	4"	1.1/8	0.3180	0.2380	3/8	H5	Bottoming	1	1321074
5/16		24	4"	1.1/8	0.3180	0.2380	3/8	H7	Bottoming	1	1321076
5/16		24	4"	1.1/8	0.3180	0.2380	3/8	H9	Bottoming	1	1321078
5/16		24	6"	1.1/8	0.3180	0.2380	3/8	H5	Bottoming	1	1321080
5/16		24	6"	1.1/8	0.3180	0.2380	3/8	H7	Bottoming	1	1321082
5/16		24	6"	1.1/8	0.3180	0.2380	3/8	H9	Bottoming	1	1321084
3/8	16		4"	1.1/4	0.3810	0.2860	7/16	H5	Bottoming	1	1321086
3/8	16		4"	1.1/4	0.3810	0.2860	7/16	H7	Bottoming	1	1321088
3/8	16		4"	1.1/4	0.3810	0.2860	7/16	H9	Bottoming	1	1321090
3/8	16		6"	1.1/4	0.3810	0.2860	7/16	H5	Bottoming	1	1321092
3/8	16		6"	1.1/4	0.3810	0.2860	7/16	H7	Bottoming	1	1321094
3/8	16		6"	1.1/4	0.3810	0.2860	7/16	H9	Bottoming	1	1321096

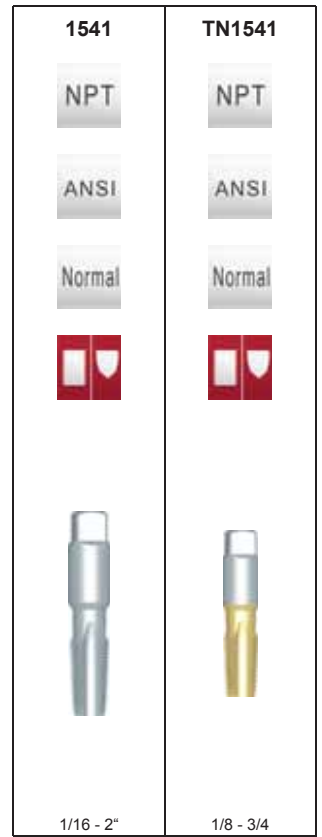
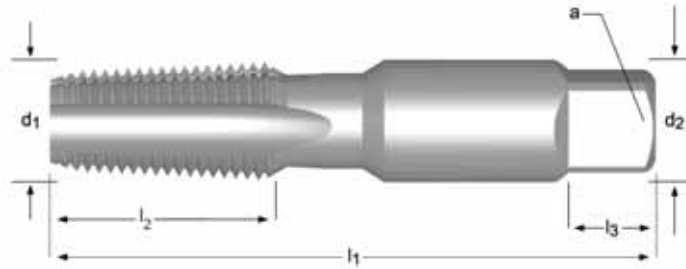
TAPS

General Purpose, Medium Hook, NPT

1541 Straight Flute. Medium hook for multi-material tapping. Generally used for pipe fittings and couplings in most ferrous and non-ferrous materials. The nominal size of a pipe tap is that of the pipe fitting to be tapped and not the actual size of the tap. NPT threads require the use of a 'sealant' such as teflon tape or pipe compound to ensure a tight joint.

TN1541

TiN coating increases surface hardness and improves tool life.



Nominal d_1	TPI	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	\square a Inch	l_3 Inch	No. of Flutes	Pack Qty	1541	TN1541
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	1010518	—
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	1010528	—
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	1010519	1060519
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	1010520	1060520
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	1010521	1060521
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	1010522	1060522
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1010523	1060523
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1010524	—
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	1010525	—
1.1/2	11.5	4.1/4	1.3/4	1.5000	1.1250	1"	7	1	1010526	—
2"	11.5	4.1/2	1.3/4	1.8750	1.4060	1.1/8	7	1	1010527	—

PIPE TAPS

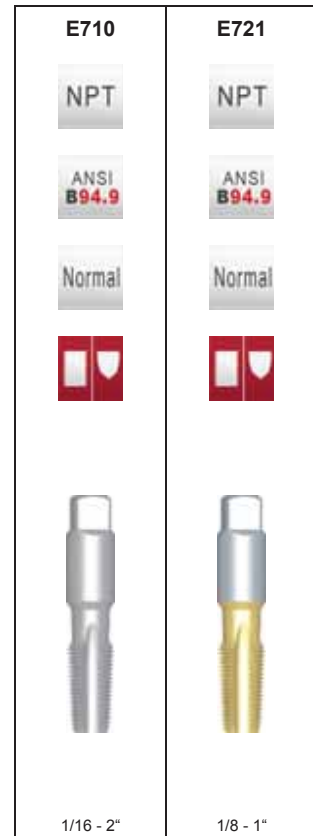
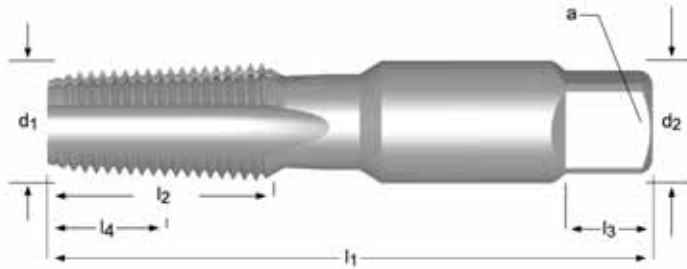


General Purpose, Medium Hook, NPT

E710 Straight Flute. Medium hook for multi-material tapping. Generally used for pipe fittings and couplings in most ferrous and non-ferrous materials. The nominal size of a pipe tap is that of the pipe fitting to be tapped and not the actual size of the tap. NPT threads require the use of a 'sealant' such as teflon tape or pipe compound to ensure a tight joint.

E721

TiN coating increases surface hardness and improves tool life.



Nominal d_1	TPI	l_1 mm	l_2 mm	d_2 \varnothing mm	\square a mm	l_3 mm		No. of Flutes	l_4 mm	Pack Qty	E710	E721
1/16	27	65	17	8.1	6.0	8	6.3	4	11.7	1	0159491	—
1/8	27	70	19	11.1	8.3	10	8.5	4	11.9	1	0099889	0161463
1/4	18	75	27	14.3	10.7	11	11	4	17.6	1	0099872	0161470
3/8	18	80	27	17.8	13.5	13	14.5	4	19.5	1	0099919	0161487
1/2	14	100	35	17.5	13.1	16	18	4	22.7	1	0099865	0161494
3/4	14	105	35	23.0	17.2	17	23	5	24.4	1	0099902	0161500
1"	11.5	115	43	28.6	21.4	21	29	5	29.4	1	0099834	0161517
1.1/4	11.5	125	43	33.3	25.0	24	38	5	27.7	1	0099858	—
1.1/2	11.5	135	43	38.1	28.6	25	44	7	28.9	1	0099841	—
2"	11.5	145	43	47.6	35.7	29	56	7	26.6	1	0099896	—

General Purpose / Work-Rite, NPT

6541

Straight Flute. Medium hook for multi-material tapping. Generally used for pipe fittings and couplings in most ferrous and non-ferrous materials.

The nominal size of a pipe tap is that of the pipe fitting to be tapped and not the actual size of the tap. NPT threads require the use of a 'sealant' such as teflon tape or pipe compound to ensure a tight joint.



Nominal d_1	TPI	l_1 Inch	l_2 Inch	l_3 Inch	No. of Flutes	Pack Qty	6541
1/8	27	2.1/8	3/4	3/8	4	1	8110601
1/4	18	2.7/16	1.1/16	7/16	4	1	8110602
3/8	18	2.9/16	1.1/16	1/2	4	1	8110603
1/2	14	3.1/8	1.3/8	5/8	4	1	8110604
3/4	14	3.1/4	1.3/8	11/16	5	1	8110605
1"	11.5	3.3/4	1.3/4	13/16	5	1	8110606
1.1/4	11.5	4	1.3/4	15/16	5	1	8110607
1.1/2	11.5	4.1/4	1.3/4	1"	7	1	8110608
2"	11.5	4.1/2	1.3/4	1.1/8	7	1	8110609

PIPE TAPS

Low Rake for Cast Iron, NPT

1544

Straight Flute. Low rake heavy-duty for cast iron and heat treated alloy steels. Nitride surface treatment reduces wear and chip welding. Manufactured with a cutting geometry specifically for gray cast irons producing broken chips. The design makes these taps also appropriate for non-metallics, cast brass and other brass materials producing broken, powdery chips.

1544

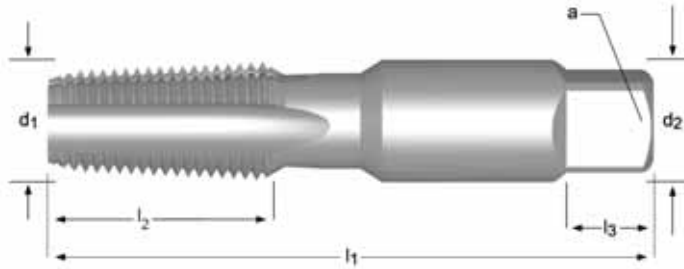
NPT

ANSI
B94.9

Normal



1/16 - 2"



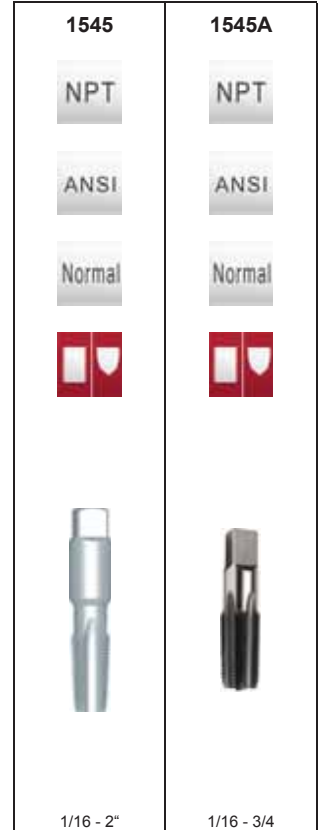
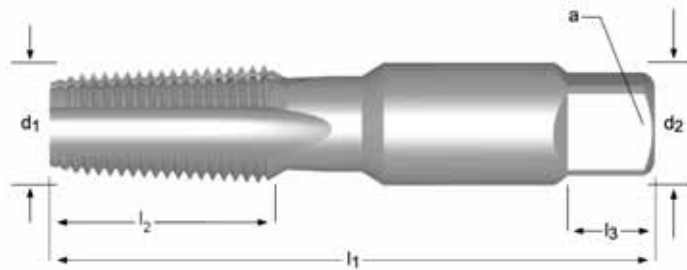
Nominal d_1	TPI	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	\square a Inch	l_3 Inch	No. of Flutes	Pack Qty	1544
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	1011760
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	1011770
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	1011761
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	1011762
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	1011764
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	1011763
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1011765
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1011766
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	1011767
1.1/2	11.5	4.1/4	1.3/4	1.5000	1.1250	1"	7	1	1011768
2"	11.5	4.1/2	1.3/4	1.8750	1.4060	1.1/8	7	1	1011769

High Hook, NPT

**1545
1545A**

1545- Designed with a high hook and deep flutes to handle the tough curly chips of free cutting materials such as low carbon and leaded steels, boiler plate, aluminum and die castings.

1545A - Identical to the 1545 series but with steam oxide surface treatment to prevent galling and chipping.



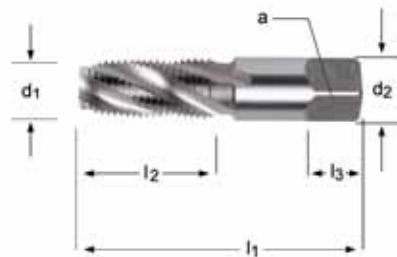
Nominal d ₁	TPI	l ₁		d ₂ Ø	a Inch	l ₃ Inch	No. of Flutes	Pack Qty	1545	1545A
		Inch	Inch						1545	1545A
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	1012869	1052869
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	1012879	—
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	1012870	1052870
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	1012871	1052871
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	1012872	1052872
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	1012873	1052873
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1012874	1052874
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1012875	—
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	1012876	—
1.1/2	11.5	4.1/4	1.3/4	1.5000	1.1250	1"	7	1	1012877	—
2"	11.5	4.1/2	1.3/4	1.8750	1.4060	1.1/8	7	1	1012878	—

PIPE TAPS

Spiral Flute, 30°, NPT

1548

Designed with a medium hook. Most effective when used in applications that produce, long, stringy chips. The spiral flute design effectively draws the chips from the hole being tapped.



1548

NPT

ANSI

Normal



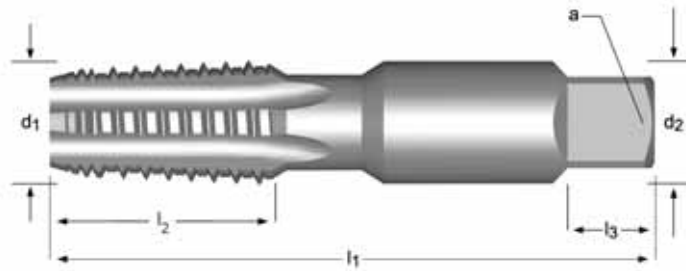
1/16 - 1"

Nominal d_1	TPI	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	\square a Inch	l_3 Inch	No. of Flutes	Pack Qty	1548
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	1010920
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	1010924
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	1010922
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	1010926
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	1010930
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	1010928
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1010932
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1010934

Interrupted Thread, NPT

1568

Interrupted thread design for chip evacuation. Removal of every other thread allows more coolant deeper into the hole. Helps to eliminate torn threads and re-cutting of chips. Ideal for use in soft, ductile materials or those producing long, continuous chips.



1568

NPT

ANSI

Normal




1/8 - 2"

Nominal d_1	TPI	l_1 Inch	l_2 Inch	d_2 \emptyset Inch /	\square a Inch	l_3 Inch	No. of Flutes	Pack Qty	1568
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	5	1	1010560
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	5	1	1010551
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	5	1	1010552
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	5	1	1010553
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	5	1	1010554
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1010555
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1010556
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	1010557
1.1/2	11.5	4.1/4	1.3/4	1.5000	1.1250	1"	7	1	1010558
2"	11.5	4.1/2	1.3/4	1.8750	1.4060	1.1/8	7	1	1010559

Interrupted Thread, NPT

E711 Interrupted thread design for chip evacuation. Removal of every other thread allows more coolant deeper into the hole. Helps to eliminate torn threads and re-cutting of chips. Ideal for use in soft, ductile materials or those producing long, continuous chips.

E711

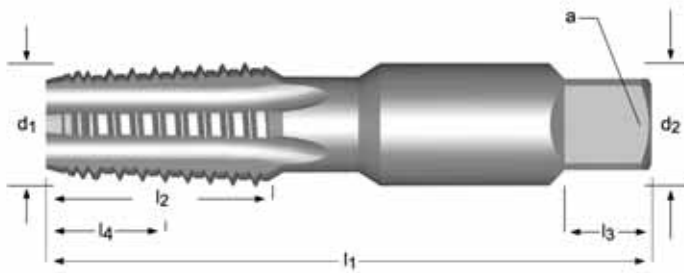
NPT


ANSI
B94.9

Normal



1/8 - 1.1/2



Nominal d_1	TPI	l_1 mm	l_2 mm	d_2 Ø mm	\square a mm	l_3 mm		No. of Flutes	l_4 mm	Pack Qty	E711
1/8	27	70	19	11.1	8.3	10	8.5	5	11.9	1	0099957
1/4	18	75	27	14.3	10.7	11	11	5	17.6	1	0099940
3/8	18	80	27	17.8	13.5	13	14.5	5	19.5	1	0099971
1/2	14	100	35	17.5	13.1	16	18	5	22.7	1	0099933
3/4	14	105	35	23.0	17.2	17	23	5	24.4	1	0099964
1"	11.5	115	43	28.6	21.4	21	29	5	29.4	1	0099926
1.1/2	11.5	135	43	38.1	28.6	25	44	7	28.9	1	0124079

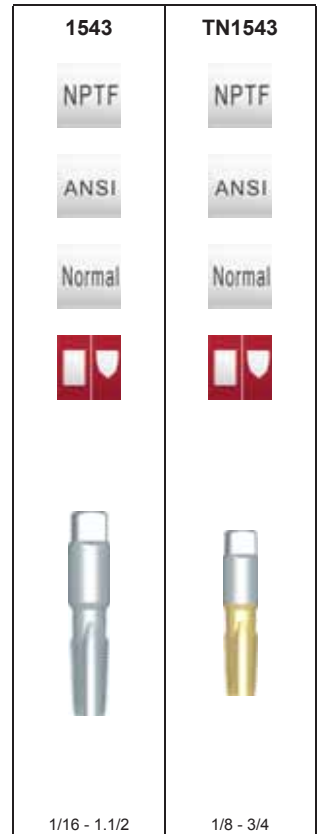
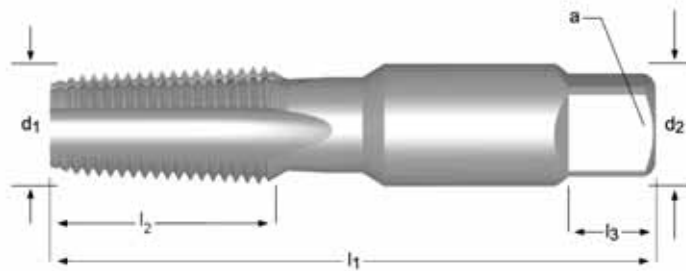
Dryseal, NPTF

1543

TN1543

Similar in design to the 1541 series but manufactured to Dryseal American National Standard Taper Pipe Thread (NPTF) specifications. Used where a leak proof pressure tight joint is required without the use of a sealing compound.

TiN coated option increases surface hardness and improves tool life.



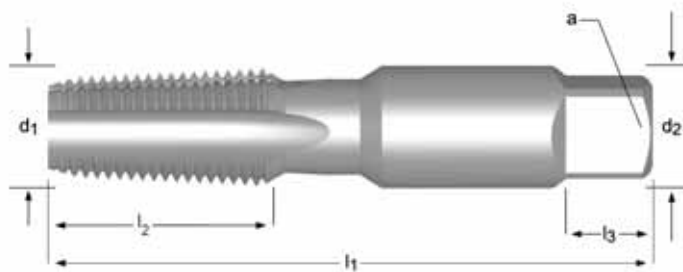
Nominal d ₁	TPI	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	a Inch	l ₃ Inch	No. of Flutes	Pack Qty	1543	TN1543
									1010529	-
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	1010529	-
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	1010539	-
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	1010530	1060530
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	1010531	1060531
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	1010532	1060532
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	1010533	1060533
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1010534	1060534
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1010535	-
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	1010536	-
1.1/2	11.5	4.1/4	1.3/4	1.5000	1.1250	1"	7	1	1010537	-

PIPE TAPS

High Hook, Dryseal, NPTF

1546

Straight flute. High hook and deep flutes with bright finish improves chip flow in soft or non-ferrous materials. Similar in design to the 1545 series but manufactured to Dryseal American National Standard Taper Pipe Thread (NPTF) specifications. Used where a leak proof pressure tight joint is required without the use of a sealing compound.



1546

NPTF

ANSI

Normal



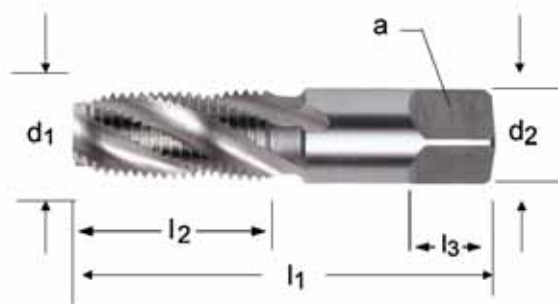
1/16 - 1"

Nominal d_1	TPI	l_1 Inch	l_2 Inch	d_2 Ø Inch /	\square a Inch	l_3 Inch	No. of Flutes	Pack Qty	1546
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	1012880
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	1012889
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	1012881
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	1012882
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	1012884
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	1012883
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1012885
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1012886

Spiral Flute, Dryseal, NPTF

1549

Spiral Flute 30°. Medium hook for evacuation of long, stringy chips. Similar in design to the 1548 series but manufactured to Dryseal American National Standard Taper Pipe Thread (NPTF) specifications. Used where a leak proof pressure tight joint is required without the use of a sealing compound.



Nominal d ₁	TPI	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	No. of Flutes	Pack Qty	1549
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	1010921
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	1010925
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	1010923
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	1010927
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	1010931
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	1010929
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1010933
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1010935

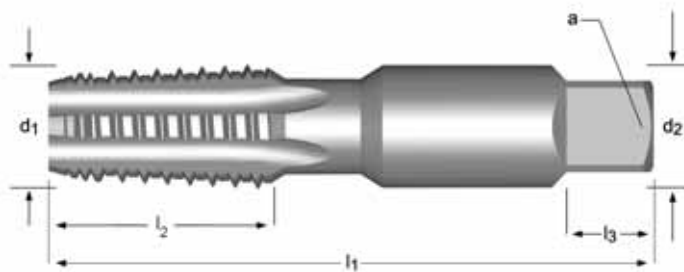
PIPE TAPS

Interrupted Thread, Dryseal, NPTF

1567

Interrupted thread design for chip evacuation. Removal of every other thread allows more coolant deeper into the hole. Helps to eliminate torn threads and re-cutting of chips.

Similar in design to the 1568 series but manufactured to Dryseal American National Standard Taper Pipe Thread (NPTF) specifications. Used where a leak proof pressure tight joint is required without the use of a sealing compound.



1567

NPTF

ANSI

Normal

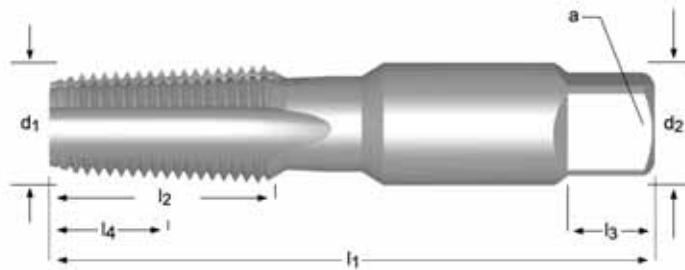


1/8 - 1.1/4

Nominal d ₁	TPI	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	□ a Inch	l ₃ Inch	No. of Flutes	Pack Qty	1567
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	5	1	1010570
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	5	1	1010561
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	5	1	1010562
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	5	1	1010564
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	5	1	1010563
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1010565
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1010566
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	1010567

General Purpose, Medium Hook, Dryseal, NPTF

E712 Medium hook for multi-material tapping. Similar in design to the E710 series but manufactured to Dryseal American National Standard Taper Pipe Thread (NPTF) specifications. Used where a leak proof pressure tight joint is required without the use of a sealing compound.



E712


NPTF

ANSI
B94.9

Normal



1/16 - 1.1/4

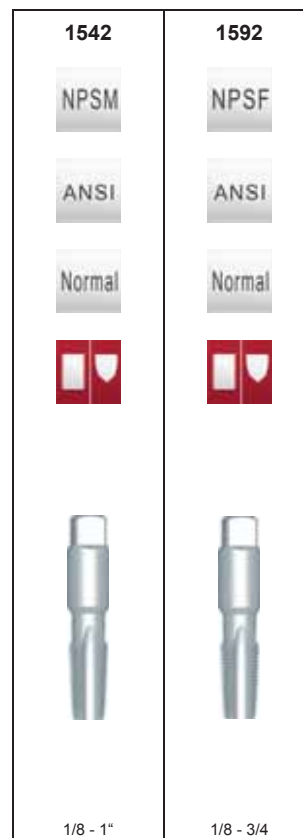
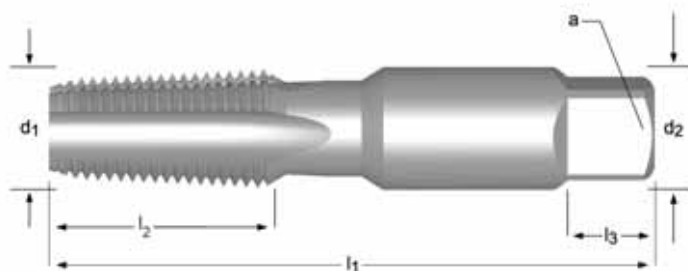
Nominal d_1	TPI	l_1 mm	l_2 mm	d_2 \emptyset mm	\square a mm	l_3 mm		No. of Flutes	l_4 mm	Pack Qty	E712
1/16	27	65	17	8.1	6.0	8	6.2	4	11.7	1	0100004
1/8	27	70	19	11.1	8.3	10	8.4	4	11.9	1	0100035
1/4	18	75	27	14.3	10.7	11	10.9	4	17.6	1	0100028
3/8	18	80	27	17.8	13.5	13	14.25	4	19.5	1	0100059
1/2	14	100	35	17.5	13.1	16	17.75	4	22.7	1	0100011
3/4	14	105	35	23.0	17.2	17	23	5	24.4	1	0100042
1"	11.5	115	43	28.6	21.4	21	29	5	29.4	1	0099988
1.1/4	11.5	125	43	33.4	24.9	23	37.75	5	27.7	1	0099995

PIPE TAPS

Straight Pipe Taps, NPS & NPSF

1542 NPS - Suitable for tapping holes for low pressure work, and then assemble with either taper threaded or straight threaded pipe or fitting and secure a tight joint with lubricant or sealer.

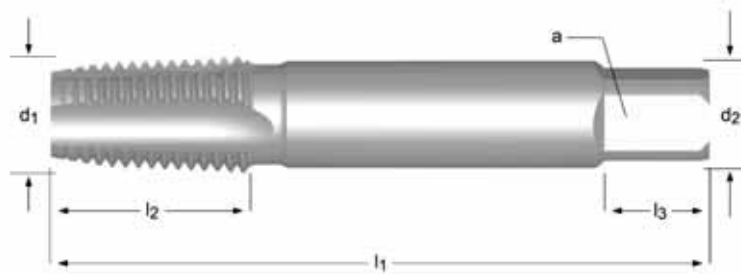
1592 NPSF (Dryseal) - Similar in design to the 1542 series but manufactured to Dryseal American National Standard Pipe Thread NPSF specifications. Intended for low pressure work where a sealer is not used such as fuel and oil lines. When assembling with a dryseal taper-threaded part there will not be any clearance between the crest and roof of the threads.



Nominal d_1	TPI	l_1	l_2	d_2	\square	l_3	No. of Flutes	Pack Qty	1542	1592
		Inch	Inch	Inch / \emptyset	a Inch	Inch				
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	1010587	1010592
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	1010581	1010588
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	1010582	1010589
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	1010583	1010590
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	1010584	1010591
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	1010585	1011070
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	1010586	—

Taper Pipe Taps, British Standard

E550 Similar to the E710 but manufactured to British Standard Taper Pipe Thread specification (BSPT).



E550

Rc

ISO
2284

Normal



1/8 - 2"

Nominal d_1	TPI	l_1 mm	l_2 mm	d_2 \varnothing mm	\square a mm	l_3 mm	No. of Flutes		Pack Qty	E550
1/8	28	59	15	8.0	6.3	9	3	8.4	1	0099490
1/4	19	67	19	10.0	8.0	11	3	11.2	1	0099483
3/8	19	75	21	12.5	10.0	13	3	14.75	1	0099520
1/2	14	87	26	16.0	12.5	16	5	18.25	1	0099476
3/4	14	96	28	20.0	16.0	20	5	23.75	1	0099513
1"	11	109	33	25.0	20.0	24	5	30	1	0099445
1.1/4	11	119	36	31.5	25.0	28	5	38.5	1	0099469
1.1/2	11	125	37	35.5	28.0	31	7	44.5	1	0099452
2"	11	140	41	40.0	31.5	34	7	56	1	0099506

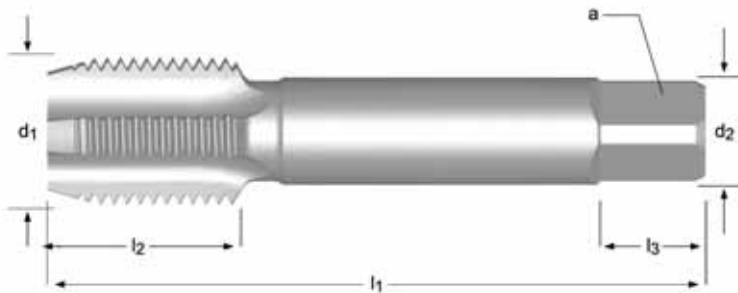
Note: ISO shank and square dimensions will necessitate metric holders

PIPE TAPS



Straight Pipe Taps, British Standard

E547 Similar to the NPS pipe taps, but manufactured to British Standard Parallel Pipe Thread specifications (BSPP).



E547

G

ISO 2284

Normal



1/8 - 2"

Nominal d ₁	TPI	l ₁ mm	l ₂ mm	d ₂ Ø mm	□ a mm	l ₃ mm	No. of Flutes	Pack Qty	Taper	Plug	Bottoming
1/8	28	59	15	8.0	8.0	9	4	1	0157169	0157176	0099285
1/4	19	67	19	10.0	8.0	11	4	1	0157190	0157206	0099278
3/8	19	75	21	12.5	10.0	13	4	1	0157220	0157237	0099315
1/2	14	87	26	16.0	12.5	16	4	1	0157251	0157268	0099261
5/8	14	91	26	18.0	14.0	18	4	1	0157282	0099322	0099339
3/4	14	96	28	20.0	16.0	20	4	1	0157299	0150757	0099308
7/8	14	102	29	22.4	18.0	22	4	1	0157305	0099353	0099360
1"	11	109	33	25.0	20.0	24	4	1	0157312	0157329	0099254
1.1/4	11	119	36	31.5	25.0	28	6	1	0157336	0099216	0099223
1.1/2	11	125	37	35.5	28.0	31	6	1	0157343	0099193	0099209
2"	11	140	41	40.0	31.5	34	6	1	0157367	0157374	0099292

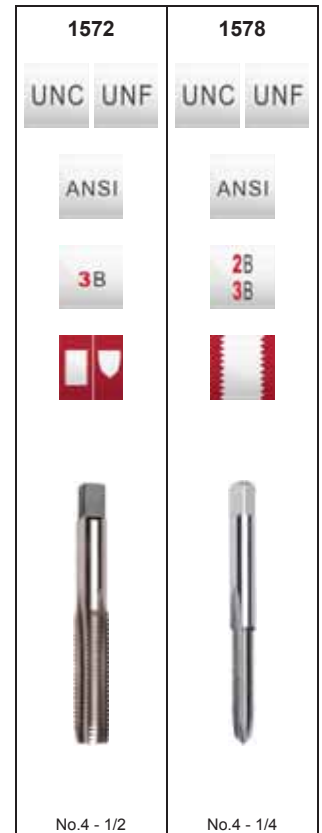
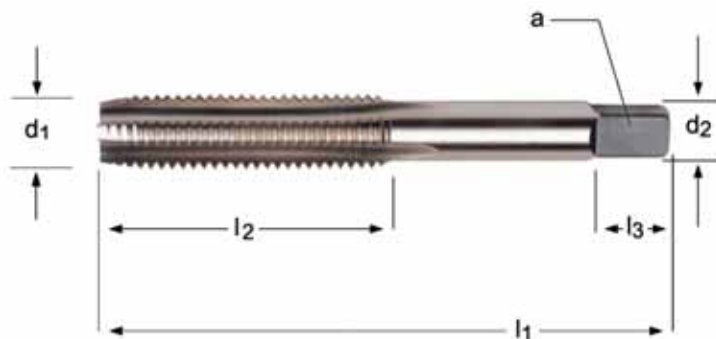
Note: ISO shank and square dimensions will necessitate metric holders

Screw Thread Insert, STI

1572 - *Straight flute, hand tap*

1578 - *Spiral point, machine tap*

Designed for use in aluminum, magnesium, and other non-ferrous materials where taps of this type are most commonly used. Taps suitable for other materials can be furnished on request. STI taps are dimensionally oversize and utilize a larger tap drill size so that the thread they produce will accept a helical coil wire screw thread insert of the same nominal size and pitch. For a particular size and pitch the lower H-Limit number is suggested for class 2B and 3B threads, while the higher H-Limit is suggested for class 2B.



Nominal d ₁	TPI UNC	TPI UNF	l ₁ Inch	l ₂ Inch	d ₂ Ø Inch /	∠ a Inch	l ₃ Inch	No. of Flutes	Limits	Pack Qty	1572 - Plug	1572 Bottoming	1578 - Plug
4	40		2"	11/16	0.1410	0.1100	3/16	2	H2	1	—	—	1010491
4	40		2"	11/16	0.1410	0.1100	3/16	3	H2	1	1010419	1010421	—
6	32		2.3/8	7/8	0.1940	0.1520	1/4	2	H2	1	—	—	1010494
6	32		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	—	—	1010495
6	32		2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	1010427	1010429	—
8	32		2.3/8	15/16	0.2200	0.1650	9/32	2	H2	1	—	—	1010498
8	32		2.3/8	15/16	0.2200	0.1650	9/32	2	H3	1	—	—	1010499
8	32		2.3/8	15/16	0.2200	0.1650	9/32	3	H3	1	1010435	1010437	—
10	24		2.1/2	1"	0.2550	0.1910	5/16	3	H2	1	1010438	1010440	—
10		32	2.1/2	1"	0.2550	0.1910	9/32	2	H2	1	—	—	1010502
10		32	2.1/2	1"	0.2550	0.1910	5/16	3	H2	1	1010442	1010444	—
10		32	2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	1010443	1010445	—
1/4	20		2.23/32	1.1/8	0.3180	0.2380	5/16	2	H2	1	—	—	1010506
1/4	20		2.23/32	1.1/8	0.3180	0.2380	5/16	2	H3	1	—	—	1010507
1/4	20		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010451	1010453	—
1/4		28	2.23/32	1.1/8	0.3180	0.2380	5/16	2	H2	1	—	—	1010508
1/4		28	2.23/32	1.1/8	0.3180	0.2380	5/16	2	H3	1	—	—	1010509
1/4		28	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	1010454	1010456	—
5/16	18		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	1010458	1010460	—
3/8	16		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	1010466	1010468	—
7/16	14		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	1010474	—	—
7/16		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	1010478	—	—
1/2	13		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	1	1010482	—	—
1/2		20	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	1010486	—	—

SPECIAL PURPOSE TAPS

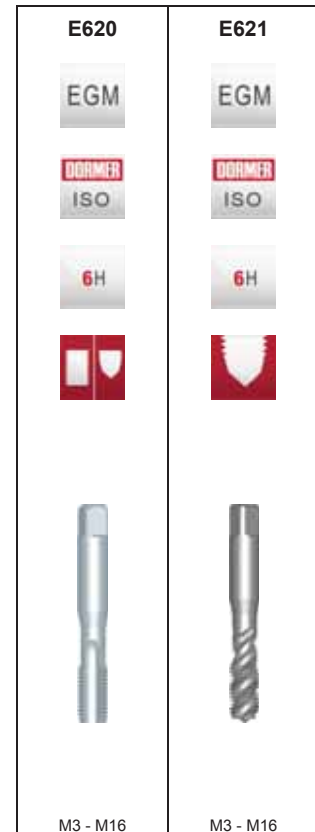
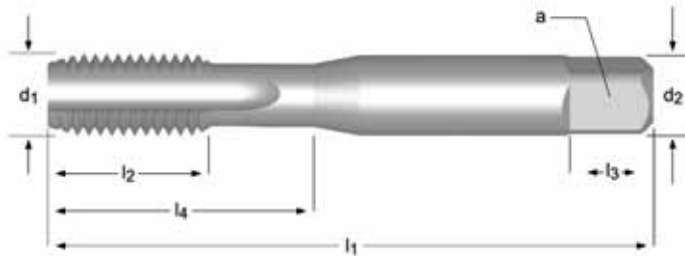


Screw Thread Insert, STI

E620 - Straight flute

E621 - Spiral flute

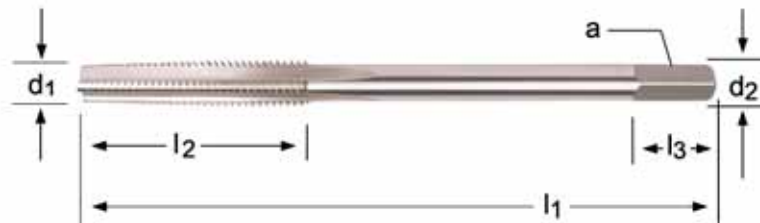
Designed for use in aluminum, magnesium, and other non-ferrous materials where taps of this type are most commonly used. Taps suitable for other materials can be furnished on request. STI taps are dimensionally oversized and utilize a larger tap drill size so that the thread they produce will accept a helical coil wire screw thread insert of the same nominal size and pitch.



Nominal d ₁	P mm	l ₁ mm	l ₂ mm	d ₂ Ø mm	∠ a mm	l ₃ mm	No. of Flutes	∠	l ₄ mm	Pack Qty	E620	E621
3	0.50	53	14	4.00	3.15	6	3	3.2	14	1	0384824	0384916
4	0.70	58	11	5.00	4.00	7	3	4.2	20	1	0384831	0384923
5	0.80	66	13	6.30	5.00	8	3	5.2	26	1	0384848	0384930
6	1.00	72	16	8.00	6.30	9	3	6.3	29	1	0384855	—
6	1.00	72	16	8.00	6.30	9	3	6.3	31	1	—	0384947
8	1.25	80	18	10.00	8.00	11	3	8.4	32	1	0384862	—
8	1.25	80	18	10.00	8.00	11	3	8.4	34	1	—	0384954
10	1.50	89	22	9.00	7.10	10	3	10.5	—	1	0384879	0384961
12	1.75	95	24	11.20	9.00	12	4	12.5	—	1	0384886	—
12	1.75	95	24	11.20	9.00	12	3	12.5	—	1	—	0384978
14	2.00	112	29	14.00	11.20	14	4	14.5	—	1	0384893	—
14	2.00	112	29	14.00	11.20	14	3	14.5	—	1	—	0384985
16	2.00	112	29	14.00	11.20	14	4	16.5	—	1	0384909	—
16	2.00	112	29	14.00	11.20	14	3	16.5	—	1	—	0384992

Nut Style

U1511 For small production runs in conventional tapping machines. They have a relatively long shank smaller than the minor diameter to permit accumulation of several nuts after tapping. Available in taper style, 7-10 thread chamfer.



U1511

UNC

ANSI

3B



1/4 - 1/2

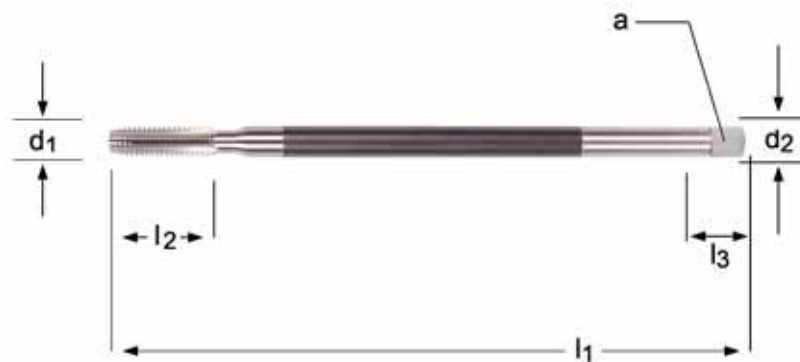
Nominal d_1	TPI UNC	l_1 Inch	l_2 Inch	d_2 Ø Inch /	a Inch	l_3 Inch	No. of Flutes	Limits	Chamfer	Pack Qty	U1511
1/4	20	5"	1.5/8	0.1850	0.1390	9/16	4	H3	Taper	1	1010375
5/16	18	5.1/2	1.13/16	0.2400	0.1800	5/8	4	H3	Taper	1	1010376
3/8	16	6"	2"	0.2940	0.2200	11/16	4	H3	Taper	1	1010377
1/2	13	7"	2.1/2	0.4000	0.3000	7/8	4	H3	Taper	1	1010378

SPECIAL PURPOSE TAPS

Pulley Style

1519

These taps have the same major diameters and pitch diameters as standard fractional size taps, but with extended shanks for reaching locations inaccessible to regular hand taps. Although originally designed for tapping pulley holes, the long shank permits tapping other long reach applications.



1519

UNC

ANSI

3B



1/4 - 3/4

Nominal d_1	TPI UNC	l_1 Inch	l_2 Inch	d_2 \varnothing Inch /	\square a Inch	l_3 Inch	No. of Flutes	Limits	Chamfer	Pack Qty	1519
1/4	20	6"	1.000	0.2550	0.1910	5/16	4	H3	Plug	1	1010379
1/4	20	8"	1.000	0.2550	0.1910	5/16	4	H3	Plug	1	1010380
5/16	18	6"	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	1010381
5/16	18	8"	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	1010382
3/8	16	6"	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	1010383
3/8	16	8"	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	1010384
3/8	16	10"	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	1010385
7/16	14	6"	1.7/16	0.4440	0.3330	1/2	4	H3	Plug	1	1010386
7/16	14	8"	1.7/16	0.4440	0.3330	1/2	4	H3	Plug	1	1010387
1/2	13	6"	1.21/32	0.5070	0.3800	9/16	4	H3	Plug	1	1010388
1/2	13	8"	1.21/32	0.5070	0.3800	9/16	4	H3	Plug	1	1010389
1/2	13	10"	1.21/32	0.5070	0.3800	9/16	4	H3	Plug	1	1010390
1/2	13	12"	1.21/32	0.5070	0.3800	9/16	4	H3	Plug	1	1010391
5/8	11	6"	1.13/16	0.6330	0.4750	11/16	4	H3	Plug	1	1010392
5/8	11	8"	1.13/16	0.6330	0.4750	11/16	4	H3	Plug	1	1010393
5/8	11	10"	1.13/16	0.6330	0.4750	11/16	4	H3	Plug	1	1010394
5/8	11	12"	1.13/16	0.6330	0.4750	11/16	4	H3	Plug	1	1010395
3/4	10	10"	2.000	0.7590	0.5690	3/4	4	H3	Plug	1	1010396
3/4	10	12"	2.000	0.7590	0.5690	3/4	4	H3	Plug	1	1010397

Combination Drill & Tap

1994 Spiral Flute 15°. Drills and taps in a single pass, reducing cycle time. Commonly used in multi-spindle operations with reversing capacity. Designed to provide 65% thread engagement and a 2B class of fit.

Bright finish improves chip flow in soft or non-ferrous materials.



Nominal Thread Size	TPI UNC	TPI UNF	d ₁ Ø Drill Inch	l ₁ OAL Inch	l ₂ Thread Inch	d ₂ Ø Shank Inch	□ a Inch	l ₃ Inch	No. of Flutes	l ₄ Drill Inch	Pack Qty	1994
4	40		0.0890	1.29/32	3/8	0.1410	0.1100	3/16	2	9/32	1	1110010
4		48	0.0938	1.29/32	3/8	0.1410	0.1100	3/16	2	9/32	1	1110012
5	40		0.1015	1.31/32	13/32	0.1410	0.1100	3/16	2	5/16	1	1110020
5		44	0.1040	1.31/32	13/32	0.1410	0.1100	3/16	2	5/16	1	1110024
6	32		0.1110	2.1/32	7/16	0.1410	0.1100	3/16	2	11/32	1	1110030
6		40	0.1160	2.1/32	7/16	0.1410	0.1100	3/16	2	11/32	1	1110034
8	32		0.1360	2.11/64	1/2	0.1680	0.1310	1/4	2	27/64	1	1110040
8		36	0.1405	2.11/64	1/2	0.1680	0.1310	1/4	2	27/64	1	1110044
10	24		0.1540	2.27/64	5/8	0.1940	0.1520	1/4	2	29/64	1	1110050
10		32	0.1610	2.27/64	5/8	0.1940	0.1520	1/4	2	29/64	1	1110054
12	24		0.1800	2.7/16	21/32	0.2200	0.1650	9/32	2	17/32	1	1110060
12		28	0.1850	2.7/16	21/32	0.2200	0.1650	9/32	2	17/32	1	1110064
1/4	20		0.2055	2.9/16	25/32	0.2550	0.1910	5/16	2	19/32	1	1110080
1/4		28	0.2188	2.9/16	25/32	0.2550	0.1910	5/16	2	19/32	1	1110084
5/16	18		0.2660	2.59/64	15/16	0.3180	0.2380	3/8	2	49/64	1	1110090
5/16		24	0.2770	2.59/64	15/16	0.3180	0.2380	3/8	2	49/64	1	1110094
3/8	16		0.3230	3.15/32	1.1/16	0.3810	0.2860	7/16	2	29/32	1	1110100
3/8		24	0.3390	3.31/64	1.1/16	0.3810	0.2860	7/16	2	59/64	1	1110104
7/16	14		0.3770	3.55/64	1.1/4	0.3230	0.2420	13/32	2	1.7/64	1	1110110
7/16		20	0.3937	3.7/8	1.1/4	0.3230	0.2420	13/32	2	1.1/8	1	1110114
1/2	13		0.4331	4.3/16	1.3/8	0.3670	0.2750	7/16	2	1.1/4	1	1110120
1/2		20	0.4531	4.13/64	1.3/8	0.3670	0.2750	7/16	2	1.17/64	1	1110124

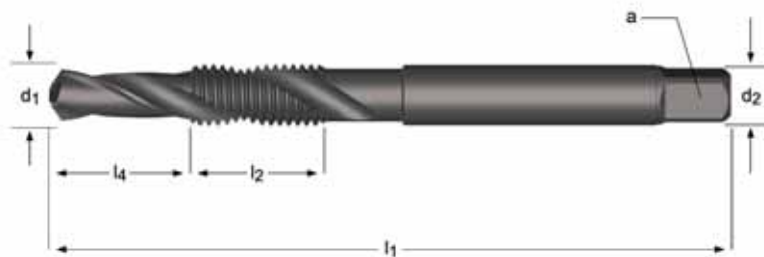
SPECIAL PURPOSE TAPS



Combination Drill & Tap

E651 Spiral Flute 30°. Drills and taps in a single pass, reducing cycle time. Commonly used in multi-spindle operations with reversing capacity. Designed to provide 65% thread engagement and a 2B class of fit.

Steam oxide finish reduces wear and chip welding in harder ferrous materials.



E651



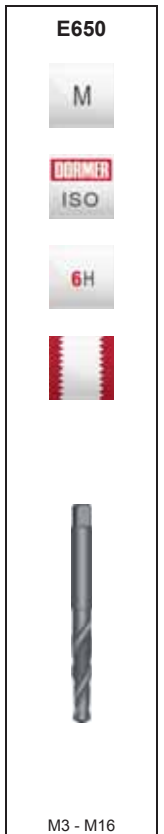
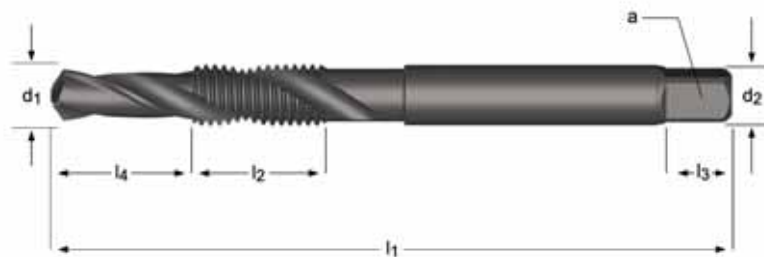
No.6 - 5/8

Nominal d_1	TPI UNC	d_1 nom mm	d_2 \varnothing mm	l_1 mm	l_4 mm	l_2 mm	\square a mm		No. of Flutes	Pack Qty	E651
6	32	2.80	3.5	56.9	6	12	2.90	5.00	2	1	0388907
8	32	3.50	4.50	64	8	12	3.55	6.00	2	1	0273272
10	24	3.90	5.00	72	10	15	4.00	7.00	2	1	0273197
12	24	4.50	5.60	77	11	15	4.50	7.00	2	1	0273210
1/4	20	5.20	6.30	83	13	17	5.00	8.00	2	1	0273227
5/16	18	6.60	8.00	94	16	21	6.30	9.00	2	1	0273241
3/8	16	8.00	10.00	104	19	23	8.00	11.00	2	1	0273234
7/16	14	9.40	8.00	107	22	25	6.30	9.00	2	1	0273265
1/2	13	10.80	9.00	114	25	29	7.10	10.00	2	1	0273203
9/16	12	12.20	11.20	124	28	29	9.00	12.00	2	1	0273289
5/8	11	13.50	12.50	134	32.5	31	10.00	13.00	2	1	0273258

Combination Drill & Tap

E650 Spiral Flute 30°. Drills and taps in a single pass, reducing cycle time. Commonly used in multi-spindle operations with reversing capacity. Designed to provide 65% thread engagement and a 2B class of fit.

Steam oxide finish reduces wear and chip welding in harder ferrous materials.



Nominal d_1	Pitch M	d_1 Ø mm	l_1 mm	l_2 mm	l_4 mm	d_2 Ø mm	a mm	l_3 mm	No. of Flutes	Pack Qty	E650
3	0.50	2.5	56	10	6	3.15	2.5	5.0	2	1	0167861
4	0.70	3.3	65	12	8	4.0	3.15	6.0	2	1	0127551
5	0.80	4.2	69	15	10	5.0	4.00	7.0	2	1	0127568
6	1.00	5.0	84	18	12	6.3	5.00	8.0	2	1	0127575
8	1.25	6.8	96	21	16	8.0	6.30	9.0	2	1	0127582
10	1.50	8.5	108	22	20	10.0	8.00	11.0	2	1	0127513
12	1.75	10.2	113	29	24	9.0	7.10	10.0	2	1	0127520
14	2.00	12.0	123	30	28	11.2	9.00	12.0	2	1	0127537
16	2.00	14.0	134	32	32	12.5	10.00	13.0	2	1	0127544

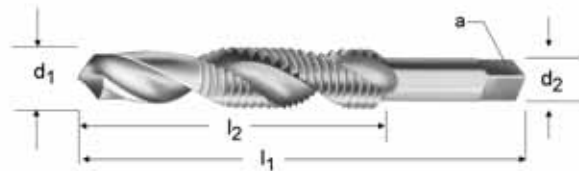
SPECIAL PURPOSE TAPS



Combination Drill & Tap, NPT Pipe Threads

E653 Spiral Flute 27°. Drills and taps in a single pass, reducing cycle time. Commonly used in multi-spindle operations with reversing capacity.

Bright finish improves chip flow in soft or non-ferrous materials.



E653

NPT

ANSI



1/16 - 1"

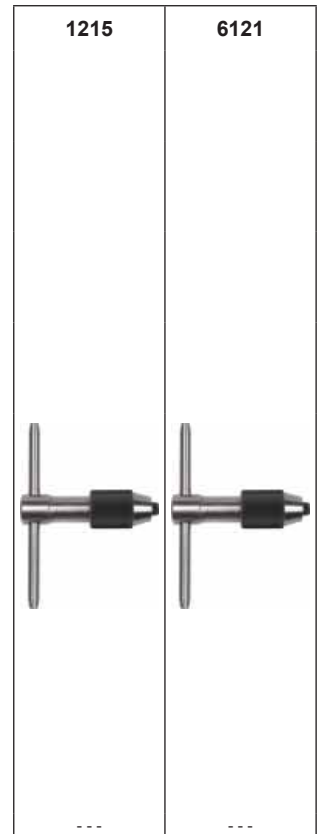
Nominal d_1	TPI NPT	d_1 Inch	l_1 Inch	l_2 Inch	d_2 Ø Inch	a Inch	No. of Flutes	Pack Qty	E653
1/16	27	0.2420	2.13/16	11/16	0.3120	0.2340	2	1	0297254
1/8	27	0.3320	2.7/8	3/4	0.4370	0.3280	2	1	0297285
1/4	18	0.4375	3.5/16	1.1/16	0.5620	0.4210	2	1	0297278
3/8	18	0.5625	3.1/2	1.1/16	0.7000	0.5310	2	1	0297308
1/2	14	0.7031	4.3/8	1.3/8	0.6870	0.5150	2	1	0297261
3/4	14	0.9062	4.9/16	1.3/8	0.9060	0.6790	2	1	0297292
1"	11.5	1.1406	5.3/8	1.3/4	1.1250	0.8430	2	1	0297247

Tap Wrench, T-Handle

1215

T-Handle tap wrenches have a sliding handle and chuck. Designed for hand tapping in tight places and can also be used with any tool that can be turned by hand.

6121



Tap Wrench Number	Hand Reamer Capacity	Hand Tap Capacity	Pack Qty	1215	6121
T0	1/16 - 3/16, #0-#8	-	1	—	8112000
T0	1/8 - 3/16, M3 - M5	1/16 - 5/32, M1 - M4	1	1810372	—
T1	3/16 - 5/16, M4 - M7	3/16 - 7/16, M4 - M10	1	1810373	—
T2	1/4 - 1/2	-	1	—	8112002
T2	1/4 - 15/32, M6 - M14	1/4 - 9/16, M6 - M14	1	1810374	—

TAPS

Tap Wrench, Straight Handle

3850 Straight handle tap wrenches are ideal for hand tapping. The straight handle design provides greater leverage, particularly suited for use with larger diameters. Simple to operate. Hardened steel jaws are opened and closed by simply twisting one hand which is knurled for side gripping.



3850



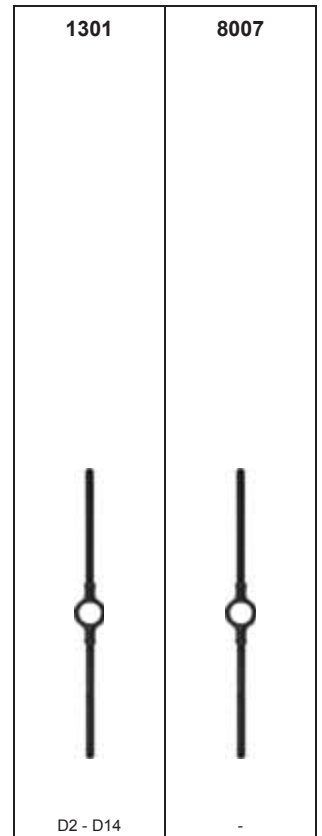
No.8 - No.14

Tap Wrench Number	Hand Reamer Capacity	Hand Tap Capacity	Pack Qty	3850
8	1/8 - 5/16, M3 - M8	1/16 - 5/16, M1 - M8	1	1810017
9	3/16 - 3/8, M5 - M9	3/16 - 1/2, M4 - M12	1	1810018
10	1/4 - 9/16, M6 - M14	1/4 - 3/4, M3 - M8	1	1810019
11	3/8 - 3/4, M9 - M19	3/8 - 1", M10 - M25	1	1810020
12	3/8 - 7/8, M9 - M22	3/8 - 1.1/8, M10 - M27	1	1810021
14	5/8 - 1.1/2, M16 - M39	7/8 - 1.7/8, M22 - M42	1	1810022

Die Stocks, Straight Handle

1301 Designed for use with round adjustable split dies. The die is held in place by two opposed cone point screws in the stock which locate in two indents in the die. When this is effected, the split in the die lines up opposite a third pointed set screw which can be run in to spread the die slightly for minute adjustment.

8007



Number	l_1		Pack Qty	1301	8007
	Inch				
200	14.3/4	2"	1	-	1810053
D2	6.3/8	13/16	1	1810042	-
D3	9"	1"	1	1810043	-
D6	14"	1.1/2	1	1810096	-
D14	40.3/4	3"	1	1810034	-

TAPS

Die Stocks, Straight Handle

L110 Designed for use with Dormer gun nosed dies. The die is held in place by two opposed cone point screws in the stock which locate in two indents in the die. When this is effected, the split in the die lines up opposite a third pointed set screw which can be run in to spread the die slightly for minute adjustment.



L110

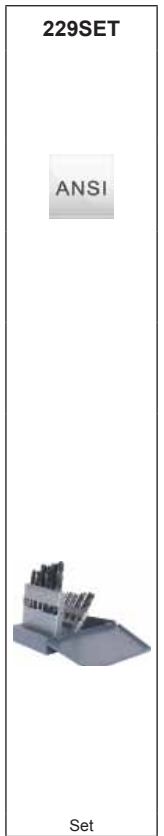


16.00 - 4"

Number	Ø x H	Pack Qty	L110
1	16 x 5	1	0111604
2a	20 x 5	1	0111611
2b	20 x 7	1	0111628
3	25 x 9	1	0111635
4	30 x 11	1	0111642
5	38 x 14	1	0111666
5f	38 x 10	1	0111659
6	45 x 18	1	0111680
6f	45 x 14	1	0111673
7	55 x 22	1	0111703
7f	55 x 16	1	0111697
8	65 x 25	1	0111727
8f	65 x 18	1	0111710
9	75 x 30	1	0111741
9f	75 x 20	1	0111734
10	90 x 36	1	0111765
10f	90 x 22	1	0111758
	13/16 x 1/4	1	0218013
	1 x 3/8	1	0218020
	1.5/16 x 7/16	1	0218037
	1.1/2 x 1/2	1	0218044
	2 x 5/8	1	0218051
	2.1/4 x 11/16	1	0218068
	3 x 7/8	1	0218075
	4 x 1	1	0218082

Tap & Drill Combination Sets

229SET 18 piece tap (styles 1500 and 1528) with corresponding drills (styles R10P & R18P). Metal index.



Nr.	A	B	Tap Sizes	Pack Qty	229SET
229C	1500,1528 taps; R10P and R18P drills	9	6-32,8-32,10-24,10-32,1/4-20,5/16-18,3/8-16,7/16-14,1/2-13	1	4111502
229M	1500,1528	9	6-32,8-32,10-24,10-32,1/4-20,5/16-18,3/8-16,7/16-14,1/2-13	1	8111502

Tap & Round Die Sets

3150



The sets feature both High Speed Steel taps and dies. Ground thread for longer tool life. All sets contain 1 plug tap and 1 round adjustable die for each cutting size, plus a corresponding die stock and tap wrench.

The metric sets also contain the appropriate tap drill sizes.

Furnished in a high quality, durable, wooden container.

3150



Set

Set No.	Description	Tap Wrench #	Die Stock #	Outside Diameter Dies	3150
Master Series	UNC TAP SIZES: 1/4-20, 5/16-18, 3/8-16, 7/16-14, 1/2-13, 9/16-12, 5/8-11 (16 piece set)	8-10	D-6	1.1/2"	1610078
	UNF TAP SIZES: 1/4-28, 5/16-24, 3/8-24, 7/16-20, 1/2-20, 9/16-18, 5/8-18 (16 piece set)	10	D-6	1.1/2"	1610079
General Purpose	UNC TAP SIZES: 1/4-20, 5/16-18, 3/8-16, 1/2-13, 9/16-12, 5/8-11, 2-56, 3-48, 6-32, 8-32, 10-24, 12-24 UNF TAP SIZES: 1/4-28, 5/16-24, 3/8-24, 1/2-20, 9/16-18, 5/8-18 UNS SIZE: 4-36 (42 piece set)	8-10	D-2 & D-6	13/16"(UNC); 1.1/2(UNC) 1.1/2(UNF)	1610080
70H	UNC TAP SIZES: 4-36NS, 6-32, 8-32, 10-24, 12-24, 1/4 - 20, 5/16 - 18 (16 piece set)	8	D-2	13/16"	1610065
70K	UNC TAP SIZES: 2-56, 3-48, 4-36 NS, 5-40, 6-32, 8-32, 10-24, 12-24, 1/4-20, 5/16 -18 (22 piece set)	8	D-2	13/16"	1610067
70M	UNF TAP SIZES: NC and NF 4-36 NS, 6-32, 8-32, 10-24, 10-32, 12-24, 1/4-20 (16 piece set)	8	D-2	13/16"	1610070
70P	UNF TAP SIZES: NC and NF 4-40, 4-48, 6-32, 6-40, 8-32, 8-36, 10-24, 10-32, 12-24, 12-28 (22 piece set)	8	D-2	13/16"	1610072
90A	UNC TAP SIZES: 1/4-20, 5/16-18, 3/8-16, 7/16-14, 1/2-13, 5/8-11 (15 piece set)	10	D3, D-6	1/4" to 3/8"-1, 7/16" to 5/8"-1.1/2"	1610076
90B	UNF TAP SIZES : 1/4-28, 5/16-24, 3/8-24, 7/16-20, 1/2-20, 5/8-18, 3/4-16, 7/8-14 (22 piece set)	9 and 11	D-3, D-6 200	1/4" to 3/8"-1"; 7/16" to 5/8"-1.1/2"; 3/4" to 7/8"-2"	1610077
1702M*	M2.0 x 0.40, M2.5 x 0.45, M3.0 x 0.50, M3.5 x 0.60, M4.0 x 0.70, M4.5 x 0.75, M5.0 x 0.80 AND Drill Sizes 1.6 mm, 2.05 mm, 2.5 mm, 2.9 mm, 3.3 mm, 3.7 mm, 4.2 mm (23 piece set)	T-0	D-2	13/16"	1610087
1703M*	1703M: M6 x 1.00, M7 x 1.00, M8 x 1.25, M10 x 1.50, M12 x 1.75 AND Drill Sizes 5.0 mm, 6.0 mm, 6.7 mm, 8.5 mm, 10.2 mm (17 piece set)	T-2	D-3	1"	1610088

*One plug tap, one round die and one tap drill for each cutting size

FLASH TAP

Service



SHIPMENT WITHIN 24-48 HOURS OF RECEIPT OF ORDER
(unless otherwise noted)

SURFACE TREATMENTS:

All taps are standard bright finish

- Steam Oxide, Nitride Oxide – add 24 hours
- Coated taps require an additional one week for delivery

ORDER PROCESSING:

Orders are accepted through authorized distributors only.

Orders received after 2:30 PM EST will be processed the following business day. All orders are subject to a +/- 10% shipment.

PHONE 800.639.1776
FAX 800.639.1876

We are pleased to present a carefully analyzed selection of semi-special tap products as a quick and reliable way to help solve your tap delivery requirements.

SPECIAL STOCK TAPS - Machine Screw, Fractional
Machine Screw Sizes (#00 - #14)
Fractional Sizes (1/8" - 4")

Includes:

Hand Tap	Pulley
Spiral Point	Extension Hand Tap
Left-Hand Hand Tap	Extension Spiral Point
Left-Hand Spiral Point	Pipe (Straight or Taper)
Oversize Hand Tap	Left-Hand Taper
Oversize Spiral Point	Spiral Flute Taper
Double Lead Hand Tap	Extension Taper
Spiral Flute Hand Tap	55° Modified Whitworth

SPECIAL STOCK TAPS - Metric

Carried in classes 6H and 4H

Includes:

Hand Tap	Oversize Spiral Point
Spiral Point	Extension Hand Tap
Left-Hand Hand Tap	Extension Spiral Point
Oversize Hand Tap	

SPECIAL STOCK HAND TAPS - HSS

Tables 302, 303 and 311
Straight Flute #0 - 1"
Straight Flute 1-1/16" - 4"
Spiral Flute #3 - 1"
Pipe (Straight or Taper)
Thread Forming
ACME Hand Taps

NOTE:

Special Taps in quantities greater than listed can be furnished to meet your specific delivery requirements.

Special Tap Prices not covered by this price schedule are available upon request.

Regular Tap Prices for standard sizes, pitches and "H" limits are available in our current price schedule.

Order Quantity and Shipment Schedule

Industry Standard ± 10% shipment policy applies on quantities over six.



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DIES

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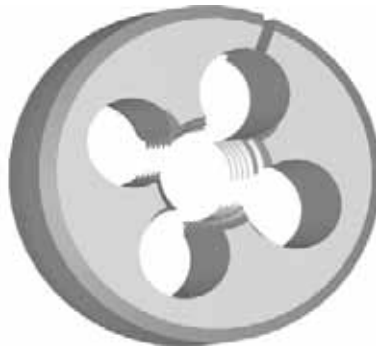
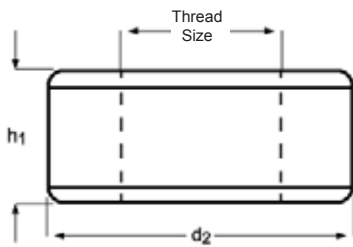


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Round Adjustable, Split Type

2010 Round adjustable dies can be closed down by approximately 0.006" on diameter. Bright finish improves chip flow in soft or non-ferrous materials.



2010(UNC)	2010(UNF)	2010(UNS)	2010(NPT)
UNC	UNF	UNS	NPT
CS	CS	CS	CS
ANSI	ANSI	ANSI	ANSI
No.1 - 1.1/2	No.0 - 1.1/2	No.4 - 1"	1/8 - 1/2

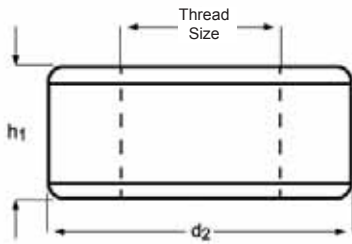
UNC	UNF	UNS	NPT	TPI	d ₂ Ø Inch	h ₁ Inch	Pack Qty	2010(UNC)	2010(UNF)	2010(UNS)	2010(NPT)
	0			80	13/16	1/4	1	-	1410002	-	-
1				64	13/16	1/4	1	1410004	-	-	-
	1			72	13/16	1/4	1	-	1410006	-	-
2				56	13/16	1/4	1	1410008	-	-	-
	2			64	13/16	1/4	1	-	1410010	-	-
3				48	13/16	1/4	1	1410012	-	-	-
	3			56	13/16	1/4	1	-	1410014	-	-
4				40	13/16	1/4	1	1410016	-	-	-
	4			48	13/16	1/4	1	-	1410018	-	-
		4		36	13/16	1/4	1	-	-	1410020	-
5				40	13/16	1/4	1	1410022	-	-	-
	5			44	13/16	1/4	1	-	1410024	-	-
6				32	13/16	1/4	1	1410026	-	-	-
6				32	1"	3/8	1	1410027	-	-	-
	6			40	13/16	1/4	1	-	1410029	-	-
8				32	13/16	1/4	1	1410032	-	-	-
8				32	1"	3/8	1	1410033	-	-	-
	8			36	13/16	1/4	1	-	1410035	-	-
10				24	13/16	1/4	1	1410038	-	-	-
10				24	1"	3/8	1	1410039	-	-	-
	10			32	13/16	1/4	1	-	1410041	-	-
	10			32	1"	3/8	1	-	1410042	-	-
12				24	13/16	1/4	1	1410044	-	-	-
12				24	1"	3/8	1	1410045	-	-	-
	12			28	13/16	1/4	1	-	1410047	-	-
		1/8		27	1"	3/8	1	-	-	-	1410203
		1/8		27	1.1/2	1/2	1	-	-	-	1410204
1/4				20	13/16	1/4	1	1410063	-	-	-
1/4				20	1"	3/8	1	1410064	-	-	-
1/4				20	1.1/2	1/2	1	1410066	-	-	-
1/4				20	2"	5/8	1	1410067	-	-	-
	1/4			32	1"	3/8	1	-	1410077	-	-
	1/4			28	1"	3/8	1	-	1410069	-	-

UNC	UNF	UNS	NPT	TPI	d ₂ Ø Inch	h ₁ Inch	Pack Qty	2010(UNC)	2010(UNF)	2010(UNS)	2010(NPT)
	1/4			28	1.1/2	1/2	1	-	1410071	-	-
	1/4			28	13/16	1/4	1	-	1410068	-	-
	1/4			28	2"	5/8	1	-	1410072	-	-
		1/4		24	1"	3/8	1	-	-	1410074	-
			1/4	18	1.1/2	1/2	1	-	-	-	1410205
			1/4	18	2"	5/8	1	-	-	-	1410206
5/16				18	13/16	1/4	1	1410079	-	-	-
5/16				18	1"	3/8	1	1410080	-	-	-
5/16				18	1.1/2	1/2	1	1410082	-	-	-
5/16				18	2"	5/8	1	1410083	-	-	-
	5/16			24	1"	3/8	1	-	1410085	-	-
	5/16			24	1.1/2	1/2	1	-	1410087	-	-
	5/16			24	2"	5/8	1	-	1410088	-	-
		5/16		32	1"	3/8	1	-	-	1410090	-
3/8				16	1"	3/8	1	1410093	-	-	-
3/8				16	1.1/2	1/2	1	1410095	-	-	-
3/8				16	2"	5/8	1	1410096	-	-	-
	3/8			24	1"	3/8	1	-	1410097	-	-
	3/8			24	1.1/2	1/2	1	-	1410099	-	-
	3/8			24	2"	5/8	1	-	1410100	-	-
			3/8	18	1.1/2	1/2	1	-	-	-	1410207
			3/8	18	2"	5/8	1	-	-	-	1410208
7/16				14	1"	3/8	1	1410101	-	-	-
7/16				14	1.1/2	1/2	1	1410103	-	-	-
7/16				14	2"	5/8	1	1410104	-	-	-
	7/16			20	1"	3/8	1	-	1410105	-	-
	7/16			20	1.1/2	1/2	1	-	1410107	-	-
	7/16			20	2"	5/8	1	-	1410108	-	-
1/2				13	1.1/2	1/2	1	1410110	-	-	-
1/2				13	2"	5/8	1	1410111	-	-	-
	1/2			20	1.1/2	1/2	1	-	1410114	-	-
	1/2			20	2"	5/8	1	-	1410115	-	-
			1/2	14	2"	5/8	1	-	-	-	1410209
9/16				12	1.1/2	1/2	1	1410117	-	-	-
9/16				12	2"	5/8	1	1410118	-	-	-
	9/16			18	1.1/2	1/2	1	-	1410120	-	-
	9/16			18	2"	5/8	1	-	1410121	-	-
5/8				11	1.1/2	1/2	1	1410123	-	-	-
5/8				11	2"	5/8	1	1410124	-	-	-
	5/8			18	1.1/2	1/2	1	-	1410126	-	-
	5/8			18	2"	5/8	1	-	1410127	-	-
3/4				10	2"	5/8	1	1410131	-	-	-
	3/4			16	2"	5/8	1	-	1410133	-	-
7/8				9	2"	5/8	1	1410135	-	-	-
	7/8			14	2"	5/8	1	-	1410137	-	-
1"				8	3"	1	1	1410140	-	-	-
	1"			12	3"	1	1	-	1410142	-	-
		1"		14	3"	1	1	-	-	1410144	-
1.1/8				7	3"	1	1	1410145	-	-	-
	1.1/8			12	3"	1	1	-	1410146	-	-
1.1/4				7	3"	1	1	1410147	-	-	-
	1.1/4			12	3"	1	1	-	1410148	-	-
1.3/8				6	3"	1	1	1410149	-	-	-
	1.3/8			12	3"	1	1	-	1410150	-	-
1/1/2				6	3"	1	1	1410151	-	-	-
	1.1/2			12	3"	1	1	-	1410152	-	-

DIES

Round Adjustable, Split Type

2510 Round adjustable dies can be closed down by approximately 0.006" on diameter. Bright finish improves chip flow in soft or non-ferrous materials.



2510(UNC)	2510(UNF)
UNC	UNF
HSS	HSS
ANSI	ANSI
No.5 - 7/8	No.5 - 7/8

UNC	UNF	TPI	d_2 \emptyset Inch	h_1 Inch	Pack Qty	2510(UNC)	2510(UNF)
5		40	13/16	1/4	1	1410153	-
	5	44	13/16	1/4	1	-	1410154
6		32	13/16	1/4	1	1410155	-
6		32	1"	3/8	1	1410156	-
	6	40	13/16	1/4	1	-	1410157
8		32	13/16	1/4	1	1410159	-
8		32	1"	3/8	1	1410160	-
	8	36	13/16	1/4	1	-	1410161
10		24	13/16	1/4	1	1410163	-
10		24	1"	3/8	1	1410164	-
	10	32	13/16	1/4	1	-	1410166
	10	32	1"	3/8	1	-	1410165
12		24	13/16	1/4	1	1410167	-
12		24	1"	3/8	1	1410168	-
	12	28	13/16	1/4	1	-	1410169
1/4		20	13/16	1/4	1	1410171	-
1/4		20	1"	3/8	1	1410172	-
1/4		20	1.1/2	1/2	1	1410173	-
	1/4	28	13/16	1/4	1	-	1410174
	1/4	28	1"	3/8	1	-	1410175
	1/4	28	1.1/2	1/2	1	-	1410176
5/16		18	13/16	1/4	1	1410177	-
5/16		18	1"	3/8	1	1410178	-
5/16		18	1.1/2	1/2	1	1410179	-
	5/16	24	13/16	1/4	1	-	1410180
	5/16	24	1"	3/8	1	-	1410181
	5/16	24	1.1/2	1/2	1	-	1410182
3/8		16	1"	3/8	1	1410183	-
3/8		16	1.1/2	1/2	1	1410184	-
	3/8	24	1"	3/8	1	-	1410185
	3/8	24	1.1/2	1/2	1	-	1410186
7/16		14	1"	3/8	1	1410187	-
7/16		14	1.1/2	1/2	1	1410188	-

UNC	UNF	TPI	d ₂ Ø Inch	h ₁ Inch	Pack Qty	2510(UNC)	2510(UNF)
	7/16	20	1"	3/8	1	-	1410189
	7/16	20	1.1/2	1/2	1	-	1410190
1/2		13	1.1/2	1/2	1	1410191	-
	1/2	20	1.1/2	1/2	1	-	1410192
9/16		12	1.1/2	1/2	1	1410193	-
	9/16	18	1.1/2	1/2	1	-	1410194
5/8		11	1.1/2	1/2	1	1410195	-
5/8		11	2"	5/8	1	1410196	-
	5/8	18	1.1/2	1/2	1	-	1410197
	5/8	18	2"	5/8	1	-	1410198
3/4		10	2"	5/8	1	1410199	-
	3/4	16	2"	5/8	1	-	1410200
7/8		9	2"	5/8	1	1410201	-
	7/8	14	2"	5/8	1	-	1410202

DIES

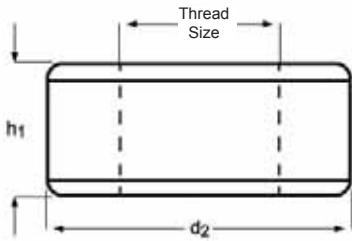


Round Adjustable, Split Type

F320 Round adjustable dies can be closed down by approximately 0.006" on diameter. Bright finish improves chip flow in soft or non-ferrous materials.

F330

F320	F330
UNC	UNF
HSS	HSS
BS 1127: 1950	BS 1127: 1950
No.4 - 1.1/4	No.4 - 1.1/2



UNC	UNF	TPI	d ₁ nom mm	d ₂ Ø Inch	h ₁ Inch	Pack Qty	F320	F330
4		40	2.85	13/16	1/4	1	0206614	-
	4	48	2.85	13/16	1/4	1	-	0207307
5		40	3.18	13/16	1/4	1	0206621	-
	5	44	3.18	13/16	1/4	1	-	0207314
6		32	3.51	13/16	1/4	1	0206645	-
	6	40	3.51	13/16	1/4	1	-	0207338
8		32	4.17	1"	3/8	1	0206676	-
8		32	4.17	13/16	1/4	1	0206669	-
	8	36	4.17	13/16	1/4	1	-	0207352
10		24	4.83	1"	3/8	1	0206690	-
10		24	4.83	13/16	1/4	1	0206683	-
	10	32	4.83	13/16	1/4	1	-	0207376
	10	32	4.83	1"	3/8	1	-	0207383
12		24	5.49	13/16	1/4	1	0206706	-
	12	28	5.49	13/16	1/4	1	-	0207390
1/4		20	6.35	1"	3/8	1	0206737	-
1/4		20	6.35	1.1/2	1/2	1	0206751	-
1/4		20	6.35	1.5/16	7/16	1	0206744	-
1/4		20	6.35	13/16	1/4	1	0206720	-
	1/4	28	6.35	1"	3/8	1	-	0207420
	1/4	28	6.35	1.1/2	1/2	1	-	0207444
	1/4	28	6.35	13/16	1/4	1	-	0207413
5/16		18	7.94	1"	3/8	1	0206768	-
5/16		18	7.94	1.1/2	1/2	1	0206782	-
	5/16	24	7.94	1"	3/8	1	-	0207451
	5/16	24	7.94	1.1/2	1/2	1	-	0207475
	5/16	24	7.94	1.5/16	7/16	1	-	0207468
3/8		16	9.53	1"	3/8	1	0206799	-
3/8		16	9.53	1.1/2	1/2	1	0206812	-
3/8		16	9.53	1.5/16	7/16	1	0206805	-
	3/8	24	9.53	1"	3/8	1	-	0207482
	3/8	24	9.53	1.1/2	1/2	1	-	0207505
	3/8	24	9.53	1.5/16	7/16	1	-	0207499

UNC	UNF	TPI	d ₁ nom mm	d ₂ Ø Inch	h ₁ Inch	Pack Qty	F320	F330
7/16		14	11.11	1.1/2	1/2	1	0206850	-
7/16		14	11.11	1.5/16	7/16	1	0206843	-
	7/16	20	11.11	1"	3/8	1	-	0207512
	7/16	20	11.11	1.1/2	1/2	1	-	0207536
	7/16	20	11.11	1.5/16	7/16	1	-	0207529
1/2		13	12.70	1.1/2	1/2	1	0206874	-
1/2		13	12.70	1.5/16	7/16	1	0206867	-
1/2		13	12.70	2"	5/8	1	0206881	-
	1/2	20	12.70	1.1/2	1/2	1	-	0207550
	1/2	20	12.70	1.5/16	7/16	1	-	0207543
9/16		12	14.29	1.1/2	1/2	1	0206904	-
	9/16	18	14.29	1.1/2	1/2	1	-	0207581
	9/16	18	14.29	1.5/16	7/16	1	-	0207574
5/8		11	15.88	1.1/2	1/2	1	0206928	-
5/8		11	15.88	2"	5/8	1	0206935	-
	5/8	18	15.88	1.1/2	1/2	1	-	0207604
	5/8	18	15.88	2"	5/8	1	-	0207611
3/4		10	19.05	1.1/2	1/2	1	0206959	-
3/4		10	19.05	2"	5/8	1	0206966	-
	3/4	16	19.05	1.1/2	1/2	1	-	0207635
	3/4	16	19.05	2"	5/8	1	-	0207642
7/8		9	22.23	2"	5/8	1	0206973	-
	7/8	14	22.23	2"	5/8	1	-	0207659
1"		8	25.40	2"	5/8	1	0206980	-
	1"	12	25.40	2"	5/8	1	-	0207666
1.1/8		7	28.58	3"	7/8	1	0206997	-
	1.1/8	12	28.58	3"	7/8	1	-	0207673
1.1/4		7	31.75	3"	7/8	1	0207000	-
	1.1/4	12	31.75	3"	7/8	1	-	0207680
	1.1/2	12	38.10	3"	7/8	1	-	0207703

Round Adjustable, Split Type

2710M Round adjustable dies can be closed down by approximately 0.006" on diameter. Bright finish improves chip flow in soft or non-ferrous materials.

2710M

M

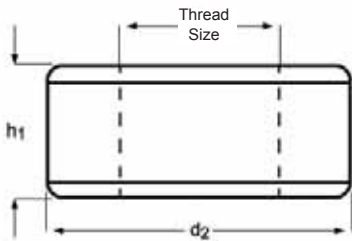
HSS



ANSI



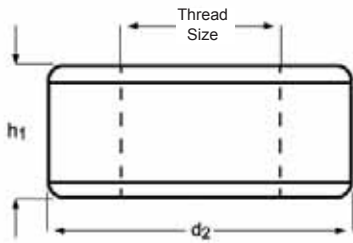
M2 - M20



M	P mm	d ₂ Ø Inch	h ₁ Inch	Pack Qty	2710M
2	0.40	13/16	1/4	1	1410573
2.3	0.40	13/16	1/4	1	1410574
2.5	0.45	13/16	1/4	1	1410575
2.6	0.45	13/16	1/4	1	1410576
3	0.50	13/16	1/4	1	1410577
3.5	0.60	13/16	1/4	1	1410578
4	0.70	13/16	1/4	1	1410579
4.5	0.75	13/16	1/4	1	1410580
5	0.80	13/16	1/4	1	1410581
6	1.00	1"	3/8	1	1410582
7	1.00	1"	3/8	1	1410583
8	1.25	1"	3/8	1	1410584
9	1.25	1"	3/8	1	1410585
10.0	1.50	1"	3/8	1	1410586
11.0	1.50	1"	3/8	1	1410587
12	1.75	1"	3/8	1	1410630
12	1.75	1.1/2	1/2	1	1410588
14	2.00	1.1/2	1/2	1	1410589
16	2.00	1.1/2	1/2	1	1410590
18	2.50	2"	5/8	1	1410591
20	2.50	2"	5/8	1	1410592

Round Adjustable, Split Type

F370 Round adjustable dies can be closed down by approximately 0.006" on diameter. Bright finish improves chip flow in soft or non-ferrous materials.



F370

G

HSS

BS 1127:1950

1/8 - 1.1/2

G(BSP)	TPI	d ₁ nom mm	d ₂ Ø Inch	h ₁ Inch	Pack Qty	F370
1/8	28	9.73	1"	3/8	1	0209325
1/4	19	13.16	1.5/16	7/16	1	0209332
3/8	19	16.66	1.1/2	1/2	1	0209349
1/2	14	20.96	2"	5/8	1	0209356
5/8	14	22.91	2"	5/8	1	0209363
3/4	14	26.44	2"	5/8	1	0209370
7/8	14	30.20	2.1/4	11/16	1	0209387
1"	11	33.25	2.1/4	11/16	1	0209394
1.1/4	11	41.91	3"	7/8	1	0209400
1.1/2	11	47.80	4"	1"	1	0209417

Gun Nosed Dies (Left Hand)

F201 Left hand gun nosed dies have a chamfer length similar to semi-bottoming taps to lead the threads. This design direct chips away from the cutting area. Bright finish improves chip flow in soft or non-ferrous materials.

F201

M

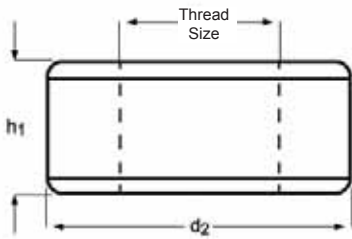
HSS



ISO
2568



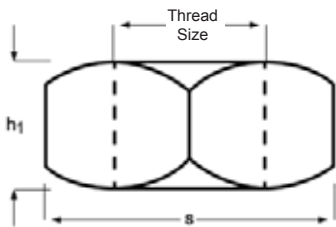
M3 - M20



M	P mm	d ₂ Ø mm	h ₁ mm	Pack Qty	F201
3	0.50	20	5	1	0164747
4	0.70	20	5	1	0105030
5	0.80	20	7	1	0105047
6	1.00	20	7	1	0105054
8	1.25	25	9	1	0105061
10	1.50	30	11	1	0104996
12	1.75	38	14	1	0105009
14	2.00	38	14	1	0105016
16	2.00	45	14	1	0105023
18	2.50	45	18	1	0164754
20	2.50	45	18	1	0164761

Hexagon Rethreading Bolt Dies (Dienuts)

2025 Rethreading bolt dies (dienuts) are used for reclaiming or cleaning up threads by hand. They are not normally used for cutting threads from solid. Bright finish improves chip flow in soft or non-ferrous materials.



2025(UNC)	2025(UNF)	2025(UNS)	2025(NPT)
UNC	UNF	UNS	NPT
CS	CS	CS	CS
1/4 - 1.1/4	1/4 - 1.1/8	11/16 - 1"	1/8 - 1"

UNC	UNF	UNS	NPT	TPI	s Inch	h1 Inch	Pack Qty	2025(UNC)	2025(UNF)	2025(UNS)	2025(NPT)
			1/8	27	1.1/16	3/8	1	-	-	-	1410270
1/4				20	19/32	1/2	1	1410239	-	-	-
	1/4			28	19/32	1/2	1	-	1410240	-	-
			1/4	18	1.1/4	5/8	1	-	-	-	1410271
5/16				18	11/16	5/16	1	1410241	-	-	-
	5/16			24	11/16	5/16	1	-	1410242	-	-
3/8				16	25/32	3/8	1	1410243	-	-	-
	3/8			24	25/32	3/8	1	-	1410244	-	-
			3/8	18	1.1/16	5/8	1	-	-	-	1410272
7/16				14	7/8	7/16	1	1410245	-	-	-
	7/16			20	7/8	7/16	1	-	1410246	-	-
1/2				13	1.1/16	1/2	1	1410247	-	-	-
	1/2			20	1.1/16	1/2	1	-	1410248	-	-
			1/2	14	1.5/8	3/4	1	-	-	-	1410273
9/16				12	1.1/16	1/2	1	1410249	-	-	-
	9/16			18	1.1/16	1/2	1	-	1410250	-	-
5/8				11	1.1/4	5/8	1	1410251	-	-	-
	5/8			18	1.1/4	5/8	1	-	1410252	-	-
		11/16		11	1.7/16	3/4	1	-	-	1410253	-
		11/16		16	1.7/16	3/4	1	-	-	1410254	-
3/4				10	1.7/16	3/4	1	1410255	-	-	-
	3/4			16	1.7/16	3/4	1	-	1410256	-	-
			3/4	14	2"	13/16	1	-	-	-	1410274
7/8				9	1.5/8	7/8	1	1410257	-	-	-
	7/8			14	1.5/8	7/8	1	-	1410258	-	-
1"				8	1.13/16	1"	1	1410259	-	-	-
	1"			12	1.13/16	1"	1	-	1410260	-	-
		1"		14	1.13/16	1"	1	-	-	1410261	-
			1"	11.5	2.3/8	1"	1	-	-	-	1410275
1.1/8				7	2"	1"	1	1410262	-	-	-
	1.1/8			12	2"	1"	1	-	1410263	-	-
1.1/4				7	2.3/16	1"	1	1410264	-	-	-
	1.1/4			12	2.3/16	1"	1	-	1410265	-	-
1.3/8				6	2.3/8	1"	1	1410266	-	-	-
	1.3/8			12	2.3/8	1"	1	-	1410267	-	-
1.1/2				6	2.9/16	1"	1	1410268	-	-	-
	1.1/2			12	2.9/16	1"	1	-	1410269	-	-

Hexagon Rethreading Die Sets (Dienuts)

2025S Rethreading bolt dies (dienuts) are used for reclaiming or cleaning up threads by hand. They are not normally used for cutting threads from solid. Bright finish improves chip flow in soft or non-ferrous materials.

2025S

ANSI

CS

ANSI

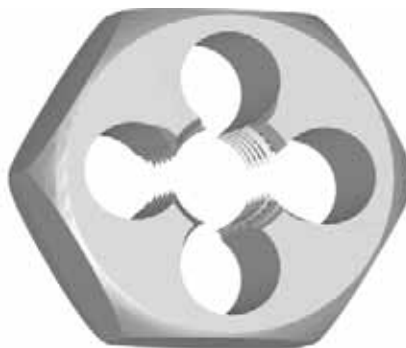
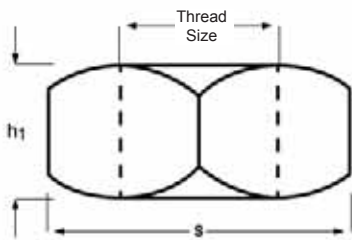
Set



Nr.	Description	Pcs	UNC		UNF		Pack Qty	2025S
821	Hexagon Dienut	8	1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 3/4				1	1410277
822	Hexagon Dienut	10	1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 3/4, 7/8, 1"				1	1410278
831	Hexagon Dienut	8			1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 3/4		1	1410280
832	Hexagon Dienut	10			1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 3/4, 7/8, 1"		1	1410281
824	Hexagon Dienut	10	1/4, 5/16, 3/8, 7/16, 1/2		1/4, 5/16, 3/8, 7/16, 1/2		1	1410282
825	Hexagon Dienut	16	1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 3/4		1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 3/4		1	1410283

Hexagon Rethreading Bolt Dies (Dienuts)

2325M Rethreading bolt dies (dienuts) are used for reclaiming or cleaning up threads by hand. They are not normally used for cutting threads from solid. Bright finish improves chip flow in soft or non-ferrous materials.



2325M

M

CS

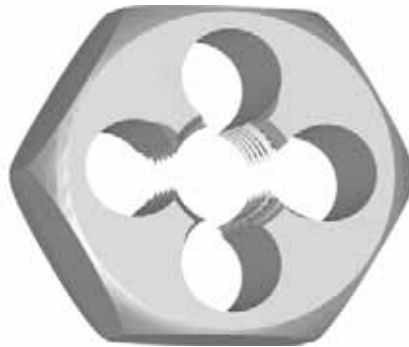
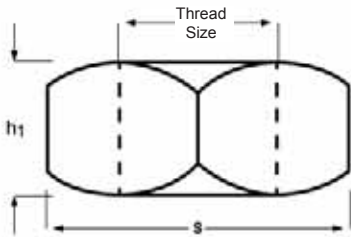
ANSI

M6 - M20

M	P mm	s Inch	h1 Inch	Pack Qty	2325M
6	1.00	19/32	1/4	1	1410609
7	1.00	11/16	5/16	1	1410610
8	1.25	11/16	5/16	1	1410611
9	1.25	25/32	3/8	1	1410612
10.0	1.50	7/8	7/16	1	1410613
11.0	1.50	7/8	7/16	1	1410614
12	1.75	1.1/16	1/2	1	1410615
14	1.25	1.1/16	1/2	1	1410617
14	2.00	1.1/16	1/2	1	1410616
16	2.00	1.1/4	5/8	1	1410618
18	1.50	1.7/16	3/4	1	1410620
18	2.50	1.7/16	3/4	1	1410619
20	2.50	1.7/16	3/4	1	1410621

Hexagon Rethreading Bolt Dies (Dienuts)

F302 Rethreading bolt dies (dienuts) are used for reclaiming or cleaning up threads by hand. They are not normally used for cutting threads from solid. Bright finish improves chip flow in soft or non-ferrous materials.



F302

M

HSS



BS
1127:
1950

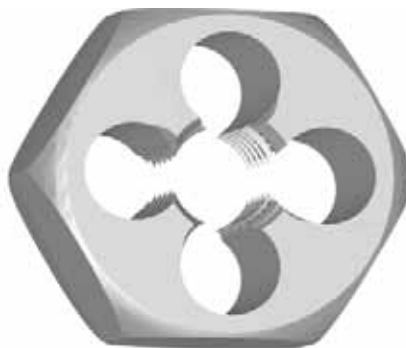
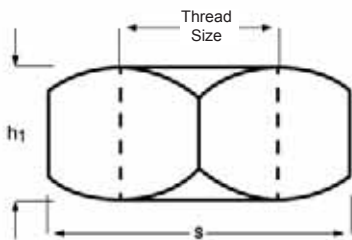


M3 - M36

M	P mm	S Inch	h1 Inch	Pack Qty	F302
3	0.50	0.7100	1/4	1	0105627
4	0.70	0.7100	1/4	1	0105672
5	0.80	0.7100	1/4	1	0105719
6	1.00	0.7100	1/4	1	0105733
7	1.00	0.8200	5/16	1	0105740
8	1.25	0.8200	5/16	1	0105757
9	1.25	0.9200	3/8	1	0105764
10	1.50	0.9200	3/8	1	0105528
11	1.50	1.0100	7/16	1	0105535
12	1.75	1.1000	1/2	1	0105542
14	2.00	1.3000	5/8	1	0105559
16	2.00	1.3000	5/8	1	0105566
18	2.50	1.4800	11/16	1	0105573
20	2.50	1.4800	11/16	1	0105580
22	2.50	1.6700	13/16	1	0105597
24	3.00	2.0500	15/16	1	0105603
27	3.00	2.2200	1.1/16	1	0105610
30	3.50	2.2200	1.1/16	1	0105634
33	3.50	2.5800	1.1/8	1	0105641
36	4.00	2.7600	1.1/4	1	0105658

Hexagon Rethreading Bolt Dies (Dienuts)

F312 Rethreading bolt dies (dienuts) are used for reclaiming or cleaning up threads by hand. They are not normally used for cutting threads from solid. Bright finish improves chip flow in soft or non-ferrous materials.



F312

MF

HSS

BS
1127:
1950

M8 - M24

MF	P mm	S Inch	h1 Inch	Pack Qty	F312
8	0.75	0.8200	5/16	1	0206331
8	1.00	0.8200	5/16	1	0206348
10	1.00	0.9200	3/8	1	0206379
10	1.25	0.9200	3/8	1	0206386
12	1.00	1.0100	7/16	1	0206393
12	1.25	1.0100	7/16	1	0206409
12	1.50	1.0100	7/16	1	0206416
14	1.50	1.3000	5/8	1	0206430
16	1.50	1.3000	5/8	1	0206454
18	1.50	1.4800	11/16	1	0206461
20	1.50	1.4800	11/16	1	0206485
22	1.50	1.6700	13/16	1	0206508
24	1.50	2.0500	15/16	1	0206522
24	2.00	2.0500	15/16	1	0206539



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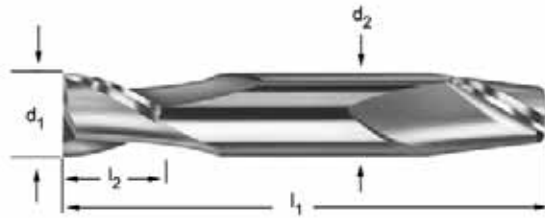
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Solid Carbide 2 Flute End Mill



Stub Length, Square End, Double End

E2302 Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft and non-ferrous materials.



E2302



1/16 - 1/2

d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E2302
1/16	0.0625	1/8	1/8	1.1/2	2	1	002002
3/32	0.0938	1/8	3/16	1.1/2	2	1	002003
1/8	0.1250	1/8	1/4	1.1/2	2	1	002004
3/16	0.1875	3/16	3/8	2"	2	1	002006
1/4	0.2500	1/4	1/2	2.1/2	2	1	002008
5/16	0.3125	5/16	1/2	2.1/2	2	1	002009
3/8	0.3750	3/8	1/2	2.1/2	2	1	002010
1/2	0.5000	1/2	5/8	3"	2	1	002012



Solid Carbide 2 Flute End Mill

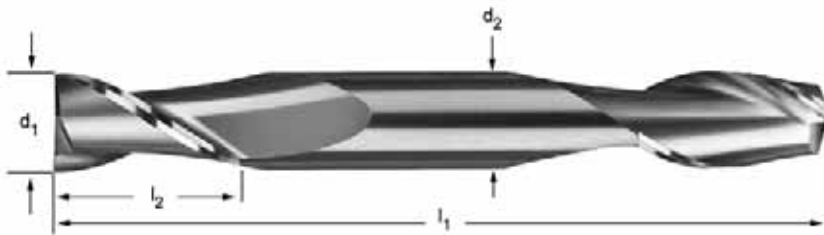
Regular Length, Square End, Double End

E4302 Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft and non-ferrous materials.

E4302



1/8 - 1/2



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E4302
1/8	0.1250	3/8	3/8	3"	2	1	002200
5/32	0.1562	3/8	7/16	3"	2	1	002201
3/16	0.1875	3/8	1/2	3"	2	1	002202
7/32	0.2188	3/8	9/16	3"	2	1	002203
1/4	0.2500	3/8	5/8	3"	2	1	002204
5/16	0.3125	3/8	3/4	3.1/2	2	1	002206
3/8	0.3750	3/8	3/4	3.1/2	2	1	002208
7/16	0.4375	7/16	7/8	4"	2	1	002209
1/2	0.5000	1/2	1"	4"	2	1	002210

Solid Carbide 2 Flute End Mill



Regular Length, Square End

E3302 Bright finish improves chip flow in soft and non-ferrous materials.

E3302V TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E3302	E3302V
1/16	0.0625	1/8	1/4	1.1/2	2	1	001000	002850
5/64	0.0781	1/8	1/4	1.1/2	2	1	001001	002851
3/32	0.0938	1/8	3/8	1.1/2	2	1	001002	002852
7/64	0.1094	1/8	3/8	1.1/2	2	1	001003	002853
1/8	0.1250	1/8	1/2	1.1/2	2	1	001004	002854
9/64	0.1406	3/16	9/16	2"	2	1	001005	002855
5/32	0.1562	3/16	9/16	2"	2	1	001006	002856
11/64	0.1719	3/16	9/16	2"	2	1	001007	002857
3/16	0.1875	3/16	5/8	2"	2	1	001008	002858
13/64	0.2031	1/4	5/8	2.1/2	2	1	001009	002859
7/32	0.2188	1/4	5/8	2.1/2	2	1	001010	002860
15/64	0.2344	1/4	3/4	2.1/2	2	1	001011	002861
1/4	0.2500	1/4	3/4	2.1/2	2	1	001012	002862
5/16	0.3125	5/16	7/8	2.1/2	2	1	001016	002863
3/8	0.3750	3/8	7/8	2.1/2	2	1	001017	002864
7/16	0.4375	7/16	1"	2.1/2	2	1	001018	002865
1/2	0.5000	1/2	1"	3"	2	1	001019	002866
9/16	0.5625	9/16	1.1/4	3.1/2	2	1	001020	002867
5/8	0.6250	5/8	1.1/4	3.1/2	2	1	001021	002868
11/16	0.6875	3/4	1.1/2	4"	2	1	001022	002869
3/4	0.7500	3/4	1.1/2	4"	2	1	001023	002870
7/8	0.8750	7/8	1.1/2	4"	2	1	001024	002871
1"	1.0000	1"	1.1/2	4"	2	1	001025	002872



Solid Carbide 2 Flute End Mill

Regular Length, Square End

E3302M Bright finish improves chip flow in soft and non-ferrous materials.

E3302MV TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d ₁ Ø mm	d ₁ decimal Inch	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	Pack Qty	E3302M	E3302MV
2.00	0.0787	3.0	6.0	38.0	2	1	001028	004275
2.50	0.0984	3.0	6.0	38.0	2	1	001029	004276
3.00	0.1181	3.0	12.0	38.0	2	1	001030	004277
3.50	0.1378	4.0	14.0	50.0	2	1	001031	004278
4.00	0.1575	4.0	14.0	50.0	2	1	001032	004279
4.50	0.1772	5.0	14.0	50.0	2	1	001033	004280
5.00	0.1969	5.0	16.0	50.0	2	1	001034	004281
6.00	0.2362	6.0	19.0	63.0	2	1	001035	004282
7.00	0.2756	8.0	19.0	63.0	2	1	001036	004283
8.00	0.3150	8.0	20.0	63.0	2	1	001037	004284
9.00	0.3543	10.0	22.0	70.0	2	1	001038	004285
10.00	0.3937	10.0	22.0	70.0	2	1	001039	004286
11.00	0.4331	11.0	25.0	70.0	2	1	001040	004287
12.00	0.4724	12.0	25.0	75.0	2	1	001041	004288
14.00	0.5512	14.0	30.0	88.0	2	1	001043	004289
16.00	0.6299	16.0	32.0	88.0	2	1	001044	004290
18.00	0.7087	18.0	36.0	100.0	2	1	001045	004291
20.00	0.7874	20.0	38.0	100.0	2	1	001046	004292
25.00	0.9843	25.0	38.0	100.0	2	1	001047	004293

Solid Carbide 2 Flute End Mill



Long Length, Square End

E5302 Bright finish improves chip flow in soft and non-ferrous materials.

E5302V TiAIN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E5302	E5302V
1/8	0.1250	1/8	3/4	2"	2	1	000000	000010
3/16	0.1875	3/16	3/4	2.1/2	2	1	000001	000011
1/4	0.2500	1/4	1.1/8	3"	2	1	000002	000012
5/16	0.3125	5/16	1.1/8	3"	2	1	000003	000013
3/8	0.3750	3/8	1.1/8	3"	2	1	000004	000014
7/16	0.4375	7/16	2"	4"	2	1	000005	000015
1/2	0.5000	1/2	2"	4"	2	1	000006	000016
5/8	0.6250	5/8	2.1/4	5"	2	1	000007	000017
3/4	0.7500	3/4	2.1/4	5"	2	1	000008	000018
1"	1.000	1"	2"	6"	2	1	000009	000019

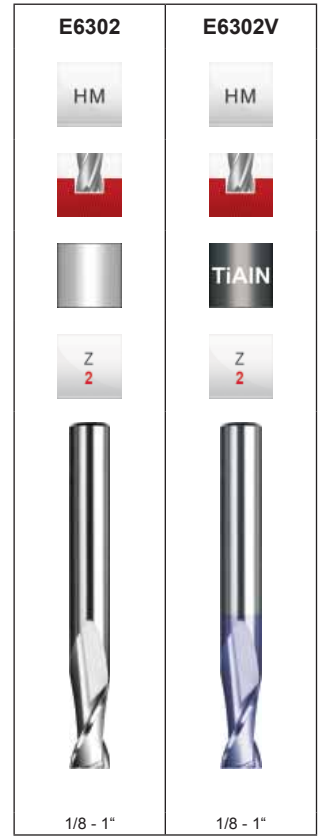
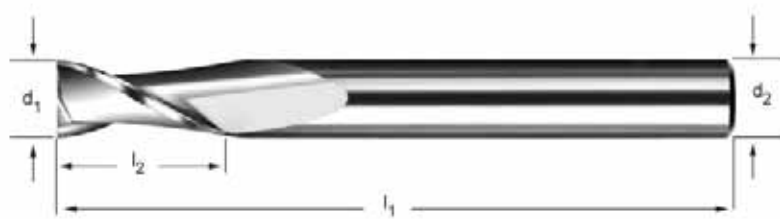


Solid Carbide 2 Flute End Mill

Extra Long Length, Square End

E6302 Bright finish improves chip flow in soft and non-ferrous materials.

E6302V TiAIN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E6302	E6302V
1/8	0.1250	1/8	1"	3"	2	1	004800	003130
3/16	0.1875	3/16	1.1/8	3"	2	1	004801	003131
1/4	0.2500	1/4	1.1/2	4"	2	1	004802	003132
5/16	0.3125	5/16	1.5/8	4"	2	1	004803	003133
3/8	0.3750	3/8	1.3/4	4"	2	1	004804	003134
7/16	0.4375	7/16	3"	6"	2	1	004805	003135
1/2	0.5000	1/2	3"	6"	2	1	004806	003136
5/8	0.6250	5/8	3"	6"	2	1	004807	003137
3/4	0.7500	3/4	3"	6"	2	1	004808	003138
1"	1.0000	1"	3"	6"	2	1	004809	003139

Solid Carbide 2 Flute End Mill



Regular Length, Ball Nose

EB3302 Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

EB3302V Ball nose for cutting internal part radius. TiAlN coating increases surface hardness, improves chip flow and tool life, allowing higher metal removal rates.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	EB3302	EB3302V
1/16	0.0625	1/8	1/4	1.1/2	2	1	001200	002630
5/64	0.0781	1/8	1/4	1.1/2	2	1	001201	002631
3/32	0.0938	1/8	3/8	1.1/2	2	1	001202	002632
7/64	0.1094	1/8	3/8	1.1/2	2	1	001203	002633
1/8	0.1250	1/8	1/2	1.1/2	2	1	001204	002634
9/64	0.1406	3/16	9/16	2"	2	1	001205	002635
5/32	0.1562	3/16	9/16	2"	2	1	001206	002636
11/64	0.1719	3/16	9/16	2"	2	1	001207	002637
3/16	0.1875	3/16	5/8	2"	2	1	001208	002638
13/64	0.2031	1/4	5/8	2.1/2	2	1	001209	002639
7/32	0.2188	1/4	5/8	2.1/2	2	1	001210	002640
15/64	0.2344	1/4	3/4	2.1/2	2	1	001211	002641
1/4	0.2500	1/4	3/4	2.1/2	2	1	001212	002642
5/16	0.3125	5/16	7/8	2.1/2	2	1	001216	002643
3/8	0.3750	3/8	7/8	2.1/2	2	1	001217	002644
7/16	0.4375	7/16	1"	2.1/2	2	1	001218	002645
1/2	0.5000	1/2	1"	3"	2	1	001219	002646
9/16	0.5625	9/16	1.1/4	3.1/2	2	1	001220	002647
5/8	0.6250	5/8	1.1/4	3.1/2	2	1	001221	002648
11/16	0.6875	3/4	1.1/2	4"	2	1	001222	002649
3/4	0.7500	3/4	1.1/2	4"	2	1	001223	002650
7/8	0.8750	7/8	1.1/2	4"	2	1	001224	002651
1"	1.0000	1"	1.1/2	4"	2	1	001225	002652



Solid Carbide 2 Flute End Mill

Regular Length, Ball Nose

EB3302M Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

EB3302MV Ball nose for cutting internal part radius. TiAlN coating increases surface hardness, improves chip flow and tool life, allowing higher metal removal rates.



d ₁ Ø mm	d ₁ decimal Inch	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	Pack Qty	EB3302M	EB3302MV
2.00	0.0787	3.0	6.0	38.0	2	1	001228	004400
2.50	0.0984	3.0	6.0	38.0	2	1	001229	004401
3.00	0.1181	3.0	12.0	38.0	2	1	001230	004402
3.50	0.1378	4.0	14.0	50.0	2	1	001231	004403
4.00	0.1575	4.0	14.0	50.0	2	1	001232	004404
4.50	0.1772	5.0	14.0	50.0	2	1	001233	004405
5.00	0.1969	5.0	16.0	50.0	2	1	001234	004406
6.00	0.2362	6.0	19.0	63.0	2	1	001235	004407
7.00	0.2756	8.0	19.0	63.0	2	1	001236	004408
8.00	0.3150	8.0	19.0	63.0	2	1	001237	004409
9.00	0.3543	10.0	22.0	70.0	2	1	001238	004410
10.00	0.3937	10.0	22.0	70.0	2	1	001239	004411
11.00	0.4331	11.0	25.0	70.0	2	1	001240	004412
12.00	0.4724	12.0	25.0	75.0	2	1	001241	004413
14.00	0.5512	14.0	30.0	88.0	2	1	001242	004414
16.00	0.6299	16.0	32.0	88.0	2	1	001243	004415
18.00	0.7087	18.0	36.0	100.0	2	1	001244	004416
20.00	0.7874	20.0	38.0	100.0	2	1	001245	004417
25.00	0.9843	25.0	38.0	100.0	2	1	001246	004418

Solid Carbide 2 Flute End Mill



Long Length, Ball Nose

EB5302 Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

EB5302V Ball nose for cutting internal part radius. TiAlN coating increases surface hardness, improves chip flow and tool life, allowing higher metal removal rates.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	EB5302	EB5302V
1/8	0.1250	1/8	3/4	2"	2	1	000040	000050
3/16	0.1875	3/16	3/4	2.1/2	2	1	000041	000051
1/4	0.2500	1/4	1.1/8	3"	2	1	000042	000052
5/16	0.3125	5/16	1.1/8	3"	2	1	000043	000053
3/8	0.3750	3/8	1.1/8	3"	2	1	000044	000059
7/16	0.4375	7/16	2"	4"	2	1	000045	000054
1/2	0.5000	1/2	2"	4"	2	1	000046	000055
5/8	0.6250	5/8	2.1/4	5"	2	1	000047	000056
3/4	0.7500	3/4	2.1/4	5"	2	1	000048	000057
1"	1.0000	1"	2"	6"	2	1	000049	000058

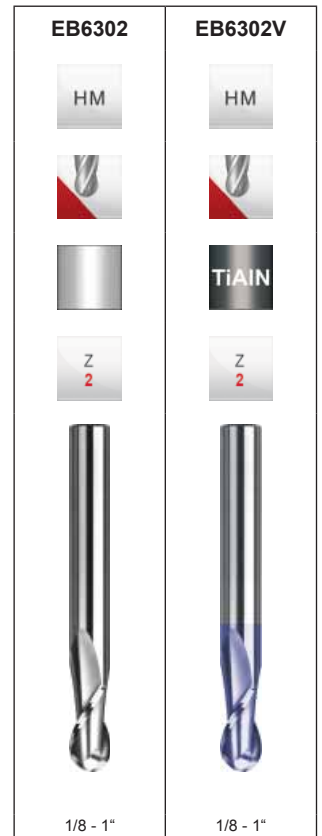
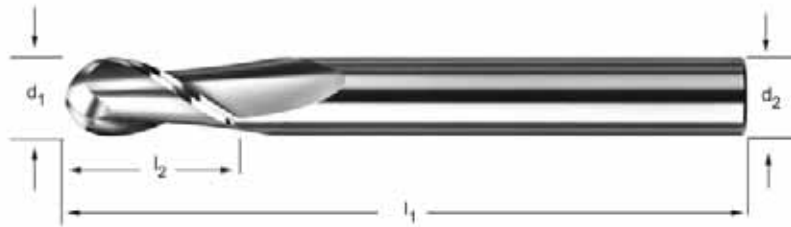


Solid Carbide 2 Flute End Mill

Extra Long Length, Ball Nose

EB6302 Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

EB6302V Ball nose for cutting internal part radius. TiAlN coating increases surface hardness, improves chip flow and tool life, allowing higher metal removal rates.



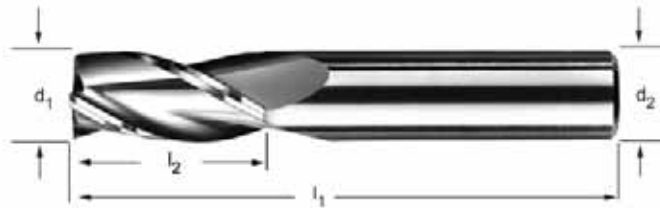
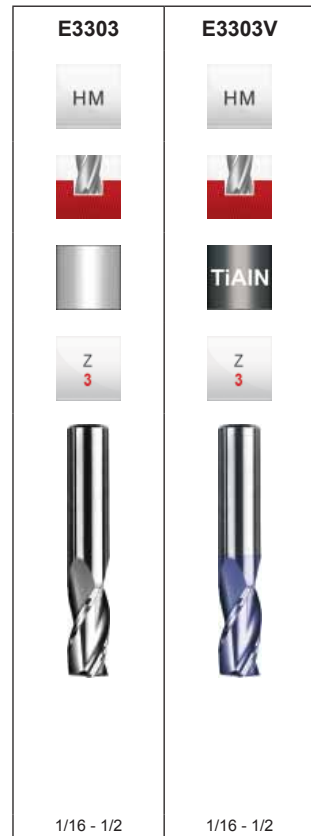
d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	EB6302	EB6302V
1/8	0.1250	1/8	1"	3"	2	1	005400	003700
3/16	0.1875	3/16	1.1/8	3"	2	1	005401	003701
1/4	0.2500	1/4	1.1/2	4"	2	1	005402	003702
5/16	0.3125	5/16	1.5/8	4"	2	1	005403	003703
3/8	0.3750	3/8	1.3/4	4"	2	1	005404	003704
7/16	0.4375	7/16	3"	6"	2	1	005405	003705
1/2	0.5000	1/2	3"	6"	2	1	005406	003706
5/8	0.6250	5/8	3"	6"	2	1	005407	003707
3/4	0.7500	3/4	3"	6"	2	1	005408	003708
1"	1.0000	1"	3"	6"	2	1	005409	003709

Solid Carbide 3 Flute End Mill



Regular Length, Square End

- E3303** 3-flute design for less chatter. Bright finish improves chip flow in soft or non-ferrous materials.
- E3303V** 3-flute design for less chatter. TiAIN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E3303	E3303V
1/16	0.0625	1/8	1/4	1.1/2	3	1	001050	002920
3/32	0.0938	1/8	3/8	1.1/2	3	1	001052	002921
1/8	0.1250	1/8	1/2	1.1/2	3	1	001054	002922
5/32	0.1562	3/16	9/16	2"	3	1	001056	002923
3/16	0.1875	3/16	5/8	2"	3	1	001058	002924
7/32	0.2188	1/4	5/8	2.1/2	3	1	001060	002925
1/4	0.2500	1/4	3/4	2.1/2	3	1	001062	002926
5/16	0.3125	5/16	7/8	2.1/2	3	1	001066	002927
3/8	0.3750	3/8	7/8	2.1/2	3	1	001067	002928
7/16	0.4375	7/16	1"	2.1/2	3	1	001068	002929
1/2	0.5000	1/2	1"	3"	3	1	001069	002930



Solid Carbide 3 Flute End Mill

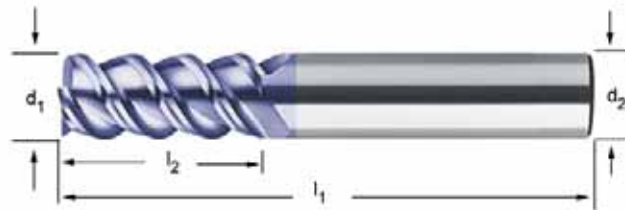
Regular Length, Square End, High Helix 60°

E3603V High Helix 3-flute design for less chatter. TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.

E3603V



1/8 - 1"



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E3603V
1/8	0.1250	1/8	1/2	1.1/2	3	1	002780
3/16	0.1875	3/16	5/8	2"	3	1	002781
1/4	0.2500	1/4	3/4	2.1/2	3	1	002782
5/16	0.3125	5/16	13/16	2.1/2	3	1	002783
3/8	0.3750	3/8	1"	2.1/2	3	1	002784
7/16	0.4375	7/16	1"	3"	3	1	002785
1/2	0.5000	1/2	1"	3"	3	1	002786
5/8	0.6250	5/8	1.1/4	3.1/2	3	1	002787
3/4	0.7500	3/4	1.1/2	4"	3	1	002788
1"	1.0000	1"	1.1/2	4"	3	1	002789

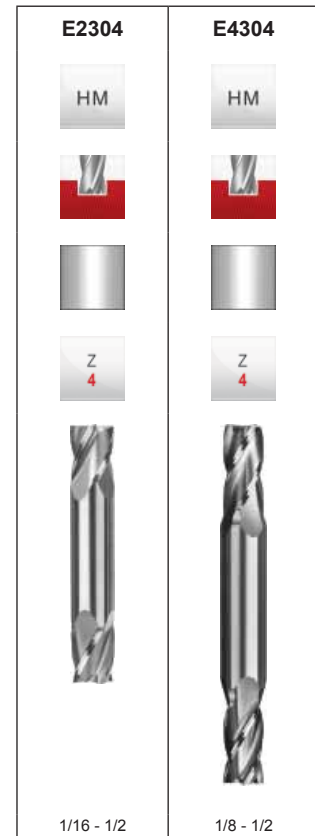
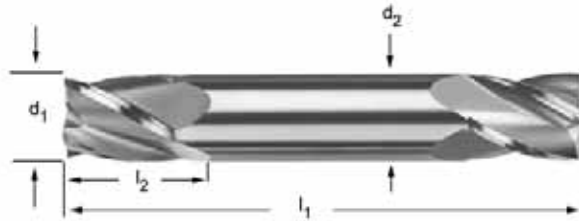
Solid Carbide 4 Flute End Mill



Square End, Double End

E2304 **Stub Length.** Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft and non-ferrous materials.

E4304 **Regular Length.** Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft and non-ferrous materials.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E2304	E4304
1/16	0.0625	1/8	1/8	1.1/2	4	1	002052	-
3/32	0.0938	1/8	3/16	1.1/2	4	1	002053	-
1/8	0.1250	1/8	1/4	1.1/2	4	1	002054	-
1/8	0.1250	3/8	3/8	3"	4	1	-	002250
5/32	0.1562	3/8	7/16	3"	4	1	-	002251
3/16	0.1875	3/16	3/8	2"	4	1	002056	-
3/16	0.1875	3/8	1/2	3"	4	1	-	002252
7/32	0.2188	3/8	9/16	3"	4	1	-	002253
1/4	0.2500	1/4	1/2	2.1/2	4	1	002058	-
1/4	0.2500	3/8	5/8	3"	4	1	-	002254
5/16	0.3125	3/8	3/4	3.1/2	4	1	-	002256
5/16	0.3125	5/16	1/2	2.1/2	4	1	002059	-
3/8	0.3750	3/8	1/2	2.1/2	4	1	002060	-
3/8	0.3750	3/8	3/4	3.1/2	4	1	-	002258
7/16	0.4375	7/16	7/8	4"	4	1	-	002259
1/2	0.5000	1/2	1"	4"	4	1	-	002260
1/2	0.5000	1/2	5/8	3"	4	1	002062	-

1/16 - 1/2

1/8 - 1/2



Solid Carbide 4 Flute End Mill

Regular Length, Square End

E3304 Bright finish improves chip flow in soft or non-ferrous materials.

E3304V TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d ₁ Ø Inch	d ₁ decimal Inch	d ₂ Ø Inch	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	Pack Qty	E3304	E3304V
1/16	0.0625	1/8	1/4	1.1/2	4	1	001100	002690
5/64	0.0781	1/8	1/4	1.1/2	4	1	001101	002691
3/32	0.0938	1/8	3/8	1.1/2	4	1	001102	002692
7/64	0.1094	1/8	3/8	1.1/2	4	1	001103	002693
1/8	0.1250	1/8	1/2	1.1/2	4	1	001104	002694
9/64	0.1406	3/16	9/16	2"	4	1	001105	002695
5/32	0.1562	3/16	9/16	2"	4	1	001106	002696
11/64	0.1719	3/16	9/16	2"	4	1	001107	002697
3/16	0.1875	3/16	5/8	2"	4	1	001108	002698
13/64	0.2031	1/4	5/8	2.1/2	4	1	001109	002699
7/32	0.2188	1/4	5/8	2.1/2	4	1	001110	002700
15/64	0.2344	1/4	3/4	2.1/2	4	1	001111	002701
1/4	0.2500	1/4	3/4	2.1/2	4	1	001112	002702
5/16	0.3125	5/16	7/8	2.1/2	4	1	001116	002703
3/8	0.3750	3/8	7/8	2.1/2	4	1	001117	002704
7/16	0.4375	7/16	1"	2.1/2	4	1	001118	002705
1/2	0.5000	1/2	1"	3"	4	1	001119	002706
9/16	0.5625	9/16	1.1/4	3.1/2	4	1	001120	002707
5/8	0.6250	5/8	1.1/4	3.1/2	4	1	001121	002708
11/16	0.6875	3/4	1.1/2	4"	4	1	001122	002709
3/4	0.7500	3/4	1.1/2	4"	4	1	001123	002710
7/8	0.8750	7/8	1.1/2	4"	4	1	001124	002711
1"	1.0000	1"	1.1/2	4"	4	1	001125	002712

Solid Carbide 4 Flute End Mill



Regular Length, Square End

E3304M Bright finish improves chip flow in soft or non-ferrous materials.

E3304MV TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d_1 Ø mm	d_1 decimal Inch	d_2 Ø mm	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E3304M	E3304MV
2.00	0.0787	3.0	6.0	38.0	4	1	001128	004325
2.50	0.0984	3.0	6.0	38.0	4	1	001129	004326
3.00	0.1181	3.0	12.0	38.0	4	1	001130	004327
3.50	0.1378	4.0	14.0	50.0	4	1	001131	004328
4.00	0.1575	4.0	14.0	50.0	4	1	001132	004329
4.50	0.1772	5.0	14.0	50.0	4	1	001133	004330
5.00	0.1969	5.0	16.0	50.0	4	1	001134	004331
6.00	0.2362	6.0	19.0	63.0	4	1	001135	004332
7.00	0.2756	8.0	19.0	63.0	4	1	001136	004333
8.00	0.3150	8.0	19.0	63.0	4	1	001137	004334
9.00	0.3543	10.0	22.0	70.0	4	1	001138	004335
10.00	0.3937	10.0	22.0	70.0	4	1	001139	004336
11.00	0.4331	11.0	25.0	70.0	4	1	001140	004337
12.00	0.4724	12.0	25.0	75.0	4	1	001141	004338
14.00	0.5512	14.0	30.0	88.0	4	1	001143	004339
16.00	0.6299	16.0	32.0	88.0	4	1	001144	004340
18.00	0.7087	18.0	36.0	100.0	4	1	001145	004341
20.00	0.7874	20.0	38.0	100.0	4	1	001146	004342
25.00	0.9843	25.0	38.0	100.0	4	1	001147	004343

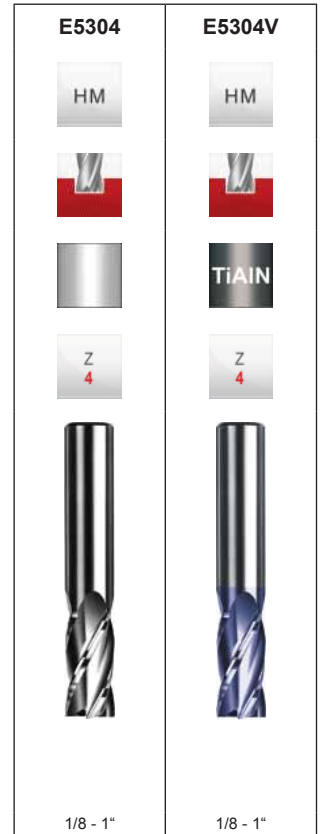


Solid Carbide 4 Flute End Mill

Long Length, Square End

E5304 Bright finish improves chip flow in soft or non-ferrous materials.

E5304V TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



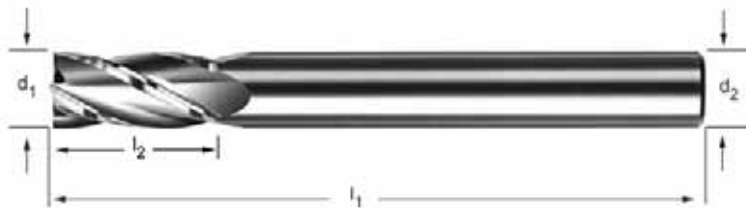
d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E5304	E5304V
1/8	0.1250	1/8	3/4	2"	4	1	000020	000030
3/16	0.1875	3/16	3/4	2.1/2	4	1	000021	000031
1/4	0.2500	1/4	1.1/8	3"	4	1	000022	000032
5/16	0.3125	5/16	1.1/8	3"	4	1	000023	000033
3/8	0.3750	3/8	1.1/8	3"	4	1	000024	000034
7/16	0.4375	7/16	2"	4"	4	1	000025	000035
1/2	0.5000	1/2	2"	4"	4	1	000026	000036
5/8	0.6250	5/8	2.1/4	5"	4	1	000027	000037
3/4	0.7500	3/4	2.1/4	5"	4	1	000028	000038
1"	1.000	1"	2"	6"	4	1	000029	000039

Solid Carbide 4 Flute End Mill



Extra Long Length, Square End

- E6304** Bright finish improves chip flow in soft or non-ferrous materials.
- E6304V** TiAIN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	E6304	E6304V
1/8	0.1250	1/8	1"	3"	4	1	004900	003165
3/16	0.1875	3/16	1.1/8	3"	4	1	004901	003166
1/4	0.2500	1/4	1.1/2	4"	4	1	004902	003167
5/16	0.3125	5/16	1.5/8	4"	4	1	004903	003168
3/8	0.3750	3/8	1.3/4	4"	4	1	004904	003169
7/16	0.4375	7/16	3"	6"	4	1	004905	003170
1/2	0.5000	1/2	3"	6"	4	1	004906	003171
5/8	0.6250	5/8	3"	6"	4	1	004907	003172
3/4	0.7500	3/4	3"	6"	4	1	004908	003173
1"	1.0000	1"	3"	6"	4	1	004909	003174

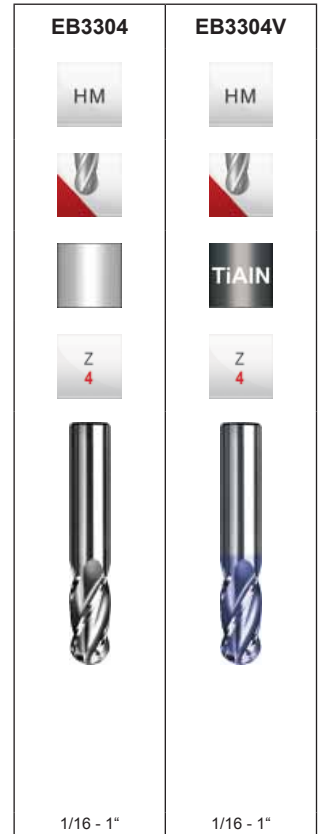
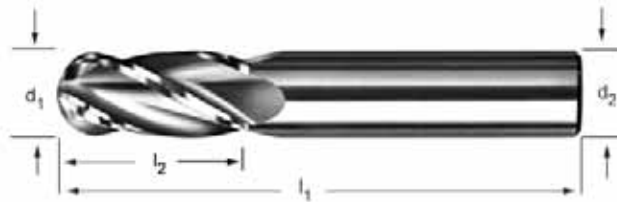


Solid Carbide 4 Flute End Mill

Regular Length, Ball Nose

EB3304 Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

EB3304V Ball nose for cutting internal part radius. TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d ₁ Ø Inch	d ₁ decimal Inch	d ₂ Ø Inch	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	Pack Qty	EB3304	EB3304V
1/16	0.0625	1/8	1/4	1.1/2	4	1	001300	003070
5/64	0.0781	1/8	1/4	1.1/2	4	1	001301	003071
3/32	0.0938	1/8	3/8	1.1/2	4	1	001302	003072
7/64	0.1094	1/8	3/8	1.1/2	4	1	001303	003073
1/8	0.1250	1/8	1/2	1.1/2	4	1	001304	003074
9/64	0.1406	3/16	9/16	2"	4	1	001305	003075
5/32	0.1562	3/16	9/16	2"	4	1	001306	003076
11/64	0.1719	3/16	9/16	2"	4	1	001307	003077
3/16	0.1875	3/16	5/8	2"	4	1	001308	003078
13/64	0.2031	1/4	5/8	2.1/2	4	1	001309	003079
7/32	0.2188	1/4	5/8	2.1/2	4	1	001310	003080
15/64	0.2344	1/4	3/4	2.1/2	4	1	001311	003081
1/4	0.2500	1/4	3/4	2.1/2	4	1	001312	003082
5/16	0.3125	5/16	7/8	2.1/2	4	1	001316	003083
3/8	0.3750	3/8	7/8	2.1/2	4	1	001317	003084
7/16	0.4375	7/16	1"	2.1/2	4	1	001318	003085
1/2	0.5000	1/2	1"	3"	4	1	001319	003086
9/16	0.5625	9/16	1.1/4	3.1/2	4	1	001320	003087
5/8	0.6250	5/8	1.1/4	3.1/2	4	1	001321	003088
11/16	0.6875	3/4	1.1/2	4"	4	1	001322	003089
3/4	0.7500	3/4	1.1/2	4"	4	1	001323	003090
7/8	0.8750	7/8	1.1/2	4"	4	1	001324	003091
1"	1.0000	1"	1.1/2	4"	4	1	001325	003092

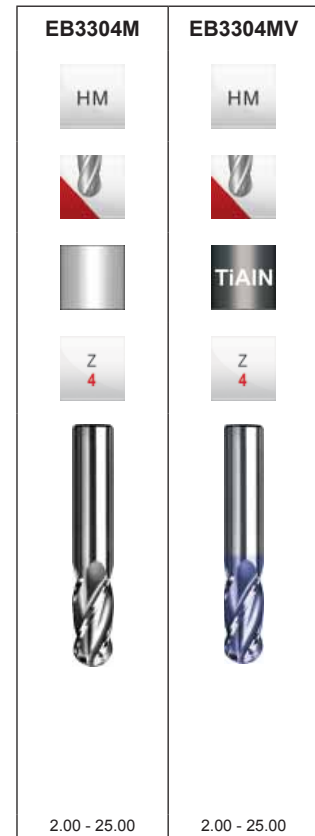
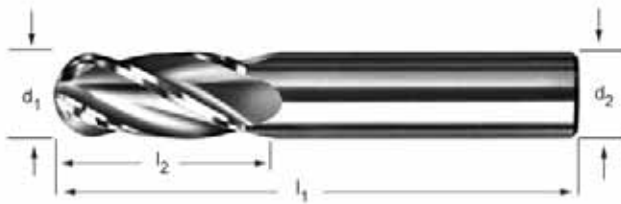
Solid Carbide 4 Flute End Mill



Regular Length, Ball Nose

EB3304M Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

EB3304MV Ball nose for cutting internal part radius. TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d_1 Ø mm	d_1 decimal Inch	d_2 Ø mm	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	EB3304M	EB3304MV
2.00	0.0787	3.0	6.0	38.0	4	1	001344	004750
2.50	0.0984	3.0	6.0	38.0	4	1	001343	004751
3.00	0.1181	3.0	12.0	38.0	4	1	001342	004752
3.50	0.1378	4.0	14.0	50.0	4	1	001341	004753
4.00	0.1575	4.0	14.0	50.0	4	1	001340	004754
4.50	0.1772	5.0	14.0	50.0	4	1	001339	004755
5.00	0.1969	5.0	16.0	50.0	4	1	001338	004756
6.00	0.2362	6.0	19.0	63.0	4	1	001337	004757
7.00	0.2756	8.0	19.0	63.0	4	1	001336	004758
8.00	0.3150	8.0	19.0	63.0	4	1	001335	004759
9.00	0.3543	10.0	22.0	70.0	4	1	001334	004760
10.00	0.3937	10.0	22.0	70.0	4	1	001333	004761
11.00	0.4331	11.0	25.0	70.0	4	1	001332	004762
12.00	0.4724	12.0	25.0	75.0	4	1	001331	004763
14.00	0.5512	14.0	30.0	88.0	4	1	001330	004764
16.00	0.6299	16.0	32.0	88.0	4	1	001329	004765
18.00	0.7087	18.0	36.0	100.0	4	1	001328	004766
20.00	0.7874	20.0	38.0	100.0	4	1	001327	004767
25.00	0.9843	25.0	38.0	100.0	4	1	001326	004768

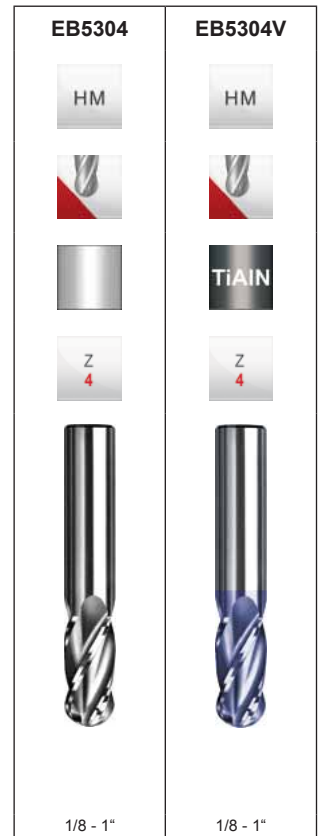
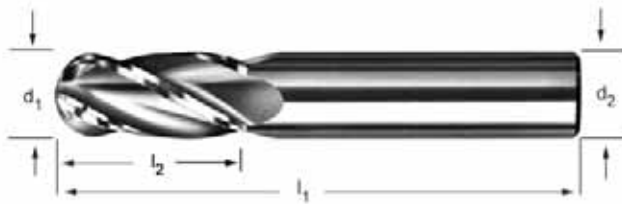


Solid Carbide 4 Flute End Mill

Long Length, Ball Nose

EB5304 Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

EB5304V Ball nose for cutting internal part radius. TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	EB5304	EB5304V
1/8	0.1250	1/8	3/4	2"	4	1	000060	000070
3/16	0.1875	3/16	3/4	2.1/2	4	1	000061	000071
1/4	0.2500	1/4	1.1/8	3"	4	1	000062	000072
5/16	0.3125	5/16	1.1/8	3"	4	1	000063	000073
3/8	0.3750	3/8	1.1/8	3"	4	1	000064	000074
7/16	0.4375	7/16	2"	4"	4	1	000065	000075
1/2	0.5000	1/2	2"	4"	4	1	000066	000076
5/8	0.6250	5/8	2.1/4	5"	4	1	000067	000077
3/4	0.7500	3/4	2.1/4	5"	4	1	000068	000078
1"	1.0000	1"	2"	6"	4	1	000069	000079

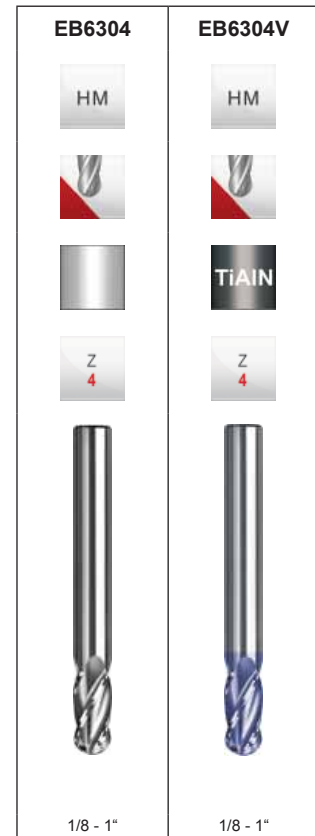
Solid Carbide 4 Flute End Mill



Extra Long Length, Ball Nose

EB6304 Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

EB6304V Ball nose for cutting internal part radius. TiAlN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	Pack Qty	EB6304	EB6304V
1/8	0.1250	1/8	1"	3"	4	1	005700	003745
3/16	0.1875	3/16	1.1/8	3"	4	1	005701	003746
1/4	0.2500	1/4	1.1/2	4"	4	1	005702	003747
5/16	0.3125	5/16	1.5/8	4"	4	1	005703	003748
3/8	0.3750	3/8	1.3/4	4"	4	1	005704	003749
7/16	0.4375	7/16	3"	6"	4	1	005705	003750
1/2	0.5000	1/2	3"	6"	4	1	005706	003751
5/8	0.6250	5/8	3"	6"	4	1	005707	003752
3/4	0.7500	3/4	3"	6"	4	1	005708	003753
1"	1.0000	1"	3"	6"	4	1	005709	003754

Stub Length, Square End, Weldon Shank

C110 Powdered Metal. P9 slotting tolerance with 30° helix.

C110

HSS-E-PM

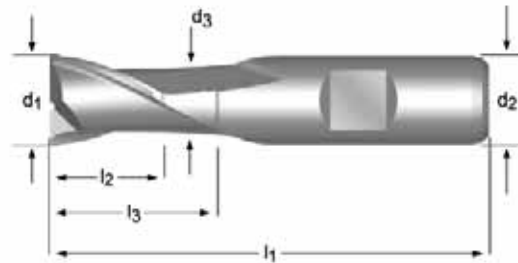
P9



Z
2



1.00 - 50.00



d ₁ Ø Inch /	d ₁ Ø mm	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	l ₃ mm Neck	d ₃ Ø mm Neck	Pack Qty	C110
	1.00	6	2.5	47	2	-	-	1	0353165
	1.50	6	3	47	2	-	-	1	0353172
1/16	1.59	6	3	47	2	-	-	1	0639795
	1.80	6	4	48	2	-	-	1	0353189
	2.00	6	4	48	2	-	-	1	0353301
3/32	2.38	6	5	49	2	-	-	1	0639801
	2.50	6	5	49	2	-	-	1	0353318
	2.80	6	5	49	2	-	-	1	0353325
	3.00	6	5	49	2	-	-	1	0353370
1/8	3.18	6	6	50	2	-	-	1	0639818
	3.50	6	6	50	2	-	-	1	0353387
	3.80	6	7	51	2	-	-	1	0353394
	4.00	6	7	51	2	-	-	1	0353424
	4.50	6	7	51	2	-	-	1	0353431
3/16	4.76	6	8	52	2	-	-	1	0639825
	4.80	6	8	52	2	-	-	1	0353448
	5.00	6	8	52	2	-	-	1	0353455
	5.50	6	8	52	2	-	-	1	0353462
	5.75	6	8	52	2	-	-	1	0353479
	6.00	6	8	52	2	-	-	1	0353486
1/4	6.35	10	10	60	2	-	-	1	0639832
	6.50	10	10	60	2	-	-	1	0353493
	6.75	10	10	60	2	-	-	1	0629031
	7.00	10	10	60	2	-	-	1	0353509
	7.50	10	10	60	2	-	-	1	0353516
	7.75	10	11	61	2	-	-	1	0573495
5/16	7.94	10	11	61	2	-	-	1	0639849
	8.00	10	11	61	2	-	-	1	0353523
	8.50	10	11	61	2	-	-	1	0353530
	9.00	10	11	61	2	-	-	1	0353547
	9.50	10	11	61	2	-	-	1	0353554
3/8	9.52	10	13	63	2	22.5	9.5	1	0639856
	9.70	10	13	63	2	22.5	9.5	1	0573501

HSS-PM 2 Flute End Mill



d ₁ Ø Inch /	d ₁ Ø mm	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	l ₃ mm	d ₃ Ø mm	Pack Qty	C110
	10.00	10	13	63	2	22.5	9.5	1	0353196
13/32	10.32	12	13	70	2	-	-	1	0639863
	10.50	12	13	70	2	-	-	1	0353202
	11.00	12	13	70	2	-	-	1	0353219
7/16	11.11	12	13	70	2	-	-	1	0639870
	11.50	12	13	70	2	-	-	1	0573433
	11.70	12	16	73	2	27.5	11.5	1	0573440
	12.00	12	16	73	2	27.5	11.5	1	0353226
	12.50	12	16	73	2	27.5	11.5	1	0573457
1/2	12.70	12	16	73	2	27.5	11.5	1	0639887
	13.00	12	16	73	2	27.5	11.5	1	0353233
17/32	13.49	12	16	73	2	27.5	11.5	1	0639894
	13.70	12	16	73	2	27.5	11.5	1	0573464
	14.00	12	16	73	2	27.5	11.5	1	0353240
9/16	14.29	12	16	73	2	27.5	11.5	1	0639900
	15.00	12	16	73	2	27.5	11.5	1	0353257
	15.70	16	19	79	2	30.5	15.5	1	0573471
5/8	15.88	16	19	79	2	30.5	15.5	1	0639917
	16.00	16	19	79	2	30.5	15.5	1	0353264
	17.00	16	19	79	2	30.5	15.5	1	0353271
11/16	17.46	16	19	79	2	30.5	15.5	1	0639924
	17.70	16	19	79	2	30.5	15.5	1	0628942
	18.00	16	19	79	2	30.5	15.5	1	0353288
	19.00	16	19	79	2	30.5	15.5	1	0353295
3/4	19.05	20	22	88	2	37.5	18.5	1	0639931
	19.70	20	22	88	2	37.5	19.5	1	0628959
	20.00	20	22	88	2	37.5	19.5	1	0353332
	21.70	20	22	88	2	37.5	19.5	1	0628966
	22.00	20	22	88	2	37.5	19.5	1	0353349
7/8	22.22	20	22	88	2	37.5	19.5	1	0639948
	24.00	25	26	102	2	45.5	23.5	1	0573488
	24.70	25	26	102	2	45.5	24.5	1	0628973
	25.00	25	26	102	2	45.5	24.5	1	0353356
1"	25.40	25	26	102	2	45.5	24.5	1	0621929
	26.00	25	26	102	2	45.5	24.5	1	0628980
	28.00	25	26	102	2	45.5	24.5	1	0353363
1.1/8	28.58	25	26	102	2	45.5	24.5	1	0639962
	30.00	25	26	102	2	45.5	24.5	1	0353400
1.1/4	31.75	32	32	112	2	51.5	31.5	1	0639979
	32.00	32	32	112	2	51.5	31.5	1	0353417
	35.00	32	32	112	2	51.5	31.5	1	0639986
	36.00	32	32	112	2	51.5	31.5	1	0628997
1.1/2	38.10	40	38	130	2	55.5	37	1	0639993
	40.00	40	38	130	2	59.5	39	1	0629000
1.3/4	44.45	40	38	130	2	59.5	38	1	0640005
	45.00	40	38	130	2	59.5	38	1	0629017
	50.00	50	45	147	2	66.5	48	1	0629024

END MILLS

Regular Length, Square End, Weldon Shank

923 Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft or non-ferrous materials.

TN923 Double end provides two cutting ends in one tool. TiN coating increases surface hardness and improves tool life.



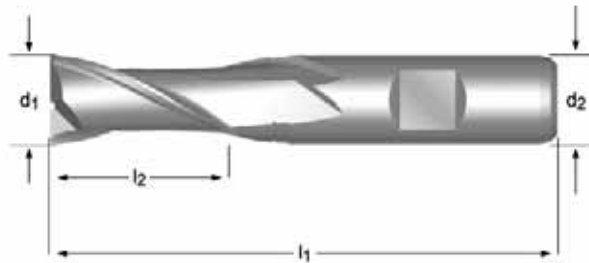
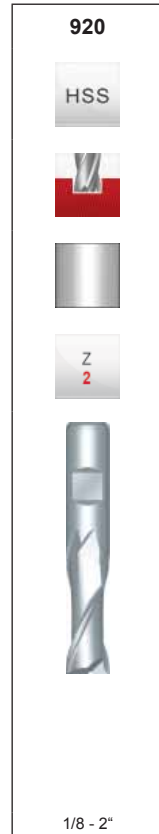
d ₁ Ø Inch	d ₁ decimal Inch	LOC l ₂ Inch	OAL l ₁ Inch	d ₂ Ø Inch	# of Flutes	Pack Qty	923	TN923
1/8	0.1250	3/8	3.1/16	3/8	2	1	5110364	5160364
5/32	0.1562	7/16	3.1/8	3/8	2	1	5110365	5160365
3/16	0.1875	7/16	3.1/4	3/8	2	1	5110366	5160366
7/32	0.2188	1/2	3.1/4	3/8	2	1	5110367	5160367
1/4	0.2500	1/2	3.3/8	3/8	2	1	5110368	5160368
9/32	0.2812	9/16	3.3/8	3/8	2	1	5110369	5160369
5/16	0.3125	9/16	3.1/2	3/8	2	1	5110370	5160370
11/32	0.3438	9/16	3.1/2	3/8	2	1	5110371	5160371
3/8	0.3750	9/16	3.1/2	3/8	2	1	5110372	5160372
13/32	0.4062	13/16	4.1/8	1/2	2	1	5110373	5160373
7/16	0.4375	13/16	4.1/8	1/2	2	1	5110374	5160374
15/32	0.4688	13/16	4.1/8	1/2	2	1	5110375	5160375
1/2	0.5000	13/16	4.1/8	1/2	2	1	5110376	5160376
9/16	0.5625	1.1/8	5"	5/8	2	1	5110377	5160377
5/8	0.6250	1.1/8	5"	5/8	2	1	5110378	5160378
11/16	0.6875	1.5/16	5.5/8	3/4	2	1	5110379	5160379
3/4	0.7500	1.5/16	5.5/8	3/4	2	1	5110380	5160380
13/16	0.8125	1.9/16	6.1/8	7/8	2	1	5110381	-
7/8	0.8750	1.9/16	6.1/8	7/8	2	1	5110382	5160382
15/16	0.9375	1.5/8	6.3/8	1"	2	1	5110383	-
1"	1.0000	1.5/8	6.3/8	1"	2	1	5110384	5160384

HSS 2 Flute End Mill



Regular Length, Square End, Weldon Shank

920 Bright finish improves chip flow in soft or non-ferrous materials.



d ₁ Ø Inch	d ₁ decimal Inch	LOC l ₂ Inch	OAL l ₁ Inch	d ₂ Ø Inch	# of Flutes	Pack Qty	920
1/8	0.1250	3/8	2.5/16	3/8	2	1	5110302
3/16	0.1875	7/16	2.3/8	3/8	2	1	5110303
1/4	0.2500	1/2	2.7/16	3/8	2	1	5110304
5/16	0.3125	9/16	2.1/2	3/8	2	1	5110305
3/8	0.3750	9/16	2.1/2	3/8	2	1	5110306
7/16	0.4375	13/16	2.11/16	3/8	2	1	5110307
1/2	0.5000	13/16	2.11/16	3/8	2	1	5110308
1/2	0.5000	1"	3.1/4	1/2	2	1	5110309
9/16	0.5625	1.1/8	3.3/8	1/2	2	1	5110310
5/8	0.6250	1.1/8	3.3/8	1/2	2	1	5110311
5/8	0.6250	1.5/16	3.3/4	5/8	2	1	5110314
11/16	0.6875	1.5/16	3.5/8	1/2	2	1	5110312
11/16	0.6875	1.5/16	3.3/4	5/8	2	1	5110315
3/4	0.7500	1.5/16	3.5/8	1/2	2	1	5110313
3/4	0.7500	1.5/16	3.3/4	5/8	2	1	5110316
3/4	0.7500	1.5/16	3.7/8	3/4	2	1	5110708
13/16	0.8125	1.1/2	4"	5/8	2	1	5110317
7/8	0.8750	1.1/2	4"	5/8	2	1	5110318
7/8	0.8750	1.1/2	4.1/8	3/4	2	1	5110709
7/8	0.8750	1.1/2	4.1/8	7/8	2	1	5110321
15/16	0.9375	1.1/2	4"	5/8	2	1	5110319
1"	1.0000	1.1/2	4"	5/8	2	1	5110320
1"	1.0000	1.1/2	4.1/8	3/4	2	1	5110710
1"	1.0000	1.1/2	4.1/8	7/8	2	1	5110323
1"	1.0000	1.5/8	4.1/2	1"	2	1	5110326
1.1/8	1.1250	1.5/8	4.1/4	3/4	2	1	5111714
1.1/8	1.1250	1.5/8	4.1/4	7/8	2	1	5110324
1.1/8	1.1250	1.5/8	4.1/2	1"	2	1	5110327
1.1/4	1.2500	1.5/8	4.1/4	3/4	2	1	5111715
1.1/4	1.2500	1.5/8	4.1/4	7/8	2	1	5110325
1.1/4	1.2500	1.5/8	4.1/2	1"	2	1	5110328
1.1/4	1.2500	1.5/8	4.1/2	1.1/4	2	1	5110331
1.3/8	1.3750	1.5/8	4.1/4	3/4	2	1	5111716

HSS 2 Flute End Mill

d ₁ Ø Inch	d ₁ decimal Inch	LOC l ₂ Inch	OAL l ₁ Inch	d ₂ Ø Inch	# of Flutes	Pack Qty	920
1.3/8	1.3750	1.5/8	4.1/2	1"	2	1	5110329
1.1/2	1.5000	1.5/8	4.1/4	3/4	2	1	5111717
1.1/2	1.5000	1.5/8	4.1/2	1"	2	1	5110330
1.1/2	1.5000	1.5/8	4.1/2	1.1/4	2	1	5110332
1.3/4	1.7500	1.1/2	3.7/8	3/4	2	1	5111718
1.3/4	1.7500	1.5/8	4.1/2	1.1/4	2	1	5110334
2"	2.0000	1.1/2	3.7/8	3/4	2	1	5111719
2"	2.0000	1.5/8	4.1/2	1.1/4	2	1	5110336


HSS 2 Flute End Mill




Regular Length, Square End, Keyway, Weldon Shank

920K Keyway cutter, close tolerance (+0.0000"/-0.0015").
Bright finish improves chip flow in soft or non-ferrous materials.


920K



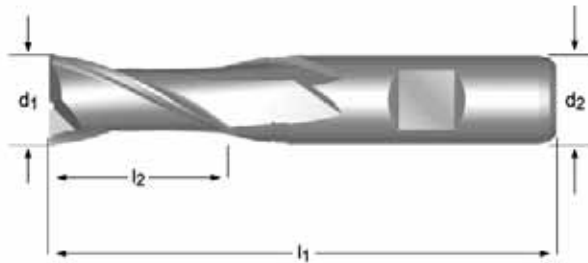
HSS



Z
2



1/8 - 1.1/2

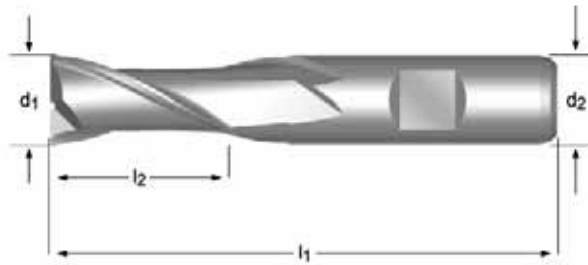
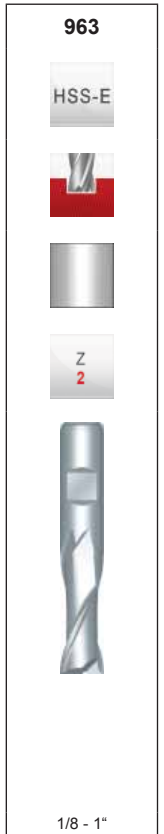


d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	920K
1/8	0.1250	3/8	2.5/16	3/8	2	1	5110715
3/16	0.1875	7/16	2.3/8	3/8	2	1	5110716
1/4	0.2500	1/2	2.7/16	3/8	2	1	5110717
5/16	0.3125	9/16	2.1/2	3/8	2	1	5110718
3/8	0.3750	9/16	2.1/2	3/8	2	1	5110719
1/2	0.5000	1"	3.1/4	1/2	2	1	5110720
5/8	0.6250	1.5/16	3.3/4	5/8	2	1	5110721
3/4	0.7500	1.5/16	3.7/8	3/4	2	1	5110722
7/8	0.8750	1.1/2	4.1/8	7/8	2	1	5110723
1"	1.0000	1.5/8	4.1/2	1"	2	1	5110724
1.1/4	1.2500	1.5/8	4.1/2	1.1/4	2	1	5110725
1.1/2	1.5000	1.5/8	4.1/2	1.1/4	2	1	5110726

Cobalt 2 Flute End Mill

Regular Length, Square End, Weldon Shank

963 Bright finish improves chip flow in soft or non-ferrous materials.



d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	963
1/8	0.1250	3/8	2.5/16	3/8	2	1	5110633
3/16	0.1875	7/16	2.3/8	3/8	2	1	5110634
1/4	0.2500	1/2	2.7/16	3/8	2	1	5110635
5/16	0.3125	9/16	2.1/2	3/8	2	1	5110636
3/8	0.3750	9/16	2.1/2	3/8	2	1	5110637
1/2	0.5000	1"	3.1/4	1/2	2	1	5110638
5/8	0.6250	1.5/16	3.3/4	5/8	2	1	5110639
3/4	0.7500	1.5/16	3.7/8	3/4	2	1	5110640
1"	1.0000	1.5/8	4.1/2	1"	2	1	5110641

HSS-PM 2 Flute End Mill



Regular Length, Square End, Weldon Shank


C123 Powdered Metal. P9 slotting tolerance with 30° helix.

C123

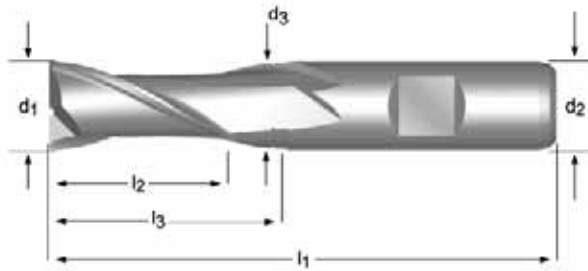
HSS-E-PM

P9

Z
2



1/16 - 40.00



d ₁ Ø Inch /	d ₁ Ø mm	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	l ₃ mm Neck	d ₃ Ø mm Neck	Pack Qty	C123
1/16	1.59	6	7	51	2	-	-	1	0640012 ¹⁾
	2.00	6	7	51	2	-	-	1	0353646
	2.50	6	8	52	2	-	-	1	0353653
1/8	3.00	6	8	52	2	-	-	1	0353714
	3.18	6	10	54	2	-	-	1	0640029 ¹⁾
	3.50	6	10	54	2	-	-	1	0353721
5/32	3.97	6	11	55	2	-	-	1	0640036 ¹⁾
	4.00	6	11	55	2	-	-	1	0353769
	4.50	6	11	55	2	-	-	1	0353776
3/16	4.76	6	13	57	2	-	-	1	0640043 ¹⁾
	5.00	6	13	57	2	-	-	1	0353790
	5.50	6	13	57	2	-	-	1	0353806
	6.00	6	13	57	2	-	-	1	0353813
1/4	6.35	10	16	66	2	-	-	1	0640050 ¹⁾
	6.50	10	16	66	2	-	-	1	0353820
	7.00	10	16	66	2	-	-	1	0353837
	7.50	10	16	66	2	-	-	1	0353844
5/16	7.94	10	19	69	2	-	-	1	0640067 ¹⁾
	8.00	10	19	69	2	-	-	1	0353851
	8.50	10	19	69	2	-	-	1	0353868
	9.00	10	19	69	2	-	-	1	0353875
	9.50	10	19	69	2	-	-	1	0353882
3/8	9.52	10	22	72	2	31.5	9.5	1	0640074 ¹⁾
	10.00	10	22	72	2	31.5	9.5	1	0353561
	11.00	12	22	79	2	-	-	1	0353578
	12.00	12	26	83	2	37.5	11.5	1	0353585
1/2	12.70	12	26	83	2	37.5	11.5	1	0640081 ¹⁾
	13.00	12	26	83	2	37.5	11.5	1	0353592
	14.00	12	26	83	2	37.5	11.5	1	0353608
9/16	14.29	12	26	83	2	37.5	11.5	1	0640098 ¹⁾
	15.00	12	26	83	2	37.5	11.5	1	0353615
5/8	15.88	16	32	92	2	43.5	15.5	1	0640104 ¹⁾

¹⁾ diameter tolerance -.0005 inches / -.0013 inches



HSS-PM 2 Flute End Mill

d ₁ Ø Inch /	d ₁ Ø mm	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	l ₃ mm	d ₃ Ø mm	Pack Qty	C123
	16.00	16	32	92	2	43.5	15.5	1	0353622
	18.00	16	32	92	2	43.5	15.5	1	0353639
3/4	19.05	20	38	104	2	53.5	18.5	1	0640111 ²⁾
	20.00	20	38	104	2	53.5	19.5	1	0353660
	22.00	20	38	104	2	53.5	19.5	1	0353677
	25.00	25	45	121	2	64.5	24.5	1	0353691
1"	25.40	25	45	121	2	64.5	24.5	1	0640128 ³⁾
	30.00	25	45	121	2	64.5	24.5	1	0353738
	32.00	32	53	133	2	72.5	31.5	1	0353745
	36.00	32	53	133	2	72.5	31.5	1	0353752 ³⁾
1.1/2	38.10	40	63	155	2	84.5	37	1	0640135 ³⁾²⁾
	40.00	40	63	155	2	84.5	39	1	0353783 ³⁾

²⁾ diameter tolerance -.0005 inches / -.0015 inches

³⁾ Available in HSCo only

HSS 2 Flute End Mill



Regular Length, Ball Nose, Weldon Shank

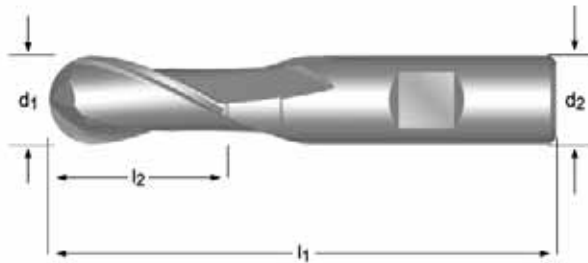
905 Ball nose for cutting internal radius. Bright finish improves chip flow in soft or non-ferrous materials.

905

HSS

Z
2

1/8 - 1.1/2

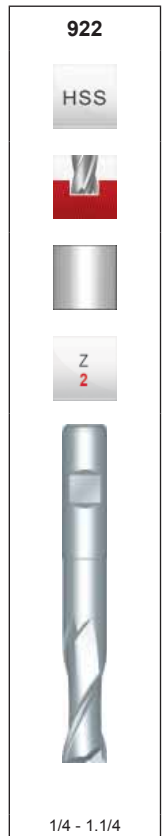
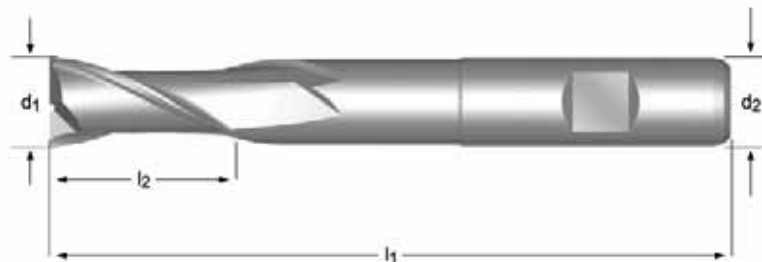


d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	905
1/8	0.1250	3/8	2.5/16	3/8	2	1	5110390
3/16	0.1875	1/2	2.3/8	3/8	2	1	5110391
1/4	0.2500	5/8	2.7/16	3/8	2	1	5110392
5/16	0.3125	3/4	2.1/2	3/8	2	1	5110393
3/8	0.3750	3/4	2.1/2	3/8	2	1	5110394
7/16	0.4375	1"	3.1/4	1/2	2	1	5110395
1/2	0.5000	1"	3.1/4	1/2	2	1	5110396
9/16	0.5625	1.1/8	3.3/8	1/2	2	1	5110700
5/8	0.6250	1.1/8	3.3/8	1/2	2	1	5110701
5/8	0.6250	1.3/8	3.3/4	5/8	2	1	5110397
3/4	0.7500	1.5/8	3.7/8	3/4	2	1	5110398
3/4	0.7500	1.5/16	3.5/8	1/2	2	1	5110702
7/8	0.8750	1.7/8	4.1/8	3/4	2	1	5110703
7/8	0.8750	2"	4.1/4	7/8	2	1	5110399
1"	1.0000	2.1/4	4.3/4	1"	2	1	5110400
1"	1.0000	2.1/4	4.1/2	3/4	2	1	5110704
1.1/8	1.1250	2.1/4	4.3/4	1"	2	1	5110401
1.1/4	1.2500	2.1/2	5"	1.1/4	2	1	5110402
1.1/2	1.5000	2.1/2	5"	1.1/4	2	1	5110403

END MILLS

Long Length, Square End, Weldon Shank

922 Bright finish improves chip flow in soft or non-ferrous materials.

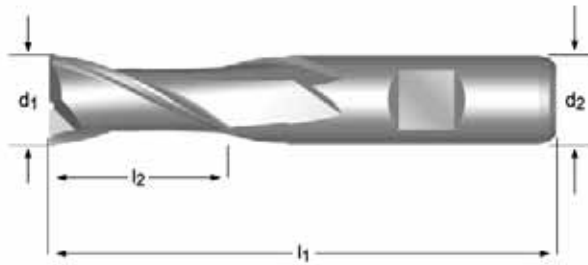
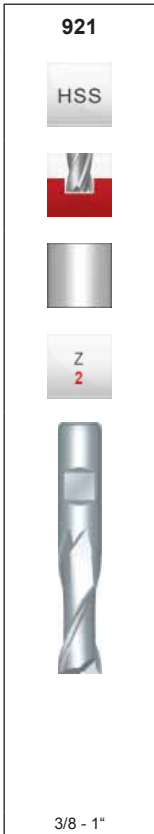


d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	922
1/4	0.2500	5/8	3.1/16	3/8	2	1	5110352
5/16	0.3125	3/4	3.1/8	3/8	2	1	5110353
3/8	0.3750	3/4	3.1/4	3/8	2	1	5110354
1/2	0.5000	1"	4"	1/2	2	1	5110355
5/8	0.6250	1.3/8	4.5/8	5/8	2	1	5110356
3/4	0.7500	1.5/8	5.1/4	3/4	2	1	5110357
7/8	0.8750	2"	6"	7/8	2	1	5110358
1"	1.0000	2.1/2	7.1/4	1"	2	1	5110359
1.1/4	1.2500	3"	7.1/4	1.1/4	2	1	5110360

HSS 2 Flute End Mill

Long Length, Square End, Weldon Shank

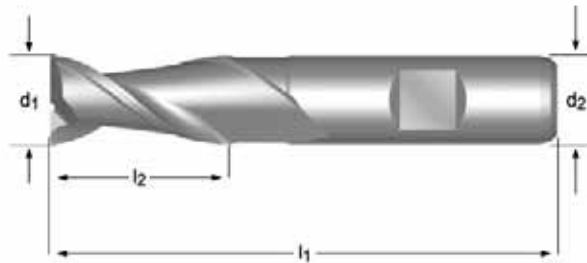
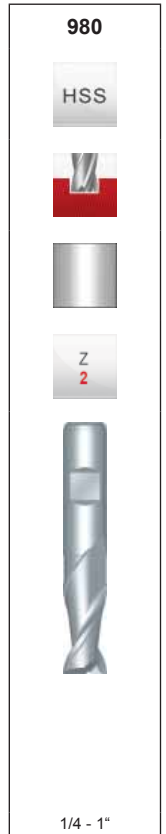
921 Keyway cutter. Bright finish improves chip flow in soft or non-ferrous materials.



d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	921
3/8	0.3750	1.1/2	3.1/4	3/8	2	1	5110337
1/2	0.5000	1.7/8	4"	1/2	2	1	5110338
5/8	0.6250	2"	4.1/8	5/8	2	1	5110339
3/4	0.7500	2.1/4	4.1/2	3/4	2	1	5110340
1"	1.0000	3"	5.1/2	1"	2	1	5110342

Regular Length, Square End, Weldon Shank

980 High Helix design for aluminum and other non-ferrous materials.

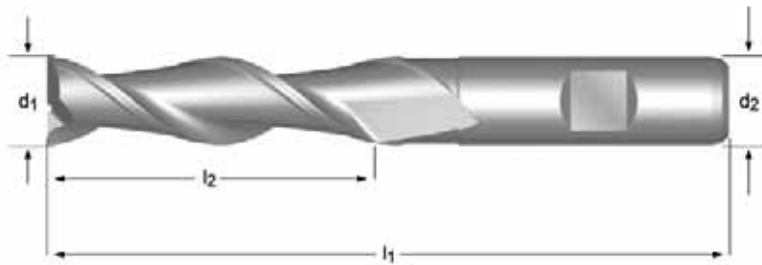


d ₁ Ø Inch	d ₁ decimal Inch	LOC l ₂ Inch	OAL l ₁ Inch	d ₂ Ø Inch	# of Flutes	Pack Qty	980
1/4	0.2500	5/8	2.7/16	3/8	2	1	5110602
5/16	0.3125	3/4	2.1/2	3/8	2	1	5110603
3/8	0.3750	3/4	2.1/2	3/8	2	1	5110604
7/16	0.4375	1"	2.11/16	3/8	2	1	5110605
1/2	0.5000	1.1/4	3.1/4	1/2	2	1	5110606
5/8	0.6250	1.5/8	3.3/4	5/8	2	1	5110607
3/4	0.7500	1.5/8	3.7/8	3/4	2	1	5110608
1"	1.0000	2"	4.1/2	1"	2	1	5110609

HSS 2 Flute End Mill

Long Length, Square End, Weldon Shank

981 High Helix design for aluminum and other non-ferrous materials.

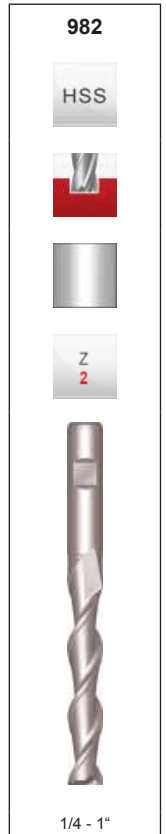
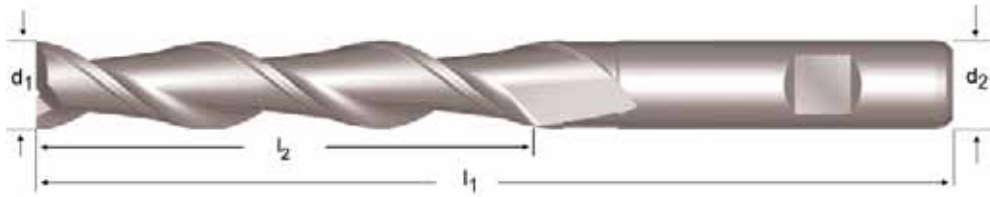


d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	981
1/4	0.2500	1.1/4	3.1/16	3/8	2	1	5110613
5/16	0.3125	1.3/8	3.1/8	3/8	2	1	5110614
3/8	0.3750	1.1/2	3.1/4	3/8	2	1	5110615
7/16	0.4375	1.3/4	3.3/4	1/2	2	1	5110616
1/2	0.5000	2"	4"	1/2	2	1	5110617
5/8	0.6250	2.1/2	4.5/8	5/8	2	1	5110618
3/4	0.7500	3"	5.1/4	3/4	2	1	5110619
1"	1.0000	4"	6.1/2	1"	2	1	5110620

HSS 2 Flute End Mill

Extra Long Length, Square End, Weldon Shank

982 High Helix design for aluminum and other non-ferrous materials.



d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	982
1/4	0.2500	1.3/4	3.9/16	3/8	2	1	5110624
5/16	0.3125	2"	3.3/4	3/8	2	1	5110625
3/8	0.3750	2.1/2	4.1/4	3/8	2	1	5110626
1/2	0.5000	3"	5"	1/2	2	1	5110627
5/8	0.6250	4"	6.1/8	5/8	2	1	5110628
3/4	0.7500	4"	6.1/4	3/4	2	1	5110629
1"	1.0000	6"	8.1/2	1"	2	1	5110630

HSS 3 Flute End Mill

Regular Length, Square End, Weldon Shank

933 Double end provides two cutting edges in one tool. 3-flute design for less chatter. Bright finish improves chip flow in soft or non-ferrous materials.

933



HSS



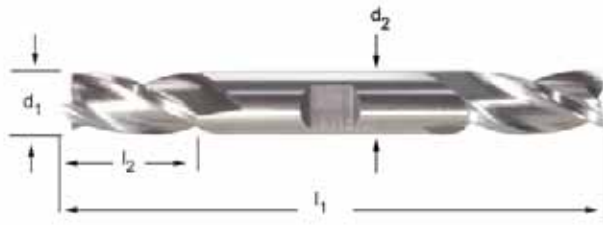




Z
3



1/8 - 1"

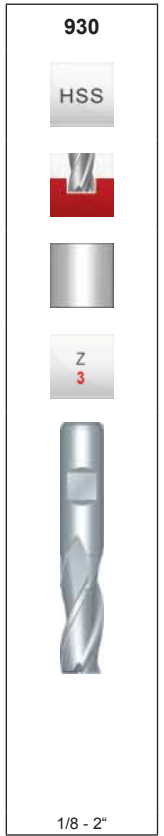
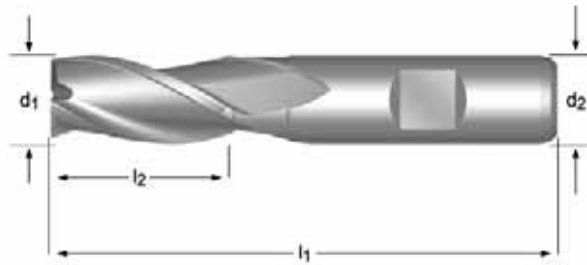


d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	933
1/8	0.1250	3/8	3.1/16	3/8	3	1	5110257
3/16	0.1875	1/2	3.1/4	3/8	3	1	5110258
1/4	0.2500	5/8	3.3/8	3/8	3	1	5110259
5/16	0.3125	3/4	3.1/2	3/8	3	1	5110260
3/8	0.3750	3/4	3.1/2	3/8	3	1	5110261
7/16	0.4375	1"	4.1/8	1/2	3	1	5110262
1/2	0.5000	1"	4.1/8	1/2	3	1	5110263
9/16	0.5625	1.3/8	5"	5/8	3	1	5110264
5/8	0.6250	1.3/8	5"	5/8	3	1	5110265
3/4	0.7500	1.5/8	5.5/8	3/4	3	1	5110266
1"	1.0000	1.7/8	6.3/8	1"	3	1	5110268

HSS 3 Flute End Mill

Regular Length, Square End, Weldon Shank

930 3-flute design for less chatter. Bright finish improves chip flow in soft or non-ferrous materials.



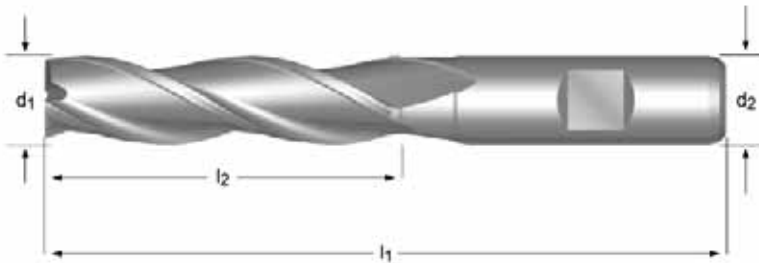
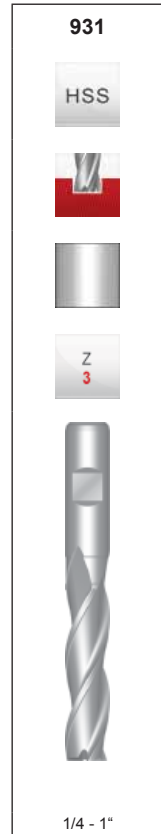
d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	930
1/8	0.1250	3/8	2.5/16	3/8	3	1	5110221
3/16	0.1875	1/2	2.3/8	3/8	3	1	5110222
1/4	0.2500	5/8	2.7/16	3/8	3	1	5110223
5/16	0.3125	3/4	2.1/2	3/8	3	1	5110224
3/8	0.3750	3/4	2.1/2	3/8	3	1	5110225
7/16	0.4375	1"	2.11/16	3/8	3	1	5110226
1/2	0.5000	1"	2.11/16	3/8	3	1	5110227
1/2	0.5000	1.1/4	3.1/4	1/2	3	1	5110228
9/16	0.5625	1.3/8	3.3/8	1/2	3	1	5110229
5/8	0.6250	1.3/8	3.3/8	1/2	3	1	5110230
5/8	0.6250	1.5/8	3.3/4	5/8	3	1	5110232
3/4	0.7500	1.5/8	3.5/8	1/2	3	1	5110231
3/4	0.7500	1.5/8	3.3/4	5/8	3	1	5110233
3/4	0.7500	1.5/8	3.7/8	3/4	3	1	5110696
7/8	0.8750	1.7/8	4.1/8	3/4	3	1	5110697
1"	1.0000	1.7/8	4.1/8	3/4	3	1	5110698
1"	1.0000	1.7/8	4"	5/8	3	1	5110235
1"	1.0000	2"	4.1/2	1"	3	1	5110237
1.1/8	1.1250	2"	4.1/2	1"	3	1	5110238
1.1/4	1.2500	2"	4.1/2	1"	3	1	5110239
1.1/4	1.2500	2"	4.1/2	1.1/4	3	1	5110240
1.1/2	1.5000	2"	4.1/2	1.1/4	3	1	5110241
1.3/4	1.7500	2"	4.1/2	1.1/4	3	1	5110242
2"	2.0000	2"	4.1/2	1.1/4	3	1	5110243

HSS 3 Flute End Mill



Long Length, Square End, Weldon Shank

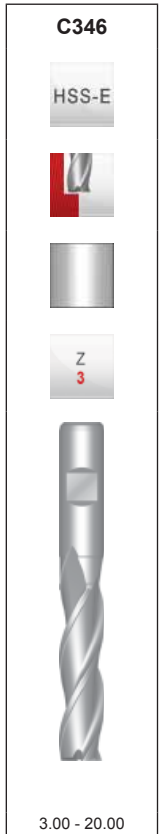
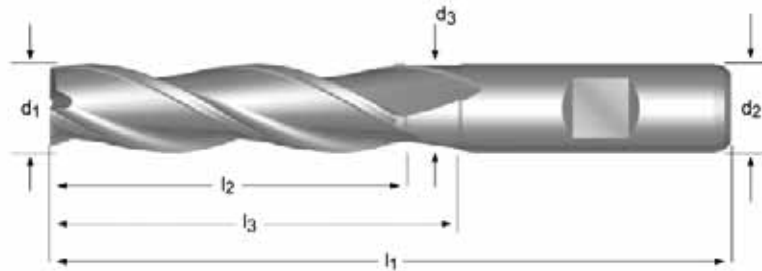
931 3-flute design for less chatter. Bright finish improves chip flow in soft or non-ferrous materials.



d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	931
1/4	0.2500	1.1/4	3.1/16	3/8	3	1	5110244
5/16	0.3125	1.3/8	3.1/8	3/8	3	1	5110245
3/8	0.3750	1.1/2	3.1/4	3/8	3	1	5110246
7/16	0.4375	1.3/4	3.3/4	1/2	3	1	5110247
1/2	0.5000	2"	4"	1/2	3	1	5110248
5/8	0.6250	2.1/2	4.5/8	5/8	3	1	5110249
3/4	0.7500	3"	5.1/4	3/4	3	1	5110250
1"	1.0000	4"	6.1/2	1"	3	1	5110252

Long Length, Square End, Weldon Shank

C346 P9 slotting tolerance with 30° helix. 3 flute design provides less chatter.



d ₁ Ø mm	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	l ₃ mm Neck	d ₃ Ø mm Neck	Pack Qty	C346
3.00	6	12	56	3	-	-	1	0122297
4.00	6	19	63	3	-	-	1	0122303
5.00	6	24	68	3	-	-	1	0122310
6.00	6	24	68	3	-	-	1	0122327
7.00	10	30	80	3	-	-	1	0126325
8.00	10	38	88	3	-	-	1	0126332
9.00	10	38	88	3	-	-	1	0126349
10.00	10	45	95	3	-	-	1	0126233
11.00	12	45	102	3	-	-	1	0126240
12.00	12	53	110	3	-	-	1	0126257
13.00	12	53	110	3	64.5	11.5	1	0126264
14.00	12	53	110	3	64.5	11.5	1	0126271
15.00	12	53	110	3	64.5	11.5	1	0126288
16.00	16	63	123	3	74.5	15.5	1	0126295
18.00	16	63	123	3	74.5	15.5	1	0126301
20.00	20	75	141	3	90.5	19.5	1	0126318

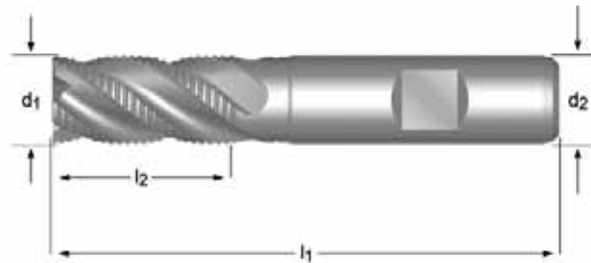
Cobalt 4 Flute End Mill



Regular Length, Square End, Roughing, Weldon Shank

9002 Roughing, Fine Profile, provides a stronger edge and runs longer than conventional coarse profile roughers. Bright finish.

TC9002 TiCN coating lowers the coefficient of friction and improves wear resistance on the end mill.



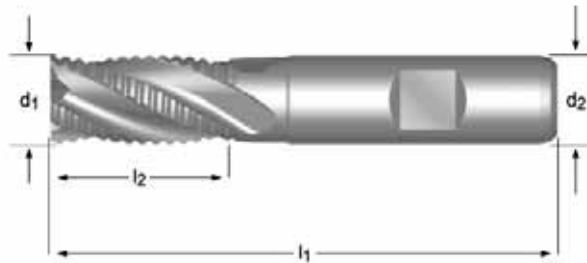
d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	9002	TC9002
1/4	0.2500	5/8	2.7/16	3/8	4	1	5210014	5270014
5/16	0.3125	3/4	2.1/2	3/8	4	1	5210015	5270015
3/8	0.3750	3/4	2.1/2	3/8	4	1	5210016	5270016
7/16	0.4375	1.1/4	3.1/4	1/2	4	1	5210017	5270017
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	5210018	5270018
9/16	0.5625	1.3/8	3.3/8	1/2	4	1	5210019	5270019
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	5210020	5270020
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	5210021	5270021
7/8	0.8750	1.7/8	4.1/8	3/4	5	1	5210022	5270022
1"	1.0000	2"	4.1/2	1"	5	1	5210023	5270023
1.1/4	1.2500	2"	4.1/2	1.1/4	6	1	5210024	5270024
1.1/2	1.5000	2"	4.1/2	1.1/4	6	1	5210025	5270025
1.3/4	1.7500	2"	4.1/2	1.1/4	6	1	5210026	5270026
2"	2.0000	2"	4.1/2	1.1/4	8	1	5210027	5270027

Cobalt 4 Flute End Mill

Regular Length, Square End, Roughing, Weldon Shank

9003 Roughing, Coarse Profile, for maximum metal removal in one pass. Bright finish.

TC9003 TiCN coating lowers the coefficient of friction and improves wear resistance on the end mill.



d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	9003	TC9003
1/4	0.2500	5/8	2.7/16	3/8	4	1	5210028	5270028
5/16	0.3125	3/4	2.1/2	3/8	4	1	5210029	5270029
3/8	0.3750	3/4	2.1/2	3/8	4	1	5210030	5270030
7/16	0.4375	1.1/4	3.1/4	1/2	4	1	5210031	5270031
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	5210032	5270032
9/16	0.5625	1.3/8	3.3/8	1/2	4	1	5210033	5270033
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	5210034	5270034
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	5210035	5270035
7/8	0.8750	1.7/8	4.1/8	3/4	5	1	5210036	5270036
1"	1.0000	2"	4.1/2	1"	5	1	5210037	5270037
1.1/4	1.2500	2"	4.1/2	1.1/4	6	1	5210038	5270038
1.1/2	1.5000	2"	4.1/2	1.1/4	6	1	5210039	5270039
1.3/4	1.7500	2"	4.1/2	1.1/4	6	1	5210040	5270040
2"	2.0000	2"	4.1/2	1.1/4	8	1	5210041	5270041

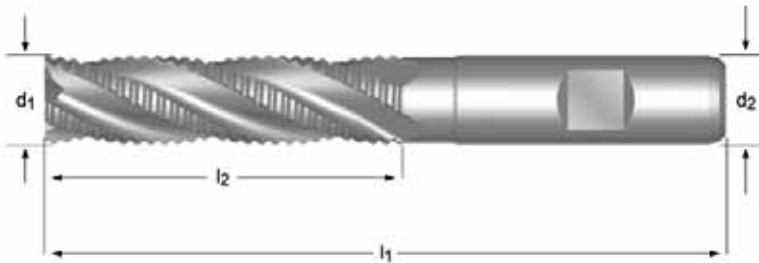
Cobalt 4 Flute End Mill



Long Length, Square End, Roughing, Weldon Shank

9009 Roughing, Coarse Profile, for maximum metal removal in one pass. Bright finish.

TC9009 TiCN coating lowers the coefficient of friction and improves wear resistance on the end mill.

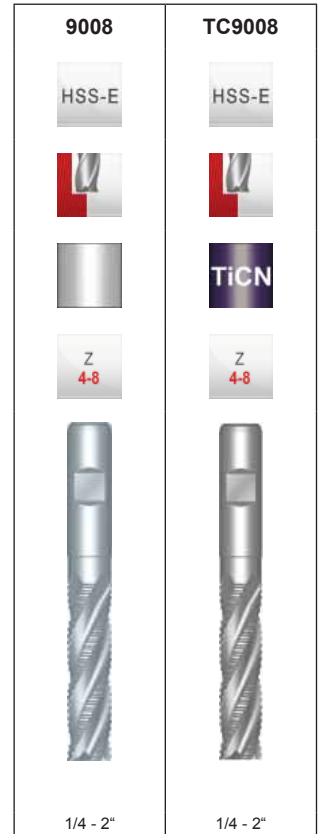
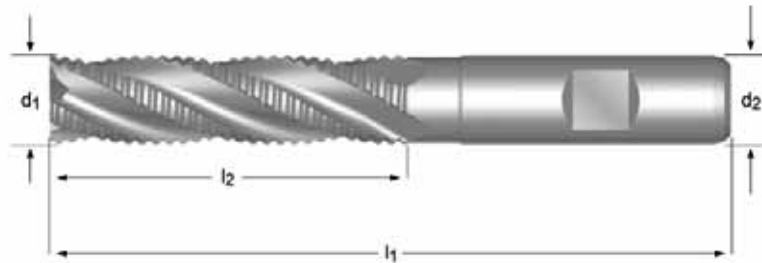


d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	9009	TC9009
1/4	0.2500	1.1/4	3.1/8	3/8	4	1	5210089	5270089
3/8	0.3750	1.1/2	3.1/4	3/8	4	1	5210090	5270090
1/2	0.5000	2"	4"	1/2	4	1	5210091	5270091
5/8	0.6250	2.1/2	4.5/8	5/8	4	1	5210092	5270092
3/4	0.7500	3"	5.1/4	3/4	4	1	5210093	5270093
7/8	0.8750	3.1/2	5.3/4	3/4	6	1	5210094	5270094
1"	1.0000	4"	6.1/2	1"	5	1	5210095	5270095
1.1/4	1.2500	4"	6.1/2	1.1/4	6	1	5210096	5270096
1.1/2	1.5000	4"	6.1/2	1.1/4	6	1	5210097	5270097
1.3/4	1.7500	4"	6.1/2	1.1/4	6	1	5210098	5270098
2"	2.0000	4"	6.1/2	1.1/4	8	1	5210099	5270099

Cobalt 4 Flute End Mill

Long Length, Square End, Roughing, Weldon Shank

- 9008** Roughing, Fine Profile, provides a stronger edge and runs longer than conventional coarse profile roughers. Bright finish.
- TC9008** TiCN coating lowers the coefficient of friction and improves wear resistance on the end mill.



d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	9008	TC9008
1/4	0.2500	1.1/4	3.1/8	3/8	4	1	5210078	5270078
3/8	0.3750	1.1/2	3.1/4	3/8	4	1	5210079	5270079
1/2	0.5000	2"	4"	1/2	4	1	5210080	5270080
5/8	0.6250	2.1/2	4.5/8	5/8	4	1	5210081	5270081
3/4	0.7500	3"	5.1/4	3/4	4	1	5210082	5270082
7/8	0.8750	3.1/2	5.3/4	3/4	6	1	5210083	5270083
1"	1.0000	4"	6.1/2	1"	5	1	5210084	5270084
1.1/4	1.2500	4"	6.1/2	1.1/4	6	1	5210085	5270085
1.1/2	1.5000	4"	6.1/2	1.1/4	6	1	5210086	5270086
1.3/4	1.7500	4"	6.1/2	1.1/4	6	1	5210087	5270087
2"	2.0000	4"	6.1/2	1.1/4	8	1	5210088	5270088

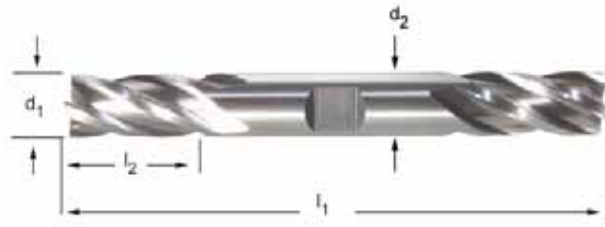
HSS 4 Flute End Mill



Regular Length, Square End, Weldon Shank

948 Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft or non-ferrous materials.

TN948 Double end provides two cutting ends in one tool. TiN coating increases surface hardness and improves tool life.

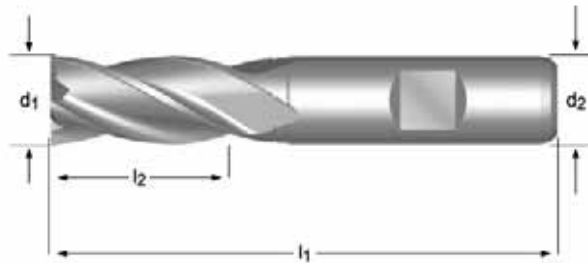


d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	948	TN948
1/8	0.1250	3/8	3.1/16	3/8	4	1	5110162	5160162
3/16	0.1875	1/2	3.1/4	3/8	4	1	5110163	5160163
1/4	0.2500	5/8	3.3/8	3/8	4	1	5110164	5160164
5/16	0.3125	3/4	3.1/2	3/8	4	1	5110165	5160165
3/8	0.3750	3/4	3.1/2	3/8	4	1	5110166	5160166
1/2	0.5000	1"	4.1/2	1/2	4	1	5110167	5160167
5/8	0.6250	1.3/8	5"	5/8	4	1	5110168	5160168
3/4	0.7500	1.5/8	5.5/8	3/4	4	1	5110169	5160169
7/8	0.8750	1.7/8	6.1/8	7/8	4	1	5110170	5160170
1"	1.0000	1.7/8	6.3/8	1"	4	1	5110171	5160171

HSS 4 Flute End Mill

Regular Length, Square End, Weldon Shank

- 945** Bright finish improves chip flow in soft or non-ferrous materials.
- TN945** TiN coating increases surface hardness and improves tool life.



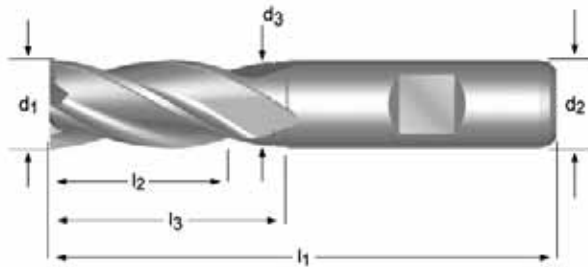
d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	945	TN945
1/8	0.1250	3/8	2.5/16	3/8	4	1	5110071	5160071
3/16	0.1875	1/2	2.3/8	3/8	4	1	5110072	5160072
1/4	0.2500	5/8	2.7/16	3/8	4	1	5110073	5160073
5/16	0.3125	3/4	2.1/2	3/8	4	1	5110074	5160074
3/8	0.3750	3/4	2.1/2	3/8	4	1	5110075	5160075
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	5110076	5160076
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	5110077	5160077
11/16	0.6875	1.5/8	3.3/4	5/8	4	1	5110078	5160078
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	5110079	5160079
7/8	0.8750	1.7/8	4.1/8	7/8	4	1	5110080	5160080
1"	1.0000	2"	4.1/2	1"	4	1	5110081	5160081
1.1/8	1.1250	2"	4.1/2	1"	4	1	5110082	5160082
1.1/4	1.2500	2"	4.1/2	1.1/4	4	1	5110083	5160083
1.1/2	1.5000	2"	4.1/2	1.1/4	4	1	5110084	5160084

HSS-PM 4 Flute End Mill



Regular Length, Square End, Weldon Shank

C247 Powdered Metal. Bright finish improves chip flow in soft or non-ferrous materials.



d_1 Ø Inch /	d_1 Ø mm	d_2 Ø mm	LOC l_2 Inch	OAL l_1 Inch	# of Flutes	l_3 mm Neck	d_3 Ø mm Neck	Pack Qty	C247
	2.00	6	7	51	4	-	-	1	0354667
	2.50	6	8	52	4	-	-	1	0354674
	3.00	6	8	52	4	-	-	1	0354728
1/8	3.18	6	10	54	4	-	-	1	0640142 ¹⁾
	3.50	6	10	54	4	-	-	1	0354735
	4.00	6	11	55	4	-	-	1	0354766
	4.50	6	11	55	4	-	-	1	0354773
3/16	4.76	6	13	57	4	-	-	1	0640159 ¹⁾
	5.00	6	13	57	4	-	-	1	0354780
	5.50	6	13	57	4	-	-	1	0354797
	6.00	6	13	57	4	-	-	1	0354803
1/4	6.35	10	16	66	4	-	-	1	0640166 ¹⁾
	6.50	10	16	66	4	-	-	1	0354810
	7.00	10	16	66	4	-	-	1	0354827
	7.50	10	16	66	4	-	-	1	0354834
5/16	7.94	10	19	69	4	-	-	1	0640173 ¹⁾
	8.00	10	19	69	4	-	-	1	0354841
	8.50	10	19	69	4	-	-	1	0354858
	9.00	10	19	69	4	-	-	1	0354865
	9.50	10	19	69	4	-	-	1	0354872
3/8	9.52	10	22	72	4	31.5	9.5	1	0640180 ¹⁾
	10.00	10	22	72	4	31.5	9.5	1	0354582
	11.00	12	22	79	4	-	-	1	0354599
	12.00	12	26	83	4	37.5	11.5	1	0354605
1/2	12.70	12	26	83	4	37.5	11.5	1	0640197 ¹⁾
	13.00	12	26	83	4	37.5	11.5	1	0354612
	14.00	12	26	83	4	37.5	11.5	1	0354629
9/16	14.29	12	26	83	4	37.5	11.5	1	0640203 ¹⁾
	15.00	12	26	83	4	37.5	11.5	1	0354636
5/8	15.88	16	32	92	4	43.5	15.5	1	0640210 ¹⁾
	16.00	16	32	92	4	43.5	15.5	1	0354643
	17.00	16	32	92	4	43.5	15.5	1	0609316

¹⁾ diameter tolerance +.0025 inches / -.0005 inches



HSS-PM 4 Flute End Mill

d ₁ Ø Inch /	d ₁ Ø mm	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	l ₃ mm	d ₃ Ø mm	Pack Qty	C247
	18.00	16	32	92	4	43.5	15.5	1	0354650
	19.00	16	32	92	4	43.5	15.5	1	0609323
3/4	19.05	20	38	104	4	53.5	18.5	1	0640227 ¹⁾
	20.00	20	38	104	4	53.5	19.5	1	0354681
	21.00	20	38	104	4	53.5	19.5	1	0609330
	22.00	20	38	104	5	53.5	19.5	1	0354698
7/8	22.22	20	38	104	5	53.5	19.5	1	0640234 ¹⁾
	23.00	20	38	104	5	53.5	19.5	1	0609347
	24.00	25	45	121	5	64.5	23.5	1	0609354
	25.00	25	45	121	5	64.5	24.5	1	0354704
1"	25.40	25	45	121	5	64.5	24.5	1	0640241 ¹⁾
	26.00	25	45	121	6	64.5	24.5	1	0609361
	28.00	25	45	121	6	64.5	24.5	1	0354711
	30.00	25	45	121	6	64.5	24.5	1	0354742
	32.00	32	53	133	6	72.5	31.5	1	0354759
	36.00	32	53	133	6	72.5	31.5	1	0609378 ²⁾³⁾
	40.00	40	63	155	6	84.5	39	1	0609385 ²⁾³⁾
	50.00	50	75	177	8	96.5	48	1	0640258 ²⁾³⁾

¹⁾ diameter tolerance +.0025 inches / -.0005 inches

²⁾ No center Cutting

³⁾ Available in HSCo only

HSS 4 Flute End Mill



Long Length, Square End, Weldon Shank

946 Bright finish improves chip flow in soft or non-ferrous materials.

TN946 TiN coating increases surface hardness and improves tool life.



d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	946	TN946
1/4	0.2500	1.1/4	3.1/16	3/8	4	1	5110085	5160085
5/16	0.3125	1.3/8	3.1/8	3/8	4	1	5110086	5160086
3/8	0.3750	1.1/2	3.1/4	3/8	4	1	5110087	5160087
1/2	0.5000	2"	4"	1/2	4	1	5110088	5160088
5/8	0.6250	2.1/2	4.5/8	5/8	4	1	5110089	5160089
3/4	0.7500	3"	5.1/4	3/4	4	1	5110090	5160090
7/8	0.8750	3.1/2	5.3/4	7/8	4	1	5110091	5160091
1"	1.0000	4"	6.1/2	1"	4	1	5110092	5160092
1.1/4	1.2500	4"	6.1/2	1.1/4	4	1	5110093	5160093

Long Length, Square End, Weldon Shank

C273 Powdered Metal. Bright finish improves chip flow in soft or non-ferrous materials.

C273

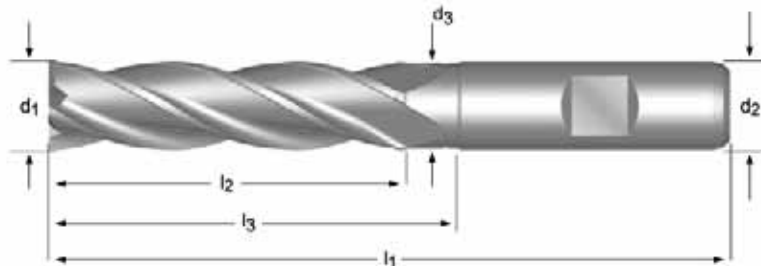
HSS-E-PM



Z
4-6



2.00 - 40.00



d ₁ Ø Inch /	d ₁ Ø mm	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	l ₃ mm Neck	d ₃ Ø mm Neck	Pack Qty	C273
	2.00	6	10	54	4	-	-	1	0354964
	2.50	6	12	56	4	-	-	1	0354971
	3.00	6	12	56	4	-	-	1	0355022
1/8	3.18	6	15	59	4	-	-	1	0640265 ¹⁾
	3.50	6	15	59	4	-	-	1	0355039
	4.00	6	19	63	4	-	-	1	0355060
	4.50	6	19	63	4	-	-	1	0355077
3/16	4.76	6	24	68	4	-	-	1	0640272 ¹⁾
	5.00	6	24	68	4	-	-	1	0355084
	5.50	6	24	68	4	-	-	1	0355091
	6.00	6	24	68	4	-	-	1	0355107
1/4	6.35	10	30	80	4	-	-	1	0640289 ¹⁾
	7.00	10	30	80	4	-	-	1	0355114
	8.00	10	38	88	4	-	-	1	0355121
	9.00	10	38	88	4	-	-	1	0355138
3/8	9.52	10	45	95	4	54.5	9.5	1	0640296 ¹⁾
	10.00	10	45	95	4	54.5	9.5	1	0354889
	11.00	12	45	102	4	-	-	1	0354896
	12.00	12	53	110	4	64.5	11.5	1	0354902
1/2	12.70	12	53	110	4	64.5	11.5	1	0640302 ¹⁾
	13.00	12	53	110	4	64.5	11.5	1	0354919
	14.00	12	53	110	4	64.5	11.5	1	0354926
	15.00	12	53	110	4	64.5	11.5	1	0354933
5/8	15.88	16	63	123	4	74.5	15.5	1	0640319 ¹⁾
	16.00	16	63	123	4	74.5	15.5	1	0354940
	18.00	16	63	123	4	74.5	15.5	1	0354957
3/4	19.05	20	75	141	4	90.5	18.5	1	0640326 ¹⁾
	20.00	20	75	141	4	90.5	19.5	1	0354988
	22.00	20	75	141	5	90.5	19.5	1	0354995
7/8	22.22	20	75	141	5	90.5	19.5	1	0640333 ¹⁾
	25.00	25	90	166	5	109.5	24.5	1	0355008
1"	25.40	25	90	166	5	109.5	24.5	1	0640340 ¹⁾

¹⁾ diameter tolerance +.0025 inches / -.0005 inches

HSS-PM 4 Flute End Mill



d ₁ Ø Inch /	d ₁ Ø mm	d ₂ Ø mm	LOC l ₂ Inch	OAL l ₁ Inch	# of Flutes	l ₃ mm	d ₃ Ø mm	Pack Qty	C273
	28.00	25	90	166	6	109.5	24.5	1	0355015
	30.00	25	90	166	6	109.5	24.5	1	0355046
	32.00	32	106	186	6	125.5	31.5	1	0355053
	36.00	32	106	186	6	125.5	31.5	1	0609293 ²⁾³⁾
1.1/2	38.10	40	125	217	6	146.5	37	1	0640357 ²⁾¹⁾³⁾
	40.00	40	125	217	6	146.5	39	1	0609309 ²⁾³⁾

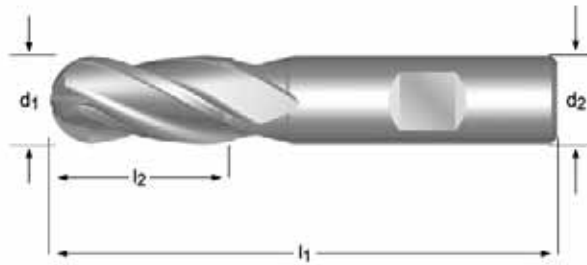
¹⁾ diameter tolerance +.0025 inches / -.0005 inches

²⁾ Available in HSCo only

³⁾ No center Cutting

Regular Length, Ball Nose, Weldon Shank

900 Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.



3/8 - 1.1/2

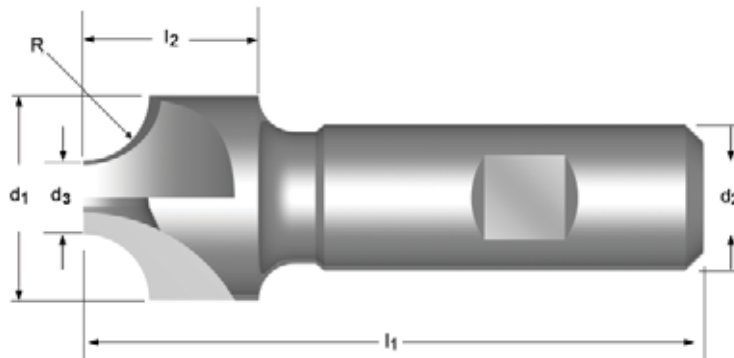
d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	900
3/8	0.3750	3/4	2.1/2	3/8	4	1	5110172
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	5110173
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	5110174
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	5110175
7/8	0.8750	1.7/8	4.1/8	7/8	4	1	5110176
1"	1.0000	2"	4.1/2	1"	4	1	5110177
1.1/4	1.2500	2"	4.1/2	1.1/4	4	1	5110178
1.1/2	1.5000	2"	4.1/2	1.1/4	4	1	5110179

HSS 4 Flute End Mill



Regular Length, Inverse Radius, Corner Rounding, Weldon Shank

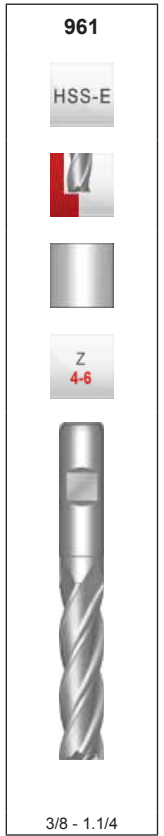
883 Corner rounding for cutting external radius on part. Bright finish improves chip flow in soft or non-ferrous materials.



R Inch	d ₁ Ø Inch	d ₂ Ø Inch	d ₃ Ø Inch	l ₂ Inch	OAL l ₁ Inch	# of Flutes	Pack Qty	883
1/16	7/16	3/8	1/4	13/16	2.1/2	4	1	5110686
3/32	1/2	3/8	1/4	13/16	2.1/2	4	1	5110687
1/8	5/8	1/2	1/4	1.1/16	3"	4	1	5110688
5/32	3/4	1/2	5/16	1	3"	4	1	5110689
3/16	7/8	3/4	3/8	7/8	3.1/8	4	1	5110690
1/4	1"	3/4	3/8	1	3.1/4	4	1	5110691
5/16	1.1/8	7/8	3/8	1.5/16	3.1/2	4	1	5110692
3/8	1.1/4	7/8	3/8	1.1/2	3.3/4	4	1	5110693
7/16	1.3/8	1"	3/8	1.9/16	4"	4	1	5110694
1/2	1.1/2	1"	3/8	1.5/8	4.1/8	4	1	5110695

Long Length, Square End, Weldon Shank

961 Bright finish improves chip flow in soft or non-ferrous materials.



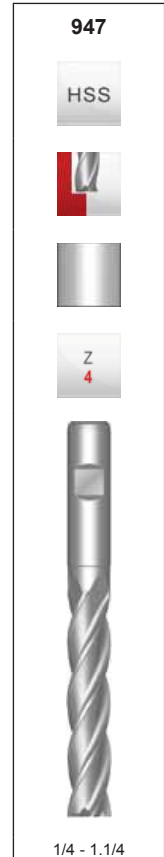
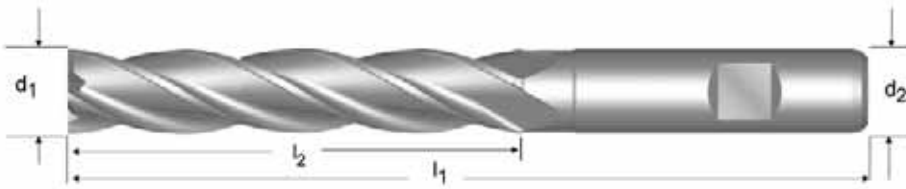
d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	961
3/8	0.3750	1.1/2	3.1/4	3/8	4	1	5110672
1/2	0.5000	2"	4"	1/2	4	1	5110673
5/8	0.6250	2.1/2	4.5/8	5/8	4	1	5110674
3/4	0.7500	3"	5.1/4	3/4	4	1	5110675
3/4	0.7500	3"	5.1/4	3/4	6	1	5110775
1"	1.0000	4"	6.1/2	1"	6	1	5110779
1"	1.0000	4"	6.1/2	1"	4	1	5110677
1.1/4	1.2500	4"	6.1/2	1.1/4	6	1	5110678

HSS 4 Flute End Mill



Extra Long Length, Square End, Weldon Shank

947 Bright finish improves chip flow in soft or non-ferrous materials.

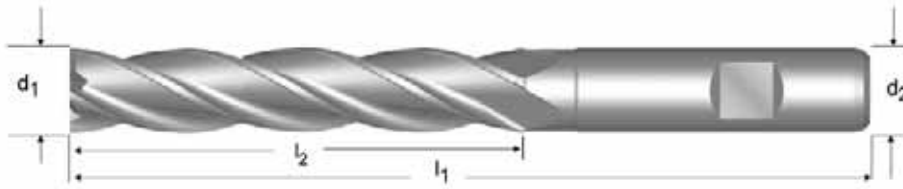


d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	947
1/4	0.2500	1.3/4	3.9/16	3/8	4	1	5110094
5/16	0.3125	2"	3.3/4	3/8	4	1	5110095
3/8	0.3750	2.1/2	4.1/4	3/8	4	1	5110096
1/2	0.5000	3"	5"	1/2	4	1	5110097
5/8	0.6250	4"	6.1/8	5/8	4	1	5110098
3/4	0.7500	4"	6.1/4	3/4	4	1	5110099
7/8	0.8750	5"	7.1/4	7/8	4	1	5110100
1"	1.0000	6"	8.1/2	1"	4	1	5110101
1.1/4	1.2500	6"	8.1/2	1.1/4	4	1	5110102

Cobalt 4 Flute End Mill

Extra Long Length, Square End, Weldon Shank

962 Bright finish improves chip flow in soft or non-ferrous materials.



d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	962
3/8	0.3750	2.1/2	4.1/4	3/8	4	1	5110679
1/2	0.5000	3"	5"	1/2	4	1	5110680
5/8	0.6250	4"	6.1/8	5/8	4	1	5110681
3/4	0.7500	4"	6.1/4	3/4	4	1	5110682
1"	1.0000	6"	8.1/2	1"	4	1	5110684

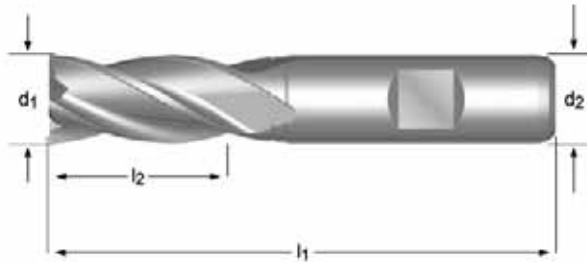
HSS Multi Flute End Mill



Regular Length, Square End, Weldon Shank

940 Multi-flute finishing. Bright finish improves chip flow in soft or non-ferrous materials.

TN940 Multi-flute finishing. TiN coating increases surface hardness and improves tool life.



d ₁ Ø Inch	d ₁ decimal Inch	LOC l ₂ Inch	OAL l ₁ Inch	d ₂ Ø Inch	# of Flutes	Pack Qty	940	TN940
1/8	0.1250	3/8	2.5/16	3/8	4	1	5110001	5160001
3/16	0.1875	1/2	2.3/8	3/8	4	1	5110002	5160002
1/4	0.2500	5/8	2.7/16	3/8	4	1	5110003	5160003
5/16	0.3125	3/4	2.1/2	3/8	4	1	5110004	5160004
3/8	0.3750	3/4	2.1/2	3/8	4	1	5110005	5160005
7/16	0.4375	1"	2.11/16	3/8	4	1	5110006	5160006
1/2	0.5000	1"	2.11/16	3/8	4	1	5110007	5160007
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	5110008	5160008
9/16	0.5625	1.3/8	3.3/8	1/2	4	1	5110009	5160009
5/8	0.6250	1.3/8	3.3/8	1/2	4	1	5110010	5160010
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	5110013	5160013
11/16	0.6875	1.5/8	3.5/8	1/2	4	1	5110011	5160011
11/16	0.6875	1.5/8	3.3/4	5/8	4	1	5110014	5160014
3/4	0.7500	1.5/8	3.5/8	1/2	4	1	5110012	5160012
3/4	0.7500	1.5/8	3.3/4	5/8	4	1	5110015	5160015
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	5110711	5160711
13/16	0.8125	1.7/8	4"	5/8	6	1	5110016	5160016
7/8	0.8750	1.7/8	4"	5/8	6	1	5110017	5160017
7/8	0.8750	1.7/8	4.1/8	3/4	4	1	5110712	5160712
7/8	0.8750	1.7/8	4.1/8	7/8	4	1	5110020	5160020
1"	1.0000	1.7/8	4"	5/8	6	1	5110019	5160019
1"	1.0000	1.7/8	4.1/8	3/4	4	1	5110713	5160713
1"	1.0000	1.7/8	4.1/8	7/8	4	1	5110022	5160022
1"	1.0000	2"	4.1/2	1"	4	1	5110025	5160025
1.1/8	1.1250	1.3/4	4"	3/4	6	1	5111720	5161720
1.1/8	1.1250	2"	4.1/4	7/8	6	1	5110023	5160023
1.1/8	1.1250	2"	4.1/2	1"	6	1	5110026	5160026
1.1/4	1.2500	1.3/4	4"	3/4	6	1	5111721	5161721
1.1/4	1.2500	2"	4.1/4	7/8	6	1	5110024	5160024
1.1/4	1.2500	2"	4.1/2	1"	6	1	5110027	5160027
1.1/4	1.2500	2"	4.1/2	1.1/4	6	1	5110030	5160030
1.3/8	1.3750	2"	4.1/4	3/4	6	1	5111722	5161722
1.3/8	1.3750	2"	4.1/2	1"	6	1	5110028	5160028

HSS Multi Flute End Mill

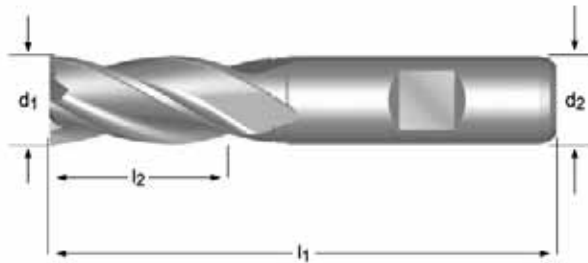
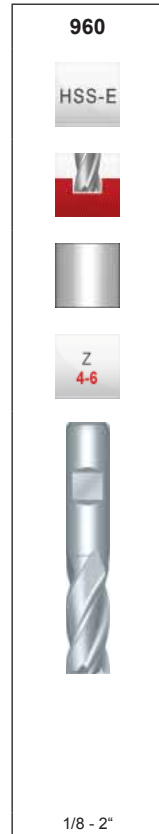
d ₁ Ø Inch	d ₁ decimal Inch	LOC l ₂ Inch	OAL l ₁ Inch	d ₂ Ø Inch	# of Flutes	Pack Qty	940	TN940
1.1/2	1.5000	2"	4.1/4	3/4	6	1	5111723	5161723
1.1/2	1.5000	2"	4.1/2	1"	6	1	5110029	5160029
1.1/2	1.5000	2"	4.1/2	1.1/4	6	1	5110031	5160031
1.3/4	1.7500	3.7/8	1.1/2	3/4	6	1	5111724	5161724
1.3/4	1.7500	4.1/2	2"	1.1/4	6	1	5110033	5160033
2"	2.0000	3.7/8	1.1/2	3/4	6	1	5111725	5161725
2"	2.0000	4.1/2	2"	1.1/4	8	1	5110035	5160035

Cobalt Multi Flute End Mill



Regular Length, Square End, Weldon Shank

960 Multi-flute finishing for high strength heat resistant materials, stainless and alloy steel, super alloys, and titanium alloys.



d_1 Ø Inch	d_1 decimal Inch	LOC l_2 Inch	OAL l_1 Inch	d_2 Ø Inch	# of Flutes	Pack Qty	960
1/8	0.1250	3/8	2.5/16	3/8	4	1	5110660
3/16	0.1875	1/2	2.3/8	3/8	4	1	5110661
1/4	0.2500	5/8	2.7/16	3/8	4	1	5110662
5/16	0.3125	3/4	2.1/2	3/8	4	1	5110663
3/8	0.3750	3/4	2.1/2	3/8	4	1	5110664
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	5110665
1/2	0.5000	1.1/4	3.1/4	1/2	6	1	5110772
5/8	0.6250	1.5/8	3.3/4	5/8	6	1	5110773
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	5110666
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	5110667
3/4	0.7500	1.5/8	3.7/8	3/4	6	1	5110774
1"	1.0000	2"	4.1/2	1"	6	1	5110778
1"	1.0000	2"	4.1/2	1"	4	1	5110669
1.1/4	1.2500	2"	4.1/2	1.1/4	6	1	5110670
1.1/2	1.5000	2"	4.1/2	1.1/4	6	1	5110671
2"	2.0000	4"	7.3/4	2"	6	1	5110782



High Performance

Carbide Reamer

Machine Reamer, Unequal Spacing . . . 388-391
High Precision, Centesimal 392-393

Cobalt Reamer

High Precision, Centesimal 394-396

General Purpose

High Speed Steel & Cobalt Reamers

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Chucking, Spiral Flute 403-406
Chucking, Expansion 401-402
Car/Alignment 407

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Chucking, Spiral Flute 409, 411-412
Chucking, Expansion 410
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REAMERS

List Number
Index



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* Denotes high performance product

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HIGH PERFORMANCE CARBIDE REAMER



Machine Reamer, Straight Shank

B441 Extremely unequal flute spacing. Straight flute. For machine reaming of abrasive, hard ferrous, and non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 4.3 5.1 5.2
5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2



B441

HM



DIN
8050



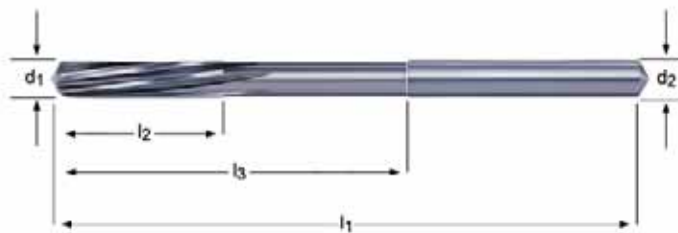
10.00 - 20.00

d_1 Ø	l_1	l_2	l_3	# of Flutes	d_2 Ø h_9 mm	Pack Qty	B441
10.0	133	19	87	6	10	1	0421086
11.0	142	19	96	6	10	1	0421093
12.0	151	19	105	6	10	1	0421109
13.0	151	19	105	6	10	1	0426302
14.0	160	19	110	6	12.5	1	0421116
15.0	162	19	112	6	12.5	1	0421123
16.0	170	22	120	6	12.5	1	0421130
17.0	175	22	123	6	14	1	0421147
18.0	182	22	130	6	14	1	0421154
19.0	189	22	131	6	16	1	0421161
20.0	195	22	137	6	16	1	0421178

Machine Reamer, Straight Shank

B400 Extremely unequal flute spacing with left hand slow spiral, right hand cut. For machine reaming of abrasive, hard ferrous, and non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 4.3 5.1 5.2
5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2



B400

HM

1.00 - 20.00

d_1 Ø mm	l_1 mm	l_2 mm	l_3 mm	# of Flutes	d_2 Ø _{h9} mm	Pack Qty	B400
1.0	34	6	15	3	1.0	1	0052983 ¹⁾
1.2	38	8	16.5	3	1.2	1	0052990 ¹⁾
1.4	40	8	18	3	1.4	1	0053003 ¹⁾
1.5	40	8	18	3	1.5	1	0053010 ¹⁾
1.6	49	11	26	3	1.6	1	0053027 ¹⁾
1.8	49	11	25	4	1.8	1	0053034 ¹⁾
2.0	49	11	24	4	2.0	1	0053041 ¹⁾
2.2	57	15	30	4	2.2	1	0053058 ¹⁾
2.5	57	15	28	4	2.5	1	0053065 ¹⁾
2.8	61	15	32	4	2.8	1	0053072 ¹⁾
3.0	61	15	30	6	3.0	1	0144152 ¹⁾
3.2	70	18	33	6	3.2	1	0144169 ¹⁾
3.5	70	18	33	6	3.5	1	0144176 ¹⁾
4.0	75	19	44	6	4.0	1	0144183 ¹⁾
4.5	80	21	46	6	4.5	1	0144190 ¹⁾
5.0	86	23	53	6	5.0	1	0144206 ¹⁾
5.5	93	26	56	6	5.6	1	0144213 ¹⁾
6.0	93	26	56	6	5.6	1	0144220 ¹⁾
6.5	101	28	63	6	6.3	1	0144237 ²⁾
7.0	109	31	69	6	7.1	1	0144244 ²⁾
8.0	117	33	75	6	8.0	1	0144251 ²⁾
9.0	125	36	81	6	9.0	1	0144268 ²⁾
10.0	133	38	87	6	10.0	1	0144275 ²⁾
12.0	151	44	105	6	10.0	1	0144282 ²⁾
14.0	160	47	110	8	12.5	1	0144299 ²⁾
16.0	170	52	120	8	12.5	1	0144305 ²⁾
18.0	182	56	130	6	14.0	1	0144312 ¹⁾
20.0	195	60	137	6	16.0	1	0144329 ¹⁾

¹⁾ Solid Carbide
²⁾ Carbide Head

HIGH PERFORMANCE CARBIDE REAMER



Machine Reamer, Taper Shank

B442 Extremely unequal flute spacing with straight flute. For machine reaming of abrasive, hard ferrous, and non-ferrous materials.

- 1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 4.3 5.1 5.2
5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2



B442

HM

DIN 8051

10.00 - 20.00

d_1 Ø	l_1	l_2	l_3	# of Flutes	MTS	Pack Qty	B442
10.0	168	19	102.5	6	1	1	0421185
12.0	182	19	116.5	6	1	1	0421192
14.0	189	19	123.5	6	1	1	0421208
15.0	204	19	124	6	2	1	0421215
16.0	210	22	130	6	2	1	0421222
17.0	214	22	134	6	2	1	0421239
18.0	219	22	139	6	2	1	0421246
19.0	223	22	143	6	2	1	0426319
20.0	228	22	148	6	2	1	0421253

Machine Reamer, Taper Shank

B411 Extremely unequal spacing with left hand spiral, and right hand cut. For machine reaming of abrasive, hard ferrous, and non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 4.3 5.1 5.2
5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2



B411

HM



DIN
8094



5.00 - 30.00

d ₁ Ø mm	l ₁ mm	l ₂ mm	l ₃ mm	# of Flutes	MTS	Pack Qty	B411
5.0	133	23	67.5	6	1	1	0053195 ¹⁾
6.0	138	26	72.5	6	1	1	0053201 ¹⁾
7.0	150	31	84.5	6	1	1	0053218 ¹⁾
8.0	156	33	90.5	6	1	1	0053225 ¹⁾
9.0	162	36	96.5	6	1	1	0053232 ¹⁾
10.0	168	38	102.5	6	1	1	0053126 ¹⁾
12.0	182	44	116.5	6	1	1	0053140 ¹⁾
14.0	189	47	123.5	8	1	1	0053164 ¹⁾
15.0	204	50	124	8	2	1	0053171 ²⁾
16.0	210	52	130	8	2	1	0053188 ²⁾
17.0	214	54	134	6	2	1	0144336 ²⁾
18.0	219	56	139	6	2	1	0144343 ²⁾
19.0	223	58	143	6	2	1	0144350 ²⁾
20.0	228	60	148	6	2	1	0144367 ²⁾
22.0	237	64	157	6	2	1	0144374 ²⁾
24.0	268	68	169	8	3	1	0144381 ²⁾
25.0	268	68	169	8	3	1	0144398 ²⁾
26.0	273	70	174	8	3	1	0144404 ²⁾
30.0	281	73	182	8	3	1	0144411 ²⁾

¹⁾ Solid Carbide
²⁾ Carbide Head

HIGH PERFORMANCE CARBIDE REAMER



High Precision, Straight Shank

B481 High Precision NC Centesimal Reamers are offered in 0.01mm increments. Extremely unequal flute spacing with left hand slow spiral, right hand cut. For machining reaming of abrasive, hard ferrous, and non-ferrous materials. Ideal for hydraulic and heat shrink tool holding systems.

1.1 1.2 1.3 1.4 1.5 1.6 3.1 3.2 3.3 3.4 4.1 4.2 4.3 5.1 5.2
5.3 6.1 6.2 6.3 6.4 7.1 7.2 7.3 7.4 8.1 8.2



B481

HM



DIN
8093



0.98 - 12.05

d ₁ Ø	l ₁	l ₂	l ₃	# of Flutes	d ₂ Øh ₆ mm	Pack Qty	B481
0.98	49.5	6	21.5	3	4	1	0421567
0.99	49.5	6	21.5	3	4	1	0421574
1.00	49.5	6	21.5	3	4	1	0421581
1.01	49.5	6	21.5	3	4	1	0421598
1.02	49.5	6	21.5	3	4	1	0421604
1.03	49.5	9	21.5	3	4	1	0421611
1.48	49	9	21	3	4	1	0421628
1.49	49	9	21	3	4	1	0421635
1.50	49	9	21	3	4	1	0421642
1.51	49	9	21	3	4	1	0421659
1.52	49	9	21	3	4	1	0421666
1.53	49	9	21	3	4	1	0421673
1.98	49	12	21	4	4	1	0421680
1.99	49	12	21	4	4	1	0421697
2.00	49	12	21	4	4	1	0421857
2.01	49	12	21	4	4	1	0421864
2.02	49	12	21	4	4	1	0421871
2.03	49	12	21	4	4	1	0421888
2.48	59	16	31	4	4	1	0421895
2.49	59	16	31	4	4	1	0421901
2.50	59	16	31	4	4	1	0421918
2.51	59	16	31	4	4	1	0421925
2.52	59	16	31	4	4	1	0421932
2.53	59	16	31	4	4	1	0421949
2.97	62.5	17	35	6	4	1	0421956
2.98	62.5	17	35	6	4	1	0421963
2.99	62.5	17	35	6	4	1	0421970
3.00	62.5	17	35	6	4	1	0421987
3.01	62.5	17	35	6	4	1	0421994
3.02	62.5	17	35	6	4	1	0422007
3.03	62.5	17	35	6	4	1	0422014
3.97	75	19	47	6	4	1	0422021
3.98	75	19	47	6	4	1	0422038



HIGH PERFORMANCE CARBIDE REAMER

d ₁ Ø mm	l ₁ mm	l ₂ mm	l ₃ mm	# of Flutes	d ₂ Øh ₆ mm	Pack Qty	B481
3.99	75	19	47	6	4	1	0422045
4.00	75	19	47	6	4	1	0422052
4.01	75	19	47	6	4	1	0422069
4.02	75	19	47	6	4	1	0422076
4.03	75	19	47	6	4	1	0422083
4.97	86	23	50	6	6	1	0422090
4.98	86	23	50	6	6	1	0422106
4.99	86	23	50	6	6	1	0422113
5.00	86	23	50	6	6	1	0422120
5.01	86	23	50	6	6	1	0422137
5.02	86	23	50	6	6	1	0422144
5.03	86	23	50	6	6	1	0422151
5.97	93	26	57	6	6	1	0422168
5.98	93	26	57	6	6	1	0422175
5.99	93	26	57	6	6	1	0422182
6.00	93	26	57	6	6	1	0422199
6.01	93	26	57	6	6	1	0422205
6.02	93	26	57	6	6	1	0422212
6.03	93	26	57	6	6	1	0422229
7.97	117	33	81	6	8	1	0422236
7.98	117	33	81	6	8	1	0422243
7.99	117	33	81	6	8	1	0422250
8.00	117	33	81	6	8	1	0422267
8.01	117	33	81	6	8	1	0422274
8.02	117	33	81	6	8	1	0422281
8.03	117	33	81	6	8	1	0422298
8.04	117	33	81	6	8	1	0422304
9.97	133	38	93	6	10	1	0422311
9.98	133	38	93	6	10	1	0422328
9.99	133	38	93	6	10	1	0422335
10.00	133	38	93	6	10	1	0421703
10.01	133	38	93	6	10	1	0421710
10.02	133	38	93	6	10	1	0421727
10.03	133	38	93	6	10	1	0421734
10.04	133	38	93	6	10	1	0421741
10.05	133	38	93	6	10	1	0421758
11.97	151	44	106	6	12	1	0421765
11.98	151	44	106	6	12	1	0421772
11.99	151	44	106	6	12	1	0421789
12.00	151	44	106	6	12	1	0421796
12.01	151	44	106	6	12	1	0421802
12.02	151	44	106	6	12	1	0421819
12.03	151	44	106	6	12	1	0421826
12.04	151	44	106	6	12	1	0421833
12.05	151	44	106	6	12	1	0421840

HIGH PERFORMANCE COBALT REAMER



High Precision, Straight Shank

B170 Centesimal Reamer by 0.01mm increments.
Left hand slow spiral, right hand cut. For machine reaming of abrasive, hard ferrous, and non-ferrous materials.

1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2
4.3 5.1 5.2 5.3 6.1 6.2 6.3 6.4



B170

HSS-E



DIN 212



0.98 - 12.00

d_1 Ø	l_1	l_2	l_3	# of Flutes	d_2 Ø _{h9} mm	Pack Qty	B170
0.98	34	5.5	15	3	1.0	1	0127957
0.99	34	5.5	15	3	1.0	1	0127964
1.00	34	5.5	15	3	1.0	1	0127971
1.01	34	5.5	15	3	1.0	1	0127988
1.02	34	5.5	15	3	1.0	1	0127995
1.03	34	5.5	15	3	1.0	1	0128008
1.04	34	5.5	15	3	1.0	1	0128015
1.05	34	5.5	15	3	1.0	1	0128022
1.49	40	8.0	18	3	1.5	1	0128459
1.50	40	8.0	18	3	1.5	1	0128466
1.51	43	9.0	20	3	1.6	1	0050392
1.52	43	9.0	20	3	1.6	1	0128473
1.98	49	11.0	24	4	2.0	1	0128916
1.99	49	11.0	24	4	2.0	1	0128923
2.00	49	11.0	24	4	2.0	1	0130896
2.01	49	11.0	24	4	2.0	1	0130902
2.02	49	11.0	24	4	2.0	1	0130919
2.03	49	11.0	24	4	2.0	1	0130926
2.04	49	11.0	24	4	2.0	1	0130933
2.05	49	11.0	24	4	2.0	1	0130940
2.49	57	14.0	28	4	2.5	1	0131367
2.50	57	14.0	28	4	2.5	1	0131374
2.51	57	14.0	28	4	2.5	1	0131381
2.52	57	14.0	28	4	2.5	1	0131398
2.98	61	15.0	32	6	3.0	1	0131848
2.99	61	15.0	32	6	3.0	1	0131855
3.00	61	15.0	32	6	3.0	1	0131862
3.01	65	16.0	35	6	3.2	1	0050491
3.02	65	16.0	35	6	3.2	1	0131879
3.03	65	16.0	35	6	3.2	1	0131886
3.04	65	16.0	35	6	3.2	1	0131893
3.05	65	16.0	35	6	3.2	1	0131909
3.49	70	18.0	40	6	3.5	1	0132302



HIGH PERFORMANCE COBALT REAMER

d ₁ Ø mm	l ₁ mm	l ₂ mm	l ₃ mm	# of Flutes	d ₂ Øh ₉ mm	Pack Qty	B170
3.50	70	18.0	40	6	3.5	1	0132319
3.51	70	18.0	40	6	3.5	1	0132326
3.52	70	18.0	40	6	3.5	1	0132333
3.98	75	19.0	43	6	4.0	1	0132784
3.99	75	19.0	43	6	4.0	1	0132791
4.00	75	19.0	43	6	4.0	1	0132807
4.01	75	19.0	43	6	4.0	1	0132814
4.02	75	19.0	43	6	4.0	1	0132821
4.03	75	19.0	43	6	4.0	1	0132838
4.04	75	19.0	43	6	4.0	1	0132845
4.05	75	19.0	43	6	4.0	1	0132852
4.49	80	21.0	47	6	4.5	1	0133286
4.50	80	21.0	47	6	4.5	1	0133293
4.51	80	21.0	47	6	4.5	1	0133309
4.52	80	21.0	47	6	4.5	1	0133316
4.98	86	23.0	52	6	5.0	1	0133767
4.99	86	23.0	52	6	5.0	1	0133774
5.00	86	23.0	52	6	5.0	1	0133781
5.01	86	23.0	52	6	5.0	1	0133798
5.02	86	23.0	52	6	5.0	1	0133804
5.03	86	23.0	52	6	5.0	1	0133811
5.04	86	23.0	52	6	5.0	1	0133828
5.05	86	23.0	52	6	5.0	1	0133835
5.49	93	26.0	57	6	5.6	1	0134269
5.50	93	26.0	57	6	5.6	1	0134276
5.51	93	26.0	57	6	5.6	1	0134283
5.52	93	26.0	57	6	5.6	1	0134290
5.98	93	26.0	57	6	5.6	1	0134757
5.99	93	26.0	57	6	5.6	1	0134764
6.00	93	26.0	57	6	5.6	1	0134771
6.01	101	28.0	63	6	6.3	1	0134788
6.02	101	28.0	63	6	6.3	1	0134795
6.03	101	28.0	63	6	6.3	1	0134801
6.04	101	28.0	63	6	6.3	1	0134818
6.05	101	28.0	63	6	6.3	1	0134825
6.49	101	28.0	63	6	6.3	1	0135242
6.50	101	28.0	63	6	6.3	1	0135259
6.51	101	28.0	63	6	6.3	1	0135303
6.52	101	28.0	63	6	6.3	1	0135310
6.98	109	31.0	69	6	7.1	1	0135761
6.99	109	31.0	69	6	7.1	1	0135778
7.00	109	31.0	69	6	7.1	1	0135785
7.01	109	31.0	69	6	7.1	1	0135792
7.02	109	31.0	69	6	7.1	1	0135808
7.03	109	31.0	69	6	7.1	1	0135815
7.04	109	31.0	69	6	7.1	1	0135822
7.05	109	31.0	69	6	7.1	1	0135839
7.49	109	31.0	69	6	7.1	1	0136270
7.50	109	31.0	69	6	7.1	1	0136287
7.51	117	33.0	75	6	8.0	1	0136294
7.52	117	33.0	75	6	8.0	1	0136300
7.98	117	33.0	75	6	8.0	1	0136751
7.99	117	33.0	75	6	8.0	1	0136768
8.00	117	33.0	75	6	8.0	1	0136959
8.01	117	33.0	75	6	8.0	1	0136775
8.02	117	33.0	75	6	8.0	1	0136782
8.03	117	33.0	75	6	8.0	1	0136799
8.04	117	33.0	75	6	8.0	1	0136805
8.05	117	33.0	75	6	8.0	1	0136812
8.49	117	33.0	75	6	8.0	1	0137260
8.50	117	33.0	75	6	8.0	1	0137277
8.51	125	36.0	81	6	9.0	1	0050590
8.52	125	36.0	81	6	9.0	1	0137284
8.98	125	36.0	81	6	9.0	1	0137734
8.99	125	36.0	81	6	9.0	1	0137741
9.00	125	36.0	81	6	9.0	1	0137758

HIGH PERFORMANCE COBALT REAMER

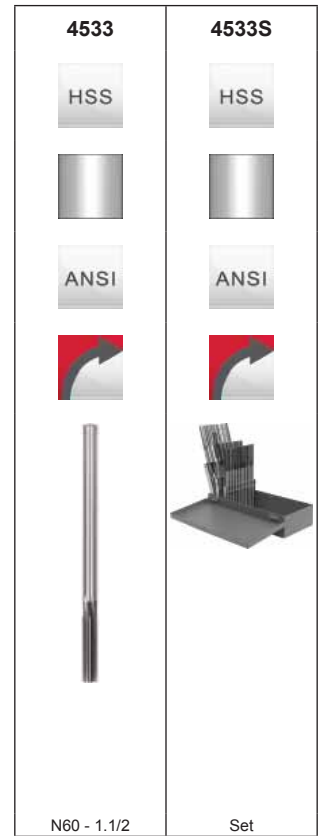


d_1 Ø	l_1	l_2	l_3	# of Flutes	d_2 Øh ₉ mm	Pack Qty	B170
mm	mm	mm	mm		mm		
9.01	125	36.0	81	6	9.0	1	0137765
9.02	125	36.0	81	6	9.0	1	0137772
9.03	125	36.0	81	6	9.0	1	0137789
9.04	125	36.0	81	6	9.0	1	0137796
9.05	125	36.0	81	6	9.0	1	0137802
9.49	125	36.0	81	6	9.0	1	0138236
9.50	125	36.0	81	6	9.0	1	0138243
9.51	133	38.0	87	6	10.0	1	0138250
9.52	133	38.0	87	6	10.0	1	0138267
9.98	133	38.0	87	6	10.0	1	0138717
9.99	133	38.0	87	6	10.0	1	0138724
10.00	133	38.0	87	6	10.0	1	0128930
10.01	133	38.0	87	6	10.0	1	0128947
10.02	133	38.0	87	6	10.0	1	0128954
10.03	133	38.0	87	6	10.0	1	0128961
10.04	133	38.0	87	6	10.0	1	0128978
10.05	133	38.0	87	6	10.0	1	0128985
10.49	133	38.0	87	6	10.0	1	0129463
10.50	133	38.0	87	6	10.0	1	0135266
10.51	133	38.0	87	6	10.0	1	0129470
10.52	133	38.0	87	6	10.0	1	0129487
10.98	142	41.0	96	6	10.0	1	0129883
10.99	142	41.0	96	6	10.0	1	0129890
11.00	142	41.0	96	6	10.0	1	0129906
11.01	142	41.0	96	6	10.0	1	0129913
11.02	142	41.0	96	6	10.0	1	0129920
11.03	142	41.0	96	6	10.0	1	0129937
11.04	142	41.0	96	6	10.0	1	0129944
11.05	142	41.0	96	6	10.0	1	0129951
11.49	142	41.0	96	6	10.0	1	0130384
11.50	142	41.0	96	6	10.0	1	0130391
11.51	142	41.0	96	6	10.0	1	0130407
11.52	142	41.0	96	6	10.0	1	0130414
11.98	151	44.0	105	6	10.0	1	0130865
11.99	151	44.0	105	6	10.0	1	0130872
12.00	151	44.0	105	6	10.0	1	0130889

Chucking Reamer, Straight Shank

4533 Straight Flute, Right Hand Cut. Chucking reamers have shorter and deeper flutes than hand reamers and are specifically designed for accurate machine reaming in most materials and equipment including screw machines, turret lathes, drill presses, and machining centers. Recommended for most general purpose reaming.

4533S Sets In Steel Cases



d ₁ Ø Inch	Set Nr.	d ₁ decimal Inch	d ₂ decimal Inch	# of Pieces	l ₂ Inch	C	l ₁ Inch	# of Flutes	Pack Qty	4533	4533S
50				29		1/16-1/2 x 64ths			1		5011089
51				14		1/8-1/2 x 16ths, decimal 0.001" over and 0.001" under			1		5011090
52				60		N1 - N60			1		5011091
53				26		A - Z			1		5011092
60		0.0400	0.0390		1/2		2.1/2	4	1	5010173	
59		0.0410	0.0390		1/2		2.1/2	4	1	5010175	
58		0.0420	0.0390		1/2		2.1/2	4	1	5010177	
57		0.0430	0.0390		1/2		2.1/2	4	1	5010179	
56		0.0465	0.0455		1/2		2.1/2	4	1	5010186	
3/64		0.0469	0.0455		1/2		2.1/2	4	1	5010187	
55		0.0520	0.0510		1/2		2.1/2	4	1	5010198	
54		0.0550	0.0510		1/2		2.1/2	4	1	5010204	
53		0.0595	0.0585		1/2		2.1/2	4	1	5010213	
1/16		0.0625	0.0585		1/2		2.1/2	4	1	5010219	
52		0.0635	0.0585		1/2		2.1/2	4	1	5010221	
51		0.0670	0.0660		3/4		3"	4	1	5010228	
50		0.0700	0.0660		3/4		3"	4	1	5010234	
49		0.0730	0.0660		3/4		3"	4	1	5010240	
48		0.0760	0.0720		3/4		3"	4	1	5010246	
5/64		0.0781	0.0720		3/4		3"	4	1	5010251	
47		0.0785	0.0720		3/4		3"	4	1	5010252	
46		0.0810	0.0771		3/4		3"	4	1	5010257	
45		0.0820	0.0771		3/4		3"	4	1	5010259	
44		0.0860	0.0810		3/4		3"	4	1	5010267	
43		0.0890	0.0810		3/4		3"	4	1	5010273	
42		0.0935	0.0880		3/4		3"	4	1	5010282	
3/32		0.0938	0.0880		3/4		3"	4	1	5010283	
41		0.0960	0.0928		7/8		3.1/2	4	1	5010288	
40		0.0980	0.0928		7/8		3.1/2	4	1	5010292	
39		0.0995	0.0928		7/8		3.1/2	4	1	5010295	
38		0.1015	0.0950		7/8		3.1/2	4	1	5010299	
37		0.1040	0.0950		7/8		3.1/2	4	1	5010304	

HSS REAMER



d ₁ Ø Inch	d ₁ decimal Inch	d ₂ decimal Inch	l ₂ Inch	l ₁ Inch	# of Flutes	Pack Qty	4533
36	0.1065	0.1030	7/8	3.1/2	4	1	5010309
7/64	0.1094	0.1030	7/8	3.1/2	4	1	5010316
35	0.1100	0.1030	7/8	3.1/2	4	1	5010318
34	0.1110	0.1055	7/8	3.1/2	4	1	5010320
33	0.1130	0.1055	7/8	3.1/2	4	1	5010324
32	0.1160	0.1120	7/8	3.1/2	4	1	5010330
31	0.1200	0.1120	7/8	3.1/2	4	1	5010338
0.1230	0.1230	0.1120	7/8	3.1/2	4	1	5010344
0.1240	0.1240	0.1190	7/8	3.1/2	4	1	5010346
0.1247	0.1247	0.1190	7/8	3.1/2	4	1	5010349
1/8	0.1250	0.1190	7/8	3.1/2	4	1	5010350
0.1260	0.1260	0.1190	7/8	3.1/2	4	1	5010354
30	0.1285	0.1190	7/8	3.1/2	4	1	5010359
29	0.1360	0.1275	1"	4"	4	1	5010374
28	0.1400	0.1350	1"	4"	4	1	5010383
9/64	0.1410	0.1350	1"	4"	4	1	5010384
27	0.1440	0.1350	1"	4"	4	1	5010391
26	0.1470	0.1430	1"	4"	4	1	5010397
25	0.1495	0.1430	1"	4"	4	1	5010402
24	0.1520	0.1460	1"	4"	4	1	5010407
23	0.1540	0.1460	1"	4"	4	1	5010411
5/32	0.1562	0.1510	1"	4"	6	1	5010416
22	0.1570	0.1510	1"	4"	6	1	5010418
21	0.1590	0.1530	1.1/8	4.1/2	6	1	5010422
20	0.1610	0.1530	1.1/8	4.1/2	6	1	5010426
19	0.1660	0.1595	1.1/8	4.1/2	6	1	5010436
18	0.1695	0.1595	1.1/8	4.1/2	6	1	5010443
11/64	0.1719	0.1645	1.1/8	4.1/2	6	1	5010448
17	0.1730	0.1645	1.1/8	4.1/2	6	1	5010451
16	0.1770	0.1700	1.1/8	4.1/2	6	1	5010459
15	0.1800	0.1755	1.1/8	4.1/2	6	1	5010465
14	0.1820	0.1755	1.1/8	4.1/2	6	1	5010469
13	0.1850	0.1800	1.1/8	4.1/2	6	1	5010475
0.1855	0.1855	0.1800	1.1/8	4.1/2	6	1	5010476
0.1865	0.1865	0.1800	1.1/8	4.1/2	6	1	5010478
0.1870	0.1870	0.1800	1.1/8	4.1/2	6	1	5010479
3/16	0.1875	0.1800	1.1/8	4.1/2	6	1	5010480
0.1885	0.1885	0.1800	1.1/8	4.1/2	6	1	5010482
12	0.1890	0.1800	1.1/8	4.1/2	6	1	5010483
11	0.1910	0.1860	1.1/4	5"	6	1	5010487
10	0.1935	0.1860	1.1/4	5"	6	1	5010492
9	0.1960	0.1895	1.1/4	5"	6	1	5010498
8	0.1990	0.1895	1.1/4	5"	6	1	5010504
7	0.2010	0.1945	1.1/4	5"	6	1	5010508
13/64	0.2031	0.1945	1.1/4	5"	6	1	5010513
6	0.2040	0.1945	1.1/4	5"	6	1	5010515
5	0.2055	0.2016	1.1/4	5"	6	1	5010518
4	0.2090	0.2016	1.1/4	5"	6	1	5010525
3	0.2130	0.2075	1.1/4	5"	6	1	5010533
7/32	0.2188	0.2075	1.1/4	5"	6	1	5010545
2	0.2210	0.2173	1.1/2	6"	6	1	5010550
1	0.2280	0.2173	1.1/2	6"	6	1	5010564
A	0.2340	0.2265	1.1/2	6"	6	1	5010576
15/64	0.2344	0.2265	1.1/2	6"	6	1	5010577
B	0.2380	0.2329	1.1/2	6"	6	1	5010585
C	0.2420	0.2329	1.1/2	6"	6	1	5010593
D	0.2460	0.2329	1.1/2	6"	6	1	5010602
0.2480	0.2480	0.2329	1.1/2	6"	6	1	5010606
0.2490	0.2490	0.2400	1.1/2	6"	6	1	5010608
0.2495	0.2495	0.2400	1.1/2	6"	6	1	5010609
1/4	0.2500	0.2400	1.1/2	6"	6	1	5010610
E	0.2500	0.2400	1.1/2	6"	6	1	5011202
0.2510	0.2510	0.2400	1.1/2	6"	6	1	5010612
F	0.2570	0.2485	1.1/2	6"	6	1	5010619
G	0.2610	0.2485	1.1/2	6"	6	1	5010622
17/64	0.2656	0.2485	1.1/2	6"	6	1	5010623

HSS REAMER

d ₁ Ø Inch	d ₁ decimal Inch	d ₂ decimal Inch	l ₂ Inch	l ₁ Inch	# of Flutes	Pack Qty	4533
H	0.2660	0.2485	1.1/2	6"	6	1	5010624
I	0.2720	0.2485	1.1/2	6"	6	1	5010626
J	0.2770	0.2485	1.1/2	6"	6	1	5010627
K	0.2810	0.2485	1.1/2	6"	6	1	5010628
9/32	0.2812	0.2485	1.1/2	6"	6	1	5010629
L	0.2900	0.2792	1.1/2	6"	6	1	5010630
M	0.2950	0.2792	1.1/2	6"	6	1	5010631
19/64	0.2969	0.2792	1.1/2	6"	6	1	5010632
N	0.3020	0.2792	1.1/2	6"	6	1	5010633
0.3100	0.3100	0.2792	1.1/2	6"	6	1	5010636
0.3115	0.3115	0.2792	1.1/2	6"	6	1	5010638
0.3120	0.3120	0.2792	1.1/2	6"	6	1	5010639
5/16	0.3125	0.2792	1.1/2	6"	6	1	5010640
0.3135	0.3135	0.2792	1.1/2	6"	6	1	5010642
O	0.3160	0.2792	1.1/2	6"	6	1	5010645
P	0.3230	0.2792	1.1/2	6"	6	1	5010647
21/64	0.3281	0.2792	1.1/2	6"	6	1	5010648
Q	0.3320	0.2792	1.1/2	6"	6	1	5010649
R	0.3390	0.2792	1.1/2	6"	6	1	5010650
11/32	0.3438	0.2792	1.1/2	6"	6	1	5010651
S	0.3480	0.3100	1.3/4	7"	6	1	5010652
T	0.3580	0.3100	1.3/4	7"	6	1	5010653
23/64	0.3594	0.3100	1.3/4	7"	6	1	5010654
U	0.3680	0.3100	1.3/4	7"	6	1	5010655
0.3730	0.3730	0.3100	1.3/4	7"	6	1	5010658
0.3740	0.3740	0.3100	1.3/4	7"	6	1	5010659
0.3745	0.3745	0.3100	1.3/4	7"	6	1	5010660
3/8	0.3750	0.3100	1.3/4	7"	6	1	5010661
0.3760	0.3760	0.3100	1.3/4	7"	6	1	5010662
V	0.3770	0.3100	1.3/4	7"	6	1	5010663
W	0.3860	0.3100	1.3/4	7"	6	1	5010665
25/64	0.3910	0.3100	1.3/4	7"	6	1	5010666
X	0.3970	0.3100	1.3/4	7"	6	1	5010667
Y	0.4040	0.3100	1.3/4	7"	6	1	5010668
13/32	0.4062	0.3100	1.3/4	7"	6	1	5010670
Z	0.4130	0.3730	1.3/4	7"	6	1	5010671
27/64	0.4219	0.3730	1.3/4	7"	6	1	5010672
0.4355	0.4355	0.3730	1.3/4	7"	6	1	5010673
0.4365	0.4365	0.3730	1.3/4	7"	6	1	5010674
0.4370	0.4370	0.3730	1.3/4	7"	6	1	5010675
7/16	0.4375	0.3730	1.3/4	7"	6	1	5010676
0.4385	0.4385	0.3730	1.3/4	7"	6	1	5010677
29/64	0.4531	0.3730	1.3/4	7"	6	1	5010678
15/32	0.4688	0.3730	1.3/4	7"	6	1	5010679
31/64	0.4844	0.4355	2"	8"	6	1	5010680
0.4980	0.4980	0.4355	2"	8"	6	1	5010681
0.4990	0.4990	0.4355	2"	8"	6	1	5010682
0.4995	0.4995	0.4355	2"	8"	6	1	5010683
1/2	0.5000	0.4355	2"	8"	6	1	5010684
0.5010	0.5010	0.4355	2"	8"	6	1	5010685
33/64	0.5156	0.4355	2"	8"	6	1	5010690
17/32	0.5312	0.4355	2"	8"	6	1	5010691
35/64	0.5469	0.4355	2"	8"	8	1	5010692
9/16	0.5625	0.4355	2"	8"	8	1	5010693
37/64	0.5781	0.4355	2"	8"	8	1	5010694
19/32	0.5938	0.4355	2"	8"	8	1	5010695
39/64	0.6094	0.5620	2.1/4	9"	8	1	5010696
5/8	0.6250	0.5620	2.1/4	9"	8	1	5010698
41/64	0.6410	0.5620	2.1/4	9"	8	1	5010700
21/32	0.6562	0.5620	2.1/4	9"	8	1	5010701
43/64	0.6719	0.5620	2.1/4	9"	8	1	5010702
11/16	0.6875	0.5620	2.1/4	9"	8	1	5010703
45/64	0.7031	0.5620	2.1/4	9"	8	1	5010704
23/32	0.7188	0.5620	2.1/4	9"	8	1	5010705
47/64	0.7344	0.6245	2.1/2	9.1/2	8	1	5010706
3/4	0.7500	0.6245	2.1/2	9.1/2	8	1	5010708

HSS REAMER



d_1 Ø Inch	d_1 decimal Inch	d_2 decimal Inch	l_2 Inch	l_1 Inch	# of Flutes	Pack Qty	4533
49/64	0.7656	0.6245	2.1/2	9.1/2	8	1	5010710
25/32	0.7812	0.6245	2.1/2	9.1/2	8	1	5010711
51/64	0.7969	0.6245	2.1/2	9.1/2	8	1	5010712
13/16	0.8125	0.6245	2.1/2	9.1/2	8	1	5010713
53/64	0.8281	0.6245	2.1/2	9.1/2	8	1	5010714
27/32	0.8438	0.6245	2.1/2	9.1/2	8	1	5010715
55/64	0.8594	0.7495	2.5/8	10"	8	1	5010716
7/8	0.8750	0.7495	2.5/8	10"	8	1	5010717
57/64	0.8910	0.7495	2.5/8	10"	8	1	5010718
29/32	0.9062	0.7495	2.5/8	10"	8	1	5010719
59/64	0.9219	0.7495	2.5/8	10"	8	1	5010720
15/16	0.9375	0.7495	2.5/8	10"	8	1	5010721
61/64	0.9531	0.7495	2.5/8	10"	8	1	5010722
31/32	0.9688	0.7495	2.5/8	10"	8	1	5010723
63/64	0.9844	0.8745	2.3/4	10.1/2	8	1	5010724
1"	1.0000	0.8745	2.3/4	10.1/2	8	1	5010725
1.1/16	1.0625	0.8745	2.3/4	10.1/2	8	1	5010726
1.1/8	1.1250	0.8745	2.7/8	11"	8	1	5010727
1.3/16	1.1875	0.9995	2.7/8	11"	8	1	5010728
1.1/4	1.2500	0.9995	3"	11.1/2	8	1	5010729
1.3/8	1.3750	0.9995	3.1/4	12"	8	1	5010731
1.1/2	1.5000	1.2495	3.1/2	12.1/2	8	1	5010733

Chucking Reamer, Expansion, Straight Shank

4531 Straight Flute, Right Hand Cut. Expansion Chucking Reamers are an economical general purpose high production tool. The expansion feature permits the reamer to be resharpened many times while still retaining the original size. Recommended for abrasive materials. As the diameter wears down, the reamers can be expanded many times by tightening the end adjusting screw and regrinding to it's original size.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	l_2 Inch	l_1 Inch	# of Flutes	Pack Qty	4531
3/8	0.3750	5/16	3/4	7"	6	1	5011204
13/32	0.4062	5/16	3/4	7"	6	1	5011205
7/16	0.4375	3/8	7/8	7"	6	1	5010778
15/32	0.4687	3/8	7/8	7"	6	1	5010779
1/2	0.5000	7/16	1"	8"	6	1	5010780
17/32	0.5312	7/16	1"	8"	6	1	5010781
9/16	0.5625	7/16	1.1/8	8"	6	1	5010782
19/32	0.5938	7/16	1.1/8	8"	6	1	5010783
5/8	0.6250	9/16	1.1/4	9"	6	1	5010784
21/32	0.6562	9/16	1.1/4	9"	6	1	5010785
11/16	0.6875	9/16	1.1/4	9"	6	1	5010786
23/32	0.7188	9/16	1.1/4	9"	6	1	5010787
3/4	0.7500	5/8	1.3/8	9.1/2	6	1	5010788
25/32	0.7812	5/8	1.3/8	9.1/2	6	1	5010789
13/16	0.8125	5/8	1.3/8	9.1/2	6	1	5010790
27/32	0.8438	5/8	1.3/8	9.1/2	6	1	5010791
7/8	0.8750	3/4	1.1/2	10"	6	1	5010792
29/32	0.9062	3/4	1.1/2	10"	6	1	5010793
15/16	0.9375	3/4	1.1/2	10"	6	1	5010794
31/32	0.9688	3/4	1.1/2	10"	6	1	5010795
1"	1.0000	7/8	1.1/8	10.1/2	8	1	5010796
1.1/32	1.0312	7/8	1.5/8	10.1/2	8	1	5010797
1.1/16	1.0625	7/8	1.5/8	10.1/2	8	1	5010798
1.3/32	1.0937	7/8	1.5/8	10.1/2	8	1	5010799
1.1/8	1.1250	7/8	1.3/4	11"	8	1	5010800
1.5/32	1.1562	7/8	1.3/4	11"	8	1	5010801
1.3/16	1.1875	1"	1.3/4	11"	8	1	5010802
1.7/32	1.2187	1"	1.3/4	11"	8	1	5010803
1.1/4	1.2500	1"	1.7/8	11.1/2	8	1	5010804
1.5/16	1.3125	1"	1.7/8	11.1/2	8	1	5010805
1.3/8	1.3750	1"	2"	12"	8	1	5010806
1.7/16	1.4375	1.1/4	2"	12"	10	1	5010807
1.1/2	1.5000	1.1/4	2.1/8	12.1/2	10	1	5010808

HSS REAMER

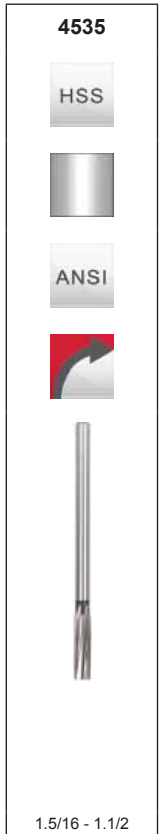


d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	l_2 Inch	l_1 Inch	# of Flutes	Pack Qty	4531
1.9/16	1.5625	1.1/4	2.1/8	12.1/2	10	1	5010809
1.5/8	1.6250	1.1/4	2.1/4	13"	10	1	5010810
1.11/16	1.6875	1.1/4	2.1/4	13"	10	1	5010811
1.3/4	1.7500	1.1/4	2.3/8	13.1/2	10	1	5010812
1.13/16	1.8125	1.1/2	2.3/8	13.1/2	10	1	5010813
1.7/8	1.8750	1.1/2	2.1/2	14"	12	1	5010814
1.15/16	1.9375	1.1/2	2.1/2	14"	12	1	5010815
2"	2.0000	1.1/2	2.1/2	14"	12	1	5010816

Chucking Reamer, Straight Shank

4535 Slow Right Hand Spiral Flute, Right Hand Cut. Cuts with a smoother, chatter free action than straight flute reamers. Recommended for more difficult to ream materials, better surface finish requirements, applications with an interruption, and to aid in chip evacuation in blind holes.

Designed for accurate machine reaming using all types of equipment and incorporating all other design features of the straight flute style.



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	l_2 Inch	l_1 Inch	# of Flutes	Pack Qty	4535
1/16	0.0625	0.0585	1/2	2.1/2	4	1	5010054
5/64	0.0781	0.0720	3/4	3"	4	1	5010055
3/32	0.0938	0.0880	3/4	3"	4	1	5010056
7/64	0.1094	0.1030	7/8	3.1/2	4	1	5010057
1/8	0.1250	0.1190	7/8	3.1/2	4	1	5010058
9/64	0.1410	0.1350	1"	4"	4	1	5010059
5/32	0.1562	0.1510	1"	4"	6	1	5010060
11/64	0.1719	0.1645	1.1/8	4.1/2	6	1	5010061
3/16	0.1875	0.1800	1.1/8	4.1/2	6	1	5010062
13/64	0.2031	0.1945	1.1/4	5"	6	1	5010063
7/32	0.2188	0.2075	1.1/4	5"	6	1	5010064
15/64	0.2344	0.2265	1.1/2	6"	6	1	5010065
1/4	0.2500	0.2400	1.1/2	6"	6	1	5010066
17/64	0.2656	0.2485	1.1/2	6"	6	1	5010067
9/32	0.2812	0.2485	1.1/2	6"	6	1	5010068
19/64	0.2969	0.2792	1.1/2	6"	6	1	5010069
5/16	0.3125	0.2792	1.1/2	6"	6	1	5010070
21/64	0.3281	0.2792	1.1/2	6"	6	1	5010071
11/32	0.3438	0.2792	1.1/2	6"	6	1	5010072
23/64	0.3594	0.3100	1.3/4	7"	6	1	5010073
3/8	0.3750	0.3100	1.3/4	7"	6	1	5010074
25/64	0.3910	0.3100	1.3/4	7"	6	1	5010075
13/32	0.4062	0.3100	1.3/4	7"	6	1	5010076
27/64	0.4219	0.3730	1.3/4	7"	6	1	5010077
7/16	0.4375	0.3730	1.3/4	7"	6	1	5010078
29/64	0.4531	0.3730	1.3/4	7"	6	1	5010079
15/32	0.4688	0.3730	1.3/4	7"	6	1	5010080
31/64	0.4844	0.4355	2"	8"	6	1	5010081
1/2	0.5000	0.4355	2"	8"	6	1	5010082
17/32	0.5312	0.4355	2"	8"	6	1	5010083
9/16	0.5625	0.4355	2"	8"	8	1	5010084

HSS REAMER



d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	l_2 Inch	l_1 Inch	# of Flutes	Pack Qty	4535
19/32	0.5938	0.4355	2"	8"	8	1	5010085
5/8	0.6250	0.5620	2.1/4	9"	8	1	5010086
21/32	0.6562	0.5620	2.1/4	9"	8	1	5010087
11/16	0.6875	0.5620	2.1/4	9"	8	1	5010088
23/32	0.7188	0.5620	2.1/4	9"	8	1	5010089
3/4	0.7500	0.6245	2.1/2	9.1/2	8	1	5010090
25/32	0.7812	0.6245	2.1/2	9.1/2	8	1	5010091
13/16	0.8125	0.6245	2.1/2	9.1/2	8	1	5010092
27/32	0.8438	0.6245	2.1/2	9.1/2	8	1	5010093
7/8	0.8750	0.7495	2.5/8	10"	8	1	5010094
29/32	0.9062	0.7495	2.5/8	10"	8	1	5010095
15/16	0.9375	0.7495	2.5/8	10"	8	1	5010096
31/32	0.9688	0.7495	2.5/8	10"	8	1	5010097
1"	1.0000	0.8745	2.3/4	10.1/2	8	1	5010098
1.1/16	1.0625	0.8745	2.3/4	10.1/2	8	1	5010099
1.1/8	1.1250	0.8745	2.7/8	11"	8	1	5010100
1.3/16	1.1875	0.9995	2.7/8	11"	8	1	5010101
1.1/4	1.2500	0.9995	3"	11.1/2	8	1	5010102
1.5/16	1.3125	0.9995	3"	11.1/2	8	1	5010103
1.3/8	1.3750	0.9995	3.1/4	12"	8	1	5010104
1.7/16	1.4375	1.2495	3.1/4	12"	8	1	5010105
1.1/2	1.5000	1.2495	3.1/2	12.1/2	8	1	5010106

Machine Reamer, Straight Shank

B901 Left Hand Slow Spiral, Right Hand Cut. Steam Oxide in flutes reduces wear and chip welding in soft ferrous materials.



B901

HSS

ST

BS
328

1.50 - 1/2

d_1 Ø Inch	d_1 Ø mm	l_1 mm	l_2 mm	# of Flutes	Pack Qty	B901
	1.50	44	21	4	1	0180808
1/16	1.59	44	21	4	1	0180815
	2.00	50	25	4	1	0180822
3/32	2.38	58	29	4	1	0180839
	2.50	58	29	4	1	0180846
	3.00	62	31	4	1	0180853
1/8	3.18	66	33	4	1	0180860
	3.50	71	35	4	1	0180877
9/64	3.57	71	35	4	1	0180884
5/32	3.97	76	38	6	1	0180891
	4.00	76	38	6	1	0180907
11/64	4.37	81	41	6	1	0180914
	4.50	81	41	6	1	0180921
3/16	4.76	87	44	6	1	0180938
	5.00	87	44	6	1	0180945
13/64	5.16	87	44	6	1	0180952
	5.50	93	47	6	1	0180969
7/32	5.56	93	47	6	1	0180976
15/64	5.95	93	47	6	1	0180983
	6.00	93	47	6	1	0180990
1/4	6.35	100	50	6	1	0181003
	7.00	107	54	6	1	0181010
9/32	7.14	107	54	6	1	0181027
5/16	7.94	115	58	6	1	0181034
	8.00	115	58	6	1	0181041
11/32	8.73	124	62	6	1	0181058
	9.00	124	62	6	1	0181065
3/8	9.52	133	66	6	1	0181072
	10.00	133	66	6	1	0181089
13/32	10.32	133	66	6	1	0181096
	11.00	142	71	6	1	0181102
7/16	11.11	142	71	6	1	0181119
	12.00	152	76	6	1	0181126
1/2	12.70	152	76	6	1	0181133

COBALT REAMER



Machine Reamer, Straight Shank

B157 Left Hand Fast Sprial, Right Hand Cut.
Designed for Stainless Steel, Titanium, and
Nickel Alloy applications.

B157

HSS-E



DIN
212



2.00 - 20.00



d ₁ Ø mm	l ₁ mm	l ₂ mm	l ₃ mm	l ₄ mm	# of Flutes	d ₂ Øh ₉ mm	Pack Qty	B157
2.0	49	11	3.5	24	3	2.0	1	0049648
3.0	61	15	4.0	32	3	3.0	1	0122198
4.0	75	19	4.0	43	3	4.0	1	0049679
5.0	86	23	4.5	52	3	5.0	1	0049693
6.0	93	26	6.0	57	3	5.6	1	0049716
7.0	109	31	7.0	69	3	7.1	1	0049730
8.0	117	33	9.0	75	3	8.0	1	0049747
9.0	125	36	9.5	81	3	9.0	1	0049754
10.0	133	38	10.0	87	3	10.0	1	0049617
11.0	142	41	10.5	96	3	10.0	1	0049624
12.0	151	44	11.0	105	3	10.0	1	0049631
13.0	151	44	11.5	105	3	10.0	1	0140352
14.0	160	47	12.0	110	3	12.5	1	0140369
15.0	162	50	12.5	112	3	12.5	1	0140376
16.0	170	52	13.0	120	3	12.5	1	0140383
17.0	175	54	13.5	123	3	14.0	1	0140390
18.0	182	56	14.0	130	3	14.0	1	0140406
19.0	189	58	14.5	131	3	16.0	1	0140413
20.0	195	60	15.0	137	3	16.0	1	0140420

Car Reamer (Alignment Reamer), Reduced Shank

B122 Left Hand Helical Flute, Right Hand Cut. 1/2" Reduced Shank. Combination Bronze and Steam Oxide in flutes reduces wear and chip welding in harder ferrous materials. Used to align or enlarge holes.

B122

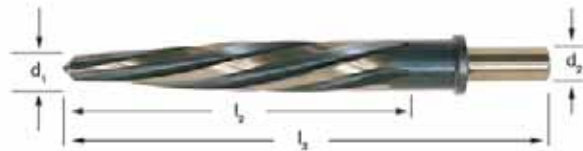
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ST
Bronze

ANSI



3/8 - 1.1/16

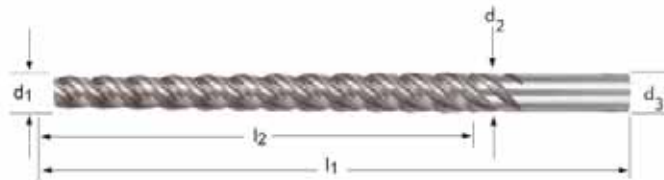


d_1 Ø Inch	d_1 decimal Inch	d_2 Ø Inch	l_2 Inch	l_1 Inch	Pack Qty	B122
3/8	0.3750	1/2	3.5/8	5.15/16	1	0426296
1/2	0.5000	1/2	3.5/8	5.15/16	1	0252376
9/16	0.5625	1/2	3.5/8	5.15/16	1	0252437
5/8	0.6250	1/2	4.1/4	6.9/16	1	0252413
11/16	0.6875	1/2	4.1/4	6.9/16	1	0252369
3/4	0.7500	1/2	4.9/16	7"	1	0252406
13/16	0.8125	1/2	4.9/16	7"	1	0252383
7/8	0.8750	1/2	4.9/16	7.1/4	1	0252420
15/16	0.9375	1/2	4.9/16	7.1/4	1	0252390
1"	1.0000	1/2	4.9/16	7.1/4	1	0252345
1.1/16	1.0625	1/2	4.9/16	7.1/4	1	0252352

HSS REAMER

Machine Reamer, Taper Pin Type, Straight Shank

4588 Left hand high spiral. Right hand cut taper pin (1/4" per foot).
Designed to convert a straight hole into a tapered hole into which standard taper pins will fit. Ideal geometry for the machine reaming of pin holes on a production basis. Helical construction prevents chips from packing in flutes and reduces brakeage.



4588

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ANSI



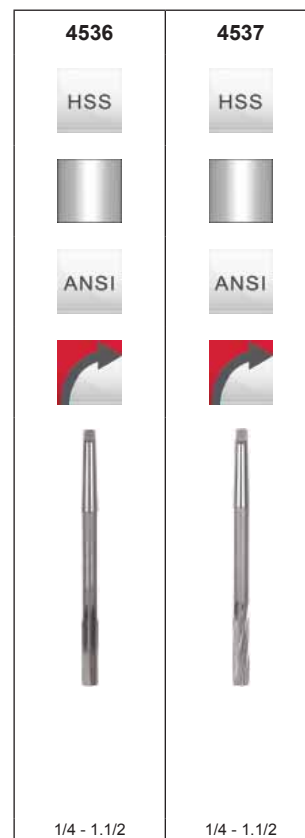
7/0 - N10

nom Ø	d ₁ decimal Inch	d ₂ Ø Inch	d ₃ Ø Inch	l ₂ Inch	l ₁ Inch	# of Flutes	Pack Qty	4588
7/0	0.0497	0.0666	5/64	13/16	1.13/16	2	1	5011157
6/0	0.0611	0.0810	3/32	15/16	1.15/16	2	1	5011158
5/0	0.0719	0.0966	7/64	1.3/16	2.3/16	2	1	5011159
4/0	0.0869	0.1142	1/8	1.5/16	2.5/16	2	1	5011160
3/0	0.1029	0.1300	9/64	1.5/16	5.5/16	2	1	5011161
2/0	0.1137	0.1462	5/32	1.9/16	2.9/16	3	1	5011162
0	0.1287	0.1638	11/64	1.11/16	5.15/16	3	1	5011163
1	0.1447	0.1798	3/16	1.11/16	2.15/16	3	1	5011164
2	0.1600	0.2010	13/64	1.15/16	3.3/16	3	1	5011165
3	0.1813	0.2294	15/64	2.5/16	3.11/16	3	1	5011166
4	0.2071	0.2600	17/64	2.9/16	4.1/16	3	1	5011167
5	0.2410	0.2994	5/16	2.13/16	4.5/16	3	1	5011168
6	0.2773	0.3540	23/64	3.11/16	5.7/16	3	1	5011169
7	0.3297	0.4220	13/32	4.7/16	6.5/16	3	1	5011170
8	0.3971	0.5050	7/16	5.3/16	7.3/16	3	1	5011171
9	0.4800	0.6066	9/16	6.1/16	8.5/16	4	1	5011172
10	0.5799	0.7216	5/8	6.13/16	9.5/16	4	1	5011173

Chucking Reamer, Taper Shank

4536 Straight flute, right hand cut. Chucking reamers have shorter and deeper flutes than hand reamers and are specifically designed for accurate machine reaming in most materials and equipment.

4537 Right hand spiral flute, right hand cut. Cuts with a smoother action than a straight flute reamer. Recommended for more difficult to ream materials, better surface finish requirements, applications with an interruption, and to aid in chip removal in blind holes.



d ₁ Ø Inch	d ₁ decimal Inch	MTS	l ₂ Inch	l ₁ Inch	# of Flutes	Pack Qty	4536	4537
							5010734	5010140
1/4	0.2500	1	1.1/2	6"	6	1	5010734	5010140
9/32	0.2813	1	1.1/2	6"	6	1	5010735	-
5/16	0.3125	1	1.1/2	6"	6	1	5010736	5010142
11/32	0.3437	1	1.1/2	6"	6	1	5010737	-
3/8	0.3750	1	1.3/4	7"	6	1	5010738	5010144
13/32	0.4062	1	1.3/4	7"	6	1	5010739	-
7/16	0.4375	1	1.3/4	7"	6	1	5010740	5010146
15/32	0.4687	1	1.3/4	7"	6	1	5010741	-
1/2	0.5000	1	2"	8"	6	1	5010742	5010148
17/32	0.5312	1	2"	8"	6	1	5010743	-
9/16	0.5625	1	2"	8"	8	1	5010744	5010150
19/32	0.5938	1	2"	8"	8	1	5010745	-
5/8	0.6250	2	2.1/4	9"	8	1	5010746	5010152
21/32	0.6562	2	2.1/4	9"	8	1	5010747	-
11/16	0.6875	2	2.1/4	9"	8	1	5010748	5010154
23/32	0.7188	2	2.1/4	9"	8	1	5010749	-
3/4	0.7500	2	2.1/2	9.1/2	8	1	5010750	5010156
25/32	0.7812	2	2.1/2	9.1/2	8	1	5010751	-
13/16	0.8125	2	2.1/2	9.1/2	8	1	5010752	5010158
27/32	0.8438	2	2.1/2	9.1/2	8	1	5010753	-
7/8	0.8750	2	2.5/8	10"	8	1	5010754	5010160
29/32	0.9062	2	2.5/8	10"	8	1	5010755	-
15/16	0.9375	3	2.5/8	10"	8	1	5010756	5010162
31/32	0.9688	3	2.5/8	10"	8	1	5010757	-
1"	1.0000	3	2.3/4	10.1/2	8	1	5010758	5010164
1.1/16	1.0625	3	2.3/4	10.1/2	8	1	5010759	5010165
1.1/8	1.1250	3	2.7/8	11"	10	1	5010760	5010166
1.3/16	1.1875	3	2.7/8	11"	10	1	5010761	5010167
1.1/4	1.2500	4	3"	11.1/2	10	1	5010762	5010168
1.5/16	1.3125	4	3"	11.1/2	10	1	5010763	5010169
1.3/8	1.3750	4	3.1/4	12"	10	1	5010764	5010170
1.7/16	1.4375	4	3.1/4	12"	10	1	5010765	5010171
1.1/2	1.5000	4	3.1/2	12.1/2	10	1	5010766	5010172

HSS REAMER

Chucking Reamer, Expansion, Taper Shank

4532 Straight flute, right hand cut.
Expansion Chucking Reamers are an economical general purpose high production tool. The expansion feature permits the reamer to be resharpened many times while still retaining the original size.
Recommended for abrasive materials. As the diameter wears down, the reamers can be expanded many times by tightening the end adjusting screw and regrinding to it's original size.



d_1 Ø	d_1 decimal		l_2	l_1	# of Flutes	Pack Qty	4532
Inch	Inch	MTS	Inch	Inch			
3/8	0.3750	1	3/4	7"	6	1	5011206
13/32	0.4062	1	3/4	7"	6	1	5011207
7/16	0.4375	1	7/8	7"	6	1	5010820
15/32	0.4687	1	7/8	7"	6	1	5010821
1/2	0.5000	1	1"	8"	6	1	5010822
17/32	0.5312	1	1"	8"	6	1	5010823
9/16	0.5625	1	1.1/8	8"	6	1	5010824
19/32	0.5938	1	1.1/8	8"	6	1	5010825
5/8	0.6250	2	1.1/4	9"	6	1	5010826
21/32	0.6562	2	1.1/4	9"	6	1	5010827
11/16	0.6875	2	1.1/4	9"	6	1	5010828
23/32	0.7188	2	1.1/4	9"	6	1	5010829
3/4	0.7500	2	1.3/8	9.1/2	6	1	5010830
25/32	0.7812	2	1.3/8	9.1/2	6	1	5010831
13/16	0.8125	2	1.3/8	9.1/2	6	1	5010832
27/32	0.8438	2	1.3/8	9.1/2	6	1	5010833
7/8	0.8750	2	1.1/2	10"	6	1	5010834
29/32	0.9062	2	1.1/2	10"	6	1	5010835
15/16	0.9375	3	1.1/2	10"	6	1	5010836
31/32	0.9688	3	1.1/2	10"	6	1	5010837
1"	1.0000	3	1.5/8	10.1/2	8	1	5010838
1.1/32	1.0312	3	1.5/8	10.1/2	8	1	5010839
1.1/16	1.0625	3	1.5/8	10.1/2	8	1	5010840
1.3/32	1.0937	3	1.5/8	10.1/2	8	1	5010841
1.1/8	1.1250	3	1.3/4	11"	8	1	5010842
1.5/32	1.1562	3	1.3/4	11"	8	1	5010843
1.3/16	1.1875	3	1.3/4	11"	8	1	5010844
1.7/32	1.2187	3	1.3/4	11"	8	1	5010845
1.1/4	1.2500	4	1.7/8	11.1/2	8	1	5010846
1.5/16	1.3125	4	1.7/8	11.1/2	8	1	5010847
1.3/8	1.3750	4	2"	12"	8	1	5010848
1.7/16	1.4375	4	2"	12"	10	1	5010849
1.1/2	1.5000	4	2.1/8	12.1/2	10	1	5010850
1.5/8	1.6250	4	2.1/4	13"	10	1	5010852
1.3/4	1.7500	5	2.3/8	13.1/2	10	1	5010854
1.7/8	1.8750	5	2.1/2	14"	12	1	5010856
2"	2.0000	5	2.1/2	14"	12	1	5010858

Machine Reamer, Taper Shank

B101 Left hand slow spiral, right hand. Steam oxide in flutes reduces wear chip welding harder ferrous materials.

B101

HSS

ST

BS
328



3.00 - 2"



d_1 Ø Inch	d_1 Ø mm	l_1 mm	l_2 mm	# of Flutes	MTS	Pack Qty	B101
	3.00	112	33	4	1	1	0181560
1/8	3.18	112	33	4	1	1	0181140
	3.50	115	35	6	1	1	0181577
5/32	3.97	117	38	6	1	1	0181157
	4.00	117	38	6	1	1	0181584
	4.50	120	41	6	1	1	0181591
3/16	4.76	124	44	6	1	1	0181164
	5.00	124	44	6	1	1	0181607
	5.50	127	47	6	1	1	0181614
7/32	5.56	127	47	6	1	1	0181171
	6.00	127	47	6	1	1	0181621
1/4	6.35	130	50	6	1	1	0181188
	6.50	130	50	6	1	1	0181638
	7.00	134	54	6	1	1	0181645
9/32	7.14	134	54	6	1	1	0181195
	7.50	134	54	6	1	1	0181652
5/16	7.94	138	58	6	1	1	0181201
	8.00	138	58	6	1	1	0181669
	8.50	138	58	6	1	1	0181676
11/32	8.73	142	62	6	1	1	0181218
	9.00	142	62	6	1	1	0181683
	9.50	142	62	6	1	1	0181690
3/8	9.52	146	66	6	1	1	0181225
	10.00	146	66	6	1	1	0181706
13/32	10.32	146	66	6	1	1	0181232
	10.50	146	66	6	1	1	0181713
	11.00	151	71	6	1	1	0181720
7/16	11.11	151	71	6	1	1	0181249
	11.50	151	71	6	1	1	0181737
15/32	11.91	156	76	6	1	1	0181256
	12.00	156	76	6	1	1	0181744
	12.50	156	76	6	1	1	0181751
1/2	12.70	156	76	6	1	1	0181263

HSS REAMER



d ₁ Ø Inch	d ₁ Ø mm	l ₁ mm	l ₂ mm	# of Flutes	MK	Pack Qty	B101
	13.00	156	76	6	1	1	0181768
17/32	13.49	161	81	6	1	1	0181270
	13.50	161	81	6	1	1	0181775
	14.00	161	81	8	1	1	0181782
9/16	14.29	181	81	8	2	1	0181287
	14.50	181	81	8	2	1	0181799
	15.00	181	81	8	2	1	0181805
19/32	15.08	187	87	8	2	1	0181294
	15.50	187	87	8	2	1	0181812
5/8	15.88	187	87	8	2	1	0181300
	16.00	187	87	8	2	1	0181829
	16.50	187	87	8	2	1	0181836
	17.00	187	87	8	2	1	0181843
11/16	17.46	193	93	8	2	1	0181324
	18.00	193	93	8	2	1	0181850
	19.00	193	93	8	2	1	0181867
3/4	19.05	200	100	8	2	1	0181348
	20.00	200	100	8	2	1	0181874
13/16	20.64	200	100	8	2	1	0181362
	21.00	200	100	8	2	1	0181881
	22.00	207	107	8	2	1	0181898
7/8	22.22	207	107	8	2	1	0181386
	23.00	207	107	8	2	1	0181904
15/16	23.81	242	115	8	3	1	0181409
	24.00	242	115	8	3	1	0181911
	25.00	242	115	10	3	1	0181928
1"	25.40	242	115	10	3	1	0181423
	26.00	242	115	10	3	1	0181935
1.1/16	26.99	251	124	10	3	1	0181430
	27.00	251	124	10	3	1	0181942
	28.00	251	124	10	3	1	0181959
1.1/8	28.58	251	124	10	3	1	0181447
	29.00	251	124	10	3	1	0181966
	30.00	251	124	10	3	1	0181973
1.3/16	30.16	260	133	10	3	1	0181454
	31.00	260	133	10	3	1	0181980
1.1/4	31.75	260	133	10	3	1	0181461
	32.00	293	133	10	4	1	0181997
	33.00	293	133	10	4	1	0182000
	34.00	302	142	10	4	1	0182017
1.3/8	34.93	302	142	10	4	1	0181485
	35.00	302	142	10	4	1	0182024
	36.00	302	142	10	4	1	0182031
	37.00	302	142	10	4	1	0182048
	38.00	312	152	10	4	1	0182055
1.1/2	38.10	312	152	10	4	1	0181508
	39.00	312	152	10	4	1	0182062
	40.00	312	152	10	4	1	0182079
	41.00	312	152	10	4	1	0182086
	42.00	312	152	10	4	1	0182093
	43.00	323	163	10	4	1	0182109
	44.00	323	163	10	4	1	0182116
1.3/4	44.45	323	163	10	4	1	0181522
	45.00	323	163	12	4	1	0182123
	46.00	323	163	12	4	1	0182130
	47.00	323	163	12	4	1	0182147
	48.00	334	174	12	4	1	0182154
	50.00	334	174	12	4	1	0182178
2"	50.80	334	174	12	4	1	0181546

Bridge Reamer, Taper Shank

B121 Left hand fast spiral, right hand cut tapered bridge reamer. Used in structural iron and steel applications for badly misaligned holes.

B121

HSS

ST

DIN
311



10.00 - 30.00



d ₁ Ø mm	l ₁ mm	l ₂ Inch	l ₃ mm	# of Flutes	MTS	Pack Qty	B121
10.0	171	95	30	4	1	1	0049020
11.0	176	100	33	4	1	1	0049037
12.0	199	105	39	4	2	1	0049044
13.0	199	105	39	4	2	1	0049051
14.0	209	115	42	4	2	1	0049068
15.0	219	125	45	4	2	1	0049075
16.0	229	135	48	4	2	1	0049082
17.0	251	135	51	4	3	1	0049099
18.0	261	145	58	4	3	1	0049105
19.0	261	145	58	4	3	1	0049112
20.0	271	155	62	4	3	1	0049129
21.0	271	155	62	4	3	1	0049136
22.0	281	165	66	4	3	1	0049143
23.0	281	165	66	4	3	1	0049150
24.0	296	180	72	4	3	1	0049167
25.0	296	180	72	4	3	1	0049174
26.0	296	180	72	4	3	1	0049181
30.0	311	195	78	5	3	1	0049211

HSS REAMER

Bridge Reamer, Taper Shank

4579 Left hand slow spiral, right hand cut tapered bridge reamer. Used in structural iron and steel applications for badly misaligned holes.

4579

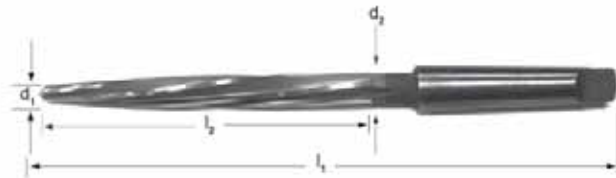
HSS



ANSI



1/4 - 1"



d ₁ decimal Inch	d ₂ Ø Inch	MTS	l ₂ Inch	l ₁ Inch	# of Flutes	Pack Qty	4579
1/4	7/16	2	4.3/8	8.1/4	4	1	5011055
9/32	1/2	2	5.1/8	9"	4	1	5011056
11/32	9/16	2	5.1/8	9"	4	1	5011057
3/8	5/8	2	6.1/8	10"	4	1	5011058
25/64	11/16	3	7.1/8	11.3/4	4	1	5011059
7/16	3/4	3	7.3/8	12"	4	1	5011060
1/2	13/16	3	7.3/8	12"	4	1	5011061
9/16	7/8	3	7.3/8	12"	4	1	5011062
5/8	15/16	3	7.3/8	12"	4	1	5011063
11/16	1"	3	7.3/8	12"	4	1	5011064
3/4	1.1/16	3	7.3/8	12"	4	1	5011065
13/16	1.1/8	3	7.3/8	12"	4	1	5011066
7/8	1.3/16	3	7.3/8	12"	4	1	5011067
15/16	1.1/4	4	7.3/8	13"	4	1	5011068
1"	1.5/16	4	7.3/8	13"	4	1	5011069



HSS CORE DRILL

Taper Shank - 4-Flute

T400 Core drill with taper shank for enlarging pre-drilled or cast holes in a wide range of materials.



T400

HSS

ST

ANSI

1/2 - 2 1/2

d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	MTS	Pack Qty	T400
1/2	0.5000	4.3/8	8.1/4	2	1	024532
17/32	0.5312	4.5/8	8.1/2	2	1	024534
9/16	0.5625	4.7/8	8.3/4	2	1	024536
19/32	0.5938	4.7/8	8.3/4	2	1	024538
5/8	0.6250	4.7/8	8.3/4	2	1	024540
21/32	0.6562	5.1/8	9"	2	1	024542
11/16	0.6875	5.3/8	9.1/4	2	1	024544
23/32	0.7188	5.5/8	9.1/2	2	1	024546
3/4	0.7500	5.7/8	9.3/4	2	1	024548
25/32	0.7812	6"	9.7/8	2	1	024550
13/16	0.8125	6.1/8	10.3/4	3	1	024552
27/32	0.8438	6.1/8	10.3/4	3	1	024554
7/8	0.8750	6.1/8	10.3/4	3	1	024556
29/32	0.9062	6.1/8	10.3/4	3	1	024558
15/16	0.9375	6.1/8	10.3/4	3	1	024560
31/32	0.9688	6.3/8	11"	3	1	024562
1"	1.0000	6.3/8	11"	3	1	024600
1.1/32	1.0312	6.1/2	11.1/8	3	1	024602
1.1/16	1.0625	6.5/8	11.1/4	3	1	024604
1.3/32	1.0938	6.7/8	12.1/2	4	1	024606
1.1/8	1.1250	7.1/8	12.3/4	4	1	024608
1.5/32	1.1562	7.1/4	12.7/8	4	1	024610
1.3/16	1.1875	7.3/8	13"	4	1	024612
1.7/32	1.2188	7.1/2	13.1/8	4	1	024614
1.1/4	1.2500	7.7/8	13.1/2	4	1	024616
1.9/32	1.2812	8.1/2	14.1/8	4	1	024618
1.5/16	1.3125	8.5/8	14.1/4	4	1	024620
1.11/32	1.3438	8.3/4	14.3/8	4	1	024622
1.3/8	1.3750	8.7/8	14.1/2	4	1	024624

REAMERS

HSS CORE DRILL



d ₁ Ø Inch	d ₁ decimal Inch	l ₂ Inch	l ₁ Inch	MTS	Pack Qty	T400
1.13/32	1.4062	9"	14.5/8	4	1	024626
1-7/16	1.4375	9.1/8	14.3/4	4	1	024628
1-15/32	1.4688	9.1/4	14.7/8	4	1	024630
1-1/2	1.5000	9.3/8	15"	4	1	024632
1.17/32	1.5312	9.3/8	16.3/8	5	1	024634
1.9/16	1.5625	9.5/8	16.5/8	5	1	024636
1.19/32	1.5938	9.7/8	16.7/8	5	1	024638
1.5/8	1.6250	10"	17"	5	1	024640
1.21/32	1.6562	10.1/8	17.1/8	5	1	024642
1.11/16	1.6875	10.1/8	17.1/8	5	1	024644
1.23/32	1.7188	10.1/8	17.1/8	5	1	024646
1.3/4	1.7500	10.1/8	17.1/8	5	1	024648
1.25/32	1.7812	10.1/8	17.1/8	5	1	024650
1.13/16	1.8125	10.1/8	17.1/8	5	1	024652
1.27/32	1.8438	10.1/8	17.1/8	5	1	024654
1.7/8	1.8750	10.3/8	17.3/8	5	1	024656
1.29/32	1.9062	10.3/8	17.3/8	5	1	024658
1.15/16	1.9375	10.3/8	17.3/8	5	1	024660
1.31/32	1.9688	10.3/8	17.3/8	5	1	024662
2"	2.0000	10.3/8	17.3/8	5	1	024700
2.1/8	2.1250	10.1/4	17.3/8	5	1	024708
2.1/4	2.2500	10.1/8	17.3/8	5	1	024716
2.3/8	2.3750	10.1/8	17.3/8	5	1	024724
2.1/2	2.5000	11.1/4	18.3/4	5	1	024732

Hand Reamer, Square Drive

4500 Straight flute hand reamer with square drive, right hand cut. Widely used by hand for the final sizing of drilled holes. The square on the shank allows it to be held in either a tap wrench or a vise depending on whether it is the reamer or the part that is rotating. A long starting taper allows for ease of entry and accurate alignment. The straight flute style is recommended for most general purpose hand reaming applications.



d_1 Ø	d_1 decimal Inch	l_2 Inch	l_1 Inch	# of Flutes	Pack Qty	4500
1/8	0.1250	1.1/2	3"	6	1	5010928
5/32	0.1562	1.5/8	3.1/4	6	1	5010929
3/16	0.1875	1.3/4	3.1/2	6	1	5010930
7/32	0.2187	1.7/8	3.3/4	6	1	5010931
1/4	0.2500	2"	4"	6	1	5010932
9/32	0.2813	2.1/8	4.1/4	6	1	5010933
5/16	0.3125	2.1/4	4.1/2	6	1	5010934
11/32	0.3437	2.3/8	4.3/4	6	1	5010935
3/8	0.3750	2.1/2	5"	6	1	5010936
13/32	0.4062	2.5/8	5.1/4	6	1	5010937
7/16	0.4375	2.3/4	5.1/2	6	1	5010938
15/32	0.4688	2.7/8	5.3/4	6	1	5010939
1/2	0.5000	3"	6"	6	1	5010940
17/32	0.5312	3.1/8	6.1/4	6	1	5010941
9/16	0.5625	3.1/4	6.1/2	8	1	5010942
19/32	0.5938	3.3/8	6.3/4	8	1	5010943
5/8	0.6250	3.1/2	7"	8	1	5010944
21/32	0.6562	3.11/16	7.3/8	8	1	5010945
11/16	0.6875	3.7/8	7.3/4	8	1	5010946
23/32	0.7188	4.1/16	8.1/8	8	1	5010947
3/4	0.7500	4.3/16	8.3/8	8	1	5010948
7/8	0.8750	4.7/8	9.3/4	8	1	5010950
1"	1.0000	5.7/16	10.7/8	8	1	5010952
1.1/8	1.1250	5.13/16	11.5/8	10	1	5010953
1.1/4	1.2500	6.1/8	12.1/4	10	1	5010954
1.3/8	1.3750	6.5/16	12.5/8	10	1	5010955
1.1/2	1.5000	6.1/2	13"	10	1	5010956

HSS REAMER



Adjustable Hand Reamer, Replaceable Blade Type

B334 For light duty sizing of uninterrupted holes.

B335 Replace blades & nuts for use with B334



Nr.	d min-max mm	l ₁ mm	l ₂ mm	l ₃ mm	# of Flutes	☐ a mm	Pack Qty	B334	B335 NUTS	B335 BLADES
000	-	-	-	-	-	-	1	-	0144640	0052327
00	-	-	-	-	-	-	1	-	0144633	0052310
0	-	-	-	-	-	-	1	-	0144626	0052303
1	-	-	-	-	-	-	1	-	0144657	0052334
2	-	-	-	-	-	-	1	-	0144664	0052372
3	-	-	-	-	-	-	1	-	0144671	0052389
4	-	-	-	-	-	-	1	-	0144688	0052396
5	-	-	-	-	-	-	1	-	0144695	0052402
6	-	-	-	-	-	-	1	-	0144701	0052419
7	-	-	-	-	-	-	1	-	0144718	0052426
8	-	-	-	-	-	-	1	-	0144725	0052433
9	-	-	-	-	-	-	1	-	0144732	0052440
10	-	-	-	-	-	-	1	-	0144749	0052341
11	-	-	-	-	-	-	1	-	0144756	0052358
12	-	-	-	-	-	-	1	-	0144763	0052365
13	-	-	-	-	-	-	1	-	0144770	0144589
14	-	-	-	-	-	-	1	-	0144787	0144596
15	-	-	-	-	-	-	1	-	0144794	0144602
16	-	-	-	-	-	-	1	-	0144800	0144619
000	6.4 - 7.2	110	32	7	4	3.0	1	0052174	-	-
00	7.2 - 8.0	110	32	7	4	3.4	1	0052167	-	-
0	8.0 - 9.0	115	34	9	5	3.8	1	0052150	-	-
1	9.0 - 10.0	115	34	9	5	4.3	1	0052181	-	-
2	10.0 - 11.0	115	34	9	5	4.9	1	0052228	-	-
3	11.0 - 12.0	125	35	9	5	4.9	1	0052235	-	-
4	12.0 - 13.5	135	41	9	5	6.2	1	0052242	-	-
5	13.5 - 15.5	146	50	12	5	7.0	1	0052259	-	-
6	15.5 - 18.0	166	60	12	5	8.0	1	0052266	-	-
7	18.0 - 21.0	178	65	15	5	9.0	1	0052273	-	-
8	21.0 - 24.0	195	76	15	5	11.0	1	0052280	-	-
9	24.0 - 27.5	218	82	18	5	12.0	1	0052297	-	-
10	27.5 - 31.5	245	86	18	5	14.5	1	0052198	-	-
11	31.5 - 37.0	280	98	18	6	18.0	1	0052204	-	-
12	37.0 - 45.0	325	108	20	6	20.0	1	0052211	-	-
13	45.0 - 55.0	370	118	20	6	26.0	1	0140819	-	-
14	55.0 - 67.0	400	125	20	6	32.0	1	0140826	-	-
15	67.0 - 80.0	435	140	23	8	39.0	1	0140833	-	-
16	80.0 - 95.0	475	155	23	8	49.0	1	0140840	-	-

Hand Reamer, Taper Pin Type, Square Drive

- 4587** Straight flute taper pin (1/4" per foot), right hand cut.
 Designed to convert a straight hole into a tapered hole into which standard taper pins will fit. The square on the shank is suitable for holding a tap wrench or vise, depending on whether the reamer or part is rotating, making them ideal for hand use.
 Recommended for most materials.



4587

HSS

ANSI

N0 - N10

nom Ø	d ₁ decimal Inch	d ₂ Ø Inch	d ₃ Ø Inch	l ₂ Inch	l ₁ Inch	# of Flutes	Pack Qty	4587
0	0.1287	0.1638	11/64	1.11/16	2.15/16	6	1	5011129
1	0.1447	0.1798	3/16	1.11/16	2.15/16	6	1	5011130
2	0.1600	0.2010	13/64	1.15/16	3.3/16	6	1	5011131
3	0.1813	0.2294	15/64	2.5/16	3.11/16	6	1	5011132
4	0.2071	0.2600	17/64	2.9/16	4.1/16	6	1	5011133
5	0.2410	0.2994	5/16	2.13/16	4.5/16	6	1	5011134
6	0.2773	0.3540	23/64	3.11/16	5.7/16	6	1	5011135
7	0.3297	0.4220	13/32	4.7/16	6.5/16	6	1	5011136
8	0.3971	0.5050	7/16	5.3/16	7.3/16	6	1	5011137
9	0.4800	0.6066	9/16	6.1/16	8.5/16	8	1	5011138
10	0.5799	0.7216	5/8	6.13/16	9.5/16	8	1	5011139

HSS REAMER

Hand Reamer, Taper Pin, Square Drive

4591 Left hand slow spiral flute, right hand cut taper pin (1/4" per foot) hand reamer with square drive.

Designed to convert a straight hole into a tapered hole into which standard taper pins will fit. The square on the shank is suitable for holding a tap wrench or vise, depending on whether the reamer or part is rotating, making them ideal for hand use.

Recommended for most materials.



4591

HSS



ANSI

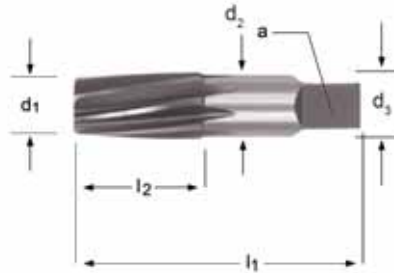


N0 - N10

nom Ø	d ₁ decimal Inch	d ₂ Ø Inch	d ₃ Ø Inch	l ₂ Inch	l ₁ Inch	# of Flutes	Pack Qty	4591
0	0.1287	0.1638	11/64	1.11/16	2.15/16	6	1	5011146
1	0.1447	0.1798	3/16	1.11/16	2.15/16	6	1	5011147
2	0.1600	0.2010	13/64	1.15/16	3.3/16	6	1	5011148
3	0.1813	0.2294	15/64	2.5/16	3.11/16	6	1	5011149
4	0.2071	0.2600	17/64	2.9/16	4.1/16	6	1	5011150
5	0.2410	0.2994	5/16	2.13/16	4.5/16	6	1	5011151
6	0.2773	0.3540	23/64	3.11/16	5.7/16	6	1	5011152
7	0.3297	0.4220	13/32	4.7/16	6.5/16	6	1	5011153
8	0.3971	0.5050	7/16	5.3/16	7.3/16	6	1	5011154
9	0.4800	0.6066	9/16	6.1/16	8.5/16	8	1	5011155
10	0.5799	0.7216	5/8	6.13/16	9.5/16	8	1	5011156

Hand Reamer, Taper Pipe Type, Square Drive

4600 Left hand spirial flute, right hand cut taper (3/4" per foot) taper pipe reamer. Intended for reaming holes to be tapped with American Standard taper pipe taps. Generally used by hand with a tap wrench.



nom Ø	d ₁ decimal Inch	d ₂ Ø Inch	d ₃ Ø Inch	l ₂ Inch	l ₁ Inch	□ a mm	# of Flutes	Pack Qty	4600
1/8	0.3160	0.3620	0.4375	3/4	2.1/8	0.3280	6	1	1810007
1/4	0.4060	0.4720	0.5625	1.1/16	2.7/16	0.4210	6	1	1810008
3/8	0.5400	0.6060	0.7000	1.1/16	2.9/16	0.5310	8	1	1810009
1/2	0.6650	0.7510	0.6875	1.3/8	3.1/8	0.5150	8	1	1810010
3/4	0.8760	0.9620	0.9063	1.3/8	3.1/4	0.6790	10	1	1810011
1"	1.1030	1.2120	1.1250	1.3/4	3.4/4	0.8430	10	1	1810012
1.1/4	1.4440	1.5530	1.3125	1.3/4	4"	0.9840	10	1	1810013
1.1/2	1.6840	1.7930	1.5000	1.3/4	4.1/4	1.1250	10	1	1810014
2"	2.1590	2.2680	1.8750	1.3/4	4.1/2	1.4060	12	1	1810015

HSS REAMER



Hand Reamer, Square Drive

B100 Left hand spiral flute, right hand cut. Widely used by hand for the final sizing of drilled holes. The square on the shank allows it to be held in either a tap wrench or a vise depending on whether it is the reamer or the part that is rotating. A long starting taper allows for ease of entry and accurate alignment.



d_1 Ø Inch	d_1 Ø mm	l_1 mm	l_2 mm	l_3 mm	# of Flutes	a mm	Pack Qty	B100
	1.50	41	20	5	3	1.12	1	0179987
1/16	1.59	41	20	5	3	1.12	1	0179598
	1.60	44	21	5	3	1.25	1	0179994
5/64	1.98	47	23	6	4	1.40	1	0179604
	2.00	50	25	6	4	1.60	1	0048610
3/32	2.38	54	27	7	4	1.80	1	0179611
	2.50	58	29	7	4	2.10	1	0048634
7/64	2.78	62	31	8	6	2.10	1	0179628
	3.00	62	31	8	6	2.40	1	0048719
1/8	3.18	66	33	8	6	2.40	1	0179635
	3.20	66	33	8	6	2.40	1	0048726
	3.50	71	35	9	6	2.70	1	0048733
9/64	3.57	71	35	9	6	2.70	1	0179642
5/32	3.97	76	38	10	6	3.00	1	0179659
	4.00	76	38	10	6	3.00	1	0048801
11/64	4.37	81	41	10	6	3.40	1	0179666
	4.50	81	41	10	6	3.40	1	0048818
3/16	4.76	87	44	11	6	3.80	1	0179673
	5.00	87	44	11	6	3.80	1	0048887
13/64	5.16	87	44	11	6	3.80	1	0179680
	5.50	93	47	12	6	4.30	1	0048894
7/32	5.56	93	47	12	6	4.30	1	0179697
15/64	5.95	93	47	12	6	4.90	1	0179703
	6.00	93	47	12	6	4.90	1	0048917
1/4	6.35	100	50	13	6	4.90	1	0179710
	6.50	100	50	13	6	4.90	1	0140314
17/64	6.75	107	54	14	6	5.50	1	0179727
	7.00	107	54	14	6	5.50	1	0048924
9/32	7.14	107	54	14	6	6.20	1	0179734
	7.50	107	54	14	6	6.20	1	0140321
19/64	7.54	115	58	15	6	6.20	1	0179741
5/16	7.94	115	58	15	6	6.20	1	0179758
	8.00	115	58	15	6	6.20	1	0048931



HSS REAMER

d ₁ Ø Inch	d ₁ Ø mm	l ₁ mm	l ₂ mm	l ₃ mm	# of Flutes	□ a mm	Pack Qty	B100
21/64	8.33	115	58	15	6	7.00	1	0179765
	8.50	115	58	15	6	7.00	1	0140338
11/32	8.73	124	62	16	6	7.00	1	0179772
	9.00	124	62	16	6	7.00	1	0048948
23/64	9.13	124	62	16	6	8.00	1	0179789
	9.50	124	62	16	6	8.00	1	0140345
3/8	9.52	124	62	17	6	8.00	1	0179796
25/64	9.92	133	66	17	6	8.00	1	0179802
	10.00	133	66	17	6	8.00	1	0048511
13/32	10.32	133	66	17	6	8.00	1	0179819
	10.50	133	66	17	6	8.00	1	0180006
	11.00	142	71	18	6	9.00	1	0048528
7/16	11.11	142	71	18	6	9.00	1	0179826
	11.50	142	71	18	6	9.00	1	0180013
	12.00	152	76	19	6	9.00	1	0048535
	12.50	152	76	19	6	10.00	1	0180020
1/2	12.70	152	76	19	6	10.00	1	0179840
	13.00	152	76	19	6	10.00	1	0048542
17/32	13.49	163	81	20	8	11.00	1	0179857
	13.50	163	81	20	8	11.00	1	0180037
	14.00	163	81	20	8	11.00	1	0048559
9/16	14.29	163	81	20	8	11.00	1	0179864
	14.50	163	81	20	8	11.00	1	0180044
	15.00	163	81	20	8	12.00	1	0048566
19/32	15.08	163	81	22	8	12.00	1	0179871
5/8	15.88	175	87	22	8	12.00	1	0179888
	16.00	175	87	22	8	12.00	1	0048573
	17.00	175	87	22	8	13.00	1	0048580
11/16	17.46	188	93	23	8	14.50	1	0179895
	18.00	188	93	23	8	14.50	1	0048597
	19.00	188	93	23	8	14.50	1	0048603
3/4	19.05	188	93	25	8	14.50	1	0179901
	20.00	201	100	25	8	16.00	1	0048658
13/16	20.64	201	100	25	8	16.00	1	0179925
	21.00	201	100	25	8	16.00	1	0180051
	22.00	215	107	27	8	18.00	1	0048665
7/8	22.22	215	107	27	8	18.00	1	0179949
	23.00	215	107	27	8	18.00	1	0180068
	24.00	231	115	29	8	18.00	1	0048672
	25.00	231	115	29	8	20.00	1	0048689
1"	25.40	231	115	29	8	20.00	1	0179970
	26.00	231	115	29	8	20.00	1	0048696
	27.00	247	124	31	10	22.00	1	0180075
	28.00	247	124	31	10	22.00	1	0048702
	29.00	247	124	31	10	22.00	1	0180082
	30.00	247	124	31	10	24.00	1	0048740
	31.00	265	133	33	10	24.00	1	0180099
	32.00	265	133	33	10	24.00	1	0048757
	33.00	265	133	33	10	26.00	1	0180105
	34.00	284	142	36	10	26.00	1	0048764
	35.00	284	142	36	10	29.00	1	0048771
	36.00	284	142	36	10	29.00	1	0048788
	37.00	284	142	36	10	29.00	1	0180112
	38.00	305	152	38	10	29.00	1	0048795
	39.00	305	152	38	10	32.00	1	0180129
	40.00	305	152	38	10	32.00	1	0048825
	45.00	326	163	41	12	35.00	1	0048856
	50.00	347	174	44	12	39.00	1	0048900

HSS REAMER



Hand Reamer, Taper Pin Type, Square Drive

B301 Straight flute taper pin (1/4" per foot), straight shank reamer.
 Designed to convert a straight hole into a tapered hole into which standard taper pins will fit. The square on the shank is suitable for holding a tap wrench or vise, depending on whether the reamer or part is rotating, making them ideal for hand use.
 Recommended for most materials.



nom Ø	d ₁ Ø mm	l ₁ mm	l ₂ mm	# of Flutes	☐ a mm	d ₂ Ø mm	Pack Qty	B301
1/16	1.59	51	25	4	1.2	1.63	1	0182277 ¹⁾
5/64	1.98	51	25	4	1.6	2.03	1	0182284 ¹⁾
3/32	2.38	57	32	4	2.0	2.41	1	0182291 ¹⁾
7/64	2.78	64	38	4	2.2	2.82	1	0182307 ¹⁾
1/8	3.18	70	44	4	2.5	3.23	1	0182314 ¹⁾
9/64	3.57	73	48	4	2.8	3.63	1	0182321 ¹⁾
5/32	3.97	76	51	4	3.1	4.01	1	0182338 ¹⁾
11/64	4.37	89	57	4	3.6	4.42	1	0182345 ¹⁾
3/16	4.76	102	70	4	4.0	4.95	1	0182352 ¹⁾
7/32	5.56	102	70	6	4.5	5.59	1	0182369 ¹⁾
1/4	6.35	117	86	6	5.0	6.43	1	0182376 ²⁾
9/32	7.14	143	105	6	5.6	7.42	1	0182383 ²⁾
5/16	7.94	143	105	6	6.3	8.03	1	0182390 ²⁾
11/32	8.73	152	114	6	7.1	8.81	1	0182406 ²⁾
3/8	9.52	165	127	6	8.0	9.68	1	0182413 ²⁾
13/32	10.32	191	146	6	8.0	10.46	1	0182420 ²⁾
7/16	11.11	191	146	6	9.0	11.25	1	0182437 ²⁾
1/2	12.70	210	165	6	10.0	12.85	1	0182444 ²⁾
9/16	14.29	216	171	6	11.2	14.50	1	0182451 ²⁾
5/8	15.88	235	191	6	12.5	16.08	1	0182468 ²⁾
3/4	19.05	273	222	6	16.0	19.30	1	0182475 ²⁾
7/8	22.22	305	241	6	18.0	22.48	1	0182482 ²⁾

¹⁾ Limit of tolerance +0.0030

²⁾ Limit of tolerance +0.0050



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HIGH PERFORMANCE CARBIDE COUNTERSINK



Solid Carbide, Straight Shank, 3-Flute

G400 90° Countersink with Straight Shank.
Recommended for abrasive, hard ferrous, and non-ferrous materials.

- 1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2
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G400

HM

DIN 335C

6.30 - 31.00

max d mm	min d mm	l_1 mm	d_2 \varnothing_{h_6} mm	# of Flutes	Pack Qty	G400
6.30 (1/4)	1.5	45	5	3	1	0128787
8.30 (5/16)	2.0	50	6	3	1	0128794
10.40 (3/8)	2.5	50	6	3	1	0128725
12.40 (1/2)	2.8	56	8	3	1	0128732
16.50 (5/8)	3.2	60	10	3	1	0128749
20.50 (3/4)	3.5	63	10	3	1	0128756
25.00 (1")	3.8	67	10	3	1	0128763
31.00 (1.1/4)	4.2	71	12	3	1	0128770

Countersink, Straight Shank, Single-Flute

4603 Available in 60°, 82°, or 90° angles. Engineered for machine use and light portable work. Single flute construction and low controlled relief assure the user of chatterless operation.

Best results obtained using high speeds and low feed. Recommended that the predrilled hole be at least 10% of the countersink diameter.



d_1 Ø	angle	d_2 Ø	l_1	# of Flutes	Pack Qty	4603
Inch		Inch	Inch			
1/4	82°	3/16	1.7/16	1	1	4710797
1/4	90°	3/16	1.7/16	1	1	4710805
3/8	60°	1/4	1.21/32	1	1	4710790
3/8	82°	1/4	1.21/32	1	1	4710798
3/8	90°	1/4	1.21/32	1	1	4710806
1/2	60°	1/4	1.27/32	1	1	4710791
1/2	82°	1/4	1.27/32	1	1	4710799
1/2	90°	1/4	1.27/32	1	1	4710807
5/8	82°	3/8	2.3/32	1	1	4710800
5/8	90°	3/8	2.3/32	1	1	4710808
3/4	60°	3/8	2.13/32	1	1	4710793
3/4	82°	3/8	2.13/32	1	1	4710801
3/4	90°	3/8	2.13/32	1	1	4710809
1"	60°	1/2	2.13/16	1	1	4710794
1"	82°	1/2	2.13/16	1	1	4710802
1"	90°	1/2	2.13/16	1	1	4710810
1.1/4	60°	1/2	3.1/2	1	1	4710795
1.1/4	82°	1/2	3.1/2	1	1	4710803
1.1/4	90°	1/2	3.1/2	1	1	4710811
1.1/2	60°	1/2	3.7/8	1	1	4710796
1.1/2	82°	1/2	3.7/8	1	1	4710804
1.1/2	90°	1/2	3.7/8	1	1	4710812

HSS COUNTERSINK



Straight Shank, 3-Flute

4608 Center Reamer/Countersink, Available in 60°, 82°, 90°, or 100° angles. Widely used to countersink screw heads and rivet heads, and countersink holes for lathe centers. The odd number of flutes eliminates chatter in most applications while providing better accuracy than a single-flute countersink.



d ₁ Inch	l ₂ Inch	l ₁ Inch	d ₂ Inch	Angle	# of Flutes	Pack Qty	4608
1/4	3/4	1.1/2	3/16	60°	3	1	5011093
1/4	3/4	1.1/2	3/16	82°	3	1	5011098
1/4	3/4	1.1/2	3/16	90°	3	1	5011103
1/4	3/4	1.1/2	3/16	100°	3	1	5011108
3/8	7/8	1.3/4	1/4	60°	3	1	5011094
3/8	7/8	1.3/4	1/4	82°	3	1	5011099
3/8	7/8	1.3/4	1/4	90°	3	1	5011104
3/8	7/8	1.3/4	1/4	100°	3	1	5011109
1/2	1"	2"	3/8	60°	3	1	5011095
1/2	1"	2"	3/8	82°	3	1	5011100
1/2	1"	2"	3/8	90°	3	1	5011105
1/2	1"	2"	3/8	100°	3	1	5011110
5/8	1"	2.1/4	3/8	60°	3	1	5011096
5/8	1"	2.1/4	3/8	82°	3	1	5011101
5/8	1"	2.1/4	3/8	90°	3	1	5011106
5/8	1"	2.1/4	3/8	100°	3	1	5011111
3/4	1.1/4	2.5/8	1/2	60°	3	1	5011097
3/4	1.1/4	2.5/8	1/2	82°	3	1	5011102
3/4	1.1/4	2.5/8	1/2	90°	3	1	5011107
3/4	1.1/4	2.5/8	1/2	100°	3	1	5011112
1"	1"	3"	1/2	60°	3	1	097464 1)
1"	1"	3"	1/2	82°	3	1	097465 1)
1"	1"	3"	1/2	90°	3	1	097466 1)
1"	1"	3"	1/2	100°	3	1	097467 1)

1) R401 series (Precision Brand)

Countersink, Straight Shank, 4-Flute

4602 Countersink with angles of 60° for centers or 82° for flat head screws. Bright finish improves chip flow in soft ferrous or non-ferrous materials.



d_1 Ø Inch	angle	d_2 Ø Inch	l_2 Inch	l_1 Inch	# of Flutes	Pack Qty	4602
1/2	60°	1/2	1.5/8	3.7/8	4	1	4710588
1/2	82°	1/2	1.5/8	3.7/8	4	1	4710593
5/8	60°	1/2	1.3/4	4"	4	1	4710589
5/8	82°	1/2	1.3/4	4"	4	1	4710594
3/4	60°	1/2	1.7/8	4.1/8	4	1	4710590
3/4	82°	1/2	1.7/8	4.1/8	4	1	4710595
7/8	60°	1/2	2"	4.1/4	4	1	4710591
7/8	82°	1/2	2"	4.1/4	4	1	4710596
1"	60°	1/2	2.1/8	4.3/8	4	1	4710592
1"	82°	1/2	2.1/8	4.3/8	4	1	4710597

HSS COUNTERSINK



Straight Shank, 3-Flute

G335 60° countersink with straight shank for multiple materials. TiN coated for improved wear resistance.

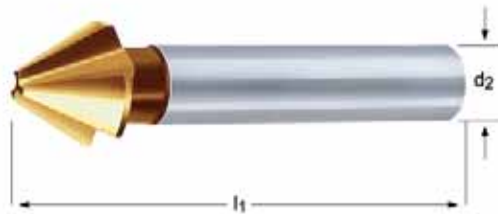
G335

HSS

TiN

DIN 334C

6.30 - 25.00



max d mm	min d	l ₁ mm	d ₂ Øh ₉ mm	# of Flutes	Pack Qty	G335
6.3 (1/4)	1.6	45	5	3	1	0149546
8.0 (5/16)	2.0	50	6	3	1	0149553
10.0 (3/8)	2.5	50	6	3	1	0149560
12.5 (1/2)	3.2	56	8	3	1	0149577
16.0 (5/8)	4.0	63	10	3	1	0149584
20.0 (3/4)	5.0	67	10	3	1	0149591
25.0 (1")	6.3	71	10	3	1	0149607

Straight Shank, 3-Flute

G154 90° countersink for multiple materials. Bright finish improves chip flow in soft ferrous or non-ferrous materials.



G154

HSS



DIN 335C



6.30 - 25.00

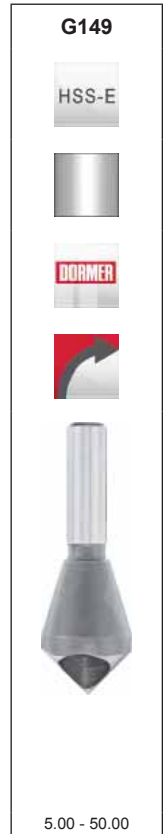
max d mm	min d	l_1 mm	d_2 $\varnothing h_3$ mm	# of Flutes	Pack Qty	G154
6.3 (1/4)	1.5	45	5	3	1	0149348
8.3 (5/16)	2.0	50	6	3	1	0149355
10.4 (3/8)	2.5	50	6	3	1	0149362
12.4 (1/2)	2.8	56	8	3	1	0149379
16.5 (5/8)	3.2	60	10	3	1	0149386
20.5 (3/4)	3.5	63	10	3	1	0149393
25.0 (1")	3.8	67	10	3	1	0149409

COBALT COUNTERSINK



Straight Shank, Single Flute

G149 90° Countersink, single flute, for multiple materials. Bright finish improves chip flow in soft ferrous or non-ferrous materials.



max d mm	min d mm	l_1 mm	d_2 Ø mm	d_1 Ø mm	# of Flutes	Pack Qty	G149
5	2	45	6	10	1	1	0109106
10	5	48	8	14	1	1	0109038
15	10	65	10	21	1	1	0109045
20	15	84	12	28	1	1	0109052
25	20	102	15	35	1	1	0109069
30	25	115	15	44	1	1	0109076
35	30	127	15	48	1	1	0109083
40	35	136	15	53	1	1	0109090
50	40	166	20	60	1	1	0109113

Straight Shank, 3-Flute

G136 90° Countersink with straight shank for multiple materials. Bright finish improves chip flow in soft ferrous or non-ferrous materials.

G560 90° Countersink with straight shank for multiple materials. TiAIN coating increases surface hardness, improves chip flow, and increases tool life.



G136	G560
4.30 - 31.00	6.30 - 31.00

max d mm	min d mm	l ₁ mm	d ₂ Øh ₉ mm	# of Flutes	Pack Qty	G136	G560
4.3	1.3	40	4	3	1	0108659	-
5.0	1.5	40	4	3	1	0108666	-
5.3	1.5	40	4	3	1	0108673	-
5.8	1.5	45	5	3	1	0108680	-
6.0	1.5	45	5	3	1	0108697	-
6.3	1.5	45	5	3	1	0108703	0109694
7.0	1.8	50	6	3	1	0108710	-
7.3	1.8	50	6	3	1	0108727	-
8.0	2.0	50	6	3	1	0108734	0127711
8.3	2.0	50	6	3	1	0108741	0127728
9.4	2.2	50	6	3	1	0108758	-
10.0	2.5	50	6	3	1	0108505	0109632
10.4	2.5	50	6	3	1	0108512	0109649
11.5	2.8	56	8	3	1	0108529	-
12.4	2.8	56	8	3	1	0108536	0109656
13.4	2.9	56	8	3	1	0108543	-
15.0	3.2	60	10	3	1	0108550	-
16.5	3.2	60	10	3	1	0108567	0109663
19.0	3.5	63	10	3	1	0108574	-
20.5	3.5	63	10	3	1	0108581	0109670
23.0	3.8	67	10	3	1	0108598	-
25.0	3.8	67	10	3	1	0108604	0109687
26.0	3.8	67	10	3	1	0108611	-
28.0	4.0	71	12	3	1	0108628	-
30.0	4.2	71	12	3	1	0108635	-
31.0	4.2	71	12	3	1	0108642	0127735

HSS COUNTERSINK



Taper Shank, 3-Flute

G137 60° Countersink with Taper Shank for multiple materials. Bright finish improves chip flow in soft ferrous and non-ferrous materials.



G137

HSS

DIN 334D

16.00 - 80.00

max d mm	min d mm	l ₁ mm	MK	# of Flutes	Pack Qty	G137
16.0 (5/8)	4.0	90	1	3	1	0108765
20.0 (3/4)	5.0	106	2	3	1	0108772
25.0 (1")	6.3	112	2	3	1	0108789
31.5 (1.1/4)	10.0	118	2	3	1	0108796
40.0 (1.1/2)	12.5	150	3	3	1	0108802
50.0 (2")	16.0	160	3	3	1	0108819
63.0 (2.1/2)	20.0	190	4	3	1	0108826
80.0 (3")	25.0	200	4	3	1	0108833

Counterbore Body - Interchangeable Pilot Type

4702 Short set

4700 Long set

Used to enlarge the end of a preformed hole when a flat bottom is required. The counterbore is an end cutting tool which utilizes and interchangeable pilot to align the enlarged hole being machined with the preformed hole. The 3 and 5 flute counterbore reduces chatter and improves finish.



d_1 Ø	l_2 Inch	l_1 Inch	d_2 Ø Inch	l_3 Inch	d_3 Ø Inch /	# of Flutes	pilot Ø Inch	pilot Ø low	pilot Ø high	Pack Qty	4702	4700
1/4	3/4	3.13/16	15/64			3	3/32	1/8	3/16	1	6210031	-
1/4	3/4	5.3/4	15/64	2.1/4	15/64	3	3/32	1/8	3/16	1	-	6210001
9/32	3/4	3.13/16	17/64			3	3/32	1/8	7/32	1	6210032	-
5/16	3/4	3.13/16	19/64			3	3/32	1/8	1/4	1	6210033	-
5/16	3/4	5.3/4	3/8	2.1/4	19/64	3	3/32	1/8	1/4	1	-	6210003
11/32	3/4	3.13/16	5/16			3	3/32	1/8	9/32	1	6210034	-
3/8	1"	4.1/16	5/16			3	5/32	3/16	5/16	1	6210035	-
3/8	1"	5.3/4	3/8	2.1/4	11/32	3	5/32	3/16	5/16	1	-	6210005
13/32	1"	4.1/16	3/8			3	5/32	3/16	11/32	1	6210036	-
7/16	1"	4.1/16	3/8			3	5/32	3/16	3/8	1	6210037	-
7/16	1"	6.1/8	7/16	2.1/4	13/32	3	5/32	3/16	3/8	1	-	6210007
15/32	1.1/4	4.5/16	7/16			3	3/16	3/16	13/32	1	6210038	-
1/2	1.1/4	4.5/16	7/16			3	3/16	3/16	7/16	1	6210039	-
1/2	1.1/4	6.3/8	1/2	2.1/2	15/32	3	3/16	1/4	7/16	1	-	6210009
17/32	1.1/4	4.5/16	1/2			3	3/16	3/16	15/32	1	6210040	-
9/16	1.1/4	4.5/16	1/2			3	3/16	3/16	1/2	1	6210041	-
9/16	1.1/4	6.1/2	1/2	2.1/2	15/32	3	3/16	1/4	1/2	1	-	6210010
19/32	1.1/4	5.1/8	1/2			3	3/16	3/16	17/32	1	6210042	-
5/8	1.1/4	5.1/8	1/2			3	3/16	3/16	9/16	1	6210043	-
5/8	1.1/4	7"	5/8	1.5/8	9/16	3	3/16	1/4	9/16	1	-	6210011
21/32	1.1/4	5.1/8	1/2			3	3/16	3/16	19/32	1	6210044	-
11/16	1.1/4	5.1/8	1/2			3	3/16	3/16	5/8	1	6210045	-
23/32	1.1/2	5.3/8	1/2			3	1/4	5/16	21/32	1	6210046	-
3/4	1.1/2	5.3/8	1/2			3	1/4	5/16	11/16	1	6210047	-
3/4	1.1/2	7.1/4	3/4	2.3/4	11/16	3	1/4	5/16	11/16	1	-	6210013
25/32	1.1/2	5.3/8	5/8			3	1/4	5/16	23/32	1	6210048	-
13/16	1.1/2	5.3/8	5/8			3	1/4	5/16	3/4	1	6210049	-
27/32	1.1/2	5.3/8	3/4			3	1/4	5/16	25/32	1	6210050	-
7/8	1.1/2	5.3/8	3/4			3	1/4	5/16	13/16	1	6210051	-
7/8	1.1/2	7.3/4	7/8	3"	3/4	3	1/4	5/16	13/16	1	-	6210015
29/32	1.1/2	6.1/8	3/4			3	1/4	16/16	27/32	1	6210052	-
15/16	1.1/2	6.1/8	3/4			3	1/4	5/16	7/8	1	6210053	-

HSS COUNTERBORE



d ₁ Ø Inch	l ₂ Inch	l ₁ Inch	d ₂ Ø Inch	l ₃ Inch	d ₃ Ø Inch /	# of Flutes	pilot Ø Inch	pilot Ø low	pilot Ø high	Pack Qty	4702	4700
31/32	1.3/4	6.3/8	3/4			3	5/16	3/8	29/32	1	6210054	-
1"	1.3/4	6.3/8	3/4			3	5/16	3/8	15/16	1	6210055	-
1"	1.3/4	9"	1"	3"	7/8	3	5/16	3/8	15/16	1	-	6210017
1.1/16	1.3/4	6.3/8	3/4			3	5/16	3/8	1"	1	6210056	-
1.1/8	1.3/4	6.3/8	1"			3	5/16	3/8	1.1/16	1	6210057	-
1.3/16	1.3/4	6.3/8	1"			3	5/16	3/8	1.1/8	1	6210058	-
1.1/4	2"	6.5/8	1"			5	3/8	7/16	1.3/16	1	6210059	-
1.3/8	2"	6.5/8	1"			5	3/8	7/16	1.5/16	1	6210060	-
1.1/2	2"	7.7/8	1.1/4			5	3/8	7/16	1.7/16	1	6210061	-
1.5/8	2.1/4	8.1/8	1.1/4			5	7/16	1/2	1.9/16	1	6210062	-
1.3/4	2.1/4	8.1/8	1.1/4			5	7/16	1/2	1.11/16	1	6210063	-
1.7/8	2.1/4	8.1/8	1.1/2			5	7/16	1/2	1.13/16	1	6210064	-
2"	2.1/2	8.3/8	1.1/2			5	1/2	9/16	1.15/16	1	6210065	-

Counterbore Body, Aircraft Series - Interchangeable Pilot Type

4706 Short Series

4705 Long Series

Used for the facing of bosses, and counterboring recesses for spring pockets and screw heads. Supplied with corner radius to produce the fillets necessary for this type of work. Designed for pneumatic or electric drills.



d_1 Ø	l_2	l_1	d_2 Ø	l_3	d_3 Ø	# of Flutes	pilot Ø	pilot Ø low	pilot Ø high	Pack Qty	4706	4705
Inch	Inch	Inch	Inch	Inch	Inch /		Inch					
1/4	1/2	2.3/8	1/4	1.1/8	15/64	4	3/32	1/8	3/16	1	6210137	-
1/4	3/4	3.13/16	15/64	3.1/16	15/64	3	3/32	1/8	3/16	1	-	6210107
9/32	1/2	2.3/8	1/4	1.1/8	0.2560	4	3/32	1/8	7/32	1	6210138	-
9/32	3/4	3.13/16	17/64	3.1/16	17/64	3	3/32	1/8	7/32	1	-	6210108
5/16	1/2	2.3/8	1/4	7/8	17/64	4	3/32	1/8	1/4	1	6210139	-
5/16	3/4	3.13/16	19/64	3.1/16	19/64	3	3/32	1/8	1/4	1	-	6210109
11/32	1/2	2.3/8	1/4	7/8	19/64	4	3/32	1/8	9/32	1	6210140	-
11/32	3/4	3.13/16	5/16	3.1/16	5/16	3	3/32	1/8	9/32	1	-	6210110
3/8	1/2	2.3/8	1/4	7/8	5/16	4	3/32	3/16	5/16	1	6210141	-
3/8	3/4	3.13/16	5/16	3.1/16	5/16	3	3/32	3/16	5/16	1	-	6210111
13/32	1/2	2.13/16	1/4	7/8	5/16	4	1/8	3/16	11/32	1	6210142	-
13/32	3/4	3.13/16	3/8	3.1/16	3/8	3	1/8	3/16	11/32	1	-	6210112
7/16	1/2	2.13/16	1/4	7/8	5/16	4	1/8	3/16	3/8	1	6210143	-
7/16	3/4	3.13/16	3/8	3.1/16	3/8	3	1/8	3/16	3/8	1	-	6210113
15/32	1/2	2.13/16	1/4	7/8	5/16	4	1/8	1/4	13/32	1	6210144	-
15/32	3/4	3.13/16	7/16	3.1/16	7/16	3	1/8	1/4	13/32	1	-	6210114
1/2	1/2	2.13/16	1/4	7/8	3/8	4	1/8	1/4	7/16	1	6210145	-
1/2	3/4	3.13/16	7/16	3.1/16	7/16	3	1/8	1/4	7/16	1	-	6210115
17/32	1/2	2.13/16	1/4	7/8	3/8	4	1/8	1/4	15/32	1	6210146	-
17/32	3/4	5.3/8	1/2	4.5/8	1/2	3	1/8	1/4	15/32	1	-	6210116
9/16	1/2	2.13/16	1/4	7/8	3/8	4	1/8	1/4	1/2	1	6210147	-
9/16	3/4	5.3/8	1/2	4.5/8	1/2	3	1/8	1/4	1/2	1	-	6210117
19/32	3/4	5.3/8	1/2	4.3/16	9/16	3	1/8	1/4	17/32	1	-	6210118
5/8	1/2	2.13/16	1/4	7/8	1/2	4	1/8	1/4	9/16	1	6210149	-
5/8	3/4	5.3/8	1/2	4.3/16	9/16	3	1/8	1/4	9/16	1	-	6210119
21/32	1.1/4	5.3/8	1/2	3.5/8	9/16	3	3/16	1/4	19/32	1	-	6210120
11/16	1.1/4	5.3/8	1/2	3.5/8	5/8	3	3/16	1/4	5/8	1	-	6210121
11/16	1/2	2.13/16	1/4	7/8	1/2	4	1/8	1/4	5/8	1	6210151	-
23/32	1.1/4	5.3/8	1/2	3.5/8	5/8	3	3/16	5/16	21/32	1	-	6210122
3/4	1.1/4	5.3/8	1/2	3.5/8	11/16	3	3/16	5/16	11/16	1	-	6210123
3/4	1/2	2.13/16	1/4	7/8	1/2	4	3/16	5/16	11/16	1	6210153	-
25/32	1.1/4	5.3/8	1/2	3.5/8	11/16	3	3/16	5/16	23/32	1	-	6210124
13/16	1.1/4	5.3/8	1/2	3.5/8	3/4	3	3/16	5/16	3/4	1	-	6210125

COUNTERBORING
COUNTERBORERS

HSS COUNTERBORE



d ₁ Ø	l ₂	l ₁	d ₂ Ø	l ₃	d ₃ Ø	# of Flutes	pilot Ø Inch	pilot Ø low	pilot Ø high	Pack Qty	4706	4705
Inch	Inch	Inch	Inch	Inch	Inch /		Inch					
13/16	1/2	2.13/16	1/4	7/8	1/2	4	3/16	5/16	3/4	1	6210155	-
7/8	1.1/4	5.3/8	1/2	3.5/8	3/4	3	3/16	5/16	13/16	1	-	6210126
7/8	1/2	2.13/16	1/4	7/8	1/2	4	3/16	5/16	13/16	1	6210157	-
15/16	1.1/4	5.3/8	1/2	3.5/8	3/4	3	3/16	5/16	7/8	1	-	6210127
15/16	1/2	2.13/16	1/4	7/8	1/2	4	3/16	5/16	7/8	1	6210159	-
1	1.1/4	5.3/8	1/2	3.5/8	3/4	3	3/16	3/8	15/16	1	-	6210128
1	1/2	2.13/16	1/4	7/8	1/2	4	3/16	3/8	15/16	1	6210161	-
1.1/16	1.1/4	5.3/8	1/2	3.5/8	15/16	3	3/16	3/8	1	1	-	6210129
1.1/8	1.1/4	5.3/8	1/2	3.5/8	15/16	3	3/16	3/8	1.1/16	1	-	6210130
1.3/16	1.1/4	5.3/8	1/2	3.5/8	15/16	3	3/16	3/8	1.1/8	1	-	6210131
1.1/4	1.1/4	5.3/8	1/2	3.5/8	1"	5	3/16	7/16	1.3/16	1	-	6210132
1.5/16	1.1/4	5.3/8	1/2	3.5/8	1"	5	1/4	9/32	1"	1	-	6210133
1.3/8	1.1/4	5.3/8	1/2	3.5/8	1"	5	1/4	9/32	1"	1	-	6210134
1.7/16	1.1/4	5.3/8	1/2	3.5/8	1.1/8	5	1/4	9/32	1	1	-	6210135
1.1/2	1.1/4	5.3/8	1/2	3.5/8	1.1/8	5	1/4	9/32	1	1	-	6210136

Counterbore Body, Taper Shank, Short Series - Interchangeable Pilot Type

4703 Short counterbore body, with taper shank for use with detachable pilots which align counterbore to existing drilled hole. 3 & 5 Flute designs for less chatter.



4703

HSS

ANSI

3/4 - 5/16

d_1 Ø	l_2	l_1	d_2 Ø	l_3	d_3 Ø	# of Flutes	pilot Ø	pilot Ø low	pilot Ø high	Pack Qty	4703
Inch	Inch	Inch	Inch	Inch	Inch /		Inch				
1/4	3/4	3.13/16	1"	15/64	2.9/16	3	3/32	1/8	3/16	1	6210066
5/16	3/4	3.13/16	1"	19/64	2.9/16	3	3/32	1/8	1/4	1	6210068
3/8	1"	4.1/16	1"	11/32	2.9/16	3	5/32	3/16	5/16	1	6210070
7/16	1"	4.1/16	1"	13.32	2.9/16	3	5/32	3/16	3/8	1	6210072
1/2	1.1/4	4.5/16	1"	29/64	2.9/16	3	3/16	4/4	7/16	1	6210074
9/16	1.1/4	4.5/16	1"	29/64	2.9/16	3	3/16	1/4	1/2	1	6210076
5/8	1.1/4	5.1/8	2"	9/16	3.1/8	3	3/16	1/4	9/16	1	6210078
11/16	1.1/4	5.1/8	2"	5/8	3.1/8	3	3/16	1/4	5/8	1	6210080
3/4	1.1/2	5.3/8	2"	21/32	3.1/8	3	1/4	5/16	11/16	1	6210082
13/16	1.1/2	5.3/8	2"	21/32	3.1/8	3	1/4	5/16	3/4	1	6210084
7/8	1.1/2	5.3/8	2"	21/32	3.1/8	3	1/4	5/16	13/16	1	6210085
15/16	1.1/2	6.1/8	2"	7/8	3.7/8	3	1/4	5/16	7/8	1	6210086
1"	1.3/4	6.3/8	3"	7/8	3.7/8	3	5/16	3/8	15/16	1	6210087
1.1/16	1.3/4	6.3/8	3"	7/8	3.7/8	3	5/16	3/8	1"	1	6210088
1.1/8	1.3/4	6.3/8	3"	7/8	3.7/8	3	5/16	3/8	1.1/16	1	6210089
1.3/16	1.3/4	6.3/8	3"	7/8	3.7/8	3	5/16	3/8	1.1/8	1	6210090
1.1/4	2"	6.5/8	3"	7/8	3.7/8	5	3/8	7/16	1.3/16	1	6210091
1.5/16	2"	6.5/8	3"	7/8	3.7/8	5	3/8	7/16	1.1/4	1	6210092
1.3/8	2"	6.5/8	3"	7/8	3.7/8	5	3/8	7/16	1.5/16	1	6210093
1.1/2	2"	7.7/8	4"	1.3/16	4.7/8	5	3/8	7/16	1.7/16	1	6210094
1.5/8	2.1/4	8.1/8	4"	1.3/8	4.7/8	5	7/16	1/2	1.9/16	1	6210095
1.3/4	2.1/4	8.1/8	4"	1.3/8	4.7/8	5	7/16	1/2	1.11/16	1	6210096
1.7/8	2.1/4	8.1/8	4"	1.1/2	4.7/8	5	7/16	1/2	1.13/16	1	6210097
2"	2.1/2	8.3/8	4"	1.1/2	4.7/8	5	1/2	9/16	1.5/16	1	6210098
2.1/8	2.1/2	9.7/8	5"	1.3/4	6.1/8	5	1/2	9/16	2.1/16	1	6210099
2.1/4	2.1/2	9.7/8	5"	1.3/4	6.1/8	5	1/2	9/16	2.3/16	1	6210100
2.3/8	2.1/2	9.7/8	5"	1.3/4	6.1/8	5	1/2	9/16	2.5/16	1	6210101
2.1/2	2.1/2	9.7/8	5"	1.3/4	6.1/8	5	1/2	9/16	2.7/16	1	6210102

HSS COUNTERBORE



Counterbore Pilot, Detachable

4704 Interchangeable detachable pilots for use with counterbore bodies. Pilot shank diameters must match counterbore body “pilot diameter” for proper match.

4704

HSS



ANSI



3/32 - 2"



Pilot Ø Inch /	d ₁ Ø Inch	Pack Qty	4704
3/32	3/32	1	3210235
40	3/32	1	3210236
1/8	3/32	1	3210114
30	3/32	1	3210238
5/32	3/32	1	3210115
21	3/32	1	3210240
20	3/32	1	3210241
19	3/32	1	3210242
3/16	3/32	1	3210116
11	3/32	1	3210244
10	3/32	1	3210245
7/32	3/32	1	3210117
1/4	3/32	1	3210118
F	3/32	1	3210248
1/8	1/8	1	3210249
30	1/8	1	3210250
5/32	1/8	1	3210251
21	1/8	1	3210252
20	1/8	1	3210253
19	1/8	1	3210254
3/16	1/8	1	3210255
11	1/8	1	3210256
10	1/8	1	3210257
7/32	1/8	1	3210258
1/4	1/8	1	3210259
F	1/8	1	3210260
9/32	1/8	1	3210261
5/16	1/8	1	3210262
3/8	1/8	1	3210263
7/16	1/8	1	3210264
1/2	1/8	1	3210265
9/16	1/8	1	3210266
5/8	1/8	1	3210267

HSS COUNTERBORE

Pilot Ø Inch /	d ₁ Ø Inch	Pack Qty	4704
3/16	5/32	1	3210119
7/32	5/32	1	3210120
1/4	5/32	1	3210121
9/32	5/32	1	3210122
5/16	5/32	1	3210123
3/8	5/32	1	3210124
3/16	3/16	1	3210281
11	3/16	1	3210282
10	3/16	1	3210283
7/32	3/16	1	3210284
1/4	3/16	1	3210125
F	3/16	1	3210286
9/32	3/16	1	3210287
5/16	3/16	1	3210126
11/32	3/16	1	3210444
3/8	3/16	1	3210127
13/32	3/16	1	3210445
7/16	3/16	1	3210128
15/32	3/16	1	3210446
1/2	3/16	1	3210129
9/16	3/16	1	3210130
5/8	3/16	1	3210131
11/16	3/16	1	3210294
3/4	3/16	1	3210295
13/16	3/16	1	3210296
7/8	3/16	1	3210297
15/16	3/16	1	3210298
1"	3/16	1	3210299
1/4	1/4	1	3210300
F	1/4	1	3210301
9/32	1/4	1	3210302
5/16	1/4	1	3210132
3/8	1/4	1	3210133
7/16	1/4	1	3210134
1/2	1/4	1	3210135
17/32	1/4	1	3210447
9/16	1/4	1	3210136
5/8	1/4	1	3210137
11/16	1/4	1	3210138
3/4	1/4	1	3210139
13/16	1/4	1	3210140
7/8	1/4	1	3210141
15/16	1/4	1	3210313
1"	1/4	1	3210314
3/8	5/16	1	3210142
7/16	5/16	1	3210143
1/2	5/16	1	3210144
9/16	5/16	1	3210145
5/8	5/16	1	3210146
11/16	5/16	1	3210147
3/4	5/16	1	3210148
13/16	5/16	1	3210149
7/8	5/16	1	3210150
15/16	5/16	1	3210151
1"	5/16	1	3210152
1.1/16	5/16	1	3210153
1.1/8	5/16	1	3210154
7/16	3/8	1	3210155
1/2	3/8	1	3210156
9/16	3/8	1	3210157
5/8	3/8	1	3210158
11/16	3/8	1	3210159
3/4	3/8	1	3210160
13/16	3/8	1	3210161
7/8	3/8	1	3210162
15/16	3/8	1	3210163

HSS COUNTERBORE



Pilot Ø Inch /	d ₁ Ø Inch	Pack Qty	4704
1"	3/8	1	3210164
1.1/16	3/8	1	3210165
1.1/8	3/8	1	3210166
1.3/16	3/8	1	3210167
1.1/4	3/8	1	3210168
1.5/16	3/8	1	3210169
1.3/8	3/8	1	3210170
1.7/16	3/8	1	3210171
1/2	7/16	1	3210172
9/16	7/16	1	3210173
5/8	7/16	1	3210174
11/16	7/16	1	3210175
3/4	7/16	1	3210176
13/16	7/16	1	3210177
7/8	7/16	1	3210178
15/16	7/16	1	3210179
1"	7/16	1	3210180
1.1/16	7/16	1	3210181
1.1/8	7/16	1	3210182
1.3/16	7/16	1	3210183
1.1/4	7/16	1	3210184
1.5/16	7/16	1	3210185
1.3/8	7/16	1	3210186
9/16	1/2	1	3210195
5/8	1/2	1	3210196
11/16	1/2	1	3210197
3/4	1/2	1	3210198
13/16	1/2	1	3210199
7/8	1/2	1	3210200
15/16	1/2	1	3210201
1"	1/2	1	3210202
1.1/16	1/2	1	3210203
1.1/8	1/2	1	3210204
1.3/16	1/2	1	3210205
1.1/4	1/2	1	3210206
1.5/16	1/2	1	3210207
1.3/8	1/2	1	3210208
1.7/16	1/2	1	3210209
1.1/2	1/2	1	3210210
1.9/16	1/2	1	3210211
1.5/8	1/2	1	3210212
1.11/16	1/2	1	3210213
1.3/4	1/2	1	3210214
1.13/16	1/2	1	3210215
1.15/16	1/2	1	3210217
1.7/8	1/2	1	3210216
2"	1/2	1	3210218

COUNTERSINKS
COUNTERBORES



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SCREW EXTRACTOR

- 1800** Screw Extractor
- 1815** Screw Extractor Set, 5 piece
- 1816** Screw Extractor Set, 6 piece



Nr.	d ₁ Ø Inch	Contents	d ₂ Ø Inch	l ₁ Inch	Pack Qty	1800	1815	1816
						-	Set	Set
1815	-	801 - 805 (5 pc.)	-	-	1	-	3210013	-
1816	-	801 - 806 (6 pc.)	-	-	1	-	-	3210014
812	1.27/32		2.9/32	6.1/4	1	3210012	-	-
811	1.15/32		1.27/32	5.5/8	1	3210011	-	-
810	1.7/32		1.17/32	5"	1	3210010	-	-
809	31/32		1.1/4	4.5/8	1	3210009	-	-
808	47/64		1"	4.3/8	1	3210008	-	-
807	31/64		3/4	4.1/8	1	3210007	-	-
806	3/8		5/8	3.3/4	1	3210006	-	-
805	1/4		7/16	3.3/8	6	3210005	-	-
804	11/64		5/16	3"	6	3210004	-	-
803	1/8		1/4	2.3/4	12	3210003	-	-
802	0.0860		3/16	2.3/8	12	3210002	-	-
801	0.0540		5/32	2"	12	3210001	-	-

DRILLING & TAPPING FLUID

1900 Drilling & Tapping Fluid - A heavy oil for drilling & tapping all ferrous and non-ferrous materials. Increases productivity and extends tool life. Environmentally safe.

Wax Stick - Multi-purpose wax that sticks to the tool and effectively removes heat while adding lubrication. Withstands tremendous pressure. Can be used in lieu of drilling/tapping fluids and cutting oils.

Foam - Heavy duty aerosol foam coats the tools as it foams on contact. Will not contaminate existing coolant.

Light Tapping Fluid - A light viscosity heavy duty drilling & tapping fluid for reducing torque. Ideal for use with a re-circulation system. Can be added to existing cutting oils to increase lubricity. Will not contaminate existing coolant as it will float to the surface for easy skimming.



Nr.	Type	Description	Pack Qty	1900
1/2 oz	Trial Size	Drilling & Tapping Fluid	1	1910512
4 oz	Squirt Bottle	Drilling & Tapping Fluid	24	1910501
16 oz	Squirt Bottle	Drilling & Tapping Fluid	12	1910502
1 gal	Bottle	Drilling & Tapping Fluid	6	1910503
5 gal	Dispenser	Drilling & Tapping Fluid	1	1910506
5 gal	Pail	Drilling & Tapping Fluid	1	1910504
55 gal	Drum	Drilling & Tapping Fluid	1	1910505
1 lb	Stick	Wax	24	1950501
20 oz	Aerosol Can	Foam	12	1910509
1 gal	Bottle	Light Tapping Fluid	6	1930503
16 oz	Squirt Bottle	Light Tapping Fluid	12	1930502

MISCELLANEOUS

SLEEVES & KEYS

411 Taper shank (internal and external) adapters. Heat treated and externally ground. Steam oxide surface finish prevents corrosion.

430 Drill Drift. Dropped forged steel keys used for removing taper shank tools from adapting sleeves and machine spindles.



MTS#	MTS # Inside/Shank	Overall Length Inch	Pack Qty	411	430
1	-	-	1	-	3210338
2	-	-	1	-	3210339
3	-	-	1	-	3210340
4	-	-	1	-	3210341
5	-	-	1	-	3210342
	1-2	3.1/2	1	3210046	-
	1-3	3.15/16	1	3210047	-
	1-4	4.13/16	1	3210048	-
	2-3	4.3/8	1	3210050	-
	2-2	4.13/16	1	3210051	-
	3-4	5.5/16	1	3210053	-
	3-5	6.1/16	1	3210054	-
	4-5	6.1/2	1	3210055	-
	5-6	8.1/2	1	3210057	-

TOOL BIT BLANKS

- 707** HSS ground blank with 10° beveled ends
- 727** Cobalt ground blank with 10° beveled ends
- 757** Cobalt Vanadium (T-15) ground blanks with 10° beveled ends



Diameter	Overall Length	Pack Qty	707	727	757
3/16	2.1/2	1	6310293	6310317	6310305
1/4	2.1/2	1	6310294	6310318	6310306
5/16	2.1/2	1	6310295	6310319	6310307
3/8	3"	1	6310296	6310320	6310308
7/16	3.1/2	1	6310297	6310321	6310309
1/2	4"	1	6310298	6310322	6310310
5/8	4.1/2	1	6310299	6310323	6310311
3/4	5"	1	6310300	6310324	6310312
1"	7"	1	6310302	6310326	6310314

TOOL MATERIALS

High Speed Steel

HSS A medium-alloyed high speed steel that has good machinability and good performance. HSS exhibits hardness, toughness and wear resistance characteristics that make it attractive in a wide range of applications, for example in drills and taps.

Cobalt High Speed Steel

HSSCo This high speed steel contains cobalt for increased hot hardness. The composition of HSSCo is a good combination of toughness and hardness. It has good machinability and good wear resistance, which makes it usable for drills, taps, milling cutters and reamers.

Non Cobalt Powder Metallurgy Steel

HSS XS1 Has a finer and more consistent grain structure than HSSCo resulting in a tougher product. Tool life and wear resistance is normally higher than HSSCo and this grade has superior edge strength and rigidity. Mainly used for milling cutters and taps.

Sintered Cobalt High Speed Steel

HSSCo XP HSSCo-XP is a Cobalt high speed steel which has been produced using powder metallurgy technology. High speed steel produced by this method exhibits superior toughness and grindability. Taps and milling cutters find particular advantage when manufactured from XP grade steel.

Chromium Steel

CS Chromium steel is a tool steel in which the principal alloying element is Chromium. It is used only for the manufacture of taps and dies. This steel has lower hot hardness properties in comparison with high speed steels. Suited for hand tap applications.

	Grade	Hardness (HV10)	C %	W %	Mo %	Cr %	V %	Co %	ISO Standard
HSS	M2	810-850	0.9	6.4	5.0	4.2	1.8	-	HSS
HSSCo	M35	830-870	0.93	6.4	5.0	4.2	1.8	4.8	HSS-E
	M42	870-960	1.08	1.5	9.4	3.9	1.2	8.0	HSS-E
HSS XS1	-	830-870	0.9	6.25	5.0	4.2	1.9	-	HSS-PM
HSSCo XP	ASP 2017	860-900	0.8	3.0	3.0	4.0	1.0	8.0	HSS-E-PM
	ASP 2030	870-910	1.28	6.4	5.0	4.2	3.1	8.5	HSS-E-PM
	ASP 2052	870-910	1.6	10.5	2.0	4.8	5.0	8.0	HSS-E-PM
CS	-	775-825	1.03	-	-	1.5	-	-	-

CARBIDE MATERIALS

Carbide Materials (or Hard Materials)

HM A sintered powder metallurgy steel, consisting of a metallic carbide composite with binder metal. The most central raw material is tungsten carbide (WC). Tungsten carbide contributes to the hardness of the material. Tantalum carbide (TaC), titanium carbide (TiC) and niobium carbide (NbC) complements WC and adjusts the properties to what is desired. These three materials are called cubic carbides. Cobalt (Co) acts as a binder and keeps the material together.

Carbide materials are often characterised by high compression strength, high hardness and therefore high wear resistance, but also by limited flexural strength and toughness. Carbide is used in taps, reamers, milling cutters, drills and thread milling cutters.

Properties	HSS materials	Carbide materials	K10/30F (often used for solid tools)
Hardness (HV30)	800-950	1300-1800	1600
Density (g/cm ³)	8.0-9.0	7.2-15	14.45
Compressive strength (N/mm ²)	3000-4000	3000-8000	6250
Flexural strength, (bending) (N/mm ²)	2500-4000	1000-4700	4300
Heat resistance (°C)	550	1000	900
E-module (KN/mm ²)	260-300	460-630	580
Grain size (µm)	-	0.2-10	0.8

The combination of hard particle (WC) and binder metal (Co) give the following changes in characteristics.

Characteristic	Higher WC content give	Higher Co content give
Hardness	Higher hardness	Lower hardness
Compressive strength (CS)	Higher CS	Lower CS
Bending strength (BS)	Lower BS	Higher BS

Grain size also influences the material properties. Small grain sizes means higher hardness and coarse grains give more toughness.

SURFACE TREATMENTS



Steam Tempering

Steam tempering gives a strongly adhering blue oxide surface that acts to retain cutting fluid and prevent chip to tool welding, thereby counteracting the formation of a built-up edge. Steam tempering can be applied to any bright tool but is most effective on drills and taps.



Bronze Finish

The bronze finish is a thin oxide layer formed on the tool surface and it is applied principally to Cobalt and Vanadium high speed steels.



Nitriding (FeN)

Nitriding is a process that is used to increase the hardness and wear resistance of the surface of a tool. It is particularly suitable for taps that are used on abrasive materials such as cast iron, bakelite, etc. Nitriding is used on twist drills when it is desirable to increase the strength and wear resistance of the cylindrical lands.

SURFACE COATINGS



Titanium Nitride Coating (TiN)

Titanium Nitride is a gold coloured ceramic coating applied by physical vapour deposition (PVD). High hardness combined with low friction properties ensures considerably longer tool life, or alternatively, better cutting performance from tools which have not been coated. TiN coating is used mainly for drills and taps.



Titanium Carbon Nitride Coating (TiCN)

Titanium Carbon Nitride is a ceramic coating applied by PVD coating technology. TiCN is harder than TiN and has a lower coefficient of friction. Its hardness and toughness in combination with good wear resistance ensures that it finds its principal application in the field of milling to enhance the performance of milling cutters.



Titanium Aluminium Nitride Coating (TiAlN)

Titanium Aluminium Nitride is a multi layer ceramic coating applied by PVD coating technology, which exhibits high toughness and oxidation stability. These properties make it ideal for higher speeds and feeds, whilst at the same time improving tool life TiAlN is suitable for drilling and tapping. It is recommended to use TiAlN when machining dry.



Chromium Nitride Coating (CrN)

CrN is an excellent coating for aluminium alloys, copper alloys and low alloyed steel materials. CrN can also be used as an alternative on Titanium and Nickel alloys. This coating has a low tendency for built-up edges.



Alcrona (AlCrN)

Super G is an aluminium chromium nitride coating mostly used for milling cutters. The coatings hot hardness and high oxidation resistance are two unique properties. When machining applications involving heavy mechanical and thermal stresses, these properties translate into supreme wear resistance.



Hardlube (TiAlN/WC/C)

Super B is a Titanium Aluminum Nitride + Tungsten Carbide + Carbon Coating used for wet and minimal lubrication machining in drilling, milling and tapping applications. Very effective for cast iron, hardened steels and heat resistant super alloys.

SURFACE TREATMENT / COATING PROPERTIES

Surface Treatments	Color	Coating material	Hardness (HV)	Thickness (µm)	Coating structure	Frict. coeff. against steel	Max. appl. temp. (°C)
ST	Dark grey	Fe 304	400	Max. 5	Conversion into the surface	–	550
Bronze	Bronze	Fe 304	400	Max. 5	Conversion into the surface	–	550
N	Grey	FeN	1300	20	Diffusion zone	–	550
TiN	Gold	TiN	2300	1-4	Mono-layer	0.4	600
TiCN	Blue grey	TiCN	3000	1-4	Multi-layer gradient	0.4	500
TiAlN	Black grey	TiAlN	3300	3	Nano structured	0.3-0.35	900
CrN	Silver grey	CrN	1750	3-4	Mono-layer	0.5	700
Super G	Blue grey	AlCrN	3200		Mono-layer	0.35	1100
Super B	Black	TiAlN+ WC/C	3000	2-6	Multi-layer lamellar	0.2	800



Technical Section General



DECIMAL EQUIVALENTS

Size	Decimal Equivalent	Size	Decimal Equivalent	Size	Decimal Equivalent	Size	Decimal Equivalent	Size	Decimal Equivalent	Size	Decimal Equivalent
80	.0135	1/16	.0625	3.3 mm	.1299	5.4 mm	.2126	O	.3160	13.50 mm	.5315
0.35 mm	.0138	1.6 mm	.0630	3.4 mm	.1339	3	.2130	8.1 mm	.3189	35/64	.5469
79	.0145	52	.0635	29	.1360	5.5 mm	.2165	8.2 mm	.3228	14.00 mm	.5512
1/64	.0156	1.65 mm	.0650	3.5 mm	.1378	7/32	.2188	P	.3230	9/16	.5625
.4 mm	.0157	1.7 mm	.0669	28	.1405	5.6 mm	.2205	8.25 mm	.3248	14.50 mm	.5709
78	.0160	51	.0670	9/64	.1406	2	.2210	8.3 mm	.3268	37/64	.5781
.45 mm	.0177	1.75 mm	.0689	3.6 mm	.1417	5.7 mm	.2244	21/64	.3281	15.00 mm	.5906
77	.0180	50	.0700	27	.1440	5.75 mm	.2264	8.4 mm	.3307	19/32	.5938
.5 mm	.0197	1.8 mm	.0709	3.7 mm	.1457	1	.2280	Q	.3320	39/64	.6094
76	.0200	1.85 mm	.0728	26	.1470	5.8 mm	.2283	8.5 mm	.3346	15.50 mm	.6102
75	.0210	49	.0730	3.75 mm	.1476	5.9 mm	.2323	8.6 mm	.3386	5/8	.6250
.55 mm	.0217	1.9 mm	.0748	25	.1495	A	.2340	R	.3390	16.00 mm	.6299
74	.0225	48	.0760	3.8 mm	.1496	15/64	.2344	8.7 mm	.3425	41/64	.6406
.6 mm	.0236	1.95 mm	.0768	24	.1520	6 mm	.2362	11/32	.3438	16.50 mm	.6496
73	.0240	5/64	.0781	3.9 mm	.1535	B	.2380	8.75 mm	.3445	21/32	.6562
72	.0250	47	.0785	23	.1540	6.1 mm	.2402	8.8 mm	.3465	17.00 mm	.6693
.65 mm	.0256	2 mm	.0787	5/32	.1562	C	.2420	S	.3480	43/64	.6719
71	.0260	2.05 mm	.0807	22	.1570	6.2 mm	.2441	8.90 mm	.3504	11/16	.6875
.7 mm	.0276	46	.0810	4 mm	.1575	D	.2460	9.00 mm	.3543	17.50 mm	.6890
70	.0280	45	.0820	21	.1590	6.25 mm	.2461	T	.3580	45/64	.7031
69	.0292	2.1 mm	.0827	20	.1610	6.3 mm	.2480	9.10 mm	.3583	18.00 mm	.7087
.75 mm	.0295	2.15 mm	.0846	4.1 mm	.1614	E	.2500	23/64	.3594	23/32	.7188
68	.0310	44	.0860	4.2 mm	.1654	1/4	.2500	9.20 mm	.3622	18.50 mm	.7283
1/32	.0312	2.2 mm	.0866	19	.1660	6.4 mm	.2520	9.25 mm	.3642	47/64	.7344
.8 mm	.0315	2.25 mm	.0886	4.25 mm	.1673	6.5 mm	.2559	9.30 mm	.3661	19.00 mm	.7480
67	.0320	43	.0890	4.3 mm	.1693	F	.2570	U	.3680	3/4	.7500
66	.0330	2.3 mm	.0906	18	.1695	6.6 mm	.2598	9.40 mm	.3701	49/64	.7656
.85 mm	.0335	2.35 mm	.0925	11/64	.1719	G	.2610	9.50 mm	.3740	19.50 mm	.7677
65	.0350	42	.0935	17	.1730	6.7 mm	.2638	3/8	.3750	25/32	.7812
.9 mm	.0354	3/32	.0938	4.4 mm	.1732	17/64	.2656	V	.3770	20.00 mm	.7874
64	.0360	2.4 mm	.0945	16	.1770	6.75 mm	.2657	9.60 mm	.3780	51/64	.7969
63	.0370	41	.0960	4.5 mm	.1772	H	.2660	9.70 mm	.3819	20.50 mm	.8071
.95 mm	.0374	2.45 mm	.0965	15	.1800	6.8 mm	.2677	9.75 mm	.3839	13/16	.8125
62	.0380	40	.0980	4.6 mm	.1811	6.9 mm	.2717	9.80 mm	.3858	21.00 mm	.8268
61	.0390	2.5 mm	.0984	14	.1820	I	.2720	W	.3860	53/64	.8281
1 mm	.0394	39	.0995	13	.1850	7 mm	.2756	9.90 mm	.3898	27/32	.8438
60	.0400	38	.1015	4.7 mm	.1850	J	.2770	25/64	.3906	21.50 mm	.8465
59	.0410	2.60 mm	.1024	4.75 mm	.1870	7.1 mm	.2795	10.00 mm	.3937	55/64	.8594
1.05 mm	.0413	37	.1040	3/16	.1875	K	.2810	X	.3970	22.00 mm	.8661
58	.0420	2.7 mm	.1063	4.8 mm	.1890	9/32	.2812	Y	.4040	7/8	.8750
57	.0430	36	.1065	12	.1890	7.2 mm	.2835	13/32	.4062	22.50 mm	.8858
1.1 mm	.0433	2.75 mm	.1083	11	.1910	7.25 mm	.2854	Z	.4130	57/64	.8906
1.15 mm	.0453	7/64	.1094	4.9 mm	.1929	7.3 mm	.2874	10.50 mm	.4134	23.00 mm	.9055
56	.0465	35	.1100	10	.1935	L	.2900	27/64	.4219	29/32	.9062
3/64	.0469	2.8 mm	.1102	9	.1960	7.4 mm	.2913	11.00 mm	.4331	59/64	.9219
1.2 mm	.0472	34	.1110	5 mm	.1969	M	.2950	7/16	.4375	23.50 mm	.9252
1.25 mm	.0492	33	.1130	8	.1990	7.5 mm	.2953	11.50 mm	.4528	15/16	.9375
1.3 mm	.0512	2.9 mm	.1142	5.1 mm	.2008	19/64	.2969	29/64	.4531	24.00 mm	.9449
55	.0520	32	.1160	7	.2010	7.6 mm	.2992	15/32	.4688	61/64	.9531
1.35 mm	.0531	3 mm	.1181	13/64	.2031	N	.3020	12.00 mm	.4724	24.50 mm	.9646
54	.0550	31	.1200	6	.2040	7.7 mm	.3031	31/64	.4844	31/32	.9688
1.4 mm	.0551	3.1 mm	.1220	5.2 mm	.2047	7.75 mm	.3051	12.50 mm	.4921	25.00 mm	.9843
1.45 mm	.0571	1/8	.1250	5	.2055	7.8 mm	.3071	1/2	.5000	63/64	.9844
1.5 mm	.0591	3.2 mm	.1260	5.25 mm	.2067	7.9 mm	.3110	13.00 mm	.5118	1.0000	1.0000
53	.0595	3.25 mm	.1280	5.3 mm	.2087	5/16	.3125	33/64	.5156		
1.55 mm	.0610	30	.1285	4	.2090	8 mm	.3150	17/32	.5312		

HARDNESS CONVERSION TABLE

Rockwell Hardness			Brinell	Tensile Strength
C	B	A	Hardness	(Lbs./Sq.In.)
70	—	86.5	780	—
69	—	86.0	762	—
68	—	85.5	745	—
67	—	85.0	728	—
66	—	84.5	712	—
65	—	84.0	697	—
64	—	83.5	682	—
63	—	83.0	668	—
62	—	82.5	653	—
61	—	82.0	640	—
60	—	81.0	627	314,000
59	—	80.5	614	307,000
58	—	80.0	601	299,000
57	—	79.5	578	291,000
56	—	79.0	567	284,000
55	—	78.5	555	277,000
54	—	78.0	545	270,000
53	—	77.5	534	263,000
52	—	77.0	514	256,000
51	—	76.5	505	250,000
50	—	76.0	495	243,000
49	—	75.5	477	236,000
48	—	75.0	469	230,000
47	—	74.0	461	223,000
46	115	73.5	444	217,000
45	115	73.0	429	211,000
44	114	72.5	415	205,000
43	114	72.0	408	200,000
42	113	71.5	401	195,000
41	112	71.0	388	188,000
40	112	70.5	375	182,000
39	111	70.0	369	176,000

Rockwell Hardness			Brinell	Tensile Strength
C	B	A	Hardness	(Lbs./Sq.In.)
38	110	69.5	363	171,000
37	110	69.0	352	167,000
36	109	68.5	341	162,000
35	109	68.0	331	158,000
34	108	67.5	321	153,000
33	108	67.0	311	148,000
32	107	66.5	302	144,000
31	106	66.0	293	140,000
30	105	65.5	285	136,000
29	104	65.0	277	133,000
28	104	64.5	269	131,000
27	103	64.0	265	130,000
26	103	63.5	262	128,000
25	102	63.0	255	125,000
24	102	62.5	248	122,000
23	101	62.0	241	119,000
22	100	61.5	235	116,000
21	99	61.0	229	113,000
20	98	60.0	223	110,000
19	97	59.5	220	108,000
18	97	59.0	217	107,000
17	96	58.0	212	104,000
16	96	57.5	207	101,000
15	95	57.0	202	99,000
14	94	56.5	200	98,000
13	93	56.0	197	97,000
12	92	55.5	192	95,000
11	92	55.0	189	94,000
10	91	54.0	187	93,000
9	90	53.5	183	91,000
8	89	53.0	179	89,000
7	88	52.5	174	87,000

LUBRICANTS

Lubricants or coolants are used on cutting tools to reduce friction or to reduce heat.

Type of Lubricant	Description	Advantages	Disadvantages
Emulsion	Emulsions or water-soluble cutting oils give lubrication properties combined with good cooling property. The oil concentrate in emulsion contains additives that give different properties like lubricators, preservatives and EP additives to improve bearing strength.	Reduces heat. Flushes away chips.	Disposal cost. Environment
Minimal lubrication	Minimal lubrication is a small amount of oil distributed with compressed air to lubricate the cutting or forming process.	Low cost. Good	Bad chip removal. Requires good set up of nozzle positioning
Oil	Cutting oils have good lubrication properties but do not provide such good cooling as water-based cutting fluids.	Good	High cost. Environment.
Dry / compressed air	Compressed air directed to the cutting process.	Clean process. Remove Chips. Low cost.	Works in a limited no. of applications.

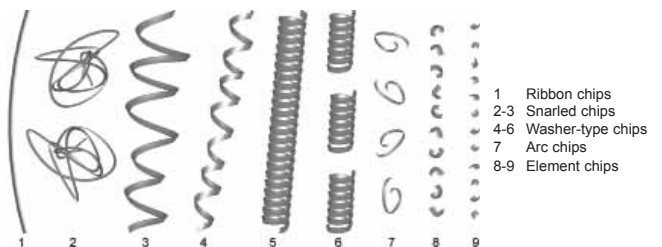


TYPES OF CHIPS

Chip formation is mostly caused by plastic deformation. This process, due to the friction generated during machining, generates heat. Heat has the positive effect of increasing the plasticity of the workpiece material, but the negative effect of increasing the wear on the tool. When workpiece material reaches its breakage point, then the chip is generated. Its form and development depend on different factors, such as:

- Chemical-physical compatibility between tool and workpiece materials
- Cutting operation
- Cutting conditions (speed, feed, material removal rate)
- Tool geometry
- Friction coefficient (with or without coating)
- Lubrication

Depending on different combinations of the above mentioned factors, the chips can turn out in many different ways (see figure below).



Chips that are shaped as small "6's & 9's" are desirable in most machining applications. This will allow for the best possible chip evacuation from the deepest cavities. Tool life is also increased dramatically when chips are kept small and manageable. When the heat generated from cutting is kept in the chip instead of the tool, wear is kept to a minimum.

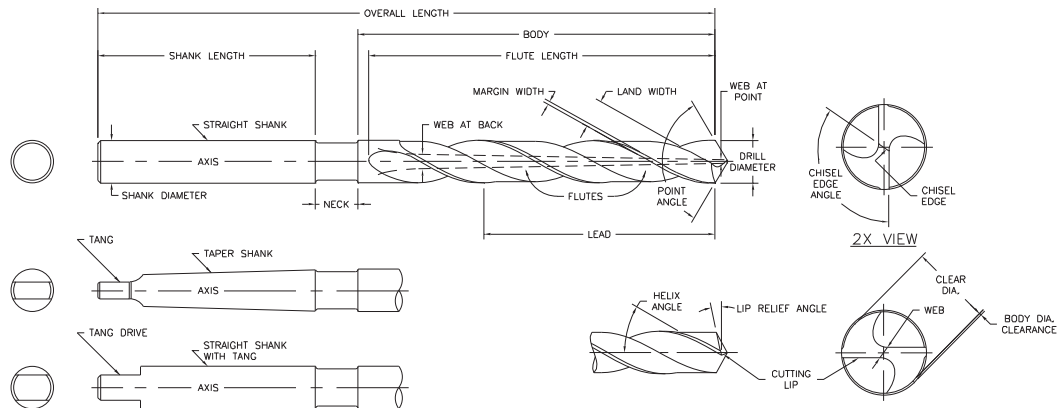
INDUSTRY STANDARD TOLERANCES FOR SHAFTS & HOLES

Tolerance values are shown in Microns (μm)

Formula for Microns ...1 μm = 0.001 mm / 0.000039

Tolerance	Diameter (mm)							
	> 1 ≤ 3	> 3 ≤ 6	> 6 ≤ 10	> 10 ≤ 18	> 18 ≤ 30	> 30 ≤ 50	> 50 ≤ 80	> 80 ≤ 120
	Diameter (inch)							
	> 0.039 ≤ 0.118	> 0.118 ≤ 0.236	> 0.236 ≤ 0.394	> 0.394 ≤ 0.709	> 0.709 ≤ 1.181	> 1.181 ≤ 1.968	> 1.968 ≤ 3.149	> 3.149 ≤ 4.724
	Tolerance values (μm)							
e8	-14 / -28	-20 / -38	-25 / -47	-32 / -59	-40 / -73	-50 / -89	-60 / -106	-72 / -126
f6	-6 / -12	-10 / -18	-13 / -22	-16 / -27	-20 / -33	-25 / -41	-30 / -49	-36 / -58
f7	-6 / -16	-10 / -22	-13 / -28	-16 / -34	-20 / -41	-25 / -50	-30 / -60	-36 / -71
h6	0 / -6	0 / -8	0 / -9	0 / -11	0 / -13	0 / -16	0 / -19	0 / -22
h7	0 / -10	0 / -12	0 / -15	0 / -18	0 / -21	0 / -25	0 / -30	0 / -35
h8	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33	0 / -39	0 / -46	0 / -54
h9	0 / -25	0 / -30	0 / -36	0 / -43	0 / -52	0 / -62	0 / -74	0 / -87
h10	0 / -40	0 / -48	0 / -58	0 / -70	0 / -84	0 / -100	0 / -120	0 / -140
h11	0 / -60	0 / -75	0 / -90	0 / -110	0 / -130	0 / -160	0 / -190	0 / -220
h12	0 / -100	0 / -120	0 / -150	0 / -180	0 / -210	0 / -250	0 / -300	0 / -350
k10	+40 / 0	+48 / 0	+58 / 0	+70 / 0	+84 / 0	+100 / 0	+120 / 0	+140 / 0
k12	+100 / 0	+120 / 0	+150 / 0	+180 / 0	+210 / 0	+250 / 0	+300 / 0	+350 / 0
m7	+2 / +12	+4 / +16	+6 / +21	+7 / +25	+8 / +29	+9 / +34	+11 / +41	+13 / +48
js14	+/- 125	+/- 150	+/- 180	+/- 215	+/- 260	+/- 310	+/- 370	+/- 435
js16	+/- 300	+/- 375	+/- 450	+/- 550	+/- 650	+/- 800	+/- 950	+/- 1100
H7	+10 / 0	+12 / 0	+15 / 0	+18 / 0	+21 / 0	+25 / 0	+30 / 0	+35 / 0
H8	+14 / 0	+18 / 0	+22 / 0	+27 / 0	+33 / 0	+39 / 0	+46 / 0	+54 / 0
H9	+25 / 0	+30 / 0	+36 / 0	+43 / 0	+52 / 0	+62 / 0	+74 / 0	+87 / 0
H12	+100 / 0	+120 / 0	+150 / 0	+180 / 0	+210 / 0	+250 / 0	+300 / 0	+350 / 0
P9	-6 / -31	-12 / -42	-15 / -51	-18 / -61	-22 / -74	-26 / -86	-32 / -106	-37 / -124
S7	-13 / -22	-15 / -27	-17 / -32	-21 / -39	-27 / -48	-34 / -59	-42 / -72	-58 / -93

DRILL NOMENCLATURE



Axis—The imaginary straight line which forms the longitudinal center line of a drill.

Backtaper—A slight decrease in diameter from front to back in the body of a drill.

Body—The portion of a drill extending from the shank or neck to the outer corners of the cutting lips.

Body Clearance Diameter—The portion of the land that has been cut away so it will not bind against the walls of the hole.

Chisel-Edge—The edge at the end of the web that connects the cutting lips.

Chisel-Edge Angle—The included angle between the chisel-edge and cutting lip, as viewed from the end of a drill.

Clearance Diameter—The diameter over the cut away portion of the drill lands.

Drill—A rotary end cutting tool having one or more cutting lips, and having one or more helical or straight flutes for the passage of chips and the admission of a cutting fluid.

Drill Diameter—The diameter over the margins of a drill measured at the point.

Flute Length—The length from the outer corners of the cutting lips to the extreme back of the flutes. Includes the sweep of the tool used to generate the flutes and therefore does not indicate the usable length of flutes.

Flutes—Helical or straight grooves cut or formed in the body of a drill to provide cutting lips, permit removal of chips, and allow cutting fluid to reach the cutting lips.

Helix Angle—The angle formed by the leading edge of the land with a plane containing the axis of a drill.

Land—The peripheral portion of the body between adjacent flutes.

Land Width—The distance between the leading edge and heel of the land; measured at a right angle to the leading edge.

Lead—The axial advance of a leading edge of the land in one turn around the circumference.

Lip Relief Angle—The axial relief angle at the outer corner of the lip; measured by projection to a plane tangent to the periphery at the outer corner of the lip.

Lips—The cutting edges of a two flute drill extending from the chisel-edge to the periphery.

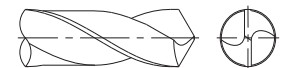
Margin—The cylindrical portion of the land, which is not cut away, to provide clearance.

Neck—The section of reduced diameter between the body and the shank of a drill.

Overall Length—The length from the extreme end of the shank to the outer corners of the cutting lip. It does not include the conical shank end often used on straight shank drills, nor the conical cutting point used on both straight and taper shank drills.

Point—The cutting end of a drill, made up of the ends of the lands and the web. In form, it resembles a cone, but departs from a true cone to furnish clearance behind the cutting lips.

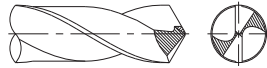
Conventional—Conventional Points with 118° included point angles are the most commonly used because they provide satisfactory results in a wide variety of materials. A possible limitation is that the straight chisel edge contributes to walking at the drill point, often making it necessary to spot the hole for improved accuracy.



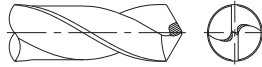
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DRILL NOMENCLATURE

Split — Split-Points (commonly called Crankshaft Points) were originally developed for use on drills designed for deep oil holes in automotive crankshafts. Since its inception, the split-point has gained widespread use and is applied to both 118° and 135° included point angles. Its main advantages are the ability to reduce thrust and eliminate walking at the drill point. This is a distinct advantage when the drill is used in a portable drill or in drilling applications where bushings cannot be used. The split-point also has two positive rake cutting edges extending to the center of the drill, which can assist as a chipbreaker to produce small chips which can readily be ejected.



Notched — Notched Points were developed for drilling tough alloys. Commonly incorporated on heavy web drills, which allow the point to withstand the higher thrust loads required in drilling these materials. As with the split-point, the Notched Point contains two additional positive rake cutting edges extending toward the center of the drill. These secondary cutting lips, which extend no further than half the original cutting lip, can assist in chip control and reduce the torque required in drilling tough materials. Notched Points can be incorporated on both 118° and 135° included point angles, making them suitable for drilling a wide variety of materials.



Point Angle—The included angle between the cutting lips projected upon a plane parallel to the drill axis and parallel to the two cutting lips.

Relative Lip Height—The difference in indicator reading between the cutting lips of a drill. Measured at a right angle to the cutting lip at a specific distance from the axis of the tool.

Shank—The part of a drill by which it is held and driven.

Tang—The flattened end of a taper shank, intended to fit into a driving slot in a socket.

Tang Drive—Two opposite parallel driving flats on the extreme end of a straight shank.

Taper Shank—Drills having conical shanks suitable for direct fitting in machine spindles, driving sleeves, or sockets. Tapered shanks generally have a tang.

Web—The central portion of the body that joins the lands. The extreme end of the web forms the chisel-edge on a two flute drill.

Web Thickness—The thickness of the web at the point, unless another specific location is indicated.

DRILLING TERMINOLOGY/ OPERATING FORMULAS

Speed — The speed of a drill is determined by the rate at which the outer periphery of the tool rotates in relation to material being cut. In general, the SFM at which a drill will operate is within a range based upon the workpiece material, its condition, hardness, and depth of hole. The deeper the hole, the greater tendency there is for more heat to be generated, due to length of drill engagement, as well as chip compaction. Thus, speed reduction is often recommended to minimize the amount of heat being generated. By increasing the SFM, fewer holes will result. Therefore, it is usually advisable to start the drilling process at a slower SFM and then increase to the maximum.

Feed — Feed rates for drilling are governed by the drill diameter machinability of materials and depth of hole. Small drills, harder materials, and deeper holes require additional considerations in selecting the proper feed rates.

The following terms and formulas can be used to determine the appropriate operating parameters.

Terms	Formulas
IPM = Inches Per Minute	$IPR \times RPM = \mathbf{IPM}$
IPR = Inches Per Revolution	$\frac{IPM}{RPM} = \mathbf{IPR}$
RPM = Revolutions Per Minute	$\frac{SFM \times 3.82}{D} = \mathbf{RPM}$
SFM = Surface Feet Per Minute	$D \times RPM \times .26 = \mathbf{SFM}$
D = Drill Diameter	

Note: For element and tolerance information, see specific technical sections on Solid Carbide or High Speed Steel.

OPTIMIZING THE DRILLING OPERATION / TROUBLESHOOTING

Drill Selection

Use the shortest drill the application will permit in order to achieve maximum tool rigidity.

HOLDERS

Tool holders and collets must provide good concentricity between the drill and the machine spindle. Use a positive back stop to prevent the tool from backing up into the holder. Never collet the tool over the flutes or over-tighten the holder. Static runout in the tool assembly must be accurately checked and maintained.

Workpiece

A secure and rigid workpiece to minimize deflection is needed, particularly on through-hole applications.

Coolants

Coolants are recommended when drilling mild steel and high temperature alloys. The purpose of the coolant media is to direct the chips away from the cutting tool and workpiece. Excessive coolant pressure and/or too much volume can negatively affect performance. When using coolant fed drills, the coolant pressure that is required should be higher than normal. Suggested pressure for coolant fed drills is minimally 150 PSI. As the diameter of the drill is reduced, the higher the pressure. This is to assist the chip in evacuating from a more confined area.

DRILLING TROUBLESHOOTING GUIDE

Problem	Solution
Wear on Outer Corners	<ul style="list-style-type: none"> • Reduce cutting speed • Increase feed (IPR) • Improve direction of coolant flow • Increase coolant pressure • Add corner break
Chipping of Chisel Edge	<ul style="list-style-type: none"> • Check accuracy of drill runout • Check workpiece clamping accuracy and movement • Check point centrality and lip height • Increase feed rate
Chipping of Cutting Lips	<ul style="list-style-type: none"> • Check accuracy of drill runout • Check workpiece clamping accuracy and movement • Reduce speed • Reduce point clearance • Increase hone
Cracking of Lands	<ul style="list-style-type: none"> • Check movement of workpiece • Increase back taper • Check accuracy of drill runout • Chip packing; increase flute form opening or peck drill (HSS or HSCO only) • Slow down helix, horizontal drilling • Increase feed • When spot drilling, reduce feed • Improve direction of coolant flow • Increase coolant pressure
Oversize Hole	<ul style="list-style-type: none"> • Increase speed, reduce feed • Check workpiece clamping accuracy and movement • Check accuracy of drill runout • Chip packing, increase flute form opening or peck drill (HSS or HSCO only) • Check point centrality and lip height
Undersize Hole	<ul style="list-style-type: none"> • Improve direction of coolant flow • Reduce cutting speed, increase feed • Check drill diameter
Hole Not Round	<ul style="list-style-type: none"> • Check accuracy of drill runout • Check workpiece clamping accuracy and movement • Check point centrality and lip height • Chip packing, increase flute form opening or peck drill (HSS or HSCO only)
Drill Breakage	<ul style="list-style-type: none"> • Chip packing, increase flute form opening or peck drill (HSS or HSCO only) • Check workpiece clamping accuracy and movement • Check accuracy of drill runout • Reduce feed rate, increase feed rate • Improve direction of coolant flow • Increase coolant pressure

HOLE SIZE / ACHIEVABLE HOLE TOLERANCES

As geometric, substrate and coating configurations become more advanced, the ability of a drill to produce a more accurate hole size increases. In general, a standard geometry tool will achieve a hole size to H12. However as the configuration of the drill becomes more complex the achievable hole size, under favourable conditions, can be as good as H8.

To offer a better insight, listed below are the product types and their achievable hole tolerances:

HSS General Purpose drills – H12

HSS / HSCo Parabolic Flute Deep Hole Drills (PFX) – H10

HSS / HSCo High performance TiN/ TiALN coated (ADX) – H9

Solid Carbide High Performance TiN / TiALN coated (CDX) – H8

NOMINAL HOLE DIAMETER (MM)

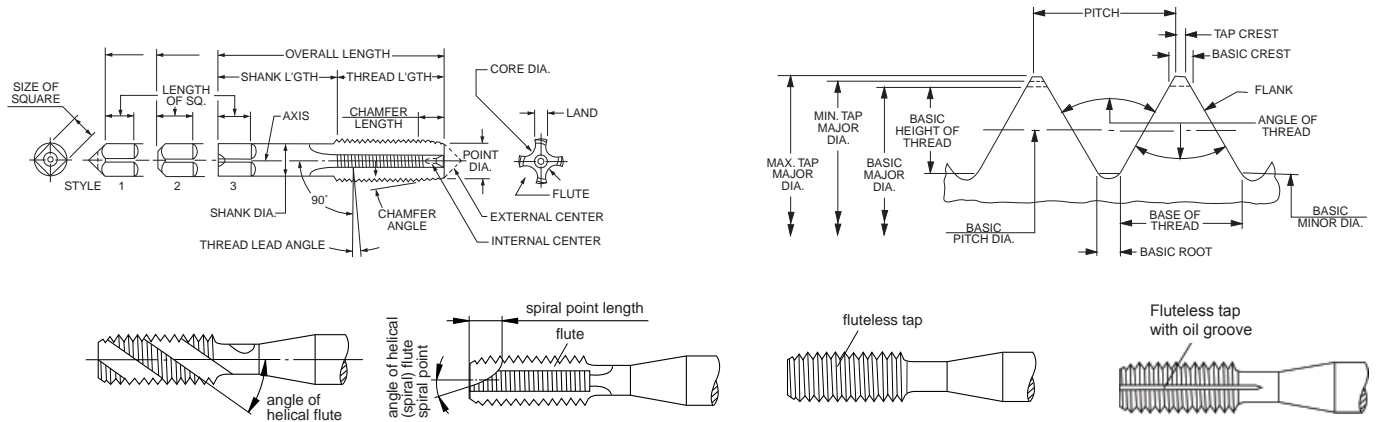
∅ (mm)	H8	H9	H10	H12
≤ 3	0 / +0.014	0 / +0.025	0 / +0.040	0 / +0.100
> 3 ≤ 6	0 / +0.018	0 / +0.030	0 / +0.048	0 / +0.120
> 6 ≤ 10	0 / +0.022	0 / +0.036	0 / +0.058	0 / +0.150
> 10 ≤ 18	0 / +0.027	0 / +0.043	0 / +0.070	0 / +0.180
> 18 ≤ 30	0 / +0.033	0 / +0.052	0 / +0.084	0 / +0.210

NOMINAL HOLE DIAMETER (INCHES)

∅ (inch)	H8	H9	H10	H12
≤ .1181	0 / +0.0006	0 / +0.0010	0 / +0.0016	0 / +0.0040
>.1181≤.2362	0 / +0.0007	0 / +0.0012	0 / +0.0019	0 / +0.0048
>.2362 ≤.3937	0 / +0.0009	0 / +0.0015	0 / +0.0023	0 / +0.0059
>.3937≤.7087	0 / +0.0011	0 / +0.0017	0 / +0.0028	0 / +0.0071
>.7087≤1.1811	0 / +0.0013	0 / +0.0021	0 / +0.0033	0 / +0.0083

In view of the ability of some drills to produce a much tighter hole tolerance, due consideration should be given to drilled holes which are subject to secondary operations, eg. tapping, reaming. The diameter of the drill will need to be increased from what is recommended to account for the fact that the hole size produced will be smaller.

TAP DEFINITIONS / NOMENCLATURE



Allowance: The minimum clearance or maximum interference which is intended between mating parts.

Angle of Thread: The angle included between the flanks of a thread measured in an axial plane.

Back Taper: A slight taper on the threaded portion of the tap making the pitch diameter near the shank smaller than that at the chamfer.

Basic: The theoretical or nominal standard size from which all variations are made.

Chamfer: The tapered and relieved cutting teeth at the front end of the threaded section. Common types of chamfer are taper, 8 to 10 pitches long, plug, 3 to 5 pitches and bottoming, 1 to 2 pitches.

Crest: The top surface joining the two sides or flanks of a thread.

Cutting Face: The leading side of the land.

Flute: The longitudinal channels formed on a tap to create cutting edges on the thread profile.

Heel: The following side of the land.

Height of Thread: In profile, distance between crest and bottom section of thread measured normal to the axis.

Hook Face: A concave cutting face of the land. This may be varied for different materials and conditions.

Interrupted Thread: Alternate teeth are removed in the thread helix on a tap; usually restricted to those having an odd number of flutes.

Land: One of the threaded sections between the flutes of a tap.

Lead of Thread: The distance a screw thread advances axially in one turn.

Major Diameter: The largest diameter of the screw or nut on a straight screw thread.

Minor Diameter: The smallest diameter of the screw or nut on a straight screw thread.

Neck: The reduced diameter, on some taps, between the threaded portion and the shank.

Pitch: The distance from a point on one thread to a corresponding point on the next thread, measured parallel to the axis.

Pitch Diameter: On a straight screw thread, the diameter of an imaginary cylinder where the width of the thread and the width of the space between threads is equal.

Point Diameter: The diameter at the leading end of the chamfered portion.

Radial: The straight face of a land, the plane of which passes through the axis of the tap.

Rake: The angle of the cutting face of the land in relation to an axial plane intersecting the cutting face at the major diameter.

Relief: The removal of metal behind the cutting edge to provide clearance between the part being threaded and a portion of the threaded land. Also, see back taper.

CHAMFER RELIEF: The gradual decrease in land height from cutting edge to heel on the chamfered portion of the tap land to provide radial clearance for the cutting edge.

CON-ECCENTRIC RELIEF: Radial relief in the thread form starting at the back of a concentric margin.

ECCENTRIC THREAD RELIEF: Radial relief in the thread form starting at the cutting edge and continuing to the heel.

Root: The bottom surface joining the flanks of two adjacent threads.

Side or flank of thread: The surface of the thread which connects the crest with the root.

Shank: The portion of the tap by which it is held and driven.

Spiral Point: An oblique cutting edge ground into the lands to provide a shear cutting action on the first few threads.

Square: The squared end of the tap shank.

Thread: The helical formed tooth of the tap which produces the thread in a tapped hole.

Thread Lead Angle: The angle made by the helix of the thread at the pitch diameter, with a plane perpendicular to the axis.

Threads Per Inch: The number of threads in one inch of length.





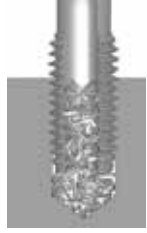

Thread:

SINGLE: A thread in which lead is equal to pitch.

DOUBLE: A thread in which lead is equal to twice the pitch.

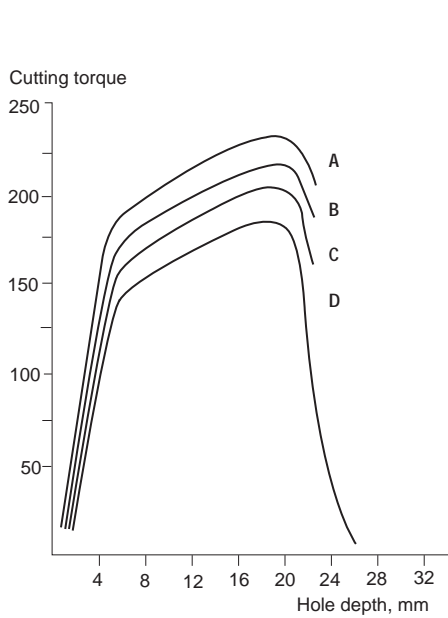
TRIPLE: A thread in which lead is equal to triple the pitch.

TAP GEOMETRIES & APPLICATIONS

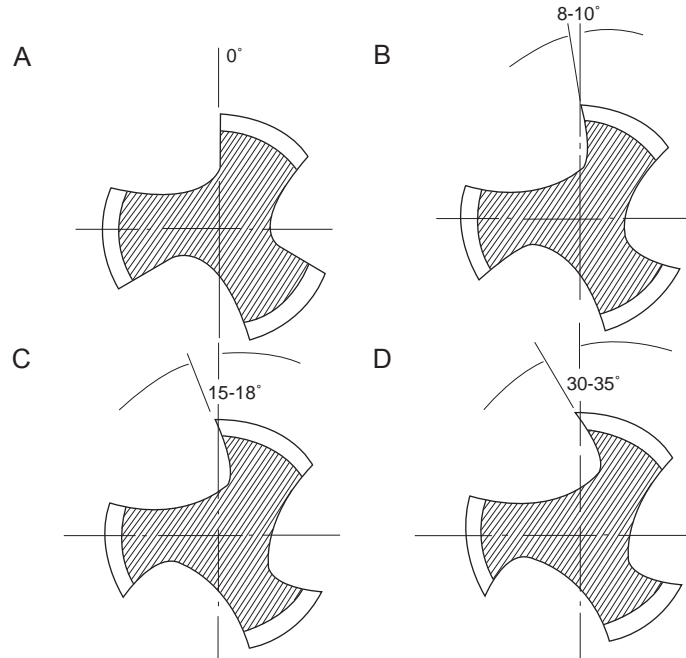
Description	Chips	Description	Chips
<p>Taps with straight flutes</p> <p>Straight flutes are the most commonly used type of tap. Suitable for use on most materials, mainly short chipping steel and cast iron, they form the basis of the program.</p>		<p>Taps with flutes only on the chamfer lead</p> <p>The cutting part of the tap is formed by gun nosing in the same manner as for a spiral point tap, the function being to drive the chips forward ahead of the cutting edges. This design is extremely rigid which facilitates good machining results. However, the short length of the gun nosing limits its application to a depth of hole less than about $1.5 \times \varnothing$.</p>	
<p>Taps with interrupted thread</p> <p>The interrupted thread ensures less friction and therefore less resistance, which is particularly important when threading material which is resilient and difficult to machine (e.g. aluminium, bronze). It is also easier for lubricant to penetrate to the cutting edges, thus helping to minimise the torque generated</p>		<p>Taps with spiral flutes</p> <p>Taps with spiral flutes are intended primarily for threading in blind holes. The helical flute transports the chips back away from the cutting edges and out of the hole, thus avoiding packing of chips in the flutes or at the bottom of the hole. In this way, danger of breaking the tap or damaging the thread is minimised.</p>	
<p>Spiral point taps</p> <p>The tap has a straight fairly shallow flute and is often referred to as a gun nose or spiral point tap. The gun nose or spiral point is designed to drive the chips forward. The relatively shallow flutes ensure that the sectional strength is maximised. They also act to allow lubricant to reach the cutting edges. This type of tap is recommended for threading through holes.</p>		<p>Cold forming taps</p> <p>Cold forming taps differ from cutting taps in that the thread is produced by plastic deformation of the component material rather than by the traditional cutting action. This means that no chips are produced by their action. The application range is materials with good formability. Tensile strength (R_m) should not exceed 1200 N/mm^2 and the elongation factor (A_5) should not be less than 10%.</p> <p>Cold forming taps without flutes are suitable for normal machining and are especially suitable when vertically tapping blind holes. They are also available with through coolant.</p>	
<p>Nut taps</p> <p>These taps are generally used to thread nuts but can be used also on deep through holes. They have a shank diameter smaller than the nominal and a longer overall length, because their function is to accumulate nuts.</p> <p>They are used on special machines designed to thread huge amounts of nuts. They can work in steel and stainless steel.</p> <p>The first serial tap has a very long chamfer, in order to spread the cutting load on almost two thirds of the thread length.</p>		<p>Through coolant taps</p> <p>The performance of taps with through coolant holes is higher than the same taps used with external lubrication. These kinds of taps allow better evacuation of the chip, which is transported away from the cutting area itself. Wear on the cutting edge is reduced, since the cooling effect on the cutting zone is higher than the heat generation.</p> <p>Lubrication can be oil, emulsion or air pressurised with oil mist. Working pressure not less than 15 bar is required, but good results can be obtained with minimal lubrication.</p>	

TAPPING TECHNICAL DATA

Rake Angles

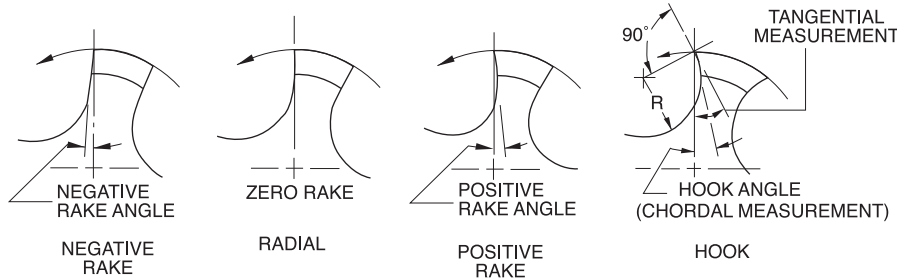


Threading tap M10 used with various rake angles in steel (low carbon steel)

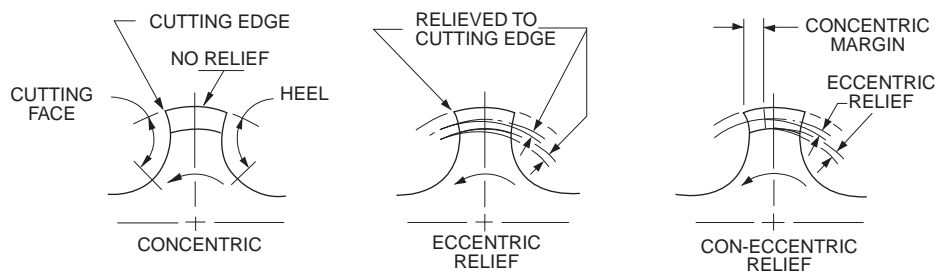


The rake angle has a primary influence on cutting forces and consequently the cutting torque and surface finish of the thread. Test results made with different rake angles are shown in the above diagram, illustrating how cutting torque

decreases with a larger rake angle. There is, however, a limit. A large rake angle means lower strength of the cutting edge.



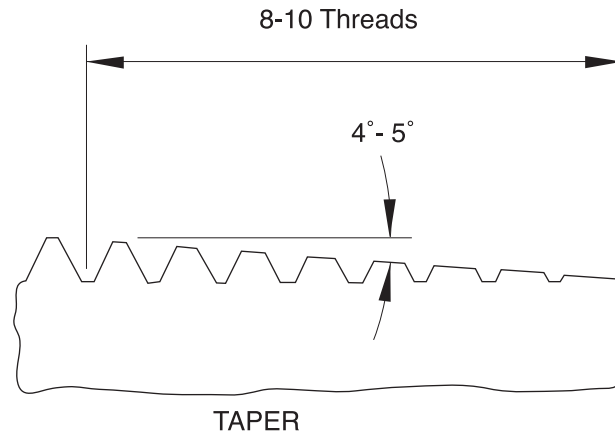
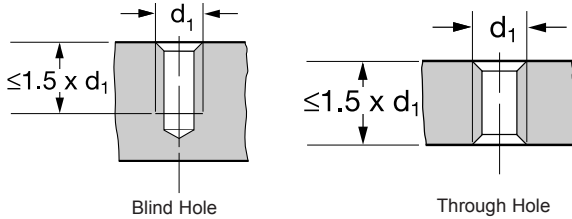
Relief Angles



CUTTING CHAMFERS

The cutting part of a tap is the teeth of the chamfer on the leading end of the tap. The rest of the thread length is the cylindrical guiding part, which is slightly back-tapered for clearance. A decision on the best type of chamfer form has to be carefully made as both the tap life and quality of thread are greatly affected.

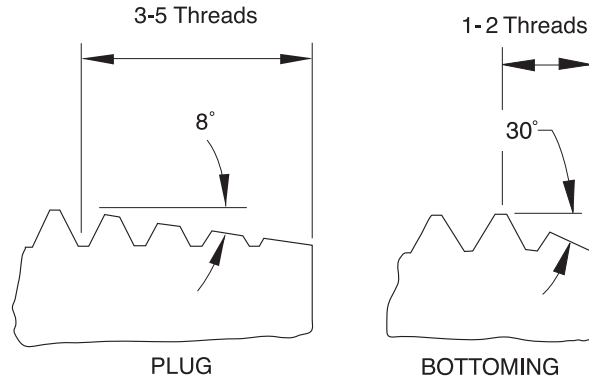
Generally, the form and length of chamfer depend on the type of hole to be tapped. Though holes do not normally cause difficulties whereas the tapping of blind holes can create certain problems associated with chip evacuation.



The length of the chamfer is determined by careful consideration of the following factors:

- The number of chamfer cutting teeth cannot be kept too low so as to avoid overloading, premature dulling and oversized or rough threads.
- A chamfer lead that is too long, however, increases the torque and the danger of breakage.

Commonly used chamfers are taper, plug and bottoming. Eight to ten cutting teeth per land are produced by a taper chamfer. A plug chamfer produces three to five cutting teeth per land and a bottoming chamfer one to two cutting teeth per land. The recommended radial relief behind the cutting edge of the chamfer portion is .004" to .005" relief per 1/16 of land width.



Tapping Speeds

Correct tapping speeds are very important in obtaining efficient tapping results. There are many factors which affect tapping speeds, some of which are listed below:

Material Factors:

- Thermo-conductivity of the material and wall thickness as it affects heat dispersion.
- Variations in carbon content of steel.
- Hard spots in material.
- Depth of hole to be tapped.
- Percentage of full thread to be tapped.

Tap Factors:

- Major diameters, pitch and lead.
- Style of tap.
- Width of lands.
- Amount of hook or rake.
- Length of chamfer. Bottoming taps normally require slower speeds than plug chamfered taps

Mechanical Factors:

- Type of tapping machine and holder; Speeds for small diameter taps are often governed by the limitation of the machine.
- Condition of tapping machine and spindle.
- Type of fixture.
- Vertical or horizontal tapping (faster speeds for vertical tapping).
- Method of feeding the tap.
- Cutting fluid used and method of application.

The optimum speed for tapping is the highest speed that conditions permit, consistent with economic tool life.

Proper tapping speeds are determined best by experiment. In the table below the speeds shown should be used as a guide only, and the suggested surface feet per minute adjusted upward or downward until the best results are obtained.

$$\text{RPM} = \frac{3.82 \times \text{SFM}}{D}$$

$$\text{SFM} = .26 \times \text{RPM} \times D$$

CHAMFER LENGTHS AND SERIAL TAPS

The first group (No. 1, No. 2, No. 3) includes taps with complete thread profile and the difference is in the chamfer length. The second group (No. 4, No. 5) includes taps with incomplete thread profile. They have lower pitch and outer diameter, compared to the complete standard, and longer chamfer. After using them, a finishing tap No. 3, must be used.

No. 1 =		6-8 x P	
No. 2 =		4-6 x P	
No. 3 =		2-3 x P	
No. 4 =		6-8 x P	
No. 5 =		3,5-5 x P	

ISO	Set code number	Including tap number
	No. 6	No. 1 + No. 2 + No. 3
	No. 7	No. 2 + No. 3
	No. 8	No. 4 + No. 5 + No. 3
DIN	Set code number	Including tap number
	No. 8	No.3 (form C) + No.4 (form A) + No.5 (form B)
ANSI	Set code number	Including tap number
	Hand Tap (No. 6)	Taper(No.1) + Plug(No.2) + Bottoming(No.3)

The Relationship Between H-Limit and Class of Fit

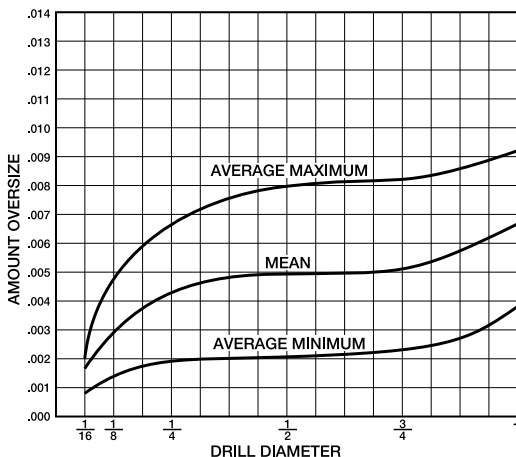
H-limits are used to properly size a tap for the threaded hole to be produced. They are selected based upon the tolerance required for the part. These tolerances are defined by the symbols class 1B, 2B, or 3B. Class 1B has the broadest tolerance and is generally applied to DIY (Do It Yourself) type nuts and bolts. Class 2B is the most common and is used for general fasteners and threaded parts. Class 3B is the tightest tolerance and used for close fit and high strength fastening applications, primarily in the automotive and aerospace industry.

Once the class of thread and part tolerance has been defined, an H-limit is selected to produce a thread that is within the minimum and maximum limits for that class of fit. These limits are the same as the Go and No Go thread plug gage dimensions. The goal is to select a tap with an H-limit that is near the middle of the part tolerance. For instance, if the total tolerance was .005", the tap should be approximately .0025" larger than the minimum limit of the part and .0025" smaller than the maximum. However, to handle the widest variety of tapping conditions, the "40% rule" is commonly used. Using this rule, the tap is placed at 40% of the part tolerance. For example, if the part tolerance is .005", multiplying .005" by 0.40 equals .002". Thus, the tap would be .002" larger than the minimum limit of the part or Go thread gage.

With the position of the tap in relationship to the part tolerance established, the selection of an H-limit number, such as H3, H4, H5, etc. is possible. H-limits are a sequence of size "steps" in .0005" increments beginning at the minimum size limit of the part, starting with H1. In other words, an H1 limit is one .0005" increment larger than the minimum limit of Go gage, an H2 is two .0005" increments (or .001) larger than the minimum limit, an H3 is three .0005" increments (or .0015") and so on. In the example above, a tap that is .002" larger than minimum limit, is four .0005" increments larger, or an H4. This would be the tap H-limit recommendation for this tolerance.

If after selecting the proper H-limit, an oversize or undersized thread exists, or if shrinkage due to heat treating or plating will occur, larger or smaller H-limits may be required to adjust to the condition.

Probable Oversize Values For Drilled Holes



Drills will normally cut a hole larger in diameter than the drill itself. The amount depends upon the rigidity of the equipment, stiffness of the drill, accuracy of the point, the material being drilled, and many other contributing factors. However, averaging all factors, the chart below shows what might be expected with standard drills without guide bushings in steel or cast iron using good drilling practices and reasonable care in the resharpening of the drills.

Drills as received from our factory will usually drill hole sizes between the minimum and mean lines. Reconditioned drills, however, may produce hole sizes between the minimum and maximum lines depending upon drill wear, margin pick-up, and accuracy of resharpening.

PROBABLE OVERSIZE DIAMETERS IN DRILLING

Drill Dia., Inch	Amount Oversize, Inch			Drill Dia., Inch	Amount Oversize, Inch		
	Average Max	Mean	Average Min.		Average Max	Mean	Average Min.
1/16	.002	.0015	.001	1/2	.008	.005	.002
1/8	.0045	.003	.001	3/4	.008	.005	.003
1/4	.0065	.004	.002	1	.004	.009	.007



Technical Section Threading



PITCH DIAMETER LIMITS

Fractional and Machine Screw

All standard Ground Thread Taps will be marked with the letter G to designate Ground Thread. The letter G will be followed by the letter H to designate above basic (L below basic) and a numeral to designate the pitch diameter limits.

Example: G H3 indicates a Ground Thread Tap with pitch diameter limits .0010 to .0015 over basic

Pitch diameter limits for Taps to 1" diameter inclusive:

- L1 = Basic to Basic minus .0005
- 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

Metric I.S.O

Where the tap pitch diameter is over or under basic thread pitch diameter by even multiples of .00052", the tap will be marked with the letter "D" or "DU" respectively, followed by a limit number. The limit number is determined as follows:

$$D \text{ Limit No.} = \frac{\text{Amt. Tap PD High Limit Is Over Basic PD}}{.00052"}$$

$$DU \text{ Limit No.} = \frac{\text{Amt. Tap PD Low Limit Is Under Basic PD}}{.00052"}$$

Examples:

M1.6 x .035 - for D3 limit, max. tap PD = basic plus .0015"
Tap PD tolerance = minus .0006"

Specials

Special taps are to be marked with the nominal diameter and number of threads per inch and form of thread as specified by the purchaser on his order or blue print provided such specifications are reasonably correct.

Special Ground Thread taps made to the pitch diameter limits shown will also be marked with the corresponding limit number.

When taps are specified to be a certain amount oversize or undersized, it is standard practice to add or subtract this amount from the basic pitch diameter of the nominal size tap. This dimension then becomes the new minimum pitch diameter for the special tap to which Standard Tolerance for the nominal size is added.

Pitch Diameter limits for Taps over 1" diameter to 1-1/2" diameter inclusive:

$$H4 = \text{Basic plus .0010 to Basic plus .0020}$$

Pitch Diameter limit numbers for taps not shown above or those over 1-1/2" diameter.

For taps with H or L limit numbers not shown above or over 1-1/2" diameter for example H12 or L10, the H or L limit number divided by 2 indicates in thousandths of an inch the amount the maximum tap pitch diameter is over basic in the H series or the amount the minimum tap pitch diameter is under basic on the L series.

M12 x 1.75-for D6 limit, max. tap PD = basic plus .0030"
Tap PD tolerance = minus .0012"

M39 x 4-for D10 limit, max. tap PD = basic plus .0050"
Tap PD tolerance = minus .0020"

M6 x 1-for DU 4 limit, min. tap PD = basic minus .0020"
Tap PD tolerance = plus .0010"

Metric taps will be marked with a capital M followed by the nominal size in millimeters and the pitch in millimeters separated by the sign "x." For example, M1.6 x 0.35; M6 x 1; M10 x 1.5.

Undersize or oversize taps will be marked with the nominal size and pitch, followed by the amount the minimum pitch diameter is over or under basic. For example, 1/2-13+.010".

Whenever possible, in the case of oversize, undersize, or other special taps, orders should specify the minimum and maximum tap pitch diameter desired.

Left hand taps will be marked "Left Hand" or "LH."

The limits and tolerances of external threads for unified screws are designated by the letter "A", which results in class 1A, class 2A, and class 3A screws. The nut (internal thread) limits and tolerances are designated by the letter "B" resulting in class 1B, class 2B, and class 3B.

Tolerances: The tolerance of the tapped hole in the unified series is always 1.3 times the tolerance of the screw for the same class of fit. In the American National Standard, pitch diameter tolerances on both the nut and the screw were equal with the nut above basic and the screw below basic.

Class 1A and 1B: This class of fit is intended to cover the manufacture of threaded parts where quick and easy assembly is necessary or desired and an allowance is provided to permit ready assembly.

Class 2A and 2B: This class of fit is intended to cover screws, bolts and nuts, but it is also suitable for a variety of other applications. An allowance is provided to minimize galling and seizure in assembling and use. It will also accommodate limited amount of plating, coating or finish.

Class 3A and 3B: This class of fit is provided for those applications where closeness of fit, accuracy of lead and angle of thread is important. No allowance is provided and these threads are obtained consistently only by use of high quality production equipment and checked by a very efficient system of gaging and inspection.

Unified and American standard threads have substantially the same thread form. Threads of both standards are mechanically interchangeable. The main difference between the two standards are: Variation of tolerance with size, differences in amounts of pitch diameter tolerance for external and internal threads, and differences in thread designations.

Caution: Select the proper percent of thread for the material to be tapped.

Remember: As the drilled hole becomes smaller the amount of chips to be removed becomes so great that the friction generated may require as much power as does the actual cutting.

TABLE OVER TAP TOLERANCE VS TOLERANCE ON INTERNAL THREAD (NUT)

Tolerance class, Tap			Tolerance, Internal thread (Nut)					Application
ISO	DIN	ANSI BS						
ISO 1	4 H	3 B	4 H	5 H				Fit without allowance
ISO 2	6 H	2 B	4 G	5 G	6 H			Normal fit
ISO 3	6 G	1 B			6 G	7 H	8 H	Fit with large allowance
-	7 G	-				7 G	8 G	Loose fit for following treatment or coating

Thread tolerances for taps are collected in standard reference DIN 13.

Normal tolerance is ISO 2 (6H) on taps, which generates an average quality fit between screw and nut. Lower tolerance (ISO 1) generates a fine fit without a gap on the flanks between screw and nut. Higher tolerance (ISO 3) generates a rough fit, with large gap. It is used in the case of a nut which will later be coated or if a loose fit is preferred.

Between tolerances 6H (ISO2) and 6G (ISO3), as well as between 6G and 7G, the tap manufacturer produces taps with tolerance 6HX and 6GX. "X" means the tolerance is outside standard and it is used for taps working high strength material or abrasive material such as cast iron. These materials do not cause oversize problems, so higher tolerance can be used in order to increase tool life. The width of the tolerance is equal between, for example, 6H and 6HX.

Forming taps are usually produced with a 6HX or 6GX tolerance.

The tolerance icon for BSW and BSF is medium. This refers to BS 84 "medium fit".

Pipe threads with the tolerance icon "Normal" refer to the following standards:

- G threads to ISO 228-1. One class for internal thread (tap), and class A and B for external thread (die).
- R, Rc and R threads to ISO 7-1.
- NPT and NPSM to ANSI B1.20.1.
- NPTF and NPSF to ANSI B1.20.3.
- PG to DIN 40 430.

SELF-LOCKING THREAD FORM

Concept

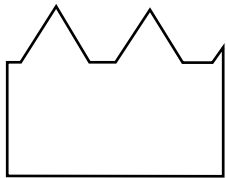
Designed to produce threads for self-locking operations and put a lock on fastener costs.

This is not to be confused as just another range of taps for a specific application. It is a thread form. Utilizing the latest generation CNC equipment this thread form can be produced on straight flute, spiral flute, spiral point, roll form and even the range of Applix high performance taps.

Although this is a made-to-order program, quantities of up to 48 pieces of any style would be delivered in no greater than 10 working days.

The relatively small quantities being produced and the additional thread grinding required does mean that taps featuring this thread form can be marginally more expensive than conventionally ground taps. Depending on the size, quantity, and/or the type of tool being compared, the additional cost will vary. However, before making a pure price decision we recommend a review of the added benefits of the concepts featured in this catalog and how they help in offsetting costs in other areas.

Self-Locking Threads and How They Work



Standard Thread Form



Self-Locking Thread Form

Taps ground to the adjacent self-locking thread form produce a highly efficient female thread form with a 30° inclined wedge that provides optimum locking contact with the crests of the male threads of a standard bolt or screw. The thread form produced is ideal for a wide variety of applications where vibration resistance is a must. Clamping forces are evenly distributed along the entire length of thread engagement providing a capability to resist the forces created by vibration that can loosen ordinary threaded fasteners. The end result is a standard male fastener locked firmly in place without having to resort to the use of costly adhesives, locking devices or inserts.

On the smaller diameters, <8-32 but including 8-36, because of their size, the taps are ground with a modified ramp form.



Key Features and Benefits

Improves Holding Power

A 30° wedge lock on the female thread creates a continuous spiral contact along the entire thread length for improved holding power versus standard thread forms.

Clamp Load More Evenly Distributed

Clamp load forces are spread evenly across all threads versus conventional 60° thread forms that

put the clamping force on the first few threads only with the other threads receiving limited or no contact at all.

Reduces Fastener Costs

Utilizing this thread form converts standard male fasteners into highly efficient self-locking ones and may eliminate the necessity for costly locking fasteners, chemical bonds, nylon plugs or other devices to maintain tightness.

Faster Assembly Operations

The larger tap drill size creates greater clearance with the male fastener than conventionally produced threads. In assembling fasteners produced with this thread form it is clearly noticeable that the fasteners turn more freely irrespective of whether by hand or utilizing assembly machinery. Assembly costs are lower and assembly related rejects are additionally reduced.

Holding Power that Lasts and Lasts

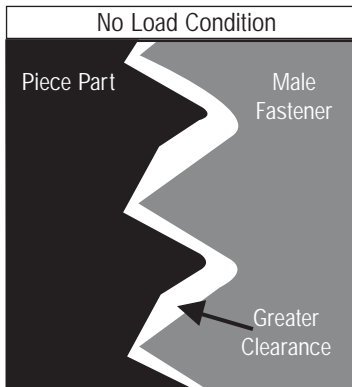
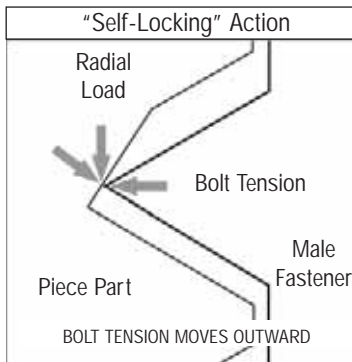
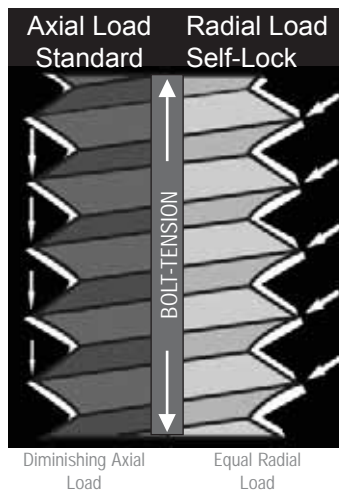
There is no loss of locking power in those applications requiring frequent loosening and tightening of the male fastener. This eliminates time intensive disassembly and assembly procedures. Conventional locking fasteners would be either destroyed or their locking power severely diminished.

Threading Solution for Soft Materials

The optimum load distribution provided by this thread form eliminates thread stripping that is typical with thread forms that concentrate clamping load on fewer threads. Ideal for aluminum and other lightweight, soft materials in applications where stripping is frequent.

Environmentally Friendly

Because the threads produced permit the male fastener to be locked in place by simply tightening, there is no necessity for bonding materials or chemical agents which eliminates the need for using potentially environmentally harmful products plus saving valuable time and cost.



SELF-LOCKING THREAD FORM

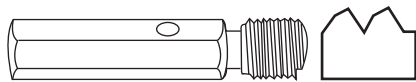
Gaging for Self-Locking Threads

How to Order

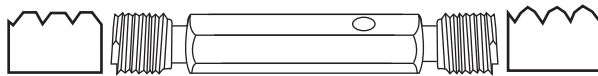
An essential element in high quality thread production is an accurate gaging capability. To facilitate the latter Precision offers a complete gaging system for self-locking threads, which consists of the following:

LARGER DIAMETERS

Go-Pitch Diameter and Ramp Gage



Hi-Pitch Diameter and Ramp Gage



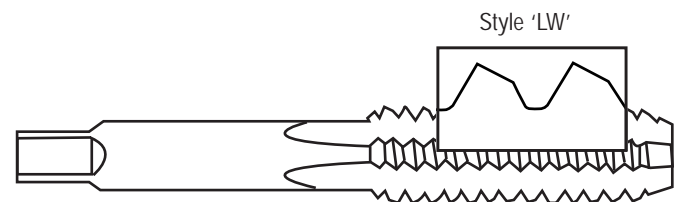
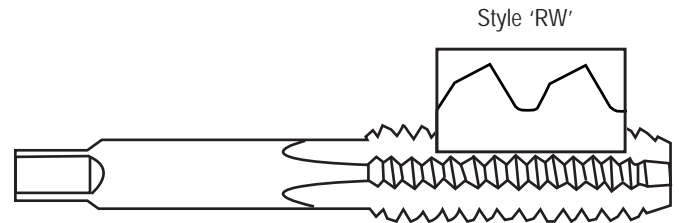
SMALLER DIAMETERS

Go-Pitch Diameter and Ramp Gage Hi-Limit Gage



Precision certifies all new gages for self-locking threads to insure their functional accuracy. A certificate of compliance can be provided for a nominal charge. It is highly recommended that they be returned on a periodic basis for recertification.

When placing your inquiry for a self-locking tap, simply advise the type of gage(s) you require and one consistent with whatever size is ordered will be quoted and supplied.



Unless otherwise specified, the taps will be provided featuring a ramp angle in the direction detailed and referred to as style "RW."

When tapping is to be effected from the opposite end of a through hole, the style "LW" must be special ordered. This style features the ramp angle in the opposite direction as detailed, and is generally used in the production of nuts.

There is no requirement to specify an H or D limit. Basically, one size fits all because contact is not made on the thread flanks but on the wedge ramp.

To place an order call or fax Customer Service at:
TEL: 1-800-877-3745 • FAX: 1-815-459-2804

Simply identify the following:

- The List No. or description of the standard tap.
- The size, number of flutes and chamfer requirements.
- The ramp style (RW or LW).

Should a gage be required, simply indicate the type when placing the order.



Technical Section

Threading



TAP DRILL SIZES FOR UNIVERSAL AND M-PROFILE SCREW THREADS

Tap Size	Tap Drill Size	Decimal Equiv. of Tap Drill (inches)	Theoretical Percent of Thread	Probable Mean Oversize (inches)	Probable Hole Size (inches)	Probable % of Thread (inches)	Tap Size	Tap Drill Size	Decimal Equiv. of Tap Drill (inches)	Theoretical Percent of Thread	Probable Mean Oversize (inches)	Probable Hole Size (inches)	Probable % of Thread (inches)
0-80	.56	.0465	83	.0015	.0480	74	8-36	.29	.1360	78	.0029	.1389	70
—	3/64	.0469	81	.0015	.0484	71	—	3.5mm	.1378	72	.0029	.1407	65
—	1.20mm	.0472	79	.0015	.0487	69	10-24	.27	.1440	85	.0032	.1472	79
—	1.25mm	.0492	67	.0015	.0507	57	—	3.70mm	.1457	82	.0032	.1489	76
1-64	.54	.0550	89	.0015	.0565	81	—	.26	.1470	79	.0032	.1502	74
—	1.45mm	.0571	78	.0015	.0586	71	—	.25	.1495	75	.0032	.1527	69
—	.53	.0595	67	.0015	.0610	59	—	.24	.1520	70	.0032	.1552	64
1-72	1.5mm	.0591	77	.0015	.0606	68	10-32	5/32	.1563	83	.0032	.1595	75
—	.53	.0595	75	.0015	.0610	67	—	.22	.1570	81	.0032	.1602	73
—	1.55mm	.0610	67	.0015	.0606	68	—	.21	.1590	76	.0032	.1622	68
2-56	.51	.0670	82	.0017	.0687	74	12-24	11/64	.1719	82	.0035	.1754	75
—	1.75mm	.0689	73	.0017	.0706	66	—	.17	.1730	79	.0035	.1765	73
—	.50	.0700	69	.0017	.0717	62	—	.16	.1770	72	.0035	.1805	66
—	1.80mm	.0709	65	.0017	.0726	58	12-28	.16	.1770	84	.0035	.1805	77
2-64	.50	.0700	79	.0017	.0717	70	—	.15	.1800	78	.0035	.1835	70
—	1.80mm	.0709	74	.0017	.0726	66	—	4.60mm	.1811	75	.0035	.1846	67
3-48	.49	.0730	64	.0017	.0747	56	—	.14	.1820	73	.0035	.1855	66
—	48	.0760	85	.0019	.0779	78	1/4-20	.09	.1960	83	.0038	.1998	77
—	5/64	.0781	77	.0019	.0800	70	—	.08	.1990	79	.0038	.2028	73
—	.47	.0785	76	.0019	.0804	69	—	.07	.2010	75	.0038	.2048	70
—	2.00mm	.0787	75	.0019	.0806	68	—	13/64	.2031	72	.0038	.2069	66
—	.46	.0810	67	.0019	.0829	60	1/4-28	5.40mm	.2126	81	.0038	.2164	72
—	45	.0820	63	.0019	.0839	56	—	.03	.2130	80	.0038	.2168	72
3-56	.46	.0810	78	.0019	.0829	69	5/16-18	F	.2570	77	.0038	.2608	72
—	.45	.0820	73	.0019	.0839	65	—	6.60mm	.2598	73	.0038	.2636	68
—	2.10mm	.0827	70	.0019	.0846	62	—	G	.2610	71	.0041	.2651	66
—	2.15mm	.0846	62	.0019	.0865	54	5/16-24	H	.2660	86	.0041	.2701	78
4-40	.44	.0860	80	.0020	.0880	74	—	I	.2720	75	.0041	.2761	67
—	2.20mm	.0866	78	.0020	.0886	72	3/8-16	7.80mm	.3071	84	.0044	.3115	78
—	.43	.0890	71	.0020	.0910	65	—	7.90mm	.3110	79	.0044	.3154	73
—	2.30mm	.0906	66	.0020	.0926	60	—	5/16	.3125	77	.0044	.3169	72
4-48	2.35mm	.0925	72	.0020	.0926	72	3/8-24	O	.3160	73	.0044	.3204	68
—	.42	.0935	68	.0020	.0955	61	—	21/64	.3281	87	.0044	.3325	79
—	3/32	.0938	68	.0020	.0958	60	—	8.40mm	.3307	82	.0044	.3351	74
—	2.40mm	.0945	65	.0020	.0965	57	—	Q	.3320	79	.0044	.3364	71
5-40	.40	.0980	83	.0023	.1003	76	—	8.50mm	.3346	75	.0044	.3390	67
—	.39	.0995	79	.0023	.1018	71	7/16-14	T	.3580	86	.0046	.3626	81
—	.38	.1015	72	.0023	.1038	65	—	23/64	.3594	84	.0046	.3640	79
—	2.60mm	.1024	70	.0023	.1047	63	—	9.20mm	.3622	81	.0046	.3668	76
5-44	.38	.1015	79	.0023	.1038	72	—	.3661	.3661	77	.0046	.3707	72
—	2.60mm	.1024	77	.0023	.1047	69	—	9.30mm	.3680	75	.0046	.3726	70
—	.37	.1040	71	.0023	.1063	63	—	U	.3701	73	.0046	.3747	68
6-32	.37	.1040	84	.0023	.1063	78	7/16-20	W	.3860	79	.0046	.3906	72
—	.36	.1065	78	.0023	.1088	72	—	25/64	.3906	72	.0046	.3952	65
—	7/64	.1094	70	.0026	.1120	64	1/2-13	10.50mm	.4134	87	.0047	.4181	82
—	.35	.1100	69	.0026	.1126	63	—	27/64	.4219	78	.0047	.4266	73
—	34	.1100	67	.0026	.1136	60	1/2-20	29/64	.4531	72	.0047	.4578	65
—	34	.1110	83	.0026	.1136	75							
6-40	.33	.1130	77	.0026	.1156	69							
—	2.90mm	.1142	73	.0026	.1168	65							
—	.32	.1160	68	.0026	.1186	60							
8-32	3.40mm	.1339	74	.0029	.1368	67							
—	.29	.1360	69	.0029	.1389	62							

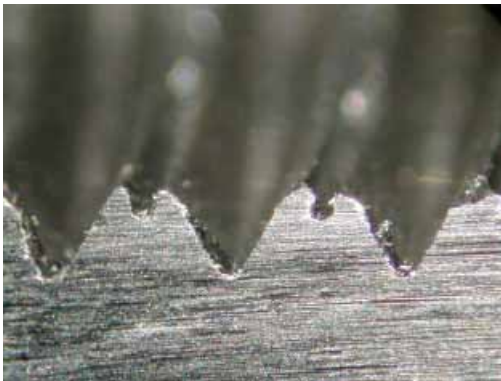
TAP DRILL SIZES FOR METRIC M-PROFILE SCREW THREADS

Metric of Tap	Tap Drill	Decimal Equiv. of Tap Drill	Theoretical Percent of Thread	Probable Mean Oversize	Probable Hole Size	Probable Percent Thread	Metric of Tap	Tap Drill	Decimal Equiv. of Tap Drill	Theoretical Percent of Thread	Probable Mean Oversize	Probable Hole Size	Probable Percent Thread
M1.6 x 0.35	1.20mm	.0472	88	.0014	.0486	80	M5 x 0.8	4.2mm	.1654	77	.0032	.1686	69
—	1.25mm	.0492	77	.0014	.0506	69	—	.19	.1660	75	.0032	.1692	68
M2 x 0.4	1/16	.0625	79	.0015	.0640	72	M6 x 1	10	.1935	84	.0038	.1973	76
—	1.60mm	.0630	77	.0017	.0647	69	—	9	.1960	79	.0038	.1998	71
—	.52	.0635	74	.0017	.0652	66	—	5mm	.1969	77	.0038	.2006	70
M2.5 x 0.45	2.05mm	.0807	77	.0019	.0826	69	—	.8	.1990	73	.0038	.2028	65
—	.46	.0810	76	.0019	.0829	67	M7 x 1	A	.2340	81	.0038	.2378	74
—	.45	.0820	71	.0019	.0839	63	—	6mm	.2362	77	.0038	.2400	70
M3 x 0.5	.40	.0980	79	.0023	.1003	70	—	B	.2380	74	.0038	.2418	66
—	2.5mm	.0984	77	.0023	.1007	68	M8 x 1.25	6.7mm	.2638	80	.0041	.2679	74
—	.39	.0995	73	.0023	.1018	64	—	17/64	.2656	77	.0041	.2697	71
M3.5 x 0.6	.33	.1130	81	.0026	.1156	72	—	H	.2660	77	.0041	.2701	70
—	2.9mm	.1142	77	.0026	.1168	68	M10 x 1.5	6.8mm	.2677	74	.0041	.2718	68
—	.32	.1160	71	.0026	.1186	63	—	8.4mm	.3307	82	.0044	.3364	.3351
M4 x 0.7	3.2mm	.1260	88	.0029	.1289	80	—	Q	.3320	80	.0044	.3364	75
—	.30	.1285	81	.0029	.1314	73	—	8.5mm	.3346	77	.0044	.3390	71
—	3.3mm	.1299	77	.0029	.1328	69	M12 x 1.5	10.4mm	.4094	81	.0047	.4141	.4141
M4.5 x 0.75	3.7mm	.1457	82	.0032	.1489	74	—	Z	.4130	77	.0047	.4177	71
—	.26	.1470	79	.0032	.1502	70	M12 x 1.75	10.20mm	.4016	79	.0047	.4047	.4063
—	.25	.1495	72	.0032	.1527	64	—	Y	.4040	76	.0047	.4087	71

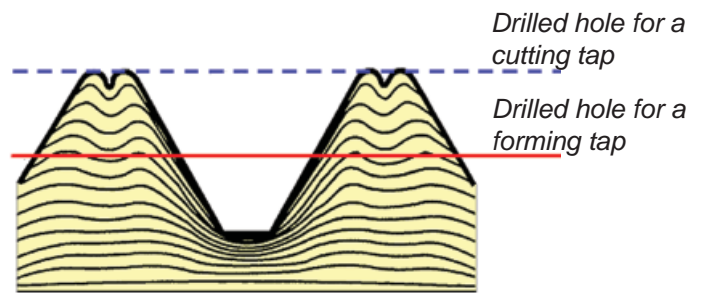
Note: “Probable Hole Size” columns listed above apply to HSS/HSCo Drills ONLY. When using Solid Carbide Drills as Tap-Drills you must ADD the average Oversize amount per diameter to the size listed in these “Probable Hole Size” columns.

FLOW OF MATERIAL WHEN FORMING A THREAD

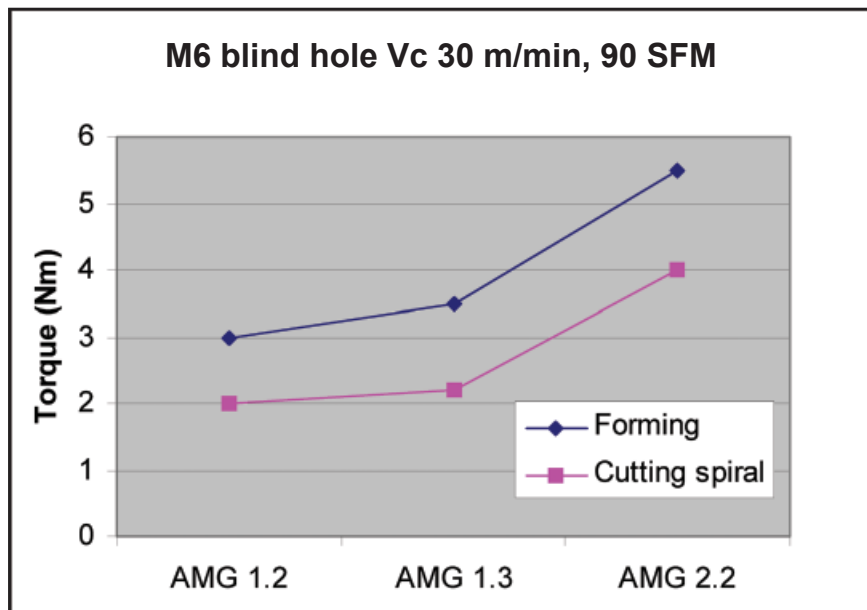
The tapping hole size depends upon the material being drilled, the cutting conditions selected and the condition of the equipment being used. If material is pushed up at the thread entry by the tap and/or the life of the tap is too short, select a slightly larger drill diameter. If on the other hand the profile of the thread formed is insufficient, then select a slightly smaller drill diameter.



Section of thread obtained by forming tap on steel C45



Cold forming taps require more power on the spindle, compared to a cutting tap of the same size, since it generates higher torque.



Torque comparison between forming and cutting taps in different material groups.

Note: Recommended thread percentage for various (Inch standard) tap sizes is shown in the “60% Thread” columns below. This is also the average percentage that is desirable for metric sizes. Use the “Probable Percent of Thread” column in the “Metric Sizes” tables below.

TAP DRILL SIZES FOR FORMING TAPS

Machine Screw Sizes

Tap Size	75% Thread		70% Thread		65% Thread		60% Thread		55% Thread		50% Thread	
	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size
0-80	0.0536	1.35mm	0.0540	1.35mm	0.0545	—	0.0549	54	0.0554	54	0.0558	1.0mm
1-64	0.0650	1.65mm	0.0655	1.65mm	0.0661	—	0.0666	—	0.0672	51	0.0677	51
1-72	0.0659	1.65mm	0.0663	—	0.0669	1.7mm	0.0673	51	0.0679	51	0.0683	—
2-56	0.0769	1.95mm	0.0774	1.95mm	0.0781	23498	0.0787	47	0.0794	2.0mm	0.0799	—
2-64	0.0780	5/64	0.0785	47	0.0791	2.0mm	0.0796	2.0mm	0.0802	—	0.0807	2.05mm
3-48	0.0884	2.25mm	0.0890	43	0.0898	43	0.0905	2.3mm	0.0913	2.3mm	0.0919	—
3-56	0.0899	43	0.0904	—	0.0911	2.3mm	0.0917	2.3mm	0.0924	2.35mm	0.0929	2.35mm
4-40	0.0993	2.5mm	0.1000	39	0.1010	39	0.1018	38	0.1028	2.6mm	0.1035	2.6mm
4-48	0.1014	38	0.1020	38	0.1028	2.6mm	0.1035	2.6mm	0.1043	37	0.1049	37
5-40	0.1123	34	0.1130	33	0.1140	33	0.1148	2.9mm	0.1158	32	0.1165	32
5-44	0.1134	33	0.1141	2.9mm	0.1150	2.9mm	0.1157	—	0.1166	32	0.1173	32
6-32	0.1221	3.1mm	0.1230	3.1mm	0.1243	—	0.1252	40916	0.1264	3.2mm	0.1274	—
6-40	0.1253	1/8	0.1260	3.2mm	0.1270	3.2mm	0.1278	3.25mm	0.1288	30	0.1295	30
8-32	0.1481	3.75mm	0.1490	—	0.1503	25	0.1512	3.8mm	0.1524	24	0.1534	3.9mm
8-36	0.1498	25	0.1507	3.8mm	0.1518	24	0.1526	24	0.1537	3.9mm	0.1546	23
10-24	0.1688	—	0.1700	18	0.1717	23682	0.1729	23682	0.1746	—	0.1758	—
10-32	0.1741	17	0.1750	—	0.1763	—	0.1772	16	0.1784	4.5mm	0.1794	—
12-24	0.1948	10	0.1960	9	0.1977	5.0mm	0.1989	8	0.2006	5.1mm	0.2018	7
12-28	0.1978	5.0mm	0.1989	8	0.2003	8	0.2014	7	0.2028	—	0.2039	13/64

Fractional Sizes

Tap Size	75% Thread		70% Thread		65% Thread		60% Thread		55% Thread		50% Thread	
	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size	Theor. Hole Size	Nearest Drill Size
1/4-20	.2245	5.7mm	.2260	—	.2280	1	.2295	1	.2315	—	.2330	5.9mm
1/4-28	.2318	—	.2329	5.9mm	.2343	A	.2354	15/64	.2368	6.0mm	.2379	B
5/16-18	0.2842	7.2mm	.2861	7.25mm	.2879	7.3mm	.2898	L	.2917	7.4mm	.2936	—
5/16-24	0.2912	7.4mm	.2927	—	.2941	M	.2955	7.5mm	.2969	19/64	.2983	7.6mm
3/8-16	.3431	11/32	.3452	8.75mm	.3474	S	.3495	8.9mm	.3516	—	.3537	9.0mm
3/8-24	.3537	9.0mm	.3552	9.0mm	.3566	—	.3580	T	.3594	23/64	.3608	—
7/16-14	.4011	—	.4035	Y	.4059	13/32	.4084	—	.4108	—	.4132	Z
7/16-20	0.4120	Z	.4137	10.5mm	.4154	—	.4171	—	.4188	—	.4205	—
1/2-13	.4608	—	.4634	—	.4660	—	.4686	15/32	.4712	12mm	.4738	12mm
1/2-20	.4745	—	.4762	—	.4779	—	.4796	—	.4813	—	.4830	31/64

Metric Sizes

Metric Tap Size	Tap Drill Size	Decimal Equiv. of Tap Drill (inches)	Theoretical Percentage of thread %	Probable Mean Oversize (inches)	Probable Hole Size (inches)	Probable Percent of Thread %	Metric Tap Size	Tap Drill Size	Decimal Equiv. of Tap Drill (inches)	Theoretical Percentage of thread %	Probable Mean Oversize (inches)	Probable Hole Size (inches)	Probable Percent of Thread %
M3 x 0.5	36	0.1065	86	.0026	.1091	67	M8 x 1.25	7.4mm	0.2910	71	.0042	.2952	59
—	2.7mm	0.1062	88	.0026	.1088	70	—	L	0.2900	75	.0042	.2942	62
M4 x 0.7	27	0.1440	72	.0032	.1472	54	—	7.3mm	.2874	82	.0042	.2916	70
—	3.6mm	.1417	84	.0032	.1449	67	M10 x 1.5	U	0.3680	64	.0046	.3726	53
—	9/64	.1406	90	.0032	.1438	73	—	9.3mm	0.3660	69	.0046	.3706	58
M5 x 0.8	14	0.1820	69	.0035	.1855	53	—	9.2mm	0.3620	78	.0046	.3666	67
—	4.6mm	.1811	74	.0035	.1846	57	—	23/64	.3594	85	.0046	.3640	74
—	15	.1800	79	.0035	.1835	62	M12 x 1.5	11.3mm	.4449	70	.0047	.4496	57
—	16	0.1770	92	.0035	.1805	76	—	7/16	.4375	86	.0047	.4422	75
M6 x 1	7/32	.2188	65	.0038	.2226	51	M12 x 1.75	7/16	.4375	75	.0047	.4422	65
—	5.4mm	.2126	88	.0038	.2164	74	—	11mm	.4331	84	.0047	.4378	73

*Probable percent of full thread produced in tapped hole using standard drill sizes.

TAP PROJECTION AND HOLE SIZE FOR PIPE TAPS

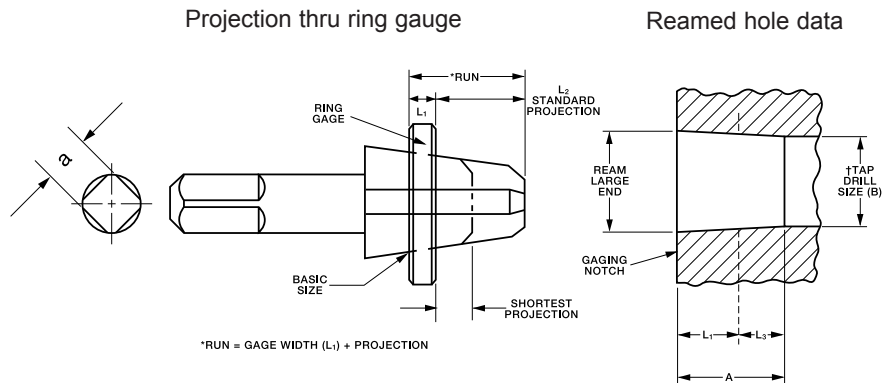
Nominal Size	Tap Thread Limits				Projection				Ream Dia. Large End	Gage Width			Tap Drill Size B	Tap Drill Size BB
	L_2	L_2 Tolerance	Taper Per Ft. Limits		NPT & NPTF		SAE - Short			L_1	L_3	A		
1/16 - 27	0.3120	±1/16	23/32	25/32	.250	0.3750	.222	.259	.2515	0.1600	.1111	.2711	15/64	C
1/8 - 27	0.3120	±1/16	23/32	25/32	.250	.375	.222	.259	.3440	0.1615	.1111	.2726	21/64	Q
1/4 - 18	0.4590	±1/16	23/32	25/32	.397	0.5210	.333	.389	.4472	0.2278	.1667	.3945	27/64	7/16
3/8 - 18	0.4540	±1/16	23/32	25/32	.392	.516	.333	0.3890	.5826	0.2400	.1667	.4067	9/16	9/16
1/2 - 14	0.5790	±1/16	23/32	25/32	.517	.641	.429	0.5000	.7213	0.3200	.2143	.5343	11/16	45/64
3/4 - 14	0.5650	±1/16	23/32	25/32	.503	0.6270	.429	.500	.9317	0.3390	.2143	.5533	57/64	29/32
1 - 11-1/2	0.6780	±3/32	23/32	25/32	.584	.772	—	—	1.1691	0.4000	.2609	.6609	1-1/8	1-9/64
1-1/4 - 11-1/2	0.6860	±3/32	23/32	25/32	.592	0.7800	—	—	1.5138	0.4200	.2609	.6809	1-15/32	1-31/64
1-1/2 - 11-1/2	0.6990	±3/32	23/32	25/32	.606	0.7920	—	—	1.7528	0.4200	.2609	.6809	1-45/64	1-23/32
2 - 11-1/2	0.6670	±3/32	23/32	25/32	.574	.760	—	—	2.2267	0.4360	.2609	.6909	2-11/64	2-3/16

TOLERANCES

Ground Thread = A maximum lead deviation of plus or minus .0005" within any two threads no further apart than 1" is permitted.

Threads per inch	Angle Tolerance
	Half Angle
8	Ground Thread
	25' Plus or Minus
11-1/2 to 27 inclusive	30' Plus or minus

*Distance small end of tap projects through L_1 Taper Thread Ring Gage.
 **Recommended sizes given permit direct tapping without reaming the hole, but only give a full thread for approx. L_1 distance.
 ***TAP DRILL SIZE (B) is size for use with a taper reamer. The tap drill size for use without a taper reamer is shown in column BB



RECOMMENDED MINOR DIAMETERS AND TAP DRILLS FOR STI SPIRAL POINT AND HAND TAPS

Nominal Diameter	T.R.I.		Aluminum				Plastic - Steel - Magnesium			
	UNC	UNF	Diameter of Tapped Holes		Recommended Minor/ Drill Size		Diameter of Tapped Holes		Recommended Minor/ Drill Size	
			Min.	Max.	Tap Drill Size	Dec Eq.	Min.	Max.	Tap Drill Size	Dec. Eq
4	40	—	.1160	.1210	31	.1200	.1190	.1240	31	.1200
6	32	—	.1440	.1500	26	.1470	.1480	.1540	25	.1495
8	32	—	.1700	.1760	17	.1730	.1740	.1800	16	.1770
10	24	—	.1990	.2050	13/64	.2031	.2030	.2090	5	.2055
10	—	32	.1960	.2020	7	.2010	.2000	.2060	13/64	.2031
1/4	20	—	.2610	.2670	H	.2660	.2650	.2710	H	.2660
1/4	—	28	.2570	.2640	G	.2610	.2610	.2680	6.7MM	.2638
5/16	18	—	.3280	.3340	Q	.3320	.3310	.3370	Q	.3320
5/16	—	24	.3230	.3300	21/64	.3281	.3270	.3340	21/64	.3281
3/8	16	—	.3900	.3980	X	.3970	.3960	.4020	X	.3970
3/8	—	24	.3850	.3920	25/64	.3906	.3890	.3960	25/64	.3906
7/16	14	—	.4530	.4630	29/64	.4531	.4610	.4710	29/64	.4531
7/16	—	20	.4500	.4580	29/64	.4531	.4530	.4610	29/64	.4531
1/2	13	—	.5150	.5250	33/64	.5156	.5230	.5330	17/64	.5312
1/2	—	20	.5130	.5220	33/64	.5156	.5150	.5240	17/64	.5312



Technical Section

Threading



TAP SIZE RECOMMENDATIONS FOR CLASSES 2B AND 3B

Machine Screw Sizes

Size	Threads Per Inch		Recommended Tap For Class of Thread		Pitch Diameter Limits For Class of Thread		
	NC	NF	Class 2B	Class 3B	Min. All Classes (Basic)	Max Class 2B	Max Class 3B
0	—	80	H2	H1	.0519	.0542	.0536
1	64	—	H2	H1	.0629	.0655	.0648
1	—	72	H2	H1	.0640	.0665	.0659
2	56	—	H2	H1	.0744	.0772	.0765
2	—	64	H2	H1	.0759	.0786	.0779
3	48	—	H2	H1	.0855	.0885	.0877
3	—	56	H2	H1	.0874	.0902	.0895
4	40	—	H2	H2	.0958	.0991	.0982
4	—	48	H2	H1	.0985	.1016	.1008
5	40	—	H2	H2	.1088	.1121	.1113
5	—	44	H2	H1	.1102	.1134	.1126
6	32	—	H3	H2	.1177	.1214	.1204
6	—	40	H2	H2	.1218	.1252	.1243
8	32	—	H3	H2	.1437	.1475	.1465
8	—	36	H2	H2	.1460	.1496	.1487
10	24	—	H3	H3	.1629	.1672	.1661
10	—	32	H3	H2	.1697	.1736	.1726
12	24	—	H3	H3	.1889	.1933	.1922
12	—	28	H3	H3	.1928	.1970	.1959

Fractional Sizes

Size	Threads Per Inch		Recommended Tap For Class of Thread		Pitch Diameter Limits For Class of Thread		
	NC	NF	Class 2B	Class 3B	Min. All Classes (Basic)	Max Class 2B	Max Class 3B
1/4	20	—	H5	H3	.2175	.2223	.2211
1/4	—	28	*H4	H3	.2268	.2311	.2300
5/16	18	—	H5	H3	.2764	.2817	.2803
5/16	—	24	*H4	H3	.2854	.2902	.2890
3/8	16	—	H5	H3	.3344	.3401	.3387
3/8	—	24	*H4	H3	.3479	.3528	.3516
7/16	14	—	H5	H3	.3911	.3972	.3957
7/16	—	20	H5	H3	.4050	.4104	.4091
1/2	13	—	H5	H3	.4500	.4565	.4548
1/2	—	20	H5	H3	.4675	.4731	.4717
9/16	12	—	H5	H3	.5084	.5152	.5135
9/16	—	18	H5	H3	.5264	.5323	.5308
5/8	11	—	H5	H3	.5660	.5732	.5714
5/8	—	18	H5	H3	.5889	.5949	.5934
3/4	10	—	H5	H5	.6850	.6927	.6907
3/4	—	16	H5	H3	.7094	.7159	.7143
7/8	9	—	H6	H4	.8028	.8110	.8089
7/8	—	14	H6	H4	.8286	.8356	.8339
1	8	—	H6	H4	.9188	.9276	.9254
1	—	12	H6	H4	.9459	.9535	.9516

Metric Sizes for Class 6H

Thread Size		Internal Thread-Class 6H (Inches)				Recommended Tap		
Nominal Dia. (mm)	Pitch (mm)	Minor Dia.		Pitch Dia.		Major Dia.	Tap Size	Limit Number
		Min.	Max.	Min.	Max.			
1.6	0.35	.0481	.0520	.0541	.0574	.0630	M1.6 x 0.35	D-3
2	0.4	.0617	.0661	.0686	.0720	.0788	M2 x 0.4	D-3
2.5	0.45	.0793	.0841	.0870	.0906	.0985	M2.5 x 0.45	D-3
3	0.5	.0969	.1023	.1054	.1092	.1182	M3 x 0.5	D-3
3.5	0.6	.1123	.1185	.1225	.1268	.1378	M3.5 x 0.6	D-4
4	0.7	.1277	.1347	.1396	.1442	.1575	M4 x 0.7	D-4
4.5	0.75	.1452	.1526	.1580	.1626	.1772	M4.5 x 0.75	D-4
5	0.8	.1628	.1706	.1764	.1812	.1969	M5 x 0.8	D-4
6	1.0	.1936	.2028	.2107	.2165	.2363	M6 x 1	D-5
7	1.0	.2330	.2422	.2500	.2559	.2756	M7 x 1	D-5
8	1.25	.2617	.2721	.2830	.2892	.3150	M8 x 1.25	D-5
10	1.5	.3298	.3415	.3554	.3624	.3937	M10 x 1.5	D-6
12	1.75	.3979	.4110	.4272	.4355	.4725	M12 x 1.75	D-6
14	2.0	.4660	.4807	.5001	.5083	.5512	M14 x 2	D-7
16	2.0	.5447	.5594	.5788	.5871	.6300	M16 x 2	D-7
20	2.5	.6809	.6985	.7235	.7322	.7875	M20 x 2.5	D-7
24	3.0	.8171	.8366	.8682	.8785	.9449	M24 x 3	D-8
30	3.5	1.0320	1.0539	1.0917	1.1026	1.1812	M30 x 3.5	D-9
36	4.0	1.2469	1.2704	1.3151	1.3268	1.4174	M36 x 4	D-9

Forming Type Taps Machine Screw and Fractional Sizes

Tap Size	Basic	Tap Recommendations For Class 2B Fit		Tap Recommendations For Class 3B Fit		Oversize Forming Taps		Tap Size UNC-NF	Basic P.D.	Tap Recommendations For Class 2B Fit		Tap Recommendations For Class 3B Fit		Oversize Forming Taps	
		Styles	Max. PD. Thread	Styles	Max. PD. Thread	Styles	Max. PD. Thread			Styles	Max. PD. Thread	Styles	Max. PD. Thread	Styles	Max. PD. Thread
0-80	.0519	—	—	H-2	.0536	—	—	10-24	.1629	H-6	.1672	H-4	.1661	—	—
1-64	.0629	—	—	H-2	.0648	—	—	10-32	.1697	H-6	.1736	H-4	.1762	—	—
1-72	.0640	—	—	H-2	.0659	—	—	12-24	.1889	H-6	.1933	H-4	.1922	—	—
2-56	.0744	H-3	.0772	H-2	.0765	—	—	12-28	.1928	H-6	.1970	H-4	.1959	—	—
2-64	.0759	H-3	.0786	H-2	.0779	—	—	1/4-20	.2175	H-6	.2223	H-4	.2211	H-8	.2215
3-48	.0855	H-3	.0885	H-2	.0877	—	—	1/4-28	.2268	H-6	.2311	H-4	.2300	H-8	.2308
3-56	.0874	H-3	.0902	H-2	.0895	—	—	5/16-18	.2764	H-7	.2817	H-5	.2803	H-9	.2809
4-40	.0958	H-5	.0991	H-3	.0982	—	—	5/16-24	.2854	H-7	.2902	H-5	.2890	H-9	.2899
4-48	.0985	H-5	.1016	H-3	.1008	—	—	3/8-16	.3344	H-7	.3401	H-5	.3387	H-9	.3389
5-40	.1088	H-5	.1121	H-3	.1113	—	—	3/8-24	.3479	H-7	.3528	H-5	.3516	H-9	.3524
5-44	.1102	H-5	.1134	H-3	.1126	—	—	7/16-14	.3911	H-8	.3972	H-5	.3957	—	—
6-32	.1177	H-5	.1214	H-3	.1204	—	—	7/16-20	.4050	H-8	.4104	H-5	.4091	—	—
6-40	.1218	H-5	.1252	H-3	.1243	—	—	1/2-13	.4500	H-8	.4565	H-5	.4548	H-10	.4550
8-32	.1437	H-5	.1475	H-3	.1465	—	—	1/2-20	.4675	H-8	.4731	H-5	.4717	H-10	.4725
8-36	.1460	H-5	.1496	H-3	.1487	—	—								



Technical Section

Threading



UNIFIED SCREW THREAD LIMITS

Diameter - Pitch Combinations for Class of Fit

Nominal Size Threads Per Inch and Series Designation	Class	Internal				Major Diameter Min.
		Minor Diameter		Pitch Diameter		
		Min.	Max.	Min.	Max.	
0-80 UNF	2B	.0465	.0514	.0519	.0542	.0600
—	3B	.0465	.0514	.0519	.0536	.0600
1-64 UNC	2B	.0561	.0623	.0629	.0655	.0730
—	3B	.0561	.0623	.0629	.0648	.0730
1-72 UNF	2B	.0580	.0635	.0640	.0665	.0730
—	3B	.0580	.0635	.0640	.0659	.0730
2-56 UNC	2B	.0667	.0737	.0744	.0772	.0860
—	3B	.0667	.0737	.0744	.0765	.0860
2-64 UNF	2B	.0691	.0753	.0759	.0786	.0860
—	3B	.0691	.0753	.0759	.0779	.0860
3-48 UNC	2B	.0764	.0845	.0855	.0885	.0990
—	3B	.0764	.0845	.0855	.0877	.0990
3-56 UNF	2B	.0797	.0865	.0874	.0902	.0990
—	3B	.0797	.0865	.0874	.0895	.0990
4-40 UNC	2B	.0849	.0939	.0958	.0991	.1120
—	3B	.0849	.0939	.0958	.0982	.1120
4-48 UNF	2B	.0894	.0968	.0985	.1016	.1120
—	3B	.0894	.0968	.0985	.1008	.1120
5-40 UNC	2B	.0979	.1062	.1088	.1121	.1250

Nominal Size Threads Per Inch and Series Designation	Class	Internal				Major Diameter Min.
		Minor Diameter		Pitch Diameter		
		Min.	Max.	Min.	Max.	
—	3B	.0979	.1062	.1088	.1113	.1250
5-44 UNF	2B	.1004	.1079	.1102	.1134	.1250
—	3B	.1004	.1079	.1102	.1126	.1250
6-32 UNC	2B	.1040	.1140	.1177	.1214	.1380
—	3B	.1040	.1140	.1177	.1204	.1380
6-40 UNF	2B	.1110	.1190	.1218	.1252	.1380
—	3B	.1110	.1186	.1218	.1243	.1380
8-32 UNC	2B	.1300	.1390	.1437	.1475	.1640
—	3B	.1300	.1389	.1437	.1465	.1640
8-36 UNF	2B	.1340	.1420	.1460	.1496	.1640
—	3B	.1340	.1416	.1460	.1487	.1640
10-24 UNC	2B	.1450	.1560	.1629	.1672	.1900
—	3B	.1450	.1555	.1629	.1661	.1900
10-32 UNF	2B	.1560	.1640	.1697	.1736	.1900
—	3B	.1560	.1641	.1697	.1726	.1900
12-24 UNC	2B	.1710	.1810	.1889	.1933	.2160
—	3B	.1710	.1807	.1889	.1922	.2160
12-28 UNF	2B	.1770	.1860	.1928	.1970	.2160
—	3B	.1770	.1857	.1928	.1959	.2160

Fractional Sizes

Nominal Size Threads Per Inch and Series Designation	Class	Internal				Major Diameter Min.
		Minor Diameter		Pitch Diameter		
		Min.	Max.	Min.	Max.	
1/4-20 UNC	1B	.1960	.2070	.2175	.2248	.2500
—	2B	.1960	.2070	.2175	.2224	.2500
—	3B	.1960	.2067	.2175	.2211	.2500
1/4-28 UNF	1B	.2110	.2200	.2268	.2333	.2500
—	2B	.2110	.2200	.2268	.2311	.2500
—	3B	.2110	.2190	.2268	.2300	.2500
5/16-18 UNC	1B	.2520	.2650	.2764	.2843	.3125
—	2B	.2520	.2650	.2764	.2817	.3125
—	3B	.2520	.2630	.2764	.2803	.3125
5/16-24 UNF	1B	.2670	.2770	.2854	.2925	.3125
—	2B	.2670	.2770	.2854	.2902	.3125
—	3B	.2670	.2754	.2854	.2890	.3125
3/8-16 UNC	1B	.3070	.3210	.3344	.3429	.3750
—	2B	.3070	.3210	.3344	.3401	.3750
—	3B	.3070	.3182	.3344	.3387	.3750

Nominal Size Threads Per Inch and Series Designation	Class	Internal				Major Diameter Min.
		Minor Diameter		Pitch Diameter		
		Min.	Max.	Min.	Max.	
3/8-24 UNF	1B	.3300	.3400	.3479	.3553	.3750
—	2B	.3300	.3400	.3479	.3528	.3750
—	3B	.3300	.3372	.3479	.3516	.3750
7/16-14 UNC	1B	.3600	.3760	.3911	.4003	.4375
—	2B	.3600	.3760	.3911	.3972	.4375
—	3B	.3600	.3717	.3911	.3957	.4375
7/16-20 UNF	1B	.3830	.3950	.4050	.4131	.4375
—	2B	.3830	.3950	.4050	.4104	.4375
—	3B	.3830	.3916	.4050	.4091	.4375
1/2-13 UNC	1B	.4170	.4340	.4500	.4597	.5000
—	2B	.4170	.4340	.4500	.4565	.5000
—	3B	.4170	.4284	.4500	.4548	.5000
1/2-20 UNF	1B	.4460	.4570	.4675	.4759	.5000
—	2B	.4460	.4570	.4675	.4731	.5000
—	3B	.4460	.4537	.4675	.4717	.5000

Metric Sizes (ANSA B1.13M-1983) All dimensions are in millimeters.

Basic Thread Description	ToL. Class	Minor Diameter		Pitch Diameter			Major Diameter Min.	
		Min.	Max.	Min.	Max.	ToL.	Min.	Max.
		M1.6 x 0.35	6H	1.221	1.321	1.373	1.458	.085
M2 x 0.4	6H	1.567	1.679	1.740	1.830	.090	2.000	2.148
M2.5 x 0.45	6H	2.013	2.138	2.208	2.303	.095	2.500	2.660
M3 x 0.5	6H	2.459	2.599	2.675	2.775	.100	3.000	3.172
M3.5 x 0.6	6H	2.850	3.010	3.110	3.222	.112	3.500	3.699
M4 x 0.7	6H	3.242	3.422	3.545	3.663	.118	4.000	4.219
M5 x 0.8	6H	4.134	4.334	4.480	4.605	.125	5.000	5.240
M6 x 1	6H	4.917	5.153	5.350	5.500	.150	6.000	6.294
M8 x 1.25	6H	6.647	6.912	7.188	7.348	.160	8.000	8.340

Basic Thread Description	ToL. Class	Minor Diameter		Pitch Diameter			Major Diameter Min.	
		Min.	Max.	Min.	Max.	ToL.	Min.	Max.
		M8 x 1	6H	6.917	7.153	7.350	7.500	.150
M10 x 1.5	6H	8.376	8.676	9.026	9.206	.180	10.000	10.396
M10 x 1.25	6H	8.647	8.912	9.188	9.348	.160	10.000	10.340
M10 x 0.75	6H	9.188	9.378	9.513	9.645	.132	10.000	10.240
M12 x 1.75	6H	10.106	10.441	10.863	11.063	.200	12.000	12.453
M12 x 1.5	6H	10.376	10.676	11.026	11.216	.190	12.000	12.406
M12 x 1.25	6H	10.647	10.912	11.188	11.368	.180	12.000	12.360
M12 x 1	6H	10.917	11.153	11.350	11.510	.160	12.000	12.304

*Internal Thread Minor Diameter Tolerances. Internal thread minor diameter tolerances are based on a length of engagement equal to the nominal diameter. For general applications these tolerances are suitable for lengths of engagement up to 1-1/2 diameters. However, some thread applications have lengths of engagement which are greater than 1-1/2 diameters or less than the nominal diameter. For such applications it may be advantageous to increase or decrease the tolerance, respectively.



Technical Section

Threading



TAPPING SPEEDS

Conventional Table (Surface Feet Per Minute to Revolutions Per Minute)

Tap Sizes UNC/ UNF	Pipe	Surface Feet Per Minute																	
		5'	10'	15'	20'	25'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
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	3593	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

Metric Sizes

Tap Sizes Metric	Surface Feet Per Minute																	
	5'	10'	15'	20'	25'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
M 1	490	979	1469	1959	2449	2938	3918	4897	5877	6856	7836	8815	9795	10774	11754	12733	13713	14692
M 2	242	484	725	967	1209	1451	1934	2418	2901	3385	3868	4352	4835	5319	5803	6286	6770	7253
M 3	162	324	486	647	809	971	1295	1619	1942	2266	2590	2914	3237	3561	3885	4208	4532	4856
M 3.5	138	277	415	554	692	830	1107	1384	1661	1938	2214	2491	2768	3045	3322	3599	3875	4152
M 4	122	243	365	487	608	730	973	1217	1460	1703	1946	2190	2433	2676	2920	3163	3406	3650
M 5	97	194	291	388	485	582	776	970	1163	1357	1551	1745	1939	2133	2327	2521	2715	2909
M 6	81	162	243	324	405	486	647	809	971	1133	1295	1457	1619	1781	1942	2104	2266	2428
M 7	69	138	208	277	346	415	554	692	830	969	1107	1246	1384	1522	1661	1799	1938	2076
M 8	61	121	182	243	303	364	485	606	728	849	970	1091	1213	1334	1455	1577	1698	1819
M 10	48	97	145	194	242	291	388	485	582	679	776	873	970	1067	1163	1260	1357	1454
M 12	40	81	121	162	202	243	324	405	486	567	647	728	809	890	971	1052	1133	1214
M 14	35	69	104	139	173	208	277	347	416	485	555	624	693	763	832	901	971	1040
M 16	30	61	91	121	152	182	243	303	364	424	485	546	606	667	728	788	849	910
M 18	27	54	81	108	135	162	216	269	323	377	431	485	539	593	647	700	754	808
M 20	24	49	73	97	121	146	194	243	291	340	388	437	485	534	582	631	680	728
M 22	22	44	66	88	110	132	176	221	265	309	353	397	441	485	529	573	618	662
M 24	20	40	61	81	101	121	162	202	243	283	323	364	404	445	485	526	566	606
M 27	18	36	54	72	90	108	144	180	216	252	287	323	359	395	431	467	503	539
M 30	16	32	49	65	81	97	129	162	194	226	259	291	323	356	388	420	453	485

TYPICAL TAPPING PROBLEMS

<i>Problem</i>	<i>Cause</i>	<i>Solution</i>
DIMENSIONAL ACCURACY		
Oversize Pitch Diameter		
	Incorrect Tap	<ol style="list-style-type: none"> 1. Use correct H limit 2. Use longer chamfered taps 3. Consider less free cutting NR style
	Chip packing	<ol style="list-style-type: none"> 1. Use spiral pointed or spiral fluted taps 2. Reduce number of flutes to create extra chip space 3. Use larger drill size 4. In blind hole applications, allow deeper holes where applicable or shorten the thread length of the parts 5. Use recommended lubricant
	Galling	<ol style="list-style-type: none"> 1. Apply surface treatment such as steam oxide, TiN, TiCN or CrN 2. Use recommended lubricant 3. Reduce tapping speed 4. Use correct tap for the material being tapped
	Operating Conditions	<ol style="list-style-type: none"> 1. Ensure correct tapping speeds to avoid torn threads 2. Check alignment of tap and drilled hole 3. Use lead screw tapper 4. use tapping machine with adequate horsepower 5. Check misalignment of tap and drilled hole due to loose spindle or worn holder
	Tool Condition	<ol style="list-style-type: none"> 1. Check accuracy of chamfer lead grinding 2. Ensure correct cutting angles 3. Land widths too narrow 4. Check burrs from regrinding not present
Oversize Internal Diameter		
	Hole Size	<ol style="list-style-type: none"> 1. Use smaller drill size 2. Avoid tapered hole 3. Use taps with correct chamfer
	Galling	See solutions prescribed under Oversize Pitch Diameter
Undersized Pitch Diameter		
	Incorrect Tap	<ol style="list-style-type: none"> 1. Use oversize taps <ul style="list-style-type: none"> » For cutting materials such as copper alloy, aluminum alloy and cast iron » For cutting tubing which will have "spring back" action after tapping 2. Use taps with correct chamfer angle 3. Use taps with higher cutting angle
	Damaged Thread	Use proper reversing speed to avoid damaging tapped thread on the existing hole
	Leftover Chips	<ol style="list-style-type: none"> 1. Improve operating conditions to eliminate leftover chips in the hole 2. Remove left over chips prior to gage checking
Undersized Internal Diameter		
	Hole Size	Use larger drill size
SURFACE FINISH		
Torn or Rough Threads		
	Dull Tap	Resharpen
	Chamfer too short	Increase chamfer length
	Incorrect rake angle	Use correct rake angle suitable for material tapped
	Galling	<ol style="list-style-type: none"> 1. Use thread relieved taps 2. Reduce land width 3. Apply surface treatment such as steam oxide, TiN, or chrome 4. Use recommended lubricant 5. Reduce tapping speed 6. Use larger drill size 7. Check alignment between tap and hole

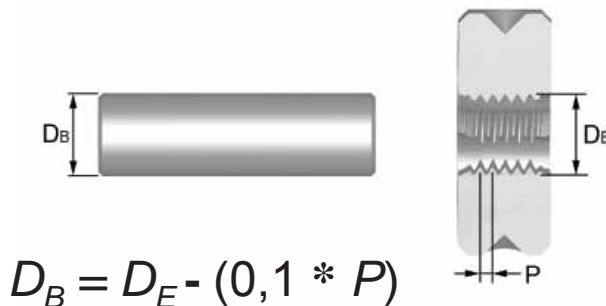
Problem	Cause	Solution
	Chip Packing	<ol style="list-style-type: none"> 1. Use spiral pointed or apiral fluted taps 2. Use larger drill size
Chattering on Tapped Thread		
	Too Positive	<ol style="list-style-type: none"> 1. Use lower rake angle 2. Reduce amount of thread relief - consider NR style 3. Use taps with wider land
	Tool Condition	Use taps with wider land
TOOL LIFE		
Breakage		
	Incorrect Tap Selection	<ol style="list-style-type: none"> 1. Tapping too deep. Avoid chip packing in the flutes or bottom of the hole. Use spiral pointed, spiral fluted or cold forming tap. 2. Use correct surface treatment such as steam oxide, TiN, TiCN or CrN
	Excessive Tapping Torque	<ol style="list-style-type: none"> 1. Hole too small - use correct size drill 2. Shorten thread length 3. Increase rake angle 4. Use a tap with more thread relief and reduced land width 5. Use spiral pointed or spiral fluted taps
	Operating Conditions	<ol style="list-style-type: none"> 1. Reduce tapping speed 2. Avoid misalignment between tap and the hole and tapered hole 3. Use floating type of tapping holder 4. Use tapping holder with torque adjustment 5. Avoid hitting bottom of the hole
	Tool Condition	<ol style="list-style-type: none"> 1. Use taps with wider land width 2. Remove all worn sections when regrinding the flutes 3. Regrind tool more frequently
Chipping		
	Incorrect Tap Selection	<ol style="list-style-type: none"> 1. Use tap with lower rake angle 2. Consider different tool steel 3. Reduce hardness of the tap 4. Increase chamfer length 5. Avoid chip packing in the flutes or in the bottom of the hole by using spiral fluted or spiral pointed taps
	Operating Conditions	<ol style="list-style-type: none"> 1. Reduce tapping speed 2. Avoid misalignment between tap and hole 3. Avoid sudden reverse in blind hole tapping 4. Avoid galling 5. Use larger drill size 6. Ensure adequate lubricant 7. Check for hard spots in the workpiece
Excessive Wear		
	Incorrect Tap Selection	<ol style="list-style-type: none"> 1. Consider specially designed taps 2. Change to an Applix style of tap made from PM material 3. Apply special surface treatment such as steam oxide, TiN, TiCN or CrN 4. Increase chamfer length
	Operating Conditions	<ol style="list-style-type: none"> 1. Reduce tapping speed 2. Apply adequate lubrication 3. Avoid work hardening the material being tapped 4. Use larger drill size
	Tool Condition	<ol style="list-style-type: none"> 1. Ensure correct rake angle 2. Minimize heat in grinding process to avoid de-tempering

TECHNICAL TIPS ON THREADING WITH DIES

1. Before starting the die or dienut, chamfer the end of the bar at an angle of 45 degrees to eliminate sudden loading of the leading edges. Ensure the die or dienut is presented to the bolt squarely.
2. Make use of the large tolerances associated with the major diameter of the bolt, by reducing the diameter of the bar (see below). This will reduce the cutting force to a minimum.
3. Use the gun nose type of die, as this ensures the chips are directed away from the cutting area.
4. Ensure a good supply of the correct lubricant is aimed at the cutting area.
5. When adjusting split dies, avoid opening out as this will cause rubbing. Split dies may be closed down by approximately 0.15mm, by turning the adjustment screws equally. Pressure on one side of the die only may cause breakage.
6. Generally speaking, dienuts are used for reclaiming or cleaning out existing threads by hand. They tend to be of a more robust construction and should only be used in exceptional circumstances to cut a thread from solid.

PRE-MACHINING DIMENSIONS

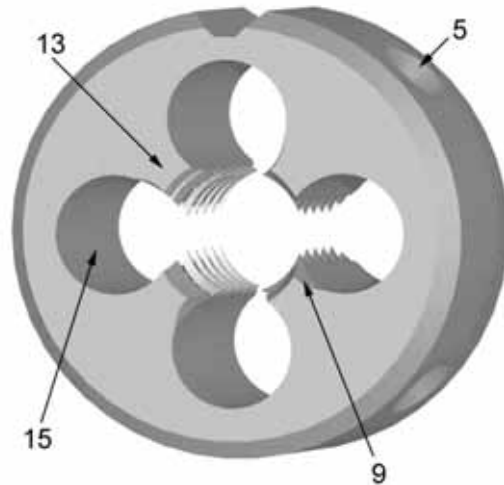
The diameter of the bolt blank must be smaller than the max. external diameter of the screw thread.



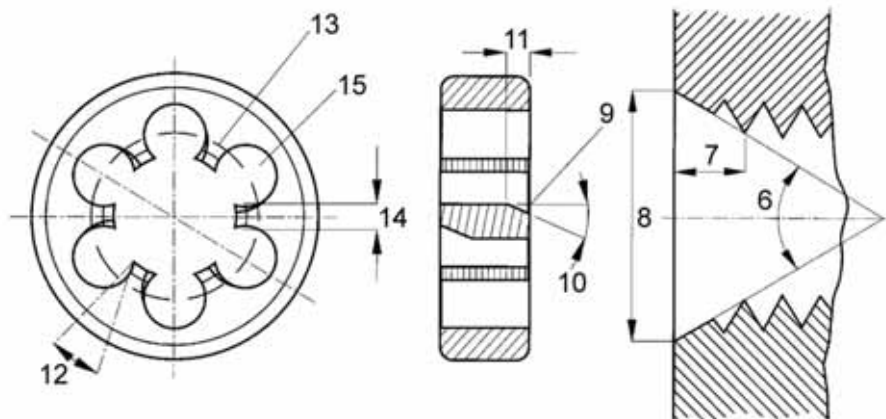
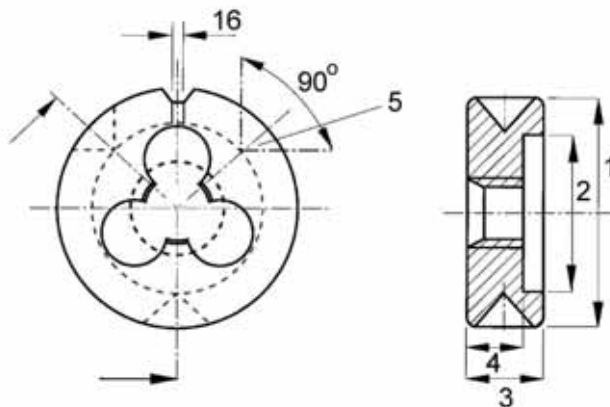
TROUBLE SHOOTING WHEN THREADING WITH DIES

<i>Problem</i>	<i>Cause</i>	<i>Solution</i>
Oversize / Undersize		
	Misalignment	Correct alignment, ensure cleanliness
	Incorrect axial feed rate	Ensure axial feed rate is controlled accurately
Poor finish		
	Incorrect rake angle for the material	Try alternative dies or special die
	Incorrect/lack of lubricant	See lubricants section
	Incorrect speed	Follow recommendations in Catalogue
	Bar diameter too large	Reduce to appropriate size
	Bar end not chamfered	Ensure bar end is chamfered
Chipping / Breakage		
	Wrong type of die	Follow recommendations in Catalogue
	Speed too high	Follow recommendations in Catalogue
	Bar diameter too large	Reduce to appropriate size
	Bar end not chamfered	Ensure bar end is chamfered
	Misalignment	Correct alignment, ensure cleanliness
Rapid wear		
	Incorrect/lack of lubricant	See lubricants section
	Speed too high	Follow recommendations in Catalogue
Built up edge		
	Incorrect/lack of lubricant	See section lubricants
	Bar diameter too large	Reduce to appropriate size
	Speed too low	Follow recommendations in Catalogue

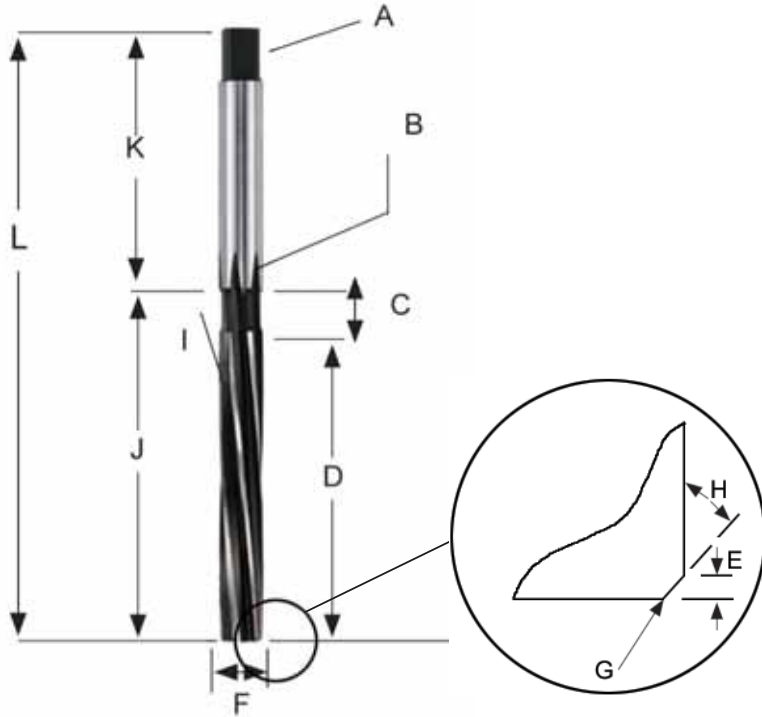
DIE DEFINITIONS / NOMENCLATURE



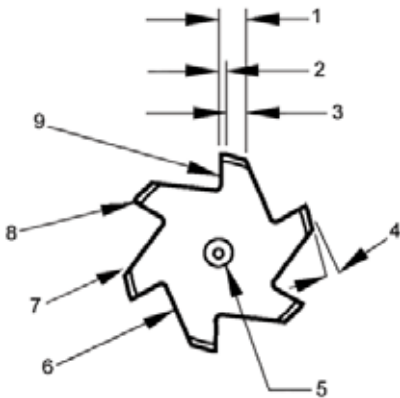
- 1 Outside Diameter
- 2 Recess Diameter
- 3 Thickness
- 4 Thread Length
- 5 Conical Hole for Fixing Screw
- 6 Chamfer Angle
- 7 Chamfer Length
- 8 Chamfer Diameter
- 9 Gun-nose
- 10 Spiral Angle
- 11 Spiral Length
- 12 Rake Angle
- 13 Land
- 14 Width of Land
- 15 Clearance Hole
- 16 Split of Adjustment



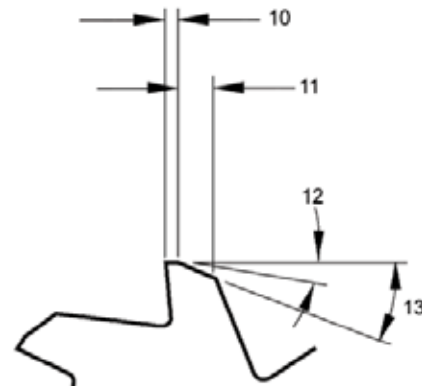
REAMER DEFINITIONS / NOMENCLATURE



- A Tang
- B Recess
- C Recess Length
- D Cut Length
- E Bevel Lead Length
- F Diameter
- G Bevel Lead
- H Bevel Lead Angle
- I Helix Angle
- J Body Length
- K Shank Length
- L Overall Length



- 1 Width of Land
- 2 Circular Land
- 3 Clearance
- 4 Clearance Angle
- 5 Centre Hole
- 6 Flute
- 7 Heel
- 8 Cutting Edge
- 9 Face



- 10 Width of Primary Clearance
- 11 Width of Secondary Clearance
- 12 Primary Clearance Angle
- 13 Secondary Clearance Angle

TECHNICAL TIPS ON REAMING

To obtain the best results when using reamers it is essential to make them 'work'. It is a common fault to prepare holes for reaming with too little stock left in. If insufficient stock is left in the hole before reaming, then the reamer will rub, quickly show wear and will result in loss of diameter. It is equally important for performance not to leave too much stock in the hole. (See Stock Removal on next page).

1. Select the optimum type of reamer and the optimum speeds and feeds for the application. Ensure that pre-drilled holes are the correct diameter.
2. The workpiece must be held rigid and the machine spindle should have no play.
3. The chuck in which a straight shank reamer is held must be good quality. If the reamer slips in the chuck and the feed is automatic, breakage of the reamer may occur.
4. When driving a Morse Taper Shank reamer into a socket, sleeve or machine spindle, always use a soft faced hammer. Make sure there is a good fit between the reamer shank and the sleeve or socket otherwise misalignment will occur and the reamer may cut oversize.
5. Keep tool overhang from machine spindle to a minimum.
6. Use recommended lubricants to enhance the life of the reamer and ensure the fluid reaches the cutting edges. As reaming is not a heavy cutting operation, soluble oil 40:1 dilution is normally satisfactory. Air blasting may be used with grey cast iron, if dry machining.
7. Do not allow the flutes of a reamer to become blocked with chips.
8. Before the reamer is reground, check concentricity between centres. In most instances only the bevel lead will need regrinding.
9. Keep reamers sharp. Frequent regrinding is good economy, but it is important to understand that reamers cut only on the bevel and taper leads and not on the lands. Consequently only these leads need regrinding. Accuracy of regrinding is important to hole quality and tool life.

HAND / MACHINE REAMERS

Although both hand and machine reamers offer the same capability regarding finished hole size, the use of each must be considered according to application. A hand reamer, for reasons of alignment, has a long taper lead, whereas a machine reamer has only a 45 degree bevel lead. A machine reamer cuts only on the bevel lead, a hand reamer cuts on the bevel lead and also on the taper lead.

APPLICATIONS

The results obtained in reaming are to a great extent dependent upon the condition of the drilled hole. If deep scores or form deviations are inherent in the hole, reaming is probably not going to rectify these inaccuracies or produce a finish within tolerance requirements. A reamer can also be mounted in a floating holder with enough clearance to permit the reamer to move freely along the existing hole.

Suggested Stock Removal

Material ≥	Core-Drilled Hole Diameter (inches)					
	5/32	> 5/32 – 3/8	> 3/8 – 5/8	> 5/8 – 1	> 1 – 1-1/2	> 1-1/2 – 2-1/2
Steel*	.004	.004 – .008	.006 – .010	.008 – .014	.010 – .018	.016 – .025
Hard cast-iron						
Soft cast-iron	.005	.005 – .012	.008 – .016	.010 – .020	.016 – .024	.024 – .031
Light alloys*						
Copper, soft						
Copper, alloys						
Plastics (Duro plastics)	.007	.007 – .012	.010 – .016	.013 – .020	.016 – .024	.020 – .031

* For soft materials and quick spiral machine reamers add 50% of allowance.

Table of Speeds and Feeds

Type of Material	Speed Range (sfm)		Type of Feed
	HSS	Carbide	
Magnesium	200 – 400	500 – 1000	M-H
Aluminum	150 – 300	500 – 1000	M-H
Brass and Bronze – Free Mach. – Tough	125 – 200	250 – 400	M
	75 – 125	150 – 250	M
Copper and Hard Bronze	50 – 75	100 – 150	L
Cast Iron – Soft (Ferritic) – Medium (Pearlitic) – Hard (Mart. or Acicular)	50 – 100	150 – 250	H
	25 – 50	75 – 150	L-M
	15 – 25	50 – 75	L
Steel – Under 200 BHN – 200 - 300 BHN – 300 - 400 BHN – 400 - 500 BHN – 500 - BHN Plus	55 – 80	200 – 300	M-H
	30 – 55	125 – 200	M
	20 – 30	50 – 125	L
	10 – 20	35 – 50	L
	—	15 – 35	L
Stainless – Free Mach. and 400 Ann. – 300 Series – P.H. and H.T. 400 series	40 – 60	150 – 250	M
	20 – 30	80 – 120	M
	15 – 25	60 – 100	L-M
High Temp Alloy – Nickel Base – Cobalt Base	10 – 20	40 – 70	L
	10 – 15	30 – 45	L
Titanium – Pure – Alloys	35 – 50	50 – 100	M
	10 – 20	35 – 50	L-M

Diameter Range	Feed (ipr) for Diameter Range		
	Light (L)	Medium (M)	Heavy (H)
≥ 1/16"	.0002" – .001"	.0005" – .002"	.001" – .003"
> 1/16" – 1/8"	.001" – .002"	.002" – .004"	.003" – .006"
> 1/8" – 1/4"	.002" – .004"	.004" – .006"	.006" – .010"
> 1/4" – 1/2"	.004" – .006"	.006" – .010"	.010" – .015"
> 1/2" – 1"	.006" – .010"	.010" – .020"	.015" – .030"
> 1"	.010" – .020"	.020" – .040"	.030" – .050"

APPLICATION REAMERS

As with most cutting tools, the substrate and geometric configuration of reamers differs, dependent on the material they are intended to cut. As such, care should be taken to ensure that the correct choice of reamer is made.

CNC reamers are manufactured with a shank tolerance of h6. This enables the reamer to be used in hydraulic and heat shrink tool holding systems, offering enhanced accuracy and concentricity.

ADJUSTABLE REAMERS

Several types of adjustable reamers are available, all offering varying degrees of diameter adjustment. It is an important aspect of adjustable reamers to follow this set procedure:

- Adjust the reamer to the required diameter.
- Check the reamer between centres for concentricity and lip height variation.
- If required, grind the reamer to eliminate any eccentricity or lip height variation.
- Re-check the diameter.

STOCK REMOVAL

The recommended stock removal in reaming is dependent on the application material and the surface finish of the pre-drilled hole. General guidelines for stock removal are shown in the following tables:

Size of reamed hole (mm)	When pre-drilled	When pre-core-drilled	Size of reamed hole (inches)	When pre-drilled	When Pre-core-drilled
Below 4	0.1	0.1	Below 3/16	0.004	0.004
Over 4 to 11	0.2	0.15	3/16 to 1/2	0.008	0.006
Over 11 to 3	0.3	0.2	1/2 to 1. 1/2	0.010	0.008
Over 39 to 50	0.4	0.3	1. 1/2 to 2	0.016	0.010

SELECTION OF REAMER TYPES

Reaming is a recognised method of producing dimensionally accurate holes of fine surface finish. Dormer offers a range of reamers for producing holes to H7 tolerance.

Reamers are classified into various types:

- Solid - available in two shank types, Straight (cylindrical) and Morse Taper.
- Shell - for use on arbors.
- Expanding - with adjustable HSS blades and used for light work.

Applications - Reamer Selection

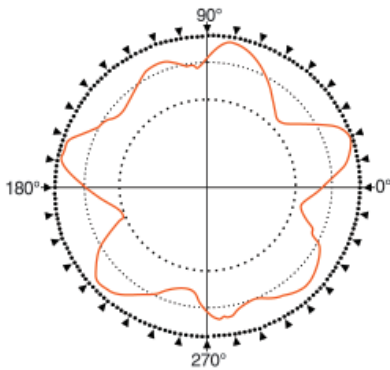
The most common types of reamers have a left-hand spiral because the main applications involve through holes requiring chips to be pushed forward. For blind holes, reamers with straight flutes or right hand spirals are recommended.

The most efficient reaming conditions depend on the application, material, quality of hole required, stock removal, lubrication and other factors. A general guide to surface speeds and feeds for machine reamers is shown in the reamer AMG and feed charts (see Dormer catalogue or Product Selector) and stock removal tables.

Extremely unequal spacing on reamers means that the divide is not the same for each tooth. As there are no two teeth diametrically opposite each other, the reamer produces a hole with a roundness variance of between 1 and 2 μm . This compared with a variance of up to 10 μm with unequal spacing.

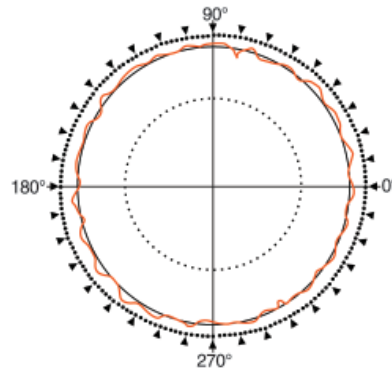
CARBIDE REAMERS - COMPARISON SPACING / EU SPACING

unequal spacing
roundness error up to 10 μm



Results of roundness

extremely unequal spacing
roundness error up to 1 - 2 μm



Results of roundness

TROUBLE SHOOTING WHEN REAMING

<i>Problem</i>	<i>Cause</i>	<i>Solution</i>
Broken or twisted tangs		
	Incorrect fit between shank and socket	Ensure the shank and the socket are clean and free from damage
Rapid Tool Wear		
	Insufficient stock to remove	Increase the amount of stock to be removed
Oversize Hole		
	Excessive lip height variation	Regrind to correct specification
	Displacement in the machine spindle	Repair and rectify spindle displacement
	Defects on the tool holder	Replace tool holder
	Tool shank is damaged	Replace or regrind the shank
	Ovality of the tool	Replace or regrind the tool
	Asymmetric bevel lead angle	Regrind to correct specification
	Too high feed or cutting speed	Adjust cutting conditions in accordance with Catalogue or Product Selector
Undersize hole		
	Insufficient stock to remove	Increase the amount of stock to be removed
	Too much heat generated while reaming. The hole widens and shrinks.	Increase coolant flow
	The tool diameter is worn and is undersize.	Regrind to correct specification.
	Too low feed or cutting speed	Adjust cutting conditions in accordance with the Dormer Product Selector.
	Pre-drilled hole is too small	Decrease the amount of stock to be removed.
Oval and conical holes		
	Displacement in the machine spindle	Repair and rectify spindle displacement
	Misalignment between tool and hole	Use a bridge reamer
	Asymmetric bevel lead angle	Regrind to correct specification
Bad Hole finish		
	Excessive stock to remove	Decrease the amount of stock to be removed
	Worn out tool	Regrind to specification
	Too small cutting rake angle	Regrind to specification
	Too diluted emulsion or cutting oil	Increase % concentration
	Feed and/or speed too low	Adjust cutting conditions in accordance with Catalogue/ Product Selector
	Cutting speed too high	Adjust cutting conditions in accordance with Catalogue/ Product Selector
The tool clamps and breaks		
	Worn out tool	Regrind to correct specification
	Back taper of the tool is too small	Check and replace / modify the tool
	The width of the land is too wide	Check and replace / modify the tool
	Workpiece material tend to squeeze	Use an adjustable reamer to compensate for the displacement
	Pre-drilled hole is too small	Decrease the amount of stock to be removed
	Heterogeneous material with hard inclusions	Use solid carbide reamer

GENERAL HINTS ON COUNTERBORING AND COUNTERSINKING

COUNTERBORING

The counterbore is an end cutting tool which is used to enlarge a preformed hole when a flat bottom is required or to spotface when a machine finish is required. It may have a fixed pilot (solid pattern) Fig.1 or be designed Fig.2 for an interchangeable pilot Fig. 3.



Fig.1



Fig.2



Fig. 3

COUNTERSINKING

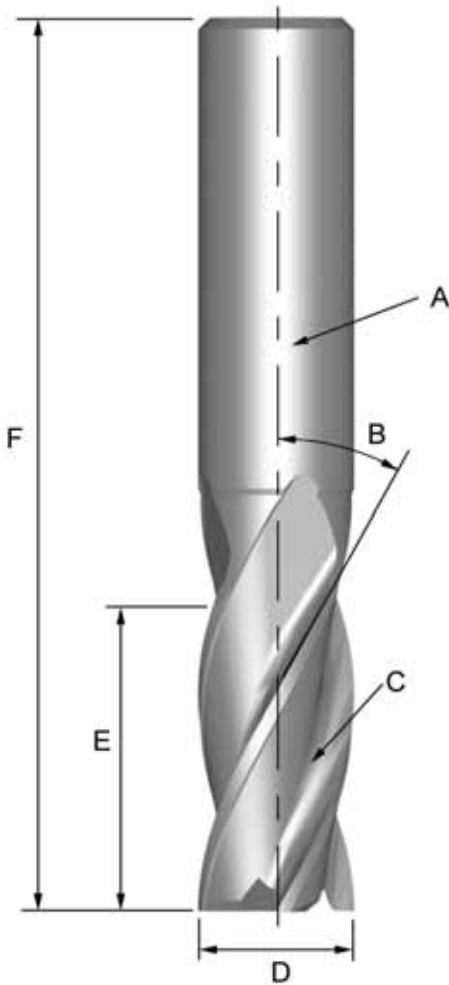
The countersink is a conical cutting tool, usually made with angular relief, having one or more flutes with specific size angle cutting edges. It is used for chamfering and countersinking holes. The countersink may have a straight shank, tapered shank, bit stock shank or special shank requiring a special holder, for holding in a power or hand operated machine.



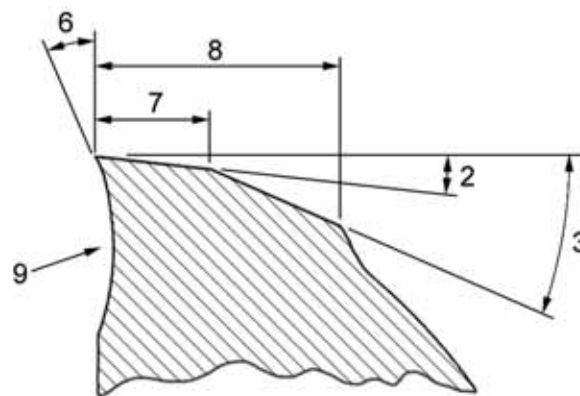
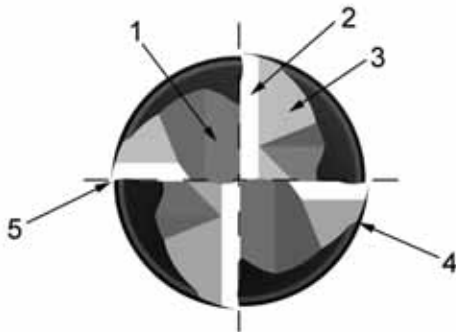
TROUBLE SHOOTING WHEN COUNTERBORING

<i>Problem</i>	<i>Cause</i>	<i>Solution</i>
Excessive Cutting Edge Wear		
	Incorrect feeds & speeds	Increase feed - especially when machining ductile or free machining materials. Also try reducing speed
	Rough cutting edge	Lightly hone cutting edge with fine grit diamond hone
	Insufficient coolant	Increase coolant flow - review type of coolant
Chipping		
	Poor chip removal	Use tool with larger flute space - larger diameter or fewer flutes
	Recutting work hardened chips	Increase coolant flow
	Vibration	Increase rigidity of set-up, especially worn tool holders
Short Tool Life		
	Excessive cratering	Increase speed or decrease feed
	Abrasive material	Decrease speed and increase feed Increase coolant flow
	Hard materials	Reduce speed - rigidity very important
	Insufficient chip room	Use larger diameter tool
	Delayed resharpening	Prompt resharpening to original geometry will increase tool life
Glazed Finish		
	Feed too light	Increase feed
	Dull cutting edge	Resharpen tool to original geometry
	Insufficient clearance	Resharpen tool with more clearance
Rough Finish		
	Dull cutting edge	Resharpen to original tool geometry
	Wrong feeds & speeds	Increase speed - also try reducing feed
Chattering		
	Insufficient machine horsepower	Use tool with fewer flutes as correct feeds & speeds must be maintained
	Vibration	Resharpen tool with more clearance

NOMENCLATURE



- A Shank
- B Helix Angle
- C Flute
- D Outside Diameter
- E Cutting Length
- F Overall Length



- 1 Gash
- 2 Primary Relief Angle
- 3 Secondary Relief Angle
- 4 Heel
- 5 Cutting Edge

- 6 Rake Angle
- 7 Width of Primary Relief Land
- 8 Width of Secondary Relief Land
- 9 Undercut Face

Milling

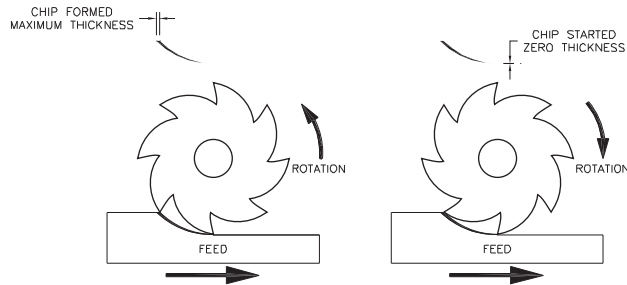
MILLING EFFECTIVELY

Types Of Cuts

Climb Milling Versus Conventional Milling

CLIMB MILLING

CONVENTIONAL MILLING



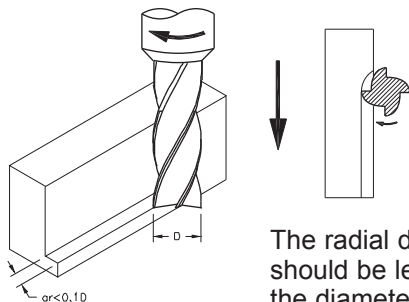
In conventional milling, the cutter revolves opposite to the direction of table feed. Therefore the width of the chip starts at zero and increases to a maximum at the end of the cut. This can lead to accelerated tool wear under some conditions. Conventional milling may be advantageous when milling hot rolled steel, surface hardened and steels with a surface scale.

In climb milling, the cutter revolves in the same direction as the table feed. The tooth meets the work at the top of the cut, producing the thickest part of the chip first. In horizontal applications the resultant force created by climb milling can act as a clamping force, acting towards the machine table.

It is important to make sure that the machine tool has no leadscrew backlash. Normally climb milling improves product surface finish and increases tool life.

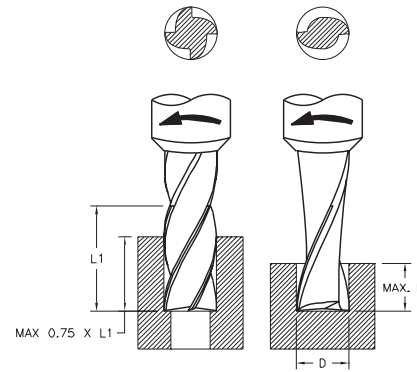
Peripheral Milling The milling of a surface which is parallel to the end mill axis.

Peripheral (Cylindrical, Slab) Milling



The radial depth of cut should be less than 0.1 of the diameter of the mill:
 $a_r < 0.1 D$.

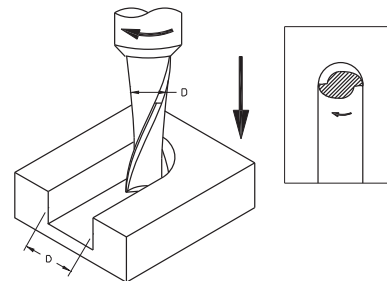
Plunge Milling The direct movement between the workpiece and the center line of the end mill when the end mill sinks directly into the workpiece.



In order to be able to “drill,” i.e. mill with axial feed, an end mill must have an end face cutting edge that goes all the way to the center. An example of such a solid drilling operation is keyway milling in the middle of a shaft.

In boring, the depth of a hole may be up to 75% of the cutting edge length. In solid drilling, however, it should not exceed 0.5-1 D.

Slot Milling



003-00-A

The radial depth of cut is equal to the diameter of the mill: $a_r = D$.

All slotting applications are a combination of conventional and climb milling. Refer to adjacent section.

FEATURES OF THE END MILL - CHOOSING THE NUMBER OF FLUTES

Number of flutes should be determined by:

- Milled material
- Dimension of workpiece
- Milling conditions

	2 Flutes	3 Flutes	4 Flutes (or multi-flutes)
Flexural strength	Low		High
Chip space	Big		Small
	<ul style="list-style-type: none"> • Large chip space. • Easy chip ejection. • Good for slot milling. • Good for heavy duty milling. • Less rigidity due to small section area. • Lower quality surface finish 	<ul style="list-style-type: none"> • Chip space almost as large as for 2 flutes. • Larger section area - higher rigidity than 2 flutes • Improved surface finish 	<ul style="list-style-type: none"> • Highest rigidity. • Largest section area – small chip space. • Gives best surface finish. • Recommended for profiling, side milling and shallow slotting.

FEATURES OF THE END MILL – HELIX ANGLE

Increasing the number of flutes makes the load on the single tooth more homogeneous and consequently, this allows for a better finish. But with a high helix angle, the load (FV) along the cutter axis is increased too. A high FV can give:

- Load problems on the bearings
- Cutter movement along the spindle axis. To avoid this problem it is necessary to use Weldon or screwed shanks.



Milling

DIRECTION OF USE OF THE CUTTER

We can split the range of the cutters in relationship to the possible working directions to the workpiece surface. There are three different types:

3 Directions	2 Directions	1 Direction

Please note that the axial direction is possible only with centre cutting end mills.

MRR (MATERIAL REMOVAL RATE) Q

We can calculate material removal rate Q as the volume of material removed divided by the time taken to cut. The volume removed is the initial volume of the workpiece minus the final volume. The cutting time is the time needed for the tool to move through the length of the workpiece. This parameter strongly influences the finishing grade of the workpiece.

$$Q = \frac{a_p * a_e * v_f}{1000}$$

Q = MRR (cm³/min) a_e = radial depth (mm)

a_p = axial depth (mm) v_f = feed rate mm/min

APPLICATIONS

The MRR and the applications are strongly related. For each different application we have a different MRR that increases with the engagement section of the cutter on the workpiece. The recent Dormer Catalogue was produced with simple icons that show the different applications.

Side Milling	Face Milling	Slot Milling	Plunge Milling	Ramping
The radial depth of cut should be less than 0.25 of the diameter of the end mill.	The radial depth of cut should be no more than 0.9 of the diameter, axial depth of cut less than 0.1 of the diameter.	Machining of a slot for keyways. The radial depth of cut is equal to the diameter on the end mill.	It is possible to drill the workpiece with an end mill only with the cutting centre. In this operation the feed has to be halved.	Both axial and radial entering into the workpiece.

Milling

MILLING EFFECTIVELY

End Mill Selection

Utilize the shortest possible tool available for the application with the largest diameter permissible and the shortest flute length as depth of cut allows. Extra length end mills have excessive overhang, thus a reduction in feed up to 25% may be required. Stub length end mills, due to their short overall and flute length, have more rigidity, thus an increase in feed rates of up to 25% may be required.

Speeds

Solid Carbide end mills must be run at higher speeds than High Speed Steel end mills. Many times, lighter cuts at higher speeds can improve the finish of the workpiece.

When the application is a slotting cut, the speed should be reduced by approximately 20%. Speeds should be decreased when milling hard or tough materials or when taking heavy cuts. Speeds should be increased when milling softer materials or when taking lighter cuts. Speeds should also be increased for finishing cuts.

Coolants

Coolants are recommended when milling mild steel and high temperature alloys. The purpose of the coolant media is to direct the chips away from the cutting tool and workpiece. This prevents damage to the cutting edges due to recutting the chips. When machining titanium, coolant flow must be heavy and directed at the area of cut to prevent overheating and assist in chip removal.

Milling Terminology/Operating Formulas

The following terms and formulas can be used to determine the appropriate operating parameters.

Terms	Formulas
SFM = Surface Feet Per Minute	$D \times \text{RPM} \times .26 = \text{SFM}$
RPM = Revolutions Per Minute	$\frac{\text{SFM} \times 3.82}{D} = \text{RPM}$
F = Feed in Inches Per Minute	$\text{Ft} \times \text{T} \times \text{RPM} = \text{F}$
Ft = Feed Per Tooth	$\frac{\text{F}}{\text{T} \times \text{RPM}} = \text{Ft}$
D = Cutting Diameter	
T = Number of Teeth	



Technical Section



Milling

TABLE OF CUTTING SPEEDS

Conversion Table (Surface Feet Per Minute to Revolutions Per Minute)

DIA. In Inches	Surface Feet Per Minute																DIA. In Inches	
	15'	20'	25'	30'	35'	40'	45'	50'	60'	70'	80'	90'	100'	110'	120'	130'		140'
	Revolutions Per Minute																	
1/64	3667	4890	6112	7334	8559	9779	11002	12224	14669	17114	19558	22003	24448	26893	29338	31782	34227	1/64
1/32	1834	2445	3056	3667	4278	4890	5501	6112	7334	8557	9779	11002	12224	13446	14669	15891	17114	1/32
3/64	1222	1630	2037	2445	2852	3260	3667	4075	4890	5705	6519	7334	8149	8964	9779	10594	11409	3/64
1/16	917	1222	1528	1833	2139	2445	2750	3056	3667	4278	4889	5500	6112	6723	7333	7945	8556	1/16
3/32	611	815	1019	1222	1426	1630	1834	2037	2445	2852	3260	3667	4075	4482	4890	5297	5705	3/32
1/8	458	611	764	917	1070	1222	1375	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	1/8
5/32	367	489	611	733	856	978	1100	1222	1467	1711	1956	2200	2445	2689	2934	3178	3423	5/32
3/16	306	407	509	611	713	815	917	1019	1222	1426	1620	1833	2037	2241	2445	2648	2852	3/16
1/4	229	306	382	458	535	611	688	764	917	1070	1222	1375	1528	1681	1833	1986	2139	1/4
5/16	183	244	306	367	428	489	550	611	733	856	978	1100	1222	1345	1467	1589	1711	5/16
3/8	153	204	255	306	357	407	458	509	611	713	815	917	1019	1120	1222	1324	1426	3/8
7/16	131	175	218	262	306	349	393	437	524	611	698	786	873	960	1048	1135	1222	7/16
1/2	115	153	191	229	267	306	344	382	458	535	611	688	764	840	917	993	1070	1/2
5/8	92	122	153	183	214	244	275	306	367	428	489	550	611	672	733	794	856	5/8
3/4	76	102	127	153	178	204	229	255	306	357	407	458	509	560	611	662	713	3/4
7/8	66	87	109	131	153	175	196	218	262	306	349	393	437	480	524	568	611	7/8
1	57	76	96	115	134	153	172	191	229	267	306	344	382	420	458	497	535	1
1-1/8	51	68	85	102	119	136	153	170	204	238	272	306	340	373	407	441	475	1-1/8
1-1/4	46	61	76	92	107	122	138	153	183	214	244	275	306	336	367	397	428	1-1/4
1-3/8	42	56	70	83	97	111	125	139	167	194	222	250	278	306	333	361	389	1-3/8
1-1/2	38	51	64	76	89	102	115	127	153	178	204	229	255	280	309	331	357	1-1/2
1-5/8	35	47	59	71	82	94	106	118	141	165	188	212	235	259	282	306	329	1-5/8
1-3/4	33	44	55	66	76	87	98	109	131	153	175	196	218	240	262	284	306	1-3/4
1-7/8	31	41	51	61	71	82	92	102	122	143	163	183	204	224	244	265	285	1-7/8
2	29	38	48	57	67	76	86	96	115	134	153	172	191	210	229	248	267	2
2-1/4	26	34	42	51	59	68	76	85	102	119	136	153	170	187	204	221	238	2-1/4
2-1/2	23	31	38	46	54	61	69	76	92	107	122	138	153	168	183	199	214	2-1/2
2-3/4	21	28	35	42	49	56	62	70	83	97	111	125	139	153	167	181	194	2-3/4
3	19	26	32	38	45	51	57	64	76	89	102	115	127	140	153	166	178	3
3-1/4	18	24	29	35	41	47	53	59	71	82	94	106	118	129	141	153	165	3-1/4
3-1/2	16	22	27	33	38	44	49	55	66	76	87	98	109	120	131	142	153	3-1/2
3-3/4	15	20	26	31	36	41	46	51	61	71	81	92	102	112	122	132	143	3-3/4
4	14	19	24	29	33	38	43	48	57	67	76	86	96	105	115	124	134	4
4-1/2	13	17	21	26	30	34	38	42	51	59	68	76	85	93	102	110	119	4-1/2
5	12	15	19	23	27	31	34	38	46	54	61	69	76	84	92	99	107	5
5-1/2	10	14	17	21	24	28	31	35	42	49	56	63	70	76	83	90	97	5-1/2
6	10	13	16	19	22	26	29	32	38	45	51	57	64	70	76	83	89	6
6-1/2	9	12	15	18	21	24	26	29	35	41	47	53	59	65	71	76	82	6-1/2
7	8	11	14	16	19	22	25	27	33	38	44	49	55	60	66	71	76	7
7-1/2	8	10	13	15	18	20	23	26	31	36	41	46	51	56	61	66	71	7-1/2
8	7	10	12	14	17	19	22	24	29	33	38	43	48	53	57	62	67	8
8-1/2	7	9	11	14	16	18	20	23	27	32	36	40	45	49	54	58	63	8-1/2
9	6	9	11	13	15	17	19	21	26	30	34	38	42	47	51	55	59	9
9-1/2	6	8	10	12	14	16	18	20	24	28	32	36	40	44	48	52	56	9-1/2
10	6	8	10	12	13	15	17	19	23	27	31	34	38	42	46	50	54	10
11	5	7	9	10	12	14	16	17	21	24	28	31	35	38	42	45	49	11
12	5	6	8	10	11	13	14	16	19	22	26	29	32	35	38	41	45	12
	15'	20'	25'	30'	35'	40'	45'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	

Milling

MILLING TROUBLESHOOTING GUIDE

Problem	Solution	
Chipping of the Cutting Edge	<ul style="list-style-type: none"> • Apply hone .0005" to .001" • Try air blow or coolant • Reduce depth of cut • Check amount of wear on collet 	<ul style="list-style-type: none"> • Reduce feed per tooth • If wet cutting, change to dry cutting • Check tool runout • Improve the stability of the work-holding
Extreme Flank Wear	<ul style="list-style-type: none"> • Use coated end mill • If conventional milling, change to climb • If using water soluble cutting fluid, change to non-water soluble cutting fluid 	<ul style="list-style-type: none"> • Increase helix angle • If conventional milling, change to climb
Vibration / Chattering	<ul style="list-style-type: none"> • Use larger diameter end mill • Increase feed per tooth • Increase helix angle • Reduce length of flutes or overhang 	<ul style="list-style-type: none"> • Reduce cutting speed • Check or change the holder • Increase number of flutes • Tighten chuck or use stronger chuck
Deflection	<ul style="list-style-type: none"> • Reduce depth of cut • Increase feed per tooth • Increase helix angle • If using water soluble cutting fluid, change to non-water soluble cutting fluid 	<ul style="list-style-type: none"> • Use larger diameter end mill • Reduce length of flutes or overhang • If using 2-flute type, change to 4-flute type • If climb milling, change to conventional milling
Poor Surface Finish	<ul style="list-style-type: none"> • Reduce end mill runout • Increase cutting speed • Reduce feed per tooth • Use small hone .0003" to .0006" • Increase helix angle 	<ul style="list-style-type: none"> • Increase number of flutes • Increase volume of air or cutting fluid • Reduce depth of cut • If dry cutting, change to wet cutting
Waviness	<ul style="list-style-type: none"> • Reduce helix angle • Check end mill runout 	<ul style="list-style-type: none"> • Reduce depth of cut • Check or change the holder
End Mill Fracturing	<ul style="list-style-type: none"> • Reduce depth of cut • Reduce feed per tooth 	<ul style="list-style-type: none"> • Reduce length of flutes or overhang • If chip jamming occurs, reduce the number of flutes
Poor Chip Disposal	<ul style="list-style-type: none"> • Use air blow • Reduce depth of cut • Reduce feed per tooth 	<ul style="list-style-type: none"> • Reduce the number of flutes • Increase volume of air or cutting fluid • Increase cutting speed
Burring Workpiece Chipping	<ul style="list-style-type: none"> • Reduce helix angle • Reduce feed per tooth 	<ul style="list-style-type: none"> • Reduce depth of cut
Chip Welding	<ul style="list-style-type: none"> • Use coolant • Use coated end mill 	<ul style="list-style-type: none"> • Increase volume of cutting fluid • Increase helix angle

APPLICATION MATERIAL GROUP (AMG) CHART WITH MATERIAL EXAMPLES

Application Material Groups (AMG)			Hardness HRC
1. Steel	1.1 Magnetic soft steel	12L14, 12L15	<120 HB
	1.2 Structural Steel/ case carburising steel	1005-1025, 1214, 1215, A36	<200 HB
	1.3 Plain Carbon steel	1030-1060, 1050-1060, 1144-1146	<24
	1.4 Alloy steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	<24
	1.5 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>24<38
	1.6 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>38
	1.7 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	49-55
	1.8 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	55-63
2. Stainless Steel	2.1 Free machining Stainless Steel	200, 303, 416, 420F, 430F, 440	<24
	2.2 Austenitic	301, 302, 304, 316, 321, 330, CUSTOM 455, AM-350	<24
	2.3 Ferritic + Austenitic, Martensitic	318-329, 400-446, DUPLEX	<32
	2.4 Precipitation Hardened	15-5PH, Custom 450 17-4PH	<32
3. Cast Iron	3.1 Lamellar graphite	Grey, G10, Gg40, J431C, A48 CLASS 20	<150 HB
	3.2 Lamellar graphite	Grey, GG25-Gg40, J158, A48 CLASS 40-60	>150 HB<32
	3.3 Nodular graphite/ Malleable Cast Iron	A220, A436, A439, A602, Black, GGG40-GGG70	<200 HB
	3.4 Nodular graphite/ Malleable Cast Iron	Black Gts/Gtw, J434C	>200 HB<32
4. Titanium	4.1 Titanium, unalloyed	Commercially Pure	<200 HB
	4.2 Titanium, alloyed	6Al4V, 6A14V-2Sn, Monel, Monel K	<28
	4.3 Titanium, alloyed	6Al4V-4Mo, 7A14V-4Mo, 4911-4967	>28<38
5. Nickel	5.1 Nickel, unalloyed	Commercially Pure, 17644, 200, 5553	<150 HB
	5.2 Nickel, alloyed	Monel 400, Hastelloy C, Inconel 625, Waspaloy	<28
	5.3 Nickel, alloyed	Inconel 718, Nimonic 75-95, Rene 41, Inconel 825, A286	>28<38
6. Copper	6.1 Copper	Commercially Pure	<100 HB
	6.2 β -Brass, Bronze	314-340, 350-370	<200 HB
	6.3 α -Brass	Alloyed Cu + Al + Fe, Long Chipping	<200 HB
	6.4 High Strength Bronze	Ampco 18-25	<49
7. Aluminium Magnesium	7.1 Al, Mg, unalloyed	Commercially Pure	<100 HB
	7.2 Al alloyed, Si<0.5%	6061 T6, 7075, 314-340	<150 HB
	7.3 Al alloyed, Si>0.5%<10%	6061 T6, 380-390	<120 HB
	7.4 Al alloyed, Si>10% Mg alloys	Magnesium Whisker Reinforced	<120 HB
8. Synthetic Materials	8.1 Thermoplastics	Ultrad, Polystrol	---
	8.2 Thermosetting plastics	Bakelit, Pertinax	---
	8.3 Reinforced plastic materials	CFK, GFKAFK	---
9. Hard Mat.	9.1 Cermets (Metal-ceramics)	Ferrotic	<54
10. Graphite	10.1 Standard graphite		---



APPLICATION MATERIAL GROUPS - DRILLS

SURFACE FEET PER MINUTE (SFM)



*Feed rate chart - see page 507. For material examples, see page 501.

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
209	115I	98I	82F	66F	39E	30D			49E	30G	33C		98I	79E	66E	46E	75F
860	79E	72E	52C	49C	20A	16A			30C	13E	26A		72G	59D	43C	30C	36D
1290	79E	72E	52C	49C	20A	16A			30C	13E	26A		72G	59D	43C	30C	36D
1511	79E	72E	52C	49C	20A	16A			30C	13E	26A		72G	59D	43C	30C	36D
1813	79E	72E	52C	49C	20A	16A			30C	13E	26A		72G	59D	43C	30C	36D
209CO	115J	98H	89G	75F	56E	33D			79E	36G	56C		115J	92G	72E	56E	92G
2A	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
2AB	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
2ACO	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
4ASM	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
4ASMCO	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
500-12			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
500-6			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
501-12			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
501-6			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
502-12			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
502-12			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
502-6			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
5ATL	89G	82G	66E	52E	30D	20B			33D	20F	13B		92H	69E	49D	43D	56E
5ATS	115I	98I	82F	66F	39E	30D			49E	30G	33C		98I	79E	66E	46E	75F
76HA	115I	98I	82G	66F	43E	30D			49E	26G	33C		98I	79F	66E	46E	79F
A002	154J	131J	115F	98F	59F	33E			66F	39G	52C		131J	98E	92E	85E	75F
A012	154J	131J	115F	98F	59F	33E			66F	39G	52C		131J	98E	92E	85E	75F
A022	115K	105K	82I	75H	52G	33E			49G	26I	30E		105K	82I	66G	52G	82I
A100	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
A108	115I	98I	82G	66F	43E	30D			49E	30G	33D		98H	79F	66E	46E	82G
A125	79E	72E	52C	49C	20A	16A			30C	13E	26A		72G	59D	43C	30C	36D
A141	115I	98I	82G	66F	43E	30D			49E	30G	33D		98H	79F	66E	46E	82G
A217	115I	98I	82G	66F	43E	30D			49E	26G	33C		98I	79F	66E	46E	79F
A218	115I	98I	82G	66F	43E	30D			49E	26G	33C		98I	79F	66E	46E	79F
A221	115I	98I	82G	66F	43E	30D			49E	26G	33C		98I	79F	66E	46E	79F
A225	115I	98I	82G	66F	43E	30D			49E	26G	33C		98I	79F	66E	46E	79F
A345	79G	72G	56E	49D	20C	16B			39C	13E	26A		72G	59D	43C	30C	49D
A350	89I	82I	66G	52F	33E	20D			43E	13G	26C		85I	66F	59E	36E	52F
A510	187M	154M	131K	98H	69F	36D			92G	46I	62G		138K	105J	92J	82F	105G
A520	187M	154M	131K	105I	69G	36E			98I	52I	66G		157M	121K	98J	85F	112I
A530	154I	131I	98F	89F	66E	33D			79E	43G	66C		118I	92E	89E	72E	105F
A553	279L	230L	197L	148H	92F	49D			131G	62I	89G		230K	164J	148J	138F	148G
A554	279L	230L	197L	148H	92F	49D			131G	62I	89G		230K	164J	148J	138F	148G
A720	115A	98A	89A	75A	56A	33A			72A	33A	49A		98A	79A	66A	46A	75A
A900	125H	108H	85H	85H	69E	52E			49E	23E	30C		79J	62J	62J	46I	72E
A901	197J	164J	144I	144I	108G	85G			56E	30E	36C		190I	154I	112J	92I	115G
A920	131J	112J	105I	105I	75E	62E			49F	23F	30D		112L	85L	85L	62J	98G
A921	197M	171M	174J	174J	125G	98G			56F	30F	36D		174L	138L	138L	118J	157I
A940	125F	108F	72G	72G	56C	39C			49C	23E	30B			52I	52I	39H	59E
A941	174G	151G	118G	118G	75D	56D			56C	30E	36B		118I	98I	98I	79H	82F
A951	89G	72G	62E	49D	26C	20B			39C	20E	39A		72G	52D	43C	30C	59D
A952	89G	72G	62E	49D	26C	20B			39C	20E	39A		72G	52D	43C	30C	59D
A976	102C	85C	72C	72C	39A	33A			39B	23C	26A			75C	52C	36A	49C
A977	102B	85B	72B	72B	39A	33A			39B	23B	26A			75B	52B	36A	49B
A978	102A	85A	72A	72A	39A	33A			39A	23A	26A			75A	52A	36A	49A
CO500-12						20B			95H	56F	56D	30D	161H	85H	85F	56D	
CO500-6						20B			95H	56F	56D	30D	161H	85H	85F	56D	
CO501-12						20B			95H	56F	56D	30D	161H	85H	85F	56D	
CO501-6						20B			95H	56F	56D	30D	161H	85H	85F	56D	
D33F	279S	246S	246S	230S	148S	148S	98S	98S	98S				246T	246T	180T	180T	
D33L	279S	246S	246S	230S	148S	148S	98S	98S	98S				246T	246T	180T	180T	
D33M	279S	246S	246S	230S	148S	148S	98S	98S	98S				246T	246T	180T	180T	
D33W	279S	246S	246S	230S	148S	148S	98S	98S	98S				246T	246T	180T	180T	
D444													298H	298H	226F	200D	
DC	279S	246S	246S	230S	148S	148S	98S	98S					246T	246T	180T	180T	
DS-90	279S	246S	246S	230S	148S	148S	98S	98S	174S	148S			246T	246T	180T	180T	148T
HX10	115H	69H	75I	69H	56F				105I	59H	56F		171L	89I	95H	59F	95H

AMG TABLES



APPLICATION MATERIAL GROUPS - DRILLS

SURFACE FEET PER MINUTE (SFM)



*Feed rate chart - see page 507. For material examples, see page 501.

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
209	43D	23B	33G	23E	13A	108F	115I	115H	52F	85J	98I	92H	75H	98K	92J	46H	10B	
860	30B	16A	16E	13C	10A	79D	108G	72F	52D	79H	72G	72F	66E	98H	85F	33D	10A	
1290	30B	16A	16E	13C	10A	79D	108G	72F	52D	79H	72G	72F	66E	98H	85F	33D	10A	
1511	30B	16A	16E	13C	10A	79D	108G	72F	52D	79H	72G	72F	66E	98H	85F	33D	10A	
1813	30B	16A	16E	13C	10A	79D	108G	72F	52D	79H	72G	72F	66E	98H	85F	33D	10A	
209CO	66D	36C	49G	23E	20B	125L	131J	89H	69F	108J	98I	98H	89F	115K	92J	66H	16C	
2A	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
2AB	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
2ACO	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
4ASM	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
4ASMCO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
500-12	39D	20B	33G	20E	10A			89H	52G				79F				10B	
500-6	39D	20B	33G	20E	10A			89H	52G				79F				10B	
501-12	39D	20B	33G	20E	10A			89H	52G				79F				10B	
501-6	39D	20B	33G	20E	10A			89H	52G				79F				10B	
502-12	39D	20B	33G	20E	10A			89H	52G				79F				10B	
502-12	39D	20B	33G	20E	10A			89H	52G				79F				10B	
502-6	39D	20B	33G	20E	10A			89H	52G				79F				10B	
5ATL	30C	13A	26F	13D	10A	98E	105H	89G	52E	105I	89H	89G	82E	115I	85G	39E	10A	
5ATS	43D	23B	33G	23E	13A	108F	115I	115H	52F	85J	98I	92H	75H	98K	92J	46H	10B	
76HA	43D	23B	33G	16E	13A	115G	108I	89H	52G	108J	98I	89H	72H	98J	92H	46F	10B	
A002	43D	23B	43G	23E	10A	164G	108I	128H	98G	134K	125J	108I	108I	98I	164H	115F	10B	
A012	43D	23B	43G	23E	10A	164G	108I	128H	98G	134K	125J	108I	108I	98I	164H	115F	10B	
A022	46F	26C	43H	26F	13B	118H	125K	89I	52I	131F	105K	105J	82J	98K	115I	56G	13C	
A100	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
A108	52E	23B	39G	23G	20E	108G	115I	102H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
A125	30B	16A	16E	13C	10A	79D	108G	72F	52D	79H	72G	72F	66E	98H	85F	33D	10A	
A141	52E	23B	39G	23G	20E	108G	115I	102H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
A217	43D	23B	33G	16E	13A	115G	108I	89H	52G	108J	98I	89H	72H	98J	92H	46F	10B	
A218	43D	23B	33G	16E	13A	115G	108I	89H	52G	108J	98I	89H	72H	98J	92H	46F	10B	
A221	43D	23B	33G	16E	13A	115G	108I	89H	52G	108J	98I	89H	72H	98J	92H	46F	10B	
A225	43D	23B	33G	16E	13A	115G	108I	89H	52G	108J	98I	89H	72H	98J	92H	46F	10B	
A345	30B	16A	26E	13C	10A	89D	108G	89F	52D	108H	89G	89F	79F	98J	98H	33F	10A	
A350	30D	16B	26G	13E	10A	108F	115I	115H	52F	108J	82I	89H	82H	115L	85J	39H	10B	
A510	66H	13B	56I	30E	20E	131D	164I	148I	66F	164G	164M	102I	108I	213G	164G	115F		
A520	66G	13B	56I	36G	23E	131E	164I	148K	66F	180I	164M	121K	115I	213G	164G	115F		
A530	59D	43B	43G	20E	10A	197G	180I	131G	115E	180I	148I	115G	92G	164J	164H	115F	10B	
A553	98E	26C	82I	49E	33G	230G	279I	262I	115G	230H	328M	180I	180J	295G				
A554	98E	26C	82I	49E	33G	230G	279I	262I	115G	230H	328M	180I	180J	295G				
A720	56A	26A	33A	23A	13A	115A	131A	115A	89A	115A	98A	89A	89A	157A	82A			
A900	49E	20C	46G	23G	20C	213G	174I	112H	98G	197J	148N	131N	92I	180I	131G			
A901	79G	33E	72I	36I	33E			184I	157I				157I					
A920	59G	33C	49I	30G	20E	213H	216J	131J	102G	246L	148N	131N	118J	180J	131H			
A921	95I	52E	79L	46I	33G			233J	164I				157J					
A940	43C	20C				213F	230F	112G	98G	174H	148N	131N	98G	180H	131F			
A941	59D	26D						157H	138H				138H					
A951	33B	20A	23E	16C	10A	72D	108G	72F	52D	98H	89G	79F	72F	98J	98H	33F	10A	
A952	33B	20A	23E	16C	10A	72D	108G	72F	52D	98H	89G	79F	72F	98J	98H	33F	10A	
A976	36A	16A						98D	89D				89D					
A977	36A	16A						98C	89C				89C					
A978	36A	16A						98B	89B				89B					
CO500-12		20D		20B	16B													
CO500-6		20D		20B	16B													
CO501-12		20D		20B	16B													
CO501-6		20D		20B	16B													
D33F							820V	820V		656V	656V	367V	197V	197X	328V			
D33L							820V	820V		656V	656V	367V	197V	197X	328V			
D33M							820V	820V		656V	656V	367V	197V	197X	328V			
D33W							820V	820V		656V	656V	367V	197V	197X	328V			
D444																		
DC							820V	820V		656V	656V	367V	197V	197X	328V			
DS-90	115T	82S	148T	98S	66S	902V	820V	820V	230T	656V	656V	367V	197V	197X	328V			
HX10	75H		59H															



APPLICATION MATERIAL GROUPS - DRILLS

SURFACE FEET PER MINUTE (SFM)



*Feed rate chart - see page 507. For material examples, see page 501.

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
HX15	115H	69H	75I	69H	56F				105I	59H	56F		171L	89I	95H	59F	95H
HX18	115H	69H	75I	69H	56F				105I	59H	56F		171L	89I	95H	59F	95H
L10	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
M40CO	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
M41CO	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
M42CO	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
M51CO	89G	82G	66E	52E	30D	20B			33D	20F	13B		92H	69E	49D	43D	56E
M52CO	89G	82G	66E	52E	30D	20B			33D	20F	13B		92H	69E	49D	43D	56E
QC0860P	98F	59F	66H	59F	46D				89H	49F	49D		151H	79H	79F		
QC1290P	98F	59F	66H	59F	46D				89H	49F	49D		151H	79H	79F		
QC21G	115F	69F	75H	69F	56D				105H	59F	59D		171H	89H	95F	59D	
QC21GM	115F	69F	75H	69F	56D				105H	59F	59D		171H	89H	95F	59D	
QC21P	98F	59F	66H	59F	46D				89H	49F	49D		151H	79H	79F		89H
QC21PM	98F	59F	66H	59F	46D				89H	49F	49D		151H	79H	79F		89H
QC41G	115F	69F	75H	69F	56D				105H	59F	59D		171H	89H	95F	59D	
QC41P	98F	59F	66H	59F	46D				89H	49F	49D		151H	79H	79F		89H
QC91G	115F	69F	75H	69F	56D				105H	59F	59D		171H	89H	95F	59D	
QC91GM	115F	69F	75H	69F	56D				105H	59F	59D		171H	89H	95F	59D	
QC91P	98F	59F	66H	59F	46D				89H	49F	49D		151H	79H	79F		89H
QC91PM	98F	59F	66H	59F	46D				89H	49F	49D		151H	79H	79F		89H
R10	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
R10A	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R10B	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R10CO	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R10H	108I	92I											82F	66D	52C	33C	49C
R10P	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
R15	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
R15A	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R15B	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R15CO	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R15P	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
R18	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
R18A	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R18B	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R18CO	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R18H	108I	92I											82F	66D	52C	33C	49C
R18P	115H	98H	82F	66F	43E	30D			49E	26G	30C		98H	79F	66E	46E	75E
R40	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
R40C	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
R41	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
R41C	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
R42	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
R42C	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
R453	410V	377V	361V	312V	246V	213U	98U	82U	180V	115V	98U	98U	361W	361W	262V	262V	180V
R454	410V	361V	295V	262V	197V	164U	98U	82U	148U	131T	115T	115T	295W	295W	230V	230V	164U
R457	410W	377W	361W	312V	246V	213U	98U	82U	180V	115V	98U		361W	361W	262V	262V	180V
R458	410W	361W	295W	262V	197V	164U	98U	82U	148U	131T	115T	115T	295W	295W	230V	230V	164U
R51	89G	82G	66E	52E	30D	20B			33D	20F	13B		92H	69E	49D	43D	56E
R510	328W	295W	295W	262W	180V	148V	115T	98S	164V				295X	295X	213W	213W	148V
R51FS																	
R52	89G	82G	66E	52E	30D	20B			33D	20F	13B		92H	69E	49D	43D	56E
R520	328X	295X	295X	262X	180X	148W	115U	98T	164W				295Y	295Y	213X	213X	197W
R55	89G	82G	66E	52E	30D	20B			33D	20F	13B		92H	69E	49D	43D	56E
R56	115H	98H	82F	66E	43D	30C			49D	23F	23B		89H	72E	62D	39D	56E
R56CO	115H	98H	82F	66E	43D	30C			49D	23F	23B		89H	72E	62D	39D	56E
R57	115H	98H	82F	66E	43D	30C			49D	23F	23B		89H	72E	62D	39D	56E
R58	98F	59F	66H	59F	46D				89H	49F	49D		151H	79H	79F		89H
R88CO	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R89CO	115J	98H	89G	79F	56E	33D			72E	36G	49C		115H	92D	72E	56E	92F
R950 3x	361W	328W	328W	279W	279W	230U											
R950 5x	361V	328V	328V	279V	279V	213U											
R950 8x	328U	295U	295U	246U	246U	197T											



APPLICATION MATERIAL GROUPS - DRILLS

SURFACE FEET PER MINUTE (SFM)



*Feed rate chart - see page 507. For material examples, see page 501.

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
HX15	75H		59H															
HX18	75H		59H															
L10	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
M40CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
M41CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
M42CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
M51CO	30C	13A	26F	13D	10A	98E	105H	89G	52E	105I	89H	89G	82E	115I	85G	39E	10A	
M52CO	30C	13A	26F	13D	10A	98E	105H	89G	52E	105I	89H	89G	82E	115I	85G	39E	10A	
QC0860P			49F			79H 75H				348H 325H				276H			151D 125D	
QC1290P			49F			79H 75H				348H 325H				276H			151D 125D	
QC21G			59H			98I 89H 89H				400H 351H				315H				
QC21GM			59H			98I 89H 89H				400H 351H				315H				
QC21P	49F		49F			89I 79H 79H				351H 325H				276H				
QC21PM	49F		49F			89I 79H 79H				351H 325H				276H				
QC41G			59H			98I 89H 89H												
QC41P	49F		49F			89I 79H 79H				351H 325H				276H				
QC91G			59H			98I 89H 89H				400H 351H				315H				
QC91GM			59H			98I 89H 89H				400H 351H				315H				
QC91P	49F		49F			89I 79H 79H				351H 325H				276H				
QC91PM	49F		49F			89I 79H 79H				351H 325H				276H				
R10	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
R10A	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R10B	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R10CO	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R10H			23E			115H 118G				148J 115J 98G 95G				138J 131I 66G				
R10P	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
R15	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
R15A	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R15B	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R15CO	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R15P	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
R18	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
R18A	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R18B	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R18CO	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R18H			23E			115H 118G				148J 115J 98G 95G				138J 131I 66G				
R18P	39D	20B	33G	20E	10A	108G	115I	89H	52G	108J	98I	89H	79F	98J	92H	46F	10B	
R40	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
R40C	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
R41	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
R41C	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
R42	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
R42C	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
R453	148V	131U				410W	722W	722W	328V	820W	820W	656V	492V					
R454	131U	115T				328V	656V	656V	262U	738W	738W	590V	394V					
R457	148V	131U				410W	722W	722W	328V	820W	820W	656V	492V					
R458	131U	115T				328V	656V	656V	262U	738W	738W	590V	394V					
R51	30C	13A	26F	13D	10A	98E	105H	89G	52E	105I	89H	89G	82E	115I	85G	39E	10A	
R510			164V							738Y 738Y 492X 213X				246X 377V				
R51FS						89I				348H 325H				276H				
R52	30C	13A	26F	13D	10A	98E	105H	89G	52E	105I	89H	89G	82E	115I	85G	39E	10A	
R520	148V	115U	164W							738Z 738Z 492Y 213Y				246Z 377V				
R55	30C	13A	26F	13D	10A	98E	105H	89G	52E	105I	89H	89G	82E	115I	85G	39E	10A	
R56	30C	16A	26F	13D	10A	115F	108H	89G	52F	108I	98H	89G	72G	98I	92G	46E	10A	
R56CO	30C	16A	26F	13D	10A	115F	108H	89G	52F	108I	98H	89G	72G	98I	92G	46E	10A	
R57	30C	16A	26F	13D	10A	115F	108H	89G	52F	108I	98H	89G	72G	98I	92G	46E	10A	
R58	49F		49F	23F	13B	108F	115H	115H	52F	85I	98H	92H	75H	98I	92I	46H	10B	
R88CO	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R89CO	66D	36C	49G	23E	20B	125H	131F	89H	69F	108J	98I	98H	89F				20C	
R950 3x																		
R950 5x																		
R950 8x																		



APPLICATION MATERIAL GROUPS - DRILLS

SURFACE FEET PER MINUTE (SFM)



*Feed rate chart - see page 507. For material examples, see page 501.

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
R960 3x									197V	164T	131T	115T	394V	380V	289V	289V	148T
R960 5x									164V	164S	131S	115S	374V	354V	279V	279V	148T
R960 8x									148U	131S	115S	98S	348U	328U	262U	262U	115S
S209	115I	98I	82F	66F	39E	30D			49E	30G	33C		98I	79E	66E	46E	75F
SPL-120	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPL-90	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPLG-120	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPLG-90	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPR-120	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPR-90	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPRG-120	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPRG-90	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPS-120	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPS-90	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPSG-120	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
SPSG-90	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
TS10-18	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
TS41-51	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G

Calculations:
(inch)

- RPM = SFM/D x 3.82
- SFM = RPM x D x .262
- IPM = IPR x RPM
- IPR = IPM ÷ RPM
- Inch = mm x .0394

Terms:

- D = Drill Diameter
- RPM = Revolutions Per Minute
- SFM = Surface Feet per Minute
- IPM = Inches Per Minute
- IPR = Inches Per Revolution
- IPR = Inches Per Revolution



APPLICATION MATERIAL GROUPS - DRILLS

SURFACE FEET PER MINUTE (SFM)



*Feed rate chart - see page 507. For material examples, see page 501.

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
R960 3x	115T	98S	115T	98S	82S													
R960 5x	115T	98S	115T	98S	82S													
R960 8x	98S	82S	98S	82S	66S													
S209	43D	23B	33G	23E	13A	108F	115I	115H	52F	85J	98I	92H	75H	98K	92J	46H	10B	
SPL-120	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPL-90	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPLG-120	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPLG-90	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPR-120	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPR-90	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPRG-120	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPRG-90	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPS-120	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPS-90	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPSG-120	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
SPSG-90	39B	23A	43D	26C	13A	89D	108E	89D	52D	108E	98E	98D	82D	98F	115E	56D	39A	
TS10-18	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
TS41-51	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	

Feed Rate Chart - Drills

How To Use This Chart to Find Cutting Feed Rate (IPR):

1. Find your Alpha Code on the AMG Chart (example: 279 U : U is the Alpha Code)
2. Find the closest diameter for your cutting application on the chart to find your IPR

Alpha Code	Feed in Inches per Revolution (IPR) ± 25%															
	1mm/ 1/32"	2mm/ 3/32"	3mm/ 1/8"	4mm/ 5/32"	5mm/ 3/16"	6mm/ 1/4"	8mm/ 5/16"	10mm/ 3/8"	12mm/ 1/2"	15mm/ 9/16"	16mm/ 5/8"	20mm/ 3/4"	25mm/ 1"	30mm/ 1.1/8"	40mm/ 1.5/8"	50mm/ 2"
A	0.0004	0.0009	0.0011	0.0013	0.0014	0.0017	0.0021	0.0024	0.0027	0.0032	0.0034	0.0043	0.0049	0.0053	0.0061	0.0069
B	0.0006	0.0011	0.0015	0.0016	0.0018	0.0021	0.0026	0.0031	0.0035	0.0041	0.0043	0.0053	0.0060	0.0065	0.0074	0.0082
C	0.0006	0.0013	0.0017	0.0020	0.0022	0.0025	0.0031	0.0039	0.0043	0.0049	0.0051	0.0063	0.0071	0.0077	0.0087	0.0094
D	0.0006	0.0015	0.0021	0.0024	0.0027	0.0031	0.0039	0.0047	0.0051	0.0059	0.0061	0.0074	0.0083	0.0090	0.0100	0.0108
E	0.0007	0.0017	0.0024	0.0028	0.0031	0.0037	0.0045	0.0055	0.0059	0.0068	0.0071	0.0085	0.0094	0.0102	0.0112	0.0122
F	0.0007	0.0020	0.0029	0.0033	0.0037	0.0043	0.0054	0.0065	0.0070	0.0080	0.0083	0.0098	0.0108	0.0116	0.0126	0.0135
G	0.0007	0.0022	0.0033	0.0038	0.0043	0.0050	0.0063	0.0075	0.0081	0.0091	0.0094	0.0110	0.0122	0.0130	0.0140	0.0148
H	0.0008	0.0026	0.0040	0.0046	0.0051	0.0059	0.0075	0.0090	0.0096	0.0107	0.0110	0.0126	0.0140	0.0148	0.0157	0.0165
I	0.0008	0.0030	0.0047	0.0053	0.0059	0.0068	0.0087	0.0104	0.0110	0.0122	0.0126	0.0142	0.0157	0.0165	0.0173	0.0181
J	0.0009	0.0033	0.0053	0.0060	0.0067	0.0078	0.0098	0.0117	0.0124	0.0137	0.0142	0.0159	0.0175	0.0183	0.0191	0.0198
K	0.0010	0.0036	0.0059	0.0067	0.0075	0.0087	0.0110	0.0130	0.0138	0.0153	0.0157	0.0177	0.0193	0.0201	0.0209	0.0215
L	0.0011	0.0040	0.0065	0.0073	0.0082	0.0094	0.0120	0.0142	0.0152	0.0165	0.0169	0.0191	0.0207	0.0215	0.0224	0.0231
M	0.0012	0.0043	0.0071	0.0080	0.0089	0.0102	0.0130	0.0154	0.0165	0.0177	0.0181	0.0205	0.0220	0.0228	0.0238	0.0248
N	0.0013	0.0047	0.0077	0.0086	0.0095	0.0110	0.0140	0.0165	0.0179	0.0189	0.0193	0.0219	0.0234	0.0242	0.0253	0.0265
S	0.0003	0.0006	0.0008	0.0010	0.0012	0.0015	0.0020	0.0031	0.0039	0.0048	0.0051	0.0059	0.0070	0.0070	0.0090	
T	0.0006	0.0011	0.0016	0.0020	0.0024	0.0028	0.0035	0.0043	0.0051	0.0063	0.0067	0.0075	0.0080	0.0090	0.0100	
U	0.0010	0.0019	0.0028	0.0031	0.0035	0.0042	0.0055	0.0067	0.0079	0.0088	0.0091	0.0094	0.0110	0.0120	0.0140	
V	0.0015	0.0027	0.0039	0.0045	0.0051	0.0060	0.0079	0.0098	0.0110	0.0122	0.0126	0.0134	0.0160	0.0170	0.0200	
W	0.0019	0.0035	0.0051	0.0059	0.0067	0.0079	0.0102	0.0130	0.0150	0.0165	0.0169	0.0177	0.0190	0.0190	0.0200	
X	0.0022	0.0041	0.0059	0.0071	0.0083	0.0098	0.0130	0.0165	0.0189	0.0210	0.0217	0.0228				
Y	0.0027	0.0049	0.0071	0.0087	0.0102	0.0125	0.0169	0.0217	0.0276	0.0276	0.0276	0.0291				
Z	0.0037	0.0068	0.0098	0.0128	0.0157	0.0210	0.0315	0.0394	0.0433	0.0463	0.0472	0.0472				



APPLICATION MATERIAL GROUPS - TAPS

SURFACE FEET PER MINUTE (SFM)



For material examples, see page 501.

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
1500	49	36	26	26	16	7			20	13	13		39	26	26	13	16
1500A	49	36	26	26	16	7			20	13	13		39	26	26	13	16
1500L	49	36	26	26	16	7			20	13	13		39	26	26	13	16
1500OV	49	36	26	26	16	7			20	13	13		39	26	26	13	16
1505	49	36	26	26	16	7			20	13	13		39	26	26	13	16
1508	49	36	26	26	16	7			20	13	13		39	26	26	13	16
1519	49	36	26	26	16	7			20	13	13		39	26	26	13	16
1528	49	36	26	26	16	7			20	13	13		39	26	26	13	16
1534	66	66	39	39	26	16			30	20	20		46	26	26	16	20
1534NE	66	66	39	39	26	16			30	20	20		46	26	26	16	20
1534NR	66	66	39	39	26	16			30	20	20		46	26	26	16	20
1541	13	13	20	16	10								20	13	20	13	
1542	13	13	20	16	10								20	13	20	13	
1543	13	13	20	16	10								20	13	20	13	
1544	13	13	20	16	10								20	13	20	13	
1545	13	13	20	16	10								20	13	20	13	
1545A	13	13	20	16	10								20	13	20	13	
1546	13	13	20	16	10								20	13	20	13	
1548	13	13	20	16	10								20	13	20	13	
1549	13	13	20	16	10								20	13	20	13	
1567	13	13	20	16	10								20	13	20	13	
1568	13	13	20	16	10								20	13	20	13	
1572	49	30	26	26					16	7							
1578	66	59	46	33	16	10			20	13	10						
1580	98	79	49	49	30				39	30							30
1582	66	49	36	36					26	20	20						20
1585	66	66	39	39	26	16			30	20	20		46	26	26	16	20
1585A	66	66	39	39	26	16			30	20	20		46	26	26	16	20
1585NR	66	59	46	33	16	10			20	13	10						
1585OV	66	66	39	39	26	16			30	20	20		46	26	26	16	20
1586	66	49	36	36					26	20	20						20
1587																	
1588																	
1590	69	59	39	39	30				30	26	20						20
1591	69	59	39	39	30				30	26	20						20
1592	13	13	20	16	10								20	13	20	13	
1593	66	66	39	39	26	16			30	20	20		46	26	26	16	20
1595	66	59	39	39	26	16			30	20	20		46	26	26	16	20
1599													49	36	36	20	
1599SB													49	36	36	20	
1600													49	36	36	20	
1629AP					148	82						98	295	230	213	115	
1630AP					148	82						98	295	230	213	115	
1634	66	66	39	39	26	16			30	20	20		46	26	26	16	20
1659AP					148	66						82	295	230	213	115	
1660AP					148	82						98	295	230	213	115	
1672AP	361	295	180	180	148	66	164		164	115	131						115
1673AP	361	295	180	180	148	66	164		164	115	131						115
1674	394	328	213	213	164	82	197		197	131	148						131
1675	394	328	213	213	164	82	197		197	131	148						131
1676AP	328	262	164	164	131	49	148		148	98	115						98
1677AP	328	262	164	164	131	49	148		148	98	115						98
1678	361	295	180	180	148	66	164		164	115	131						115
1679	361	295	180	180	148	66	164		164	115	131						115
1681AP	492	410	295	295	197				197	115	148						197
1687AP	492	410	295	295	197				197	115	148						197
1700M	49	36	26	26	16	7			20	13	13		39	26	26	13	16
1785M	66	66	39	39	26	16			30	20	20		46	26	26	16	20



APPLICATION MATERIAL GROUPS - TAPS

SURFACE FEET PER MINUTE (SFM)



For material examples, see page 501.

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
1500	13		16	7		20	66	49	7	39	79	59	16	26	13			
1500A	13		16	7		20	66	49	7	39	79	59	16	26	13			
1500L	13		16	7		20	66	49	7	39	79	59	16	26	13			
1500OV	13		16	7		20	66	49	7	39	79	59	16	26	13			
1505	13		16	7		20	66	49	7	39	79	59	16	26	13			
1508	13		16	7		20	66	49	7	39	79	59	16	26	13			
1519	13		16	7		20	66	49	7	39	79	59	16	26	13			
1528	13		16	7		20	66	49	7	39	79	59	16	26	13			
1534	16	7	26	10		30	89	69	10	49	98	66	20	98	26			
1534NE	16	7	26	10		30	89	69	10	49	98	66	20	98	26			
1534NR	16	7	26	10		30	89	69	10	49	98	66	20	98	26			
1541							36					36	23	13				
1542							36					36	23	13				
1543							36					36	23	13				
1544							36					36	23	13				
1545							36					36	23	13				
1545A							36					36	23	13				
1546							36					36	23	13				
1548							36					36	23	13				
1549							36					36	23	13				
1567							36					36	23	13				
1568							36					36	23	13				
1572						26	66	49		39	79	59	16					
1578		10	33	13		33		49		33	82	43	33	66				
1580	26		30			39	121	98		79	161	98						
1582	16	7	20	16														
1585	16	7	26	10		30	89	69	10	49	98	66	20	98	26			
1585A	16	7	26	10		30	89	69	10	49	98	66	20	98	26			
1585NR		10	33	13		33		49		33	82	43	33	66				
1585OV	16	7	26	10		30	89	69	10	49	98	66	20	98	26			
1586	16	7	20	16														
1587						30	79	79		49	66	66						
1588						30	79	79		49	66	66						
1590	16	7			10													
1591	16	7			10													
1592							36					36	23	13				
1593	16	7	26	10		30	89	69	10	49	98	66	20	98	26			
1595	16	7	26	10		30	89	69	10	49	98	66	20	98	26			
1599									13								13	
1599SB									13								13	
1600									13								13	
1629AP		33			49				82									
1630AP		33			49				82									
1634	16	7	26	10		30	89	69	10	49	98	66	20	98	26			
1659AP		33			49				82									
1660AP		33			49				82									
1672AP	82		115	66		148	394	328		279	328	279	98					
1673AP	82		115	66		148	394	328		279	328	279	98					
1674	98		131	82		164	410	361		312	394	312	131					
1675	98		148	82		164	410	361		312	394	312	131					
1676AP	66		98	49		131	328	295		262	312	262	98					
1677AP	66		98	49		131	328	295		262	312	262	98					
1678	82		115	66		148	394	328		295	377	295	115					
1679	82		115	66		148	394	328		295	377	295	115					
1681AP			148			180	590	426		590	656	754						
1687AP			148			180	590	426		590	656	754						
1700M	13		16	7		20	66	49	7	39	79	59	16	26	13			
1785M	16	7	26	10		30	89	69	10	49	98	66	20	98	26			



APPLICATION MATERIAL GROUPS - TAPS SURFACE FEET PER MINUTE (SFM)



For material examples, see page 501.

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
1788(M)																	
1985	75	69	49	49	30	16			36	20							20
1994	82	72	59	49										26			
3300	98	79	49	49	30				39	30							30
3306E	98	79	49	49	30				39	30							30
E000	82	72	59	52	33	16							49	26	49	26	33
E001	82	72	59	52	33	16			23	20	13		49	26	49	26	
E002	82	72	59	52	33												33
E003	82	72	59	52	33				23	20	13						
E005	82	72	59	52	33	16							49	26	49	26	33
E006	82	72	59	52	33	16			26	23	16		49	26	49	26	
E007	82	72	59	52	33												33
E008	82	72	59	52	33				23	20	13						
E010	82	72	59	52	33	16							49	26	49	26	33
E011	82	72	59	52	33	16			23	20	13		49	26	49	26	
E012	82	72	59	52	33												33
E013	82	72	59	52	33				23	20	13						
E015	82	72	59	52	33	16							49	26	49	26	33
E016	82	72	59	52	33	16			26	23	16		49	26	49	26	
E017	82	72	59	52	33												33
E018	82	72	59	52	33				23	20	13						
E020	82	72	59	52	33	16							49	26	49	26	33
E021	82	72	59	52	33	16			23	20	13		49	26	49	26	
E022	82	72	59	52	33												33
E023	82	72	59	52	33				23	20	13						
E025	82	72	59	52	33	16							49	26	49	26	33
E026	82	72	59	52	33	16			26	23	16		49	26	49	26	
E027	82	72	59	52	33												33
E028	82	72	59	52	33				23	20	13						
E030	82	72	59	52	33	16							49	26	49	26	33
E031	82	72	59	52	33	16			23	20	13		49	26	49	26	
E032	82	72	59	52	33	16											33
E033	82	72	59	52	33	16			23	20	13						
E035	82	72	59	52	33	16							49	26	49	26	33
E036	82	72	59	52	33	16			26	23	16		49	26	49	26	
E037	82	72	59	52	33	16											33
E038	82	72	59	52	33	16			23	20	13						
E040	82	72	59	52	33	16							49	26	49	26	33
E041	82	72	59	52	33	16			23	20	13		49	26	49	26	
E042	82	72	59	52	33												33
E043	82	72	59	52	33	16			23	20	13						
E044	82	72	59	52	33	16											
E052	82	72	59	52	33												
E061	72	66	52	39	23	13							39	23	33	16	
E071	72	66	52	39	23	13							39	23	33	16	
E201													49	26	49	26	
E252													49	26	49	26	
E500	23	20	16	13	10								39	23	33	16	
E501	23	20	16	13	10								39	23	33	16	
E504	46	39	33	26	20								59	39	72	39	
E513	23	20	16	13	10								39	23	33	16	
E547	23	20	16	13	10								39	23	33	16	
E550	72	66	52	39	23	13			23	16	23		39	23	33	16	
E620	23	20	16	13	10								39	23	33	16	
E621		59	46	33	16				20	13	10						
E650	82	72	59	49										26			
E651	82	72	59	49										26			
E653	82	72	59	49										26			



APPLICATION MATERIAL GROUPS - TAPS

SURFACE FEET PER MINUTE (SFM)



For material examples, see page 501.

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
1788(M)						30	79	79		49	66	66						
1985	16	7	30	16	10													
1994							98	66		59	115			98				
3300	26		30			39	121	98		79	161	98						
3306E	26		30			39	121	98		79	161	98						
E000	16		39	16		39	98	66		52	115	66	49	98				
E001																		
E002	16		39	16						52	115	66	49					
E003																		
E005	16		39	16		39	98	66		52	115	66	49	98				
E006																		
E007	16		39	16						52	115	66	49					
E008																		
E010	16		39	16		39	98	66		52	115	66	49	98				
E011																		
E012	16		39	16						52	115	66	49	98				
E013																		
E015	16		39	16		39	98	66		52	115	66	49	98				
E016																		
E017	16		39	16						52	115	66	49	98				
E018																		
E020	16		39	16		39	98	66		52	115	66	49	98				
E021																		
E022	16		39	16		39	98	66		52	115	66	49	98				
E023																		
E025	16		39	16		39	98	66		52	115	66	49	98				
E026																		
E027	16		39	16		39	98	66		52	115	66	49	98				
E028																		
E030	16		39	16		39	98	66		52	115	66	49	98				
E031																		
E032	16		39	16						52	115	66	49	98				
E033																		
E035	16		39	16		39	98	66		52	115	66	49	98				
E036																		
E037	16		39	16						52	115	66	49	98				
E038																		
E040	16		39	16		39	98	66		52	115	66	49	98				
E041																		
E042	16		39	16						52	115	66	49	98				
E043																		
E044	16			16														
E052						39	98	66		52	115	66	49					
E061						39	98	66				66	49		39	23		
E071						39	98	66				66	49		39	23		
E201							66		16				49		33			
E252							66		16				49		33			
E500						13	33	23	7		39	23	16		16	10		
E501						13	33	23	7		39	23	16		16	10		
E504							66	46	13		79	46	33		33	20		
E513						13	33	23	7		39	23	16		16	10		
E547						13	33	23	7		39	23	16		16	10		
E550						39	98	66	13		115	66	49		39	23		
E620						13	33	23	7		39	23	16		16	10		
E621				13						33	82	43	33					
E650							98	66		59	115			98				
E651							98	66		59	115			98				
E653							98	66		59	115			98				



APPLICATION MATERIAL GROUPS - TAPS SURFACE FEET PER MINUTE (SFM)



For material examples, see page 501.

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
E710	13	13	20	16	10								20	13	20	13	
E711	13	13	20	16	10								20	13	20	13	
E712	13	13	20	16	10								20	13	20	13	
E721	13	13	20	16	10								20	13	20	13	
EP006H	82	72	59	52	33	16							49	26	49	26	33
EP016H	82	72	59	52	33	16			23	20	13		49	26	49	26	
EP10	82	72	59	52	33	16							49	26	49	26	33
EP11	82	72	59	52	33	16			23	20	13		49	26	49	26	
EP20	82	72	59	52	33	16							49	26	49	26	33
EP21	82	72	59	52	33	16			23	20	13		49	26	49	26	
EP30	82	72	59	52	33	16							49	26	49	26	33
EP31	82	72	59	52	33	16			23	20	13		49	26	49	26	
EP40	82	72	59	52	33	16							49	26	49	26	33
EP41	82	72	59	52	33	16			23	20	13		49	26	49	26	
EX016H	82	72	59	52	33				23	20	13						
EX10	82	72	59	52	33												33
EX11	82	72	59	52	33				23	20	13						
EX20	82	72	59	52	33												33
EX21	82	72	59	52	33				23	20	13						
EX30	82	72	59	52	33												33
EX31	82	72	59	52	33				23	20	13						
EX40	82	72	59	52	33												33
EX41	82	72	59	52	33				23	20	13						
TN1500	59	46	30	30	20	10			26	26	16		49	30	30	16	20
TN1534	79	75	49	49	30	20			39	26	26		49	30	30	20	
TN1541	16	16	23	20	13								23	16	23	16	
TN1543	16	16	23	20	13								23	16	23	16	
TN1585	79	75	49	49	30	20			39	26	26		49	30	30	20	
TN1785	79	75	49	49	30	20			39	26	26		49	30	30	20	
U1511	39	33	26	20	16								46	26	39		

APPLICATION MATERIAL GROUPS - DIES SURFACE FEET PER MINUTE (SFM)

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
2010	26	23	20	16					13	7			26	23	20	16	
2025	26	23	20	16					13	7			26	23	20	16	
2325M	26	23	20	16					13	7			26	23	20	16	
2510	26	23	20	16					13	7			26	23	20	16	
2710M	26	23	20	16					13	7			26	23	20	16	
F201	26	23	20	16					13	7			26	23	20	16	
F302	26	23	20	16					13	7			26	23	20	16	
F312	26	23	20	16					13	7			26	23	20	16	
F320	26	23	20	16					13	7			26	23	20	16	
F330	26	23	20	16					13	7			26	23	20	16	
F370	26	23	20	16					13	7			26	23	20	16	



APPLICATION MATERIAL GROUPS - TAPS SURFACE FEET PER MINUTE (SFM)



For material examples, see page 501.

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
E710							36					36	23	13				
E711							36					36	23	13				
E712							36					36	23	13				
E721							36					36	23	13				
EP006H	16		39	16		39	98	66		52	115	66	49	98				
EP016H																		
EP10	16		39	16		39	98	66		52	115	66	49	98				
EP11																		
EP20	16		39	16		39	98	66		52	115	66	49	98				
EP21																		
EP30	16		39	16		39	98	66		52	115	66	49	98				
EP31																		
EP40	16		39	16		39	98	66		52	115	66	49	98				
EP41																		
EX016H																		
EX10	16		39	16						52	115	66	49					
EX11																		
EX20	16		39	16						52	115	66	49					
EX21																		
EX30	16		39	16						52	115	66	49					
EX31																		
EX40	16		39	16						52	115	66	49	98				
EX41																		
TN1500	16		20	10		26	79	59	10	49	98	75	20	30	16			
TN1534			30	13		39	115	89	13	66	125	79	26	121	30			
TN1541							39					39	26	16				
TN1543							39					39	26	16				
TN1585			30	13		39	115	89	13	66	125	79	26	121	30			
TN1785			30	13		39	115	89	13	66	125	79	26	121	30			
U1511							52	39			66	39			26			

APPLICATION MATERIAL GROUPS - DIES SURFACE FEET PER MINUTE (SFM)

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
2010	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
2025	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
2325M	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
2510	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
2710M	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
F201	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
F302	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
F312	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
F320	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
F330	7		30	7	7	30	26	23		33	49	49	33	49	33	16		
F370	7		30	7	7	30	26	23		33	49	49	33	49	33	16		



APPLICATION MATERIAL GROUPS - END MILLS

SURFACE FEET PER MINUTE (SFM)



*Feed rate chart - see pages 516 & 517. For material examples, see page 501.

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
883	66P	66P	52P	46P	33P	26P			43P	30P	20R	16R	59R	49R	52R	33R	52N
900	164S	131S	115T	98T					75Y				92S	75S	131T	82T	92V
905	112S	89S	79T										89S	72S	89T		62V
920	98A	89A	75B										82A	66A	82B		59D
921	98A	89A	75B										82A	66A	82B		59D
922	98A	89A	75B										82A	66A	82B		59D
923	98A	89A	75B										82A	66A	82B		59D
930		131A	115B	98B	66C					62F			75A	131B	82B		92D
931	164A	131A	115B	98B					75F				92A	75A	131B	82B	92D
933		131A	115B	98B	66C					62F			75A	131B	82B		92D
945	164S	131S	115T	98T					75Y				92S	75S	131T	82T	92V
946	98A	89A	75B										82A	66A	82B		59D
947	98A	89A	75B										82A	66A	82B		59D
948	115S	92S	79T	69T					52Y				92S	75S	92T	56T	62V
960	164S	131S	115T	98T					75Y				92S	75S	131T	82T	92V
961	148S	118S	102T	89T					66Y				82S	66S	118T	72T	82V
962	148S	118S	102T	89T					66Y				82S	66S	118T	72T	82V
963	164A	131A	115B	98B					75F				92A	75A	131B	82B	92D
980	164A	131A	115B						75F	62F							92D
981	148A	118A	102B						66F	56F							82D
982	148A	118A	102B						66F	56F							82D
9002	164G	131G	115H	98H					75L				92G	75G	131H	82H	92J
9008	148G	118G	102H	89H					66L				82G	66G	118H	72H	82J
9009	148G	118G	102H	89H					66L				82G	66G	118H	72H	82J
920K	98A	89A	75B										82A	66A	82B		59D
C110	197A	164A	131B	115B					98F				115A	98A	164B	98B	115D
C123	180A	148A	131B	115B					82F				98A	82A	148B	98B	98D
C247	180S	148S	131T	115T					82Y				98S	82S	148T	82T	98V
C273	164S	164S	115T	98T					33Y				82S	66S	131T	82T	82V
C346	148A	115A	98B	82B					66F				82A	66A	115B	66B	82D
E2302	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
E2304	361B	325B	325B	298B	249B	230B			239A	171A	131A	98A	449B	377B	377B	279B	
E3302	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
E3302M	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
E3302MV	400B	298B	298B	259B	230B	200B			325A	223A	174A	131A	551B	525B	525B	374B	230B
E3302V	400B	298B	298B	259B	230B	200B			325A	223A	174A	131A	551B	525B	525B	374B	230B
E3303	289B	223B	223B	180B	161B	148B			200A	141A	108A		374B	318B	318B	249B	
E3303V	400B	298B	298B	259B	230B	200B			325A	223A	174A		551B	525B	525B	374B	230B
E3304	361B	325B	325B	298B	249B	230B			239A	171A	131A	105A	449B	377B	377B	279B	
E3304M	361B	325B	325B	298B	249B	230B			239A	171A	131A	105A	449B	377B	377B	279B	
E3304MV	499B	449B	449B	423B	400B	328B			351A	276A	200A	164A	699B	649B	649B	430B	259B
E3304V	499B	449B	449B	423B	400B	328B			351A	276A	200A	164A	699B	649B	649B	430B	259B
E3603V						200B			325A	226A	174A	131A					230B
E4302	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
E4304	361B	325B	325B	298B	249B	230B			239A	171A	131A	105A	449B	377B	377B	279B	
E6302	249B	200B	200B	161B	144B	131B			180A	108A	98A	66A	298B	249B	249B	200B	
E6302V	361B	269B	269B	239B	200B	180B			298A	180A	171A	131A	499B	400B	400B	341B	200B
E6304	325B	298B	298B	276B	226B	180B			200A	141A	115A	89A	361B	298B	298B	230B	
E6304V	449B	400B	400B	390B	361B	298B			325A	226A	164A	115A	600B	508B	508B	400B	230B
EB3302	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
EB3302M	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
EB3302MV	400B	298B	298B	259B	230B	200B			325A	223A	174A	131A	551B	525B	525B	374B	230B
EB3302V	400B	298B	298B	259B	230B	200B			325A	223A	174A	131A	551B	525B	525B	374B	230B
EB3304	361B	325B	325B	298B	249B	230B			239A	171A	131A	98A	449B	377B	377B	279B	
EB3304M	361B	325B	325B	298B	249B	230B			239A	171A	131A	98A	449B	377B	377B	279B	
EB3304MV	499B	449B	449B	423B	400B	328B			351A	276A	200A	148A	699B	649B	649B	430B	259B
EB3304V	499B	449B	449B	423B	400B	328B			351A	276A	200A	148A	699B	649B	649B	430B	259B
EB6302	249B	200B	200B	161B	144B	131B			180A	108A	98A	82A	298B	249B	249B	200B	



APPLICATION MATERIAL GROUPS - END MILLS

SURFACE FEET PER MINUTE (SFM)



*Feed rate chart - see pages 516 & 517. For material examples, see page 501.

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
883	36P	20C	66P	13C	7M	131P	148P	148P	16M	180R	134R	85R	56R					56R
900	75V		157V	43U		410U	410U	410U		984X	984X	295X		410U				
905	49V		108V	20U		200U	223U	223U		243X	194X	144X		200U				
920	49D		98D	20C		180C	197C	197C		197E	180E	115E		197C				
921	49D		98D	20C		180C	197C	197C		197E	180E	115E		197C				
922	49D		98D	20C		180C	197C	197C		197E	180E	115E		197C				
923	49D		98D	20C		180C	197C	197C		197E	180E	115E		197C				
930	75D	33D		43C	20D		410C	410C	49C			295E	197A		410C			
931	75D		157D	43C		410C	410C	410C			984E	295E		410C				
933	75D	33D		43C	20D		410C	410C	49C			295E	197A		410C			
945	75V		157V	43U		410U	410U	410U		984X	984X	295X		410U				
946	49D		98D	20C		180C	197C	197C			180E	115E		197C				
947	49D		98D	20C		180C	197C	197C			180E	115E		197C				
948	52V		108V	20U		203U	223U	223U			197X	148X		203U				
960	75V		157V	43U		410U	410U	410U		984X	984X	295X		410U				
961	66V		141V	36U		367U	367U	367U		886X	886X	266X		367U				
962	66V		141V	36U		367U	367U	367U		886X	886X	266X		367U				
963	75D		157D	43C		410C	410C	410C		984E	984E	295E		410C				
980			157D			410C				984E	984E	295E		410C				
981			141D			367C				886E	886E	266E		367C				
982			141D			367C				886E	886E	266E		367C				
9002	75J		157J	43I		410I	410I	410I			984K	295K		410I				
9008	66J		141J	36I		367I	367I	367I			886K	266K		367I				
9009	66J		141J	36I		367I	367I	367I			886K	266K		367I				
920K	49D		98D	20C		180C	197C	197C		197E	180E	115E		197C				
C110	82D		197D	49C		279C	279C	279C		722E	722E	279E		295C				
C123	82D		164D	49C		262C	262C	262C		656E	656E	262E		262C				
C247	82V		164V	49U		262U	262U	262U		656X	656X	262X		262U				
C273	66V		148V	33U		230U	230U	230U		590X	590X	230X		230U				
C346	66D		148D	33C		230C	230C	230C		590E	590E			230C				
E2302						649C	499C	499C	125B	1499C	1499C	649C	400B					
E2304						679C	574C	574C	144B	1601C	1601C	708C	479B					
E3302						649C	499C	499C	125B	1499C	1499C	649C	400B					
E3302M						649C	499C	499C	125B	1499C	1499C	649C	400B					
E3302MV	200B	190B	230B	161A	98A													
E3302V	200B	190B	230B	161A	98A													
E3303						649C	499C	499C	125B	1499C	1499C	649C	400B					
E3303V	200B	190B	230B	161A	98A													
E3304						679C	574C	574C	144B	1601C	1601C	708C	479B					
E3304M						679C	574C	574C	144B	1601C	1601C	708C	479B					
E3304MV	230B	200B	266B	200A	131A													
E3304V	230B	200B	266B	200A	131A													
E3603V	200B	190B	230B	161A	98A													
E4302						649C	499C	499C	125B	1499C	1499C	649C	400B					
E4304						679C	574C	574C	144B	1601C	1601C	708C	479B					
E6302						584C	449C	449C	108B	1348C	1348C	584C	361B					
E6302V	180B	174B	200B	141A	85A													
E6304						613C	518C	518C	131B	1450C	1450C	640C	430B					
E6304V	210B	180B	236B	180A	115A													
EB3302						649C	499C	499C	125B	1499C	1499C	649C	400B					
EB3302M						649C	499C	499C	125B	1499C	1499C	649C	400B					
EB3302MV	200B	190B	230B	161A	98A													
EB3302V	200B	190B	230B	161A	98A													
EB3304						679C	574C	574C	144B	1601C	1601C	708C	479B					
EB3304M						679C	574C	574C	144B	1601C	1601C	708C	479B					
EB3304MV	230B	200B	266B	200A	131A													
EB3304V	230B	200B	266B	200A	131A													
EB6302			148B			584C	449C	449C	108B	1348C	1348C	584C	361B					

For material examples, see page 501.

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
EB6302V	361B	269B	269B	239B	200B	180B			298A	180A	171A	89A	499B	400B	400B	341B	200B
EB6304	325B	298B	298B	276B	226B	180B			200A	141A	115A		361B	298B	298B	230B	
EB6304V	400B	374B	374B	351B	325B	249B			226A	190A	151A	121A	499B	430B	430B	338B	200B
TC9002	197G	184G	161H	138H					105L				128G	105G	184H	128H	128J
TC9003	197G	184G	161H	138H					105L				128G	105G	184H	128H	128J
TC9008	197G	184G	161H	138H					105L				128G	105G	184H	128H	128J
TC9009	197G	184G	161H	138H					105L				128G	105G	184H	128H	128J
TN923	118A	105A	89B										98A	79A	98B		72D
TN940	138S	112S	95T	82T					62Y				112S	92S	112T	66T	75V
TN945	138S	112S	95T	82T					62Y				112S	92S	112T	66T	75V
TN946	138S	112S	95T	82T					62Y				112S	92S	112T	66T	75V
TN948	138S	112S	95T	82T					62Y				112S	92S	112T	66T	75V

Feed Rate Chart - Solid Carbide End Mills

How To Use This Chart to Find Cutting Feed Rate (IPR):

1. Find your Alpha Code on the AMG Chart (example: 279 U : U is the Alpha Code).
2. Find the closest diameter for your cutting application on the chart.
3. Select the type of cut and # Flutes to find your Ft Range.

# of Flutes	Type of Cut	Depth/Width of Cut	Alpha Code	Feed Per Tooth (Ft) Dia Inches											
				1/8	5/32	3/16	1/4	5/16	13/32	1/2	9/16	5/8	11/16	3/4	
>4		↓ 1,5 ↔ 0,05	A				0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	
			B				0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.004	
			C				0.003	0.003	0.004	0.004	0.005	0.005	0.006	0.007	
3-4		↓ 1,5 ↔ 0,1	A	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	
			B	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.005	0.006	0.007	
			C	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.006	0.007	0.008	0.009	
3-4		↓ 1 ↔ 0,5	A	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	
			B	0.003	0.000	0.001	0.001	0.001	0.002	0.002	0.002	0.003	0.003	0.004	
			C	0.000	0.001	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.005	
2-3		↓ 0,5 ↔ 1	A	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	
			B	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	
			C	0.001	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.005	
3-4		↓ 0,5 ↔ 1 ↓ 1 ↔ 0,5	B				0.001	0.002	0.003	0.003	0.003	0.004	0.004	0.004	
2 & 4		↓ 0,1 - 0,5mm ↔ 0,1 - 0,5mm	A												
			BC	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.003	0.003	0.004		
4		↓ 0,01 - 0,1 ↔ ≤ 1	A												
			BC				0.002	0.002	0.002	0.003		0.003			
							0.002	0.002	0.003	0.003		0.004			



APPLICATION MATERIAL GROUPS - END MILLS

SURFACE FEET PER MINUTE (SFM)







For material examples, see page 501.

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
EB6302V	180B	174B	200B	141A	85A													
EB6304						613C	518C	518C	131B	1450C	1450C	640C	430B					
EB6304V	190B		210B			699C	571C	571C	180B	1650C	1650C	708C	410B					
TC9002	105J		220J	59I		574I	574I	574I			1378K	413K		574I				
TC9003	105J		220J	59I		574I	574I	574I			1378K	413K		574I				
TC9008	105J		220J	59I		574I	574I	574I			1378K	413K		574I				
TC9009	105J		220J	59I		574I	574I	574I			1378K	413K		574I				
TN923	59D		118D	23C		216C	236C	236C		236E	216E	138E		236C				
TN940	62V		131V	23U		243U	269U	269U			236X	177X		243U				
TN945	62V		131V	23U		243U	269U	269U			236X	177X		243U				
TN946	62V		131V	23U		243U	269U	269U			236X	177X		243U				
TN948	62V		131V	23U		243U	269U	269U			236X	177X		243U				

Feed Rate Chart - HSS End Mills

How To Use This Chart to Find Cutting Feed Rate (IPR):

1. Find your Alpha Code on the AMG Chart (example: 279 U : U is the Alpha Code).
2. Find the closest diameter for your cutting application on the chart.
3. Select the type of cut and # Flutes to find your Ft Range.

Feed per Tooth (Ft) Dia Inches																		
Type of Cut	Alpha Code	0.078	1/8	5/32	3/16	1/4	5/16	13/32	1/2	9/16	5/8	11/16	3/4	7/8	1"	1.1/4	1.1/2	
	A	0.0003	0.0005	0.0007	0.0009	0.0011	0.0017	0.0024	0.0028	0.0033	0.0038	0.0038	0.0038	0.0039	0.0041	0.0042	0.0043	
	B	0.0003	0.0005	0.0006	0.0009	0.0010	0.0015	0.0021	0.0026	0.0030	0.0034	0.0034	0.0034	0.0035	0.0037	0.0037	0.0038	
	C	0.0003	0.0004	0.0006	0.0007	0.0009	0.0014	0.0019	0.0023	0.0027	0.0031	0.0031	0.0031	0.0031	0.0033	0.0034	0.0034	
	D	0.0003	0.0004	0.0006	0.0008	0.0009	0.0015	0.0020	0.0024	0.0028	0.0032	0.0032	0.0032	0.0032	0.0033	0.0035	0.0038	0.0040
	E	0.0005	0.0007	0.0009	0.0014	0.0017	0.0025	0.0034	0.0041	0.0048	0.0055	0.0056	0.0056	0.0056	0.0057	0.0060	0.0066	0.0069
	↔ D	F	0.0004	0.0005	0.0007	0.0008	0.0010	0.0013	0.0016	0.0020	0.0022	0.0025	0.0028	0.0031	0.0031	0.0033	0.0033	0.0033
	G					0.0010	0.0013	0.0014	0.0017	0.0020	0.0022	0.0025	0.0028	0.0028	0.0021	0.0021	0.0022	
	H					0.0009	0.0012	0.0013	0.0015	0.0018	0.0020	0.0023	0.0026	0.0026	0.0019	0.0019	0.0020	
	I					0.0008	0.0011	0.0011	0.0014	0.0016	0.0018	0.0020	0.0023	0.0023	0.0017	0.0017	0.0018	
	J					0.0009	0.0012	0.0013	0.0015	0.0018	0.0020	0.0023	0.0026	0.0026	0.0019	0.0019	0.0020	
	↓ D	K					0.0014	0.0019	0.0026	0.0031	0.0036	0.0059	0.0035	0.0039	0.0038	0.0043	0.0043	0.0046
	↔ 0,8D	L					0.0004	0.0005	0.0007	0.0008	0.0010	0.0011	0.0012	0.0013	0.0013	0.0013	0.0015	0.0017
	M	0.0003	0.0005	0.0007	0.0009	0.0012	0.0016	0.0022	0.0027	0.0031	0.0036	0.0041	0.0045	0.0035	0.0041	0.0038	0.0042	
	N	0.0003	0.0004	0.0006	0.0008	0.0011	0.0015	0.0020	0.0024	0.0028	0.0032	0.0037	0.0041	0.0024	0.0037	0.0034	0.0038	
	O	0.0002	0.0004	0.0006	0.0007	0.0010	0.0013	0.0018	0.0022	0.0026	0.0029	0.0033	0.0036	0.0029	0.0033	0.0031	0.0034	
	P	0.0003	0.0004	0.0006	0.0008	0.0011	0.0014	0.0019	0.0023	0.0027	0.0031	0.0035	0.0039	0.0031	0.0035	0.0033	0.0036	
	↓ 1,5D	Q	0.0004	0.0006	0.0008	0.0010	0.0015	0.0019	0.0026	0.0031	0.0036	0.0041	0.0035	0.0039	0.0039	0.0044	0.0050	0.0055
	↔ 0,25D	R	0.0005	0.0006	0.0008	0.0010	0.0011	0.0015	0.0019	0.0022	0.0026	0.0029	0.0033	0.0036	0.0036	0.0036	0.0041	0.0043
	S	0.0004	0.0006	0.0009	0.0011	0.0015	0.0020	0.0028	0.0034	0.0039	0.0045	0.0051	0.0056	0.0044	0.0051	0.0048	0.0052	
	T	0.0004	0.0006	0.0008	0.0010	0.0014	0.0018	0.0025	0.0030	0.0035	0.0051	0.0046	0.0051	0.0040	0.0046	0.0043	0.0047	
	U	0.0003	0.0005	0.0007	0.0009	0.0013	0.0016	0.0023	0.0028	0.0032	0.0036	0.0041	0.0046	0.0036	0.0041	0.0039	0.0043	
	V	0.0004	0.0005	0.0008	0.0010	0.0013	0.0017	0.0024	0.0029	0.0034	0.0039	0.0043	0.0048	0.0038	0.0043	0.0041	0.0045	
	↓ 1,5D	X	0.0005	0.0007	0.0010	0.0013	0.0018	0.0023	0.0032	0.0039	0.0045	0.0052	0.0044	0.0049	0.0048	0.0055	0.0062	0.0068
	↔ 0,1D	Y	0.0006	0.0008	0.0010	0.0012	0.0014	0.0019	0.0023	0.0028	0.0024	0.0036	0.0041	0.0045	0.0045	0.0045	0.0051	0.0054

Easy Calculations: (inch)

$$RPM = SFM/D \times 3.82 \quad F = Ft \times T \times RPM$$

$$RPM = [(m/min.) \times 1000] \div (3.14 \times D)$$

Terms: RPM = Revolutions Per Minute F = Feed Inches Per Minute
 Ft = Feed Per Tooth T = Number of Teeth D = Cutting Dia.
 SFM = Surface Feet per Minute



APPLICATION MATERIAL GROUPS - REAMERS

SURFACE FEET PER MINUTE (SFM)



For material examples, see page 501.

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
4500	82C	66C	52C	49B	30B	16A			36C	20B	26B	20B	52E	49D	43C	36C	49C
4531	82C	66C	52C	49B	30B	16A			36C	20B	26B	20B	52E	49D	43C	36C	49C
4532	82C	66C	52C	49B	30B	16A			36C	20B	26B	20B	52E	49D	43C	36C	49C
4533	82C	66C	52C	49B	30B	16A			36C	20B	26B	20B	52E	49D	43C	36C	49C
4535	82C	66C	52C	49B	30B	16A			36C	20B	26B	20B	52E	49D	43C	36C	49C
4536	82C	66C	52C	49B	30B	16A			36C	20B	26B	20B	52E	49D	43C	36C	49C
4537	82C	66C	52C	49B	30B	16A			36C	20B	26B		52E	49D	43C	36C	49C
4579	59C	46C	36C	33B	16B	13A			26C	16B	20B		46E	36D	33C	30C	36C
4587	59C	46C	36C	33B	16B	13A			26C	16B	20B		46E	36D	33C	30C	36C
4588	59C	46C	36C	33B	16B	13A			26C	16B	20B		46E	36D	33C	30C	36C
4591	59C	46C	36C	33B	16B	13A			26C	16B	20B		46E	36D	33C	30C	36C
4600	59C	46C	36C	33B	16B	13A			26C	16B	20B	20B	46E	36D	33C	30C	36C
B100	59C	46C	36C	33B	16B	13A			26F				46E	36D	33C	30C	36C
B101	59C	46C	36C	33B	16B	13A			26C				46E	36D	33C	30C	36C
B121	59C	46C	36C	33B	16B	13A							46E	36D	33C	30C	36C
B122	59C	46C	36C	33B	16B	13A			26C	16B	20B		46E	36D	33C	30C	36C
B157	82C	66C	52C	49B	30B	16A			36C	20B	26B						49C
B170	82C	66C	52C	49B	30B	16A			36C	20B	26B		52E	49D	43C	36C	49C
B301	59C	46C	36C	33B	16B	13A			26C	16B	20B		46E	36D	33C	30C	36C
B400	59B	59B	46B	46B	33C	33C							56D	56D	56D	46D	46C
B411	59B	59B	46B	46B	33C	33C							56D	56D	56D	46D	46C
B441	59B	59B	46B	46B	33C	33C							56D	56D	56D	46D	46C
B442	59B	59B	46B	46B	33C	33C							56D	56D	56D	46D	46C
B481	59B	59B	46B	46B	33C	33C							56D	56D	56D	46D	46C
B901	59C	46C	36C	33B	16B	13A			26C				46E	36D	33C	30C	36C

APPLICATION MATERIAL GROUPS - COUNTERSINKS

SURFACE FEET PER MINUTE (SFM)

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1
4602	98F	82E	66D	49D	33B	20A			26C	20B	13A		82F	49D	39C	26C	39C
4603	98F	82E	66D	49D	33B	20A			26C	20B	13A		82F	49D	39C	26C	39C
4700	82C	66C	52C	49B	30B	16A			36C	20B	26B		52E	49D	43C	36C	49C
4702	82C	66C	52C	49B	30B	16A			36C	20B	26B		52E	49D	43C	36C	49C
4703	82C	66C	52C	49B	30B	16A			36C	20B	26B		52E	49D	43C	36C	49C
4705	82C	66C	52C	49B	30B	16A			36C	20B	26B		52E	49D	43C	36C	49C
4706	82C	66C	52C	49B	30B	16A			36C	20B	26B		52E	49D	43C	36C	49C
G136	98F	82E	66D	49D	33B	20A			26C	20B	13A		82F	49D	39C	26C	39C
G137	98F	82E	66D	49D	33B	20A			26C	20B	13A		82F	49D	39C	26C	39C
G149	98D	82D	66C	49B	33A	20A			26B	20A			82D	49C	39A	26A	39B
G154	98F	82E	66D	49D	33B	20A			26C	20B	13A		82F	49D	39C	26C	39C
G335	164E	131E	98D	66D	49B	33B							148F	115D	98C	98C	66C
G400	98F	82E	66D	49D	33B	20A			26C	20B	13A		82F	49D	39C	26C	39C
G560	164E	131E	98D	66D	49B	33B							148F	115D	98C	98C	66C

Feed Rate Chart - Reamers

Alpha Code	Reamers - Feed in Inches per Revolution											Ø Diameter		
	1/16	5/64	1/8	3/16	5/16	25/64	1/2	5/8	25/32	1"	1-13/16	1-1/2	2"	
A	0.002	0.002	0.003	0.004	0.006	0.007	0.007	0.009	0.010	0.011	0.013	0.015	0.017	
B	0.002	0.003	0.004	0.006	0.007	0.008	0.009	0.011	0.012	0.014	0.016	0.020	0.022	
C	0.003	0.003	0.005	0.007	0.009	0.010	0.011	0.013	0.015	0.017	0.019	0.024	0.027	
D	0.031	0.004	0.006	0.008	0.011	0.013	0.014	0.016	0.019	0.021	0.024	0.029	0.033	
E	0.004	0.006	0.007	0.010	0.014	0.015	0.017	0.020	0.021	0.025	0.030	0.036	1.043	
F	0.006	0.007	0.010	0.014	0.017	0.020	0.022	0.025	0.028	0.031	0.037	1.047	1.059	



APPLICATION MATERIAL GROUPS - REAMERS

SURFACE FEET PER MINUTE (SFM)



For material examples, see page 501.

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
4500	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4531	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4532	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4533	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4535	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4536	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4537	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4579	16B	13B	16D			59D	66E	59D	36D	75F	59F	49E	46D		69B			
4587	16B	13B	16D			59D	66E	59D	36D	75F	59F	49E	46D		69B			
4588	16B	13B	16D			59D	66E	59D	36D	75F	59F	49E	46D		69B			
4591	16B	13B	16D			59D	66E	59D	36D	75F	59F	49E	46D		69B			
4600	16B	13B	16D			59D	66E	59D	36D	75F	59F	49E	46D		69B			
B100	16B	13B	16D	10C	7C	59D	66E	59D	36D	75F	59F				69B			
B101	16B	13B	16D	10C	7C	59D	66E	59D	36D	75F	59F				69B			
B121															69B			
B122	16B	13B	16D			59D	66E	59D	36D	75F	59F	49E	46D		69B			
B157	30B	16B	26D	16C	10C	82D	92E			92F	82F	66E	52D	98B			10A	
B170	30B	16B	26D	16C	10C	82D	92E	82D	46D									
B301	16B	13B	16D			59D	66E	59D	36D	75F	59F	49E	46D		69B			
B400	46C	33B	33C	33B	33B	125E	125E	125E	125D	197D	197D	82D	82D	82C	43C			
B411	46C	33B	33C	33B	33B	125E	125E	125E	125D	197D	197D	82D	82D	82C	43C			
B441	46C	33B	33C	33B	33B	125E	125E	125E	125D	197D	197D	82D	82D	82C	43C			
B442	46C	33B	33C	33B	33B	125E	125E	125E	125D	197D	197D	82D	82D	82C	43C			
B481	46C	33B	33C	33B	33B	125E	125E	125E	125D	197D	197D	82D	82D	82C	43C			
B901	16B	13B	16D	10C	7C	59D	66E	59D	36D	75F	59F				69B			

APPLICATION MATERIAL GROUPS - COUNTERSINKS

SURFACE FEET PER MINUTE (SFM)

	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	7.3	7.4	8.1	8.2	8.3	9.1	10.1
4602	33A	26A	39C	20B	13A	82D	66F	82F	33D	98G	82F	66F	33F	98G	66G			
4603	33A	26A	39C	20B	13A	82D	66F	82F	33D	98G	82F	66F	33F	98G	66G			
4700	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4702	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4703	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4705	30B	16B	26D	16C	10C	82D	92E	82D	46D									
4706	30B	16B	26D	16C	10C	82D	92E	82D	46D									
G136	33A	26A	39C	20B	13A	82D	66F	82F	33D	98G	82F	66F	33F	98G	66G			
G137	33A	26A	39C	20B	13A	82D	66F	82F	33D	98G	82F	66F	33F	98G	66G			
G149	33A	26A	39B	20A	13A	82B	66C	82C	33B	98D	82C	66C	33C	98D	66D			
G154	33A	26A	39C	20B	13A	82D	66F	82F	33D	98G	82F	66F	33F	98G	66G			
G335	49A	33A	66C	33B	20A	131D	98F	131F	49D	164G	131F	98F	49F	164G	98G			
G400	33A	26A	39C	20B	13A	82D	66F	82F	33D	98G	82F	66F	33F	98G	66G			
G560	49A	33A	66C	33B	20A	131D	98F	131F	49D	164G	131F	98F	49F	164G	98G			

Feed Rate Chart - Countersinks, Counterbores

Alpha Code	Countersinks, Counterbores - Feed in Inches per Revolution										Ø Diameter	
	1/4	5/16	5/64	5/8	25/32	1"	1-1/4	1-1/2	2-3/8	3"		
A	0.001	0.002	0.002	0.002	0.003	0.004	0.004	0.005	0.006	0.006		
B	0.002	0.002	0.002	0.003	0.004	0.005	0.006	0.006	0.007	0.008		
C	0.002	0.002	0.003	0.004	0.005	0.006	0.006	0.007	0.008	0.009		
D	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011		
E	0.003	0.004	0.005	0.006	0.007	0.008	0.010	0.011	0.012	0.013		
F	0.004	0.004	0.005	0.006	0.007	0.008	0.010	0.011	0.013	0.014		
G	0.004	0.005	0.006	0.007	0.008	0.009	0.011	0.013	0.014	0.016		
H	0.005	0.006	0.007	0.008	0.009	0.010	0.012	0.014	0.016	0.018		



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000001	E53023/16	330	000073	EB5304V5/16	345	0000830	A10012.2	71	001101	E33045/64	339
000002	E53021/4	330	000074	EB5304V3/8	345	0000847	A10012.25	71	001102	E33043/32	339
000003	E53025/16	330	000075	EB5304V7/16	345	0000854	A10012.3	71	0001103	A10014.25	72
000004	E53023/8	330	0000076	A100.38	68	0000861	A10012.4	71	001103	E33047/64	339
000005	E53027/16	330	000076	EB5304V1/2	345	0000878	A10012.5	71	001104	E33041/8	339
000006	E53021/2	330	000077	EB5304V5/8	345	0000885	A10012.6	71	001105	E33049/64	339
000007	E53025/8	330	000078	EB5304V3/4	345	0000892	A10012.7	71	001106	E33045/32	339
000008	E53023/4	330	000079	EB5304V1	345	0000908	A10012.75	71	001107	E330411/64	339
000009	E53021	330	000083	A100.4	68	0000915	A10012.8	71	001108	E33043/16	339
000010	E5302V1/8	330	000090	A100.42	68	0000922	A10012.9	71	001109	E330413/64	339
000011	E5302V3/16	330	0000113	A100.48	68	0000939	A10013.0	71	0001110	A10014.5	72
000012	E5302V1/4	330	0000120	A100.5	68	0000946	A10013.1	71	001111	E33047/32	339
000013	E5302V5/16	330	0000137	A100.52	68	0000953	A10013.2	71	001111	E330415/64	339
000014	E5302V3/8	330	0000144	A100.55	68	0000960	A10013.25	71	001112	E33041/4	339
000015	E5302V7/16	330	0000151	A100.58	69	0000977	A10013.3	71	001116	E33045/16	339
000016	E5302V1/2	330	0000168	A100.6	69	0000984	A10013.4	71	001117	E33043/8	339
000017	E5302V5/8	330	0000175	A100.62	69	0000991	A10013.5	71	001118	E33047/16	339
000018	E5302V3/4	330	0000182	A100.65	69	001000	E33021/16	328	001119	E33041/2	339
000019	E5302V1	330	0000199	A100.68	69	001001	E33025/64	328	001120	E33049/16	339
000020	E53041/8	341	0000205	A100.7	69	001002	E33023/32	328	001121	E33045/8	339
000021	A100.2	68	0000212	A100.72	69	001003	E33027/64	328	001122	E330411/16	339
000021	E53043/16	341	0000229	A100.75	69	001004	A10013.6	71	001123	E33043/4	339
000022	E53041/4	341	0000236	A100.78	69	001004	E33021/8	328	001124	E33047/8	339
000023	E53045/16	341	0000243	A100.8	69	001005	E33029/64	328	001125	E33041	339
000024	E53043/8	341	0000250	A100.82	69	001006	E33025/32	328	0001127	A10014.75	72
000025	E53047/16	341	0000267	A100.85	69	001007	E330211/64	328	001128	E3304M2.0	340
000026	E53041/2	341	0000274	A100.88	69	001008	E33023/16	328	001129	E3304M2.5	340
000027	E53045/8	341	0000281	A100.9	69	001009	E330213/64	328	001130	E3304M3.0	340
000028	E53043/4	341	0000298	A100.92	69	001010	E33027/32	328	001131	E3304M3.5	340
000029	E53041	341	0000304	A100.95	69	001011	A10013.7	71	001132	E3304M4.0	340
000030	E5304V1/8	341	0000311	A100.98	69	001011	E330215/64	328	001133	E3304M4.5	340
000031	E5304V3/16	341	0000328	A1001.0	69	001012	E33021/4	328	0001134	A10015.0	72
000032	E5304V1/4	341	0000335	A1001.05	69	001016	E33025/16	328	001134	E3304M5.0	340
000033	E5304V5/16	341	0000342	A1001.1	69	001017	E33023/8	328	001135	E3304M6.0	340
000034	E5304V3/8	341	0000359	A1001.15	69	001018	E33027/16	328	001136	E3304M7.0	340
000035	E5304V7/16	341	0000366	A1001.2	69	001019	E33021/2	328	001137	E3304M8.0	340
000036	E5304V1/2	341	0000373	A1001.25	69	001020	E33029/16	328	001138	E3304M9.0	340
000037	E5304V5/8	341	0000380	A1001.3	69	001021	E33025/8	328	001139	E3304M10.0	340
000038	A100.25	68	0000397	A1001.35	69	001022	E330211/16	328	001140	E3304M11.0	340
000038	E5304V3/4	341	0000403	A1001.4	69	001023	E33023/4	328	0001141	A10015.25	72
000039	E5304V1	341	0000410	A1001.45	69	001024	E33027/8	328	001141	E3304M12.0	340
000040	EB53021/8	334	0000427	A1001.5	69	001025	E33021	328	001143	E3304M14.0	340
000041	EB53023/16	334	0000434	A1001.55	69	0001028	A10013.75	71	001144	E3304M16.0	340
000042	EB53021/4	334	0000441	A1001.6	69	001028	E3302M2.0	329	001145	E3304M18.0	340
000043	EB53025/16	334	0000458	A1001.65	69	001029	E3302M2.5	329	001146	E3304M20.0	340
000044	EB53023/8	334	0000465	A1001.7	69	001030	E3302M3.0	329	001147	E3304M25.0	340
000045	A100.3	68	0000472	A1001.75	69	001031	E3302M3.5	329	0001158	A10015.5	72
000045	EB53027/16	334	0000489	A1001.8	69	001032	E3302M4.0	329	0001165	A10015.75	72
000046	EB53021/2	334	0000496	A1001.85	69	001033	E3302M4.5	329	0001196	A10016.0	72
000047	EB53025/8	334	0000502	A1001.9	69	001034	E3302M5.0	329	001200	EB33021/16	332
000048	EB53023/4	334	0000519	A1001.95	69	0001035	A10013.8	71	001201	EB33025/64	332
000049	EB53021	334	0000526	A10010.0	71	001035	E3302M6.0	329	0001202	A10016.5	72
000050	EB5302V1/8	334	0000533	A10010.1	71	001036	E3302M7.0	329	001202	EB33023/32	332
000051	EB5302V3/16	334	0000540	A10010.2	71	001037	E3302M8.0	329	001203	EB33027/64	332
000052	A100.32	68	0000557	A10010.25	71	001038	E3302M9.0	329	001204	EB33021/8	332
000052	EB5302V1/4	334	0000564	A10010.3	71	001039	E3302M10.0	329	001205	EB33029/64	332
000053	EB5302V5/16	334	0000571	A10010.4	71	001040	E3302M11.0	329	001206	EB33025/32	332
000054	EB5302V7/16	334	0000588	A10010.5	71	001041	E3302M12.0	329	001207	EB330211/64	332
000055	EB5302V1/2	334	0000595	A10010.6	71	0001042	A10013.9	71	001208	EB33023/16	332
000056	EB5302V5/8	334	0000601	A10010.7	71	001043	E3302M14.0	329	001209	EB330213/64	332
000057	EB5302V3/4	334	0000618	A10010.75	71	001044	E3302M16.0	329	001210	EB33027/32	332
000058	EB5302V1	334	0000625	A10010.8	71	001045	E3302M18.0	329	001211	EB330215/64	332
000059	EB5302V3/8	334	0000632	A10010.9	71	001046	E3302M20.0	329	001212	EB33021/4	332
000060	EB53041/8	345	0000649	A10011.0	71	001047	E3302M25.0	329	001216	EB33025/16	332
000061	EB53043/16	345	0000656	A10011.1	71	001050	E33031/16	336	001217	EB33023/8	332
000062	EB53041/4	345	0000663	A10011.2	71	001052	E33033/32	336	001218	EB33027/16	332
000063	EB53045/16	345	0000670	A10011.25	71	001054	E33031/8	336	001219	EB33021/2	332
000064	EB53043/8	345	0000687	A10011.3	71	001056	E33035/32	336	001220	EB33029/16	332
000065	EB53047/16	345	0000694	A10011.4	71	001058	E33033/16	336	001221	EB33025/8	332
000066	EB53041/2	345	0000700	A10011.5	71	001060	E33037/32	336	001222	EB330211/16	332
000067	EB53045/8	345	0000717	A10011.6	71	001062	E33031/4	336	001223	EB33023/4	332
000068	EB53043/4	345	0000724	A10011.7	71	001066	E33035/16	336	001224	EB33027/8	332
000069	A100.35	68	0000731	A10011.75	71	001067	E33033/8	336	001225	EB33021	332
000069	EB53041	345	0000748	A10011.8	71	001068	E33037/16	336	0001226	A10017.0	72
000070	EB5304V1/8	345	0000755	A10011.9	71	001069	E33031/2	336	001228	EB3302M2.0	333
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001231	EB3302M3.5	333	0001479	A1002.7	69	002204	E43021/4	327	002695	E3304V9/64	339
001232	EB3302M4.0	333	0001486	A1002.75	69	002206	E43025/16	327	002696	E3304V5/32	339
0001233	A10017.5	72	0001493	A1002.8	69	002208	E43023/8	327	002697	E3304V11/64	339
001233	EB3302M4.5	333	0001509	A1002.85	69	002209	E43027/16	327	002698	E3304V3/16	339
001234	EB3302M5.0	333	0001516	A1002.9	69	002210	E43021/2	327	002699	E3304V13/64	339
001235	EB3302M6.0	333	0001523	A1002.95	69	002250	E43041/8	338	002700	E3304V7/32	339
001236	EB3302M7.0	333	0001530	A10020.0	72	002251	E43045/32	338	002701	E3304V15/64	339
001237	EB3302M8.0	333	0001608	A1003.0	69	002252	E43043/16	338	002702	E3304V1/4	339
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001239	EB3302M10.0	333	0001622	A1003.15	69	0002254	A1007.1	70	002704	E3304V3/8	339
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001242	EB3302M14.0	333	0001653	A1003.3	69	002258	E43043/8	338	002707	E3304V9/16	339
001243	EB3302M16.0	333	0001660	A1003.4	70	002259	E43047/16	338	002708	E3304V5/8	339
001244	EB3302M18.0	333	0001677	A1003.5	70	002260	E43041/2	338	002709	E3304V11/16	339
001245	EB3302M20.0	333	0001684	A1003.6	70	0002261	A1007.2	70	002710	E3304V3/4	339
001246	EB3302M25.0	333	0001691	A1003.7	70	0002278	A1007.25	70	002711	E3304V7/8	339
0001271	A10018.0	72	0001707	A1003.75	70	0002285	A1007.3	70	002712	E3304V1	339
0001288	A10018.5	72	0001714	A1003.8	70	0002292	A1007.4	70	002780	E3603V1/8	337
0001295	A10019.0	72	0001721	A1003.9	70	0002308	A1007.5	70	002781	E3603V3/16	337
001300	EB33041/16	343	0001820	A1004.0	70	0002315	A1007.6	70	002782	E3603V1/4	337
0001301	A10019.5	72	0001837	A1004.1	70	0002322	A1007.7	70	002783	E3603V5/16	337
001301	EB33045/64	343	0001844	A1004.2	70	0002339	A1007.75	70	002784	E3603V3/8	337
001302	EB33043/32	343	0001851	A1004.25	70	0002346	A1007.8	70	002785	E3603V7/16	337
001303	EB33047/64	343	0001868	A1004.3	70	0002353	A1007.9	70	002786	E3603V1/2	337
001304	EB33041/8	343	0001875	A1004.4	70	0002391	A1008.0	70	002787	E3603V5/8	337
001305	EB33049/64	343	0001882	A1004.5	70	0002407	A1008.1	70	002788	E3603V3/4	337
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001307	EB330411/64	343	0001905	A1004.7	70	0002421	A1008.25	70	002850	E3302V11/16	328
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001309	EB330413/64	343	0001929	A1004.8	70	0002445	A1008.4	70	002852	E3302V3/32	328
001310	EB33047/32	343	0001936	A1004.9	70	0002452	A1008.5	70	002853	E3302V7/64	328
001311	EB330415/64	343	0001967	A1005.0	70	0002469	A1008.6	70	002854	E3302V1/8	328
001312	EB33041/4	343	0001974	A1005.1	70	0002476	A1008.7	71	002855	E3302V9/64	328
001316	EB33045/16	343	0001981	A1005.2	70	0002483	A1008.75	71	002856	E3302V5/32	328
001317	EB33043/8	343	0001998	A1005.25	70	0002490	A1008.8	71	002857	E3302V11/64	328
001318	EB33047/16	343	0002001	A1005.3	70	0002506	A1008.9	71	002858	E3302V3/16	328
001319	EB33041/2	343	002002	E23021/16	326	0002513	A1009.0	71	002859	E3302V13/64	328
001320	EB33049/16	343	002003	E23023/32	326	0002520	A1009.1	71	002860	E3302V7/32	328
001321	EB33045/8	343	002004	E23021/8	326	0002537	A1009.2	71	002861	E3302V15/64	328
001322	EB330411/16	343	002006	E23023/16	326	0002544	A1009.25	71	002862	E3302V1/4	328
001323	EB33043/4	343	002008	E23021/4	326	0002551	A1009.3	71	002863	E3302V5/16	328
001324	EB33047/8	343	002009	E23025/16	326	0002568	A1009.4	71	002864	E3302V3/8	328
001325	EB33041	343	002010	E23023/8	326	0002575	A1009.5	71	002865	E3302V7/16	328
001326	EB3304M25.0	344	002012	E23021/2	326	0002582	A1009.6	71	002866	E3302V1/2	328
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001329	EB3304M16.0	344	0002032	A1005.6	70	0002612	A1009.8	71	002869	E3302V11/16	328
001330	EB3304M14.0	344	0002049	A1005.7	70	0002629	A1009.9	71	002870	E3302V3/4	328
001331	EB3304M12.0	344	002052	E23041/16	338	002630	EB3302V11/16	332	002871	E3302V7/8	328
0001332	A1002.0	69	002053	E23043/32	338	002631	EB3302V5/64	332	002872	E3302V1	328
001332	EB3304M11.0	344	002054	E23041/8	338	002632	EB3302V3/32	332	002920	E3303V1/16	336
001333	EB3304M10.0	344	0002056	A1005.75	70	002633	EB3302V7/64	332	002921	E3303V3/32	336
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0008140	.A1083.3	69	010011	.R1011/64	65	010218	.R10B9/32	81	010512	.R10H3/16	84
0008157	.A1083.4	70	010012	.R103/16	66	010219	.R10B19/64	81	010513	.R10H13/64	84
0008164	.A1083.5	70	010013	.R1013/64	66	010220	.R10B5/16	81	010514	.R10H7/32	85
0008171	.A1083.6	70	010014	.R107/32	66	010221	.R10B21/64	81	010515	.R10H15/64	85
0008188	.A1083.7	70	010015	.R1015/64	66	010222	.R10B11/32	81	010516	.R10H1/4	85
0008195	.A1083.8	70	010016	.R101/4	66	010223	.R10B23/64	81	010517	.R10H17/64	85
0008201	.A1083.9	70	010017	.R1017/64	66	010224	.R10B3/8	81	010518	.R10H9/32	85
0008256	.A1084.0	70	010018	.R109/32	66	010225	.R10B25/64	81	010519	.R10H19/64	85
0008263	.A1084.1	70	010019	.R1019/64	66	010226	.R10B13/32	82	010520	.R10H5/16	85
0008270	.A1084.2	70	010020	.R105/16	66	010227	.R10B27/64	82	010521	.R10H21/64	85
0008287	.A1084.3	70	010021	.R1021/64	66	010228	.R10B7/16	82	010522	.R10H11/32	85
0008294	.A1084.4	70	010022	.R1011/32	66	010229	.R10B29/64	82	010523	.R10H23/64	85
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010526	R10H13/32	85	010922	L1011/32	73	013156	QC21PM5.6	89	015101	R15AA	78
010527	R10H27/64	85	010923	L1023/64	73	013160	QC21PM6.0	89	015102	R15AB	78
010528	R10H7/16	85	010924	L103/8	73	013165	QC21PM6.5	89	015103	R15AC	78
010529	R10H29/64	85	010925	L1025/64	73	013168	QC21PM6.8	89	015104	R15AD	78
010530	R10H15/32	85	010926	L1013/32	73	013170	QC21PM7.0	89	015105	R15AE	78
010531	R10H31/64	85	010927	L1027/64	73	013175	QC21PM7.5	89	015106	R15AF	78
010532	R10H1/2	85	010928	L107/16	73	013180	QC21PM8.0	89	015107	R15AG	78
010601	R10P1/64	64	010929	L1029/64	73	013182	QC21PM8.2	89	015108	R15AH	78
010602	R10P1/32	65	010930	L1015/32	73	013185	QC21PM8.5	89	015109	R15AI	78
010603	R10P3/64	65	010931	L1031/64	73	013186	QC21PM8.6	89	015110	R15AJ	78
010604	R10P1/16	65	010932	L101/2	73	013190	QC21PM9.0	89	015111	R15AK	78
010605	R10P5/64	65	0010938	R95033/64	10	013195	QC21PM9.5	89	015112	R15AL	78
010606	R10P3/32	65	0010945	R95017/32	10	0013229	R9501.3/64	12	015113	R15AM	78
010607	R10P7/64	65	0010952	R95013.5	10	0013243	R9501.1/16	12	015114	R15AN	78
010608	R10P1/8	65	0010969	R95035/64	10	0013267	R95027.0	12	015115	R15AO	78
010609	R10P9/64	65	0010983	R95014.0	10	0013274	R9501.5/64	12	015116	R15AP	78
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010611	R10P11/64	65	0011010	R95014.5	10	0013304	R95028.0	12	015118	R15AR	78
010612	R10P3/16	66	0011140	R95037/64	10	0013311	R9501.7/64	12	015119	R15AS	78
010613	R10P13/64	66	0011201	R95015.0	10	0013328	R9501.1/8	12	015120	R15AT	78
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010615	R10P15/64	66	0011232	R95039/64	11	0013366	R95029.0	12	015122	R15AV	78
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010617	R10P17/64	66	0011379	R9505/8	11	0013427	R9501.11/64	12	015124	R15AX	78
010618	R10P9/32	66	0011386	R95016.0	11	0013434	R95030.0	12	015125	R15AY	78
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010639	R10P39/64	67	0012468	R95013/16	11	014950	QC21PM15.0	89	015220	R15BT	81
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010641	R10P41/64	67	0012536	R95053/64	11	014960	QC21PM16.0	90	015222	R15BV	81
010642	R10P21/32	67	0012550	R95027/32	11	014965	QC21PM16.5	90	015223	R15BW	81
010643	R10P43/64	67	0012574	R95021.5	11	014970	QC21PM17.0	90	015224	R15BX	81
010644	R10P11/16	67	0012604	R95055/64	11	014975	QC21PM17.5	90	015225	R15BY	81
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0010884	R95031/64	10	0012642	R95057/64	11	015003	R15C	66	015302	R15COB	93
010902	L101/32	73	0012666	R95023.0	11	015004	R15D	66	015303	R15COC	93
010903	L103/64	73	0012673	R95029/32	11	015005	R15E	66	015304	R15COD	94
010904	L101/16	73	0012680	R95059/64	11	015006	R15F	66	015305	R15COE	94
010905	L105/64	73	0012703	R95015/16	12	015007	R15G	66	015306	R15COF	94
010906	L103/32	73	0012727	R95024.0	12	015008	R15H	66	015307	R15COG	94
010907	L107/64	73	0012741	R95061/64	12	015009	R15I	66	015308	R15COH	94
0010907	R95012.5	10	0012772	R95031/32	12	015010	R15J	66	015309	R15COI	94
010908	L101/8	73	0012819	R95025.0	12	015011	R15K	66	015310	R15COJ	94
010909	L109/64	73	0012826	R95063/64	12	015012	R15L	66	015311	R15COK	94
010910	L105/32	73	0012833	R9501	12	015013	R15M	66	015312	R15COL	94
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010912	L103/16	73	0013090	R95026.0	12	015015	R15O	66	015314	R15CON	94
010913	L1013/64	73	013115	QC21PM1.5	89	015016	R15P	66	015315	R15COO	94
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010915	L1015/64	73	013125	QC21PM2.5	89	015019	R15S	66	015318	R15COR	94
010916	L101/4	73	013130	QC21PM3.0	89	015020	R15T	66	015319	R15COS	94
010917	L1017/64	73	013135	QC21PM3.5	89	015021	R15U	66	015320	R15COT	94
010918	L109/32	73	013140	QC21PM4.0	89	015022	R15V	66	015321	R15COU	94
010919	L1019/64	73	013145	QC21PM4.5	89	015023	R15W	66	015322	R15COV	94
010920	L105/16	73	013150	QC21PM5.0	89	015024	R15X	66	015323	R15COW	94
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015326	.R15COZ	95	016030	.2A3.0	69	016114	.2A11.4	71	016300	.2ACO10.0	94
015601	.R15PA	66	016031	.2A3.1	69	0016114	.R96015.5	14	016302	.2ACO10.2	94
015602	.R15PB	66	016032	.2A3.2	69	016115	.2A11.5	71	016305	.2ACO10.5	95
015603	.R15PC	66	016033	.2A3.3	69	016117	.2A11.7	71	016308	.2ACO10.8	95
015604	.R15PD	66	016034	.2A3.4	70	016118	.2A11.8	71	016310	.2ACO11.0	95
015605	.R15PE	66	016035	.2A3.5	70	016120	.2A12.0	71	016312	.2ACO11.2	95
015606	.R15PF	66	016036	.2A3.6	70	016121	.2A12.1	71	016315	.2ACO11.5	95
015607	.R15PG	66	016037	.2A3.7	70	0016121	.R9605/8	14	016318	.2ACO11.8	95
015608	.R15PH	66	0016039	.R96035/64	13	016122	.2A12.2	71	016320	.2ACO12.0	95
015609	.R15PI	66	016040	.2A4.0	70	016125	.2A12.5	71	016322	.2ACO12.2	95
015610	.R15PJ	66	016041	.2A4.1	70	016127	.2A12.7	71	016325	.2ACO12.5	95
015611	.R15PK	66	016042	.2A4.2	70	016128	.2A12.8	71	016330	.2ACO13.0	95
015612	.R15PL	66	016043	.2A4.3	70	016129	.2A12.9	71	016355	.2ACO1.05	91
015613	.R15PM	66	016044	.2A4.4	70	016130	.2A13.0	71	016356	.2ACO1.15	91
015614	.R15PN	66	016045	.2A4.5	70	016135	.2AB13.5	71	016357	.2ACO1.25	92
015615	.R15PO	66	016046	.2A4.6	70	0016138	.R96016.0	14	016358	.2ACO1.35	92
015616	.R15PP	66	0016046	.R96014.0	13	016140	.2AB14.0	72	016359	.2ACO1.45	92
015617	.R15PQ	66	016048	.2A4.8	70	016145	.2AB14.5	72	016360	.2ACO1.55	92
015618	.R15PR	66	016050	.2A5.0	70	0016145	.R96041/64	14	016361	.2ACO1.65	92
015619	.R15PS	66	016051	.2A5.1	70	016150	.2AB15.0	72	016362	.2ACO1.75	92
015620	.R15PT	66	016052	.2A5.2	70	0016152	.R96016.5	14	016363	.2ACO1.85	92
015621	.R15PU	66	016053	.2A5.3	70	016155	.2AB15.5	72	016364	.2ACO1.95	92
015622	.R15PV	66	0016053	.R9609/16	13	016160	.2AB16.0	72	016365	.2ACO2.05	92
015623	.R15PW	66	016054	.2A5.4	70	016165	.2AB16.5	72	016368	.2ACO2.35	92
015624	.R15PX	66	016055	.2A5.5	70	0016169	.R96021/32	14	016371	.2ACO3.25	92
015625	.R15PY	66	016056	.2A5.6	70	016170	.2AB17.0	72	016372	.2ACO3.75	93
015626	.R15PZ	66	016057	.2A5.7	70	016175	.2AB17.5	72	016373	.2ACO4.25	93
015804	.QC21P1/16	86	016058	.2A5.8	70	0016176	.R96017.0	14	016375	.2ACO5.25	93
015805	.QC21P5/64	86	016060	.2A6.0	70	0016183	.R96043/64	14	016379	.2ACO7.25	94
015806	.QC21P3/32	86	0016060	.R96014.5	13	0016190	.R96011/16	14	016410	.2ACO1.0	91
015807	.QC21P7/64	86	016061	.2A6.1	70	016215	.2A.15	68	016411	.2ACO1.1	91
015808	.QC21P1/8	86	016062	.2A6.2	70	016216	.2A.16	68	016412	.2ACO1.2	92
015809	.QC21P9/64	86	016063	.2A6.3	70	016217	.2A.17	68	016413	.2ACO1.3	92
015810	.QC21P5/32	87	016064	.2A6.4	70	016218	.2A.18	68	016414	.2ACO1.4	92
015811	.QC21P11/64	87	016065	.2A6.5	70	016219	.2A.19	68	016415	.2ACO1.5	92
015812	.QC21P3/16	87	016066	.2A6.6	70	016221	.2A.21	68	016416	.2ACO1.6	92
015813	.QC21P13/64	87	016067	.2A6.7	70	016222	.2A.22	68	016417	.2ACO1.7	92
015814	.QC21P7/32	87	016068	.2A6.8	70	016223	.2A.23	68	016418	.2ACO1.8	92
015815	.QC21P15/64	87	016070	.2A7.0	70	016224	.2A.24	68	016419	.2ACO1.9	92
015816	.QC21P1/4	87	016072	.2A7.2	70	016225	.2A.25	68	016420	.2ACO2.0	92
015817	.QC21P17/64	87	016073	.2A7.3	70	016226	.2A.26	68	016421	.2ACO2.1	92
015818	.QC21P9/32	87	016074	.2A7.4	70	016227	.2A.27	68	016422	.2ACO2.2	92
015819	.QC21P19/64	87	016075	.2A7.5	70	016228	.2A.28	68	016423	.2ACO2.3	92
015820	.QC21P5/16	87	016076	.2A7.6	70	016229	.2A.29	68	016424	.2ACO2.4	92
015821	.QC21P21/64	87	0016077	.R96037/64	13	016232	.2A.32	68	016425	.2ACO2.5	92
015822	.QC21P11/32	87	016078	.2A7.8	70	016234	.2A.34	68	016426	.2ACO2.6	92
015823	.QC21P23/64	87	016079	.2A7.9	70	016235	.2A.35	68	016427	.2ACO2.7	92
015824	.QC21P3/8	87	016080	.2A8.0	70	016236	.2A.36	68	016428	.2ACO2.8	92
015825	.QC21P25/64	87	016081	.2A8.1	70	016238	.2A.38	68	016429	.2ACO2.9	92
016002	.2A.2	68	016082	.2A8.2	70	016242	.2A.42	68	016430	.2ACO3.0	92
016003	.2A.3	68	016084	.2A8.4	70	016244	.2A.44	68	016431	.2ACO3.1	92
016004	.2A.4	68	0016084	.R96015.0	13	016245	.2A.45	68	016432	.2ACO3.2	92
016005	.2A.5	68	016085	.2A8.5	70	016246	.2A.46	68	016433	.2ACO3.3	92
016006	.2A.6	69	016086	.2A8.6	70	016248	.2A.48	68	016434	.2ACO3.4	92
016007	.2A.7	69	016087	.2A8.7	71	016250	.2A.55	68	016435	.2ACO3.5	93
016008	.2A.8	69	016088	.2A8.8	71	016251	.2A.65	69	016436	.2ACO3.6	93
016009	.2A.9	69	016089	.2A8.9	71	016252	.2A.75	69	016437	.2ACO3.7	93
016010	.2A1.00	69	016090	.2A9.0	71	016253	.2A.85	69	016438	.2ACO3.8	93
016011	.2A1.1	69	0016091	.R96019/32	13	016254	.2A.95	69	016440	.2ACO4.0	93
016012	.2A1.2	69	016093	.2A9.3	71	016256	.2A1.15	69	016441	.2ACO4.1	93
016013	.2A1.3	69	016094	.2A9.4	71	016257	.2A1.25	69	016442	.2ACO4.2	93
016014	.2A1.4	69	016095	.2A9.5	71	016258	.2A1.35	69	016443	.2ACO4.3	93
016015	.2A1.5	69	016096	.2A9.6	71	016259	.2A1.45	69	016444	.2ACO4.4	93
016016	.2A1.6	69	016097	.2A9.7	71	016260	.2A1.55	69	016445	.2ACO4.5	93
016017	.2A1.7	69	016098	.2A9.8	71	016261	.2A1.65	69	016447	.2ACO4.7	93
016018	.2A1.8	69	016099	.2A9.9	71	016262	.2A1.75	69	016448	.2ACO4.8	93
016019	.2A1.9	69	016100	.2A10.0	71	016264	.2A1/16	69	016450	.2ACO5.0	93
016020	.2A2.0	69	016102	.2A10.2	71	016266	.2A2.15	69	016451	.2ACO5.1	93
016021	.2A2.1	69	016103	.2A10.3	71	016267	.2A2.25	69	016452	.2ACO5.2	93
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019401	..QC21PN1	87	0019887	..A12510.5X315	132	020058	..20929/32	145	0020289	..A1255.0X250	131
019402	..QC21PN2	87	019890	..QC21GM9.0	89	020059	..20959/64	145	0020296	..A1255.0X315	131
019403	..QC21PN3	87	0019894	..A12510.5X400	132	020060	..20915/16	145	0020302	..A1255.0X400	131
019404	..QC21PN4	87	019895	..QC21GM9.5	89	020061	..20961/64	145	0020319	..A1256.5X200	131
019405	..QC21PN5	87	0019900	..A12510.0X250	132	020062	..20931/32	145	0020326	..A1256.5X250	131
019406	..QC21PN6	87	019900	..QC21GM10.0	89	020063	..20963/64	145	0020333	..A1256.5X315	131
019407	..QC21PN7	87	019905	..QC21GM10.5	89	0020067	..A1252.0X125	130	0020340	..A1256.0X200	131
019408	..QC21PN8	87	019910	..QC21GM11.0	89	0020074	..A1252.0X160	130	0020357	..A1256.0X250	131
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019410	..QC21PN10	87	0019917	..A12510.0X315	132	0020098	..A1253.5X160	130	0020371	..A1256.0X400	131
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019412	..QC21PN12	87	0019924	..A12510.0X400	132	020101	..2091.1/64	145	0020395	..A1257.5X250	131
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019414	..QC21PN14	87	0019930	..QC21GM13.0	89	020103	..2091.3/64	145	0020418	..A1257.0X200	131
019415	..QC21PN15	87	0019931	..A12511.0X250	132	020104	..2091.1/16	145	0020425	..A1257.0X250	131
019416	..QC21PN16	87	0019948	..A12511.0X315	132	0020104	..A1253.5X200	130	0020432	..A1257.0X315	131
019417	..QC21PN17	87	0019955	..A12511.0X400	132	020105	..2091.5/64	145	0020449	..A1258.5X250	132
019418	..QC21PN18	87	0019962	..A12512.0X250	133	020106	..2091.3/32	145	0020456	..A1258.5X315	132
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019436	..QC21PN36	86	020020	..2095/16	144	020123	..2091.23/64	146	021330	..209C015/32	155
019437	..QC21PN37	86	020021	..20921/64	144	020124	..2091.3/8	146	021331	..209C031/64	155
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019444	..QC21PN44	86	020028	..2097/16	144	020130	..2091.15/32	146	021338	..209C019/32	155
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019446	..QC21PN46	86	0020029	..A12514.0X400	133	020132	..2091.1/2	146	021340	..209C05/8	155
019447	..QC21PN47	86	020030	..20915/32	144	020134	..2091.17/32	146	021341	..209C041/64	155
019448	..QC21PN48	86	020031	..20931/64	144	0020135	..A1253.0X200	130	021342	..209C021/32	155
019449	..QC21PN49	86	020032	..2091/2	144	020136	..2091.9/16	146	021343	..209C043/64	155
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019452	..QC21PN52	86	020035	..20935/64	144	020142	..2091.21/32	146	021347	..209C047/64	155
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019835	..QC21GM3.5	89	020040	..2095/8	145	020152	..2091.13/16	146	021353	..209C053/64	155
019840	..QC21GM4.0	89	020041	..20941/64	145	020154	..2091.27/32	146	021354	..209C013/16	155
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026375	.5ATS37.5	150	029084	.2AB8.4	70	032360	.4ASMC03.6	114	0033470	.A35015.0	148
026380	.5ATS38.0	150	029085	.2AB8.5	70	0032367	.R96016.08	14	0033487	.A35015.25	148
026390	.5ATS39.0	150	029086	.2AB8.6	70	032370	.4ASMC03.7	114	0033494	.A35015.5	148
026400	.5ATS40.0	150	029087	.2AB8.7	71	0032374	.R96016.3	14	0033500	.A35015.75	148
026410	.5ATS41.0	150	029088	.2AB8.8	71	0032381	.R96017.6	14	0033517	.A35016.0	148
026420	.5ATS42.0	150	029089	.2AB8.9	71	0032398	.R96019.25	14	0033524	.A35016.25	148
026430	.5ATS43.0	150	029090	.2AB9.0	71	032400	.4ASMC04.0	114	0033531	.A35016.5	148
026440	.5ATS44.0	150	029093	.2AB9.3	71	0032404	.R96019.3	14	0033548	.A35016.75	148
026450	.5ATS45.0	150	029094	.2AB9.4	71	032410	.4ASMC04.1	114	0033555	.A35017.0	148
026470	.5ATS47.0	150	029095	.2AB9.5	71	0032411	.R96019.35	14	0033562	.A35017.25	148
026480	.5ATS48.0	150	029096	.2AB9.6	71	032420	.4ASMC04.2	114	0033579	.A35017.5	148
026490	.5ATS49.0	150	029097	.2AB9.7	71	0032428	.R96022.5	14	0033593	.A35018.0	149
026500	.5ATS50.0	150	029098	.2AB9.8	71	0032435	.R96025.65	15	0033616	.A35018.5	149
029010	.2AB1.0	69	029099	.2AB9.9	71	032470	.4ASMC04.7	114	0033623	.A35019.0	149
029011	.2AB1.1	69	029100	.2AB10.0	71	032480	.4ASMC04.8	114	0033647	.A35019.5	149
029012	.2AB1.2	69	029102	.2AB10.2	71	032490	.4ASMC04.9	114	0033654	.A35019.75	149
029013	.2AB1.3	69	029103	.2AB10.3	71	032500	.4ASMC05.0	114	0033661	.A35020.0	149
029014	.2AB1.4	69	029105	.2AB10.5	71	032510	.4ASMC05.1	114	0033678	.A35020.25	149
029015	.2AB1.5	69	029108	.2AB10.8	71	032550	.4ASMC05.5	114	0033685	.A35020.5	149
029016	.2AB1.6	69	029109	.2AB10.9	71	032570	.4ASMC05.7	114	0033692	.A35021.0	149
029017	.2AB1.7	69	029110	.2AB11.0	71	032600	.4ASMC06.0	114	0033708	.A35021.5	149
029018	.2AB1.8	69	029112	.2AB11.2	71	032640	.4ASMC06.4	114	0033715	.A35022.0	149
029019	.2AB1.9	69	029113	.2AB11.3	71	032650	.4ASMC06.5	114	0033722	.A35022.5	149
029020	.2AB2.0	69	029114	.2AB11.4	71	032680	.4ASMC06.8	114	0033739	.A35023.0	149
029021	.2AB2.1	69	029115	.2AB11.5	71	032700	.4ASMC07.0	114	0033746	.A35023.5	149
029022	.2AB2.2	69	029117	.2AB11.7	71	032800	.4ASMC08.0	114	0033753	.A35024.0	149
029023	.2AB2.3	69	029118	.2AB11.8	71	032850	.4ASMC08.5	114	0033760	.A35024.5	149
029024	.2AB2.4	69	029120	.2AB12.0	71	032950	.4ASMC09.5	114	0033777	.A35025.0	149
029025	.2AB2.5	69	029121	.2AB12.1	71	032980	.4ASMC09.8	114	0033784	.A35025.5	149
029026	.2AB2.6	69	029122	.2AB12.2	71	033000	.4ASMC10.0	114	0033791	.A35026.0	149
029027	.2AB2.7	69	029125	.2AB12.5	71	033002	.4ASMC10.2	114	0033807	.A35026.5	149
029029	.2AB2.9	69	029127	.2AB12.7	71	033005	.4ASMC10.5	114	0033814	.A35027.0	149
029030	.2AB3.0	69	029128	.2AB12.8	71	0033043	.H85331/64	16	0033821	.A35027.5	149
029031	.2AB3.1	69	029129	.2AB12.9	71	0033043	.H85331/64	19	0033838	.A35028.0	149
029032	.2AB3.2	69	029130	.2AB13.0	71	0033050	.H8531/2	16	0033845	.A35029.0	150
029033	.2AB3.3	69	029256	.2AB1.15	69	0033050	.H8531/2	19	0033852	.A35030.0	150
029034	.2AB3.4	70	029257	.2AB1.25	69	0033067	.H85317/32	16	0033869	.A35030.5	150
029035	.2AB3.5	70	029258	.2AB1.35	69	0033067	.H85317/32	19	0033876	.A35031.0	150
029036	.2AB3.6	70	029259	.2AB1.45	69	0033074	.H8539/16	16	0033883	.A35031.5	150
029037	.2AB3.7	70	029260	.2AB1.55	69	0033074	.H8539/16	19	0033890	.A35032.0	150
029040	.2AB4.0	70	029262	.2AB1.75	69	0033081	.H85339/64	16	0033906	.A35033.0	150
029041	.2AB4.1	70	029264	.2AB1.95	69	0033081	.H85339/64	17	0033913	.A35034.0	150
029042	.2AB4.2	70	029268	.2AB2.35	69	0033098	.H85341/64	17	0033920	.A35035.0	150
029043	.2AB4.3	70	029268	.2AB2.35	69	0033104	.H85311/16	17	0033937	.A35036.0	150
029044	.2AB4.4	70	029271	.2AB3.25	69	033110	.4ASMC10.1	114	0033944	.A35037.0	150
029045	.2AB4.5	70	029276	.2AB5.75	70	0033111	.H85323/32	17	0033951	.A35038.0	150
029046	.2AB4.6	70	029278	.2AB6.75	70	033112	.4ASMC10.2	114	0033968	.A35039.0	150
029048	.2AB4.8	70	029279	.2AB7.25	70	033115	.4ASMC10.5	114	0033975	.A35040.0	150
029050	.2AB5.0	70	029281	.2AB7.85	70	0033128	.H85349/64	17	0033982	.A35041.0	150
029051	.2AB5.1	70	029282	.2AB8.25	70	0033135	.H85351/64	17	0033999	.A35042.0	150
029052	.2AB5.2	70	029283	.2AB8.75	71	0033142	.H85327/32	17	0034002	.A35043.0	150
029053	.2AB5.3	70	0030530	.A190200	183	0033159	.H85357/64	17	0034019	.A35044.0	150
029054	.2AB5.4	70	0030547	.A190201	183	0033166	.H85359/64	17	0034026	.A35045.0	150
029055	.2AB5.5	70	0030554	.A190202	183	0033173	.H85331/32	18	0034033	.A35046.0	150
029056	.2AB5.6	70	0030561	.A190203	183	0033180	.H8531.1/64	18	0034040	.A35047.0	150
029057	.2AB5.7	70	0030578	.A190204	183	0033197	.H8531.3/64	18	0034057	.A35048.0	150
029058	.2AB5.8	70	0030585	.A190206	183	033200	.4ASMC10.2	114	0034071	.A3505.0	147
029060	.2AB6.0	70	0030608	.A191413	183	0033210	.H8531.3/32	18	0034088	.A3505.5	147
029061	.2AB6.1	70	0030615	.A191419	183	0033227	.H8531.1/8	18	0034101	.A35050.0	150
029062	.2AB6.2	70	032230	.4ASMC02.3	114	0033234	.H8531.11/64	18	0034118	.A3506.0	147
029063	.2AB6.3	70	032250	.4ASMC02.5	114	0033241	.A35010.0	147	0034125	.A3506.7	147
029064	.2AB6.4	70	0032268	.R95015.24	11	0033265	.A35010.2	147	034135	.2A13.5	71
029065	.2AB6.5	70	0032275	.R95016.08	11	0033289	.A35010.5	148	034140	.2A14.0	72
029066	.2AB6.6	70	0032282	.R95016.3	11	0033296	.A35010.7	148	034145	.2A14.5	72
029067	.2AB6.7	70	0032299	.R95017.6	11	0033319	.A35011.0	148	0034149	.A3506.8	147
029068	.2AB6.8	70	032300	.4ASMC03.0	114	0033333	.A35011.5	148	034150	.2A15.0	72
029070	.2AB7.0	70	0032305	.R95019.25	11	0033340	.A35011.75	148	0034156	.A3507.0	147
029072	.2AB7.2	70	032310	.4ASMC03.1	114	0033357	.A35011.8	148	0034163	.A3507.5	147
029073	.2AB7.3	70	0032312	.R95019.3	11	0033364	.A35012.0	148	0034187	.A3508.0	147
029074	.2AB7.4	70	032320	.4ASMC03.2	114	0033395	.A35012.5	148	0034200	.A3508.4	147



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0039434	A5208.3	50	040033	R4033/64	100	040563	R4063/64	100	040935	A53016.5	148
0039441	A5208.4	50	040034	S92216.0	100	040577	R453N12	36	040942	A53017.0	148
0039458	A5208.5	50	040035	R4035/64	100	040584	R453N11	36	040966	A53017.5	148
0039465	A5208.6	50	040036	R409/16	100	040591	R453N10	36	040980	A53018.0	149
0039472	A5208.7	50	040037	R4037/64	100	040600	R401	100	040997	A53018.5	149
0039489	A5208.8	50	040038	R4019/32	100	040604	R401.1/16	100	041001	R41N1	99
0039496	A5208.9	50	040039	R4039/64	100	040607	R453N9	36	041002	R41N2	99
0039502	A5209.0	50	040040	R405/8	100	040608	R401.1/8	100	041003	R41N3	99
0039519	A5209.1	50	040041	R4041/64	100	040612	R401.3/16	100	041004	R41N4	99
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0039540	A5209.4	50	040044	R4011/16	100	040620	R401.5/16	100	041007	R41N7	99
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0039564	A5209.6	50	040305	M40C05/64	111	040624	R401.3/8	100	041009	R41N9	99
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0039618	R96014.8	13	040310	M40C05/32	112	040640	R401.5/8	100	041014	R41N14	99
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0039670	R96016.2	14	040316	M40C01/4	112	040656	R401.7/8	100	041019	R41N19	99
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0042632	.R458Q	31	046047	.M40CO47/64	113	0046722	.A9004.6	45	0047262	.A9008.6	47
0042649	.R458T	31	046048	.M40CO3/4	113	0046739	.A9004.7	45	0047279	.A900R	47
0042656	.R458U	31	046100	.4ASM1.0	107	0046746	.A9003/16	45	0047286	.A9008.7	47
0042663	.R458X	31	046125	.4ASM1.25	107	046750	.4ASM7.5	107	0047293	.A90011/32	47
0042670	.R458Y	31	046130	.4ASM1.3	107	0046753	.A9004.8	45	0047309	.A9008.8	47
0042687	.R458Z	31	046165	.4ASM1.65	107	0046760	.A9004.9	46	0047316	.A9008.9	47
0042694	.R45810.8	31	046200	.4ASM2.0	107	0046777	.A9005.0	46	0047323	.A9009.0	47
042801	.R42CA	105	046230	.4ASM2.3	107	0046784	.A9005.1	46	0047330	.A9009.1	47
042802	.R42CB	105	046240	.4ASM2.4	107	0046791	.A900N7	46	0047347	.A90023/64	47
042803	.R42CC	105	046250	.4ASM2.5	107	046800	.4ASM8.0	108	0047354	.A9009.2	47
042804	.R42CD	105	0046289	.A9001.0	44	0046807	.A90013/64	46	0047361	.A9009.3	47
042805	.R42CE	105	0046296	.A9001.1	44	046810	.4ASM8.1	108	0047378	.A9009.4	47
042806	.R42CF	105	046300	.4ASM3.0	107	0046814	.A9005.2	46	0047385	.A9009.5	47
042807	.R42CG	105	0046302	.A9001.2	44	0046821	.A9005.3	46	0047392	.A9003/8	47
042808	.R42CH	105	046310	.4ASM3.1	107	0046838	.A9005.4	46	0047408	.A9009.6	47
042809	.R42CI	105	0046319	.A9001.3	44	046840	.4ASM8.4	108	0047415	.A9009.7	47
042810	.R42CJ	105	046320	.4ASM3.2	107	0046845	.A9005.5	46	0047422	.A9009.8	47
042811	.R42CK	105	0046326	.A9001.4	44	046850	.4ASM8.5	108	0047439	.A9009.9	47
042812	.R42CL	105	046330	.4ASM3.3	107	0046852	.A9007/32	46	0047446	.A90025/64	47
042813	.R42CM	105	0046333	.A9001.5	44	0046869	.A9005.6	46	0047453	.A90010.0	47
042814	.R42CN	105	046340	.4ASM3.4	107	046870	.4ASM8.7	108	0047460	.A90010.2	47
042815	.R42CO	105	0046340	.A9001/16	44	0046876	.A9005.7	46	0047477	.A90010.3	47
042816	.R42CP	105	046350	.4ASM3.5	107	0046883	.A9005.8	46	0047484	.A90013/32	47
042817	.R42CQ	105	0046357	.A9001.6	44	0046890	.A9005.9	46	0047491	.A90010.4	47
042818	.R42CR	105	0046364	.A9001.7	44	046900	.4ASM9.0	108	0047507	.A90010.5	47
042819	.R42CS	106	046370	.4ASM3.7	107	0046906	.A90015/64	46	0047514	.A90027/64	47
042820	.R42CT	106	0046371	.A9001.8	44	046910	.4ASM9.1	108	0047521	.A90010.8	47
042821	.R42CU	106	0046388	.A9001.9	44	0046913	.A9006.0	46	0047538	.A90011.0	47
042822	.R42CV	106	0046395	.A9005/64	44	046920	.4ASM9.2	108	0047545	.A9007/16	47
042823	.R42CW	106	046400	.4ASM4.0	107	0046920	.A9006.1	46	0047552	.A90011.2	47
042824	.R42CX	106	0046401	.A9002.0	44	046930	.4ASM9.3	108	0047569	.A90011.5	47
042825	.R42CY	106	0046418	.A9002.1	45	0046937	.A9006.2	46	0047576	.A90029/64	47
042826	.R42CZ	106	046420	.4ASM4.2	107	0046944	.A9006.3	46	0047583	.A90011.8	47
0044988	.A720.15	57	0046425	.A9002.2	45	046950	.4ASM9.5	108	0047590	.A90015/32	47
0044995	.A720.18	57	0046432	.A9002.3	45	0046951	.A9001/4	46	0047606	.A90012.0	47
0045008	.A720.2	57	0046449	.A9003/32	45	0046968	.A9006.4	46	0047613	.A90012.2	47
0045015	.A720.22	57	046450	.4ASM4.5	107	046970	.4ASM9.7	108	0047620	.A90031/64	47
0045022	.A720.25	57	0046456	.A9002.4	45	0046975	.A9006.5	46	0047637	.A90012.5	47
0045039	.A720.28	57	0046463	.A9002.5	45	0046982	.A900F	46	0047644	.A9001/2	47
0045046	.A720.3	57	0046470	.A9002.6	45	0046999	.A9006.6	46	0047651	.A90012.8	47
0045053	.A720.35	57	0046487	.A9002.7	45	047000	.4ASM10.0	108	0047668	.A90013.0	47
0045060	.A720.38	57	0046494	.A9007/64	45	047002	.4ASM10.2	108	0047675	.A90013.5	47
0045077	.A720.39	57	046500	.4ASM5.0	107	0047002	.A9006.7	46	0047682	.A90014.0	47
0045084	.A720.4	57	0046500	.A9002.8	45	047005	.4ASM10.5	108	0047699	.A90014.5	47
0045107	.A720.45	57	0046517	.A9002.9	45	047008	.4ASM10.8	108	0047705	.A90015.0	48
0045114	.A720.5	57	0046524	.A9003.0	45	0047019	.A90017/64	46	0047712	.A90015.5	48
0045121	.A720.6	57	0046531	.A9003.1	45	0047026	.A9006.8	46	0047729	.A90016.0	48
045610	.TS18N10	171	0046548	.A9001/8	45	0047033	.A9006.9	46	0047736	.A90017.0	48
045611	.TS18N11	171	046550	.4ASM5.5	107	0047040	.A900I	46	0047743	.A90017.5	48



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0047767	.A90019.0	48	0048535	.B10012.0	423	0049693	.B1575.0	406	050320	.QC91GM12.0	124
0047774	.A90020.0	48	0048542	.B10013.0	423	0049709	.A90114.5	47	0050323	.A9201.4	52
0047781	.A9011.5	44	0048559	.B10014.0	423	0049716	.B1576.0	406	050325	.QC91GM12.5	124
0047798	.A9012.0	44	0048566	.B10015.0	423	0049723	.A90115.0	48	050330	.QC91GM13.0	124
0047804	.A9012.5	45	0048573	.B10016.0	423	0049730	.B1577.0	406	0050347	.A9201.5	52
0047811	.A9012.6	45	0048580	.B10017.0	423	0049747	.B1578.0	406	0050392	.B1701.51	394
0047828	.A9013.0	45	0048597	.B10018.0	423	0049754	.B1579.0	406	0050491	.B1703.01	394
0047835	.A9013.1	45	0048603	.B10019.0	423	050015	.QC91PM1.5	124	0050590	.B1708.51	395
0047842	.A9013.2	45	0048610	.B1002.0	422	050020	.QC91PM2.0	124	0050644	.A9201/16	52
0047859	.A9013.3	45	0048627	.A9019.9	47	050025	.QC91PM2.5	124	0050668	.A9201.6	52
0047866	.A9013.4	45	0048634	.B1002.5	422	050030	.QC91PM3.0	124	0050675	.A9201.7	52
0047873	.A9013.5	45	0048641	.A90110.0	47	050035	.QC91PM3.5	124	0050682	.A9201.8	52
0047880	.A9013.6	45	0048658	.B10020.0	423	050040	.QC91PM4.0	124	0050699	.A9201.9	52
0047897	.A9013.7	45	0048665	.B10022.0	423	050045	.QC91PM4.5	124	0050705	.A9205/64	52
0047903	.A9013.8	45	0048672	.B10024.0	423	050050	.QC91PM5.0	124	0050712	.A9202.0	52
0047910	.A9013.9	45	0048689	.B10025.0	423	050052	.QC91PM5.2	124	0050729	.A9202.1	52
0047927	.A9014.0	45	0048696	.B10026.0	423	050055	.QC91PM5.5	124	0050743	.A9202.2	53
0047934	.A9014.1	45	0048702	.B10028.0	423	050056	.QC91PM5.6	124	0050750	.A9202.3	53
0047941	.A9014.2	45	0048719	.B1003.0	422	050060	.QC91PM6.0	124	0050767	.A9203/32	53
0047958	.A9014.3	45	0048726	.B1003.2	422	050065	.QC91PM6.5	124	0050781	.A9202.4	53
0047965	.A9014.4	45	0048733	.B1003.5	422	050068	.QC91PM6.8	124	0050804	.A9202.5	53
0047972	.A9014.5	45	0048740	.B10030.0	423	050070	.QC91PM7.0	124	0050811	.A9202.6	53
0047989	.A9014.6	45	0048757	.B10032.0	423	050075	.QC91PM7.5	124	0050828	.A9202.7	53
0047996	.A9014.7	45	0048764	.B10034.0	423	050080	.QC91PM8.0	124	0050835	.A9207/64	53
0048009	.A9014.8	45	0048771	.B10035.0	423	050082	.QC91PM8.2	124	0050842	.A9202.8	53
0048016	.A9014.9	46	0048788	.B10036.0	423	050085	.QC91PM8.5	124	0050859	.A9202.9	53
0048023	.A9015.0	46	0048795	.B10038.0	423	050086	.QC91PM8.6	124	0050866	.A9203.0	53
0048030	.A9015.1	46	0048801	.B1004.0	422	050090	.QC91PM9.0	124	0050873	.A9203.1	53
0048047	.A9015.2	46	0048818	.B1004.5	422	050095	.QC91PM9.5	124	0050880	.A9201/8	53
0048054	.A9015.3	46	0048825	.B10040.0	423	050100	.QC91PM10.0	124	0050897	.A9203.2	53
0048061	.A9015.4	46	0048856	.B10045.0	423	050105	.QC91PM10.5	124	050901	.QC91GN1	123
0048078	.A9015.5	46	0048863	.A90110.2	47	050110	.QC91PM11.0	124	050902	.QC91GN2	123
0048085	.A9015.6	46	0048870	.A90110.3	47	050115	.QC91PM11.5	124	0050903	.A9203.3	53
0048092	.A9015.7	46	0048887	.B1005.0	422	050120	.QC91PM12.0	124	050903	.QC91GN3	123
0048108	.A9015.8	46	0048894	.B1005.5	422	050125	.QC91PM12.5	124	050904	.QC91GN4	123
0048115	.A9015.9	46	0048900	.B10050.0	423	050130	.QC91PM13.0	124	050905	.QC91GN5	123
0048122	.A9016.0	46	0048917	.B1006.0	422	0050132	.A90115.5	48	050906	.QC91GN6	123
0048139	.A9016.1	46	0048924	.B1007.0	422	050135	.QC91PM13.5	124	050907	.QC91GN7	123
0048146	.A9016.2	46	0048931	.B1008.0	422	050140	.QC91PM14.0	124	050908	.QC91GN8	123
0048153	.A9016.3	46	0048948	.B1009.0	423	050145	.QC91PM14.5	124	050909	.QC91GN9	123
0048160	.A9016.4	46	0048955	.A90110.4	47	050150	.QC91PM15.0	125	0050910	.A9203.4	53
0048177	.A9016.5	46	0049013	.A90110.5	47	050155	.QC91PM15.5	125	050910	.QC91GN10	123
0048184	.A9016.6	46	0049020	.B12110.0	413	050160	.QC91PM16.0	125	050911	.QC91GN11	123
0048191	.A9016.7	46	0049037	.B12111.0	413	050165	.QC91PM16.5	125	050912	.QC91GN12	123
0048207	.A9016.8	46	0049044	.B12112.0	413	0050170	.A90116.0	48	050913	.QC91GN13	123
0048214	.A9016.9	46	0049051	.B12113.0	413	050170	.QC91PM17.0	125	050914	.QC91GN14	123
0048221	.A9017.0	46	0049068	.B12114.0	413	050175	.QC91PM17.5	125	050915	.QC91GN15	123
0048238	.A9017.1	46	0049075	.B12115.0	413	050215	.QC91GM1.5	124	050916	.QC91GN16	123
0048245	.A9017.2	46	0049082	.B12116.0	413	0050217	.A9201.0	52	050917	.QC91GN17	123
0048252	.A9017.3	46	0049099	.B12117.0	413	050220	.QC91GM2.0	124	050918	.QC91GN18	123
0048269	.A9017.4	46	0049105	.B12118.0	413	050225	.QC91GM2.5	124	050919	.QC91GN19	123
0048276	.A9017.5	46	0049112	.B12119.0	413	050230	.QC91GM3.0	124	050920	.QC91GN20	123
0048283	.A9017.6	46	0049129	.B12120.0	413	050235	.QC91GM3.5	124	050921	.QC91GN21	123
0048290	.A9017.7	46	0049136	.B12121.0	413	050240	.QC91GM4.0	124	050922	.QC91GN22	123
0048306	.A9017.8	46	0049143	.B12122.0	413	050245	.QC91GM4.5	124	050923	.QC91GN23	123
0048313	.A9017.9	46	0049150	.B12123.0	413	050250	.QC91GM5.0	124	050924	.QC91GN24	123
0048320	.A9018.0	46	0049167	.B12124.0	413	050252	.QC91GM5.2	124	050925	.QC91GN25	123
0048337	.A9018.1	46	0049174	.B12125.0	413	050255	.QC91GM5.5	124	050926	.QC91GN26	122
0048344	.A9018.2	46	0049181	.B12126.0	413	050256	.QC91GM5.6	124	0050927	.A9203.5	53
0048351	.A9018.3	47	0049198	.A90110.8	47	050260	.QC91GM6.0	124	050927	.QC91GN27	122
0048368	.A9018.4	47	0049211	.B12130.0	413	0050262	.A9201.1	52	050928	.QC91GN28	122
0048375	.A9018.5	47	0049235	.A90111.0	47	050265	.QC91GM6.5	124	050929	.QC91GN29	122
0048382	.A9018.6	47	0049242	.A90111.2	47	050268	.QC91GM6.8	124	050930	.QC91GN30	122
0048399	.A9018.7	47	0049280	.A90111.5	47	050270	.QC91GM7.0	124	050931	.QC91GN31	122
0048405	.A9018.8	47	0049297	.A90111.8	47	050275	.QC91GM7.5	124	050932	.QC91GN32	122
0048412	.A9018.9	47	0049303	.A90112.0	47	050280	.QC91GM8.0	124	050933	.QC91GN33	122
0048429	.A9019.0	47	0049587	.A90112.2	47	050282	.QC91GM8.2	124	0050934	.A9209/64	53
0048436	.A9019.1	47	0049594	.A90112.5	47	050285	.QC91GM8.5	124	050934	.QC91GN34	122
0048443	.A9019.2	47	0049600	.A90112.8	47	050286	.QC91GM8.6	124	050935	.QC91GN35	122
0048450	.A9019.3	47	0049617	.B15710.0	406	050290	.QC91GM9.0	124	050936	.QC91GN36	122
0048467	.A9019.4	47	0049624	.B15711.0	406	050295	.QC91GM9.5	124	050937	.QC91GN37	122
0048474	.A9019.5	47	0049631	.B15712.0	406	050300	.QC91GM10.0	124	050938	.QC91GN38	122
0048481	.A9019.6	47	0049648	.B1572.0	406	050305	.QC91GM10.5	124	050939	.QC91GN39	122
0048498	.A9019.7	47	0049655	.A90113.0	47	0050309	.A9201.2	52	050940	.QC91GN40	122
0048504	.A9019.8	47	0049662	.A90113.5	47	050310	.QC91GM11.0	124	0050941	.A9203.6	53
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050951	QC91GN51	122	0051085	A9204.7	53	051334	M51CO17/32	127	0051535	A9207.9	54
050952	QC91GN52	122	0051092	A9203/16	53	051335	M51CO35/64	127	0051542	A9205/16	54
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052066	.R52N66	115	052339	.M52CON39	126	0052853	.A9216.5	54	053606	.CO500-63/32	142
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052068	.R52N68	115	0052358	.B33511BLADES	418	0052884	.A9216.8	54	053608	.CO500-61/8	143
052069	.R52N69	115	0052365	.B33512BLADES	418	0052891	.A9216.9	54	053609	.CO500-69/64	143
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052071	.R52N71	115	0052389	.B3353BLADES	418	0052914	.A9217.1	54	053611	.CO500-611/64	143
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0052075	.A92013.5	55	0052433	.B3358BLADES	418	0052952	.A9217.5	54	053614	.CO500-67/32	143
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0052112	.A92015.5	56	0052532	.A9213.3	53	0053058	.B4002.2	389	053705	.CO501-6N5	143
0052129	.A92016.0	56	0052549	.A9213.4	53	0053065	.B4002.5	389	053706	.CO501-6N6	143
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0052143	.A92017.5	56	0052563	.A9213.6	53	0053089	.A9217.8	54	053708	.CO501-6N8	143
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053747	CO501-6N47	142	0055625	A9403.6	59	056380	5ATL3.8	119	057305	5ATL30.5	120
053748	CO501-6N48	142	055625	QC0860P25/64	136	056400	5ATL4.0	119	057310	5ATL31.0	120
053749	CO501-6N49	142	055626	QC0860P13/32	136	056420	5ATL4.2	119	057408	08601/8	128
053750	CO501-6N50	142	055627	QC0860P27/64	136	056430	5ATL4.3	119	057410	08605/32	128
0053751	A9401.4	58	055628	QC0860P7/16	136	056450	5ATL4.5	119	057412	08603/16	128
053751	CO501-6N51	142	055629	QC0860P29/64	136	056460	5ATL4.6	119	057414	08607/32	128
053752	CO501-6N52	142	055630	QC0860P15/32	136	056480	5ATL4.8	119	057416	08601/4	128
0053768	A9401.5	58	055631	QC0860P31/64	136	056500	5ATL5.0	119	057418	08609/32	128
0053775	A9401/16	58	0055632	A9403.7	59	056550	5ATL5.5	120	057420	08605/16	128
0054253	A9401.6	58	055632	QC0860P1/2	136	056560	5ATL5.6	120	057422	086011/32	128
0054260	A9401.7	58	055904	QC91G1/16	122	0056561	A9404.8	59	057424	08603/8	128
0054383	A9401.8	58	055905	QC91G5/64	122	056570	5ATL5.7	120	057426	086013/32	128
0054390	A9401.9	58	055906	QC91G3/32	122	056600	5ATL6.0	120	057428	08607/16	128
0054406	A9405/64	58	055907	QC91G7/64	122	0056615	A9404.9	59	057430	086015/32	129
0054604	A9402.0	58	055908	QC91G1/8	122	056640	5ATL6.4	120	057432	08601/2	129
0054611	A9402.1	58	055909	QC91G9/64	122	0056646	A9405.0	59	0057780	A9405.5	59
0054628	A9402.2	58	055910	QC91G5/32	123	056650	5ATL6.5	120	0057797	A9407/32	59
0054710	A9402.3	58	055911	QC91G11/64	123	056680	5ATL6.8	120	0057810	A9405.6	59
0054727	A9403/32	58	055912	QC91G3/16	123	056720	5ATL7.2	120	0057827	A9405.7	59
0054734	A9402.4	58	055913	QC91G13/64	123	056750	5ATL7.5	120	0057834	A9405.8	59
0054789	A9402.5	58	055914	QC91G7/32	123	056770	5ATL7.0	120	0057841	A9405.9	59
0054796	A9402.6	58	055915	QC91G15/64	123	056780	5ATL7.8	120	0057858	A94015/64	59
0054802	A9402.7	58	055916	QC91G1/4	123	056800	5ATL8.0	120	0057865	A9406.0	59
0054833	A9407/64	58	055917	QC91G17/64	123	056820	5ATL8.2	120	0057872	A9406.1	59
0054840	A9402.8	58	055918	QC91G9/32	123	0056820	A9405.1	59	057904	QC91P1/16	122
0054857	A9402.9	58	055919	QC91G19/64	123	056850	5ATL8.5	120	057905	QC91P5/64	122
0054871	A9403.0	58	055920	QC91G5/16	123	0056882	A94013/64	59	057906	QC91P3/32	122
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055007	R55G	117	055927	QC91G27/64	123	0057056	A9405.4	59	057913	QC91P13/64	123
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090133	C16B209SET	193	091465	R561.1/64	157	091592	R571.11/32	160	0924525	E500M33NO3	241
090154	C29R51SET	192	091467	R561.3/64	158	091595	R571.13/32	160	0924549	E500M36NO2	241
090155	C60R52SET	192	091468	R561.1/16	158	091598	R571.15/32	160	0924556	E500M36NO3	241
090161	C20R18PSET	180	091469	R561.5/64	158	092333	R56CO33/64	162	0924587	E500M39NO3	241
090162	C29R10PSET	179	091470	R561.3/32	158	092334	R56CO17/32	162	0924617	E500M4.5NO2	240
090163	C15R10PSET	179	091471	R561.7/64	158	092335	R56CO35/64	162	0924624	E500M4.5NO3	240
090164	C13R10PSET	179	091472	R561.1/8	158	092336	R56CO9/16	162	0924648	E500M4NO2	240
090165	C21R10PSET	179	091473	R561.9/64	158	092337	R56CO37/64	162	0924655	E500M4NO3	240
090170	C29R40SET	188	091474	R561.11/64	158	092338	R56CO19/32	162	0924662	E500M4NO6	240
090173	C26R42SET	188	091475	R561.13/64	158	092339	R56CO39/64	162	0924686	E500M42NO3	241
090174	C60R41SET	188	091476	R561.3/16	158	092340	R56CO5/8	162	0924709	E500M45NO3	241
090231	C33R56SET	194	091477	R561.15/64	158	092341	R56CO41/64	162	0924730	E500M48NO3	241
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090292	C26R15COSET	186	091482	R561.5/16	158	092344	R56CO11/16	162	0924792	E500M52NO3	241
090328	C8R56COSET	194	091483	R561.3/8	158	092345	R56CO45/64	162	0924808	E500M6NO1	240
090556	C8R56SET	194	091484	R561.7/16	158	092346	R56CO23/32	162	0924815	E500M6NO2	240
090558	C8R57SET	194	091485	R561.1/2	158	092347	R56CO47/64	162	0924822	E500M6NO3	240
090600	C60R18COSET	186	091486	R561.1/32	158	092348	R56CO3/4	162	0924846	E500M7NO3	240
091010	C29HX10SET	185	091487	R561.5/32	158	092349	R56CO49/64	162	0924853	E500M7NO6	240
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091268	R581.1/16	161	091495	R561.15/32	158	092352	R56CO13/16	162	0924891	E500M8NO6	240
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0096499	.E513M24X2.0NO2	243	0099865	.E7101/2	278	0108567	.G13616.5	435	0115718	.R5104.2	33
0096505	.E513M24X2.0NO3	243	0099872	.E7101/4	278	0108574	.G13619.0	435	0115725	.R5104.3	33
0096512	.E513M25X1.5NO3	243	0099889	.E7101/8	278	0108581	.G13620.5	435	0115732	.R5104.5	33
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0096536	.E513M26X1.5NO3	243	0099902	.E7103/4	278	0108604	.G13625.0	435	0115756	.R5105.0	33
0096543	.E513M28X1.5NO2	243	099903	.C29R40COSET	190	0108611	.G13626.0	435	0115763	.R5105.1	33
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0096567	.E513M3X.35NO3	242	0099926	.E7111	284	0108635	.G13630.0	435	0115787	.R5106.0	33
0096574	.E513M30X1.5NO2	243	099930	.C60R41COSET	190	0108642	.G13631.0	435	0115794	.R5106.5	33
0096581	.E513M30X1.5NO3	243	0099933	.E7111/2	284	0108659	.G1364.3	435	0115800	.R5106.8	34
0096598	.E513M32X1.5NO3	243	099935	.C29L10SET	184	0108666	.G1365.0	435	0115817	.R5106.9	34
0096604	.E513M33X2.0NO2	243	0099940	.E7111/4	284	0108673	.G1365.3	435	0115824	.R5107.0	34
0096611	.E513M33X3.0NO3	243	099944	.C13R10COSET	186	0108680	.G1365.8	435	0115831	.R5107.3	34
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0096642	.E513M36X2.0NO3	243	099960	.C60M41COSET	191	0108710	.G1367.0	435	0115862	.R5108.0	34
0096659	.E513M36X3.0NO2	243	099961	.C26M42COSET	191	0108727	.G1367.3	435	0115879	.R5108.5	34
0096666	.E513M36X3.0NO3	243	099962	.C29M40COSET	191	0108734	.G1368.0	435	0115886	.R5109.0	34
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0096703	.E513M42X1.5NO3	243	099977	.C29R10SET	179	0108772	.G13720.0	436	0115923	.R52010.0	27
0096710	.E513M45X1.5NO3	243	099978	.C15R10SET	179	0108789	.G13725.0	436	0115930	.R52010.2	27
0096727	.E513M5X.5NO2	242	099979	.C13R10SET	179	0108796	.G13731.5	436	0115947	.R52010.4	27
0096734	.E513M5X.5NO3	242	099980	.C21R10SET	179	0108802	.G13740.0	436	0115954	.R52010.5	27
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0096765	.E513M6X.75NO3	242	099982	.C115COMBSET	182	0108826	.G13763.0	436	0115978	.R52011.5	28
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0116371	.R5206.1	27	0128015	.B1701.04	394	0133811	.B1705.03	395	0134931	.R4578.9	31
0116388	.R5206.2	27	0128022	.B1701.05	394	0133828	.B1705.04	395	0134948	.R4579.4	31
0116395	.R5206.3	27	0128459	.B1701.49	394	0133835	.B1705.05	395	0134955	.R4579.9	31
0116401	.R5206.4	27	0128466	.B1701.5	394	0134191	.R4534.4	36	0134962	.R45711.4	31
0116418	.R5206.5	27	0128473	.B1701.52	394	0134207	.R4534.8	36	0134979	.R45711.6	31
0116425	.R5206.8	27	0128725	.G40010.4	428	0134214	.R4534.9	36	0134986	.R45712.8	31
0116432	.R5206.9	27	0128732	.G40012.4	428	0134221	.R4535.2	36	0134993	.R45713.8	31
0116449	.R5207.0	27	0128749	.G40016.5	428	0134238	.R4536.2	36	0135006	.R45714.8	32
0116456	.R5207.3	27	0128756	.G40020.5	428	0134245	.R4536.4	36	0135013	.R4584.4	30
0116463	.R5207.4	27	0128763	.G40025.0	428	0134252	.R4536.7	36	0135020	.R4584.7	30
0116470	.R5207.5	27	0128770	.G40031.0	428	0134269	.B1705.49	395	0135037	.R4584.8	30
0116487	.R5207.8	27	0128787	.G4006.3	428	0134276	.B1705.5	395	0135044	.R4584.9	30
0116494	.R5208.0	27	0128794	.G4008.3	428	0134283	.B1705.51	395	0135051	.R4585.2	30
0116500	.R5208.5	27	0128916	.B1701.98	394	0134290	.B1705.52	395	0135068	.R4586.2	30
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0116531	.R5209.3	27	0128947	.B17010.01	396	0134320	.R4538.2	37	0135099	.R4587.7	30
0116548	.R5209.5	27	0128954	.B17010.02	396	0134337	.R4538.4	37	0135105	.R4587.9	30
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0122303	.C3464.0	365	0128985	.B17010.05	396	0134368	.R4539.9	37	0135136	.R4589.4	31
0122310	.C3465.0	365	0129463	.B17010.49	396	0134375	.R45311.4	37	0135143	.R4589.7	31
0122327	.C3466.0	365	0129470	.B17010.51	396	0134382	.R45311.6	37	0135150	.R4589.9	31
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0122457	.E500M56NO3	241	0129883	.B17010.98	396	0134405	.R45313.8	37	0135174	.R45811.6	31
0122464	.E500M1NO3	240	0129890	.B17010.99	396	0134412	.R45314.8	38	0135181	.R45812.8	31
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0122488	.E500M1.4NO3	240	0129913	.B17011.01	396	0134436	.R45317.8	38	0135204	.R45815.8	32
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0136294	.B1707.51	395	0137260	.B1708.49	395	0138038	.EP205-40	201	0140369	.B15714.0	406
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0144305	.B40016.0	389	0148884	.A9785.0X315	62	0150139	.EX11M18X1.5	220	0154342	.E500M33NO1	241
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0144336	.B41117.0	391	0148914	.A9786.5X350	62	0150160	.EX11M22X1.5	220	0154397	.E500M24NO6	241
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0144695	.B3355NUT	418	0149560	.G33510.0	432	0150368	.EX201/2	215	0154724	.E500M5NO6	240
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0212226	.A92011.25	55	0214763	.A12539/64X315	133	0252406	.B1223/4	407	0343128	.E513M9X.75NO3	242



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0343142	.E513M11X1.25NO3	242	0348352	.E0618-32NO6	245	0349717	.E0717/16NO2	245	0351161	.A0027.7	70
0343166	.E513M12X.75NO3	242	0348369	.E06110-24NO1	245	0349724	.E0717/16NO3	245	0351178	.A0027.8	70
0343173	.E513M13X1.5NO3	242	0348376	.E06110-24NO2	245	0349731	.E0717/16NO6	245	0351185	.A0027.9	70
0343203	.E513M16X1.25NO3	242	0348383	.E06110-24NO3	245	0349748	.E0711/2NO1	245	0351208	.A0028.0	70
0343302	.E513M36X1.5NO3	243	0348390	.E06110-24NO6	245	0349755	.E0711/2NO2	245	0351215	.A0028.1	70
0343319	.E513M42X3.0NO3	243	0348406	.E06112-24NO1	245	0349762	.E0711/2NO3	245	0351222	.A0028.2	70
0343333	.E513M48X1.5NO3	243	0348413	.E06112-24NO2	245	0349779	.E0711/2NO6	245	0351239	.A0028.3	70
0343340	.E513M48X2.0NO3	243	0348420	.E06112-24NO3	245	0349786	.E0719/16NO1	245	0351253	.A0028.4	70
0343357	.E513M48X3.0NO3	243	0348437	.E06112-24NO6	245	0349793	.E0719/16NO2	245	0351260	.A0028.5	70
0345245	.R5103.9	33	0348444	.E0611/4NO1	245	0349809	.E0719/16NO3	245	0351277	.A0028.6	70
0345252	.R5106.6	33	0348451	.E0611/4NO2	245	0349816	.E0719/16NO6	245	0351284	.A0028.7	71
0345269	.R5107.8	34	0348468	.E0611/4NO3	245	0349823	.E0715/8NO1	245	0351307	.A0028.8	71
0345276	.R5107.9	34	0348475	.E0611/4NO6	245	0349830	.E0715/8NO2	245	0351314	.A0028.9	71
0345283	.R5108.8	34	0348482	.E0615/16NO1	245	0349847	.E0715/8NO3	245	0351321	.A0029.0	71
0345290	.R5109.9	34	0348499	.E0615/16NO2	245	0349854	.E0715/8NO6	245	0351338	.A0029.1	71
0345306	.R51010.8	34	0348505	.E0615/16NO3	245	0349861	.E0713/4NO1	245	0351352	.A0029.2	71
0346402	.R5206.6	27	0348512	.E0615/16NO6	245	0349878	.E0713/4NO2	245	0351369	.A0029.3	71
0346419	.R5206.7	27	0348529	.E0613/8NO1	245	0349885	.E0713/4NO3	245	0351376	.A0029.4	71
0346426	.R5207.1	27	0348536	.E0613/8NO2	245	0349892	.E0717/8NO1	245	0351383	.A0029.5	71
0346433	.R5207.2	27	0348543	.E0613/8NO3	245	0349908	.E0717/8NO2	245	0351406	.A0029.6	71
0346440	.R5207.6	27	0348550	.E0613/8NO6	245	0349915	.E0717/8NO3	245	0351413	.A0029.7	71
0346457	.R5207.7	27	0348567	.E0617/16NO1	245	0349922	.E0717/8NO6	245	0351420	.A0029.8	71
0346464	.R5207.9	27	0348574	.E0617/16NO2	245	0349939	.E0711X12NO1	245	0351437	.A0029.9	71
0346471	.R5208.1	27	0348581	.E0617/16NO3	245	0349946	.E0711X12NO2	245	0351451	.A00210.0	71
0346488	.R5208.2	27	0348598	.E0617/16NO6	245	0349953	.E0711X12NO3	245	0351468	.A00210.1	71
0346495	.R5208.3	27	0348604	.E0611/2NO1	245	0349960	.E0711X12NO6	245	0351475	.A00210.2	71
0346501	.R5208.4	27	0348611	.E0611/2NO2	245	0349977	.E0711X14NO1	245	0351482	.A00210.3	71
0346518	.R5208.6	27	0348628	.E0611/2NO3	245	0349984	.E0711X14NO2	245	0351505	.A00210.4	71
0346525	.R5208.8	27	0348635	.E0611/2NO6	245	0349991	.E0711X14NO3	245	0351512	.A00210.5	71
0346532	.R5208.9	27	0348642	.E0619/16NO2	245	0350003	.E0711X14NO6	245	0351529	.A00210.6	71
0346549	.R5209.1	27	0348659	.E0619/16NO3	245	0350577	.A0023.0	69	0351536	.A00210.7	71
0346556	.R5209.6	27	0348666	.E0619/16NO6	245	0350584	.A0023.1	69	0351550	.A00210.8	71
0346563	.R5209.7	27	0348673	.E0615/8NO1	245	0350607	.A0023.2	69	0351567	.A00210.9	71
0346570	.R5209.8	27	0348680	.E0615/8NO2	245	0350614	.A0023.3	69	0351574	.A00211.0	71
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0346778	.R52010.1	27	0348703	.E0615/8NO6	245	0350638	.A0023.5	70	0351604	.A00211.2	71
0347072	.A9761/8	61	0348710	.E0613/4NO1	245	0350652	.A0023.6	70	0351611	.A00211.3	71
0347089	.A9765/32	61	0348727	.E0613/4NO2	245	0350669	.A0023.7	70	0351628	.A00211.4	71
0347096	.A9761/4	62	0348734	.E0613/4NO3	245	0350676	.A0023.8	70	0351635	.A00211.5	71
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0347119	.A97611/32	62	0348758	.E0617/8NO1	245	0350706	.A0024.0	70	0351666	.A00211.7	71
0347126	.A9763/8	63	0348765	.E0617/8NO2	245	0350713	.A0024.1	70	0351673	.A00211.8	71
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0347140	.A97611.0	63	0348789	.E0617/8NO6	245	0350737	.A0024.3	70	0351703	.A00212.0	71
0347157	.A97611.5	63	0348796	.E0611NO1	245	0350751	.A0024.4	70	0351710	.A00212.1	71
0347164	.A97612.0	63	0348802	.E0611NO2	245	0350768	.A0024.5	70	0351734	.A00212.3	71
0347171	.A97612.5	63	0348819	.E0611NO3	245	0350775	.A0024.6	70	0351758	.A00212.4	71
0347188	.A9761/2	63	0348826	.E0611NO6	245	0350782	.A0024.7	70	0351765	.A00212.5	71
0347195	.A97613.0	63	0349427	.E0716-40NO1	245	0350805	.A0024.8	70	0351772	.A00212.6	71
0347201	.A97614.0	63	0349434	.E0716-40NO2	245	0350812	.A0024.9	70	0351796	.A00212.7	71
0347218	.A9771/8	61	0349441	.E0716-40NO3	245	0350829	.A0025.0	70	0351802	.A00212.8	71
0347225	.A9773/16	62	0349458	.E0716-40NO6	245	0350836	.A0025.1	70	0351819	.A00212.9	71
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0347249	.A97711/32	62	0349472	.E0718-36NO2	245	0350867	.A0025.3	70	0351833	.E0619/16NO1	245
0347256	.A97710.5	63	0349489	.E0718-36NO3	245	0350874	.A0025.4	70	0351932	.E0713/4NO6	245
0347263	.A97711.0	63	0349496	.E0718-36NO6	245	0350881	.A0025.5	70	0353165	.C1101.0	347
0347270	.A97711.5	63	0349502	.E07110-32NO1	245	0350904	.A0025.6	70	0353172	.C1101.5	347
0347287	.A97712.0	63	0349519	.E07110-32NO2	245	0350911	.A0025.7	70	0353189	.C1101.8	347
0347294	.A97712.5	63	0349526	.E07110-32NO3	245	0350928	.A0025.8	70	0353196	.C11010.0	348
0347300	.A97713.0	63	0349533	.E07110-32NO6	245	0350935	.A0025.9	70	0353202	.C11010.5	348
0347317	.A97714.0	63	0349540	.E07112-28NO1	245	0350959	.A0026.0	70	0353219	.C11011.0	348
0347324	.A9783.0	61	0349557	.E07112-28NO2	245	0350966	.A0026.1	70	0353226	.C11012.0	348
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0347362	.A9761.5	61	0349571	.E07112-28NO6	245	0350980	.A0026.3	70	0353240	.C11014.0	348
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0347386	.A9771.5	61	0349595	.E0711/4NO2	245	0351017	.A0026.5	70	0353264	.C11016.0	348
0347393	.A9771/16	61	0349601	.E0711/4NO3	245	0351024	.A0026.6	70	0353271	.C11017.0	348
0347409	.A9772.0	61	0349618	.E0711/4NO6	245	0351031	.A0026.7	70	0353288	.C11018.0	348
0347416	.A9773/32	61	0349625	.E0715/16NO1	245	0351055	.A0026.8	70	0353295	.C11019.0	348
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0348284	.E0618-32NO1	245	0349649	.E0715/16NO3	245	0351079	.A0027.0	70	0353318	.C1102.5	347
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0348321	.E0616-32NO6	245	0349687	.E0713/8NO3	245	0351123	.A0027.4	70	0353356	.C11025.0	348
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0353394	.C1103.8	347	0354872	.C2479.5	372	0384855	.E620M6	294	0391013	.A55315.5	42
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0353462	.C1105.5	347	0354940	.C27316.0	375	0384923	.E621M4	294	0391150	.A55319.0	43
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0353509	.C1107.0	347	0354988	.C27320.0	375	0384961	.E621M10	294	0391228	.A5535.2	42
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0353554	.C1109.5	347	0355039	.C2733.5	375	0385197	.A00213.3	71	0391327	.A5536.8	42
0353561	.C12310.0	354	0355046	.C27330.0	376	0385203	.A00213.6	71	0391334	.A5536.9	42
0353578	.C12311.0	354	0355053	.C27332.0	376	0385210	.A00213.7	71	0391341	.A5537.0	42
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0353837	.C1237.0	354	0376850	.A0021.7	69	0388181	.E0611.3/8NO2	245	0418031	.A3451.0	152
0353844	.C1237.5	354	0376867	.A0021.8	69	0388198	.E0611.3/8NO3	245	0418048	.A3451.1/4	152
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0353882	.C1239.5	354	0376911	.A0022.4	69	0388235	.E0711.1/8NO1	245	0418086	.A34511/16	151
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0354711	.C24728.0	373	0380932	.R51029/64	34	0390795	.A55310.0	42	0418222	.A34522.0	152
0354728	.C2473.0	372	0380949	.R5103/16	33	0390801	.A55310.2	42	0418239	.A34524.0	152
0354735	.C2473.5	372	0380956	.R51031/64	34	0390818	.A55310.3	42	0418246	.A34525.0	152
0354742	.C24730.0	373	0380963	.R5105/16	34	0390825	.A55310.5	42	0418253	.A34526.0	152
0354759	.C24732.0	373	0380970	.R5105/32	33	0390849	.A55311.0	42	0418260	.A34527.0	152
0354766	.C2474.0	372	0380987	.R5107/16	34	0390856	.A55311.3	42	0418277	.A34528.0	152
0354773	.C2474.5	372	0380994	.R5107/32	33	0390863	.A55311.5	42	0418284	.A34529/64	151
0354780	.C2475.0	372	0381007	.R5109/32	34	0390870	.A55312.0	42	0418291	.A3453/4	152
0354797	.C2475.5	372	0381014	.R5109/64	33	0390887	.A55312.5	42	0418307	.A3453/8	151
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0418383	.A3458.0	151	0419991	.A95216.5	153	0421932	.B4812.52	392	0423639	.A9528.0	153
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0418451	.A95112.5	153	0420065	.A95220.0	154	0422007	.B4813.02	392	0426319	.B44219.0	390
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0418475	.A95113.5	153	0420089	.A95222.0	154	0422021	.B4813.97	392	0441336	.A92113/64	54
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0418567	.A95118.0	154	0420171	.A34510.5	151	0422113	.B4814.99	393	0567616	.E000M5	207
0418574	.A95118.5	154	0420188	.A95213.0	153	0422120	.B4815.00	393	0567623	.E000M6	207
0418581	.A95119.0	154	0420195	.A95216.0	153	0422137	.B4815.01	393	0567630	.E000M8	207
0418598	.A95119.5	154	0420201	.A3459.5	151	0422144	.B4815.02	393	0567647	.E000M10	207
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0419625	.A34517.5	151	0421567	.B4810.98	392	0422335	.B4819.99	393	0567838	.E001M20	208
0419632	.A34518.5	152	0421574	.B4810.99	392	0422564	.A34533.0	152	0567845	.E001M22	208
0419649	.A34519.5	152	0421581	.B4811.00	392	0423257	.A141N10	84	0567852	.E001M24	208
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0419670	.A34522.5	152	0421611	.B4811.03	392	0423288	.A1411/4	85	0567883	.E002M4	221
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0419700	.A34524.5	152	0421642	.B4811.50	392	0423318	.A14111/64	84	0567913	.E002M8	221
0419717	.A34525.5	152	0421659	.B4811.51	392	0423325	.A14113/32	85	0567920	.E002M10	221
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0419748	.A34531.0	152	0421680	.B4811.98	392	0423356	.A14117/64	85	0567951	.E002M16	221
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0419762	.A34534.0	152	0421703	.B48110.00	393	0423370	.A14121/64	85	0567975	.E002M20	221
0419779	.A34535.0	152	0421710	.B48110.01	393	0423387	.A14123/64	85	0567982	.E002M22	221
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0419830	.A34541.0	152	0421772	.B48111.98	393	0423448	.A1413/8	85	0568040	.E003M6	221
0419847	.A34542.0	152	0421789	.B48111.99	393	0423455	.A14131/64	85	0568057	.E003M8	221
0419854	.A34545.0	152	0421796	.B48112.00	393	0423462	.A1415/16	85	0568064	.E003M10	221
0419861	.A34548.0	152	0421802	.B48112.01	393	0423479	.A1415/32	84	0568071	.E003M12	221
0419878	.A34550.0	152	0421819	.B48112.02	393	0423486	.A1415/64	84	0568088	.E003M14	221
0419885	.A95210.0	153	0421826	.B48112.03	393	0423493	.A1417/16	85	0568095	.E003M16	221
0419892	.A95210.5	153	0421833	.B48112.04	393	0423509	.A1417/32	85	0568101	.E003M18	221
0419908	.A95211.0	153	0421840	.B48112.05	393	0423516	.A1417/64	84	0568118	.E003M20	221
0419915	.A95211.5	153	0421857	.B4812.00	392	0423523	.A1419/32	85	0568125	.E003M22	221
0419922	.A95212.0	153	0421864	.B4812.01	392	0423530	.A1419/64	84	0568132	.E003M24	221
0419939	.A95212.5	153	0421871	.B4812.02	392	0423547	.A14115/64	85	0568149	.E010M4X.5	207
0419946	.A95213.5	153	0421888	.B4812.03	392	0423554	.A95231.0	154	0568156	.E010M5X.5	207
0419953	.A95214.0	153	0421895	.B4812.48	392	0423561	.A95232.0	154	0568163	.E010M6X.5	207
0419960	.A95214.5	153	0421901	.B4812.49	392	0423568	.A95233.0	154	0568170	.E010M6X.75	207



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0568231	.E010M12X1.25	207	0569009	.E02012-24	202	0569771	.E0401/4	232	0571491	.A012N27	65
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0568262	.E010M14X1.25	207	0569030	.E0203/8	202	0569801	.E0403/4	232	0571521	.A012N3	66
0568279	.E010M14X1.5	207	0569047	.E0207/16	202	0569818	.E0411/8	232	0571538	.A012N30	65
0568286	.E010M16X1.0	207	0569054	.E0201/2	202	0569825	.E0411/4	232	0571545	.A012N31	65
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0568811	.E013M6X.5	221	0569580	.E0301/2	202	0571309	.A012N1	66	0572078	.A0123/8	66
0568828	.E013M6X.75	221	0569597	.E0309/16	202	0571316	.A012N10	66	0572085	.A01231/64	66
0568835	.E013M8X.75	221	0569603	.E0305/8	202	0571323	.A012N11	66	0572092	.A01233/64	66
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0568859	.E013M10X1.0	221	0569627	.E0307/8	202	0571347	.A012N13	66	0572115	.A01237/64	67
0568866	.E013M10X1.25	221	0569634	.E0301	202	0571354	.A012N14	66	0572122	.A01239/64	67
0568873	.E013M12X1.0	221	0569641	.E0318-36	202	0571361	.A012N15	65	0572139	.A0125/16	66
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0568897	.E013M12X1.5	221	0569665	.E0311/4	202	0571385	.A012N17	65	0572153	.A0125/8	67
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0573440	.C11011.7	348	0580493	.E006M6	204	0581377	.E0263/8	199	0582282	.E0367/8	200
0573457	.C11012.5	348	0580509	.E006M63FL	204	0581384	.E0263/8H11	199	0582299	.E0361-12	200
0573464	.C11013.7	348	0580516	.E006M8	204	0581391	.E0263/83FL	199	0582305	.E0361-14	200
0573471	.C11015.7	348	0580523	.E006M10	204	0581407	.E0267/16	199	0582312	.E03710-32	214
0573488	.C11024.0	348	0580530	.E006M103FL	204	0581414	.E0261/2	199	0582329	.E0371/4	214
0573495	.C1107.75	347	0580547	.E006M12	204	0581421	.E0261/2H11	199	0582336	.E0375/16	214
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0573952	.A0121/64	64	0580561	.E006M14	204	0581445	.E0269/16	200	0582350	.E0377/16	214
0573969	.A0121/32	65	0580578	.E006M16	204	0581452	.E0265/8H11	200	0582367	.E0371/2	214
0573976	.A0123/64	65	0580585	.E006M18	204	0581469	.E0265/8	200	0582374	.E0379/16	214
0573983	.A012N53	65	0580592	.E006M20	204	0581476	.E0263/4	200	0582381	.E0375/8	214
0573990	.A012N54	65	0580608	.E007M4	218	0581483	.E0267/8	200	0582398	.E0373/4	214
0574003	.A012N55	65	0580615	.E007M5	218	0581490	.E0261	200	0582404	.E0377/8	214
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0574027	.A012N57	65	0580639	.E007M8	218	0581513	.E0278-32	214	0582428	.E0371-14	214
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0574065	.A012N61	65	0580677	.E007M16	218	0581551	.E0275/16	214	0582466	.E0383/8	214
0574072	.A012N62	65	0580684	.E007M18	218	0581568	.E0273/8	214	0582473	.E0387/16	214
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0574102	.A012N65	65	0580714	.E008M5	218	0581599	.E0279/16	214	0582503	.E0385/8	214
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0574171	.A012N72	64	0580783	.E008M18	218	0581667	.E0286-32	214	0583203	.E0262-56	199
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0574201	.A012N75	64	0580929	.E015M10X1.0	204	0581698	.E02812-24	214	0588710	.A0221/4	102
0574218	.A012N76	64	0580936	.E015M14X1.5	204	0581704	.E0281/4	214	0588727	.A0221/8	102
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0574317	.A09712	180	0580981	.E016M18X1.5	204	0581759	.E0281/2	214	0588772	.A02210.4	103
0574324	.A09714	180	0580998	.E017M8X1.0	218	0581766	.E0289/16	214	0588789	.A02210.5	103
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0574348	.A09720	180	0581018	.E017M14X1.5	218	0581780	.E0283/4	214	0588802	.A02210.7	103
0574355	.A09760	180	0581025	.E017M18X1.5	218	0581797	.E0287/8	214	0588819	.A02210.8	103
0574362	.A09730	180	0581032	.E018M8X1.0	218	0581803	.E0281	214	0588826	.A02210.9	103
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0578674	.A012N49	65	0581087	.E0258-32	199	0581995	.E0351/4	199	0588871	.A02211.5	103
0578681	.A012N50	65	0581094	.E02510-24	199	0582008	.E0351/43FL	199	0588888	.A02211.6	103
0578698	.A012N51	65	0581100	.E02512-24	199	0582015	.E0355/16	199	0588895	.A02211.7	103
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0578759	.A0123/4	67	0581162	.E0253/83FL	199	0582077	.E0351/23FL	199	0588956	.A02212.1	103
0578766	.A01247/64	67	0581179	.E0257/16	199	0582084	.E0359/16	200	0588963	.A02212.2	103
0580301	.E005M4	204	0581186	.E0251/2	199	0582091	.E0355/8	200	0588970	.A02212.5	103
0580318	.E005M43FL	204	0581193	.E0251/23FL	199	0582107	.E0353/4	200	0588987	.A02213.0	103
0580325	.E005M5	204	0581209	.E0259/16	200	0582114	.E0357/8	200	0588994	.A02213.5	103
0580332	.E005M53FL	204	0581216	.E0255/8	200	0582121	.E0351-12	200	0589007	.A02213/32	103
0580349	.E005M6	204	0581223	.E0253/4	200	0582138	.E0351-14	200	0589014	.A02213/64	102
0580356	.E005M63FL	204	0581230	.E0257/8	200	0582145	.E03610-32	199	0589021	.A02214.0	103
0580363	.E005M8	204	0581247	.E0251	200	0582152	.E03612-28	199	0589038	.A02214.5	103
0580370	.E005M83FL	204	0581254	.E0264-40	199	0582169	.E0361/4	199	0589045	.A02215.0	103
0580387	.E005M10	204	0581261	.E0265-40	199	0582176	.E0361/43FL	199	0589052	.A02215.5	103
0580394	.E005M103FL	204	0581278	.E0266-32	199	0582183	.E0365/16	199	0589069	.A02215/64	102
0580400	.E005M12	204	0581285	.E0268-32	199	0582190	.E0365/163FL	199	0589076	.A02216.0	103
0580417	.E005M123FL	204	0581292	.E02610-24	199	0582206	.E0363/8	199	0589083	.A0223.1	102
0580424	.E005M14	204	0581308	.E02612-24	199	0582213	.E0363/83FL	199	0589090	.A0223.2	102
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0580455	.E005M20	204	0581339	.E0261/43FL	199	0582244	.E0361/23FL	199	0589120	.A0223.4	102
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0589212.	A0224.1	102	0600214.	A0222.8	101	0614099.	R4534.3	35	0614860.	R45715.5	32
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0589267.	A0224.6	102	0600399.	A022.6	101	0614143.	R4536.0	36	0614914.	R4573.5	29
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0589328.	A0225.2	102	0600450.	A0221.2	101	0614204.	R4538.5	37	0614976.	R4575.1	30
0589335.	A0225.3	102	0600467.	A0221.3	101	0614211.	R4538.7	37	0614983.	R4575.5	30
0589342.	A0225.4	102	0600474.	A0221.4	101	0614228.	R4539.0	37	0614990.	R4576.0	30
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0589540.	A0227.1	102	0606438.	E052M8	225	0614426.	R45416.0	38	0615195.	R45811.2	31
0589557.	A0227.2	102	0606445.	E052M10	225	0614433.	R4543.0	35	0615201.	R45811.5	31
0589564.	A0227.3	102	0606452.	E052M12	225	0614440.	R4543.3	35	0615218.	R45812.0	31
0589571.	A0227.4	102	0606469.	E052M16	225	0614457.	R4543.4	35	0615225.	R45812.5	31
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0589595.	A0227.6	102	0609309.	C27340.0	376	0614471.	R4544.0	35	0615249.	R45813.0	31
0589601.	A0227.7	102	0609316.	C24717.0	372	0614488.	R4544.2	35	0615256.	R45813.5	31
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0589656.	A0228.0	102	0609361.	C24726.0	373	0614532.	R4545.5	36	0615300.	R45815.5	32
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0589670.	A0228.2	102	0609385.	C24740.0	373	0614556.	R4546.5	36	0615324.	R4583.0	29
0589687.	A0228.3	102	0612057.	A720.17	57	0614563.	R4546.7	36	0615331.	R4583.3	29
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0635919	.A9417/32	59	0640272	.C2733/16	375	1010092	.15001/2X13H3NO3	236	1010191	.15001.1/4X12H4NO1	237
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0635933	.A9411/4	59	0640296	.C2733/8	375	1010094	.15001/2X20H3NO1	236	1010193	.15001.1/4X12H4NO3	237
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0636015	.A9413/8	60	1010002	.15001/4X20H2NO1	236	1010107	.15009/16X12H5NO2	236	1010201	.15001.1/2X6H4NO2	237
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0636060	.A94129/64	60	1010007	.15001/4X20H5NO2	236	1010114	.15009/16X18H5NO2	236	1010206	.15951/4X20NO2	246
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0636084	.A94123/64	60	1010009	.15001/4X20H2NO3	236	1010117	.15009/16X18H5NO3	236	1010208	.15951/4X28NO2	246
0636091	.A9411/2	60	1010010	.15001/4X20H3NO3	236	1010118	.15005/8X11H3NO1	236	1010209	.15951/4X28NO3	246
0636107	.A94133/64	60	1010011	.15001/4X20H5NO3	236	1010120	.15005/8X11H2NO2	236	1010210	.15955/16X18NO2	246
0636114	.A94135/64	60	1010014	.15001/4X28H3NO1	236	1010121	.15005/8X11H3NO2	236	1010211	.15955/16X18NO3	246
0636121	.A9419/16	60	1010015	.15001/4X28H1NO2	236	1010122	.15005/8X11H5NO2	237	1010216	.15081/4X20NO2	246
0636138	.A94137/64	60	1010016	.15001/4X28H2NO2	236	1010123	.15005/8X11H3NO3	236	1010219	.15081/4X20NO3	246
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0636183	.E001M7	207	1010021	.15001/4X28H3NO3	236	1010129	.15005/8X18H5NO2	237	1010236	.15085/16X24NO2	246
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0639818	.C1101/8	347	1010028	.15005/16X18H3NO2	236	1010135	.150011/16X11H3NO3	237	1010247	.15083/8X24NO3	246
0639825	.C1103/16	347	1010029	.15005/16X18H5NO2	236	1010136	.150011/16X16H3NO1	237	1010248	.15087/16X14NO2	246
0639832	.C1101/4	347	1010031	.15005/16X18H2NO3	236	1010137	.150011/16X16H3NO2	237	1010250	.15087/16X20NO2	246
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0639900	.C1109/16	348	1010041	.15005/16X24H1NO3	236	1010145	.15003/4X10H5NO3	237	1010259	.15991/4X28NO3	251
0639917	.C1105/8	348	1010042	.15005/16X24H2NO3	236	1010146	.15003/4X16H3NO1	237	1010260	.15995/16X18NO2	251
0639924	.C11011/16	348	1010043	.15005/16X24H3NO3	236	1010148	.15003/4X16H2NO2	237	1010261	.15995/16X18NO3	251
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1010274	.15991/2X20NO2	251	1010382	.15195/16X18X8	296	1010525	.15411.1/4X11.1/2	277	1010637	.15283-56H23FLNO3	235
1010275	.15991/2X20NO3	251	1010383	.15193/8X16X6	296	1010526	.15411.1/2X11.1/2	277	1010640	.15284-36H23FLNO1	235
1010276	.15999/16X12NO2	251	1010384	.15193/8X16X8	296	1010527	.15412X11.1/2	277	1010641	.15284-36H23FLNO2	235
1010277	.15999/16X12NO3	251	1010385	.15193/8X16X10	296	1010528	.15411/8X27X.0313	277	1010642	.15284-36H23FLNO3	235
1010278	.15999/16X18NO2	251	1010386	.15197/16X14X6	296	1010529	.15431/16X27	285	1010643	.15284-40H13FLNO1	235
1010279	.15999/16X18NO3	251	1010387	.15197/16X14X8	296	1010530	.15431/8X27	285	1010644	.15284-40H23FLNO1	235
1010280	.15995/8X11NO2	251	1010388	.15191/2X13X6	296	1010531	.15431/4X18	285	1010645	.15284-40H13FLNO2	235
1010281	.15995/8X11NO3	251	1010389	.15191/2X13X8	296	1010532	.15433/8X18	285	1010646	.15284-40H23FLNO2	235
1010282	.15995/8X18NO2	251	1010390	.15191/2X13X10	296	1010533	.15431/2X14	285	1010647	.15284-40H13FLNO3	235
1010283	.15995/8X18NO3	251	1010391	.15191/2X13X12	296	1010534	.15433/4X14	285	1010648	.15284-40H23FLNO3	235
1010284	.15993/4X10NO2	251	1010392	.15195/8X11X6	296	1010535	.15431/2X11.1/2	285	1010649	.15284-40H12FLNO2	235
1010285	.15993/4X10NO3	251	1010393	.15195/8X11X8	296	1010536	.15431.1/4X11.1/2	285	1010650	.15284-40H22FLNO2	235
1010286	.15993/4X16NO2	251	1010394	.15195/8X11X10	296	1010537	.15431.1/2X11.1/2	285	1010652	.15284-40H22FLNO3	235
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1010291	.15851/4X20H22FLNO2	255	1010399	.15881/4X20NO3	266	1010554	.15681/2X14	283	1010662	.15285-40H23FLNO2	235
1010292	.15851/4X20H32FLNO2	255	1010400	.15881/4X28NO2	266	1010555	.15683/4X14	283	1010664	.15285-40H23FLNO3	235
1010293	.15851/4X20H52FLNO2	255	1010401	.15881/4X28NO3	266	1010556	.15681X11.1/2	283	1010666	.15285-40H22FLNO2	235
1010294	.15851/4X20H32FLNO3	255	1010402	.15885/16X18NO2	266	1010557	.15681.1/4X11.1/2	283	1010669	.15285-44H23FLNO1	235
1010295	.15851/4X20H33FLNO2	255	1010403	.15885/16X18NO3	266	1010558	.15681.1/2X11.1/2	283	1010671	.15285-44H23FLNO2	235
1010296	.15851/4X20H53FLNO2	255	1010404	.15885/16X24NO2	266	1010559	.15682X11.1/2	283	1010672	.15285-44H23FLNO3	235
1010297	.15851/4X28H12FLNO2	255	1010405	.15885/16X24NO3	266	1010560	.15681/8X27X0.313	283	1010673	.15285-44H22FLNO2	235
1010298	.15851/4X28H22FLNO2	255	1010406	.15883/8X16NO2	266	1010561	.15671/8X27	288	1010675	.15286-32H13FLNO1	235
1010299	.15851/4X28H32FLNO2	255	1010407	.15883/8X16NO3	266	1010562	.15671/4X18	288	1010676	.15286-32H23FLNO1	235
1010300	.15851/4X28H42FLNO2	255	1010408	.15883/8X24NO2	266	1010563	.15673/8X18	288	1010677	.15286-32H33FLNO1	235
1010301	.15851/4X28H32FLNO3	255	1010409	.15883/8X24NO3	266	1010564	.15671/2X14	288	1010678	.15286-32H13FLNO2	235
1010302	.15851/4X28H23FLNO2	255	1010410	.15887/16X14NO2	266	1010565	.15673/4X14	288	1010679	.15286-32H23FLNO2	235
1010303	.15851/4X28H43FLNO2	255	1010411	.15887/16X14NO3	266	1010566	.15671X11.1/2	288	1010680	.15286-32H33FLNO2	235
1010304	.15855/16X18H12FLNO2	255	1010412	.15887/16X20NO2	266	1010567	.15671.1/4X11.1/2	288	1010681	.15286-32H13FLNO3	235
1010305	.15855/16X18H22FLNO2	255	1010413	.15887/16X20NO3	266	1010570	.15671/8X27X0.313	288	1010682	.15286-32H23FLNO3	235
1010306	.15855/16X18H32FLNO2	255	1010414	.15881/2X13NO2	266	1010581	.15421/8X27	290	1010683	.15286-32H33FLNO3	235
1010307	.15855/16X18H52FLNO2	255	1010415	.15881/2X13NO3	266	1010582	.15421/4X18	290	1010684	.15286-32H12FLNO2	235
1010308	.15855/16X18H32FLNO3	255	1010416	.15881/2X20NO2	266	1010583	.15423/8X18	290	1010685	.15286-32H22FLNO2	235
1010309	.15855/16X18H33FLNO2	255	1010417	.15881/2X20NO3	266	1010584	.15421/2X14	290	1010686	.15286-32H22FLNO2	235
1010310	.15855/16X18H53FLNO2	255	1010419	.15724-40H2NO2	293	1010585	.15423/4X14	290	1010688	.15286-32H22FLNO3	235
1010311	.15855/16X24H12FLNO2	255	1010421	.15724-40H2NO3	293	1010586	.15421X11.1/2	290	1010689	.15286-32H23FLNO3	235
1010312	.15855/16X24H22FLNO2	255	1010427	.15726-32H3NO2	293	1010587	.15421/8X27X0.313	290	1010690	.15286-40H23FLNO1	235
1010313	.15855/16X24H32FLNO2	255	1010429	.15726-32H3NO3	293	1010588	.15921/8X27	290	1010692	.15286-40H23FLNO2	235
1010314	.15855/16X24H42FLNO2	255	1010435	.15728-32H3NO2	293	1010589	.15921/4X18	290	1010693	.15286-40H23FLNO3	235
1010315	.15855/16X24H32FLNO3	255	1010437	.15728-32H3NO3	293	1010590	.15923/8X18	290	1010694	.15286-40H22FLNO2	235
1010316	.15855/16X24H23FLNO2	255	1010438	.157210-24H2NO2	293	1010591	.15921/2X14	290	1010697	.15288-32H24FLNO1	236
1010317	.15855/16X24H43FLNO2	255	1010440	.157210-24H2NO3	293	1010592	.15921/8X27X0.313	290	1010698	.15288-32H34FLNO1	236
1010318	.15853/8X16H13FLNO2	255	1010442	.157210-32H2NO2	293	1010593	.15280-80H12FLNO1	235	1010699	.15288-32H14FLNO2	236
1010319	.15853/8X16H23FLNO2	255	1010443	.157210-32H3NO2	293	1010594	.15280-80H12FLNO2	235	1010700	.15288-32H24FLNO2	236
1010320	.15853/8X16H33FLNO2	255	1010444	.157210-32H3NO3	293	1010595	.15280-80H22FLNO2	235	1010701	.15288-32H34FLNO2	236
1010321	.15853/8X16H53FLNO2	255	1010445	.157210-32H3NO3	293	1010596	.15280-80H12FLNO3	235	1010703	.15288-32H24FLNO3	236
1010346	.15861/4X202FLNO2	265	1010445	.157210-32H3NO3	293	1010597	.15280-80H22FLNO3	235	1010704	.15288-32H34FLNO3	236
1010347	.15861/4X202FLNO3	265	1010451	.15721/4X20H3NO2	293	1010598	.15281-64H12FLNO1	235	1010706	.15288-32H22FLNO2	236
1010348	.15861/4X203FLNO2	265	1010453	.15721/4X20H3NO3	293	1010599	.15281-64H12FLNO2	235	1010707	.15288-32H32FLNO2	236
1010349	.15861/4X203FLNO3	265	1010454	.15721/4X28H3NO2	293	1010600	.15281-64H22FLNO2	235	1010709	.15288-32H22FLNO3	236
1010350	.15861/4X282FLNO2	265	1010456	.15721/4X28H3NO3	293	1010601	.15281-64H12FLNO3	235	1010710	.15288-32H32FLNO3	236
1010351	.15861/4X282FLNO3	265	1010458	.15725/16X18H3NO2	293	1010603	.15281-72H12FLNO1	235	1010712	.15288-32H23FLNO2	236
1010352	.15861/4X283FLNO2	265	1010460	.15725/16X18H3NO3	293	1010604	.15281-72H12FLNO2	235	1010713	.15288-32H33FLNO2	236
1010353	.15861/4X283FLNO3	265	1010466	.15723/8X16H3NO2	293	1010605	.15281-72H22FLNO2	235	1010715	.15288-32H23FLNO3	236
1010354	.15865/16X183FLNO2	265	1010468	.15723/8X16H3NO3	293	1010606	.15281-72H12FLNO3	235	1010716	.15288-32H33FLNO3	236
1010355	.15865/16X183FLNO3	265	1010474	.15727/16X14H3NO2	293	1010607	.15281-72H22FLNO3	235	1010717	.15288-36H24FLNO1	236
1010356	.15865/16X243FLNO2	265	1010478	.15727/16X20H3NO2	293	1010608	.15282-56H13FLNO1	235	1010719	.15288-36H24FLNO2	236
1010357	.15865/16X243FLNO3	265	1010482	.15721/2X13H3NO2	293	1010609	.15282-56H23FLNO1	235	1010720	.15288-36H24FLNO3	236
1010358	.15863/8X163FLNO2	265	1010486	.15721/2X20H3NO2	293	1010610	.15282-56H13FLNO2	235	1010724	.152810-24H24FLNO1	236
1010359	.15863/8X163FLNO3	265	1010491	.15784-40H2	293	1010611	.15282-56H23FLNO2	235	1010725	.152810-24H34FLNO1	236
1010360	.15863/8X243FLNO2	265	1010494	.15786-32H2	293	1010612	.15282-56H23FLNO3	235	1010726	.152810-24H14FLNO2	236
1010361	.15863/8X243FLNO3	265	1010495	.15786-32H3	293	1010613	.15282-56H23FLNO3	235	1010727	.152810-24H24FLNO2	236
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1010363	.15867/16X143FLNO3	265	1010499	.15788-32H3	293	1010615	.15282-56H22FLNO2	235	1010730	.152810-24H24FLNO3	236
1010366	.15861/2X133FLNO2	265	1010502	.157810-32H2	293	1010617	.15282-56H22FLNO3	235	1010731	.152810-24H34FLNO3	236
1010367	.15861/2X133FLNO3	265	1010506	.15781/4X20H2	293	1010618	.15282-64H23FLNO1	235	1010733	.152810-24H22FLNO2	236
1010368	.15861/2X203FLNO2	265	1010507	.15781/4X20H3	293	1010620	.15282-64H23FLNO2	235	1010734	.152810-24H32FLNO2	236
1010369	.15861/2X203FLNO3	265	1010508	.15781/4X28H2	293	1010621	.15282-64H23FLNO3	235	1010736	.152810-24H22FLNO3	236
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1010743	.152810-24H33FLNO3	236	1010886	.15873-48NO3	266	1010971	.15911/2X20NO2	267	1011268	.16007/16X14NO2	251
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1010749	.152810-32H34FLNO2	236	1010891	.15876-32NO2	266	1011003	.1528S2-56H2	235	1011273	.16001/2X13NO3	251
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1010754	.152810-32H22FLNO2	236	1010897	.158710-24NO2	266	1011010	.1528S5-40H2	235	1011277	.16009/16X12NO3	251
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1010757	.152810-32H22FLNO3	236	1010899	.158710-32NO2	266	1011013	.1528S6-32H3	235	1011279	.16009/16X18NO3	251
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1010784	.1534NR1-72H2NO2	259	1010922	.15481/8X27	282	1011046	.1500S7/16X20	236	1011757	.15857/16	264
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1010792	.1534NR2-64H2NO2	259	1010927	.15491/4X18	282	1011051	.1500S5/8X11	236	1011762	.15441/4X18	280
1010796	.1534NR3-48H2NO2	259	1010928	.15483/8X18	282	1011052	.1500S5/8X18	237	1011763	.15443/8X18	280
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1010799	.1534NR3-56H1NO2	259	1010930	.15481/2X14	282	1011054	.1500S11/16X16	237	1011765	.15443/4X14	280
1010800	.1534NR3-56H2NO2	259	1010931	.15491/2X14	282	1011055	.1500S3/4X10	237	1011766	.15441X11.1/2	280
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1012358	.15345-44H2NO2	254	1012485	.1700M10X1.5NO3	247	1012669	.1785M4.5	258	1012879	.15451/8X27X0.313	281
1012359	.15346-32H1NO2	254	1012493	.1700M11X1.5NO2	247	1012672	.1785M5	258	1012880	.15461/16X27	286
1012360	.15346-32H2NO2	254	1012494	.1700M11X1.5NO3	247	1012674	.1785M6	254	1012881	.15461/8X27	286
1012361	.15346-32H3NO2	254	1012495	.1700M12X1.75NO1	247	1012676	.1785M7	258	1012882	.15461/4X18	286
1012363	.15346-32H2NO3	254	1012496	.1700M12X1.75NO2	247	1012678	.1785M8	258	1012883	.15463/8X18	286
1012364	.15346-32H3NO3	254	1012497	.1700M12X1.75NO3	247	1012680	.1785M9	258	1012884	.15461/2X14	286
1012366	.15346-40H2NO2	254	1012498	.1700M12X1.25NO1	247	1012682	.1785M10	258	1012885	.15463/4X14	286
1012367	.15346-40H2NO3	254	1012499	.1700M12X1.25NO2	247	1012685	.1785M11	258	1012886	.15461X11.1/2	286
1012368	.15348-32H1NO2	254	1012500	.1700M12X1.25NO3	247	1012686	.1785M12	258	1012889	.15461/8X27X0.313	286
1012369	.15348-32H2NO2	254	1012501	.1700M14X1.5NO1	247	1012689	.1785M14	258	1012890	.1785NRM1.6	262
1012370	.15348-32H3NO2	254	1012502	.1700M14X1.5NO2	247	1012693	.1785M16	258	1012891	.1785NRM2	262
1012372	.15348-32H2NO3	254	1012503	.1700M14X1.5NO3	247	1012696	.1785M18	258	1012892	.1785NRM2.3	262
1012373	.15348-32H3NO3	254	1012504	.1700M14X2.0NO1	247	1012813	.1585NR1/4X20H12FLNO2	260	1012893	.1785NRM2.5	262
1012375	.15348-36H2NO2	254	1012505	.1700M14X2.0NO2	247	1012814	.1585NR1/4X20H22FLNO2	260	1012894	.1785NRM2.6	262
1012376	.153410-24H1NO2	254	1012506	.1700M14X2.0NO3	247	1012815	.1585NR1/4X20H32FLNO2	260	1012896	.1785NRM3	262
1012377	.153410-24H2NO2	254	1012513	.1700M16X1.5NO1	247	1012816	.1585NR1/4X20H52FLNO2	260	1012897	.1785NRM3.5	262
1012378	.153410-24H3NO2	254	1012514	.1700M16X1.5NO2	247	1012817	.1585NR1/4X20H32FLNO3	260	1012898	.1785NRM4	262
1012379	.153410-24H2NO3	254	1012515	.1700M16X1.5NO3	247	1012818	.1585NR1/4X20H33FLNO2	260	1012899	.1785NRM4.5	262
1012380	.153410-24H3NO3	254	1012516	.1700M16X2.0NO1	247	1012819	.1585NR1/4X20H53FLNO2	260	1012900	.1785NRM5	262
1012381	.153410-32H1NO2	254	1012517	.1700M16X2.0NO2	247	1012820	.1585NR1/4X28H12FLNO2	260	1012901	.1785NRM6	262
1012382	.153410-32H2NO2	254	1012518	.1700M16X2.0NO3	247	1012821	.1585NR1/4X28H22FLNO2	260	1012902	.1785NRM7	262
1012383	.153410-32H3NO2	254	1012522	.1700M18X1.5NO1	247	1012822	.1585NR1/4X28H32FLNO2	260	1012903	.1785NRM8	262
1012385	.153410-32H2NO3	254	1012523	.1700M18X1.5NO2	247	1012823	.1585NR1/4X28H42FLNO2	260	1012904	.1785NRM10	262
1012386	.153410-32H3NO3	254	1012524	.1700M18X1.5NO3	247	1012824	.1585NR1/4X28H32FLNO3	260	1012905	.1785NRM12	262
1012388	.153412-28H3NO2	254	1012525	.1700M18X2.5NO1	247	1012825	.1585NR1/4X28H23FLNO2	260	1012906	.1785NRM14	262
1012389	.153412-24H3NO2	254	1012526	.1700M18X2.5NO2	247	1012826	.1585NR1/4X28H43FLNO2	260	1012907	.1785NRM16	262
1012408	.1700M1.6X.35NO1	247	1012527	.1700M18X2.5NO3	247	1012827	.1585NR5/16X18H12FLNO2	260	1012908	.1785NRM18	262
1012409	.1700M1.6X.35NO2	247	1012534	.1700M20X1.5NO1	247	1012828	.1585NR5/16X18H22FLNO2	260	1012909	.1785NRM20	262
1012410	.1700M1.6X.35NO3	247	1012535	.1700M20X1.5NO2	247	1012829	.1585NR5/16X18H32FLNO2	260	1012920	.1788M3X.5NO2	268
1012411	.1700M1.8X.35NO1	247	1012536	.1700M20X1.5NO3	247	1012830	.1585NR5/16X18H52FLNO2	260	1012922	.1788M3.5X.6NO2	268
1012412	.1700M1.8X.35NO2	247	1012537	.1700M20X2.5NO1	247	1012832	.1585NR5/16X18H33FLNO2	260	1012923	.1788M4X.7NO2	268
1012413	.1700M1.8X.35NO3	247	1012538	.1700M20X2.5NO2	247	1012833	.1585NR5/16X18H53FLNO2	260	1012924	.1788M4X.5X.75NO2	268
1012414	.1700M2X.4NO1	247	1012539	.1700M20X2.5NO3	247	1012834	.1585NR5/16X24H12FLNO2	260	1012925	.1788M5X.8NO2	268
1012415	.1700M2X.4NO2	247	1012540	.1700M22X1.5NO1	247	1012835	.1585NR5/16X24H22FLNO2	260	1012926	.1788M6X1.0NO2	268
1012416	.1700M2X.4NO3	247	1012541	.1700M22X1.5NO2	247	1012836	.1585NR5/16X24H32FLNO2	260	1012928	.1788M8X1.25NO2	268
1012421	.1700M2.3X.4NO2	247	1012542	.1700M22X1.5NO3	247	1012837	.1585NR5/16X24H42FLNO2	260	1012930	.1788M10X1.5NO2	268
1012422	.1700M2.3X.4NO3	247	1012543	.1700M22X2.5NO1	247	1012838	.1585NR5/16X24H33FLNO3	260	1012932	.1788M12X1.75NO2	268
1012423	.1700M2.5X.45NO1	247	1012544	.1700M22X2.5NO2	247	1012839	.1585NR5/16X24H23FLNO2	260	1012940	.1788M3X.5NO3	268
1012424	.1700M2.5X.45NO2	247	1012545	.1700M22X2.5NO3	247	1012840	.1585NR5/16X24H43FLNO2	260	1012942	.1788M3.5X.6NO3	268
1012425	.1700M2.5X.45NO3	247	1012546	.1700M24X2.0NO1	247	1012841	.1585NR5/16X24H53FLNO2	260	1012943	.1788M4X.5X.75NO2	268
1012426	.1700M2.6X.45NO1	247	1012547	.1700M24X2.0NO2	247	1012842	.1585NR3/8X16H23FLNO2	260	1012944	.1788M4.5X.75NO3	268
1012427	.1700M2.6X.45NO2	247	1012548	.1700M24X2.0NO3	247	1012843	.1585NR3/8X16H33FLNO2	260	1012945	.1788M5X.8NO3	268
1012428	.1700M2.6X.45NO3	247	1012555	.1700M24X3.0NO1	247	1012844	.1585NR3/8X16H53FLNO2	260	1012946	.1788M6X1.0NO3	268
1012432	.1700M3X.5NO1	247	1012556	.1700M24X3.0NO2	247	1012845	.1585NR3/8X24H13FLNO2	260	1012948	.1788M8X1.25NO3	268
1012433	.1700M3X.5NO2	247	1012557	.1700M24X3.0NO3	247	1012846	.1585NR3/8X24H23FLNO2	260	1012950	.1788M10X1.5NO3	268
1012434	.1700M3X.5NO3	247	1012558	.1700SM2X.4	247	1012847	.1585NR3/8X24H33FLNO2	260	1012952	.1788M12X1.75NO3	268
1012435	.1700M3.5X.6NO1	247	1012559	.1700SM2.6X.45	247	1012848	.1585NR3/8X24H43FLNO2	260	1013037	.19854-40	212
1012436	.1700M3.5X.6NO2	247	1012560	.1700SM2.5X.45	247	1012849	.1585NR7/16X14H23FLNO2	261	1013038	.19854-48	212
1012437	.1700M3.5X.6NO3	247	1012561	.1700SM3X.5	247	1012850	.1585NR7/16X14H33FLNO2	261	1013039	.19855-40	212
1012441	.1700M4X.7NO1	247	1012562	.1700SM3.5X.6	247	1012851	.1585NR7/16X14H53FLNO2	261	1013040	.19855-44	212
1012442	.1700M4X.7NO2	247	1012563	.1700SM4X.7	247	1012852	.1585NR7/16X20H23FLNO2	261	1013041	.19856-32	212
1012443	.1700M4X.7NO3	247	1012564	.1700SM5X.8	247	1012853	.1585NR7/16X20H33FLNO2	261	1013042	.19856-40	212
1012444	.1700M4.5X.75NO1	247	1012565	.1700SM6X1.0	247	1012854	.1585NR7/16X20H53FLNO2	261	1013043	.19858-32	212
1012445	.1700M4.5X.75NO2	247	1012566	.1700SM8X1.25	247	1012855	.1585NR1/2X13H13FLNO2	261	1013044	.19858-36	212
1012446	.1700M4.5X.75NO3	247	1012567	.1700SM10X1.5	247	1012856	.1585NR1/2X13H23FLNO2	261	1013045	.198510-24	212
1012453	.1700M5X.8NO1	247	1012568	.1700SM12X1.75	247	1012857	.1585NR1/2X13H33FLNO2	261	1013046	.198510-32	212
1012454	.1700M5X.8NO2	247	1012570	.1700M30X3.5NO1	247	1012858	.1585NR1/2X13H53FLNO2	261	1013047	.198512-24	212
1012455	.1700M5X.8NO3	247	1012571	.1700M30X3.5NO2	247	1012859	.1585NR1/2X20H13FLNO2	261	1013048	.198512-28	212
1012459	.1700M6X1.0NO1	247	1012572	.1700M30X3.5NO3	247	1012860	.1585NR1/2X20H23FLNO2	261	1013049	.19851/4X20	212
1012460	.1700M6X1.0NO2	247	1012573	.1700M36X4.0NO1	247	1012861	.1585NR1/2X20H33FLNO2	261	1013050	.19851/4X28	212
1012461	.1700M6X1.0NO3	247	1012574	.1700M36X4.0NO2	247	1012862	.1585NR1/2X20H53FLNO2	261	1013051	.19855/16X18	212
1012465	.1700M7X1.0NO1	247	1012575	.1700M36X4.0NO3	247	1012863	.1585NR5/8X11H33FLNO2	261	1013052	.19855/16X24	212
1012466	.1700M7X1.0NO2	247	1012576	.1700SM7X1.0	247	1012864	.1585NR5/8X11H53FLNO2	261	1013053	.19853/8X16	212
1012467	.1700M7X1.0NO3	247	1012577	.1700SM8X1.0	247	1012865	.1585NR3/4X10H33FLNO2	261	1013054	.19853/8X24	212
1012468	.1700M8X1.0NO1	247	1012578	.1700SM10X1.25	247	1012866	.1585NR3/4X10H53FLNO2	261	1013055	.19857/16X14	212
1012469	.1700M8X1.0NO2	247	1012579	.1700SM12X1.25	247	1012867	.1585NR5/8X18H33FLNO2	261	1013056	.19857/16X20	212
1012470	.1700M8X1.0NO3	247	1012580	.1700SM14X2.0	247	1012868	.1585NR3/4X16H33FLNO2	261	1013057	.19851/2X13	212
1012471	.1700M8X1.25NO1	247	1012581	.1700SM16X2.0	247	1012869	.15451/16X27	281	1013058	.19851/2X20	212
1012472	.1700M8X1.25NO2	247	1012582	.1700SM18X2.5	247	1012870	.15451/8X27	281	1013059	.19859/16X12	212
1012473	.1700M8X1.25NO3	247	1012583	.1700SM20X2.5	247	1012871	.15451/4X18	281	1013060	.19859/16X18	212
1012478	.1700M9X1.25NO2	247	1012659	.1785M2	258	1012872	.15453/8X18	281	1013061	.19855/8X11	212
1012479	.1700M9X1.25NO3	247	1012661	.1785M2.3	258	1012873	.15451/2X14	281	1013062	.19855/8X18	212
1012480	.1700M10X1.25NO1	247	1012662	.1785M2.5	258	1012874	.15453/4X14	281	1013065	.19853/4X10	212
1012481	.1700M10X1.25NO2	247	1012663	.1785M2.6	258	1012875	.15451X11.1/2	281	1013066	.19853/4X16	212
1012482	.1700M10X1.25NO3	247	1012664	.1785M3	258	1012876	.15451.1/4X11.1/2	281	1013067	.19857/8X9	212
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1013204	.15001.1/2X6H10NO2	237	1050028	.1500A5/16X18	238	1060532	.TN15433/8	285	1310052	.158010-24H6NO3	269
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1013336	.15052.1/8NO3	250	1050344	.1585A3/4X10	256	1110084	.199414X28	297	1310096	.15807/16X14H5NO3	270
1013337	.15052.1/4NO1	250	1052774	.1585A5/8X18	256	1110090	.19945/16X18	297	1310098	.15807/16X20H5NO2	270
1013338	.15052.1/4NO2	250	1052775	.1585A3/4X16	256	1110094	.19945/16X24	297	1310100	.15807/16X20H5NO3	270
1013339	.15052.1/4NO3	250	1052869	.1545A1/16	281	1110100	.19943/8X16	297	1310102	.158012X13H5NO2	270
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1013342	.15052.3/8NO3	250	1052872	.1545A3/8	281	1110114	.19947/16X20	297	1310108	.158012X20H5NO3	270
1013343	.15052.1/2NO1	250	1052873	.1545A1/2	281	1110120	.199412X13	297	1310110	.33000-80H2NO3	271
1013344	.15052.1/2NO2	250	1052874	.1545A3/4	281	1110124	.199412X20	297	1310111	.33001-64H2NO3	271
1013345	.15052.1/2NO3	250	1060006	.TN150014X20NO2	239	1310001	.15800-80H2NO3	269	1310112	.33001-64H2NO3	271
1013346	.15052.5/8NO1	250	1060017	.TN150014X28NO2	239	1310002	.15801-64H2NO3	269	1310113	.33002-56H2NO3	271
1013347	.15052.5/8NO2	250	1060028	.TN1500516X18NO2	239	1310003	.15801-72H2NO3	269	1310114	.33002-56H3NO3	271
1013348	.15052.5/8NO3	250	1060039	.TN1500516X24NO2	239	1310004	.15802-56H2NO3	269	1310115	.33002-64H2NO3	271
1013349	.15052.3/4NO1	250	1060050	.TN150038X16NO2	239	1310005	.15802-56H3NO3	269	1310116	.33002-64H3NO3	271
1013350	.15052.3/4NO2	250	1060061	.TN150038X24NO2	239	1310006	.15802-64H2NO3	269	1310118	.33003-48H3NO3	271
1013351	.15052.3/4NO3	250	1060070	.TN1500716X14NO2	239	1310007	.15802-64H3NO3	269	1310120	.33003-56H3NO3	271
1013352	.15052.7/8NO1	250	1060079	.TN1500716X20NO2	239	1310008	.15803-48H2NO3	269	1310121	.33004-40H3NO2	271
1013353	.15052.7/8NO2	250	1060088	.TN150012X13NO2	239	1310009	.15803-48H3NO3	269	1310122	.33004-40H5NO2	271
1013354	.15052.7/8NO3	250	1060092	.TN150012X13NO3	239	1310010	.15803-56H2NO3	269	1310123	.33004-40H3NO3	271
1013355	.15053NO1	250	1060097	.TN150012X20NO2	239	1310011	.15803-56H3NO3	269	1310124	.33004-40H5NO3	271
1013356	.15053NO2	250	1060121	.TN150058X11NO2	239	1310012	.15804-40H3NO2	269	1310125	.33004-48H3NO2	271
1013357	.15053NO3	250	1060123	.TN150058X11NO3	239	1310013	.15804-40H5NO2	269	1310127	.33004-48H3NO3	271
1020002	.1534NE4-40X4	263	1060131	.TN150058X18NO3	239	1310014	.15804-40H3NO3	269	1310129	.33005-40H3NO2	271
1020004	.1534NE6-32X4	263	1060144	.TN150034X10NO3	239	1310015	.15804-40H5NO3	269	1310130	.33005-40H5NO2	271
1020006	.1534NE6-32X6	263	1060152	.TN150034X16NO3	239	1310016	.15804-48H3NO2	269	1310131	.33005-40H3NO3	271
1020008	.1534NE8-32X4	263	1060157	.TN150078X9NO2	239	1310018	.15804-48H3NO3	269	1310132	.33005-40H5NO3	271
1020010	.1534NE8-32X6	263	1060292	.TN15851/4-20H32FL	255	1310020	.15805-40H3NO2	269	1310133	.33005-44H3NO2	271
1020012	.1534NE10-24X4	263	1060293	.TN15851/4-20H52FL	255	1310021	.15805-40H5NO2	269	1310135	.33005-44H3NO3	271
1020014	.1534NE10-24X6	263	1060295	.TN15851/4-20H33FL	255	1310022	.15805-40H3NO3	269	1310137	.33006-32H3NO2	271
1020016	.1534NE10-32X4	263	1060296	.TN15851/4-20H53FL	255	1310023	.15805-40H5NO3	269	1310138	.33006-32H5NO2	271
1020018	.1534NE10-32X6	263	1060299	.TN15851/4-28H32FL	255	1310024	.15805-44H3NO2	269	1310140	.33006-32H3NO3	271
1020020	.1534NE14X20X4	263	1060306	.TN15855/16-18H32FL	255	1310026	.15805-44H3NO3	269	1310141	.33006-32H5NO3	271
1020022	.1534NE14X20X6	263	1060309	.TN15855/16-18H33FL	255	1310028	.15806-32H3NO2	269	1310143	.33006-40H3NO2	271
1020024	.1534NE14X28X4	263	1060310	.TN15855/16-18H53FL	255	1310029	.15806-32H5NO2	269	1310145	.33006-40H3NO3	271
1020026	.1534NE14X28X6	263	1060313	.TN15855/16-24H32FL	255	1310031	.15806-32H3NO3	269	1310146	.33006-40H5NO3	271
1020028	.1534NE5/16X18X4	263	1060320	.TN15853/8-16H33FL	255	1310032	.15806-32H5NO3	269	1310147	.33008-32H3NO2	271
1020030	.1534NE5/16X18X6	263	1060321	.TN15853/8-16H53FL	255	1310034	.15806-40H3NO2	269	1310148	.33008-32H5NO2	271
1020032	.1534NE5/16X24X4	263	1060324	.TN15853/8-24H33FL	256	1310035	.15806-40H5NO2	269	1310150	.33008-32H3NO3	271
1020034	.1534NE5/16X24X6	263	1060328	.TN15857/16-14H33FL	256	1310036	.15806-40H3NO3	269	1310151	.33008-32H5NO3	271
1020036	.1534NE3/8X16X4	263	1060332	.TN15857/16-20H33FL	256	1310037	.15806-40H5NO3	269	1310153	.33008-36H3NO2	271
1020038	.1534NE3/8X16X6	263	1060336	.TN15851/2-13H33FL	256	1310038	.15808-32H3NO2	269	1310155	.33008-36H3NO3	271
1020040	.1534NE3/8X24X4	263	1060340	.TN15851/2-20H33FL	256	1310039	.15808-32H5NO2	269	1310157	.330010-24H4NO2	271



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1310160	.330010-24H4NO3	271	1321018	.3306E8-32X6H3	275	1410082	.20105/16X18X1.1/2	311	1410188	.25107/16X14X1.1/2	312
1310161	.330010-24H6NO3	271	1321020	.3306E8-32X6H5	275	1410083	.20105/16X18X2	311	1410189	.25107/16X20X1	313
1310163	.330010-32H4NO2	271	1321022	.3306E10-24X4H4	275	1410085	.20105/16X24X1	311	1410190	.25107/16X20X1.1/2	313
1310164	.330010-32H6NO2	271	1321024	.3306E10-24X4H6	275	1410087	.20105/16X24X1.1/2	311	1410191	.25101/2X13X1.1/2	313
1310166	.330010-32H4NO3	271	1321026	.3306E10-24X6H4	275	1410088	.20105/16X24X2	311	1410192	.25101/2X20X1.1/2	313
1310167	.330010-32H6NO3	271	1321028	.3306E10-24X6H6	275	1410090	.20105/16X32X1	311	1410193	.25109/16X12X1.1/2	313
1310169	.330012-24H4NO2	271	1321030	.3306E10-32X4H4	275	1410093	.20103/8X16X1	311	1410194	.25109/16X18X1.1/2	313
1310171	.330012-24H4NO3	271	1321032	.3306E10-32X4H6	275	1410095	.20103/8X16X1.1/2	311	1410195	.25105/8X11X1.1/2	313
1310172	.330012-24H6NO3	271	1321034	.3306E10-32X6H4	275	1410096	.20103/8X16X2	311	1410196	.25105/8X11X2	313
1310173	.330012-28H4NO2	271	1321036	.3306E10-32X6H6	275	1410097	.20103/8X24X1	311	1410197	.25105/8X18X1.1/2	313
1310175	.330012-28H4NO3	271	1321038	.3306E1/4X20X4H4	275	1410099	.20103/8X24X1.1/2	311	1410198	.25105/8X18X2	313
1310177	.33001/4X20H4NO2	271	1321040	.3306E1/4X20X4H6	275	1410100	.20103/8X24X2	311	1410199	.25103/4X10X2	313
1310178	.33001/4X20H6NO2	271	1321042	.3306E1/4X20X4H8	275	1410101	.20107/16X14X1	311	1410200	.25103/4X16X2	313
1310180	.33001/4X20H4NO3	271	1321044	.3306E1/4X20X6H4	275	1410103	.20107/16X14X1.1/2	311	1410201	.25107/8X9X2	313
1310181	.33001/4X20H6NO3	271	1321046	.3306E1/4X20X6H6	275	1410104	.20107/16X14X2	311	1410202	.25107/8X14X2	313
1310183	.33001/4X28H4NO2	271	1321048	.3306E1/4X20X6H8	275	1410105	.20107/16X20X1	311	1410203	.20101/8X27X1	310
1310185	.33001/4X28H4NO3	271	1321050	.3306E1/4X28X4H4	275	1410107	.20107/16X20X1.1/2	311	1410204	.20101/8X27X1.1/2	310
1310187	.33005/16X18H5NO2	272	1321052	.3306E1/4X28X4H6	275	1410108	.20107/16X20X2	311	1410205	.20101/4X18X1.1/2	311
1310188	.33005/16X18H7NO2	272	1321054	.3306E1/4X28X4H8	275	1410110	.20101/2X13X1.1/2	311	1410206	.20101/4X18X2	311
1310189	.33005/16X18H5NO3	272	1321056	.3306E1/4X28X6H4	275	1410111	.20101/2X13X2	311	1410207	.20103/8X18X1.1/2	311
1310190	.33005/16X18H7NO3	272	1321058	.3306E1/4X28X6H6	275	1410114	.20101/2X20X1.1/2	311	1410208	.20103/8X18X2	311
1310191	.33005/16X24H5NO2	272	1321060	.3306E1/4X28X6H8	275	1410115	.20101/2X20X2	311	1410209	.20101/2X14X2	311
1310192	.33005/16X24H7NO2	272	1321062	.3306E5/16X18X4H5	275	1410117	.20109/16X12X1.1/2	311	1410239	.20251/4X20	319
1310193	.33005/16X24H5NO3	272	1321064	.3306E5/16X18X4H7	275	1410118	.20109/16X12X2	311	1410240	.20251/4X28	319
1310194	.33005/16X24H7NO3	272	1321066	.3306E5/16X18X4H9	275	1410120	.20109/16X18X1.1/2	311	1410241	.20255/16X18	319
1310195	.33003/8X16H5NO2	272	1321068	.3306E5/16X18X6H5	276	1410121	.20109/16X18X2	311	1410242	.20255/16X24	319
1310196	.33003/8X16H7NO2	272	1321070	.3306E5/16X18X6H7	276	1410123	.20105/8X11X1.1/2	311	1410243	.20253/8X16	319
1310197	.33003/8X16H5NO3	272	1321072	.3306E5/16X18X6H9	276	1410124	.20105/8X11X2	311	1410244	.20253/8X24	319
1310198	.33003/8X16H7NO3	272	1321074	.3306E5/16X24X4H5	276	1410126	.20105/8X18X1.1/2	311	1410245	.20257/16X14	319
1310199	.33003/8X24H5NO2	272	1321076	.3306E5/16X24X4H7	276	1410127	.20105/8X18X2	311	1410246	.20257/16X20	319
1310200	.33003/8X24H7NO2	272	1321078	.3306E5/16X24X4H9	276	1410131	.20103/4X10X2	311	1410247	.20251/2X13	319
1310201	.33003/8X24H5NO3	272	1321080	.3306E5/16X24X6H5	276	1410133	.20103/4X16X2	311	1410248	.20251/2X20	319
1310202	.33003/8X24H7NO3	272	1321082	.3306E5/16X24X6H7	276	1410135	.20107/8X9X2	311	1410249	.20259/16X12	319
1310203	.33007/16X14H5NO2	272	1321084	.3306E5/16X24X6H9	276	1410137	.20107/8X14X2	311	1410250	.20259/16X18	319
1310205	.33007/16X14H5NO3	272	1321086	.3306E3/8X16X4H5	276	1410140	.20101X8X3	311	1410251	.20255/8X11	319
1310207	.33007/16X20H5NO2	272	1321088	.3306E3/8X16X4H7	276	1410142	.20101X12X3	311	1410252	.20255/8X18	319
1310209	.33007/16X20H5NO3	272	1321090	.3306E3/8X16X4H9	276	1410144	.20101X14X3	311	1410253	.202511/16X11	319
1310211	.33001/2X13H5NO2	272	1321092	.3306E3/8X16X6H5	276	1410145	.20101.1/8X7X3	311	1410254	.202511/16X16	319
1310213	.33001/2X13H5NO3	272	1321094	.3306E3/8X16X6H7	276	1410146	.20101.1/8X12X3	311	1410255	.20253/4X10	319
1310215	.33001/2X20H5NO2	272	1321096	.3306E3/8X16X6H9	276	1410147	.20101.1/4X7X3	311	1410256	.20253/4X16	319
1310217	.33001/2X20H5NO3	272	1410002	.20100-80X13/16	310	1410148	.20101.1/4X12X3	311	1410257	.20257/8X9	319
1310400	.1580M3X.5NO2	273	1410004	.20101-64X13/16	310	1410149	.20101.3/8X6X3	311	1410258	.20257/8X14	319
1310401	.1580M3X.5NO3	273	1410006	.20101-72X13/16	310	1410150	.20101.3/8X12X3	311	1410259	.20251X8	319
1310402	.1580M4X.7NO2	273	1410008	.20102-56X13/16	310	1410151	.20101.1/2X6X3	311	1410260	.20251X12	319
1310403	.1580M4X.7NO3	273	1410010	.20102-64X13/16	310	1410152	.20101.1/2X12X3	311	1410261	.20251X14	319
1310404	.1580M5X.8NO2	273	1410012	.20103-48X13/16	310	1410153	.25105-40X13/16	312	1410262	.20251.1/8X7	319
1310405	.1580M5X.8NO3	273	1410014	.20103-56X13/16	310	1410154	.25105-44X13/16	312	1410263	.20251.1/8X12	319
1310406	.1580M6X1.0NO2	273	1410016	.20104-40X13/16	310	1410155	.25109-32X1	312	1410264	.20251.1/4X7	319
1310407	.1580M6X1.0NO3	273	1410018	.20104-48X13/16	310	1410156	.25106-32X1	312	1410265	.20251.1/4X12	319
1310408	.1580M8X1.25NO2	273	1410020	.20104-36X13/16	310	1410157	.25106-40X13/16	312	1410266	.20251.3/8X6	319
1310409	.1580M8X1.25NO3	273	1410022	.20105-40X13/16	310	1410159	.25108-32X13/16	312	1410267	.20251.3/8X12	319
1310410	.1580M10X1.5NO2	273	1410024	.20105-44X13/16	310	1410160	.25108-32X1	312	1410268	.20251.1/2X6	319
1310411	.1580M10X1.5NO3	273	1410026	.20106-32X13/16	310	1410161	.25108-36X13/16	312	1410269	.20251.1/2X12	319
1310412	.1580M12X1.75NO2	273	1410027	.20106-32X1	310	1410163	.251010-24X13/16	312	1410270	.20251/8X27	319
1310413	.1580M12X1.75NO3	273	1410029	.20106-40X13/16	310	1410164	.251010-24X1	312	1410271	.20251/4X18	319
1310500	.3300M3X.5NO2	274	1410032	.20108-32X13/16	310	1410165	.251010-32X13/16	312	1410272	.20253/8X18	319
1310501	.3300M3X.5NO3	274	1410033	.20108-32X1	310	1410166	.251010-32X1	312	1410273	.20251/2X14	319
1310502	.3300M4X.7NO2	274	1410035	.20108-36X13/16	310	1410167	.251012-24X13/16	312	1410274	.20253/4X14	319
1310503	.3300M4X.7NO3	274	1410038	.201010-24X13/16	310	1410168	.251012-24X1	312	1410275	.20251X11.1/2	319
1310504	.3300M5X.8NO2	274	1410039	.201010-24X1	310	1410169	.251012-28X13/16	312	1410277	.2025S82SET	320
1310505	.3300M5X.8NO3	274	1410041	.201010-32X13/16	310	1410171	.25101/4X20X13/16	312	1410278	.2025S82SET	320
1310506	.3300M6X1.0NO2	274	1410042	.201010-32X1	310	1410172	.25101/4X20X1	312	1410280	.2025S831SET	320
1310507	.3300M6X1.0NO3	274	1410044	.201012-24X13/16	310	1410173	.25101/4X20X1.1/2	312	1410281	.2025S832SET	320
1310508	.3300M8X1.25NO2	274	1410045	.201012-24X1	310	1410174	.25101/4X28X13/16	312	1410282	.2025S824SET	320
1310509	.3300M8X1.25NO3	274	1410047	.201012-28X13/16	310	1410175	.25101/4X28X1	312	1410283	.2025S82SET	320
1310510	.3300M10X1.5NO2	274	1410063	.20101/4X20X13/16	310	1410176	.25101/4X28X1.1/2	312	1410573	.2710M2X.4X13/16	316
1310511	.3300M10X1.5NO3	274	1410064	.20101/4X20X1	310	1410177	.25105/16X18X13/16	312	1410574	.2710M2.3X.4X13/16	316
1310512	.3300M12X1.75NO2	274	1410066	.20101/4X20X1.1/2	310	1410178	.25105/16X18X1	312	1410575	.2710M2.5X.45X13/16	316
1310513	.3300M12X1.75NO3	274	1410067	.20101/4X20X2	310	1410179	.25105/16X18X1.1/2	312	1410576	.2710M2.5X.45X13/16	316
1321002	.3306E4-40X4H3	275	1410068	.20101/4X28X13/16	311	1410180	.25105/16X24X13/16	312	1410577	.2710M3X.5X13/16	316
1321004	.3306E4-40X4H5	275	1410069	.20101/4X28X1	310	1410181	.25105/16X24X1	312	1410578	.2710M3.5X.6X13/16	316
1321006	.3306E6-32X4H3	275	1410071	.20101/4X28X1.1/2	311	1410182	.25105/16X24X1.1/2	312	1410579	.2710M4X.7X13/16	316
1321008	.3306E6-32X4H5	275	1410072	.20101/4X28X2	311	1410183	.25103/8X16X1	312	1410580	.2710M4.5X.75X13/16	316
1321010	.3306E6-32X6H3	275	1410074	.20101/4X24X1	311	1410184	.25103/8X16X1.1/2	312	1410581	.2710M5X.8X1	316
1321012	.3306E6-32X6H5	275	1410077	.20101/4X32X1	310	1410185	.25103/8X24X1	312	1410582	.2710M6X1.0X1	316
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1410589	.2710M14X2.0X1.1/2	316	1716520	.16743/8X24	198	1810053	.8007200	303	3210152	.47041X5/16	443
1410590	.2710M16X2.0X1.1/2	316	1716530	.16747/16X14	198	1810096	.1301D6	303	3210153	.47041.1/16X5/16	443
1410591	.2710M18X2.5X2	316	1716532	.16747/16X20	198	1810372	.1215T0	301	3210154	.47041.1/8X5/16	443
1410592	.2710M20X2.5X2	316	1716534	.16741/2X13	198	1810373	.1215T1	301	3210155	.47047/16X3/8	443
1410609	.2325M6X1.0	321	1716536	.16741/2X20	198	1810374	.1215T2	301	3210156	.47041/2X3/8	443
1410610	.2325M7X1.0	321	1716538	.16745/8X11	198	1910501	.19004OZ	449	3210157	.47049/16X3/8	443
1410611	.2325M8X1.25	321	1716540	.16745/8X18	198	1910502	.190016OZLT	449	3210158	.47045/8X3/8	443
1410612	.2325M9X1.25	321	1716542	.16743/4X10	198	1910503	.19001GALLT	449	3210159	.470411/16X3/8	443
1410613	.2325M10X1.5	321	1716544	.16743/4X16	198	1910504	.19005GALP	449	3210160	.47043/4X3/8	443
1410614	.2325M11X1.5	321	1716546	.16741X8	198	1910505	.190055GAL	449	3210161	.470413/16X3/8	443
1410615	.2325M12X1.75	321	1716548	.16741X12	198	1910506	.19005GALD	449	3210162	.47047/8X3/8	443
1410616	.2325M14X2.0	321	1716704	.1675M6X1.0	203	1910509	.190020OZ	449	3210163	.470415/16X3/8	443
1410617	.2325M14X1.25	321	1716706	.1675M8X1.25	203	1910512	.19001/2OZ	449	3210164	.47041X3/8	444
1410618	.2325M16X2.0	321	1716708	.1675M10X1.25	203	1930502	.190016OZ	449	3210165	.47041.1/16X3/8	444
1410619	.2325M8X2.5	321	1716710	.1675M10X1.5	203	1930503	.19001GAL	449	3210166	.47041.1/8X3/8	444
1410620	.2325M18X1.5	321	1716720	.1675M12X1.5	203	1950501	.190011B	449	3210167	.47041.3/16X3/8	444
1410621	.2325M20X2.5	321	1716722	.1675M12X1.75	203	3210001	.1800N1	448	3210168	.47041.1/4X3/8	444
1410630	.2710M12X1.75X1	316	1716724	.1675M14X1.5	203	3210002	.1800N2	448	3210169	.47041.5/16X3/8	444
1610065	.315070HSET	306	1716726	.1675M14X2.0	203	3210003	.1800N3	448	3210170	.47041.3/8X3/8	444
1610067	.315070KSET	306	1716728	.1675M16X1.5	203	3210004	.1800N4	448	3210171	.47041.7/16X3/8	444
1610070	.315070MSET	306	1716730	.1675M16X2.0	203	3210005	.1800N5	448	3210172	.47041/2X7/16	444
1610072	.315070PSET	306	1716732	.1675M18X1.5	203	3210006	.1800N6	448	3210173	.47049/16X7/16	444
1610076	.315090ASET	306	1716734	.1675M18X2.5	203	3210007	.1800N7	448	3210174	.47045/8X7/16	444
1610077	.315090BSET	306	1716736	.1675M20X1.5	203	3210008	.1800N8	448	3210175	.470411/16X7/16	444
1610078	.3150NCSET	306	1716738	.1675M20X2.5	203	3210009	.1800N9	448	3210176	.47043/4X7/16	444
1610079	.3150NFSET	306	1716740	.1675M24X2.0	203	3210010	.1800N10	448	3210177	.470413/16X7/16	444
1610080	.3150GENSET	306	1716742	.1675M24X3.0	203	3210011	.1800N11	448	3210178	.47047/8X7/16	444
1610087	.31501702MSET	306	1717510	.16781/4X20	213	3210012	.1800N12	448	3210179	.470415/16X7/16	444
1610088	.31501703MSET	306	1717512	.16781/4X28	213	3210013	.1815SET	448	3210180	.47041X7/16	444
1712221	.16414-40H3	226	1717514	.16785/16X18	213	3210014	.1816SET	448	3210181	.47041.1/16X7/16	444
1712223	.16414-40H5	226	1717516	.16785/16X24	213	3210046	.4111-2	450	3210182	.47041.1/8X7/16	444
1712227	.16415-40H3	226	1717518	.16783/8X16	213	3210047	.4111-3	450	3210183	.47041.3/16X7/16	444
1712229	.16415-40H5	226	1717520	.16783/8X24	213	3210048	.4111-4	450	3210184	.47041.1/4X7/16	444
1712233	.16416-32H3	226	1717530	.16787/16X14	213	3210050	.4112-3	450	3210185	.47041.5/16X7/16	444
1712235	.16416-32H5	226	1717532	.16787/16X20	213	3210051	.4112-4	450	3210186	.47041.3/8X7/16	444
1712239	.16418-32H3	226	1717534	.16781/2X13	213	3210053	.4113-4	450	3210195	.47049/16X1/2	444
1712241	.16418-32H5	226	1717536	.16781/2X20	213	3210054	.4113-5	450	3210196	.47045/8X1/2	444
1712245	.16418-36H3	226	1717538	.16785/8X11	213	3210055	.4114-5	450	3210197	.470411/16X1/2	444
1712247	.16418-36H5	226	1717540	.16785/8X18	213	3210057	.4115-6	450	3210198	.47043/4X1/2	444
1712252	.164110-24H4	226	1717542	.16783/4X10	213	3210114	.47041/8X3/32	442	3210199	.470413/16X1/2	444
1712254	.164110-24H6	226	1717544	.16783/4X16	213	3210115	.47045/32X3/32	442	3210200	.47047/8X1/2	444
1712258	.164110-32H4	226	1717546	.16781X8	213	3210116	.47043/16X3/32	442	3210201	.470415/16X1/2	444
1712260	.164110-32H6	226	1717548	.16781X12	213	3210117	.47047/32X3/32	442	3210202	.47041X1/2	444
1712264	.16411/4X20H4	226	1717704	.1679M6X1.0	217	3210118	.47041/4X3/32	442	3210203	.47041.1/16X1/2	444
1712266	.16411/4X20H6	226	1717706	.1679M8X1.25	217	3210119	.47043/16X5/32	443	3210204	.47041.1/8X1/2	444
1712270	.16411/4X28H4	226	1717708	.1679M10X1.25	217	3210120	.47047/32X5/32	443	3210205	.47041.3/16X1/2	444
1712272	.16411/4X28H6	226	1717710	.1679M10X1.5	217	3210121	.47041/4X5/32	443	3210206	.47041.1/4X1/2	444
1712277	.16415/16X18H5	226	1717720	.1679M12X1.5	217	3210122	.47049/32X5/32	443	3210207	.47041.5/16X1/2	444
1712279	.16415/16X18H7	226	1717722	.1679M12X1.75	217	3210123	.47045/16X5/32	443	3210208	.47041.3/8X1/2	444
1712283	.16415/16X24H5	226	1717724	.1679M14X1.5	217	3210124	.47043/8X5/32	443	3210209	.47041.7/16X1/2	444
1712285	.16415/16X24H7	226	1717726	.1679M14X2.0	217	3210125	.47041/4X3/16	443	3210210	.47041.1/2X1/2	444
1712289	.16413/8X16H5	226	1717728	.1679M16X1.5	217	3210126	.47045/16X3/16	443	3210211	.47041.9/16X1/2	444
1712291	.16413/8X16H7	226	1717730	.1679M16X2.0	217	3210127	.47043/8X3/16	443	3210212	.47041.5/8X1/2	444
1712295	.16413/8X24H5	226	1717732	.1679M18X1.5	217	3210128	.47047/16X3/16	443	3210213	.47041.11/16X1/2	444
1712297	.16413/8X24H7	226	1717734	.1679M18X2.5	217	3210129	.47041/2X3/16	443	3210214	.47041.3/4X1/2	444
1712301	.16411/2X13H5	227	1717736	.1679M20X1.5	217	3210130	.47049/16X3/16	443	3210215	.47041.13/16X1/2	444
1712304	.16411/2X13H8	227	1717738	.1679M20X2.5	217	3210131	.47045/8X3/16	443	3210216	.47041.7/8X1/2	444
1712307	.16411/2X20H5	227	1717740	.1679M24X2.0	217	3210132	.47045/16X1/4	443	3210217	.47041.15/16X1/2	444
1712310	.16411/2X20H8	227	1717742	.1679M24X3.0	217	3210133	.47043/8X1/4	443	3210218	.47042X1/2	444
1712313	.16417/16X14H5	226	1810007	.46001/8	421	3210134	.47047/16X1/4	443	3210235	.47043/32X3/32	442
1712316	.16417/16X14H8	226	1810008	.46001/4	421	3210135	.47041/2X1/4	443	3210236	.4704N40X3/32	442
1712320	.16417/16X20H5	226	1810009	.46003/8	421	3210136	.47049/16X1/4	443	3210238	.4704N30X3/32	442
1712322	.16417/16X20H8	227	1810010	.46001/2	421	3210137	.47045/8X1/4	443	3210240	.4704N21X3/32	442
1713051	.1671M3X.5	228	1810011	.46003/4	421	3210138	.470411/16X1/4	443	3210241	.4704N20X3/32	442
1713052	.1671M4X.7	228	1810012	.46001	421	3210139	.47043/4X1/4	443	3210242	.4704N19X3/32	442
1713053	.1671M5X.8	228	1810013	.46001.1/4	421	3210140	.470413/16X1/4	443	3210244	.4704N11X3/32	442
1713054	.1671M6X1.0	228	1810014	.46001.1/2	421	3210141	.47047/8X1/4	443	3210245	.4704N10X3/32	442
1713055	.1671M8X1.0	228	1810015	.46002	421	3210142	.47043/8X5/16	443	3210248	.4704FX3/32	442
1713056	.1671M8X1.25	228	1810017	.3850N8	302	3210143	.47047/16X5/16	443	3210249	.47041/8X1/8	442
1713057	.1671M10X1.5	228	1810018	.3850N9	302	3210144	.47041/2X5/16	443	3210250	.4704N30X1/8	442
1713058	.1671M12X1.5	228	1810019	.3850N10	302	3210145	.47049/16X5/16	443	3210251	.47045/32X1/8	442
1713059	.1671M12X1.75	228	1810020	.3850N11	302	3210146	.47045/8X5/16	443	3210252	.4704N21X1/8	442



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3210253.	.4704N20X1/8	442	46111409.	.H85338.0	18	46204839.	.1660APM12X1.5	223	46204916.	.1677APM12X1.75	217
3210254.	.4704N19X1/8	442	46111410.	.H85339.5	18	46204840.	.1660APM12X1.75	223	46204917.	.1677APM14X1.5	217
3210255.	.47043/16X1/8	442	46111411.	.H85341.0	18	46204841.	.1660APM3X.5	223	46204918.	.1677APM14X2.0	217
3210256.	.4704N11X1/8	442	46111412.	.H85342.5	18	46204842.	.1660APM4X.7	223	46204919.	.1677APM16X1.5	217
3210257.	.4704N10X1/8	442	46111413.	.H85532.0	21	46204843.	.1660APM5X.8	223	46204920.	.1677APM16X2.0	217
3210258.	.47047/32X1/8	442	46111414.	.H85533.5	21	46204844.	.1660APM6X1.0	223	46204921.	.1677APM18X1.5	217
3210259.	.47041/4X1/8	442	46111415.	.H85535.0	21	46204845.	.1660APM8X1.0	223	46204922.	.1677APM18X2.5	217
3210260.	.4704FX1/8	442	46111416.	.H85536.5	21	46204846.	.1660APM8X1.25	223	46204923.	.1677APM20X1.5	217
3210261.	.47049/32X1/8	442	46111417.	.H85538.0	21	46204847.	.1672AP1/2X13	198	46204924.	.1677APM20X2.5	217
3210262.	.47045/16X1/8	442	46111418.	.H85539.5	21	46204848.	.1672AP1/2X20	198	46204925.	.1677APM24X2.0	217
3210263.	.47043/8X1/8	442	46111419.	.H85541.0	21	46204849.	.1672AP1/4X20	198	46204926.	.1677APM24X3.0	217
3210264.	.47047/16X1/8	442	46111420.	.H85542.5	21	46204850.	.1672AP1/4X28	198	46204927.	.1677APM4X.7	217
3210265.	.47041/2X1/8	442	46111421.	.H85832.0	24	46204851.	.1672AP10X24	198	46204928.	.1677APM5X.8	217
3210266.	.47049/16X1/8	442	46111422.	.H85833.5	24	46204852.	.1672AP10X32	198	46204929.	.1677APM6X1.0	217
3210267.	.47045/8X1/8	442	46111423.	.H85835.0	24	46204853.	.1672AP1X0X12	198	46204930.	.1677APM8X1.25	217
3210281.	.47043/16X3/16	443	46111424.	.H85836.5	24	46204854.	.1672AP1X0X8	198	46204931.	.16787/8X14	213
3210282.	.4704N11X3/16	443	46111425.	.H85838.0	24	46204855.	.1672AP3/4X10	198	46204932.	.16787/8X9	213
3210283.	.4704N10X3/16	443	46111426.	.H85839.5	24	46204856.	.1672AP3/4X16	198	46204933.	.1681AP1/2X13	229
3210284.	.47047/32X3/16	443	46111427.	.H85841.0	24	46204857.	.1672AP3/8X16	198	46204934.	.1681AP1/2X20	229
3210286.	.4704FX3/16	443	46111428.	.H85842.5	24	46204858.	.1672AP3/8X24	198	46204935.	.1681AP1/4X20	229
3210287.	.47049/32X3/16	443	46111949.	.H860N7	25	46204859.	.1672AP4X10	198	46204936.	.1681AP1/4X28	229
3210294.	.470411/16X3/16	443	46204754.	.1629AP1/2X13	209	46204860.	.1672AP5/16X18	198	46204937.	.1681AP10X24	229
3210295.	.47043/4X3/16	443	46204755.	.1629AP1/2X20	209	46204861.	.1672AP5/16X24	198	46204938.	.1681AP10X32	229
3210296.	.470413/16X3/16	443	46204756.	.1629AP1/4X20	209	46204862.	.1672AP5/8X11	198	46204939.	.1681AP1X12	229
3210297.	.47047/8X3/16	443	46204757.	.1629AP1/4X28	209	46204863.	.1672AP5/8X18	198	46204940.	.1681AP1X8	229
3210298.	.470415/16X3/16	443	46204758.	.1629AP10X24	209	46204864.	.1672AP6X32	198	46204941.	.1681AP3/4X10	229
3210299.	.47041X3/16	443	46204759.	.1629AP10X32	209	46204865.	.1672AP7/16X14	198	46204942.	.1681AP3/4X16	229
3210300.	.47041/4X1/4	443	46204759.	.1629AP10X32	209	46204866.	.1672AP7/16X20	198	46204943.	.1681AP3/8X16	229
3210301.	.4704FX1/4	443	46204790.	.1629AP1X12	209	46204867.	.1672AP7/8X14	198	46204944.	.1681AP3/8X24	229
3210302.	.47049/32X1/4	443	46204791.	.1629AP1X8	209	46204868.	.1672AP7/8X9	198	46204945.	.1681AP4X40	229
3210313.	.470415/16X1/4	443	46204792.	.1629AP3/4X10	209	46204869.	.1672AP8X32	198	46204946.	.1681AP5/16X18	229
3210314.	.47041X1/4	443	46204793.	.1629AP3/4X16	209	46204870.	.1673APM10X1.25	203	46204947.	.1681AP5/16X24	229
3210338.	.430N1	450	46204794.	.1629AP3/8X16	209	46204871.	.1673APM10X1.5	203	46204948.	.1681AP5/8X11	229
3210339.	.430N2	450	46204795.	.1629AP3/8X24	209	46204872.	.1673APM12X1.5	203	46204949.	.1681AP5/8X18	229
3210340.	.430N3	450	46204796.	.1629AP4X40	209	46204873.	.1673APM12X1.75	203	46204950.	.1681AP6X32	229
3210341.	.430N4	450	46204797.	.1629AP5/16X18	209	46204874.	.1673APM14X1.5	203	46204951.	.1681AP7/16X14	229
3210342.	.430N5	450	46204798.	.1629AP5/16X24	209	46204875.	.1673APM14X2.0	203	46204952.	.1681AP7/16X20	229
3210444.	.470411/32X3/16	443	46204799.	.1629AP5/8X11	209	46204876.	.1673APM16X1.5	203	46204953.	.1681AP7/8X14	229
3210445.	.470413/32X3/16	443	46204800.	.1629AP5/8X18	209	46204877.	.1673APM16X2.0	203	46204954.	.1681AP7/8X9	229
3210446.	.470415/32X3/16	443	46204801.	.1629AP6X32	209	46204878.	.1673APM18X1.5	203	46204955.	.1681AP8X32	229
3210447.	.470417/32X1/4	443	46204802.	.1629AP7/16X14	209	46204879.	.1673APM18X2.5	203	46204956.	.1687APM10X1.25	230
4111502.	.229CSET	305	46204803.	.1629AP7/16X20	209	46204880.	.1673APM20X1.5	203	46204957.	.1687APM10X1.5	230
46073789.	.A9011/2	47	46204804.	.1629AP7/8X9	209	46204881.	.1673APM20X2.5	203	46204958.	.1687APM12X1.5	230
46104481.	.R9501.7/32	12	46204805.	.1629AP8X32	209	46204882.	.1673APM24X2.0	203	46204959.	.1687APM12X1.75	230
46104482.	.R95031.0	12	46204806.	.1630AP1/2X13	222	46204883.	.1673APM24X3.0	203	46204960.	.1687APM14X1.5	230
46104483.	.R9501.1/4	12	46204807.	.1630AP1/2X20	222	46204884.	.1673APM4X.7	203	46204961.	.1687APM14X2.0	230
46104484.	.R95032.0	12	46204808.	.1630AP1/4X20	222	46204885.	.1673APM5X.8	203	46204962.	.1687APM16X1.5	230
46104485.	.R95032.5	12	46204809.	.1630AP1/4X28	222	46204886.	.1673APM6X1.0	203	46204963.	.1687APM16X2.0	230
46104486.	.R9501.19/64	12	46204810.	.1630AP10X24	222	46204887.	.1673APM8X1.25	203	46204964.	.1687APM18X1.5	230
46104487.	.R95033.0	12	46204811.	.1630AP10X32	222	46204888.	.16747/8X14	198	46204965.	.1687APM18X2.5	230
46104488.	.R95033.5	12	46204812.	.1630AP1X12	222	46204889.	.16747/8X9	198	46204966.	.1687APM20X1.5	230
46104489.	.R95034.0	12	46204813.	.1630AP1X8	222	46204890.	.1676AP1/2X13	213	46204967.	.1687APM20X2.5	230
46104530.	.R9501.11/32	12	46204814.	.1630AP3/4X10	222	46204891.	.1676AP1/2X20	213	46204968.	.1687APM24X2.0	230
46104531.	.R95034.5	12	46204815.	.1630AP3/4X16	222	46204892.	.1676AP1/4X20	213	46204969.	.1687APM24X3.0	230
46104532.	.R9501.3/8	12	46204816.	.1630AP3/8X16	222	46204893.	.1676AP1/4X28	213	46204970.	.1687APM4X.7	230
46104533.	.R95035.0	12	46204817.	.1630AP3/8X24	222	46204894.	.1676AP10X24	213	46204971.	.1687APM5X.8	230
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5010826	.45325/8	410	5011095	.46081/2X60	430	5110015	.9403/4X5/8	382	5110233	.9303/4X5/8	363
5010827	.453221/32	410	5011096	.46085/8X60	430	5110016	.94013/16X5/8	382	5110235	.9301X5/8	363
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5010840	.45321.1/16	410	5011109	.46083/8X100	430	5110035	.9402X1.1/4	383	5110249	.9315/8	364
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5010842	.45321.1/8	410	5011111	.46085/8X100	430	5110072	.9453/16	371	5110252	.9311	364
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5010845	.45321.7/32	410	5011130	.4587N1	419	5110075	.9453/8	371	5110259	.9331/4	362
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5010847	.45321.5/16	410	5011132	.4587N3	419	5110077	.9455/8	371	5110261	.9333/8	362
5010848	.45321.3/8	410	5011133	.4587N4	419	5110078	.94511/16	371	5110262	.9337/16	362
5010849	.45321.7/16	410	5011134	.4587N5	419	5110079	.9453/4	371	5110263	.9331/2	362
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5110381	.92313/16	349	5110691	.8831/4	378	5160035	TN9402X1.1/4	383	5210030	.90033/8	367
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5270036	.TC90037/8	367	6210074	.47031/2	441	6310298	.7071/2	451			
5270037	.TC90031	367	6210076	.47039/16	441	6310299	.7075/8	451			
5270038	.TC90031.1/4	367	6210078	.47035/8	441	6310300	.7073/4	451			
5270039	.TC90031.1/2	367	6210080	.470311/16	441	6310302	.7071	451			
5270040	.TC90031.3/4	367	6210082	.47033/4	441	6310305	.7573/16	451			
5270041	.TC90032	367	6210084	.470313/16	441	6310306	.7571/4	451			
5270078	.TC90081/4	369	6210085	.47037/8	441	6310307	.7575/16	451			
5270079	.TC90083/8	369	6210086	.470315/16	441	6310308	.7573/8	451			
5270080	.TC90081/2	369	6210087	.47031	441	6310309	.7577/16	451			
5270081	.TC90085/8	369	6210088	.47031.1/16	441	6310310	.7571/2	451			
5270082	.TC90083/4	369	6210089	.47031.1/8	441	6310311	.7575/8	451			
5270083	.TC90087/8	369	6210090	.47031.3/16	441	6310312	.7573/4	451			
5270084	.TC90081	369	6210091	.47031.1/4	441	6310314	.7571	451			
5270085	.TC90081.1/4	369	6210092	.47031.5/16	441	6310317	.7273/16	451			
5270086	.TC90081.1/2	369	6210093	.47031.3/8	441	6310318	.7271/4	451			
5270087	.TC90081.3/4	369	6210094	.47031.1/2	441	6310319	.7275/16	451			
5270088	.TC90082	369	6210095	.47031.5/8	441	6310320	.7273/8	451			
5270089	.TC90091/4	368	6210096	.47031.3/4	441	6310321	.7277/16	451			
5270090	.TC90093/8	368	6210097	.47031.7/8	441	6310322	.7271/2	451			
5270091	.TC90091/2	368	6210098	.47032	441	6310323	.7275/8	451			
5270092	.TC90095/8	368	6210099	.47032.1/8	441	6310324	.7273/4	451			
5270093	.TC90093/4	368	6210100	.47032.1/4	441	6310326	.7271	451			
5270094	.TC90097/8	368	6210101	.47032.3/8	441	8110601	.65411/8	279			
5270095	.TC90091	368	6210102	.47032.1/2	441	8110602	.65411/4	279			
5270096	.TC90091.1/4	368	6210107	.47051/4	439	8110603	.65413/8	279			
5270097	.TC90091.1/2	368	6210108	.47059/32	439	8110604	.65411/2	279			
5270098	.TC90091.3/4	368	6210109	.47055/16	439	8110605	.65413/4	279			
5270099	.TC90092	368	6210110	.470511/32	439	8110606	.65411	279			
6210001	.47001/4	437	6210111	.47053/8	439	8110607	.65411.1/4	279			
6210003	.47005/16	437	6210112	.470513/32	439	8110608	.65411.1/2	279			
6210005	.47003/8	437	6210113	.47057/16	439	8110609	.65412	279			
6210007	.47007/16	437	6210114	.470515/32	439	8111502	.229MSET	305			
6210009	.47001/2	437	6210115	.47051/2	439	8112000	.6121T0	301			
6210010	.47009/16	437	6210116	.470517/32	439	8112002	.6121T2	301			
6210011	.47005/8	437	6210117	.47059/16	439						
6210013	.47003/4	437	6210118	.470519/32	439						
6210015	.47007/8	437	6210119	.47055/8	439						
6210017	.47001	438	6210120	.470521/32	439						
6210031	.47021/4	437	6210121	.470511/16	439						
6210032	.47029/32	437	6210122	.470523/32	439						



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PRODUCT WARRANTY



Precision Dormer, LLC ("The Company").

The Company warrants to original equipment manufacturers, distributors and industrial and commercial users of its products that each new product manufactured by The Company shall be free from material defects and workmanship for one year after delivery by The Company. The Company's exclusive obligation under this warranty is limited to furnishing a replacement for, or at its option, repairing or issuing credit for, any product which is, within one year from the date of delivery by The Company, returned freight prepaid to the plant designated by a representative of The Company and which upon inspection is determined by The Company to be materially defective in material or workmanship.

Complete information as to operating conditions, machine setup and application of cutting fluid should accompany any product returned for inspection. All defective products returned to The Company under this warranty shall be The Company's property. The provisions of this warranty shall not apply to any product of The Company which has been subjected to misuse, improper operating conditions, machine setup, application of cutting fluid, or which has been repaired or altered without authorization from The Company. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, EXCEPT AS EXPRESSLY SET FORTH HEREIN, THE COMPANY MAKES NO WARRANTY, EXPRESS OR IMPLIED, AS TO ANY MATTER WHATSOEVER INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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