

# DORMER PRAMET

## ROUND TOOL CATALOG



 **DORMER**

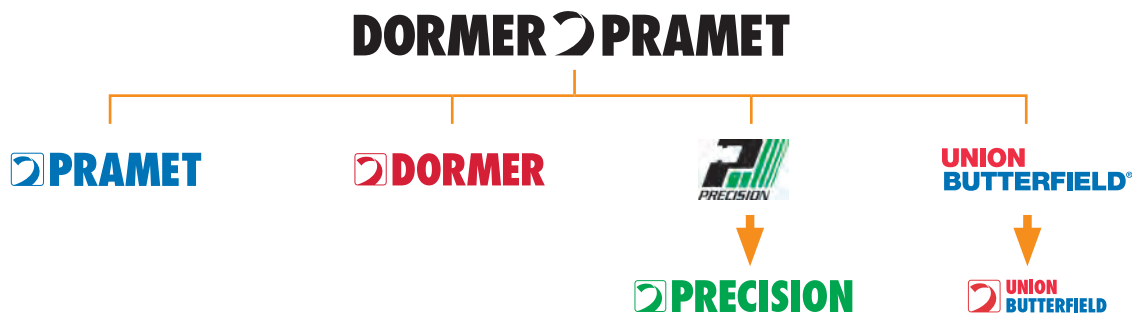
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 **UNION  
BUTTERFIELD**

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## 2020 VISION: CLARITY IN BRAND ALIGNMENT



We acknowledge a unified appearance of our product logos will show that Dormer Pramet manufactures all our product brands – Precision Twist Drill, Dormer, Union Butterfield and Pramet.

In 2020, we are educating on the evolution of the Precision Twist Drill and Union Butterfield logos. Beginning in 2021, these logos will adopt the chip - our unifying symbol across the company and product brands that communicates our promise of quality manufacturing, products and logistics.

The Union Butterfield and Precision Twist Drill brands are pioneer brands for the North American marketplace. Since launching in 1885 and 1952, respectively, they represent a legacy of local support and quality tooling. Adding the chip to these logos aligns all brands visually and confirms to customers that when they add any of our tools to their shop, they add our entire team, including quality production facilities, reliable delivery and nationwide support.

## WORKPIECE MATERIAL GROUPS (WMG)

Available on our website [www.dormerpramet.com](http://www.dormerpramet.com) or by downloading our NEW Machining Calculator App.

### What is WMG?

Previous to 2019, we classified our tools according to WMG for indexable tools and AMG for round tools. We have begun to unify our technical data formats to only use WMG.

Workpiece material groups (“WMG”) are used to support easy and reliable selection of the right cutting tool and starting values for machining conditions in particular applications.

Dormer Pramet classifies workpiece materials into six different colored groups;

- **Blue:** Steel and cast steel (P-group)
- **Yellow:** Stainless steel (M-group)
- **Red:** Cast iron (K-group)
- **Green:** Non-ferrous metals (N-group)
- **Orange:** High-temperature alloys (S-group)
- **Grey:** Hardened materials (H-group)

Each of these are divided into subgroups based on their structure and/or composition. For example, P-group steel and cast steel is split into four subgroups, namely;

- P1 – **Free machining steel**
- P2 – **Plain carbon steel**
- P3 – **Alloy steel**
- P4 – **Tool steel**

A final division includes material properties, such as hardness and ultimate tensile strength. This is to provide our customers with a complete tool recommendation, including starting values for cutting speed and feed.

Speeds and feeds in the separate high performance catalogs are provided according to our new WMG groupings. The data in this catalog is still utilizing our traditional AMG groupings.

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## General Purpose

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## General Purpose

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# HYDRA DRILL

## How to Use This Chart:


































































































- 1) Determine your Workpiece Material from the Application Material Groups (AMG) below.
- 2) Use the icons to find Product Features.
- 3) Find the Surface Feet Per Minute (SFM) and Alpha Code.  
example: 361 W  
361 = SFM  
W = Alpha Code used to find your Feed Rate (IPR)
- 4) To find Cutting Feed Rate, find your Alpha Code on the AMG Chart (example: 279 U : U is the Alpha Code)
- 5) Find the closest diameter for your cutting application on the Feed Rate chart below to find your IPR

Fn	Ø						
	1/2"	19/32"	5/8"	3/4"	1"	1.3/16"	1.1/2"
S	0.004	0.005	0.005	0.006	0.007	0.007	0.009
T	0.005	0.006	0.007	0.007	0.008	0.009	0.010
U	0.008	0.009	0.009	0.009	0.011	0.012	0.014
V	0.011	0.012	0.013	0.013	0.016	0.017	0.020
W	0.015	0.016	0.017	0.018	0.019	0.019	0.020

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, 6Al4V-2Sn, Monel, Monel K	<28
	4.3 Titanium, alloyed	6Al4V-4Mo, 7Al4V-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	Ultradid, 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		---



# Visual Index - Drills

Head Style:	R950					R960					R970					
	   															
																
Head Range:	15/32 - 42.00	15/32 - 42.00	15/32 - 42.00	13.5 - 42.00	15/32 - 42.00	15/32 - 30.50	15/32 - 30.50	15/32 - 30.50	15/32 - 30.50	15/32 - 30.50	15/32 - 42.00	15/32 - 42.00	15/32 - 42.00	15/32 - 42.00	15/32 - 42.00	
Body Style:	H851	H853	H855	H858	H8512	H851	H853	H855	H858	H8512	H851	H853	H855	H858	H8512	
																
Tool Material:	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	
Standard:																
Depth of Cut:	1.5XD	3XD	5XD	8XD	12XD	1.5XD	3XD	5XD	8XD	12XD	1.5XD	3XD	5XD	8XD	12XD	
Finish/Coating:																
Shank:																
Direction of Cut:																
Coolant:																
Range:	15/32 - 30.50	15/32 - 42.00	15/32 - 42.00	13.5 - 42.00	13.5 - 1.1/64	15/32 - 30.50	15/32 - 42.00	15/32 - 42.00	13.5 - 42.00	13.5 - 1.1/64	15/32 - 30.50	15/32 - 42.00	15/32 - 42.00	13.5 - 42.00	13.5 - 1.1/64	
Page #	21,30	21,33	21,36	21,39	21,42	24,30	24,33	24,36	24,39	24,42	27,30	27,33	27,36	27,39	27,42	
ISO																
1.1						397W	361W	361V	328U	289U	397W	361W	361V	328U	289U	P 1
1.2						361W	328W	328V	295U	262U	361W	328W	328V	295U	262U	P 1
1.3	361W	328W	328V	295U	262U											P 2
1.4	307W	279W	279V	246U	223U											P 3
1.5	307W	279W	279V	246U	223U											P 4
1.6	217T	197T	197T	197S	158S											H 1
1.7																H 3
1.8																H 4
2.1						217V	197V	164V	148U	157U						M 1
2.2						180T	164T	164S	131S	131S						M 3
2.3						144T	131T	131S	115S	92S						M 2
2.4	127T	115T	115T	98S	92S											S 2
3.1						433V	394V	374V	346U	315U	433V	394V	374V	346U	315U	K 1
3.2						418V	380V	354V	328U	304U	418V	380V	354V	328U	304U	K 2
3.3	318U	289U	279V	262U	231U						318U	289U	279V	262U	231U	K 3
3.4	318U	289U	279V	262U	231U						318U	289U	279V	262U	231U	K 4
4.1						163T	148T	148T	115S	118S						S 1
4.2						127T	115T	115T	98S	92S						S 2
4.3						108S	98S	98S	82S	78S						S 3
5.1						127T	115T	115T	98S	92S						S 1
5.2						108S	98S	98S	82S	78S						S 2
5.3						90S	82S	82S	66S	66S						S 3
6.1																N 3
6.2																N 4
6.3																N 3
6.4																N 4
7.1																N 1
7.2																N 1
7.3																N 1
7.4																N 2
8.1																O
8.2																O
8.3																O
9.1																H
10.1																O

# Visual Index - Drills

## Feed Rate Chart - Drills

Alpha Code	Feed in Inches per Revolution (IPR) ± 25%															Ø Diameter				
	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								

### How to Use This Chart:

- Determine your Workpiece Material from the Application Material Groups (AMG) below.
- Use the icons to find Product Features.
- Find the Surface Feet Per Minute (SFM) and Alpha Code.  
example: 361 W  
361 = SFM  
W = Alpha Code used to find your Feed Rate (IPR)
- To find Cutting Feed Rate, find your Alpha Code on the AMG Chart (example: 279 U : U is the Alpha Code)
- Find the closest diameter for your cutting application on the Feed Rate chart to find your IPR

Application Material Groups (AMG)		Hardness HRC	ISO	
1. Steel	1.1 Magnetic soft steel	12L14, 12L15	<120 HB	P 1
	1.2 Structural Steel/ case carburising steel	1005-1025, 1214, 1215, A36	<200 HB	P 1
	1.3 Plain Carbon steel	1030-1060, 1050-1060, 1144-1146	<24	P 2
	1.4 Alloy steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	<24	P 3
	1.5 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>24<38	P 4
	1.6 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>38	H 1
	1.7 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	49-55	H 3
	1.8 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	55-63	H 4
2. Stainless Steel	2.1 Free machining Stainless Steel	200, 303, 416, 420F, 430F, 440	<24	M 1
	2.2 Austenitic	301, 302, 304, 316, 321, 330, CUSTOM 455, AM-350	<24	M 3
	2.3 Ferritic + Austenitic, Martensitic	318-329, 400-446, DUPLEX	<32	M 2
	2.4 Precipitation Hardened	15-5PH, Custom 450 17-4PH	<32	S 2
3. Cast Iron	3.1 Lamellar graphite	Grey, G10, Gg40, J431C, A48 CLASS 20	<150 HB	K 1
	3.2 Lamellar graphite	Grey, GG25-Gg40, J158, A48 CLASS 40-60	>150 HB<32	K 2
	3.3 Nodular graphite/ Malleable Cast Iron	A220, A436, A439, A602, Black, GGG40-GGG70	<200 HB	K 3
	3.4 Nodular graphite/ Malleable Cast Iron	Black Gts/Gtw, J434C	>200 HB<32	K 4
4. Titanium	4.1 Titanium, unalloyed	Commercially Pure	<200 HB	S 1
	4.2 Titanium, alloyed	6Al4V, 6A14V-2Sn, Monel, Monel K	<28	S 2
	4.3 Titanium, alloyed	6Al4V-4Mo, 7A14V-4Mo, 4911-4967	>28<38	S 3
5. Nickel	5.1 Nickel, unalloyed	Commercially Pure, 17644, 200, 5553	<150 HB	S 1
	5.2 Nickel, alloyed	Monel 400, Hastelloy C, Inconel 625, Waspaloy	<28	S 2
	5.3 Nickel, alloyed	Inconel 718, Nimonic 75-95, Rene 41, Inconel 825, A286	>28<38	S 3
6. Copper	6.1 Copper	Commercially Pure	<100 HB	N 3
	6.2 β-Brass, Bronze	314-340, 350-370	<200 HB	N 4
	6.3 α-Brass	Alloyed Cu + Al + Fe, Long Chipping	<200 HB	N 3
	6.4 High Strength Bronze	Ampco 18-25	<49	N 4
7. Aluminium Magnesium	7.1 Al, Mg, unalloyed	Commercially Pure	<100 HB	N 1
	7.2 Al alloyed, Si<0.5%	6061 T6, 7075, 314-340	<150 HB	N 1
	7.3 Al alloyed, Si>0.5%<10%	6061 T6, 380-390	<120 HB	N 1
	7.4 Al alloyed, Si>10% Mg alloys	Magnesium Whisker Reinforced	<120 HB	N 2
8. Synthetic Materials	8.1 Thermoplastics	Ultradid, Polystrol	---	O
	8.2 Thermosetting plastics	Bakelid, Pertinax	---	O
	8.3 Reinforced plastic materials	CFK, GFKAFK	---	O
9. Hard Mat.	9.1 Cermets (Metal-ceramics)	Ferrotic	<54	H
10. Graphite	10.1 Standard graphite		---	O

# Visual Index - Drills

Tool Material:	HM	HM	HM	HM	HM	HM	HM	HM	HM	HSS	HSS-E	HSS-E	HSS	HSS-E	HSS-E	
Standard:	DIN 6539	DIN 6537 K	DIN 6537 K	DIN 6537 K	DIN 338	DIN 6537 L	DIN 6537 L	DIN 6537 L	DORMER	DIN 1897	DIN ANSI	DIN ANSI	DIN 338	DORMER	DIN ANSI	
Depth of Cut:	2.5XD	3XD	3XD	3XD	4XD	5XD	5XD	5XD	8XD	2.5XD	3XD	3XD	4XD	5XD	6XD	
Point Style:	130°	140°	140°	140°	130°	140°	140°	140°	140°	130°	130°	130°	130°	130°	130°	
Finish/Coating:	TiN	TiAN	TiAN	TiAN	TiN	TiAN	TiAN	TiAN	TiAN	TiN		Alcona Top	TiN	TiAN Top		
Shank:		DIN 6535HA	DIN 6535HA	DIN 6535HA		DIN 6535HA	DIN 6535HA	DIN 6535HA	DIN 6535HA					DIN 6535HA		
Flute Form:	N	∞	∞	∞	N	∞	∞	∞	∞		W	W			W	
Direction of Cut:																
Coolant Through:																
Style:	R520	R458	R457	R467	R510	R454	R453	R463	R459	A520	A920	A921	A510	A553	A900	
Range:	3.00 - 16.50	3.00 - 20.00	3.00 - 20.00	3.00 - 16.00	3.00 - 14.25	3.00 - 20.00	3.00 - 20.00	3.00 - 16.00	3.00 - 16.00	3.00 - 13.00	1.00 - 20.00	2.50 - 16.00	3.00 - 14.00	5.00 - 20.00	1.00 - 20.00	
Page #	45	47	47	51	54	56	56	60	63	66	69	69	73	76	78	
1.1	328X	510W	510W		328W	510V	510V		443V	187M	131J	197M	187M	279L	125H	
1.2	295X	440W	460W		295W	440V	460V		394V	154M	112J	171M	154M	230L	108H	
1.3	295X	360W	440W		295W	360V	440V		361U	131K	105I	174J	131K	197L	85H	
1.4	262X	330V	375V		262W	330V	375V		328U	105I	105I	174J	98H	148H	85H	
1.5	180X	245V	295V		180V	245V	295V		262U	69G	75E	125G	69F	92F	69E	
1.6	148W	164U	213U		148V	164U	213U		180T	36E	62E	98G	36D	49D	52E	
1.7	115U	98U	98U		115T	98U	98U									
1.8	98T	82U	82U		98S	82U	82U									
2.1	164W	148U	246V	279G	164V	148U	246V	279G	246V	98I	49F	56F	92G	131G	49E	
2.2		131T	115V	246G		131T	115V	246G	115V	52I	23F	30F	46I	62I	23E	
2.3		115T	98U	197F		115T	98U	197F	98U	66G	30D	36D	62G	89G	30C	
2.4		115T				115T										
3.1	295Y	295W	394W		295X	295W	394W		394W	157M	112L	174L	138K	230K	79J	
3.2	295Y	295W	394W		295X	295W	394W		394W	121K	85L	138L	105J	164J	62J	
3.3	213X	230V	262V		213W	230V	262V		262V	98J	85L	138L	92J	148J	62J	
3.4	213X	230V	262V		213W	230V	262V		262V	85F	62J	118J	82F	138F	46I	
4.1	197W	164U	180V	180V	148V	164U	180V	180V		112I	98G	157I	105G	148G	72E	
4.2	148V	131U	148V	148V	148V	131U	148V	148V		66G	59G	95I	66H	98E	49E	
4.3	115U	115T	131U	131U		115T	131U	131U		13B	33C	52E	13B	26C	20C	
5.1	164W			180U	164V			180U		56I	49I	79L	56I	82I	46G	
5.2				148U				148U		36G	30G	46I	30E	49E	23G	
5.3				131U				131U		23E	20E	33G	20E	33G	20C	
6.1		328V	410W			328V	410W		410V	131E	213H		131D	230G	213G	
6.2		656V	722W			656V	722W		722V	164I	216J		164I	279I	174I	
6.3		656V	722W			656V	722W		722V	148K	131J	233J	148I	262I	112H	
6.4		262U	328V			262U	328V		328U	66F	102G	164I	66F	115G	98G	
7.1	738Z	738W	820W		738Y	738W	820W		935W	180I	246L		164G	230H	197J	
7.2	738Z	738W	820W		738Y	738W	820W		935W	164M	148N		164M	328M	148N	
7.3	492Y	590V	656V		492X	590V	656V		623V	121K	131N		102I	180I	131N	
7.4	213Y	394V	492V		213X	394V	492V		312V	115I	118J	157J	108I	180J	92I	
8.1	246Z				246X					213G	180J		213G	295G	180I	
8.2	377V				377V					164G	131H		164G		131G	
8.3										115F			115F			
9.1																
10.1																

# Visual Index - Drills

	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
	DIN ANSI	DIN ANSI	DIN ANSI	DIN 1869/1	DIN 1869/2	DIN 1869/3	ANSI	ANSI	ANSI	ANSI	DIN 338	DIN 338	DIN 338	DIN 338	DIN 338	ANSI
	6XD	10XD	10XD	15XD	20XD	25XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD
	130°	130°	130°	130°	130°	130°	118°	118°	118°	118°	118°	118°	118°	118°	118°	118°
	Alcorna Top		Alcorna Top					ST	TN	TN		ST	ST	TN	TN	TN
	W	W	W	W	W	W			N	N	N	N	N	N	N	N
	A901	A940	A941	A976	A977	A978	R10P R15P R18P	R10 R15 R18	A012	A012S	2A	2AB	A100	A002	A002S	L10
	1.50 - 16.00	1.00 - 20.00	1.00 - 16.00	1.50 - 14.00	1.50 - 14.00	3.00 - 10.00	N97 - 11/16	N80 - 11/16	N80 - 3/4	1/16 - 1/2	0.15 - 15.00	1.00 - 17.50	0.20 - 20.00	1.00 - 16.00	2.00 - 13.00	1/32 - 1/2
	78	81	81	84	84	84	87	87	91	91	95	95	95	95	95	102
1.1	197J	125F	174G	102C	102B	102A	115H	115H	154J	154J	115H	115H	115H	154J	154J	115H
1.2	164J	108F	151G	85C	85B	85A	98H	98H	131J	131J	98H	98H	98H	131J	131J	98H
1.3	144I	72G	118G	72C	72B	72A	82F	82F	115F	115F	82F	82F	82F	115F	115F	82F
1.4	144I	72G	118G	72C	72B	72A	66F	66F	98F	98F	66F	66F	66F	98F	98F	66F
1.5	108G	56C	75D	39A	39A	39A	43E	43E	59F	59F	43E	43E	43E	59F	59F	43E
1.6	85G	39C	56D	33A	33A	33A	30D	30D	33E	33E	30D	30D	30D	33E	33E	30D
1.7																
1.8																
2.1	56E	49C	56C	39B	39B	39A	49E	49E	66F	66F	49E	49E	49E	66F	66F	49E
2.2	30E	23E	30E	23C	23B	23A	26G	26G	39G	39G	26G	26G	26G	39G	39G	26G
2.3	36C	30B	36B	26A	26A	26A	30C	30C	52C	52C	30C	30C	30C	52C	52C	30C
2.4																
3.1	190I		118I				98H	98H	131J	131J	98H	98H	98H	131J	131J	98H
3.2	154I	52I	98I	75C	75B	75A	79F	79F	98E	98E	79F	79F	79F	98E	98E	79F
3.3	112J	52I	98I	52C	52B	52A	66E	66E	92E	92E	66E	66E	66E	92E	92E	66E
3.4	92I	39H	79H	36A	36A	36A	46E	46E	85E	85E	46E	46E	46E	85E	85E	46E
4.1	115G	59E	82F	49C	49B	49A	75E	75E	75F	75F	75E	75E	75E	75F	75F	75E
4.2	79G	43C	59D	36A	36A	36A	39D	39D	43D	43D	39D	39D	39D	43D	43D	39D
4.3	33E	20C	26D	16A	16A	16A	20B	20B	23B	23B	20B	20B	20B	23B	23B	20B
5.1	72I						33G	33G	43G	43G	33G	33G	33G	43G	43G	33G
5.2	36I						20E	20E	23E	23E	20E	20E	20E	23E	23E	20E
5.3	33E						10A	10A	10A	10A	10A	10A	10A	10A	10A	10A
6.1		213F					108G	108G	164G	164G	108G	108G	108G	164G	164G	108G
6.2		230F					115I	115I	108I	108I	115I	115I	115I	108I	108I	115I
6.3	184I	112G	157H	98D	98C	98B	89H	89H	128H	128H	89H	89H	89H	128H	128H	89H
6.4	157I	98G	138H	89D	89C	89B	52G	52G	98G	98G	52G	52G	52G	98G	98G	52G
7.1		174H					108J	108J	134K	134K	108J	108J	108J	134K	134K	108J
7.2		148N					98I	98I	125J	125J	98I	98I	98I	125J	125J	98I
7.3		131N					89H	89H	108I	108I	89H	89H	89H	108I	108I	89H
7.4	157I	98G	138H	89D	89C	89B	79F	79F	108I	108I	79F	79F	79F	108I	108I	79F
8.1		180H					98J	98J	98I	98I	98J	98J	98J	98I	98I	98J
8.2		131F					92H	92H	164H	164H	92H	92H	92H	164H	164H	92H
8.3							46F	46F	115F	115F	46F	46F	46F	115F	115F	46F
9.1							10B	10B	10B	10B	10B	10B	10B	10B	10B	10B
10.1																

# Visual Index - Drills

	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS-E	HSS-E	HSS-E	HSS
	DIN 338	ANSI	NAS 907	NAS 907	ANSI	DIN 338	ANSI	ANSI	DIN 338	DIN 338	NAS 907	DIN 338	NAS 907	ANSI
	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	3XD	2.5XD
	118°	135°	118°	135°	118°	135°	135°	135°	135°	135°	135°	135°	135°	118°
	ST	Peek Bronze	ST	ST		ST		TiN		TiN	Bronze	Bronze	Bronze	
	N				W	W						N		
	A101	HX10 HX15 HX18	R10A R15A R18A	R10B R15B R18B	R10H R18H	A108	QC21P	QC21G	QC21PM	QC21GM	R10CO R15CO R18CO	2ACO	R88CO R89CO	R40 R41 R42
	1.00 - 12.00	1/16 - 1/2	1/16 - 1/2	1/16 - 1/2	N80 - 1/2	1.00 - 16.00	1/16 - 11/16	1/16 - 1/2	1.50 - 17.50	1.50 - 13.00	N80 - 11/16	1.00 - 13.00	1/16 - 1/2	N60 - 2"
	103	105	108	111	114	114	119	119	122	122	123	123	128	130
1.1	35H	115H	115J	115J	108I	115I	98F	115F	98F	115F	115J	115J	115J	115J
1.2	30H	69H	98H	98H	92I	98I	59F	69F	59F	69F	98H	98H	98H	98J
1.3	25F	75I	89G	89G		82G	66H	75H	66H	75H	89G	89G	89G	89G
1.4	20F	69H	79F	79F		66F	59F	69F	59F	69F	79F	79F	79F	69G
1.5	13E	56F	56E	56E		43E	46D	56D	46D	56D	56E	56E	56E	46F
1.6	9D		33D	33D		30D					33D	33D	33D	33E
1.7														
1.8														
2.1	15E	105I	72E	72E		49E	89H	105H	89H	105H	72E	72E	72E	52F
2.2	8G	59H	36G	36G		30G	49F	59F	49F	59F	36G	36G	36G	30H
2.3	9C	56F	49C	49C		33D	49D	59D	49D	59D	49C	49C	49C	33D
2.4														
3.1	30H	171L	115H	115H	82F	98H	151H	171H	151H	171H	115H	115H	115H	105J
3.2	24F	89I	92D	92D	66D	79F	79H	89H	79H	89H	92D	92D	92D	89G
3.3	20E	95H	72E	72E	52C	66E	79F	95F	79F	95F	72E	72E	72E	66F
3.4	14E	59F	56E	56E	33C	46E		59D		59D	56E	56E	56E	52F
4.1	23E	95H	92F	92F	49C	82G	89H		89H		92F	92F	92F	89G
4.2	12D	75H	66D	66D		52E	49F		49F		66D	66D	66D	52E
4.3	6B		36C	36C		23B					36C	36C	36C	26C
5.1	10G	59H	49G	49G	23E	39G	49F	59H	49F	59H	49G	49G	49G	43H
5.2	6E		23E	23E		23G					23E	23E	23E	26F
5.3	3A		20B	20B		20E					20B	20B	20B	13B
6.1	33G		125H	125H	115H	108G	89I	98I	89I	98I	125H	125H	125H	118H
6.2	35I		131F	131F	118G	115I	79H	89H	79H	89H	131F	131F	131F	125J
6.3	27H		89H	89H		102H	79H	89H	79H	89H	89H	89H	89H	89I
6.4	16G		69F	69F		52G					69F	69F	69F	52H
7.1	33J		108J	108J	148J	108J	351H	400H	351H	400H	108J	108J	108J	108K
7.2	30I		98I	98I	115J	98I	325H	351H	325H	351H	98I	98I	98I	98J
7.3	27H		98H	98H	98G	89H					98H	98H	98H	98I
7.4	24F		89F	89F	95G	79F	276H	315H	276H	315H	89F	89F	89F	82I
8.1	30J				138J	98J								98K
8.2	28H				131I	92H								115I
8.3	14F				66G	46F								56G
9.1	3B		20C	20C		10B					20C	20C	20C	13C
10.1														



# Visual Index - Drills

	HSS	HSS	HSS	HSS	HSS	HSS-E	HSS-E	HSS-E	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS-E
	DIN ANSI	ANSI	DIN 1897	ANSI	ANSI	DIN 1899	ANSI	DIN 1897	ANSI	DIN 340	ANSI	ANSI	ANSI	DIN 340	DIN 340	ANSI
	2.5XD	2.5XD	2.5XD	3XD	3XD	2.5XD	2.5XD	2.5XD	6XD	6XD	6XD	6XD	6XD	6XD	6XD	6XD
	135°	135°	135°	135°	135°	118°	135°	135°	118°	118°	118°	135°	135°	135°	135°	135°
	TN	ST	ST		TN		Bronze	Bronze					TN		TN	Bronze
	N		N			N		N		N	W					
	A022	R40C R41C R42C	4ASM	QC41P	QC41G	A720	M40CO M41CO M42CO	4ASM- CO	R51 R52 R55	5ATL	R51FS	QC91P	QC91G	QC91PM	QC91GM	M51CO M52CO
	0.50 - 16.00	N60 - 1/2	1.00 - 12.50	1/16 - 11/16	1/16 - 1/2	0.15 - 1.40	N60 - 3/4	2.30 - 12.00	N80 - 1.3/4	1.00 - 31.00	1/16 - 1/2	1/16 - 11/16	1/16 - 1/2	1.50 - 17.00	1.50 - 12.50	1/16 - 1"
	133	136	139	141	141	143	144	147	148	152	154	155	155	157	157	158
1.1	115K	115J	115J	98F	115F	115A	125K	125K	89G	89G		98F	115F	98F	115F	89G
1.2	105K	98J	98J	59F	69F	98A	108H	108H	82G	82G		59F	69F	59F	69F	82G
1.3	82I	89G	89G	66H	75H	89A	98G	98G	66E	66E		66H	75H	66H	75H	66E
1.4	75H	69G	69G	59F	69F	75A	89G	89G	52E	52E		59F	69F	59F	69F	52E
1.5	52G	46F	46F	46D	56D	56A	59F	59F	30D	30D		46D	56D	46D	56D	30D
1.6	33E	33E	33E			33A	36E	36E	20B	20B						20B
1.7																
1.8																
2.1	49G	52F	52F	89H	105H	72A	72F	72F	33D	33D		89H	105H	89H	105H	33D
2.2	26I	30H	30H	49F	59F	33A	36H	36H	20F	20F		49F	59F	49F	59F	20F
2.3	30E	33D	33D	49D	59D	49A	49D	49D	13B	13B		49D	59D	49D	59D	13B
2.4																
3.1	105K	105J	105J	151H	171H	98A	112K	112K	92H	92H		151H	171H	151H	171H	92H
3.2	82I	89G	89G	79H	89H	79A	98F	98F	69E	69E		79H	89H	79H	89H	69E
3.3	66G	66F	66F	79F	95F	66A	72F	72F	49D	49D		79F	95F	79F	95F	49D
3.4	52G	52F	52F		59D	46A	56F	56F	43D	43D			59D		59D	43D
4.1	82I	89G	89G	89H		75A	98G	98G	56E	56E		89H		89H		56E
4.2	46F	52E	52E	49F		56A	59F	59F	30C	30C		49F		49F		30C
4.3	26C	26C	26C			26A	33C	33C	13A	13A						13A
5.1	43H	43H	43H	49F	59H	33A	49H	49H	26F	26F		49F	59H	49F	59H	26F
5.2	26F	26F	26F			23A	30F	30F	13D	13D						13D
5.3	13B	13B	13B			13A	20C	20C	10A	10A						10A
6.1	118H	118H	118H		89I	115A	125I	125I	98E	98E	89I	89I	98I	89I	98I	98E
6.2	125K	125J	125J	79H	89H	131A	131K	131K	105H	105H		79H	89H	79H	89H	105H
6.3	89I	89I	89I	79H	89H	115A	89J	89J	89G	89G		79H	89H	79H	89H	89G
6.4	52I	52H	52H			89A	52I	52I	52E	52E						52E
7.1	131F	108K	108K	351H		115A	115K	115K	105I	105I	348H	351H	400H	351H	400H	105I
7.2	105K	98J	98J	325H		98A	108J	108J	89H	89H	325H	325H	351H	325H	351H	89H
7.3	105J	98I	98I			89A	102I	102I	89G	89G						89G
7.4	82J	82I	82I	276H		89A	98G	98G	82E	82E	276H	276H	315H	276H	315H	82E
8.1	98K	98K	98K			157A	115M	115M	115I	115I						115I
8.2	115I	115I	115I			82A	92K	92K	85G	85G						85G
8.3	56G	56G	56G				56I	56I	39E	39E						39E
9.1	13C	13C	13C				20C	20C	10A	10A						10A
10.1																

# Visual Index - Drills

	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS-E	HSS-E	HSS	HSS	HSS	HSS	HSS	HSS		
	ANSI	ANSI	BS 328	ANSI	NAS 907	NAS 907	NAS 907	NAS 907	NAS 907	NAS 907	ANSI	DIN 345	DIN 345	DIN 341	DIN 1670/1	DIN 1670/1		
	12XD	15XD	10XD	10XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	4XD	6XD	10XD	15XD	
	118°	118°	118°	135°	135°	118°	135°	135°	135°	135°	118°	118°	118°	118°	118°	118°	130°	
			N		N	N						N	N	N	N	N	W	
	0860 1290	1511 1813	A125	QC0860P QC1290P	A243	A244	500-6 501-6 502-6	500-12 501-12 502-12	CO500-6 CO501-6	CO500-12 CO500-12	209 S209	5ATS	A530	A350	A345	A951		
	1/8 - 3/4	3/16 - 1"	1.40 - 1"	1/8 - 1/2	3/32 - 1/4	1/8 - 1/4	N60 - 1/2	3/64 - 1/2	1/16 - 1/4	1/16 - 1/4	1/8 - 2"	5.00 - 50.00	8.50 - 40.00	5.00 - 50.00	8.00 - 40.00	10.00 - 30.00		
	160	162	162	167	169	169	170	173	175	175	177	180	180	180	183	185		
1.1	79E	79E	79E	98F							115I	115I	154I	89I	79G	89G		
1.2	72E	72E	72E	59F							98I	98I	131I	82I	72G	72G		
1.3	52C	52C	52C	66H	82F	82F	82F	82F			82F	82F	98F	66G	56E	62E		
1.4	49C	49C	49C	59F	66F	66F	66F	66F			66F	66F	89F	52F	49D	49D		
1.5	20A	20A	20A	46D	43E	43E	43E	43E			39E	39E	66E	33E	20C	26C		
1.6	16A	16A	16A		30D	30D	30D	30D	20B	20B	30D	30D	33D	20D	16B	20B		
1.7																		
1.8																		
2.1	30C	30C	30C	89H	49E	49E	49E	49E	95H	95H	49E	49E	79E	43E	39C	39C		
2.2	13E	13E	13E	49F	26G	26G	26G	26G	56F	56F	30G	30G	43G	13G	13E	20E		
2.3	26A	26A	26A	49D	30C	30C	30C	30C	56D	56D	33C	33C	66C	26C	26A	39A		
2.4									30D	30D								
3.1	72G	72G	72G	151H	98I	98I	98I	98I	161H	161H	98I	98I	118I	85I	72G	72G		
3.2	59D	59D	59D	79H	79F	79F	79F	79F	85H	85H	79E	79E	92E	66F	59D	52D		
3.3	43C	43C	43C	79F	66E	66E	66E	66E	85F	85F	66E	66E	89E	59E	43C	43C		
3.4	30C	30C	30C		46E	46E	46E	46E	56D	56D	46E	46E	72E	36E	30C	30C		
4.1	36D	36D	36D		75F	75F	75F	75F			75F	75F	105F	52F	49D	59D		
4.2	30B	30B	30B		39D	39D	39D	39D			43D	43D	59D	30D	30B	33B		
4.3	16A	16A	16A		20B	20B	20B	20B	20D	20D	23B	23B	43B	16B	16A	20A		
5.1	16E	16E	16E	49F	33G	33G	33G	33G			33G	33G	43G	26G	26E	23E		
5.2	13C	13C	13C		20E	20E	20E	20E	20B	20B	23E	23E	20E	13E	13C	16C		
5.3	10A	10A	10A		10A	10A	10A	10A	16B	16B	13A	13A	10A	10A	10A	10A		
6.1	79D	79D	79D								108F	108F	197G	108F	89D	72D		
6.2	108G	108G	108G	79H							115I	115I	180I	115I	108G	108G		
6.3	72F	72F	72F	75H	89H	89H	89H	89H			115H	115H	131G	115H	89F	72F		
6.4	52D	52D	52D		52G	52G	52G	52G			52F	52F	115E	52F	52D	52D		
7.1	79H	79H	79H	348H							85J	85J	180I	108J	108H	98H		
7.2	72G	72G	72G	325H							98I	98I	148I	82I	89G	89G		
7.3	72F	72F	72F								92H	92H	115G	89H	89F	79F		
7.4	66E	66E	66E	276H	79F	79F	79F	79F			75H	75H	92G	82H	79F	72F		
8.1	98H	98H	98H	151D							98K	98K	164J	115L	98J	98J		
8.2	85F	85F	85F	125D							92J	92J	164H	85J	98H	98H		
8.3	33D	33D	33D								46H	46H	115F	39H	33F	33F		
9.1	10A	10A	10A		10B	10B	10B	10B			10B	10B	10B	10B	10A	10A		
10.1																		

# Visual Index - Drills

	HSS	HSS-E	HSS-E	HSS	HSS	HSS	HSS	HSS	HSS-E	HSS HM	HSS HM	HM	HM	HM	HSS	HSS	
	DIN 1870/2	ANSI	DIN 345	ANSI	DORNER	ANSI	ANSI	ANSI	ANSI	ANSI	DIN 338	ANSI		ANSI	ANSI	ANSI	
	20XD	4XD	4XD	5XD	4XD	4XD	4XD	1.5XD	4XD	4XD	4XD	3XD	3XD	1XD	1XD	1XD	
	130°	135°	118°		118°	118°	118°	118°	118°	118°	118°	118°	118°	90°	90°	90°	
	ST	Bronze	Bronze	ST	ST	ST	ST	ST	ST	ST	ST					TN	
	W		N		N						N						
	A952	209CO	A730	T400	A170	R56	R57	R58	R56CO	D444	A160	D33F D33W D33L	D33M	DS-90 DS-120 DS-142	SPS-90	SPSG-90	
	8.00 - 40.00	1/4 - 1.1/2	10.00 - 32.00	1/2 - 1.5/8	13.00 - 1.1/2	33/64 - 1.1/2	33/64 - 1.1/2	1" - 2"	33/64 - 1"	N32 - 1/2	4.00 - 16.00	N68 - 1/2	1.00 - 12.00	1/8 - 1/2	1/4 - 1"	1/4 - 1"	
	185	187	189	191	192	194	196	198	199	200	202	203	206	207	208	208	
1.1	89G	115J	115J	75E	115H	115H	115H	98F	115H	197E	197E	279S	279S	279S	115E	115E	
1.2	72G	98H	98H	46F	98H	98H	98H	59F	98H	197E	197E	246S	246S	246S	98E	98E	
1.3	62E	89G	89G	49F	82F	82F	82F	66H	82F	180D	180D	246S	246S	246S	89C	89C	
1.4	49D	75F	75F	49D	66E	66E	66E	59F	66E	164D	164D	230S	230S	230S	69C	69C	
1.5	26C	56E	56E	36D	43D	43D	43D	46D	43D	131C	131C	148S	148S	148S	46C	46C	
1.6	20B	33D	33D		30C	30C	30C		30C	121A	121A	148S	148S	148S	33B	33B	
1.7												98S	98S	98S			
1.8												98S	98S	98S			
2.1	39C	79E	79E	66F	49D	49D	49D	89H	49D	131B	131B	98S	98S	174S	52C	52C	
2.2	20E	36G	36G	39D	23F	23F	23F	49F	23F	115C	115C			148S	30D	30D	
2.3	39A	56C	56C	39D	23B	23B	23B	49D	23B	115A	115A				33B	33B	
2.4																	
3.1	72G	115J	115J	108E	89H	89H	89H	151H	89H	164C	164C	246T	246T	246T	105E	105E	
3.2	52D	92G	92G	59H	72E	72E	72E	79H	72E	131A	131A	246T	246T	246T	89C	89C	
3.3	43C	72E	72E	59F	62D	62D	62D	79F	62D	115A	115A	180T	180T	180T	66C	66C	
3.4	30C	56E	56E		39D	39D	39D		39D	98A	98A	180T	180T	180T	52B	52B	
4.1	59D	92G	92G	69F	56E	56E	56E	89H	56E	115A	115A			148T	89C	89C	
4.2	33B	66D	66D	36D	30C	30C	30C	49F	30C	115A	115A			115T	39B	39B	
4.3	20A	36C	36C		16A	16A	16A		16A	82A	82A			82S	23A	23A	
5.1	23E	49G	49G	49D	26F	26F	26F	49F	26F	98A	98A			148T	43D	43D	
5.2	16C	23E	23E		13D	13D	13D	23F	13D	82A	82A			98S	26C	26C	
5.3	10A	20B	20B		10A	10A	10A	13B	10A	66A	66A			66S	13A	13A	
6.1	72D	125L	125L		115F	115F	115F	108F	115F	180D	180D				902V	89D	89D
6.2	108G	131J	131J		108H	108H	108H	115H	108H	230G	230G	820V	820V	820V	108E	108E	
6.3	72F	89H	89H		89G	89G	89G	115H	89G	197C	197C	820V	820V	820V	89D	89D	
6.4	52D	69F	69F		52F	52F	52F	52F	52F	164C	164C			230T	52D	52D	
7.1	98H	108J	108J		108I	108I	108I	85I	108I	164I	164I	656V	656V	656V	108E	108E	
7.2	89G	98I	98I		98H	98H	98H	98H	98H	148H	148H	656V	656V	656V	98E	98E	
7.3	79F	98H	98H		89G	89G	89G	92H	89G	131G	131G	367V	367V	367V	98D	98D	
7.4	72F	89F	89F		72G	72G	72G	75H	72G	115F	115F	197V	197V	197V	82D	82D	
8.1	98J	115K	115K		98I	98I	98I	98I	98I			197X	197X	197X	98F	98F	
8.2	98H	92J	92J		92G	92G	92G	92I	92G	197E	197E	328V	328V	328V	115E	115E	
8.3	33F	66H	66H		46E	46E	46E	46H	46E						56D	56D	
9.1	10A	16C	16C		10A	10A	10A	10B	10A	30C	30C				39A	39A	
10.1																	

# Visual Index - Drills

	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HM	HSS	HSS	HSS	HSS
	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	BS 328	ANSI	ANSI
	1XD	1XD	1XD	1XD	1XD	1XD	1XD	1XD	1XD	1XD	1XD	1XD	1XD	1XD	1XD
	120°	120°	90°	90°	120°	120°	90°	90°	120°	120°			120°	120°	120°
	SPS-120	SPSG-120	SPR-90	SPRG-90	SPR-120	SPRG-120	SPL-90	SPLG-90	SPL-120	SPLG-120	DC	76HA	A225	A217	A218
	1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 1/2	1/4 - 1"	1/4 - 1"	1/4 - 5/8	1/4 - 1/2	N0 - N6	N000 - N8	3/64 - 5/16	N1 - N8	N1 - N8
	208	208	209	209	209	209	210	210	210	210	211	212	213	213	213
1.1	115E	115E	115E	115E	115E	115E	115E	115E	115E	115E	279S	115I	115I	115I	115I
1.2	98E	98E	98E	98E	98E	98E	98E	98E	98E	98E	246S	98I	98I	98I	98I
1.3	89C	89C	89C	89C	89C	89C	89C	89C	89C	89C	246S	82G	82G	82G	82G
1.4	69C	69C	69C	69C	69C	69C	69C	69C	69C	69C	230S	66F	66F	66F	66F
1.5	46C	46C	46C	46C	46C	46C	46C	46C	46C	46C	148S	43E	43E	43E	43E
1.6	33B	33B	33B	33B	33B	33B	33B	33B	33B	33B	148S	30D	30D	30D	30D
1.7											98S				
1.8											98S				
2.1	52C	52C	52C	52C	52C	52C	52C	52C	52C	52C		49E	49E	49E	49E
2.2	30D	30D	30D	30D	30D	30D	30D	30D	30D	30D		26G	26G	26G	26G
2.3	33B	33B	33B	33B	33B	33B	33B	33B	33B	33B		33C	33C	33C	33C
2.4															
3.1	105E	105E	105E	105E	105E	105E	105E	105E	105E	105E	246T	98I	98I	98I	98I
3.2	89C	89C	89C	89C	89C	89C	89C	89C	89C	89C	246T	79F	79F	79F	79F
3.3	66C	66C	66C	66C	66C	66C	66C	66C	66C	66C	180T	66E	66E	66E	66E
3.4	52B	52B	52B	52B	52B	52B	52B	52B	52B	52B	180T	46E	46E	46E	46E
4.1	89C	89C	89C	89C	89C	89C	89C	89C	89C	89C		79F	79F	79F	79F
4.2	39B	39B	39B	39B	39B	39B	39B	39B	39B	39B		43D	43D	43D	43D
4.3	23A	23A	23A	23A	23A	23A	23A	23A	23A	23A		23B	23B	23B	23B
5.1	43D	43D	43D	43D	43D	43D	43D	43D	43D	43D		33G	33G	33G	33G
5.2	26C	26C	26C	26C	26C	26C	26C	26C	26C	26C		16E	16E	16E	16E
5.3	13A	13A	13A	13A	13A	13A	13A	13A	13A	13A		13A	13A	13A	13A
6.1	89D	89D	89D	89D	89D	89D	89D	89D	89D	89D		115G	115G	115G	115G
6.2	108E	108E	108E	108E	108E	108E	108E	108E	108E	108E	820V	108I	108I	108I	108I
6.3	89D	89D	89D	89D	89D	89D	89D	89D	89D	89D	820V	89H	89H	89H	89H
6.4	52D	52D	52D	52D	52D	52D	52D	52D	52D	52D		52G	52G	52G	52G
7.1	108E	108E	108E	108E	108E	108E	108E	108E	108E	108E	656V	108J	108J	108J	108J
7.2	98E	98E	98E	98E	98E	98E	98E	98E	98E	98E	656V	98I	98I	98I	98I
7.3	98D	98D	98D	98D	98D	98D	98D	98D	98D	98D	367V	89H	89H	89H	89H
7.4	82D	82D	82D	82D	82D	82D	82D	82D	82D	82D	197V	72H	72H	72H	72H
8.1	98F	98F	98F	98F	98F	98F	98F	98F	98F	98F	197X	98J	98J	98J	98J
8.2	115E	115E	115E	115E	115E	115E	115E	115E	115E	115E	328V	92H	92H	92H	92H
8.3	56D	56D	56D	56D	56D	56D	56D	56D	56D	56D		46F	46F	46F	46F
9.1	39A	39A	39A	39A	39A	39A	39A	39A	39A	39A		10B	10B	10B	10B
10.1															





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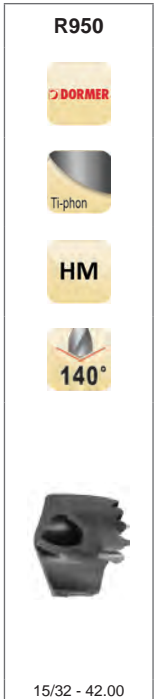
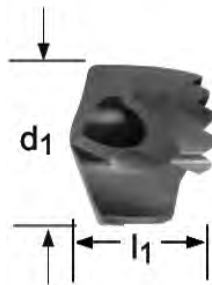
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2ACO.....	123	C114COMBP .....	226	H8512.....	42	R51FS .....	154
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501-12 .....	173	C15L10.....	231	HX18 .....	105	R56CO .....	199
501-6.....	170	C15R10 .....	224	L10 .....	102	R57.....	196
502-12 .....	173	C15R10CO.....	234	M40CO.....	144	R58.....	198
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5ATL.....	152	C20R18 .....	225	M42CO.....	144	R89CO .....	128
5ATS.....	180	C20R18P.....	225	M51CO.....	158	R950.....	21
76HA.....	212	C21R10CO.....	234	M52CO.....	158	R960.....	24
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A012 .....	91	C252AB.....	228	QC1290P.....	167	S209.....	177
A022 .....	133	C26M42CO .....	239	QC21G .....	119	SPL-120 .....	210
A088 .....	237	C26R15 .....	226	QC21GM .....	122	SPL-90 .....	210
A094 .....	229	C26R15CO.....	234	QC21P.....	119	SPLG-120.....	210
A095 .....	230	C26R15P.....	226	QC21PM.....	122	SPLG-90.....	210
A097 .....	225	C26R42 .....	236	QC41G .....	141	SPR-120.....	209
A100 .....	95	C29HX10.....	233	QC41P.....	141	SPR-90.....	209
A101 .....	103	C29L10.....	231	QC91G .....	155	SPRG-120 .....	209
A108 .....	114	C29M40CO .....	239	QC91GM .....	157	SPRG-90.....	209
A125 .....	162	C29R10 .....	224	QC91P.....	155	SPS-120.....	208
A160 .....	202	C29R10CO.....	234	QC91PM.....	157	SPS-90 .....	208
A170 .....	192	C29R10P.....	224	R10.....	87	SPSG-120 .....	208
A190 .....	228	C29R40 .....	236	R10A.....	108	SPSG-90 .....	208
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A217 .....	213	C29R51 .....	240	R10CO .....	123	TS10HS .....	215
A218 .....	213	C33R56 .....	241	R10H .....	114	TS15HS .....	215
A221 .....	214	C502AB.....	228	R10P.....	87	TS18HS .....	215
A225 .....	213	C60M41CO .....	239	R15.....	87	TS40HS .....	215
A243 .....	169	C60R18 .....	225	R15A.....	108	TS41HS .....	215
A244 .....	169	C60R18CO.....	234	R15B .....	111	TS42HS .....	215
A287 .....	232	C60R18P.....	225	R15CO .....	123	TS51HS .....	215
A345 .....	183	C60R41 .....	236	R15P .....	87	TS52HS .....	215
A350 .....	180	C60R41C.....	238	R18.....	87	TS55HS .....	215
A510 .....	73	C8R56 .....	241	R18A.....	108	TS10CO.....	219
A520 .....	66	C8R56CO.....	241	R18B .....	111	TS15CO.....	219
A530 .....	180	C8R57 .....	241	R18CO .....	123	TS18CO.....	219
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A720 .....	143	CO500-6.....	175	R18P .....	87	TS41CO.....	219
A730 .....	189	CO501-12.....	175	R40.....	130	TS42CO.....	219
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A920 .....	69	D33L.....	203	R41C .....	136	TS55CO.....	219
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A940 .....	81	D33W .....	203	R42C .....	136		
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## Hydra Drill Head

### R950

1.3 1.4 1.5 1.6 2.4 3.3 3.4

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



\* For more information on Hydra, see page 539

$d_1$ $\varnothing h_7$ Inch	$d_1$ $\varnothing h_7$ mm	$d_1$ decimal Inch	$l_1$ mm	Pack Qty	R950
15/32	11.91	0.4688	9.1	1	5988695
	12.00	0.4724	9.1	1	5988624
	12.10	0.4764	9.1	1	5988627
	12.20	0.4803	9.1	1	5988630
31/64	12.30	0.4844	9.1	1	5988936
	12.50	0.4921	9.4	1	5988633
	12.60	0.4961	9.4	1	5988640
1/2	12.70	0.5000	9.4	1	5988620
	12.80	0.5039	9.4	1	5988641
	12.90	0.5079	9.4	1	5988642
	13.00	0.5118	9.7	1	5988643
33/64	13.10	0.5156	9.7	1	5988850
	13.20	0.5197	9.7	1	5988644
17/32	13.49	0.5313	9.7	1	5988697
	13.50	0.5315	10.3	1	5988645
	13.60	0.5354	10.3	1	5988646
	13.70	0.5394	10.3	1	5988647
	13.80	0.5433	10.3	1	5988648
35/64	13.89	0.5469	10.3	1	5988854
	14.00	0.5512	10.3	1	5988652
	14.10	0.5551	10.3	1	5988655
	14.20	0.5591	10.3	1	5988657
9/16	14.29	0.5625	10.3	1	5988904
	14.50	0.5709	10.3	1	5988660
	14.60	0.5748	11.0	1	5988663
37/64	14.68	0.5781	11.0	1	5988857
	14.70	0.5787	11.0	1	5988666
	14.80	0.5827	11.0	1	5988668
	15.00	0.5906	11.0	1	5988670
19/32	15.08	0.5938	11.0	1	5988779
	15.10	0.5945	11.0	1	5988672
	15.20	0.5984	11.0	1	5988674
	15.24	0.6000	11.0	1	5988678

# HYDRA DRILL



d <sub>1</sub> Øh <sub>7</sub> Inch	d <sub>1</sub> Øh <sub>7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>1</sub> mm	Pack Qty	R950
39/64	15.48	0.6094	11.0	1	5988860
	15.50	0.6102	11.0	1	5988680
	15.60	0.6142	11.6	1	5988683
5/8	15.70	0.6181	11.6	1	5988687
	15.88	0.6250	11.6	1	5988884
	16.00	0.6299	11.6	1	5988698
	16.08	0.6331	11.6	1	5988702
	16.10	0.6339	11.6	1	5988710
41/64	16.20	0.6378	11.6	1	5988715
	16.27	0.6406	11.6	1	5988864
	16.30	0.6417	11.6	1	5988725
	16.50	0.6496	11.6	1	5988690
	16.60	0.6535	12.2	1	5988749
21/32	16.67	0.6563	12.2	1	5988802
	16.70	0.6575	12.2	1	5988790
	17.00	0.6693	12.2	1	5988833
43/64	17.07	0.6719	12.2	1	5988867
	17.10	0.6732	12.2	1	5988873
	17.20	0.6772	12.2	1	5988881
11/16	17.46	0.6875	12.2	1	5988623
	17.50	0.6890	12.2	1	5988885
	17.60	0.6929	12.9	1	5988891
45/64	17.70	0.6969	12.9	1	5988894
	17.86	0.7031	12.9	1	5988872
	18.00	0.7087	12.9	1	5988701
	18.10	0.7126	12.9	1	5988706
	18.20	0.7165	12.9	1	5988713
23/32	18.26	0.7188	12.9	1	5988824
	18.50	0.7283	12.9	1	5988718
	18.60	0.7323	13.5	1	5988723
47/64	18.65	0.7344	13.5	1	5988877
	18.70	0.7362	13.5	1	5988728
	18.90	0.7441	13.5	1	5988733
	19.00	0.7480	13.5	1	5988740
3/4	19.05	0.7500	13.5	1	5988928
	19.10	0.7520	13.5	1	5988745
	19.20	0.7559	13.5	1	5988752
	19.25	0.7579	13.5	1	5988756
	19.30	0.7598	13.5	1	5988760
49/64	19.35	0.7618	13.5	1	5988764
	19.45	0.7656	13.5	1	5988880
	19.50	0.7677	13.5	1	5988767
	19.60	0.7717	14.1	1	5988771
25/32	19.70	0.7756	14.1	1	5988775
	19.84	0.7813	14.1	1	5988851
	20.00	0.7874	14.1	1	5988782
51/64	20.24	0.7969	14.1	1	5988892
	20.50	0.8071	14.1	1	5988786
13/16	20.64	0.8125	14.8	1	5988649
	21.00	0.8268	14.8	1	5988794
53/64	21.03	0.8281	14.8	1	5988896
27/32	21.43	0.8438	14.8	1	5988869
	21.50	0.8465	14.8	1	5988798
55/64	21.83	0.8594	15.0	1	5988898
	22.00	0.8661	15.0	1	5988806
7/8	22.22	0.8750	15.0	1	5988903
	22.50	0.8858	15.0	1	5988810
57/64	22.62	0.8906	15.0	1	5988899
	22.70	0.8937	15.0	1	5988814
	23.00	0.9055	15.1	1	5988816
29/32	23.02	0.9063	15.1	1	5988917
59/64	23.42	0.9219	15.1	1	5988900
	23.50	0.9252	15.1	1	5988820
15/16	23.81	0.9375	15.4	1	5988691
	24.00	0.9449	15.4	1	5988828

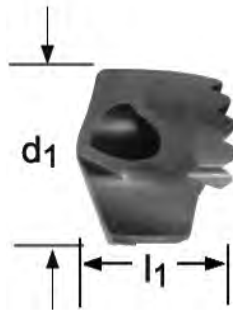
$d_1$ $\varnothing_{h_7}$ Inch	$d_1$ $\varnothing_{h_7}$ mm	$d_1$ decimal Inch	$l_1$ mm	Pack Qty	R950
61/64	24.21	0.9531	15.4	1	5988901
	24.50	0.9646	15.4	1	5988837
31/32	24.61	0.9688	15.4	1	5988934
	25.00	0.9844	15.8	1	5988840
63/64	25.00	0.9844	15.8	1	5988902
1"	25.40	1.0000	15.8	1	5988604
	25.50	1.0039	15.8	1	5988843
	25.65	1.0098	15.8	1	5988847
1.1/64	25.80	1.0156	15.8	1	5988676
	26.00	1.0236	16.4	1	5988855
1.1/32	26.19	1.0313	16.4	1	5988650
	26.50	1.0433	16.4	1	5988858
1.3/64	26.59	1.0469	16.4	1	5988744
1.1/16	26.99	1.0625	17.1	1	5988637
	27.00	1.0630	17.1	1	5988861
1.5/64	27.38	1.0781	17.1	1	5988611
	27.50	1.0827	17.1	1	5988865
1.3/32	27.78	1.0938	17.1	1	5988739
	28.00	1.1024	17.7	1	5988876
1.7/64	28.18	1.1094	17.7	1	5988614
	28.50	1.1220	17.7	1	5988844
1.1/8	28.58	1.1250	17.7	1	5988720
1.9/64	28.97	1.1406	18.3	1	5988617
	29.00	1.1417	18.3	1	5988888
1.5/32	29.37	1.1563	18.3	1	5988608
	29.50	1.1614	18.3	1	5988906
1.11/64	29.77	1.1719	18.3	1	5988730
	30.00	1.1811	19.0	1	5988930
1.3/16	30.16	1.1875	19.0	1	5988735
	30.50	1.2008	19.0	1	5988932
1.7/32	30.96	1.2188	21.0	1	6104481
	31.00	1.2205	21.0	1	6104482
1.1/4	31.75	1.2500	21.0	1	6104483
	32.00	1.2598	21.0	1	6104484
	32.50	1.2795	21.0	1	6104485
1.19/64	32.94	1.2969	21.0	1	6104486
	33.00	1.2992	21.0	1	6104487
	33.50	1.3189	21.0	1	6104488
	34.00	1.3386	23.0	1	6104489
1.11/32	34.13	1.3438	23.0	1	6104530
	34.50	1.3583	23.0	1	6104531
1.3/8	34.93	1.3750	23.0	1	6104532
	35.00	1.3780	23.0	1	6104533
	36.00	1.4173	23.0	1	6104534
1.27/64	36.12	1.4219	23.0	1	6104535
	36.50	1.4370	23.0	1	6104536
	37.00	1.4567	25.0	1	6104537
1.15/32	37.31	1.4688	25.0	1	6104538
	37.50	1.4764	25.0	1	6104539
	38.00	1.4961	25.0	1	6104540
1.1/2	38.10	1.5000	25.0	1	6104541
	38.50	1.5157	25.0	1	6104542
1.17/32	38.89	1.5313	25.0	1	6104543
	39.00	1.5354	25.0	1	6104544
	39.50	1.5551	25.0	1	6104545
1.9/16	39.69	1.5625	27.0	1	6104546
	40.00	1.5748	27.0	1	6104547
	41.00	1.6142	27.0	1	6104548
1.5/8	41.28	1.6250	27.0	1	6104549
	42.00	1.6535	27.0	1	6104550

## Hydra Drill Head

### R960

1.1 1.2 2.1 2.2 2.3 3.1 3.2 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-phon coating for longer tool life.



R960



15/32 - 30.50

\* For more information on Hydra, see page 539

$d_1$ $\varnothing h_7$ Inch	$d_1$ $\varnothing h_7$ mm	$d_1$ decimal Inch	$l_1$ mm	Pack Qty	R960
15/32	11.91	0.4688	9.1	1	5988758
	12.00	0.4724	9.1	1	5988922
	12.10	0.4764	9.1	1	5988923
	12.20	0.4803	9.1	1	5988924
31/64	12.30	0.4844	9.1	1	5988575
	12.50	0.4921	9.4	1	5988925
	12.60	0.4961	9.4	1	5988926
1/2	12.70	0.5000	9.4	1	5988920
	12.80	0.5039	9.4	1	5988927
	12.90	0.5079	9.4	1	5988929
	13.00	0.5118	9.7	1	5988685
33/64	13.10	0.5156	9.7	1	5988579
	13.20	0.5197	9.7	1	5988737
17/32	13.49	0.5313	9.7	1	5988831
	13.50	0.5315	10.3	1	5988791
	13.60	0.5354	10.3	1	5988839
	13.70	0.5394	10.3	1	5988883
	13.80	0.5433	10.3	1	5988889
35/64	13.89	0.5469	10.3	1	5988583
	14.00	0.5512	10.3	1	5988895
	14.10	0.5551	10.3	1	5988897
	14.20	0.5591	10.3	1	5988692
9/16	14.29	0.5625	10.3	1	5988664
	14.50	0.5709	10.3	1	5988696
	14.60	0.5748	11.0	1	5988700
37/64	14.68	0.5781	11.0	1	5988591
	14.70	0.5787	11.0	1	5988705
	14.80	0.5827	11.0	1	5988709
	15.00	0.5906	11.0	1	5988714
19/32	15.08	0.5938	11.0	1	5988621
	15.10	0.5945	11.0	1	5988719
	15.20	0.5984	11.0	1	5988724



$d_1$ $\varnothing_{h_7}$ Inch	$d_1$ $\varnothing_{h_7}$ mm	$d_1$ decimal Inch	$l_1$ mm	Pack Qty	R960
	15.24	0.6000	11.0	1	5988729
39/64	15.48	0.6094	11.0	1	5988595
	15.50	0.6102	11.0	1	5988734
	15.60	0.6142	11.6	1	5988742
	15.70	0.6181	11.6	1	5988747
5/8	15.88	0.6250	11.6	1	5988612
	16.00	0.6299	11.6	1	5988763
	16.08	0.6331	11.6	1	5988769
	16.10	0.6339	11.6	1	5988773
	16.20	0.6378	11.6	1	5988777
41/64	16.27	0.6406	11.6	1	5988599
	16.30	0.6417	11.6	1	5988783
	16.50	0.6496	11.6	1	5988787
	16.60	0.6535	12.2	1	5988795
21/32	16.67	0.6563	12.2	1	5988443
	16.70	0.6575	12.2	1	5988799
	17.00	0.6693	12.2	1	5988803
43/64	17.07	0.6719	12.2	1	5988601
	17.10	0.6732	12.2	1	5988807
	17.20	0.6772	12.2	1	5988811
11/16	17.46	0.6875	12.2	1	5988921
	17.50	0.6890	12.2	1	5988818
	17.60	0.6929	12.9	1	5988823
	17.70	0.6969	12.9	1	5988827
45/64	17.86	0.7031	12.9	1	5988603
	18.00	0.7087	12.9	1	5988835
	18.10	0.7126	12.9	1	5988841
	18.20	0.7165	12.9	1	5988845
23/32	18.26	0.7188	12.9	1	5988471
	18.50	0.7283	12.9	1	5988848
	18.60	0.7323	13.5	1	5988853
47/64	18.65	0.7344	13.5	1	5988606
	18.70	0.7362	13.5	1	5988856
	18.90	0.7441	13.5	1	5988863
	19.00	0.7480	13.5	1	5988868
3/4	19.05	0.7500	13.5	1	5988559
	19.10	0.7520	13.5	1	5988871
	19.20	0.7559	13.5	1	5988875
	19.25	0.7579	13.5	1	5988879
	19.30	0.7598	13.5	1	5988887
	19.35	0.7618	13.5	1	5988438
49/64	19.45	0.7656	13.5	1	5988609
	19.50	0.7677	13.5	1	5988495
	19.60	0.7717	14.1	1	5988544
	19.70	0.7756	14.1	1	5988587
25/32	19.84	0.7813	14.1	1	5988511
	20.00	0.7874	14.1	1	5988629
51/64	20.24	0.7969	14.1	1	5988615
	20.50	0.8071	14.1	1	5988632
13/16	20.64	0.8125	14.8	1	5988893
	21.00	0.8268	14.8	1	5988635
53/64	21.03	0.8281	14.8	1	5988618
27/32	21.43	0.8438	14.8	1	5988531
	21.50	0.8465	14.8	1	5988638
55/64	21.83	0.8594	15.0	1	5988626
	22.00	0.8661	15.0	1	5988448
7/8	22.22	0.8750	15.0	1	5988661
	22.50	0.8858	15.0	1	5988453
57/64	22.62	0.8906	15.0	1	5988651
	22.70	0.8937	15.0	1	5988458
	23.00	0.9055	15.1	1	5988462
29/32	23.02	0.9063	15.1	1	5988556
59/64	23.42	0.9219	15.1	1	5988653
	23.50	0.9252	15.1	1	5988466
15/16	23.81	0.9375	15.4	1	5988754

# HYDRA DRILL



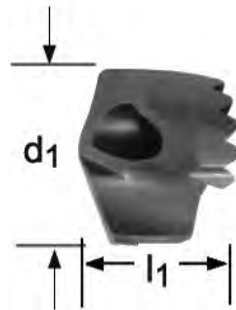
$d_1$ $\varnothing h_7$ Inch	$d_1$ $\varnothing h_7$ mm	$d_1$ decimal Inch	$l_1$ mm	Pack Qty	R960
	24.00	0.9449	15.4	1	5988476
61/64	24.21	0.9531	15.4	1	5988656
	24.50	0.9646	15.4	1	5988483
31/32	24.61	0.9688	15.4	1	5988572
	25.00	0.9844	15.8	1	5988488
63/64	25.00	0.9844	15.8	1	5988658
1"	25.40	1.0000	15.8	1	5988905
	25.50	1.0039	15.8	1	5988499
	25.65	1.0098	15.8	1	5988506
1.1/64	25.80	1.0156	15.8	1	5988909
	26.00	1.0236	16.4	1	5988516
1.1/32	26.19	1.0312	16.4	1	5988908
	26.50	1.0433	16.4	1	5988519
1.3/64	26.59	1.0469	16.4	1	5988914
1.1/16	26.99	1.0625	17.1	1	5988907
	27.00	1.0630	17.1	1	5988523
1.5/64	27.38	1.0781	17.1	1	5988916
	27.50	1.0827	17.1	1	5988528
1.3/32	27.78	1.0938	17.1	1	5988913
	28.00	1.1024	17.7	1	5988535
1.7/64	28.18	1.1094	17.7	1	5988918
	28.50	1.1220	17.7	1	5988540
1.1/8	28.58	1.1250	17.7	1	5988910
1.9/64	28.97	1.1406	18.3	1	5988919
	29.00	1.1417	18.3	1	5988548
1.5/32	29.37	1.1563	18.3	1	5988915
	29.50	1.1614	18.3	1	5988552
1.11/64	29.77	1.1719	18.3	1	5988911
	30.00	1.1811	19.0	1	5988564
1.3/16	30.16	1.1875	19.0	1	5988912
	30.50	1.2008	19.0	1	5988568

## Hydra Drill Head

### R970

**1.1** **1.2** 3.1 3.2 3.3 3.4

Replaceable heads in tough micro-grain carbide for quick and easy tool changes. Engineered for high productivity of cast iron materials. Superior hole accuracy and precise repeatable tolerances. Special Ti-phos coating for longer tool life.



\* For more information on Hydra, see page 539

$d_1$ $\varnothing h_7$ Inch	$d_1$ $\varnothing h_7$ mm	$d_1$ decimal Inch	$l_1$ mm	Pack Qty	R970
15/32		0.4689	9.1	1	7332946
	12.0	0.4724	9.1	1	7332947
	12.1	0.4764	9.1	1	7332948
	12.2	0.4803	9.1	1	7332949
31/64		0.4844	9.1	1	7332980
	12.5	0.4921	9.4	1	7332981
	12.6	0.4961	9.4	1	7332982
1/2		0.5000	9.4	1	7332983
	12.8	0.5039	9.4	1	7332984
	12.9	0.5079	9.4	1	7332985
	13.0	0.5118	9.7	1	7332986
33/64		0.5156	9.7	1	7332987
	13.2	0.5197	9.7	1	7332988
17/32		0.5313	9.7	1	7332989
	13.5	0.5315	10.3	1	7332990
	13.6	0.5354	10.3	1	7332991
	13.7	0.5394	10.3	1	7332992
	13.8	0.5433	10.3	1	7332993
35/64		0.5469	10.3	1	7332994
	14.0	0.5512	10.3	1	7332995
	14.1	0.5551	10.3	1	7332996
	14.2	0.5591	10.3	1	7332997
9/16		0.5625	10.3	1	7332998
	14.5	0.5709	10.3	1	7332999
	14.6	0.5748	11.0	1	7333000
37/64		0.5781	11.0	1	7333001
	14.7	0.5787	11.0	1	7333002
	14.8	0.5827	11.0	1	7333003
	15.0	0.5906	11.0	1	7333004
19/32		0.5938	11.0	1	7333005
	15.1	0.5945	11.0	1	7333006
	15.2	0.5984	11.0	1	7333007

# HYDRA DRILL



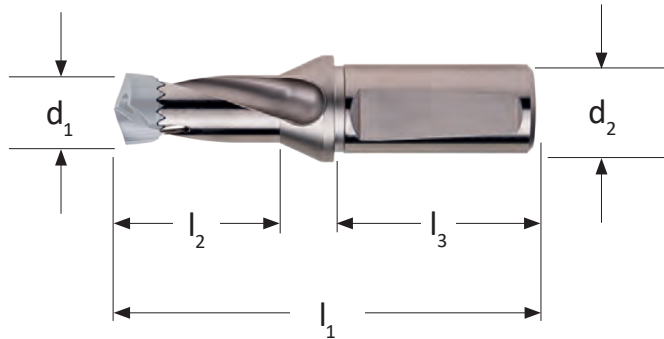
$d_1$ $\varnothing h_7$ Inch	$d_1$ $\varnothing h_7$ mm	$d_1$ decimal Inch	$l_1$ mm	Pack Qty	R970
	15.24	0.6000	11.0	1	7333008
39/64		0.6094	11.0	1	7333009
	15.5	0.6102	11.6	1	7333010
	15.6	0.6142	11.6	1	7333011
5/8	15.7	0.6181	11.6	1	7333012
		0.6250	11.6	1	7333013
	16.0	0.6299	11.6	1	7333014
	16.08	0.6331	11.6	1	7333015
	16.1	0.6339	11.6	1	7333016
	16.2	0.6378	11.6	1	7333017
41/64		0.6406	11.6	1	7333018
	16.3	0.6417	11.6	1	7333019
	16.5	0.6496	11.6	1	7333020
	16.6	0.6535	12.2	1	7333021
21/32		0.6563	12.2	1	7333022
	16.7	0.6575	12.2	1	7333023
	17.0	0.6693	12.2	1	7333024
43/64		0.6719	12.2	1	7333025
	17.1	0.6732	12.2	1	7333026
	17.2	0.6772	12.2	1	7333027
11/16		0.6875	12.2	1	7333028
	17.5	0.6890	12.2	1	7333029
	17.6	0.6929	12.9	1	7333030
	17.7	0.6969	12.9	1	7333031
45/64		0.7031	12.9	1	7333032
	18.0	0.7087	12.9	1	7333033
	18.1	0.7126	12.9	1	7333034
	18.2	0.7165	12.9	1	7333035
23/32		0.7188	12.9	1	7333036
	18.5	0.7283	12.9	1	7333037
	18.6	0.7323	13.5	1	7333038
47/64		0.7344	13.5	1	7333039
	18.7	0.7362	13.5	1	7333040
	18.9	0.7441	13.5	1	7333041
	19.0	0.7480	13.5	1	7333042
3/4		0.7500	13.5	1	7333043
	19.1	0.7520	13.5	1	7333044
	19.2	0.7559	13.5	1	7333045
	19.25	0.7579	13.5	1	7333046
	19.3	0.7598	13.5	1	7333047
	19.35	0.7618	13.5	1	7333048
49/64		0.7656	13.5	1	7333049
	19.5	0.7677	13.5	1	7333050
	19.6	0.7717	14.1	1	7333051
	19.7	0.7756	14.1	1	7333052
25/32		0.7813	14.1	1	7333053
	20.0	0.7874	14.1	1	7333054
51/64		0.7969	14.1	1	7333055
	20.5	0.8071	14.1	1	7333056
13/16		0.8125	14.8	1	7333057
	21.0	0.8268	14.8	1	7333058
53/64		0.8281	14.8	1	7333059
27/32		0.8438	14.8	1	7333060
	21.5	0.8465	14.8	1	7333061
55/64		0.8594	15.0	1	7333062
	22.0	0.8661	15.0	1	7333063
7/8		0.8750	15.0	1	7333064
	22.5	0.8858	15.0	1	7333065
57/64		0.8906	15.0	1	7333066
	22.7	0.8937	15.0	1	7333067
	23.0	0.9055	15.1	1	7333068
29/32		0.9063	15.1	1	7333069
59/64		0.9219	15.1	1	7333070
	23.5	0.9252	15.1	1	7333071
15/16		0.9375	15.4	1	7333072

$d_1$ $\varnothing_{h_7}$ Inch	$d_1$ $\varnothing_{h_7}$ mm	$d_1$ decimal Inch	$l_1$ mm	Pack Qty	R970
	24.0	0.9449	15.4	1	7333073
61/64		0.9531	15.4	1	7333074
	24.5	0.9646	15.4	1	7333075
31/32		0.9688	15.4	1	7333076
	25.0	0.9843	15.8	1	7333077
63/64		0.9844	15.8	1	7333078
1		1.0000	15.8	1	7333079
	25.5	1.0039	15.8	1	7333080
	25.65	1.0098	15.8	1	7333081
1.1/64		1.0156	15.8	1	7333082
	26.0	1.0236	16.4	1	7333083
1.1/32		1.0313	16.4	1	7333084
	26.5	1.0433	16.4	1	7333085
1.3/64		1.0469	16.4	1	7333086
1.1/16		1.0625	17.1	1	7333087
	27.0	1.0630	17.1	1	7333088
1.5/64		1.0781	17.1	1	7333089
	27.5	1.0827	17.1	1	7333090
1.3/32		1.0938	17.1	1	7333091
	28.0	1.1024	17.7	1	7333092
1.7/64		1.1094	17.7	1	7333093
	28.5	1.1220	17.7	1	7333094
1.1/8		1.1250	17.7	1	7333095
1.9/64		1.1406	18.3	1	7333096
	29.0	1.1417	18.3	1	7333097
1.5/32		1.1563	18.3	1	7333098
	29.5	1.1614	18.3	1	7333099
1.11/64		1.1719	18.3	1	7333100
	30.0	1.1811	19.0	1	7333101
1.3/16		1.1875	19.0	1	7333102
	30.5	1.2008	19.0	1	7333103
1.7/32		1.2188	21.0	1	7333104
	31.0	1.2205	21.0	1	7333105
1.1/4		1.2500	21.0	1	7333106
	32.0	1.2598	21.0	1	7333107
	32.5	1.2795	21.0	1	7333108
1.19/64		1.2968	21.0	1	7333109
	33.0	1.2992	21.0	1	7333110
	33.5	1.3189	21.0	1	7333111
	34.0	1.3386	23.0	1	7333112
1.11/32		1.3438	23.0	1	7333113
	34.5	1.3583	23.0	1	7333114
1.3/8		1.3750	23.0	1	7333115
	35.0	1.3780	23.0	1	7333116
	36.0	1.4173	23.0	1	7333117
1.27/64		1.4219	23.0	1	7333118
	36.5	1.4370	23.0	1	7333119
	37.0	1.4567	25.0	1	7333120
1.15/32		1.4688	25.0	1	7333121
	37.5	1.4764	25.0	1	7333122
	38.0	1.4961	25.0	1	7333123
1.1/2		1.5000	25.0	1	7333124
	38.5	1.5157	25.0	1	7333125
1.17/32		1.5313	25.0	1	7333126
	39.0	1.5354	25.0	1	7333127
	39.5	1.5551	25.0	1	7333128
1.9/16		1.5625	27.0	1	7333129
	40.0	1.5748	27.0	1	7333130
	41.0	1.6142	27.0	1	7333131
1.5/8		1.6250	27.0	1	7333132
	42.0	1.6535	27.0	1	7333133

## 1.5xD Hydra Bodies

### H851

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

- \* Fractional bodies have cylindrical shank
- \* Metric bodies have whistle notch on shank
- \* For more information on Hydra, see page 539

**H851 Coolant Through**

ISO 9766

1.5XD

HSS

140°

**NEW**

31/64 – 30.5

Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	1.5xD Hydra Body - Fractional Shank					1.5xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H851 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H851 EDP#
15/32	5988695	5988758	7332946	5/8	25.5	88.5	47.63	7833294	16.00	25.5	88.5	48.0	7833297
12.0	5988624	5988922	7332947	5/8	25.5	88.5	47.63	7833294	16.00	25.5	88.5	48.0	7833297
12.1	5988627	5988923	7332948	5/8	25.5	88.5	47.63	7833294	16.00	25.5	88.5	48.0	7833297
12.2	5988630	5988924	7332949	5/8	25.5	88.5	47.63	7833294	16.00	25.5	88.5	48.0	7833297
31/64	5988936	5988575	7332980	5/8	25.5	88.5	47.63	7833294	16.00	25.5	88.5	48.0	7833297
12.5	5988633	5988925	7332981	5/8	25.8	88.8	47.63	7833295	16.00	25.8	88.8	48.0	7833298
12.6	5988640	5988926	7332982	5/8	25.8	88.8	47.63	7833295	16.00	25.8	88.8	48.0	7833298
1/2	5988620	5988920	7332983	5/8	25.8	88.8	47.63	7833295	16.00	25.8	88.8	48.0	7833298
12.8	5988641	5988927	7332984	5/8	25.8	88.8	47.63	7833295	16.00	25.8	88.8	48.0	7833298
12.9	5988642	5988929	7332985	5/8	25.8	88.8	47.63	7833295	16.00	25.8	88.8	48.0	7833298
13.0	5988643	5988685	7332986	5/8	30.9	93.9	47.63	7833296	16.00	27.0	90.0	48.0	7833299
33/64	5988850	5988579	7332987	5/8	30.9	93.9	47.63	7833296	16.00	27.0	90.0	48.0	7833299
13.2	5988644	5988737	7332988	5/8	30.9	93.9	47.63	7833296	16.00	27.0	90.0	48.0	7833299
17/32	5988697	5988831	7332989	5/8	30.9	93.9	47.63	7833296	16.00	27.0	90.0	48.0	7833299
13.5	5988645	5988791	7332990	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
13.6	5988646	5988839	7332991	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
13.7	5988647	5988883	7332992	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
13.8	5988648	5988889	7332993	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
35/64	5988854	5988583	7332994	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
14.0	5988652	5988895	7332995	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
14.1	5988655	5988897	7332996	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
14.2	5988657	5988692	7332997	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
9/16	5988904	5988664	7332998	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
14.5	5988660	5988696	7332999	3/4	30.3	93.9	50.8	7833331	16.00	30.9	93.9	48.0	7833330
14.6	5988663	5988700	7333000	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
37/64	5988857	5988591	7333001	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
14.7	5988666	5988705	7333002	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
14.8	5988668	5988709	7333003	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
15.0	5988670	5988714	7333004	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
19/32	5988779	5988621	7333005	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
15.1	5988672	5988719	7333006	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336



Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	1.5xD Hydra Body - Fractional Shank					1.5xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H851 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H851 EDP#
15.2	5988674	5988724	7333007	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
15.24	5988678	5988729	7333008	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
39/64	5988860	5988595	7333009	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
15.5	5988680	5988734	7333010	3/4	32.3	97.3	50.8	7833332	20.00	32.3	97.3	50.0	7833336
15.6	5988683	5988742	7333011	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
15.7	5988687	5988747	7333012	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
5/8	5988884	5988612	7333013	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
16.0	5988698	5988763	7333014	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
16.08	5988702	5988769	7333015	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
16.1	5988710	5988773	7333016	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
16.2	5988715	5988777	7333017	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
41/64	5988864	5988599	7333018	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
16.3	5988725	5988783	7333019	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
16.5	5988690	5988787	7333020	3/4	34.9	99.9	50.8	7833333	20.00	34.9	99.9	50.0	7833337
16.6	5988749	5988795	7333021	3/4	36.4	101.4	50.8	7833334	20.00	36.4	101.4	50.0	7833338
21/32	5988802	5988443	7333022	3/4	36.4	101.4	50.8	7833334	20.00	36.4	101.4	50.0	7833338
16.7	5988790	5988799	7333023	3/4	36.4	101.4	50.8	7833334	20.00	36.4	101.4	50.0	7833338
17.0	5988833	5988803	7333024	3/4	36.4	101.4	50.8	7833334	20.00	36.4	101.4	50.0	7833338
43/64	5988867	5988601	7333025	3/4	36.4	101.4	50.8	7833334	20.00	36.4	101.4	50.0	7833338
17.1	5988873	5988807	7333026	3/4	36.4	101.4	50.8	7833334	20.00	36.4	101.4	50.0	7833338
17.2	5988881	5988811	7333027	3/4	36.4	101.4	50.8	7833334	20.00	36.4	101.4	50.0	7833338
11/16	5988623	5988921	7333028	3/4	36.4	101.4	50.8	7833334	20.00	36.4	101.4	50.0	7833338
17.5	5988885	5988818	7333029	3/4	36.4	101.4	50.8	7833334	20.00	36.4	101.4	50.0	7833338
17.6	5988891	5988823	7333030	3/4	39.0	104.0	50.8	7833335	20.00	39.0	104.0	50.0	7833339
17.7	5988894	5988827	7333031	3/4	39.0	104.0	50.8	7833335	20.00	39.0	104.0	50.0	7833339
45/64	5988872	5988603	7333032	3/4	39.0	104.0	50.8	7833335	20.00	39.0	104.0	50.0	7833339
18.0	5988701	5988835	7333033	3/4	39.0	104.0	50.8	7833335	20.00	39.0	104.0	50.0	7833339
18.1	5988706	5988841	7333034	3/4	39.0	104.0	50.8	7833335	20.00	39.0	104.0	50.0	7833339
18.2	5988713	5988845	7333035	3/4	39.0	104.0	50.8	7833335	20.00	39.0	104.0	50.0	7833339
23/32	5988824	5988471	7333036	3/4	39.0	104.0	50.8	7833335	20.00	39.0	104.0	50.0	7833339
18.5	5988718	5988848	7333037	3/4	39.0	104.0	50.8	7833335	20.00	39.0	104.0	50.0	7833339
18.6	5988723	5988853	7333038	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
47/64	5988877	5988606	7333039	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
18.7	5988728	5988856	7333040	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
18.9	5988733	5988863	7333041	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
19.0	5988740	5988868	7333042	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
3/4	5988928	5988559	7333043	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
19.1	5988745	5988871	7333044	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
19.2	5988752	5988875	7333045	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
19.25	5988756	5988879	7333046	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
19.3	5988760	5988887	7333047	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
19.35	5988764	5988438	7333048	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
49/64	5988880	5988609	7333049	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
19.5	5988767	5988495	7333050	1"	40.4	111.4	57.15	7833345	25.00	40.4	111.4	56.0	7833340
19.6	5988771	5988544	7333051	1"	43.0	114.0	57.15	7833346	25.00	43.0	114.0	56.0	7833341
19.7	5988775	5988587	7333052	1"	43.0	114.0	57.15	7833346	25.00	43.0	114.0	56.0	7833341
25/32	5988851	5988511	7333053	1"	43.0	114.0	57.15	7833346	25.00	43.0	114.0	56.0	7833341
20.0	5988782	5988629	7333054	1"	43.0	114.0	57.15	7833346	25.00	43.0	114.0	56.0	7833341
51/64	5988892	5988615	7333055	1"	43.0	114.0	57.15	7833346	25.00	43.0	114.0	56.0	7833341
20.5	5988786	5988632	7333056	1"	43.0	114.0	57.15	7833346	25.00	43.0	114.0	56.0	7833341
13/16	5988649	5988893	7333057	1"	44.5	115.5	57.15	7833347	25.00	44.5	115.5	56.0	7833342
21.0	5988794	5988635	7333058	1"	44.5	115.5	57.15	7833347	25.00	44.5	115.5	56.0	7833342
53/64	5988896	5988618	7333059	1"	44.5	115.5	57.15	7833347	25.00	44.5	115.5	56.0	7833342
27/32	5988869	5988531	7333060	1"	44.5	115.5	57.15	7833347	25.00	44.5	115.5	56.0	7833342
21.5	5988798	5988638	7333061	1"	44.5	115.5	57.15	7833347	25.00	44.5	115.5	56.0	7833342
55/64	5988898	5988626	7333062	1"	46.1	117.1	57.15	7833348	25.00	46.1	117.1	56.0	7833343
22.0	5988806	5988448	7333063	1"	46.1	117.1	57.15	7833348	25.00	46.1	117.1	56.0	7833343
7/8	5988903	5988661	7333064	1"	46.1	117.1	57.15	7833348	25.00	46.1	117.1	56.0	7833343
22.5	5988810	5988453	7333065	1"	46.1	117.1	57.15	7833348	25.00	46.1	117.1	56.0	7833343
57/64	5988899	5988651	7333066	1"	46.1	117.1	57.15	7833348	25.00	46.1	117.1	56.0	7833343
22.7	5988814	5988458	7333067	1"	46.1	117.1	57.15	7833348	25.00	46.1	117.1	56.0	7833343
23.0	5988816	5988462	7333068	1"	47.0	118.0	57.15	7833349	25.00	47.0	118.0	56.0	7833344
29/32	5988917	5988556	7333069	1"	47.0	118.0	57.15	7833349	25.00	47.0	118.0	56.0	7833344
59/64	5988900	5988653	7333070	1"	47.0	118.0	57.15	7833349	25.00	47.0	118.0	56.0	7833344
23.5	5988820	5988466	7333071	1"	47.0	118.0	57.15	7833349	25.00	47.0	118.0	56.0	7833344

# HYDRA DRILL

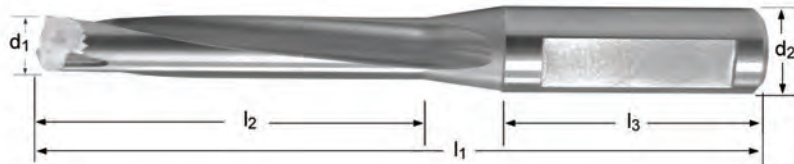


Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	1.5xD Hydra Body - Fractional Shank					1.5xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H851 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H851 EDP#
15/16	5988691	5988754	7333072	1"	49.3	124.3	57.15	7833350	32.00	49.3	124.3	60.0	7833357
24.0	5988828	5988476	7333073	1"	49.3	124.3	57.15	7833350	32.00	49.3	124.3	60.0	7833357
61/64	5988901	5988656	7333074	1"	49.3	124.3	57.15	7833350	32.00	49.3	124.3	60.0	7833357
24.5	5988837	5988483	7333075	1"	49.3	124.3	57.15	7833350	32.00	49.3	124.3	60.0	7833357
31/32	5988934	5988572	7333076	1"	49.3	124.3	57.15	7833350	32.00	49.3	124.3	60.0	7833357
25.0	5988840	5988488	7333077	1.1/4	49.7	124.7	60.33	7833351	32.00	49.7	124.7	60.0	7833358
63/64	5988902	5988658	7333078	1.1/4	49.7	124.7	60.33	7833351	32.00	49.7	124.7	60.0	7833358
1	5988604	5988905	7333079	1.1/4	49.7	124.7	60.33	7833351	32.00	49.7	124.7	60.0	7833358
25.5	5988843	5988499	7333080	1.1/4	49.7	124.7	60.33	7833351	32.00	49.7	124.7	60.0	7833358
25.65	5988847	5988506	7333081	1.1/4	49.7	124.7	60.33	7833351	32.00	49.7	124.7	60.0	7833358
1.1/64	5988676	5988909	7333082	1.1/4	49.7	124.7	60.33	7833351	32.00	49.7	124.7	60.0	7833358
26.0	5988855	5988516	7333083	1.1/4	52.3	127.3	60.33	7833352	32.00	52.3	127.3	60.0	7833359
1.1/32	5988650	5988908	7333084	1.1/4	52.3	127.3	60.33	7833352	32.00	52.3	127.3	60.0	7833359
26.5	5988858	5988519	7333085	1.1/4	52.3	127.3	60.33	7833352	32.00	52.3	127.3	60.0	7833359
1.3/64	5988744	5988914	7333086	1.1/4	52.3	127.3	60.33	7833352	32.00	52.3	127.3	60.0	7833359
1.1/16	5988637	5988907	7333087	1.1/4	52.8	127.8	60.33	7833353	32.00	52.8	127.8	60.0	7833360
27.0	5988861	5988523	7333088	1.1/4	52.8	127.8	60.33	7833353	32.00	52.8	127.8	60.0	7833360
1.5/64	5988611	5988916	7333089	1.1/4	52.8	127.8	60.33	7833353	32.00	52.8	127.8	60.0	7833360
27.5	5988865	5988528	7333090	1.1/4	52.8	127.8	60.33	7833353	32.00	52.8	127.8	60.0	7833360
1.3/32	5988739	5988913	7333091	1.1/4	52.8	127.8	60.33	7833353	32.00	52.8	127.8	60.0	7833360
28.0	5988876	5988535	7333092	1.1/4	54.4	129.4	60.33	7833354	32.00	54.4	129.4	60.0	7833361
1.7/64	5988614	5988918	7333093	1.1/4	54.4	129.4	60.33	7833354	32.00	54.4	129.4	60.0	7833361
28.5	5988844	5988540	7333094	1.1/4	54.4	129.4	60.33	7833354	32.00	54.4	129.4	60.0	7833361
1.1/8	5988720	5988910	7333095	1.1/4	54.4	129.4	60.33	7833354	32.00	54.4	129.4	60.0	7833361
1.9/64	5988617	5988919	7333096	1.1/4	55.8	130.8	60.33	7833355	32.00	55.8	130.8	60.0	7833362
29.0	5988888	5988548	7333097	1.1/4	55.8	130.8	60.33	7833355	32.00	55.8	130.8	60.0	7833362
1.5/32	5988608	5988915	7333098	1.1/4	55.8	130.8	60.33	7833355	32.00	55.8	130.8	60.0	7833362
29.5	5988906	5988552	7333099	1.1/4	55.8	130.8	60.33	7833355	32.00	55.8	130.8	60.0	7833362
1.11/64	5988730	5988911	7333100	1.1/4	55.8	130.8	60.33	7833355	32.00	55.8	130.8	60.0	7833362
30.0	5988930	5988564	7333101	1.1/4	58.4	133.4	60.33	7833356	32.00	58.4	133.4	60.0	7833363
1.3/16	5988735	5988912	7333102	1.1/4	58.4	133.4	60.33	7833356	32.00	58.4	133.4	60.0	7833363
30.5	5988932	5988568	7333103	1.1/4	58.4	133.4	60.33	7833356	32.00	58.4	133.4	60.0	7833363

## 3xD Hydra Bodies

### H853

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



**H853**  
Coolant Through

DIN  
6535HB  
DIN  
6535HE

**3xD**

**HSS**

**140°**

15/32 - 42.00

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

- \* Fractional bodies have straight flat on shank
- \* Metric bodies have whistle notch on shank
- \* For more information on Hydra, see page 539

Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	3xD Hydra Body - Fractional Shank					3xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H853 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H853 EDP#
15/32	5988695	5988758	7332946	5/8	44.0	105.0	48.0	5988068	16.0	44.0	105.0	48.0	5988132
12.0	5988624	5988922	7332947	5/8	44.0	105.0	48.0	5988068	16.0	44.0	105.0	48.0	5988132
12.1	5988627	5988923	7332948	5/8	44.0	105.0	48.0	5988068	16.0	44.0	105.0	48.0	5988132
12.2	5988630	5988924	7332949	5/8	44.0	105.0	48.0	5988068	16.0	44.0	105.0	48.0	5988132
31/64	5988936	5988575	7332980	5/8	44.0	105.0	48.0	5988068	16.0	44.0	105.0	48.0	5988132
12.5	5988633	5988925	7332981	5/8	44.0	105.0	48.0	5988126	16.0	44.0	105.0	48.0	5987969
12.6	5988640	5988926	7332982	5/8	44.0	105.0	48.0	5988126	16.0	44.0	105.0	48.0	5987969
1/2	5988620	5988920	7332983	5/8	44.0	105.0	48.0	5988126	16.0	44.0	105.0	48.0	5987969
12.8	5988641	5988927	7332984	5/8	44.0	105.0	48.0	5988126	16.0	44.0	105.0	48.0	5987969
12.9	5988642	5988929	7332985	5/8	44.0	105.0	48.0	5988126	16.0	44.0	105.0	48.0	5987969
13.0	5988643	5988685	7332986	5/8	47.0	110.0	48.0	5987992	16.0	47.0	110.0	48.0	5987973
33/64	5988850	5988579	7332987	5/8	47.0	110.0	48.0	5987992	16.0	47.0	110.0	48.0	5987973
13.2	5988644	5988737	7332988	5/8	47.0	110.0	48.0	5987992	16.0	47.0	110.0	48.0	5987973
17/32	5988697	5988831	7332989	5/8	47.0	110.0	48.0	5987992	16.0	47.0	110.0	48.0	5987973
13.5	5988645	5988791	7332990	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
13.6	5988646	5988839	7332991	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
13.7	5988647	5988883	7332992	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
13.8	5988648	5988889	7332993	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
35/64	5988854	5988583	7332994	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
14.0	5988652	5988895	7332995	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
14.1	5988655	5988897	7332996	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
14.2	5988657	5988692	7332997	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
9/16	5988904	5988664	7332998	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
14.5	5988660	5988696	7332999	3/4	52.5	116.5	48.0	5988093	16.0	52.5	116.5	48.0	5987976
14.6	5988663	5988700	7333000	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
37/64	5988857	5988591	7333001	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
14.7	5988666	5988705	7333002	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
14.8	5988668	5988709	7333003	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
15.0	5988670	5988714	7333004	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
19/32	5988779	5988621	7333005	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
15.1	5988672	5988719	7333006	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
15.2	5988674	5988724	7333007	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
15.24	5988678	5988729	7333008	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
39/64	5988860	5988595	7333009	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979
15.5	5988680	5988734	7333010	3/4	55.5	126.5	50.0	5988072	20.0	55.5	126.5	50.0	5987979

Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	3xD Hydra Body - Fractional Shank					3xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H853 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H853 EDP#
15.6	5988683	5988742	7333011	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
15.7	5988687	5988747	7333012	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
5/8	5988884	5988612	7333013	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
16.0	5988698	5988763	7333014	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
16.08	5988702	5988769	7333015	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
16.1	5988710	5988773	7333016	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
16.2	5988715	5988777	7333017	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
41/64	5988864	5988599	7333018	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
16.3	5988725	5988783	7333019	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
16.5	5988690	5988787	7333020	3/4	59.5	131.5	50.0	5988076	20.0	59.5	131.5	50.0	5987983
16.6	5988749	5988795	7333021	3/4	62.5	136.5	50.0	5988129	20.0	62.5	136.5	50.0	5987987
21/32	5988802	5988443	7333022	3/4	62.5	136.5	50.0	5988129	20.0	62.5	136.5	50.0	5987987
16.7	5988790	5988799	7333023	3/4	62.5	136.5	50.0	5988129	20.0	62.5	136.5	50.0	5987987
17.0	5988833	5988803	7333024	3/4	62.5	136.5	50.0	5988129	20.0	62.5	136.5	50.0	5987987
43/64	5988867	5988601	7333025	3/4	62.5	136.5	50.0	5988129	20.0	62.5	136.5	50.0	5987987
17.1	5988873	5988807	7333026	3/4	62.5	136.5	50.0	5988129	20.0	62.5	136.5	50.0	5987987
17.2	5988881	5988811	7333027	3/4	62.5	136.5	50.0	5988129	20.0	62.5	136.5	50.0	5987987
11/16	5988623	5988921	7333028	3/4	62.5	136.5	50.0	5988129	20.0	62.5	136.5	50.0	5987987
17.5	5988885	5988818	7333029	3/4	62.5	136.5	50.0	5988129	20.0	62.5	136.5	50.0	5987987
17.6	5988891	5988823	7333030	3/4	66.5	141.5	50.0	5988025	20.0	66.5	141.5	50.0	5987996
17.7	5988894	5988827	7333031	3/4	66.5	141.5	50.0	5988025	20.0	66.5	141.5	50.0	5987996
45/64	5988872	5988603	7333032	3/4	66.5	141.5	50.0	5988025	20.0	66.5	141.5	50.0	5987996
18.0	5988701	5988835	7333033	3/4	66.5	141.5	50.0	5988025	20.0	66.5	141.5	50.0	5987996
18.1	5988706	5988841	7333034	3/4	66.5	141.5	50.0	5988025	20.0	66.5	141.5	50.0	5987996
18.2	5988713	5988845	7333035	3/4	66.5	141.5	50.0	5988025	20.0	66.5	141.5	50.0	5987996
23/32	5988824	5988471	7333036	3/4	66.5	141.5	50.0	5988025	20.0	66.5	141.5	50.0	5987996
18.5	5988718	5988848	7333037	3/4	66.5	141.5	50.0	5988025	20.0	66.5	141.5	50.0	5987996
18.6	5988723	5988853	7333038	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
47/64	5988877	5988606	7333039	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
18.7	5988728	5988856	7333040	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
18.9	5988733	5988863	7333041	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
19.0	5988740	5988868	7333042	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
3/4	5988928	5988559	7333043	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
19.1	5988745	5988871	7333044	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
19.2	5988752	5988875	7333045	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
19.25	5988756	5988879	7333046	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
19.3	5988760	5988887	7333047	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
19.35	5988764	5988438	7333048	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
49/64	5988880	5988609	7333049	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
19.5	5988767	5988495	7333050	1	69.5	156.5	56.0	5988079	25.0	69.5	156.5	56.0	5987999
19.6	5988771	5988544	7333051	1	73.5	156.5	56.0	5988083	25.0	73.5	156.5	56.0	5988003
19.7	5988775	5988587	7333052	1	73.5	156.5	56.0	5988083	25.0	73.5	156.5	56.0	5988003
25/32	5988851	5988511	7333053	1	73.5	156.5	56.0	5988083	25.0	73.5	156.5	56.0	5988003
20.0	5988782	5988629	7333054	1	73.5	156.5	56.0	5988083	25.0	73.5	156.5	56.0	5988003
51/64	5988892	5988615	7333055	1	73.5	156.5	56.0	5988083	25.0	73.5	156.5	56.0	5988003
20.5	5988786	5988632	7333056	1	73.5	156.5	56.0	5988083	25.0	73.5	156.5	56.0	5988003
13/16	5988649	5988893	7333057	1	76.5	156.5	56.0	5988045	25.0	76.5	156.5	56.0	5988013
21.0	5988794	5988635	7333058	1	76.5	156.5	56.0	5988045	25.0	76.5	156.5	56.0	5988013
53/64	5988896	5988618	7333059	1	76.5	156.5	56.0	5988045	25.0	76.5	156.5	56.0	5988013
27/32	5988869	5988531	7333060	1	76.5	156.5	56.0	5988045	25.0	76.5	156.5	56.0	5988013
21.5	5988798	5988638	7333061	1	76.5	156.5	56.0	5988045	25.0	76.5	156.5	56.0	5988013
55/64	5988898	5988626	7333062	1	80.1	161.5	56.0	5988086	25.0	80.1	161.5	56.0	5988017
22.0	5988806	5988448	7333063	1	80.1	161.5	56.0	5988086	25.0	80.1	161.5	56.0	5988017
7/8	5988903	5988661	7333064	1	80.1	161.5	56.0	5988086	25.0	80.1	161.5	56.0	5988017
22.5	5988810	5988453	7333065	1	80.1	161.5	56.0	5988086	25.0	80.1	161.5	56.0	5988017
57/64	5988899	5988651	7333066	1	80.1	161.5	56.0	5988086	25.0	80.1	161.5	56.0	5988017
22.7	5988814	5988458	7333067	1	80.1	161.5	56.0	5988086	25.0	80.1	161.5	56.0	5988017
23.0	5988816	5988462	7333068	1	82.5	160.5	56.0	5988089	25.0	82.5	160.5	56.0	5988021
29/32	5988917	5988556	7333069	1	82.5	160.5	56.0	5988089	25.0	82.5	160.5	56.0	5988021
59/64	5988900	5988653	7333070	1	82.5	160.5	56.0	5988089	25.0	82.5	160.5	56.0	5988021
23.5	5988820	5988466	7333071	1	82.5	160.5	56.0	5988089	25.0	82.5	160.5	56.0	5988021

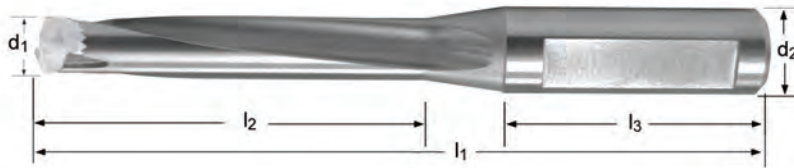


Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	3xD Hydra Body - Fractional Shank					3xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H853 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H853 EDP#
15/16	5988691	5988754	7333072	1	86.2	170.2	60.0	5988064	32.0	86.2	170.2	60.0	5988029
24.0	5988828	5988476	7333073	1	86.2	170.2	60.0	5988064	32.0	86.2	170.2	60.0	5988029
61/64	5988901	5988656	7333074	1	86.2	170.2	60.0	5988064	32.0	86.2	170.2	60.0	5988029
24.5	5988837	5988483	7333075	1	86.2	170.2	60.0	5988064	32.0	86.2	170.2	60.0	5988029
31/32	5988934	5988572	7333076	1	86.2	170.2	60.0	5988064	32.0	86.2	170.2	60.0	5988029
25.0	5988840	5988488	7333077	1.1/4	88.0	170.0	60.0	5987965	32.0	88.0	170.0	60.0	5988033
63/64	5988902	5988658	7333078	1.1/4	88.0	170.0	60.0	5987965	32.0	88.0	170.0	60.0	5988033
1	5988604	5988905	7333079	1.1/4	88.0	170.0	60.0	5987965	32.0	88.0	170.0	60.0	5988033
25.5	5988843	5988499	7333080	1.1/4	88.0	170.0	60.0	5987965	32.0	88.0	170.0	60.0	5988033
25.65	5988847	5988506	7333081	1.1/4	88.0	170.0	60.0	5987965	32.0	88.0	170.0	60.0	5988033
1.1/64	5988676	5988909	7333082	1.1/4	88.0	170.0	60.0	5987965	32.0	88.0	170.0	60.0	5988033
26.0	5988855	5988516	7333083	1.1/4	92.0	175.0	60.0	5988123	32.0	92.0	175.0	60.0	5988037
1.1/32	5988650	5988908	7333084	1.1/4	92.0	175.0	60.0	5988123	32.0	92.0	175.0	60.0	5988037
26.5	5988858	5988519	7333085	1.1/4	92.0	175.0	60.0	5988123	32.0	92.0	175.0	60.0	5988037
1.3/64	5988744	5988914	7333086	1.1/4	92.0	175.0	60.0	5988123	32.0	92.0	175.0	60.0	5988037
1.1/16	5988637	5988907	7333087	1.1/4	94.0	175.0	60.0	5988118	32.0	94.0	175.0	60.0	5988042
27.0	5988861	5988523	7333088	1.1/4	94.0	175.0	60.0	5988118	32.0	94.0	175.0	60.0	5988042
1.5/64	5988611	5988916	7333089	1.1/4	94.0	175.0	60.0	5988118	32.0	94.0	175.0	60.0	5988042
27.5	5988865	5988528	7333090	1.1/4	94.0	175.0	60.0	5988118	32.0	94.0	175.0	60.0	5988042
1.3/32	5988739	5988913	7333091	1.1/4	94.0	175.0	60.0	5988118	32.0	94.0	175.0	60.0	5988042
28.0	5988876	5988535	7333092	1.1/4	97.0	180.0	60.0	5988007	32.0	97.0	180.0	60.0	5988050
1.7/64	5988614	5988918	7333093	1.1/4	97.0	180.0	60.0	5988007	32.0	97.0	180.0	60.0	5988050
28.5	5988844	5988540	7333094	1.1/4	97.0	180.0	60.0	5988007	32.0	97.0	180.0	60.0	5988050
1.1/8	5988720	5988910	7333095	1.1/4	97.0	180.0	60.0	5988007	32.0	97.0	180.0	60.0	5988050
1.9/64	5988617	5988919	7333096	1.1/4	100.0	185.0	60.0	5988053	32.0	100.0	185.0	60.0	5988057
29.0	5988888	5988548	7333097	1.1/4	100.0	185.0	60.0	5988053	32.0	100.0	185.0	60.0	5988057
1.5/32	5988608	5988915	7333098	1.1/4	100.0	185.0	60.0	5988053	32.0	100.0	185.0	60.0	5988057
29.5	5988906	5988552	7333099	1.1/4	100.0	185.0	60.0	5988053	32.0	100.0	185.0	60.0	5988057
1.11/64	5988730	5988911	7333100	1.1/4	100.0	185.0	60.0	5988053	32.0	100.0	185.0	60.0	5988057
30.0	5988930	5988564	7333101	1.1/4	104.0	185.0	60.0	5988091	32.0	104.0	185.0	60.0	5988061
1.3/16	5988735	5988912	7333102	1.1/4	104.0	185.0	60.0	5988091	32.0	104.0	185.0	60.0	5988061
30.5	5988932	5988568	7333103	1.1/4	104.0	185.0	60.0	5988091	32.0	104.0	185.0	60.0	5988061
1.7/32	6104481	—	7333104	—	—	—	—	—	32.0	111.5	196.5	60.0	6111405
31.00	6104482	—	7333105	—	—	—	—	—	32.0	111.5	196.5	60.0	6111405
1.1/4	6104483	—	7333106	—	—	—	—	—	32.0	111.5	196.5	60.0	6111405
32.00	6104484	—	7333107	—	—	—	—	—	32.0	111.5	196.5	60.0	6111405
32.50	6104485	—	7333108	—	—	—	—	—	32.0	116.5	201.5	60.0	6111406
1.19/64	6104486	—	7333109	—	—	—	—	—	32.0	116.5	201.5	60.0	6111406
33.00	6104487	—	7333110	—	—	—	—	—	32.0	116.5	201.5	60.0	6111406
33.50	6104488	—	7333111	—	—	—	—	—	32.0	116.5	201.5	60.0	6111406
34.00	6104489	—	7333112	—	—	—	—	—	40.0	121.5	216.5	70.0	6111407
1.11/32	6104530	—	7333113	—	—	—	—	—	40.0	121.5	216.5	70.0	6111407
34.50	6104531	—	7333114	—	—	—	—	—	40.0	121.5	216.5	70.0	6111407
1.3/8	6104532	—	7333115	—	—	—	—	—	40.0	121.5	216.5	70.0	6111407
35.00	6104533	—	7333116	—	—	—	—	—	40.0	121.5	216.5	70.0	6111407
36.00	6104534	—	7333117	—	—	—	—	—	40.0	125.5	221.5	70.0	6111408
1.27/64	6104535	—	7333118	—	—	—	—	—	40.0	125.5	221.5	70.0	6111408
36.50	6104536	—	7333119	—	—	—	—	—	40.0	125.5	221.5	70.0	6111408
37.00	6104537	—	7333120	—	—	—	—	—	40.0	131.5	226.5	70.0	6111409
1.15/32	6104538	—	7333121	—	—	—	—	—	40.0	131.5	226.5	70.0	6111409
37.50	6104539	—	7333122	—	—	—	—	—	40.0	131.5	226.5	70.0	6111409
38.00	6104540	—	7333123	—	—	—	—	—	40.0	131.5	226.5	70.0	6111409
1.1/2	6104541	—	7333124	—	—	—	—	—	40.0	136.5	231.5	70.0	6111410
38.50	6104542	—	7333125	—	—	—	—	—	40.0	136.5	231.5	70.0	6111410
1.17/32	6104543	—	7333126	—	—	—	—	—	40.0	136.5	231.5	70.0	6111410
39.00	6104544	—	7333127	—	—	—	—	—	40.0	136.5	231.5	70.0	6111410
39.50	6104545	—	7333128	—	—	—	—	—	40.0	136.5	231.5	70.0	6111410
1.9/16	6104546	—	7333129	—	—	—	—	—	40.0	146.5	246.5	70.0	6111411
40.00	6104547	—	7333130	—	—	—	—	—	40.0	146.5	246.5	70.0	6111411
41.00	6104548	—	7333131	—	—	—	—	—	40.0	146.5	246.5	70.0	6111411
1.5/8	6104549	—	7333132	—	—	—	—	—	40.0	151.5	251.5	70.0	6111412
42.00	6104550	—	7333133	—	—	—	—	—	40.0	151.5	251.5	70.0	6111412

## 5xD Hydra Bodies

### H855

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



**H855  
Coolant  
Through**

DIN  
6535HB  
DIN  
6535HE

**HSS**

**140°**



15/32 - 42.00

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

- \* Fractional bodies have straight flat on shank
- \* Metric bodies have whistle notch on shank
- \* For more information on Hydra, see page 539

Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	5xD Hydra Body - Fractional Shank					5xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H855 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H855 EDP#
15/32	5988695	5988758	7332946	5/8	69.0	130.0	48.0	5988755	16.0	69.0	130.0	48.0	5988115
12.0	5988624	5988922	7332947	5/8	69.0	130.0	48.0	5988755	16.0	69.0	130.0	48.0	5988115
12.1	5988627	5988923	7332948	5/8	69.0	130.0	48.0	5988755	16.0	69.0	130.0	48.0	5988115
12.2	5988630	5988924	7332949	5/8	69.0	130.0	48.0	5988755	16.0	69.0	130.0	48.0	5988115
31/64	5988936	5988575	7332980	5/8	69.0	130.0	48.0	5988755	16.0	69.0	130.0	48.0	5988115
12.5	5988633	5988925	7332981	5/8	69.0	130.0	48.0	5988109	16.0	69.0	130.0	48.0	5988120
12.6	5988640	5988926	7332982	5/8	69.0	130.0	48.0	5988109	16.0	69.0	130.0	48.0	5988120
1/2	5988620	5988920	7332983	5/8	69.0	130.0	48.0	5988109	16.0	69.0	130.0	48.0	5988120
12.8	5988641	5988927	7332984	5/8	69.0	130.0	48.0	5988109	16.0	69.0	130.0	48.0	5988120
12.9	5988642	5988929	7332985	5/8	69.0	130.0	48.0	5988109	16.0	69.0	130.0	48.0	5988120
13.0	5988643	5988685	7332986	5/8	74.0	140.0	48.0	5988878	16.0	74.0	140.0	48.0	5988681
33/64	5988850	5988579	7332987	5/8	74.0	140.0	48.0	5988878	16.0	74.0	140.0	48.0	5988681
13.2	5988644	5988737	7332988	5/8	74.0	140.0	48.0	5988878	16.0	74.0	140.0	48.0	5988681
17/32	5988697	5988831	7332989	5/8	74.0	140.0	48.0	5988878	16.0	74.0	140.0	48.0	5988681
13.5	5988645	5988791	7332990	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
13.6	5988646	5988839	7332991	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
13.7	5988647	5988883	7332992	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
13.8	5988648	5988889	7332993	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
35/64	5988854	5988583	7332994	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
14.0	5988652	5988895	7332995	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
14.1	5988655	5988897	7332996	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
14.2	5988657	5988692	7332997	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
9/16	5988904	5988664	7332998	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
14.5	5988660	5988696	7332999	3/4	81.5	146.5	48.0	5988785	16.0	81.5	146.5	48.0	5988738
14.6	5988663	5988700	7333000	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
37/64	5988857	5988591	7333001	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
14.7	5988666	5988705	7333002	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
14.8	5988668	5988709	7333003	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
15.0	5988670	5988714	7333004	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
19/32	5988779	5988621	7333005	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781



Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	5xD Hydra Body - Fractional Shank					5xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H855 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H855 EDP#
15.1	5988672	5988719	7333006	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
15.2	5988674	5988724	7333007	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
15.24	5988678	5988729	7333008	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
39/64	5988860	5988595	7333009	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
15.5	5988680	5988734	7333010	3/4	86.5	156.5	50.0	5988759	20.0	86.5	156.5	50.0	5988781
15.6	5988683	5988742	7333011	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
15.7	5988687	5988747	7333012	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
5/8	5988884	5988612	7333013	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
16.0	5988698	5988763	7333014	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
16.08	5988702	5988769	7333015	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
16.1	5988710	5988773	7333016	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
16.2	5988715	5988777	7333017	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
41/64	5988864	5988599	7333018	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
16.3	5988725	5988783	7333019	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
16.5	5988690	5988787	7333020	3/4	92.5	166.5	50.0	5988762	20.0	92.5	166.5	50.0	5988825
16.6	5988749	5988795	7333021	3/4	97.5	171.5	50.0	5988112	20.0	97.5	171.5	50.0	5988870
21/32	5988802	5988443	7333022	3/4	97.5	171.5	50.0	5988112	20.0	97.5	171.5	50.0	5988870
16.7	5988790	5988799	7333023	3/4	97.5	171.5	50.0	5988112	20.0	97.5	171.5	50.0	5988870
17.0	5988833	5988803	7333024	3/4	97.5	171.5	50.0	5988112	20.0	97.5	171.5	50.0	5988870
43/64	5988867	5988601	7333025	3/4	97.5	171.5	50.0	5988112	20.0	97.5	171.5	50.0	5988870
17.1	5988873	5988807	7333026	3/4	97.5	171.5	50.0	5988112	20.0	97.5	171.5	50.0	5988870
17.2	5988881	5988811	7333027	3/4	97.5	171.5	50.0	5988112	20.0	97.5	171.5	50.0	5988870
11/16	5988623	5988921	7333028	3/4	97.5	171.5	50.0	5988112	20.0	97.5	171.5	50.0	5988870
17.5	5988885	5988818	7333029	3/4	97.5	171.5	50.0	5988112	20.0	97.5	171.5	50.0	5988870
17.6	5988891	5988823	7333030	3/4	103.5	176.5	50.0	5988703	20.0	103.5	176.5	50.0	5988882
17.7	5988894	5988827	7333031	3/4	103.5	176.5	50.0	5988703	20.0	103.5	176.5	50.0	5988882
45/64	5988872	5988603	7333032	3/4	103.5	176.5	50.0	5988703	20.0	103.5	176.5	50.0	5988882
18.0	5988701	5988835	7333033	3/4	103.5	176.5	50.0	5988703	20.0	103.5	176.5	50.0	5988882
18.1	5988706	5988841	7333034	3/4	103.5	176.5	50.0	5988703	20.0	103.5	176.5	50.0	5988882
18.2	5988713	5988845	7333035	3/4	103.5	176.5	50.0	5988703	20.0	103.5	176.5	50.0	5988882
23/32	5988824	5988471	7333036	3/4	103.5	176.5	50.0	5988703	20.0	103.5	176.5	50.0	5988882
18.5	5988718	5988848	7333037	3/4	103.5	176.5	50.0	5988703	20.0	103.5	176.5	50.0	5988882
18.6	5988723	5988853	7333038	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
47/64	5988877	5988606	7333039	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
18.7	5988728	5988856	7333040	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
18.9	5988733	5988863	7333041	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
19.0	5988740	5988868	7333042	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
3/4	5988928	5988559	7333043	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
19.1	5988745	5988871	7333044	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
19.2	5988752	5988875	7333045	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
19.25	5988756	5988879	7333046	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
19.3	5988760	5988887	7333047	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
19.35	5988764	5988438	7333048	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
49/64	5988880	5988609	7333049	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
19.5	5988767	5988495	7333050	1	108.5	191.5	56.0	5988766	25.0	108.5	191.5	56.0	5988886
19.6	5988771	5988544	7333051	1	114.5	196.5	56.0	5988770	25.0	114.5	196.5	56.0	5988890
19.7	5988775	5988587	7333052	1	114.5	196.5	56.0	5988770	25.0	114.5	196.5	56.0	5988890
25/32	5988851	5988511	7333053	1	114.5	196.5	56.0	5988770	25.0	114.5	196.5	56.0	5988890
20.0	5988782	5988629	7333054	1	114.5	196.5	56.0	5988770	25.0	114.5	196.5	56.0	5988890
51/64	5988892	5988615	7333055	1	114.5	196.5	56.0	5988770	25.0	114.5	196.5	56.0	5988890
20.5	5988786	5988632	7333056	1	114.5	196.5	56.0	5988770	25.0	114.5	196.5	56.0	5988890
13/16	5988649	5988893	7333057	1	119.5	196.5	56.0	5988726	25.0	119.5	196.5	56.0	5988686
21.0	5988794	5988635	7333058	1	119.5	196.5	56.0	5988726	25.0	119.5	196.5	56.0	5988686
53/64	5988896	5988618	7333059	1	119.5	196.5	56.0	5988726	25.0	119.5	196.5	56.0	5988686
27/32	5988869	5988531	7333060	1	119.5	196.5	56.0	5988726	25.0	119.5	196.5	56.0	5988686
21.5	5988798	5988638	7333061	1	119.5	196.5	56.0	5988726	25.0	119.5	196.5	56.0	5988686
55/64	5988898	5988626	7333062	1	125.1	201.1	56.0	5988774	25.0	125.1	201.1	56.0	5988689
22.0	5988806	5988448	7333063	1	125.1	201.1	56.0	5988774	25.0	125.1	201.1	56.0	5988689
7/8	5988903	5988661	7333064	1	125.1	201.1	56.0	5988774	25.0	125.1	201.1	56.0	5988689
22.5	5988810	5988453	7333065	1	125.1	201.1	56.0	5988774	25.0	125.1	201.1	56.0	5988689
57/64	5988899	5988651	7333066	1	125.1	201.1	56.0	5988774	25.0	125.1	201.1	56.0	5988689
22.7	5988814	5988458	7333067	1	125.1	201.1	56.0	5988774	25.0	125.1	201.1	56.0	5988689
23.0	5988816	5988462	7333068	1	129.5	210.5	56.0	5988778	25.0	129.5	210.5	56.0	5988694
29/32	5988917	5988556	7333069	1	129.5	210.5	56.0	5988778	25.0	129.5	210.5	56.0	5988694

# HYDRA DRILL

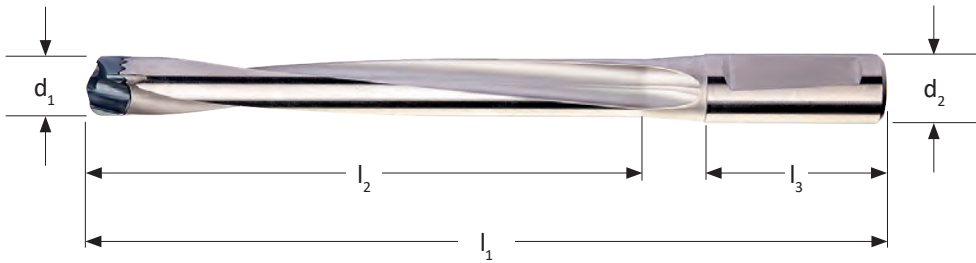


Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	5xD Hydra Body - Fractional Shank					5xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H855 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H855 EDP#
59/64	5988900	5988653	7333070	1	129.5	210.5	56.0	5988778	25.0	129.5	210.5	56.0	5988694
23.5	5988820	5988466	7333071	1	129.5	210.5	56.0	5988778	25.0	129.5	210.5	56.0	5988694
15/16	5988691	5988754	7333072	1	135.2	220.2	60.0	5988751	32.0	135.2	220.2	60.0	5988707
24.0	5988828	5988476	7333073	1	135.2	220.2	60.0	5988751	32.0	135.2	220.2	60.0	5988707
61/64	5988901	5988656	7333074	1	135.2	220.2	60.0	5988751	32.0	135.2	220.2	60.0	5988707
24.5	5988837	5988483	7333075	1	135.2	220.2	60.0	5988751	32.0	135.2	220.2	60.0	5988707
31/32	5988934	5988572	7333076	1	135.2	220.2	60.0	5988751	32.0	135.2	220.2	60.0	5988707
25.0	5988840	5988488	7333077	1.1/4	140.0	225.0	60.0	5988095	32.0	140.0	225.0	60.0	5988711
63/64	5988902	5988658	7333078	1.1/4	140.0	225.0	60.0	5988095	32.0	140.0	225.0	60.0	5988711
1	5988604	5988905	7333079	1.1/4	140.0	225.0	60.0	5988095	32.0	140.0	225.0	60.0	5988711
25.5	5988843	5988499	7333080	1.1/4	140.0	225.0	60.0	5988095	32.0	140.0	225.0	60.0	5988711
25.65	5988847	5988506	7333081	1.1/4	140.0	225.0	60.0	5988095	32.0	140.0	225.0	60.0	5988711
1.1/64	5988676	5988909	7333082	1.1/4	140.0	225.0	60.0	5988095	32.0	140.0	225.0	60.0	5988711
26.0	5988855	5988516	7333083	1.1/4	146.0	230.0	60.0	5988106	32.0	146.0	230.0	60.0	5988716
1.1/32	5988650	5988908	7333084	1.1/4	146.0	230.0	60.0	5988106	32.0	146.0	230.0	60.0	5988716
26.5	5988858	5988519	7333085	1.1/4	146.0	230.0	60.0	5988106	32.0	146.0	230.0	60.0	5988716
1.3/64	5988744	5988914	7333086	1.1/4	146.0	230.0	60.0	5988106	32.0	146.0	230.0	60.0	5988716
1.1/16	5988637	5988907	7333087	1.1/4	151.0	235.0	60.0	5988104	32.0	151.0	235.0	60.0	5988722
27.0	5988861	5988523	7333088	1.1/4	151.0	235.0	60.0	5988104	32.0	151.0	235.0	60.0	5988722
1.5/64	5988611	5988916	7333089	1.1/4	151.0	235.0	60.0	5988104	32.0	151.0	235.0	60.0	5988722
27.5	5988865	5988528	7333090	1.1/4	151.0	235.0	60.0	5988104	32.0	151.0	235.0	60.0	5988722
1.3/32	5988739	5988913	7333091	1.1/4	151.0	235.0	60.0	5988104	32.0	151.0	235.0	60.0	5988722
28.0	5988876	5988535	7333092	1.1/4	157.0	240.0	60.0	5988097	32.0	157.0	240.0	60.0	5988732
1.7/64	5988614	5988918	7333093	1.1/4	157.0	240.0	60.0	5988097	32.0	157.0	240.0	60.0	5988732
28.5	5988844	5988540	7333094	1.1/4	157.0	240.0	60.0	5988097	32.0	157.0	240.0	60.0	5988732
1.1/8	5988720	5988910	7333095	1.1/4	157.0	240.0	60.0	5988097	32.0	157.0	240.0	60.0	5988732
1.9/64	5988617	5988919	7333096	1.1/4	162.0	245.0	60.0	5988099	32.0	162.0	245.0	60.0	5988743
29.0	5988888	5988548	7333097	1.1/4	162.0	245.0	60.0	5988099	32.0	162.0	245.0	60.0	5988743
1.5/32	5988608	5988915	7333098	1.1/4	162.0	245.0	60.0	5988099	32.0	162.0	245.0	60.0	5988743
29.5	5988906	5988552	7333099	1.1/4	162.0	245.0	60.0	5988099	32.0	162.0	245.0	60.0	5988743
1.11/64	5988730	5988911	7333100	1.1/4	162.0	245.0	60.0	5988099	32.0	162.0	245.0	60.0	5988743
30.0	5988930	5988564	7333101	1.1/4	167.0	255.0	60.0	5988101	32.0	167.0	255.0	60.0	5988748
1.3/16	5988735	5988912	7333102	1.1/4	167.0	255.0	60.0	5988101	32.0	167.0	255.0	60.0	5988748
30.5	5988932	5988568	7333103	1.1/4	167.0	255.0	60.0	5988101	32.0	167.0	255.0	60.0	5988748
1.7/32	6104481	—	7333104	—	—	—	—	—	32.0	176.5	261.5	60.0	6111413
31.00	6104482	—	7333105	—	—	—	—	—	32.0	176.5	261.5	60.0	6111413
1.1/4	6104483	—	7333106	—	—	—	—	—	32.0	176.5	261.5	60.0	6111413
32.00	6104484	—	7333107	—	—	—	—	—	32.0	176.5	261.5	60.0	6111413
32.50	6104485	—	7333108	—	—	—	—	—	32.0	186.5	271.5	60.0	6111414
1.19/64	6104486	—	7333109	—	—	—	—	—	32.0	186.5	271.5	60.0	6111414
33.00	6104487	—	7333110	—	—	—	—	—	32.0	186.5	271.5	60.0	6111414
33.50	6104488	—	7333111	—	—	—	—	—	32.0	186.5	271.5	60.0	6111414
34.00	6104489	—	7333112	—	—	—	—	—	40.0	196.5	291.5	70.0	6111415
1.11/32	6104530	—	7333113	—	—	—	—	—	40.0	196.5	291.5	70.0	6111415
34.50	6104531	—	7333114	—	—	—	—	—	40.0	196.5	291.5	70.0	6111415
1.3/8	6104532	—	7333115	—	—	—	—	—	40.0	196.5	291.5	70.0	6111415
35.00	6104533	—	7333116	—	—	—	—	—	40.0	196.5	291.5	70.0	6111415
36.00	6104534	—	7333117	—	—	—	—	—	40.0	201.5	296.5	70.0	6111416
1.27/64	6104535	—	7333118	—	—	—	—	—	40.0	201.5	296.5	70.0	6111416
36.50	6104536	—	7333119	—	—	—	—	—	40.0	201.5	296.5	70.0	6111416
37.00	6104537	—	7333120	—	—	—	—	—	40.0	211.5	306.5	70.0	6111417
1.15/32	6104538	—	7333121	—	—	—	—	—	40.0	211.5	306.5	70.0	6111417
37.50	6104539	—	7333122	—	—	—	—	—	40.0	211.5	306.5	70.0	6111417
38.00	6104540	—	7333123	—	—	—	—	—	40.0	211.5	306.5	70.0	6111417
1.1/2	6104541	—	7333124	—	—	—	—	—	40.0	211.5	316.5	70.0	6111418
38.50	6104542	—	7333125	—	—	—	—	—	40.0	211.5	316.5	70.0	6111418
1.17/32	6104543	—	7333126	—	—	—	—	—	40.0	211.5	316.5	70.0	6111418
39.00	6104544	—	7333127	—	—	—	—	—	40.0	211.5	316.5	70.0	6111418
39.50	6104545	—	7333128	—	—	—	—	—	40.0	211.5	316.5	70.0	6111418
1.9/16	6104546	—	7333129	—	—	—	—	—	40.0	226.5	325.5	70.0	6111419
40.00	6104547	—	7333130	—	—	—	—	—	40.0	226.5	325.5	70.0	6111419
41.00	6104548	—	7333131	—	—	—	—	—	40.0	226.5	325.5	70.0	6111419
1.5/8	6104549	—	7333132	—	—	—	—	—	40.0	236.5	336.5	70.0	6111420
42.00	6104550	—	7333133	—	—	—	—	—	40.0	236.5	336.5	70.0	6111420

## 8xD Hydra Bodies

### H858

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



**H858 Coolant Through**

DIN 6535HB  
DIN 6535HE

**8XD**

**HSS**

**140°**

13.50 - 42.00

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

- \* Metric bodies have whistle notch on shank
- \* For more information on Hydra, see page 539

Hydra Head $d_1 \text{ } \varnothing$	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	8xD Hydra Body - Metric Shank					8xD Hydra Body - Metric Shank				
				$d_2 \text{ } \varnothing_{h_6}$ mm	$l_2$ mm	$l_1$ mm	$l_3$ mm	H858 EDP#	$d_2 \text{ } \varnothing_{h_6}$ mm	$l_2$ mm	$l_1$ mm	$l_3$ mm	H858 EDP#
13.5	5988645	5988791	7332990	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
13.6	5988646	5988839	7332991	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
13.7	5988647	5988883	7332992	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
13.8	5988648	5988889	7332993	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
35/64	5988854	5988583	7332994	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
14.0	5988652	5988895	7332995	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
14.1	5988655	5988897	7332996	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
14.2	5988657	5988692	7332997	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
9/16	5988904	5988664	7332998	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
14.5	5988660	5988696	7332999	—	—	—	—	—	16.0	124.5	191.5	48.0	5988789
14.6	5988663	5988700	7333000	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
37/64	5988857	5988591	7333001	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
14.7	5988666	5988705	7333002	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
14.8	5988668	5988709	7333003	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
15.0	5988670	5988714	7333004	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
19/32	5988779	5988621	7333005	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
15.1	5988672	5988719	7333006	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
15.2	5988674	5988724	7333007	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
15.24	5988678	5988729	7333008	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
39/64	5988860	5988595	7333009	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
15.5	5988680	5988734	7333010	—	—	—	—	—	20.0	133.5	201.5	50.0	5988793
15.6	5988683	5988742	7333011	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797
15.7	5988687	5988747	7333012	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797
5/8	5988884	5988612	7333013	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797
16.0	5988698	5988763	7333014	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797
16.08	5988702	5988769	7333015	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797
16.1	5988710	5988773	7333016	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797
16.2	5988715	5988777	7333017	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797
41/64	5988864	5988599	7333018	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797
16.3	5988725	5988783	7333019	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797

# HYDRA DRILL



Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	8xD Hydra Body - Metric Shank					8xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H858 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H858 EDP#
16.5	5988690	5988787	7333020	—	—	—	—	—	20.0	141.5	211.5	50.0	5988797
16.6	5988749	5988795	7333021	—	—	—	—	—	20.0	150.5	221.5	50.0	5988800
21/32	5988802	5988443	7333022	—	—	—	—	—	20.0	150.5	221.5	50.0	5988800
16.7	5988790	5988799	7333023	—	—	—	—	—	20.0	150.5	221.5	50.0	5988800
17.0	5988833	5988803	7333024	—	—	—	—	—	20.0	150.5	221.5	50.0	5988800
43/64	5988867	5988601	7333025	—	—	—	—	—	20.0	150.5	221.5	50.0	5988800
17.1	5988873	5988807	7333026	—	—	—	—	—	20.0	150.5	221.5	50.0	5988800
17.2	5988881	5988811	7333027	—	—	—	—	—	20.0	150.5	221.5	50.0	5988800
11/16	5988623	5988921	7333028	—	—	—	—	—	20.0	150.5	221.5	50.0	5988800
17.5	5988885	5988818	7333029	—	—	—	—	—	20.0	150.5	221.5	50.0	5988800
17.6	5988891	5988823	7333030	—	—	—	—	—	20.0	158.5	226.5	50.0	5988804
17.7	5988894	5988827	7333031	—	—	—	—	—	20.0	158.5	226.5	50.0	5988804
45/64	5988872	5988603	7333032	—	—	—	—	—	20.0	158.5	226.5	50.0	5988804
18.0	5988701	5988835	7333033	—	—	—	—	—	20.0	158.5	226.5	50.0	5988804
18.1	5988706	5988841	7333034	—	—	—	—	—	20.0	158.5	226.5	50.0	5988804
18.2	5988713	5988845	7333035	—	—	—	—	—	20.0	158.5	226.5	50.0	5988804
23/32	5988824	5988471	7333036	—	—	—	—	—	20.0	158.5	226.5	50.0	5988804
18.5	5988718	5988848	7333037	—	—	—	—	—	20.0	158.5	226.5	50.0	5988804
18.6	5988723	5988853	7333038	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
47/64	5988877	5988606	7333039	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
18.7	5988728	5988856	7333040	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
18.9	5988733	5988863	7333041	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
19.0	5988740	5988868	7333042	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
3/4	5988928	5988559	7333043	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
19.1	5988745	5988871	7333044	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
19.2	5988752	5988875	7333045	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
19.25	5988756	5988879	7333046	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
19.3	5988760	5988887	7333047	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
19.35	5988764	5988438	7333048	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
49/64	5988880	5988609	7333049	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
19.5	5988767	5988495	7333050	—	—	—	—	—	25.0	167.5	251.5	56.0	5988808
19.6	5988771	5988544	7333051	—	—	—	—	—	25.0	175.5	264.5	56.0	5988812
19.7	5988775	5988587	7333052	—	—	—	—	—	25.0	175.5	264.5	56.0	5988812
25/32	5988851	5988511	7333053	—	—	—	—	—	25.0	175.5	264.5	56.0	5988812
20.0	5988782	5988629	7333054	—	—	—	—	—	25.0	175.5	264.5	56.0	5988812
51/64	5988892	5988615	7333055	—	—	—	—	—	25.0	175.5	264.5	56.0	5988812
20.5	5988786	5988632	7333056	—	—	—	—	—	25.0	175.5	264.5	56.0	5988812
13/16	5988649	5988893	7333057	—	—	—	—	—	25.0	184.5	266.5	56.0	5988817
21.0	5988794	5988635	7333058	—	—	—	—	—	25.0	184.5	266.5	56.0	5988817
53/64	5988896	5988618	7333059	—	—	—	—	—	25.0	184.5	266.5	56.0	5988817
27/32	5988869	5988531	7333060	—	—	—	—	—	25.0	184.5	266.5	56.0	5988817
21.5	5988798	5988638	7333061	—	—	—	—	—	25.0	184.5	266.5	56.0	5988817
55/64	5988898	5988626	7333062	—	—	—	—	—	25.0	192.1	271.1	56.0	5988821
22.0	5988806	5988448	7333063	—	—	—	—	—	25.0	192.1	271.1	56.0	5988821
7/8	5988903	5988661	7333064	—	—	—	—	—	25.0	192.1	271.1	56.0	5988821
22.5	5988810	5988453	7333065	—	—	—	—	—	25.0	192.1	271.1	56.0	5988821
57/64	5988899	5988651	7333066	—	—	—	—	—	25.0	192.1	271.1	56.0	5988821
22.7	5988814	5988458	7333067	—	—	—	—	—	25.0	192.1	271.1	56.0	5988821
23.0	5988816	5988462	7333068	—	—	—	—	—	25.0	200.5	280.5	56.0	5988829
29/32	5988917	5988556	7333069	—	—	—	—	—	25.0	200.5	280.5	56.0	5988829
59/64	5988900	5988653	7333070	—	—	—	—	—	25.0	200.5	280.5	56.0	5988829
23.5	5988820	5988466	7333071	—	—	—	—	—	25.0	200.5	280.5	56.0	5988829
15/16	5988691	5988754	7333072	—	—	—	—	—	32.0	208.2	295.2	60.0	5988832
24.0	5988828	5988476	7333073	—	—	—	—	—	32.0	208.2	295.2	60.0	5988832
61/64	5988901	5988656	7333074	—	—	—	—	—	32.0	208.2	295.2	60.0	5988832
24.5	5988837	5988483	7333075	—	—	—	—	—	32.0	208.2	295.2	60.0	5988832
31/32	5988934	5988572	7333076	—	—	—	—	—	32.0	208.2	295.2	60.0	5988832
25.0	5988840	5988488	7333077	—	—	—	—	—	32.0	217.0	300.0	60.0	5988836
63/64	5988902	5988658	7333078	—	—	—	—	—	32.0	217.0	300.0	60.0	5988836
1	5988604	5988905	7333079	—	—	—	—	—	32.0	217.0	300.0	60.0	5988836
25.5	5988843	5988499	7333080	—	—	—	—	—	32.0	217.0	300.0	60.0	5988836
25.65	5988847	5988506	7333081	—	—	—	—	—	32.0	217.0	300.0	60.0	5988836
1.1/64	5988676	5988909	7333082	—	—	—	—	—	32.0	217.0	300.0	60.0	5988836
26.0	5988855	5988516	7333083	—	—	—	—	—	32.0	225.0	310.0	60.0	5988842
1.1/32	5988650	5988908	7333084	—	—	—	—	—	32.0	225.0	310.0	60.0	5988842

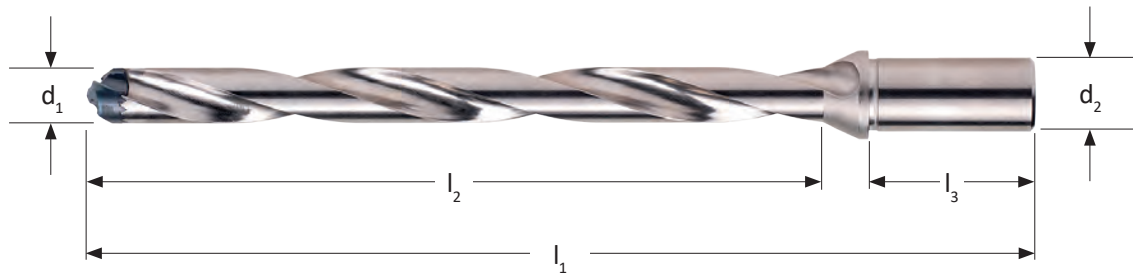
Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	8xD Hydra Body - Metric Shank					8xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H858 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H858 EDP#
26.5	5988858	5988519	7333085	—	—	—	—	—	32.0	225.0	310.0	60.0	5988842
1.3/64	5988744	5988914	7333086	—	—	—	—	—	32.0	225.0	310.0	60.0	5988842
1.1/16	5988637	5988907	7333087	—	—	—	—	—	32.0	234.0	320.0	60.0	5988846
27.0	5988861	5988523	7333088	—	—	—	—	—	32.0	234.0	320.0	60.0	5988846
1.5/64	5988611	5988916	7333089	—	—	—	—	—	32.0	234.0	320.0	60.0	5988846
27.5	5988865	5988528	7333090	—	—	—	—	—	32.0	234.0	320.0	60.0	5988846
1.3/32	5988739	5988913	7333091	—	—	—	—	—	32.0	234.0	320.0	60.0	5988846
28.0	5988876	5988535	7333092	—	—	—	—	—	32.0	242.0	325.0	60.0	5988849
1.7/64	5988614	5988918	7333093	—	—	—	—	—	32.0	242.0	325.0	60.0	5988849
28.5	5988844	5988540	7333094	—	—	—	—	—	32.0	242.0	325.0	60.0	5988849
1.1/8	5988720	5988910	7333095	—	—	—	—	—	32.0	242.0	325.0	60.0	5988849
1.9/64	5988617	5988919	7333096	—	—	—	—	—	32.0	251.0	335.0	60.0	5988852
29.0	5988888	5988548	7333097	—	—	—	—	—	32.0	251.0	335.0	60.0	5988852
1.5/32	5988608	5988915	7333098	—	—	—	—	—	32.0	251.0	335.0	60.0	5988852
29.5	5988906	5988552	7333099	—	—	—	—	—	32.0	251.0	335.0	60.0	5988852
1.11/64	5988730	5988911	7333100	—	—	—	—	—	32.0	251.0	335.0	60.0	5988852
30.0	5988930	5988564	7333101	—	—	—	—	—	32.0	259.0	345.0	60.0	5988859
1.3/16	5988735	5988912	7333102	—	—	—	—	—	32.0	259.0	345.0	60.0	5988859
30.5	5988932	5988568	7333103	—	—	—	—	—	32.0	259.0	345.0	60.0	5988859
1.7/32	6104481	—	7333104	—	—	—	—	—	32.0	271.5	356.5	60.0	6111421
31.00	6104482	—	7333105	—	—	—	—	—	32.0	271.5	356.5	60.0	6111421
1.1/4	6104483	—	7333106	—	—	—	—	—	32.0	271.5	356.5	60.0	6111421
32.00	6104484	—	7333107	—	—	—	—	—	32.0	271.5	356.5	60.0	6111421
32.50	6104485	—	7333108	—	—	—	—	—	40.0	286.5	371.5	60.0	6111422
1.19/64	6104486	—	7333109	—	—	—	—	—	40.0	286.5	371.5	60.0	6111422
33.00	6104487	—	7333110	—	—	—	—	—	40.0	286.5	371.5	60.0	6111422
33.50	6104488	—	7333111	—	—	—	—	—	40.0	286.5	371.5	60.0	6111422
34.00	6104489	—	7333112	—	—	—	—	—	40.0	301.5	396.5	70.0	6111423
1.11/32	6104530	—	7333113	—	—	—	—	—	40.0	301.5	396.5	70.0	6111423
34.50	6104531	—	7333114	—	—	—	—	—	40.0	301.5	396.5	70.0	6111423
1.3/8	6104532	—	7333115	—	—	—	—	—	40.0	301.5	396.5	70.0	6111423
35.00	6104533	—	7333116	—	—	—	—	—	40.0	301.5	396.5	70.0	6111423
36.00	6104534	—	7333117	—	—	—	—	—	40.0	311.5	406.5	70.0	6111424
1.27/64	6104535	—	7333118	—	—	—	—	—	40.0	311.5	406.5	70.0	6111424
36.50	6104536	—	7333119	—	—	—	—	—	40.0	311.5	406.5	70.0	6111424
37.00	6104537	—	7333120	—	—	—	—	—	40.0	326.5	421.5	70.0	6111425
1.15/32	6104538	—	7333121	—	—	—	—	—	40.0	326.5	421.5	70.0	6111425
37.50	6104539	—	7333122	—	—	—	—	—	40.0	326.5	421.5	70.0	6111425
38.00	6104540	—	7333123	—	—	—	—	—	40.0	326.5	421.5	70.0	6111425
1.1/2	6104541	—	7333124	—	—	—	—	—	40.0	336.5	431.5	70.0	6111426
38.50	6104542	—	7333125	—	—	—	—	—	40.0	336.5	431.5	70.0	6111426
1.17/32	6104543	—	7333126	—	—	—	—	—	40.0	336.5	431.5	70.0	6111426
39.00	6104544	—	7333127	—	—	—	—	—	40.0	336.5	431.5	70.0	6111426
39.50	6104545	—	7333128	—	—	—	—	—	40.0	336.5	431.5	70.0	6111426
1.9/16	6104546	—	7333129	—	—	—	—	—	40.0	351.5	451.5	70.0	6111427
40.00	6104547	—	7333130	—	—	—	—	—	40.0	351.5	451.5	70.0	6111427
41.00	6104548	—	7333131	—	—	—	—	—	40.0	351.5	451.5	70.0	6111427
1.5/8	6104549	—	7333132	—	—	—	—	—	40.0	361.5	461.5	70.0	6111428
42.00	6104550	—	7333133	—	—	—	—	—	40.0	361.5	461.5	70.0	6111428



## 12xD Hydra Bodies

### H8512

Metric body, Cylindrical shank



H851  
Coolant  
Through



12XD

HSS

140°



NEW

13.5 – 1.1/64

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

\* For more information on Hydra, see page 539

Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	12xD Hydra Body - Fractional Shank					12xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H8512 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H8512 EDP#
13.5	5988645	5988791	7332990	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
13.6	5988646	5988839	7332991	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
13.7	5988647	5988883	7332992	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
13.8	5988648	5988889	7332993	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
35/64	5988854	5988583	7332994	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
14.0	5988652	5988895	7332995	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
14.1	5988655	5988897	7332996	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
14.2	5988657	5988692	7332997	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
9/16	5988904	5988664	7332998	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
14.5	5988660	5988696	7332999	—	—	—	—	—	16.00	168.0	236.0	48.0	7833364
14.6	5988663	5988700	7333000	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
37/64	5988857	5988591	7333001	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
14.7	5988666	5988705	7333002	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
14.8	5988668	5988709	7333003	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
15.0	5988670	5988714	7333004	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
19/32	5988779	5988621	7333005	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
15.1	5988672	5988719	7333006	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
15.2	5988674	5988724	7333007	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
15.24	5988678	5988729	7333008	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
39/64	5988860	5988595	7333009	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
15.5	5988680	5988734	7333010	—	—	—	—	—	20.00	180.0	250.3	50.0	7833365
15.6	5988683	5988742	7333011	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366
15.7	5988687	5988747	7333012	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366
5/8	5988884	5988612	7333013	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366
16.0	5988698	5988763	7333014	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366
16.08	5988702	5988769	7333015	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366
16.1	5988710	5988773	7333016	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366
16.2	5988715	5988777	7333017	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366
41/64	5988864	5988599	7333018	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366
16.3	5988725	5988783	7333019	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366
16.5	5988690	5988787	7333020	—	—	—	—	—	20.00	192.0	262.6	50.0	7833366



Hydra Head d <sub>1</sub> Ø	Hydra Head R950 EDP#	Hydra Head R960 EDP#	Hydra Head R970 EDP#	12xD Hydra Body - Fractional Shank					12xD Hydra Body - Metric Shank				
				d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H8512 EDP#	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	H8512 EDP#
16.6	5988749	5988795	7333021	—	—	—	—	—	20.00	204.0	275.0	50.0	7833367
21/32	5988802	5988443	7333022	—	—	—	—	—	20.00	204.0	275.0	50.0	7833367
16.7	5988790	5988799	7333023	—	—	—	—	—	20.00	204.0	275.0	50.0	7833367
17.0	5988833	5988803	7333024	—	—	—	—	—	20.00	204.0	275.0	50.0	7833367
43/64	5988867	5988601	7333025	—	—	—	—	—	20.00	204.0	275.0	50.0	7833367
17.1	5988873	5988807	7333026	—	—	—	—	—	20.00	204.0	275.0	50.0	7833367
17.2	5988881	5988811	7333027	—	—	—	—	—	20.00	204.0	275.0	50.0	7833367
11/16	5988623	5988921	7333028	—	—	—	—	—	20.00	204.0	275.0	50.0	7833367
17.5	5988885	5988818	7333029	—	—	—	—	—	20.00	204.0	275.0	50.0	7833367
17.6	5988891	5988823	7333030	—	—	—	—	—	20.00	216.0	287.2	50.0	7833368
17.7	5988894	5988827	7333031	—	—	—	—	—	20.00	216.0	287.2	50.0	7833368
45/64	5988872	5988603	7333032	—	—	—	—	—	20.00	216.0	287.2	50.0	7833368
18.0	5988701	5988835	7333033	—	—	—	—	—	20.00	216.0	287.2	50.0	7833368
18.1	5988706	5988841	7333034	—	—	—	—	—	20.00	216.0	287.2	50.0	7833368
18.2	5988713	5988845	7333035	—	—	—	—	—	20.00	216.0	287.2	50.0	7833368
23/32	5988824	5988471	7333036	—	—	—	—	—	20.00	216.0	287.2	50.0	7833368
18.5	5988718	5988848	7333037	—	—	—	—	—	20.00	216.0	287.2	50.0	7833368
18.6	5988723	5988853	7333038	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
47/64	5988877	5988606	7333039	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
18.7	5988728	5988856	7333040	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
18.9	5988733	5988863	7333041	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
19.0	5988740	5988868	7333042	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
3/4	5988928	5988559	7333043	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
19.1	5988745	5988871	7333044	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
19.2	5988752	5988875	7333045	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
19.25	5988756	5988879	7333046	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
19.3	5988760	5988887	7333047	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
19.35	5988764	5988438	7333048	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
49/64	5988880	5988609	7333049	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
19.5	5988767	5988495	7333050	—	—	—	—	—	25.00	228.0	305.6	56.0	7833369
19.6	5988771	5988544	7333051	—	—	—	—	—	25.00	240.0	317.8	56.0	7833370
19.7	5988775	5988587	7333052	—	—	—	—	—	25.00	240.0	317.8	56.0	7833370
25/32	5988851	5988511	7333053	—	—	—	—	—	25.00	240.0	317.8	56.0	7833370
20.0	5988782	5988629	7333054	—	—	—	—	—	25.00	240.0	317.8	56.0	7833370
51/64	5988892	5988615	7333055	—	—	—	—	—	25.00	240.0	317.8	56.0	7833370
20.5	5988786	5988632	7333056	—	—	—	—	—	25.00	240.0	317.8	56.0	7833370
13/16	5988649	5988893	7333057	—	—	—	—	—	25.00	252.0	330.1	56.0	7833371
21.0	5988794	5988635	7333058	—	—	—	—	—	25.00	252.0	330.1	56.0	7833371
53/64	5988896	5988618	7333059	—	—	—	—	—	25.00	252.0	330.1	56.0	7833371
27/32	5988869	5988531	7333060	—	—	—	—	—	25.00	252.0	330.1	56.0	7833371
21.5	5988798	5988638	7333061	—	—	—	—	—	25.00	252.0	330.1	56.0	7833371
55/64	5988898	5988626	7333062	—	—	—	—	—	25.00	264.0	343.0	56.0	7833372
22.0	5988806	5988448	7333063	—	—	—	—	—	25.00	264.0	343.0	56.0	7833372
7/8	5988903	5988661	7333064	—	—	—	—	—	25.00	264.0	343.0	56.0	7833372
22.5	5988810	5988453	7333065	—	—	—	—	—	25.00	264.0	343.0	56.0	7833372
57/64	5988899	5988651	7333066	—	—	—	—	—	25.00	264.0	343.0	56.0	7833372
22.7	5988814	5988458	7333067	—	—	—	—	—	25.00	264.0	343.0	56.0	7833372
23.0	5988816	5988462	7333068	—	—	—	—	—	25.00	276.0	354.8	56.0	7833373
29/32	5988917	5988556	7333069	—	—	—	—	—	25.00	276.0	354.8	56.0	7833373
59/64	5988900	5988653	7333070	—	—	—	—	—	25.00	276.0	354.8	56.0	7833373
23.5	5988820	5988466	7333071	—	—	—	—	—	25.00	276.0	354.8	56.0	7833373
15/16	5988691	5988754	7333072	—	—	—	—	—	32.00	288.0	371.7	60.0	7833374
24.0	5988828	5988476	7333073	—	—	—	—	—	32.00	288.0	371.7	60.0	7833374
61/64	5988901	5988656	7333074	—	—	—	—	—	32.00	288.0	371.7	60.0	7833374
24.5	5988837	5988483	7333075	—	—	—	—	—	32.00	288.0	371.7	60.0	7833374
31/32	5988934	5988572	7333076	—	—	—	—	—	32.00	288.0	371.7	60.0	7833374
25.0	5988840	5988488	7333077	—	—	—	—	—	32.00	300.0	383.8	60.0	7833375
63/64	5988902	5988658	7333078	—	—	—	—	—	32.00	300.0	383.8	60.0	7833375
1	5988604	5988905	7333079	—	—	—	—	—	32.00	300.0	383.8	60.0	7833375
25.5	5988843	5988499	7333080	—	—	—	—	—	32.00	300.0	383.8	60.0	7833375
25.65	5988847	5988506	7333081	—	—	—	—	—	32.00	300.0	383.8	60.0	7833375
1.1/64	5988676	5988909	7333082	—	—	—	—	—	32.00	300.0	383.8	60.0	7833375

## 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 more information on Hydra, see page 539



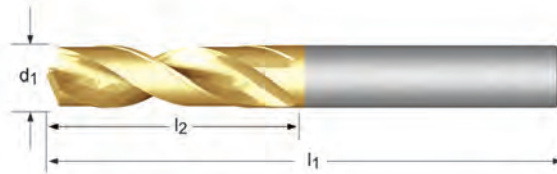
H860	H861	For Hydra Head Range	Wrench Size / Bit	Pack Qty	H860	H861
H860N1	H861N1	15/32 - 15.5	Torx 8IP	1	5988862	5987939
H860N2	H861N2	15.6 - 18.5	Torx 10IP	1	5988866	5987942
H860N3	H861N3	18.6 - 21.5	Torx 15IP	1	5988874	5987945
H860N4	H861N3	55/64 - 31/32	Torx 15IP	1	5987928	5987945
H860N5	H861N4	25.0 - 1.3/32	Torx 20IP	1	5987933	5987947
H860N6	H861N5	28.0 - 33.5	Torx 25IP	1	5987936	5987950
H860N7	H861N6	34.0 - 42.0	Torx 4mm	1	6111949	6260354

## 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

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



**R520**

DIN  
**6539**

**2.5XD**

**HM**

**130°**



3.00 - 16.50

$d_1$ $\varnothing h_7$ Inch	$d_1$ $\varnothing h_7$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	R520
	3.00	0.1181	16	46	1	5981147
	3.10	0.1220	18	49	1	5981152
1/8	3.18	0.1250	18	49	1	5980549
	3.20	0.1260	18	49	1	5981155
	3.30	0.1299	18	49	1	5981161
	3.40	0.1339	20	52	1	5981164
	3.50	0.1378	20	52	1	5981167
	3.60	0.1417	20	52	1	5981171
	3.70	0.1457	20	52	1	5981174
	3.80	0.1496	22	55	1	5981178
	3.90	0.1535	22	55	1	5981182
	4.00	0.1575	22	55	1	5981201
	4.10	0.1614	22	55	1	5981204
	4.20	0.1654	22	55	1	5981208
	4.30	0.1693	24	58	1	5981212
	4.40	0.1732	24	58	1	5981216
	4.50	0.1772	24	58	1	5981220
	4.60	0.1811	24	58	1	5981225
	4.70	0.1850	24	58	1	5981227
	4.80	0.1890	26	62	1	5981230
	4.90	0.1929	26	62	1	5981236
	5.00	0.1969	26	62	1	5981242
	5.10	0.2008	26	62	1	5981244
	5.20	0.2047	26	62	1	5981247
	5.30	0.2087	26	62	1	5981252
	5.40	0.2126	28	66	1	5981254
	5.50	0.2165	28	66	1	5981257
	5.60	0.2205	28	66	1	5981260
	5.70	0.2244	28	66	1	5981263
	5.80	0.2283	28	66	1	5981266
	5.90	0.2323	28	66	1	5981269
	6.00	0.2362	28	66	1	5981142
	6.10	0.2402	31	70	1	5981176

# CDX 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
	6.20	0.2441	31	70	1	5981218
	6.30	0.2480	31	70	1	5981226
1/4	6.35	0.2500	31	70	1	5980546
	6.40	0.2520	31	70	1	5981229
	6.50	0.2559	31	70	1	5981233
	6.60	0.2598	31	70	1	5981237
	6.70	0.2638	31	70	1	5981073
	6.80	0.2677	34	74	1	5981077
	6.90	0.2717	34	74	1	5981080
	7.00	0.2756	34	74	1	5981084
	7.10	0.2795	34	74	1	5981088
	7.20	0.2835	34	74	1	5981092
	7.30	0.2874	34	74	1	5981096
	7.40	0.2913	34	74	1	5981099
	7.50	0.2953	34	74	1	5981102
	7.60	0.2992	37	79	1	5981105
	7.70	0.3031	37	79	1	5981111
	7.80	0.3071	37	79	1	5981114
	7.90	0.3110	37	79	1	5981117
5/16	7.94	0.3125	37	79	1	5981275
	8.00	0.3150	37	79	1	5981126
	8.10	0.3189	37	79	1	5981129
	8.20	0.3228	37	79	1	5981131
	8.30	0.3268	37	79	1	5981135
	8.40	0.3307	37	79	1	5981138
	8.50	0.3346	37	79	1	5981145
	8.60	0.3386	40	84	1	5981148
	8.70	0.3425	40	84	1	5981150
	8.80	0.3465	40	84	1	5981153
	8.90	0.3504	40	84	1	5981156
	9.00	0.3543	40	84	1	5981159
	9.10	0.3583	40	84	1	5981163
	9.20	0.3622	40	84	1	5981166
	9.30	0.3661	40	84	1	5981169
	9.40	0.3701	40	84	1	5981173
	9.50	0.3740	40	84	1	5981180
3/8	9.52	0.3750	43	89	1	5981189
	9.60	0.3780	43	89	1	5981184
	9.70	0.3819	43	89	1	5981190
	9.80	0.3858	43	89	1	5981194
	9.90	0.3898	43	89	1	5981196
	10.00	0.3937	43	89	1	5980551
	10.10	0.3976	43	89	1	5980554
	10.20	0.4016	43	89	1	5980557
	10.30	0.4055	43	89	1	5980560
	10.40	0.4094	43	89	1	5980563
	10.50	0.4134	43	89	1	5980566
	11.00	0.4331	47	95	1	5980569
7/16	11.11	0.4375	47	95	1	5981120
	11.20	0.4409	47	95	1	5980575
	11.50	0.4528	47	95	1	5980579
	12.00	0.4724	51	102	1	5980589
	12.50	0.4921	51	102	1	5980591
1/2	12.70	0.5000	51	102	1	5980542
	13.00	0.5118	51	102	1	5980595
	13.50	0.5315	54	107	1	5980598
	14.00	0.5512	54	107	1	5980612
	14.20	0.5591	56	111	1	5981124
	14.25	0.5610	56	111	1	5981158
	14.50	0.5709	56	111	1	5981198
	15.00	0.5906	56	111	1	5981238
	15.10	0.5945	58	115	1	5981272
5/8	15.88	0.6250	58	115	1	5981108
	16.00	0.6299	58	115	1	5981285
	16.50	0.6496	60	119	1	5981289

## 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

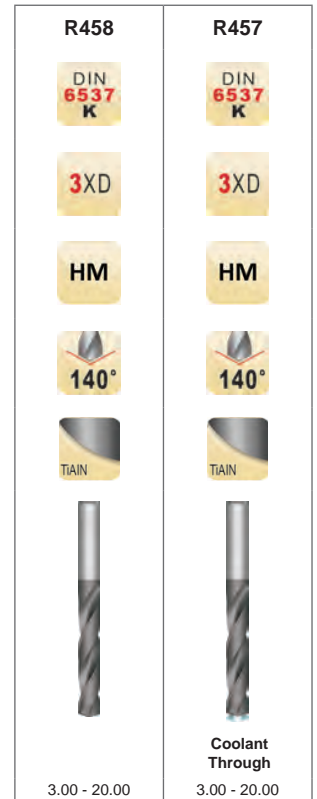
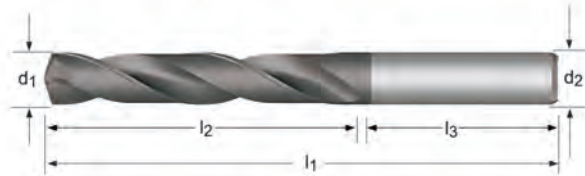
Self centering 4-facet split point and CTW flute construction for enhanced penetration rate. TiAlN coating increases wear resistance and improves tool life at high RPM.

### 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

Coolant through clears chips away from the cutting edge. Self centering 4-facet split point for enhanced penetration rates. TiAlN coating increases surface hardness and improves tool life at high RPM.

High productivity in a wide range of materials



d <sub>1</sub> Ø "/Nr.	d <sub>1</sub> Ø <sub>m7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	d <sub>2</sub> Ø <sub>h6</sub> mm	Pack Qty	R458	R457
	3.00	0.1181	20	62	36	6	1	5981063	5979225
	3.10	0.1220	20	62	36	6	1	5981066	5979229
1/8	3.18	0.1252	20	62	36	6	1	5980514	5979015
	3.20	0.1260	20	62	36	6	1	5981070	5979232
30	3.26	0.1283	20	62	36	6	1	5980227	5979343
	3.30	0.1299	20	62	36	6	1	5981074	5979236
	3.40	0.1339	20	62	36	6	1	5981081	5979240
29	3.45	0.1358	20	62	36	6	1	5980221	5979338
	3.50	0.1378	20	62	36	6	1	5981086	5979244
28	3.57	0.1406	20	62	36	6	1	5980216	5979335
9/64	3.57	0.1406	20	62	36	6	1	5980470	5980283
	3.60	0.1417	20	62	36	6	1	5981090	5979246
27	3.66	0.1441	20	62	36	6	1	5980213	5979331
	3.70	0.1457	20	62	36	6	1	5981093	5979249
26	3.73	0.1469	24	66	36	6	1	5981095	5979324
25	3.80	0.1496	24	66	36	6	1	5981098	5979321
24	3.86	0.1520	24	66	36	6	1	5980204	5979318
	3.90	0.1535	24	66	36	6	1	5981101	5979260
23	3.91	0.1539	24	66	36	6	1	5980201	5979315
5/32	3.97	0.1563	24	66	36	6	1	5980485	5980298
22	3.99	0.1571	24	66	36	6	1	5980198	5979312
	4.00	0.1575	24	66	36	6	1	5981132	5979285
21	4.04	0.1591	24	66	36	6	1	5980192	5979309
	4.05	0.1594	24	66	36	6	1	—	5979287
20	4.09	0.1610	24	66	36	6	1	5980188	5979306
	4.10	0.1614	24	66	36	6	1	5981134	5979292
	4.20	0.1654	24	66	36	6	1	5981137	5979295
19	4.22	0.1661	24	66	36	6	1	5980180	5979300
	4.30	0.1693	24	66	36	6	1	5981140	5979298
18	4.31	0.1697	24	66	36	6	1	5980176	5979297
11/64	4.37	0.1720	24	66	36	6	1	5980411	5979050
17	4.39	0.1728	24	66	36	6	1	5980172	5979291
	4.40	0.1732	24	66	36	6	1	5981143	5979301

# FORCE X SOLID CARBIDE DRILL



d <sub>1</sub> Ø "/Nr.	d <sub>1</sub> Øm <sub>7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	d <sub>2</sub> Øh <sub>6</sub> mm	Pack Qty	R458	R457
16	4.50	0.1772	24	66	36	6	1	5981149	5979289
15	4.57	0.1799	24	66	36	6	1	5980166	5979286
	4.60	0.1811	24	66	36	6	1	5981151	5979307
14	4.62	0.1819	24	66	36	6	1	5980163	5979284
	4.70	0.1850	24	66	36	6	1	5981154	5979310
13	4.70	0.1850	24	66	36	6	1	5980160	5979281
3/16	4.76	0.1875	28	66	36	6	1	5981103	5979263
12	4.80	0.1890	28	66	36	6	1	5981157	5979279
11	4.85	0.1909	28	66	36	6	1	5980153	5979277
	4.90	0.1929	28	66	36	6	1	5981160	5979319
10	4.92	0.1937	28	66	36	6	1	5980150	5979275
9	4.98	0.1961	28	66	36	6	1	5980253	5979369
	5.00	0.1969	28	66	36	6	1	5981175	5980432
	5.05	0.1988	28	66	36	6	1	—	5980440
8	5.06	0.1992	28	66	36	6	1	5980250	5979360
	5.10	0.2008	28	66	36	6	1	5981181	5980444
7	5.11	0.2012	28	66	36	6	1	5980247	5979357
13/64	5.16	0.2031	28	66	36	6	1	5980456	5979077
6	5.18	0.2039	28	66	36	6	1	5980243	5979353
	5.20	0.2047	28	66	36	6	1	5980322	5980447
5	5.22	0.2055	28	66	36	6	1	5980240	5979350
	5.30	0.2087	28	66	36	6	1	7361260	7361237
4	5.31	0.2091	28	66	36	6	1	5980237	5979346
	5.40	0.2126	28	66	36	6	1	7361261	7361238
3	5.41	0.2130	28	66	36	6	1	5980226	5979341
	5.50	0.2165	28	66	36	6	1	5980360	5980451
7/32	5.56	0.2189	28	66	36	6	1	5980394	5980386
	5.60	0.2205	28	66	36	6	1	5980397	5980287
2	5.61	0.2209	28	66	36	6	1	5980184	5979303
	5.70	0.2244	28	66	36	6	1	5980435	5980290
1	5.79	0.2280	28	66	36	6	1	5980146	5979273
	5.80	0.2283	28	66	36	6	1	5980474	5980293
	5.90	0.2323	28	66	36	6	1	7361262	7361239
A	5.94	0.2339	28	66	36	6	1	5980127	5979254
15/64	5.95	0.2343	28	66	36	6	1	5980494	5979114
	6.00	0.2362	28	66	36	6	1	5980492	5980303
B	6.03	0.2374	34	79	36	8	1	7361263	7361240
	6.05	0.2382	34	79	36	8	1	—	5980306
	6.10	0.2402	34	79	36	8	1	5980329	5980309
C	6.15	0.2421	34	79	36	8	1	7361264	7361241
	6.20	0.2441	34	79	36	8	1	5980333	5980312
D	6.25	0.2461	34	79	36	8	1	5980131	5979257
	6.30	0.2480	34	79	36	8	1	5980336	5980320
1/4	6.35	0.2500	34	79	36	8	1	5980479	5979135
E	6.35	0.2500	34	79	36	8	1	7361265	7361242
	6.40	0.2520	34	79	36	8	1	5980339	5980323
	6.50	0.2559	34	79	36	8	1	5980342	5980327
F	6.53	0.2571	34	79	36	8	1	7361266	7361243
	6.60	0.2598	34	79	36	8	1	5980345	5980331
G	6.63	0.2610	34	79	36	8	1	7361267	7361244
	6.70	0.2638	34	79	36	8	1	5980347	5980335
17/64	6.75	0.2657	34	79	36	8	1	5980517	5979316
H	6.76	0.2661	34	79	36	8	1	5980134	5979259
	6.80	0.2677	34	79	36	8	1	5980350	5980338
	6.90	0.2717	34	79	36	8	1	5980353	5980341
I	6.91	0.2720	34	79	36	8	1	7361268	7361245
	7.00	0.2756	34	79	36	8	1	5980356	5980344
J	7.04	0.2772	41	79	36	8	1	7361269	7361246
	7.10	0.2795	41	79	36	8	1	5980362	5980349
K	7.14	0.2811	41	79	36	8	1	7361270	7361247
9/32	7.14	0.2811	41	79	36	8	1	5980467	5980280
	7.20	0.2835	41	79	36	8	1	7361271	7361248
	7.30	0.2874	41	79	36	8	1	5980366	5980352
L	7.37	0.2902	41	79	36	8	1	5980136	5979262
	7.40	0.2913	41	79	36	8	1	5980369	5980358



d <sub>1</sub> Ø "/Nr.	d <sub>1</sub> Øm <sub>7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	d <sub>2</sub> Øh <sub>6</sub> mm	Pack Qty	R458	R457
M	7.49	0.2949	41	79	36	8	1	5980139	5979265
	7.50	0.2953	41	79	36	8	1	5980373	5980363
19/64	7.54	0.2969	41	79	36	8	1	5981188	5979192
	7.60	0.2992	41	79	36	8	1	5980377	5980367
N	7.67	0.3020	41	79	36	8	1	5980144	5979271
	7.70	0.3031	41	79	36	8	1	5980381	5980371
	7.80	0.3071	41	79	36	8	1	5980385	5980375
	7.90	0.3110	41	79	36	8	1	5980388	5980379
5/16	7.94	0.3126	41	79	36	8	1	5980480	5980296
	8.00	0.3150	41	79	36	8	1	5980400	5980389
O	8.03	0.3161	47	89	40	10	1	5980256	5979013
	8.05	0.3169	47	89	40	10	1	—	5980392
	8.10	0.3189	47	89	40	10	1	5980403	5980398
	8.20	0.3228	47	89	40	10	1	5980406	5980401
P	8.20	0.3228	47	89	40	10	1	7361272	7361249
	8.30	0.3268	47	89	40	10	1	7361273	7361250
21/64	8.33	0.3280	47	89	40	10	1	5981046	5979203
	8.40	0.3307	47	89	40	10	1	5980409	5980404
Q	8.43	0.3319	47	89	40	10	1	5980260	5979034
	8.50	0.3346	47	89	40	10	1	5980412	5980407
	8.60	0.3386	47	89	40	10	1	5980415	5980410
R	8.61	0.3390	47	89	40	10	1	7361274	7361251
	8.70	0.3425	47	89	40	10	1	5980418	5980413
11/32	8.73	0.3437	47	89	40	10	1	5980408	5979048
	8.80	0.3465	47	89	40	10	1	5980421	5980416
S	8.84	0.3480	47	89	40	10	1	7361275	7361252
	8.90	0.3504	47	89	40	10	1	7361276	5980420
	9.00	0.3543	47	89	40	10	1	5980425	5980423
T	9.09	0.3579	47	89	40	10	1	5980263	5979055
	9.10	0.3583	47	89	40	10	1	5980428	5980429
23/64	9.13	0.3594	47	89	40	10	1	5981051	5979209
	9.20	0.3622	47	89	40	10	1	7361277	7361253
	9.30	0.3661	47	89	40	10	1	5980439	5980436
U	9.35	0.3681	47	89	40	10	1	5980266	5979080
	9.40	0.3701	47	89	40	10	1	5980443	5980122
3/8	9.50	0.3740	47	89	40	10	1	5980445	5980159
	9.52	0.3748	47	89	40	10	1	5981109	5979269
V	9.58	0.3772	47	89	40	10	1	7361278	7361254
	9.60	0.3780	47	89	40	10	1	5980449	5980195
	9.70	0.3819	47	89	40	10	1	5980454	5980233
	9.80	0.3858	47	89	40	10	1	5980457	5980268
W	9.80	0.3858	47	89	40	10	1	7361279	7361255
	9.90	0.3898	47	89	40	10	1	5980461	5980274
25/64	9.92	0.3906	47	89	40	10	1	5981055	5979212
	10.00	0.3937	47	89	40	10	1	5980520	5979017
	10.05	0.3957	55	102	45	12	1	—	5979019
X	10.08	0.3969	55	102	45	12	1	5980271	5979117
	10.10	0.3976	55	102	45	12	1	5980523	5979021
	10.20	0.4016	55	102	45	12	1	5980524	5979023
Y	10.26	0.4039	55	102	45	12	1	5980359	5979125
	10.30	0.4055	55	102	45	12	1	5980527	5979025
13/32	10.32	0.4063	55	102	45	12	1	5980453	5979075
	10.40	0.4094	55	102	45	12	1	5980364	5979027
Z	10.49	0.4130	55	102	45	12	1	5980402	5979128
	10.50	0.4134	55	102	45	12	1	5980370	5979029
27/64	10.60	0.4173	55	102	45	12	1	5980374	5979030
	10.70	0.4213	55	102	45	12	1	7361280	—
	10.72	0.4220	55	102	45	12	1	5981058	5979218
	10.80	0.4252	55	102	45	12	1	5980378	7361256
	10.90	0.4291	55	102	45	12	1	7361281	—
7/16	11.00	0.4331	55	102	45	12	1	5980384	5979032
	11.10	0.4370	55	102	45	12	1	7361282	—
	11.11	0.4374	55	102	45	12	1	5980391	5980382
	11.20	0.4409	55	102	45	12	1	5980387	5979036

# FORCE X SOLID CARBIDE DRILL



d <sub>1</sub> Ø "/Nr.	d <sub>1</sub> Øm <sub>7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	d <sub>2</sub> Øh <sub>6</sub> mm	Pack Qty	R458	R457
	11.30	0.4449	55	102	45	12	1	7361283	7361257
	11.40	0.4488	55	102	45	12	1	5980390	5979038
	11.50	0.4528	55	102	45	12	1	5980393	5979040
29/64	11.51	0.4531	55	102	45	12	1	5981061	5979221
	11.60	0.4567	55	102	45	12	1	5980396	5979042
	11.70	0.4606	55	102	45	12	1	7361284	—
	11.80	0.4646	55	102	45	12	1	5980399	5979044
	11.90	0.4685	55	102	45	12	1	7361285	—
15/32	11.91	0.4689	55	102	45	12	1	5980490	5979110
	12.00	0.4724	55	102	45	12	1	5980414	5979052
	12.05	0.4744	60	107	45	14	1	—	5979053
	12.10	0.4764	60	107	45	14	1	5980419	5979057
	12.20	0.4803	60	107	45	14	1	5980422	5979060
31/64	12.30	0.4843	60	107	45	14	1	5981115	5979272
	12.50	0.4921	60	107	45	14	1	5980426	5979062
	12.70	0.5000	60	107	45	14	1	5980430	5979064
1/2	12.70	0.5000	60	107	45	14	1	5980442	5979132
	12.80	0.5039	60	107	45	14	1	5980433	5979066
	13.00	0.5118	60	107	45	14	1	5980438	5979068
33/64	13.10	0.5157	60	107	45	14	1	5981118	5979274
	13.30	0.5236	60	107	45	14	1	7361286	7361258
17/32	13.49	0.5311	60	107	45	14	1	5980511	5979282
	13.50	0.5315	60	107	45	14	1	5980446	5979070
	13.80	0.5433	60	107	45	14	1	5980450	5979072
35/64	13.89	0.5469	60	107	45	14	1	5981121	5979276
	14.00	0.5512	60	107	45	14	1	5980459	5979082
	14.25	0.5610	65	115	48	16	1	5980462	5979085
9/16	14.29	0.5626	65	115	48	16	1	5980464	5980276
	14.50	0.5709	65	115	48	16	1	5980465	5979088
37/64	14.68	0.5780	65	115	48	16	1	5981125	5979278
	14.80	0.5827	65	115	48	16	1	5980468	5979091
	15.00	0.5906	65	115	48	16	1	5980471	5979094
19/32	15.08	0.5937	65	115	48	16	1	5981185	5979188
	15.10	0.5945	65	115	48	16	1	5980475	5979098
	15.30	0.6024	65	115	48	16	1	7361287	7361259
39/64	15.48	0.6094	65	115	48	16	1	5981127	5979280
	15.50	0.6102	65	115	48	16	1	5980483	5979102
	15.80	0.6220	65	115	48	16	1	5980487	5979106
5/8	15.88	0.6252	65	115	48	16	1	5980489	5980301
	16.00	0.6299	65	115	48	16	1	5980496	5979120
41/64	16.27	0.6406	73	123	48	18	1	5981162	5980284
	16.50	0.6496	73	123	48	18	1	5980499	5979172
21/32	16.67	0.6563	73	123	48	18	1	5981197	5979200
	17.00	0.6693	73	123	48	18	1	5980503	5979215
43/64	17.07	0.6720	73	123	48	18	1	5981165	5980317
11/16	17.46	0.6874	73	123	48	18	1	5980405	5979046
	17.50	0.6890	73	123	48	18	1	5980506	5979253
	17.80	0.7008	73	123	48	18	1	5980509	—
45/64	17.86	0.7031	73	123	48	18	1	5981168	5980355
	18.00	0.7087	73	123	48	18	1	5981043	5979322
23/32	18.26	0.7189	79	131	50	20	1	5981049	5979206
	18.50	0.7283	79	131	50	20	1	5981078	5979325
47/64	18.65	0.7343	79	131	50	20	1	5981170	5980395
	18.80	0.7402	79	131	50	20	1	—	5979329
	19.00	0.7480	79	131	50	20	1	5981112	5979332
3/4	19.05	0.7500	79	131	50	20	1	5981106	5979266
	19.50	0.7677	79	131	50	20	1	5981146	5979180
	19.80	0.7795	79	131	50	20	1	5981177	5979184
	20.00	0.7874	79	131	50	20	1	5981192	5979196

## Multi-Application, Short Length, Reinforced Shank

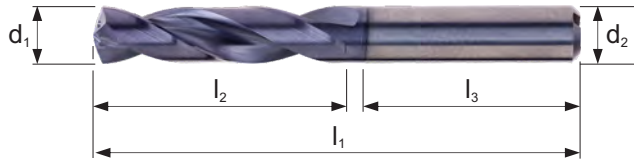
R467

2.1 2.2 2.3 2.4 4.1 4.2 4.3

5.1 5.2 5.3

Self-centering 4-facet split point and CTW flute construction for enhanced penetration rate specifically designed for Stainless Steel (ISO-M) materials. TiAlN coating increases wear resistance and improves tool life. Coolant through combined with an advanced point geometry prevents premature wear of the cutting edges. Length designed for 3 x Diameter drilling depths.

High productivity in a wide range of materials



**R467**

**DIN 6537 K**

**3XD**

**HM**

**140°**

**TiAlN**



**Coolant Through**  
3.00 - 16.00

d <sub>1</sub> Ø "/Nr.	d <sub>1</sub> Øm <sub>7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	d <sub>2</sub> Øh <sub>6</sub> mm	Pack Qty	R467
	3.00	0.1181	20	62	36	6	1	7625100
	3.10	0.1220	20	62	36	6	1	7625101
1/8	3.18	0.1250	20	62	36	6	1	7625102
	3.20	0.1260	20	62	36	6	1	7625103
	3.30	0.1299	20	62	36	6	1	7625104
	3.40	0.1339	20	62	36	6	1	7625105
29	3.45	0.1360	20	62	36	6	1	7625106
	3.50	0.1378	20	62	36	6	1	7625107
9/64	3.57	0.1406	20	62	36	6	1	7625108
	3.60	0.1417	20	62	36	6	1	7625109
	3.70	0.1457	20	62	36	6	1	7625110
	3.80	0.1496	24	66	36	6	1	7625111
	3.90	0.1535	24	66	36	6	1	7625112
5/32	3.97	0.1563	24	66	36	6	1	7625113
	4.00	0.1575	24	66	36	6	1	7625114
	4.05	0.1594	24	66	36	6	1	7625115
	4.10	0.1614	24	66	36	6	1	7625116
	4.20	0.1654	24	66	36	6	1	7625117
	4.30	0.1693	24	66	36	6	1	7625118
11/64	4.37	0.1719	24	66	36	6	1	7625119
	4.40	0.1732	24	66	36	6	1	7625120
	4.50	0.1772	24	66	36	6	1	7625121
	4.60	0.1811	24	66	36	6	1	7625122
	4.70	0.1850	24	66	36	6	1	7625123
3/16	4.76	0.1875	28	66	36	6	1	7625124
	4.80	0.1890	28	66	36	6	1	7625125
	4.90	0.1929	28	66	36	6	1	7625126
	5.00	0.1969	28	66	36	6	1	7625127
	5.05	0.1988	28	66	36	6	1	7625128
	5.10	0.2008	28	66	36	6	1	7625129
7	5.11	0.2010	28	66	36	6	1	7625130
13/64	5.16	0.2031	28	66	36	6	1	7625131
	5.20	0.2047	28	66	36	6	1	7625132

# FORCE M SOLID CARBIDE DRILL



$d_1$ Ø "/Nr.	$d_1$ Ø <sub>m7</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ Ø <sub>h6</sub> mm	Pack Qty	R467
5	5.22	0.2055	28	66	36	6	1	7625133
	5.30	0.2087	28	66	36	6	1	7625134
	5.40	0.2126	28	66	36	6	1	7625135
	5.50	0.2165	28	66	36	6	1	7625136
7/32	5.56	0.2188	28	66	36	6	1	7625137
	5.60	0.2205	28	66	36	6	1	7625138
	5.70	0.2244	28	66	36	6	1	7625139
	5.80	0.2283	28	66	36	6	1	7625140
	5.90	0.2323	28	66	36	6	1	7625141
15/64	5.95	0.2344	28	66	36	6	1	7625142
	6.00	0.2362	28	66	36	6	1	7625143
	6.05	0.2382	34	79	36	8	1	7625144
	6.10	0.2402	34	79	36	8	1	7625145
	6.20	0.2441	34	79	36	8	1	7625146
	6.30	0.2480	34	79	36	8	1	7625147
	6.35	0.2500	34	79	36	8	1	7625148
1/4	6.40	0.2520	34	79	36	8	1	7625149
	6.50	0.2559	34	79	36	8	1	7625150
	6.60	0.2598	34	79	36	8	1	7625151
	6.70	0.2638	34	79	36	8	1	7625152
	6.75	0.2656	34	79	36	8	1	7625153
	6.80	0.2677	34	79	36	8	1	7625154
	6.90	0.2717	34	79	36	8	1	7625155
17/64	7.00	0.2756	34	79	36	8	1	7625156
	7.10	0.2795	41	79	36	8	1	7625157
	7.14	0.2813	41	79	36	8	1	7625158
	7.20	0.2835	41	79	36	8	1	7625159
	7.30	0.2874	41	79	36	8	1	7625160
	7.40	0.2913	41	79	36	8	1	7625161
	7.50	0.2953	41	79	36	8	1	7625162
19/64	7.54	0.2969	41	79	36	8	1	7625163
	7.60	0.2992	41	79	36	8	1	7625164
	7.70	0.3031	41	79	36	8	1	7625165
	7.80	0.3071	41	79	36	8	1	7625166
	7.90	0.3110	41	79	36	8	1	7625167
	7.94	0.3125	41	79	36	8	1	7625168
5/16	8.00	0.3150	41	79	36	8	1	7625169
	8.05	0.3169	47	89	40	10	1	7625170
	8.10	0.3189	47	89	40	10	1	7625171
	8.20	0.3228	47	89	40	10	1	7625172
	8.30	0.3268	47	89	40	10	1	7625173
	8.33	0.3281	47	89	40	10	1	7625174
	8.40	0.3307	47	89	40	10	1	7625175
21/64	8.50	0.3346	47	89	40	10	1	7625176
	8.60	0.3386	47	89	40	10	1	7625177
	8.70	0.3425	47	89	40	10	1	7625178
	8.73	0.3438	47	89	40	10	1	7625179
	8.80	0.3465	47	89	40	10	1	7625180
	8.90	0.3504	47	89	40	10	1	7625181
	9.00	0.3543	47	89	40	10	1	7625182
23/64	9.10	0.3583	47	89	40	10	1	7625183
	9.13	0.3594	47	89	40	10	1	7625184
	9.20	0.3622	47	89	40	10	1	7625185
	9.30	0.3661	47	89	40	10	1	7625186
	9.40	0.3701	47	89	40	10	1	7625187
	9.50	0.3740	47	89	40	10	1	7625188
	9.53	0.3750	47	89	40	10	1	7625189
3/8	9.60	0.3780	47	89	40	10	1	7625190
	9.70	0.3819	47	89	40	10	1	7625191
	9.80	0.3858	47	89	40	10	1	7625192
	9.90	0.3898	47	89	40	10	1	7625193
	9.92	0.3906	47	89	40	10	1	7625194
	10.00	0.3937	47	89	40	10	1	7625195
25/64	10.05	0.3957	55	102	45	12	1	7625196
	10.10	0.3976	55	102	45	12	1	7625197

$d_1$ $\emptyset$ "/Nr.	$d_1$ $\emptyset m_7$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ $\emptyset h_6$ mm	Pack Qty	R467
	10.20	0.4016	55	102	45	12	1	7625198
	10.30	0.4055	55	102	45	12	1	7625199
13/32	10.32	0.4063	55	102	45	12	1	7625200
	10.40	0.4094	55	102	45	12	1	7625201
	10.50	0.4134	55	102	45	12	1	7625202
	10.60	0.4173	55	102	45	12	1	7625203
27/64	10.72	0.4219	55	102	45	12	1	7625204
	10.80	0.4252	55	102	45	12	1	7625205
	10.90	0.4291	55	102	45	12	1	7625206
	11.00	0.4331	55	102	45	12	1	7625207
7/16	11.11	0.4375	55	102	45	12	1	7625208
	11.20	0.4409	55	102	45	12	1	7625209
	11.30	0.4449	55	102	45	12	1	7625210
	11.40	0.4488	55	102	45	12	1	7625211
	11.50	0.4528	55	102	45	12	1	7625212
29/64	11.51	0.4531	55	102	45	12	1	7625213
	11.60	0.4567	55	102	45	12	1	7625214
	11.80	0.4646	55	102	45	12	1	7625215
15/32	11.91	0.4688	55	102	45	12	1	7625216
	12.00	0.4724	55	102	45	12	1	7625217
	12.05	0.4744	60	107	45	14	1	7625218
	12.10	0.4764	60	107	45	14	1	7625219
	12.20	0.4803	60	107	45	14	1	7625220
31/64	12.30	0.4844	60	107	45	14	1	7625221
	12.50	0.4921	60	107	45	14	1	7625222
1/2	12.70	0.5000	60	107	45	14	1	7625223
	12.70	0.5000	60	107	45	14	1	7625224
	12.80	0.5039	60	107	45	14	1	7625225
	13.00	0.5118	60	107	45	14	1	7625226
33/64	13.10	0.5156	60	107	45	14	1	7625227
	13.30	0.5236	60	107	45	14	1	7625228
17/32	13.49	0.5313	60	107	45	14	1	7625229
	13.50	0.5315	60	107	45	14	1	7625230
	13.80	0.5433	60	107	45	14	1	7625231
35/64	13.89	0.5469	60	107	45	14	1	7625232
	14.00	0.5512	60	107	45	14	1	7625233
	14.25	0.5610	65	115	48	16	1	7625234
9/16	14.29	0.5625	65	115	48	16	1	7625235
	14.50	0.5709	65	115	48	16	1	7625236
37/64	14.68	0.5781	65	115	48	16	1	7625237
	14.80	0.5827	65	115	48	16	1	7625238
	15.00	0.5906	65	115	48	16	1	7625239
19/32	15.08	0.5938	65	115	48	16	1	7625240
	15.10	0.5945	65	115	48	16	1	7625241
	15.30	0.6024	65	115	48	16	1	7625242
39/64	15.48	0.6094	65	115	48	16	1	7625243
	15.50	0.6102	65	115	48	16	1	7625244
	15.80	0.6220	65	115	48	16	1	7625245
5/8	15.88	0.6250	65	115	48	16	1	7625246
	16.00	0.6299	65	115	48	16	1	7625247

# CDX SOLID CARBIDE DRILL

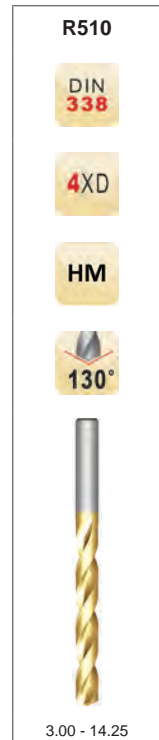


## Multi-Application, Jobber Length, Parallel Shank

### 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

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



$d_1$ Øh <sub>7</sub> Inch	$d_1$ Øh <sub>7</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	R510
	3.00	0.1181	33	61	1	5980504
1/8	3.18	0.1250	36	65	1	5980502
	3.20	0.1260	36	65	1	5980508
	3.30	0.1299	36	65	1	5980512
	3.40	0.1339	39	70	1	5980515
	3.50	0.1378	39	70	1	5980518
	3.70	0.1457	39	70	1	5980522
	3.90	0.1535	43	75	1	5980526
	4.00	0.1575	43	75	1	5980538
	4.10	0.1614	43	75	1	5980540
	4.20	0.1654	43	75	1	5980543
	4.30	0.1693	47	80	1	5980545
	4.50	0.1772	47	80	1	5980548
	4.60	0.1811	47	80	1	5980553
	4.70	0.1850	47	80	1	5980556
3/16	4.76	0.1875	52	86	1	5980529
	4.90	0.1929	52	86	1	5980559
	5.00	0.1969	52	86	1	5980562
	5.10	0.2008	52	86	1	5980565
	5.50	0.2165	57	93	1	5980571
	5.60	0.2205	57	93	1	5980472
	5.70	0.2244	57	93	1	5980510
	6.00	0.2362	57	93	1	5980607
1/4	6.35	0.2500	63	101	1	5980460
	6.50	0.2559	63	101	1	5980615
	6.60	0.2598	63	101	1	5980619
	6.80	0.2677	69	109	1	5980622
	6.90	0.2717	69	109	1	5980626
	7.00	0.2756	69	109	1	5980478
	7.30	0.2874	69	109	1	5980481
	7.40	0.2913	69	109	1	5980484
	7.50	0.2953	69	109	1	5980488
	7.80	0.3071	75	117	1	5980493



d <sub>1</sub> Øh <sub>7</sub> Inch	d <sub>1</sub> Øh <sub>7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	R510
	7.90	0.3110	75	117	1	5980497
5/16	7.94	0.3125	75	117	1	5980539
	8.00	0.3150	75	117	1	5980505
	8.50	0.3346	75	117	1	5980507
	8.70	0.3425	81	125	1	5980513
	8.80	0.3465	81	125	1	5980516
	9.00	0.3543	81	125	1	5980519
	9.20	0.3622	81	125	1	5980521
	9.30	0.3661	81	125	1	5980525
	9.40	0.3701	81	125	1	5980528
	9.50	0.3740	81	125	1	5980531
3/8	9.52	0.3750	87	133	1	5980530
	9.90	0.3898	87	133	1	5980533
	10.00	0.3937	87	133	1	5980534
	10.20	0.4016	87	133	1	5980568
	10.30	0.4055	87	133	1	5980574
	10.40	0.4094	87	133	1	5980577
	10.50	0.4134	87	133	1	5980581
	10.80	0.4252	94	142	1	5980585
	11.00	0.4331	94	142	1	5980424
7/16	11.11	0.4375	94	142	1	5980500
	11.20	0.4409	94	142	1	5980427
	11.50	0.4528	94	142	1	5980431
	12.00	0.4724	101	151	1	5980441
1/2	12.70	0.5000	101	151	1	5980417
	13.00	0.5118	101	151	1	5980448
	14.00	0.5512	108	160	1	5980458
	14.25	0.5610	114	169	1	5980463

# FORCE X SOLID CARBIDE DRILL



## Multi-Application, Standard Length, Reinforced Shank

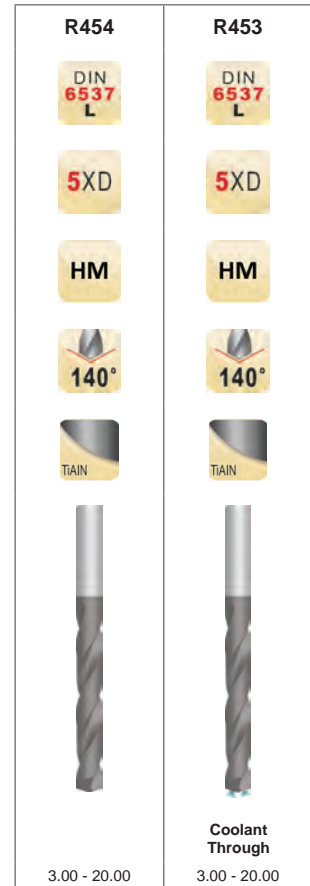
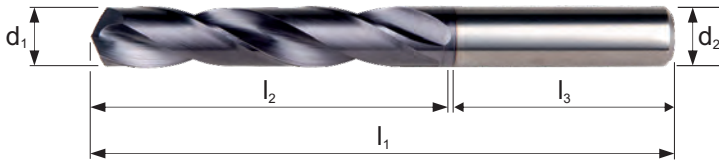
**R454** Self centering 4-facet split point and CTW flute construction for enhanced penetration rate. TiAlN coating increases wear resistance, improves tool life at high RPM.

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

**R453** Coolant through clears chips away from the cutting edge. Self centering 4-facet split point and CTW flute construction for enhanced penetration rates. TiAlN 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

High productivity in a wide range of materials



$d_1$ Ø Inch	$d_1$ Ø <sub>m7</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ Ø <sub>h6</sub> mm	Pack Qty	R454	R453
	3.00	0.1181	28	66	36	6	1	5979852	5979633
	3.10	0.1220	28	66	36	6	1	5979855	5979636
1/8	3.18	0.1252	28	66	36	6	1	5979974	5979930
	3.20	0.1260	28	66	36	6	1	5979858	5979642
30	3.26	0.1283	28	66	36	6	1	5980077	5979877
	3.30	0.1299	28	66	36	6	1	5979861	5979645
	3.40	0.1339	28	66	36	6	1	5979864	5979648
29	3.45	0.1358	28	66	36	6	1	5980006	5980039
	3.50	0.1378	28	66	36	6	1	5979868	5979651
28	3.57	0.1406	28	66	36	6	1	5979966	5980036
9/64	3.57	0.1406	28	66	36	6	1	5979250	5979488
	3.60	0.1417	28	66	36	6	1	5979871	5979654
27	3.66	0.1441	28	66	36	6	1	5979924	5980032
	3.70	0.1457	28	66	36	6	1	5979876	5979657
26	3.73	0.1469	36	74	36	6	1	5979572	5980028
25	3.80	0.1496	36	74	36	6	1	5979879	5979660
24	3.86	0.1520	36	74	36	6	1	5979561	5979982
	3.90	0.1535	36	74	36	6	1	5979885	5979663
	3.91	0.1539	36	74	36	6	1	5979558	5979939
5/32	3.97	0.1563	36	74	36	6	1	5980068	5978954
22	3.99	0.1571	36	74	36	6	1	5979556	5979903
	4.00	0.1575	36	74	36	6	1	5979913	5978985
21	4.04	0.1591	36	74	36	6	1	5979553	5979867
	4.05	0.1594	36	74	36	6	1	—	5978987
20	4.09	0.1610	36	74	36	6	1	5979550	5979764
	4.10	0.1614	36	74	36	6	1	5979919	5978989
	4.20	0.1654	36	74	36	6	1	5980020	5978991
19	4.22	0.1661	36	74	36	6	1	5979544	5979757
	4.30	0.1693	36	74	36	6	1	5980061	5978932
18	4.31	0.1697	36	74	36	6	1	5979541	5979754
11/64	4.37	0.1720	36	74	36	6	1	5980033	5980001
17	4.39	0.1728	36	74	36	6	1	5979537	5979751

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø <sub>m7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	d <sub>2</sub> Ø <sub>h6</sub> mm	Pack Qty	R454	R453
	4.40	0.1732	36	74	36	6	1	5980103	5978933
	4.50	0.1772	36	74	36	6	1	5980137	5978934
16	4.50	0.1772	36	74	36	6	1	5979533	5979745
15	4.57	0.1799	36	74	36	6	1	5979531	5979740
	4.60	0.1811	36	74	36	6	1	5980170	5978935
14	4.62	0.1819	36	74	36	6	1	5979529	5979736
13	4.70	0.1850	36	74	36	6	1	5980178	5978936
3/16	4.76	0.1874	44	82	36	6	1	5979889	5979666
12	4.80	0.1890	44	82	36	6	1	5980182	5978937
11	4.85	0.1909	44	82	36	6	1	5979522	5979724
	4.90	0.1929	44	82	36	6	1	5980187	5978938
10	4.92	0.1937	44	82	36	6	1	5979519	5979717
9	4.98	0.1961	44	82	36	6	1	5979937	5979894
	5.00	0.1969	44	82	36	6	1	5980038	5978944
	5.05	0.1988	44	82	36	6	1	—	5978945
8	5.06	0.1992	44	82	36	6	1	5979934	5979891
	5.10	0.2008	44	82	36	6	1	5980042	5978946
7	5.11	0.2012	44	82	36	6	1	5980097	5979888
13/64	5.16	0.2031	44	82	36	6	1	5980070	5979672
6	5.18	0.2039	44	82	36	6	1	5980093	5979886
	5.20	0.2047	44	82	36	6	1	5980045	5978947
5	5.22	0.2055	44	82	36	6	1	5980089	5979883
	5.30	0.2087	44	82	36	6	1	—	7361201
4	5.31	0.2091	44	82	36	6	1	5980085	5979880
	5.40	0.2126	44	82	36	6	1	—	7361202
3	5.41	0.2130	44	82	36	6	1	5980044	5979873
	5.50	0.2165	44	82	36	6	1	5980048	5978948
7/32	5.56	0.2189	44	82	36	6	1	5980148	5979507
	5.60	0.2205	44	82	36	6	1	5980051	5978949
2	5.61	0.2209	44	82	36	6	1	5979547	5979760
	5.70	0.2244	44	82	36	6	1	5980055	5978950
1	5.79	0.2280	44	82	36	6	1	5979516	5979712
	5.80	0.2283	44	82	36	6	1	5980058	5978951
	5.90	0.2323	44	82	36	6	1	—	7361203
A	5.94	0.2339	44	82	36	6	1	5979491	5979694
15/64	5.95	0.2343	44	82	36	6	1	5979928	5979555
	6.00	0.2362	44	82	36	6	1	5980075	5978956
B	6.03	0.2374	53	91	36	8	1	7361224	7361204
	6.05	0.2382	53	91	36	8	1	—	5978957
	6.10	0.2402	53	91	36	8	1	5980080	5978958
C	6.15	0.2421	53	91	36	8	1	7361225	7361205
	6.20	0.2441	53	91	36	8	1	5980084	5978959
D	6.25	0.2461	53	91	36	8	1	5979495	5979697
	6.30	0.2480	53	91	36	8	1	5980088	5978960
1/4	6.35	0.2500	53	91	36	8	1	5979970	5979925
E	6.35	0.2500	53	91	36	8	1	7361226	7361206
	6.40	0.2520	53	91	36	8	1	5980092	5978961
	6.50	0.2559	53	91	36	8	1	5980096	5978962
F	6.53	0.2571	53	91	36	8	1	7361227	7361207
	6.60	0.2598	53	91	36	8	1	5980100	5978963
G	6.63	0.2610	53	91	36	8	1	7361228	7361208
	6.70	0.2638	53	91	36	8	1	5980106	5978965
17/64	6.75	0.2657	53	91	36	8	1	5979798	5979579
H	6.76	0.2661	53	91	36	8	1	5979499	5979700
	6.80	0.2677	53	91	36	8	1	5980109	5978966
	6.90	0.2717	53	91	36	8	1	5980111	5978967
I	6.91	0.2720	53	91	36	8	1	7361229	7361209
	7.00	0.2756	53	91	36	8	1	5980113	5978968
J	7.04	0.2772	53	91	36	8	1	7361230	7361210
	7.10	0.2795	53	91	36	8	1	5980116	5978970
K	7.14	0.2811	53	91	36	8	1	7361231	7361211
9/32	7.14	0.2811	53	91	36	8	1	5979241	5979484
	7.20	0.2835	53	91	36	8	1	—	7361212
	7.30	0.2874	53	91	36	8	1	5980119	5978971
L	7.37	0.2902	53	91	36	8	1	5979503	5979702

# FORCE X SOLID CARBIDE DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø <sub>m<sub>7</sub></sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	d <sub>2</sub> Ø <sub>h<sub>6</sub></sub> mm	Pack Qty	R454	R453
M	7.40	0.2913	53	91	36	8	1	5980123	5978973
	7.49	0.2949	53	91	36	8	1	5979510	5979705
	7.50	0.2953	53	91	36	8	1	5980126	5978975
19/64	7.54	0.2969	53	91	36	8	1	5979822	5979599
	7.60	0.2992	53	91	36	8	1	5980130	5978977
	7.67	0.3020	53	91	36	8	1	5979513	5979708
N	7.70	0.3031	53	91	36	8	1	5980133	5978979
	7.80	0.3071	53	91	36	8	1	5980140	5978983
	7.90	0.3110	53	91	36	8	1	5980142	5979424
	7.94	0.3126	53	91	36	8	1	5980064	5978952
5/16	8.00	0.3150	53	91	36	8	1	5980151	5979534
	8.03	0.3161	61	103	40	10	1	5979940	5979897
	8.05	0.3169	61	103	40	10	1	—	5979568
O	8.10	0.3189	61	103	40	10	1	5980155	5979575
	8.20	0.3228	61	103	40	10	1	5980157	5979578
	8.20	0.3228	61	103	40	10	1	7361232	7361213
	8.30	0.3268	61	103	40	10	1	—	7361214
21/64	8.33	0.3280	61	103	40	10	1	5979831	5979612
	8.40	0.3307	61	103	40	10	1	5980162	5979581
Q	8.43	0.3319	61	103	40	10	1	5979944	5979900
	8.50	0.3346	61	103	40	10	1	5980164	5979584
	8.60	0.3386	61	103	40	10	1	5980167	5979429
R	8.61	0.3390	61	103	40	10	1	7361233	7361215
	8.70	0.3425	61	103	40	10	1	5980175	5979432
	8.73	0.3437	61	103	40	10	1	5980029	5979998
11/32	8.80	0.3465	61	103	40	10	1	5979222	5979436
	8.84	0.3480	61	103	40	10	1	7361234	7361216
	8.90	0.3504	61	103	40	10	1	5979268	5979440
9.00	0.3543	61	103	40	10	10	1	5979294	5979444
	9.09	0.3579	61	103	40	10	1	5979947	5979906
	9.10	0.3583	61	103	40	10	1	5979327	5979448
23/64	9.13	0.3594	61	103	40	10	1	5979838	5979620
	9.20	0.3622	61	103	40	10	1	—	7361217
	9.30	0.3661	61	103	40	10	1	5979364	5979452
U	9.35	0.3681	61	103	40	10	1	5979949	5979909
	9.40	0.3701	61	103	40	10	1	5979372	5979454
	9.50	0.3740	61	103	40	10	1	5979376	5979458
3/8	9.52	0.3748	61	103	40	10	1	5979895	5979674
V	9.58	0.3772	61	103	40	10	1	7361235	7361218
	9.60	0.3780	61	103	40	10	1	5979381	5979461
	9.70	0.3819	61	103	40	10	1	5979385	5979467
	9.80	0.3858	61	103	40	10	1	5979228	5979472
W	9.80	0.3858	61	103	40	10	1	7361236	7361219
	9.90	0.3898	61	103	40	10	1	5979233	5979476
	9.92	0.3906	61	103	40	10	1	5979840	5979624
25/64	10.00	0.3937	61	103	40	10	1	5979978	5979933
	10.05	0.3957	70	118	45	12	1	—	5979936
	10.08	0.3969	70	118	45	12	1	5979952	5979912
X	10.10	0.3976	70	118	45	12	1	5979981	5979942
	10.20	0.4016	70	118	45	12	1	5979985	5979946
	10.26	0.4039	70	118	45	12	1	5979955	5979916
Y	10.30	0.4055	70	118	45	12	1	5979989	5979950
	10.32	0.4063	70	118	45	12	1	5980067	5979639
	10.40	0.4094	70	118	45	12	1	5979993	5979953
Z	10.49	0.4130	70	118	45	12	1	5979959	5979918
	10.50	0.4134	70	118	45	12	1	5979996	5979956
	10.60	0.4173	70	118	45	12	1	5980000	5979960
27/64	10.72	0.4220	70	118	45	12	1	5979843	5979627
	10.80	0.4252	70	118	45	12	1	—	7361220
	11.00	0.4331	70	118	45	12	1	5980003	5979964
7/16	11.11	0.4374	70	118	45	12	1	5980145	5979464
	11.20	0.4409	70	118	45	12	1	5980009	5979968
	11.30	0.4449	70	118	45	12	1	—	7361221
	11.40	0.4488	70	118	45	12	1	5980012	5979972

d <sub>1</sub> Ø Inch	d <sub>1</sub> Øm <sub>7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	d <sub>2</sub> Øh <sub>6</sub> mm	Pack Qty	R454	R453
29/64	11.50	0.4528	70	118	45	12	1	5980015	5979976
	11.51	0.4531	70	118	45	12	1	5979849	5979630
	11.60	0.4567	70	118	45	12	1	5980018	5979986
15/32	11.80	0.4646	70	118	45	12	1	5980022	5979990
	11.91	0.4689	70	118	45	12	1	5979926	5979552
	12.00	0.4724	70	118	45	12	1	5980037	5980005
	12.05	0.4744	76	124	45	14	1	—	5980008
	12.10	0.4764	76	124	45	14	1	5980040	—
31/64	12.20	0.4803	76	124	45	14	1	5980047	5980011
	12.30	0.4843	76	124	45	14	1	5979898	5978931
	12.50	0.4921	76	124	45	14	1	5980050	5980014
	12.70	0.5000	76	124	45	14	1	5980053	5980017
1/2	12.70	0.5000	76	124	45	14	1	5979962	5979921
	12.80	0.5039	76	124	45	14	1	5980057	5980023
	13.00	0.5118	76	124	45	14	1	5980060	5979536
33/64	13.10	0.5157	76	124	45	14	1	5979901	5978942
	13.30	0.5236	76	124	45	14	1	—	7361222
17/32	13.49	0.5311	76	124	45	14	1	5979795	5979576
	13.50	0.5315	76	124	45	14	1	5980062	5979570
	13.80	0.5433	76	124	45	14	1	5980065	5979602
35/64	13.89	0.5469	76	124	45	14	1	5979904	5978953
	14.00	0.5512	76	124	45	14	1	5980074	5979680
	14.25	0.5610	82	133	48	16	1	5980081	5979684
9/16	14.29	0.5626	82	133	48	16	1	5979237	5979480
	14.50	0.5709	82	133	48	16	1	5979778	5979688
37/64	14.68	0.5780	82	133	48	16	1	5979907	5978964
	14.80	0.5827	82	133	48	16	1	5979813	5979691
	15.00	0.5906	82	133	48	16	1	5979846	5979540
19/32	15.08	0.5937	82	133	48	16	1	5979820	5979596
	15.10	0.5945	82	133	48	16	1	5979882	5979543
	15.30	0.6024	82	133	48	16	1	—	7361223
39/64	15.48	0.6094	82	133	48	16	1	5979910	5978981
	15.50	0.6102	82	133	48	16	1	5979915	5979546
	15.80	0.6220	82	133	48	16	1	5979922	5979549
	15.88	0.6252	82	133	48	16	1	5980071	5978955
5/8	16.00	0.6299	82	133	48	16	1	5979931	5979559
	16.27	0.6406	91	143	48	18	1	5980189	5978939
41/64	16.50	0.6496	91	143	48	18	1	5979783	5979562
	21/32	16.67	0.6563	91	143	48	18	1	5979828
43/64	17.00	0.6693	91	143	48	18	1	5979786	5979564
	17.07	0.6720	91	143	48	18	1	5980026	5978940
11/16	17.46	0.6874	91	143	48	18	1	5980025	5979995
	17.50	0.6890	91	143	48	18	1	5979789	5979567
	17.80	0.7008	91	143	48	18	1	5979792	5979573
45/64	17.86	0.7031	91	143	48	18	1	5980030	5978941
	18.00	0.7087	91	143	48	18	1	5979801	5979582
23/32	18.26	0.7189	99	153	50	20	1	5979834	5979616
	18.50	0.7283	99	153	50	20	1	5979804	5979585
47/64	18.65	0.7343	99	153	50	20	1	5980034	5978943
	19.00	0.7480	99	153	50	20	1	5979807	5979588
3/4	19.05	0.7500	99	153	50	20	1	5979892	5979669
	19.50	0.7677	99	153	50	20	1	5979810	5979590
	19.80	0.7795	99	153	50	20	1	5979816	5979593
	20.00	0.7874	99	153	50	20	1	5979824	5979605

# FORCE M SOLID CARBIDE DRILL



## Multi-Application, Standard Length, Reinforced Shank

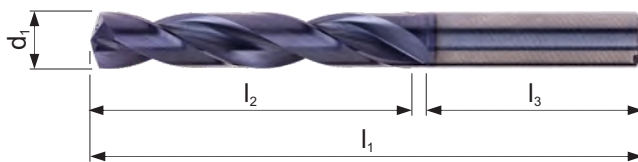
R463

2.1 2.2 2.3 2.4 4.1 4.2 4.3

5.1 5.2 5.3

Self-centering 4-facet split point and CTW flute construction for enhanced penetration rate specifically designed for Stainless Steel (ISO-M) materials. TiAlN coating increases wear resistance and improves tool life. Coolant through combined with an advanced point geometry prevents premature wear of the cutting edges. Length designed for 5 x Diameter drilling depths.

High productivity in a wide range of materials



R463

DIN  
6537  
L

5XD

HM

140°

TiAlN



Coolant  
Through  
3.00 - 16.00

d <sub>1</sub> Ø Inch	d <sub>1</sub> Øm <sub>7</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>3</sub> mm	d <sub>2</sub> Øh <sub>6</sub> mm	Pack Qty	R463
	3.00	0.1181	28	66	36	6	1	7624913
	3.10	0.1220	28	66	36	6	1	7624914
1/8	3.18	0.1250	28	66	36	6	1	7624915
	3.20	0.1260	28	66	36	6	1	7624916
	3.30	0.1299	28	66	36	6	1	7624917
	3.40	0.1339	28	66	36	6	1	7624918
29	3.45	0.1360	28	66	36	6	1	7624919
	3.50	0.1378	28	66	36	6	1	7624960
9/64	3.57	0.1406	28	66	36	6	1	7624961
	3.60	0.1417	28	66	36	6	1	7624962
	3.70	0.1457	28	66	36	6	1	7624963
	3.80	0.1496	36	74	36	6	1	7624964
	3.90	0.1535	36	74	36	6	1	7624965
5/32	3.97	0.1563	36	74	36	6	1	7624966
	4.00	0.1575	36	74	36	6	1	7624967
	4.05	0.1594	36	74	36	6	1	7624968
	4.10	0.1614	36	74	36	6	1	7624969
	4.20	0.1654	36	74	36	6	1	7624970
	4.30	0.1693	36	74	36	6	1	7624971
11/64	4.37	0.1719	36	74	36	6	1	7624972
	4.40	0.1732	36	74	36	6	1	7624973
	4.50	0.1772	36	74	36	6	1	7624974
	4.60	0.1811	36	74	36	6	1	7624975
	4.70	0.1850	36	74	36	6	1	7624976
3/16	4.76	0.1875	44	82	36	6	1	7624977
	4.80	0.1890	44	82	36	6	1	7624978
	4.90	0.1929	44	82	36	6	1	7624979
	5.00	0.1969	44	82	36	6	1	7624980
	5.05	0.1988	44	82	36	6	1	7624981
	5.10	0.2008	44	82	36	6	1	7624982
7	5.11	0.2010	44	82	36	6	1	7624983
13/64	5.16	0.2031	44	82	36	6	1	7624984



$d_1$ Ø Inch	$d_1$ Ø <sub>m7</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ Ø <sub>h6</sub> mm	Pack Qty	R463
5	5.20	0.2047	44	82	36	6	1	7624985
	5.22	0.2055	44	82	36	6	1	7624986
	5.30	0.2087	44	82	36	6	1	7624987
	5.40	0.2126	44	82	36	6	1	7624988
7/32	5.50	0.2165	44	82	36	6	1	7624989
	5.56	0.2188	44	82	36	6	1	7624990
	5.60	0.2205	44	82	36	6	1	7624991
	5.70	0.2244	44	82	36	6	1	7624992
	5.80	0.2283	44	82	36	6	1	7624993
	5.90	0.2323	44	82	36	6	1	7624994
15/64	5.95	0.2344	44	82	36	6	1	7624995
	6.00	0.2362	44	82	36	6	1	7624996
	6.05	0.2382	53	91	36	8	1	7624997
	6.10	0.2402	53	91	36	8	1	7624998
	6.20	0.2441	53	91	36	8	1	7624999
	6.30	0.2480	53	91	36	8	1	7625000
	6.35	0.2500	53	91	36	8	1	7625001
1/4	6.40	0.2520	53	91	36	8	1	7625002
	6.50	0.2559	53	91	36	8	1	7625003
	6.60	0.2598	53	91	36	8	1	7625004
	6.70	0.2638	53	91	36	8	1	7625005
	6.75	0.2656	53	91	36	8	1	7625006
	6.80	0.2677	53	91	36	8	1	7625007
17/64	6.90	0.2717	53	91	36	8	1	7625008
	7.00	0.2756	53	91	36	8	1	7625009
	7.10	0.2795	53	91	36	8	1	7625010
	7.14	0.2813	53	91	36	8	1	7625011
	7.20	0.2835	53	91	36	8	1	7625012
	7.30	0.2874	53	91	36	8	1	7625013
	7.40	0.2913	53	91	36	8	1	7625014
19/64	7.50	0.2953	53	91	36	8	1	7625015
	7.54	0.2969	53	91	36	8	1	7625016
	7.60	0.2992	53	91	36	8	1	7625017
	7.70	0.3031	53	91	36	8	1	7625018
	7.80	0.3071	53	91	36	8	1	7625019
	7.90	0.3110	53	91	36	8	1	7625020
5/16	7.94	0.3125	53	91	36	8	1	7625021
	8.00	0.3150	53	91	36	8	1	7625022
	8.05	0.3169	61	103	40	10	1	7625023
	8.10	0.3189	61	103	40	10	1	7625024
	8.20	0.3228	61	103	40	10	1	7625025
	8.30	0.3268	61	103	40	10	1	7625026
21/64	8.33	0.3281	61	103	40	10	1	7625027
	8.40	0.3307	61	103	40	10	1	7625028
	8.50	0.3346	61	103	40	10	1	7625029
	8.60	0.3386	61	103	40	10	1	7625030
	8.70	0.3425	61	103	40	10	1	7625031
	8.73	0.3438	61	103	40	10	1	7625032
	8.80	0.3465	61	103	40	10	1	7625033
11/32	8.90	0.3504	61	103	40	10	1	7625034
	9.00	0.3543	61	103	40	10	1	7625035
	9.10	0.3583	61	103	40	10	1	7625036
	9.13	0.3594	61	103	40	10	1	7625037
	9.20	0.3622	61	103	40	10	1	7625038
	9.30	0.3661	61	103	40	10	1	7625039
23/64	9.40	0.3701	61	103	40	10	1	7625040
	9.50	0.3740	61	103	40	10	1	7625041
	9.53	0.3750	61	103	40	10	1	7625042
	9.60	0.3780	61	103	40	10	1	7625043
	9.70	0.3819	61	103	40	10	1	7625044
	9.80	0.3858	61	103	40	10	1	7625045
3/8	9.90	0.3898	61	103	40	10	1	7625046
	9.92	0.3906	61	103	40	10	1	7625047
	10.00	0.3937	61	103	40	10	1	7625048
	10.05	0.3957	70	118	45	12	1	7625049

# FORCE M SOLID CARBIDE DRILL



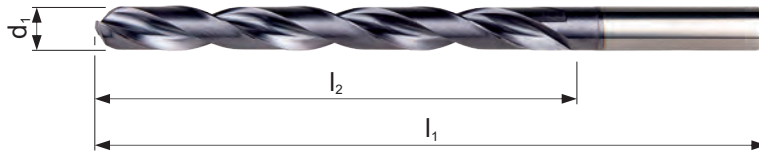
$d_1$ Ø Inch	$d_1$ Ø <sub>m7</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ Ø <sub>h6</sub> mm	Pack Qty	R463
	10.10	0.3976	70	118	45	12	1	7625050
	10.20	0.4016	70	118	45	12	1	7625051
	10.30	0.4055	70	118	45	12	1	7625052
13/32	10.32	0.4063	70	118	45	12	1	7625053
	10.40	0.4094	70	118	45	12	1	7625054
	10.50	0.4134	70	118	45	12	1	7625055
	10.60	0.4173	70	118	45	12	1	7625056
27/64	10.72	0.4219	70	118	45	12	1	7625057
	10.80	0.4252	70	118	45	12	1	7625058
	10.90	0.4291	70	118	45	12	1	7625059
	11.00	0.4331	70	118	45	12	1	7625060
7/16	11.11	0.4375	70	118	45	12	1	7625061
	11.20	0.4409	70	118	45	12	1	7625062
	11.30	0.4449	70	118	45	12	1	7625063
	11.40	0.4488	70	118	45	12	1	7625064
	11.50	0.4528	70	118	45	12	1	7625065
29/64	11.51	0.4531	70	118	45	12	1	7625066
	11.60	0.4567	70	118	45	12	1	7625067
	11.80	0.4646	70	118	45	12	1	7625068
15/32	11.91	0.4688	70	118	45	12	1	7625069
	12.00	0.4724	70	118	45	12	1	7625070
	12.05	0.4744	76	124	45	14	1	7625071
	12.20	0.4803	76	124	45	14	1	7625072
31/64	12.30	0.4844	76	124	45	14	1	7625073
	12.50	0.4921	76	124	45	14	1	7625074
1/2	12.70	0.5000	76	124	45	14	1	7625075
	12.70	0.5000	76	124	45	14	1	7625076
	12.80	0.5039	76	124	45	14	1	7625077
	13.00	0.5118	76	124	45	14	1	7625078
33/64	13.10	0.5156	76	124	45	14	1	7625079
	13.30	0.5236	76	124	45	14	1	7625080
17/32	13.49	0.5313	76	124	45	14	1	7625081
	13.50	0.5315	76	124	45	14	1	7625082
	13.80	0.5433	76	124	45	14	1	7625083
35/64	13.89	0.5469	76	124	45	14	1	7625084
	14.00	0.5512	76	124	45	14	1	7625085
	14.25	0.5610	82	133	48	16	1	7625086
9/16	14.29	0.5625	82	133	48	16	1	7625087
	14.50	0.5709	82	133	48	16	1	7625088
37/64	14.68	0.5781	82	133	48	16	1	7625089
	14.80	0.5827	82	133	48	16	1	7625090
	15.00	0.5906	82	133	48	16	1	7625091
19/32	15.08	0.5938	82	133	48	16	1	7625092
	15.10	0.5945	82	133	48	16	1	7625093
	15.30	0.6024	82	133	48	16	1	7625094
39/64	15.48	0.6094	82	133	48	16	1	7625095
	15.50	0.6102	82	133	48	16	1	7625096
	15.80	0.6220	82	133	48	16	1	7625097
5/8	15.88	0.6250	82	133	48	16	1	7625098
	16.00	0.6299	82	133	48	16	1	7625099

## Multi-Application, 8xD, Reinforced Shank

**R459** Coolant through clears chips away from the cutting edge. Self centering 4-facet split point and CTW flute construction for enhanced penetration rates. TiAlN coating increases surface hardness, improves tool life at high RPM.

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

High productivity in a wide range of materials



R459



Coolant Through

3.00 - 16.00

$d_1$ $\varnothing m_7$ Inch	$d_1$ $\varnothing m_7$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ $\varnothing h_8$ mm	Pack Qty	R459
	3.00	0.1181	37	79	36	6	1	6718973
	3.10	0.1220	37	79	36	6	1	6718974
1/8	3.18	0.1252	37	79	36	6	1	6718975
	3.20	0.1260	37	79	36	6	1	6718976
	3.30	0.1299	37	79	36	6	1	6718977
	3.40	0.1339	37	79	36	6	1	6718978
	3.50	0.1378	37	79	36	6	1	6718979
9/64	3.57	0.1406	37	79	36	6	1	6718990
	3.60	0.1417	37	79	36	6	1	6718991
	3.70	0.1457	37	79	36	6	1	6718992
	3.80	0.1496	48	90	36	6	1	6718993
	3.90	0.1535	48	90	36	6	1	6718994
5/32	3.97	0.1563	48	90	36	6	1	6718995
	4.00	0.1575	48	90	36	6	1	6718996
	4.10	0.1614	48	90	36	6	1	6718997
	4.20	0.1654	48	90	36	6	1	6718998
	4.30	0.1693	48	90	36	6	1	6718999
11/64	4.37	0.1720	48	90	36	6	1	6719000
	4.40	0.1732	48	90	36	6	1	6719001
	4.50	0.1772	48	90	36	6	1	6719002
	4.60	0.1811	48	90	36	6	1	6719003
	4.70	0.1850	62	104	36	6	1	6719004
3/16	4.76	0.1874	62	104	36	6	1	6719005
	4.80	0.1890	62	104	36	6	1	6719006
	4.90	0.1929	62	104	36	6	1	6719007
	5.00	0.1969	62	104	36	6	1	6719008
	5.10	0.2008	62	104	36	6	1	6719009
13/64	5.16	0.2031	62	104	36	6	1	6719010
	5.20	0.2047	62	104	36	6	1	6719011
	5.30	0.2087	62	104	36	6	1	6719012
	5.40	0.2126	62	104	36	6	1	6719013
	5.50	0.2165	62	104	36	6	1	6719014

# FORCE X SOLID CARBIDE DRILL



$d_1$ $\varnothing m_7$ Inch	$d_1$ $\varnothing m_7$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ $\varnothing h_6$ mm	Pack Qty	R459
7/32	5.56	0.2189	62	104	36	6	1	6719015
	5.60	0.2205	62	104	36	6	1	6719016
	5.70	0.2244	62	104	36	6	1	6719017
	5.80	0.2283	62	104	36	6	1	6719018
	5.90	0.2323	62	104	36	6	1	6719019
15/64	5.95	0.2343	62	104	36	6	1	6719020
	6.00	0.2362	62	104	36	6	1	6719021
	6.10	0.2402	84	126	36	8	1	6719022
	6.20	0.2441	84	126	36	8	1	6719023
	6.30	0.2480	84	126	36	8	1	6719024
1/4	6.35	0.2500	84	126	36	8	1	6719025
	6.40	0.2520	84	126	36	8	1	6719026
	6.50	0.2559	84	126	36	8	1	6719027
	6.60	0.2598	84	126	36	8	1	6719028
	6.70	0.2638	84	126	36	8	1	6719029
17/64	6.75	0.2657	84	126	36	8	1	6719030
	6.80	0.2677	84	126	36	8	1	6719031
	6.90	0.2717	84	126	36	8	1	6719032
	7.00	0.2756	84	126	36	8	1	6719033
	7.10	0.2795	84	126	36	8	1	6719034
9/32	7.14	0.2811	84	126	36	8	1	6719035
	7.20	0.2835	84	126	36	8	1	6719036
	7.30	0.2874	84	126	36	8	1	6719037
	7.40	0.2913	84	126	36	8	1	6719038
	7.50	0.2953	84	126	36	8	1	6719039
19/64	7.54	0.2969	84	126	36	8	1	6719040
	7.60	0.2992	84	126	36	8	1	6719041
	7.70	0.3031	84	126	36	8	1	6719042
	7.80	0.3071	84	126	36	8	1	6719043
	7.90	0.3110	84	126	36	8	1	6719044
5/16	7.94	0.3126	84	126	36	8	1	6719045
	8.00	0.3150	84	126	36	8	1	6719046
	8.10	0.3189	106	152	40	10	1	6719047
	8.20	0.3228	106	152	40	10	1	6719048
	8.30	0.3268	106	152	40	10	1	6719049
21/64	8.33	0.3280	106	152	40	10	1	6719050
	8.40	0.3307	106	152	40	10	1	6719051
	8.50	0.3346	106	152	40	10	1	6719052
	8.60	0.3386	106	152	40	10	1	6719053
	8.70	0.3425	106	152	40	10	1	6719054
11/32	8.73	0.3437	106	152	40	10	1	6719055
	8.80	0.3465	106	152	40	10	1	6719056
	8.90	0.3504	106	152	40	10	1	6719057
	9.00	0.3543	106	152	40	10	1	6719058
	9.10	0.3583	106	152	40	10	1	6719059
23/64	9.13	0.3594	106	152	40	10	1	6719060
	9.20	0.3622	106	152	40	10	1	6719061
	9.30	0.3661	106	152	40	10	1	6719062
	9.40	0.3701	106	152	40	10	1	6719063
	9.50	0.3740	106	152	40	10	1	6719064
3/8	9.53	0.3748	106	152	40	10	1	6719065
	9.60	0.3780	106	152	40	10	1	6719066
	9.70	0.3819	106	152	40	10	1	6719067
	9.80	0.3858	106	152	40	10	1	6719068
	9.90	0.3898	106	152	40	10	1	6719069
25/64	9.92	0.3906	106	152	40	10	1	6719070
	10.00	0.3937	106	152	40	10	1	6719071
	10.20	0.4016	128	180	45	12	1	6719072
	10.30	0.4055	128	180	45	12	1	6719073
13/32	10.32	0.4063	128	180	45	12	1	6719074
	10.40	0.4094	128	180	45	12	1	6719075
	10.50	0.4134	128	180	45	12	1	6719076
27/64	10.72	0.4220	128	180	45	12	1	6719077
	10.80	0.4252	128	180	45	12	1	6719078

$d_1$ $\varnothing m_7$ Inch	$d_1$ $\varnothing m_7$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ $\varnothing h_6$ mm	Pack Qty	R459
	11.00	0.4331	128	180	45	12	1	6719079
7/16	11.11	0.4374	128	180	45	12	1	6719080
	11.20	0.4409	128	180	45	12	1	6719081
	11.30	0.4449	128	180	45	12	1	6719082
	11.50	0.4528	128	180	45	12	1	6719083
29/64	11.51	0.4531	128	180	45	12	1	6719084
	11.80	0.4646	128	180	45	12	1	6719085
15/32	11.91	0.4689	128	180	45	12	1	6719086
	12.00	0.4724	128	180	45	12	1	6719087
	12.20	0.4803	151	202	48	14	1	6719088
31/64	12.30	0.4843	151	202	48	14	1	6719089
	12.50	0.4921	151	202	48	14	1	6719090
1/2	12.70	0.5000	151	202	48	14	1	6719091
	12.80	0.5039	151	202	48	14	1	6719092
	13.00	0.5118	151	202	48	14	1	6719093
33/64	13.10	0.5157	151	202	48	14	1	6719094
17/32	13.49	0.5311	151	202	48	14	1	6719095
	13.50	0.5315	151	202	48	14	1	6719096
35/64	13.89	0.5469	151	202	48	14	1	6719097
	14.00	0.5512	151	202	48	14	1	6719098
	14.25	0.5610	172	227	48	16	1	6719099
9/16	14.29	0.5626	172	227	48	16	1	6719100
	14.50	0.5709	172	227	48	16	1	6719101
37/64	14.68	0.5780	172	227	48	16	1	6719102
	15.00	0.5906	172	227	48	16	1	6719103
19/32	15.08	0.5937	172	227	48	16	1	6719104
	15.10	0.5945	172	227	48	16	1	6719105
39/64	15.48	0.6094	172	227	48	16	1	6719106
	15.50	0.6102	172	227	48	16	1	6719107
5/8	15.88	0.6252	172	227	48	16	1	6719108
	16.00	0.6299	172	227	48	16	1	6719109

# ADX SCREW MACHINE DRILL



## Multi-Application, Screw Machine Length

### 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

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

$d_1$ $\varnothing h_8$ 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	5970286
	3.10	0.1220	18	49	1	5970447
1/8	3.18	0.1250	18	49	1	5970282
	3.20	0.1260	18	49	1	5970483
	3.30	0.1299	18	49	1	5970513
	3.40	0.1339	20	52	1	5970545
	3.50	0.1378	20	52	1	5970567
9/64	3.57	0.1406	20	52	1	5970032
	3.60	0.1417	20	52	1	5970571
	3.70	0.1457	20	52	1	5970574
	3.80	0.1496	22	55	1	5970576
	3.90	0.1535	22	55	1	5970578
5/32	3.97	0.1563	22	55	1	5970528
	4.00	0.1575	22	55	1	5970462
	4.10	0.1614	22	55	1	5970466
	4.20	0.1654	22	55	1	5970469
	4.30	0.1693	24	58	1	5970471
11/64	4.37	0.1719	24	58	1	5970200
	4.40	0.1732	24	58	1	5970474
	4.50	0.1772	24	58	1	5970477
	4.60	0.1811	24	58	1	5970480
	4.70	0.1850	24	58	1	5970485
3/16	4.76	0.1875	26	62	1	5970451
	4.80	0.1890	26	62	1	5970488
	4.90	0.1929	26	62	1	5970490
	5.00	0.1969	26	62	1	5970493
	5.10	0.2008	26	62	1	5970496
13/64	5.16	0.2031	26	62	1	5970240
	5.20	0.2047	26	62	1	5970499
	5.30	0.2087	26	62	1	5970502
	5.40	0.2126	28	66	1	5970505
	5.50	0.2165	28	66	1	5970508
7/32	5.56	0.2188	28	66	1	5970139



$d_1$ $\varnothing h_8$ 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	5970511
	5.70	0.2244	28	66	1	5970516
	5.80	0.2283	28	66	1	5970519
	5.90	0.2323	28	66	1	5970521
15/64	5.95	0.2344	28	66	1	5970248
	6.00	0.2362	28	66	1	5970532
	6.10	0.2402	31	70	1	5970537
	6.20	0.2441	31	70	1	5970539
	6.30	0.2480	31	70	1	5970541
1/4	6.35	0.2500	31	70	1	5970236
	6.40	0.2520	31	70	1	5970543
	6.50	0.2559	31	70	1	5970547
	6.60	0.2598	31	70	1	5970549
	6.70	0.2638	31	70	1	5970551
17/64	6.75	0.2656	34	74	1	5970254
	6.80	0.2677	34	74	1	5970553
	6.90	0.2717	34	74	1	5970555
	7.00	0.2756	34	74	1	5970557
	7.10	0.2795	34	74	1	5970559
9/32	7.14	0.2812	34	74	1	5970027
	7.20	0.2835	34	74	1	5970561
	7.30	0.2874	34	74	1	5970563
	7.40	0.2913	34	74	1	5970565
	7.50	0.2953	34	74	1	5970569
19/64	7.54	0.2969	37	79	1	5970258
	7.60	0.2992	37	79	1	5969952
	7.70	0.3031	37	79	1	5969987
	7.80	0.3071	37	79	1	5970042
	7.90	0.3110	37	79	1	5970092
5/16	7.94	0.3125	37	79	1	5970524
	8.00	0.3150	37	79	1	5970143
	8.10	0.3189	37	79	1	5970147
	8.20	0.3228	37	79	1	5970152
	8.30	0.3268	37	79	1	5969954
21/64	8.33	0.3281	37	79	1	5970261
	8.40	0.3307	37	79	1	5969957
	8.50	0.3346	37	79	1	5969960
	8.60	0.3386	40	84	1	5969963
	8.70	0.3425	40	84	1	5969966
11/32	8.73	0.3437	40	84	1	5970199
	8.80	0.3465	40	84	1	5969969
	8.90	0.3504	40	84	1	5969972
	9.00	0.3543	40	84	1	5969975
	9.10	0.3583	40	84	1	5969979
23/64	9.13	0.3594	40	84	1	5970265
	9.20	0.3622	40	84	1	5969983
	9.30	0.3661	40	84	1	5969990
	9.40	0.3701	40	84	1	5969997
	9.50	0.3740	40	84	1	5970004
3/8	9.52	0.3750	43	89	1	5970455
	9.60	0.3780	43	89	1	5970009
	9.70	0.3819	43	89	1	5970014
	9.80	0.3858	43	89	1	5970018
	9.90	0.3898	43	89	1	5970022
25/64	9.92	0.3906	43	89	1	5970269
	10.00	0.3937	43	89	1	5970290
	10.10	0.3976	43	89	1	5970294
	10.20	0.4016	43	89	1	5970298
	10.30	0.4055	43	89	1	5970302
13/32	10.32	0.4063	43	89	1	5970232
	10.40	0.4094	43	89	1	5970174
	10.50	0.4134	43	89	1	5970178
	10.60	0.4173	43	89	1	5970180
	10.70	0.4213	47	95	1	5970182
27/64	10.72	0.4219	47	95	1	5970274

# ADX 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
	10.80	0.4252	47	95	1	5970184
	10.90	0.4291	47	95	1	5970186
	11.00	0.4331	47	95	1	5970188
	11.10	0.4370	47	95	1	5970189
7/16	11.11	0.4375	47	95	1	5970132
	11.20	0.4409	47	95	1	5970190
	11.30	0.4449	47	95	1	5970191
	11.40	0.4488	47	95	1	5970193
	11.50	0.4528	47	95	1	5970194
29/64	11.51	0.4531	47	95	1	5970278
	11.60	0.4567	47	95	1	5970195
	11.70	0.4606	47	95	1	5970196
	11.80	0.4646	47	95	1	5970197
	11.90	0.4685	51	102	1	5970198
15/32	11.91	0.4688	51	102	1	5970244
	12.00	0.4724	51	102	1	5970201
	12.10	0.4764	51	102	1	5970202
	12.20	0.4803	51	102	1	5970205
	12.30	0.4843	51	102	1	5970208
31/64	12.30	0.4843	51	102	1	5970458
	12.40	0.4882	51	102	1	5970210
	12.50	0.4921	51	102	1	5970213
	12.60	0.4961	51	102	1	5970216
	12.70	0.5000	51	102	1	5970219
1/2	12.70	0.5000	51	102	1	5970203
	12.80	0.5039	51	102	1	5970222
	12.90	0.5079	51	102	1	5970225
	13.00	0.5118	51	102	1	5970228

## Multi-Application, Premium Cobalt Screw Machine Length - Parabolic Flute

*for Advanced Chip Removal*

### A920

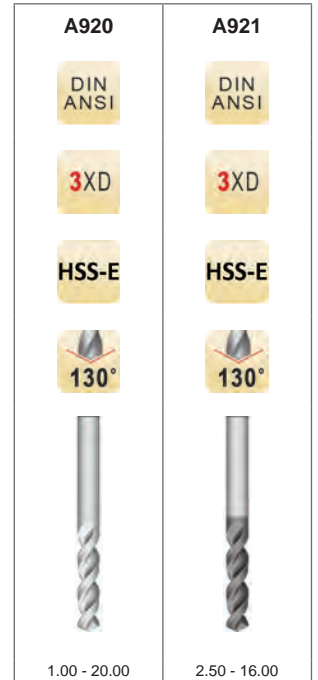
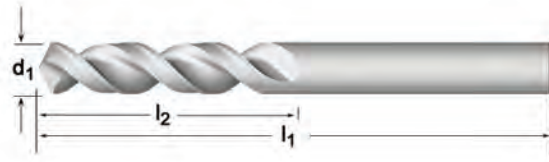
1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2

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

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



$d_1$ Ø <sub>h8</sub> Inch	$d_1$ Ø <sub>h8</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	A920	A921
	1.00	0.0394	6	26	1	5972252	—
	1.10	0.0433	7	28	1	5972257	—
3/64	1.19	0.0469	13	35	1	5972320	—
	1.20	0.0472	8	30	1	5972261	—
	1.25	0.0492	8	30	1	5972265	—
	1.30	0.0512	8	30	1	5972269	—
	1.35	0.0531	9	32	1	5972273	—
	1.40	0.0551	9	32	1	5972277	—
	1.50	0.0591	9	32	1	5972292	—
	1.55	0.0610	10	34	1	5972352	—
1/16	1.59	0.0625	16	41	1	5972536	—
	1.60	0.0630	10	34	1	5972389	—
	1.70	0.0669	10	34	1	5972434	—
	1.75	0.0689	11	36	1	5972481	—
	1.80	0.0709	11	36	1	5972524	—
	1.90	0.0748	11	36	1	5972532	—
5/64	1.98	0.0781	17	43	1	5972343	—
	2.00	0.0787	12	38	1	5972340	—
	2.10	0.0827	12	38	1	5972344	—
	2.15	0.0846	13	40	1	5972346	—
	2.20	0.0866	13	40	1	5972348	—
	2.30	0.0906	13	40	1	5972350	—
	2.35	0.0925	14	43	1	5972208	—
3/32	2.38	0.0937	19	41	1	5972313	—
	2.40	0.0945	14	43	1	5972212	—
	2.50	0.0984	14	43	1	5972216	5972616
	2.60	0.1024	14	43	1	5972220	5972620
	2.70	0.1063	16	46	1	5972229	5972624
7/64	2.78	0.1094	21	46	1	5972429	5972962
	2.80	0.1102	16	46	1	5972233	—
	2.90	0.1142	16	46	1	5972236	5972628
	3.00	0.1181	16	46	1	5972279	5972655
	3.10	0.1220	18	49	1	5972282	5972659

# PFX SCREW MACHINE DRILL



d <sub>1</sub> Øh <sub>8</sub> Inch	d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	A920	A921
1/8	3.18	0.1250	22	48	1	5972355	5971789
	3.20	0.1260	18	49	1	5972286	5972663
	3.30	0.1299	18	49	1	5972294	5972667
	3.40	0.1339	20	52	1	5972297	5972671
	3.50	0.1378	20	52	1	5972301	5972675
9/64	3.57	0.1406	24	49	1	5971669	5972558
	3.60	0.1417	20	52	1	5972304	5972683
	3.70	0.1457	20	52	1	5972306	5972688
	3.80	0.1496	22	55	1	5972308	5972691
	3.90	0.1535	22	55	1	5972310	5972696
5/32	3.97	0.1563	25	52	1	5972341	5972844
	4.00	0.1575	22	55	1	5972334	5972737
	4.10	0.1614	22	55	1	5972336	5972741
	4.20	0.1654	22	55	1	5972338	5972745
	4.30	0.1693	24	58	1	5972342	5972749
11/64	4.37	0.1719	27	54	1	5972413	5971828
	4.40	0.1732	24	58	1	5972311	5972753
	4.50	0.1772	24	58	1	5972333	5972756
	4.60	0.1811	24	58	1	5972354	5972760
	4.70	0.1850	24	58	1	5972391	5972764
3/16	4.76	0.1875	29	56	1	5972312	5972701
	4.80	0.1890	26	62	1	5972436	5972769
	4.90	0.1929	26	62	1	5972446	5972777
	5.00	0.1969	26	62	1	5972317	5972834
	5.10	0.2008	26	62	1	5972319	5972875
13/64	5.16	0.2031	30	57	1	5972459	5972679
	5.20	0.2047	26	62	1	5972321	5972928
	5.30	0.2087	26	62	1	5972323	5972977
	5.40	0.2126	28	66	1	5972325	5973023
	5.50	0.2165	28	66	1	5972327	5973030
7/32	5.56	0.2188	32	60	1	5972425	5972956
	5.60	0.2205	28	66	1	5972329	5973034
	5.70	0.2244	28	66	1	5972331	5973038
	5.80	0.2283	28	66	1	5972335	5973041
	5.90	0.2323	28	66	1	5972337	5972838
15/64	5.95	0.2344	33	62	1	5972492	5972605
	6.00	0.2362	28	66	1	5972347	5972852
	6.10	0.2402	31	70	1	5972349	5972854
	6.20	0.2441	31	70	1	5972351	5972858
	6.30	0.2480	31	70	1	5972353	5972863
1/4	6.35	0.2500	35	64	1	5972544	5971780
	6.40	0.2520	31	70	1	5972356	5972867
	6.50	0.2559	31	70	1	5972359	5972870
	6.60	0.2598	31	70	1	5972362	5972879
	6.70	0.2638	31	70	1	5972366	5972884
17/64	6.75	0.2656	37	67	1	5972516	5972609
	6.80	0.2677	34	74	1	5972369	5972889
	6.90	0.2717	34	74	1	5972373	5972894
	7.00	0.2756	34	74	1	5972377	5972899
	7.10	0.2795	34	74	1	5972381	5972902
9/32	7.14	0.2812	38	68	1	5971666	5972556
	7.20	0.2835	34	74	1	5972385	5972909
	7.30	0.2874	34	74	1	5972388	5972914
	7.40	0.2913	34	74	1	5972396	5972918
	7.50	0.2953	34	74	1	5972399	5972923
19/64	7.54	0.2969	40	70	1	5972318	5972614
	7.60	0.2992	37	79	1	5972403	5972932
	7.70	0.3031	37	79	1	5972407	5972937
	7.80	0.3071	37	79	1	5972411	5972943
	7.90	0.3110	37	79	1	5972418	5972948
5/16	7.94	0.3125	41	71	1	5972339	5972841
	8.00	0.3150	37	79	1	5972433	5972965
	8.10	0.3189	37	79	1	5972442	5972969
	8.20	0.3228	37	79	1	5971617	5972973
	8.30	0.3268	37	79	1	5971662	5972981

d <sub>1</sub> Ø <sub>h8</sub> Inch	d <sub>1</sub> Ø <sub>h8</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	A920	A921
21/64	8.33	0.3281	43	75	1	5972253	5972632
	8.40	0.3307	37	79	1	5971709	5972987
	8.50	0.3346	37	79	1	5971753	5972991
	8.60	0.3386	40	84	1	5971796	5972995
	8.70	0.3425	40	84	1	5971803	5972999
11/32	8.73	0.3437	43	76	1	5972409	5971826
	8.80	0.3465	40	84	1	5971806	5973003
	8.90	0.3504	40	84	1	5971808	5973007
	9.00	0.3543	40	84	1	5971809	5973011
	9.10	0.3583	40	84	1	5971624	5973015
23/64	9.13	0.3594	44	78	1	5972260	5972640
	9.20	0.3622	40	84	1	5971628	5973019
	9.30	0.3661	40	84	1	5971632	5973026
	9.40	0.3701	40	84	1	5971634	5972358
	9.50	0.3740	40	84	1	5971638	5972404
3/8	9.52	0.3750	46	79	1	5972322	5972708
	9.60	0.3780	43	89	1	5971642	5972449
	9.70	0.3819	43	89	1	5971646	5972494
	9.80	0.3858	43	89	1	5971650	5972539
	9.90	0.3898	43	89	1	5971654	5972547
25/64	9.92	0.3906	48	83	1	5972267	5972644
	10.00	0.3937	43	89	1	5972357	5971794
	10.20	0.4016	43	89	1	5972360	5971798
	10.30	0.4055	43	89	1	5972361	5971802
13/32	10.32	0.4063	49	84	1	5972453	5972636
	10.50	0.4134	43	89	1	5972367	5971807
27/64	10.72	0.4219	51	86	1	5972271	5972648
	10.80	0.4252	47	95	1	5972374	5971812
	11.00	0.4331	47	95	1	5972378	5971814
7/16	11.11	0.4375	52	87	1	5972421	5972953
	11.50	0.4528	47	95	1	5972395	5971822
29/64	11.51	0.4531	54	90	1	5972275	5972652
	11.80	0.4646	47	95	1	5972401	5971824
15/32	11.91	0.4688	54	92	1	5972489	5972792
	12.00	0.4724	51	102	1	5972415	5971830
	12.20	0.4803	51	102	1	5972422	—
31/64	12.30	0.4843	56	94	1	5972324	5972712
	12.50	0.4921	51	102	1	5972426	5971834
1/2	12.70	0.5000	57	95	1	5972540	5971776
	13.00	0.5118	51	102	1	5972444	5971842
33/64	13.10	0.5156	60	98	1	5972326	5972715
	13.50	0.5315	54	107	1	5972450	5972603
35/64	13.89	0.5469	64	102	1	5972328	5972719
	14.00	0.5512	54	107	1	5972464	5972726
9/16	14.29	0.5625	64	102	1	5971658	5972553
	14.50	0.5709	56	111	1	5972468	5972772
37/64	14.68	0.5781	67	105	1	5972330	5972723
	14.75	0.5807	56	111	1	5972474	5972781
	15.00	0.5906	56	111	1	5972477	5972785
19/32	15.08	0.5937	67	105	1	5972290	5972611
39/64	15.48	0.6094	70	108	1	5972332	5972730
	15.50	0.6102	58	115	1	5972485	5972789
5/8	15.88	0.6250	70	108	1	5972345	5972847
	16.00	0.6299	58	115	1	5972496	5972607
41/64	16.27	0.6406	73	114	1	5972451	—
	16.50	0.6496	60	119	1	5972500	—
21/32	16.67	0.6563	73	114	1	5972245	—
	16.75	0.6594	60	119	1	5972504	—
	17.00	0.6693	60	119	1	5972508	—
43/64	17.07	0.6719	73	117	1	5972456	—
11/16	17.46	0.6875	73	117	1	5972405	—
	17.50	0.6890	62	123	1	5972512	—
45/64	17.86	0.7031	76	121	1	5972461	—
	18.00	0.7087	62	123	1	5972520	—
23/32	18.26	0.7188	76	121	1	5972256	—

# PFX 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	A920	A921
	18.50	0.7283	64	127	1	5972528	—
47/64	18.65	0.7344	79	127	1	5972314	—
	19.00	0.7480	64	127	1	5972202	—
3/4	19.05	0.7500	79	127	1	5972316	—
49/64	19.45	0.7656	83	130	1	5972315	—
	19.50	0.7677	66	131	1	5972249	—
25/32	19.84	0.7813	83	130	1	5972264	—
	20.00	0.7874	66	131	1	5972241	—



## 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

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

A510

DIN  
338

4XD

HSS

130°



3.00 - 14.00

$d_1$ Øh <sub>8</sub> Inch	$d_1$ Øh <sub>8</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	A510
	3.00	0.1181	33	61	1	5970433
	3.10	0.1220	36	65	1	5970435
1/8	3.18	0.1250	36	65	1	5970041
	3.20	0.1260	36	65	1	5970437
	3.30	0.1299	36	65	1	5970439
	3.40	0.1339	39	70	1	5970441
	3.50	0.1378	39	70	1	5970443
9/64	3.57	0.1406	39	70	1	5970449
	3.60	0.1417	39	70	1	5970445
	3.70	0.1457	39	70	1	5970448
	3.80	0.1496	43	75	1	5970453
	3.90	0.1535	43	75	1	5970457
5/32	3.97	0.1563	43	75	1	5970452
	4.00	0.1575	43	75	1	5970472
	4.10	0.1614	43	75	1	5970475
	4.20	0.1654	43	75	1	5970478
	4.30	0.1693	47	80	1	5970481
11/64	4.37	0.1719	47	80	1	5970138
	4.40	0.1732	47	80	1	5970486
	4.50	0.1772	47	80	1	5970491
	4.60	0.1811	47	80	1	5970494
	4.70	0.1850	47	80	1	5970497
3/16	4.76	0.1875	52	86	1	5970461
	4.80	0.1890	52	86	1	5970500
	4.90	0.1929	52	86	1	5970504
	5.00	0.1969	52	86	1	5970507
	5.10	0.2008	52	86	1	5970509
13/64	5.16	0.2031	52	86	1	5970403
	5.20	0.2047	52	86	1	5970512
	5.30	0.2087	52	86	1	5970515
	5.40	0.2126	57	93	1	5970518
	5.50	0.2165	57	93	1	5970525
7/32	5.56	0.2188	57	93	1	5970389

# ADX 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	5970307
	5.70	0.2244	57	93	1	5970354
	5.80	0.2283	57	93	1	5970393
	5.90	0.2323	57	93	1	5970424
15/64	5.95	0.2344	57	93	1	5970412
	6.00	0.2362	57	93	1	5970456
	6.10	0.2402	63	101	1	5970459
	6.20	0.2441	63	101	1	5970463
	6.30	0.2480	63	101	1	5970313
1/4	6.35	0.2500	63	101	1	5970034
	6.40	0.2520	63	101	1	5970317
	6.50	0.2559	63	101	1	5970321
	6.60	0.2598	63	101	1	5970325
	6.70	0.2638	63	101	1	5970329
17/64	6.75	0.2656	69	109	1	5970415
	6.80	0.2677	69	109	1	5970332
	6.90	0.2717	69	109	1	5970336
	7.00	0.2756	69	109	1	5970340
	7.10	0.2795	69	109	1	5970345
9/32	7.14	0.2812	69	109	1	5970444
	7.20	0.2835	69	109	1	5970350
	7.30	0.2874	69	109	1	5970359
	7.40	0.2913	69	109	1	5970362
	7.50	0.2953	69	109	1	5970365
19/64	7.54	0.2969	75	117	1	5970418
	7.60	0.2992	75	117	1	5970369
	7.70	0.3031	75	117	1	5970372
	7.80	0.3071	75	117	1	5970379
	7.90	0.3110	75	117	1	5970383
5/16	7.94	0.3125	75	117	1	5970446
	8.00	0.3150	75	117	1	5970391
	8.10	0.3189	75	117	1	5970395
	8.20	0.3228	75	117	1	5970398
	8.30	0.3268	75	117	1	5970400
21/64	8.33	0.3281	75	117	1	5970421
	8.40	0.3307	75	117	1	5970404
	8.50	0.3346	75	117	1	5970406
	8.60	0.3386	81	125	1	5970410
	8.70	0.3425	81	125	1	5970413
11/32	8.73	0.3437	81	125	1	5970136
	8.80	0.3465	81	125	1	5970416
	8.90	0.3504	81	125	1	5970419
	9.00	0.3543	81	125	1	5970422
	9.10	0.3583	81	125	1	5970425
23/64	9.13	0.3594	81	125	1	5970423
	9.20	0.3622	81	125	1	5970428
	9.30	0.3661	81	125	1	5970430
	9.40	0.3701	81	125	1	5970432
	9.50	0.3740	81	125	1	5970434
3/8	9.52	0.3750	87	133	1	5970465
	9.60	0.3780	87	133	1	5970436
	9.70	0.3819	87	133	1	5970438
	9.80	0.3858	87	133	1	5970440
	9.90	0.3898	87	133	1	5970442
25/64	9.92	0.3906	87	133	1	5970426
	10.00	0.3937	87	133	1	5970046
	10.10	0.3976	87	133	1	5970051
	10.20	0.4016	87	133	1	5970055
	10.30	0.4055	87	133	1	5970066
13/32	10.32	0.4063	87	133	1	5970401
	10.40	0.4094	87	133	1	5970069
	10.50	0.4134	87	133	1	5970073
	10.60	0.4173	87	133	1	5970077
	10.70	0.4213	94	142	1	5970081
27/64	10.72	0.4219	94	142	1	5970429

$d_1$ $\varnothing h_8$ Inch	$d_1$ $\varnothing h_8$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	A510
	10.80	0.4252	94	142	1	5970085
	10.90	0.4291	94	142	1	5970089
	11.00	0.4331	94	142	1	5970093
	11.10	0.4370	94	142	1	5970097
7/16	11.11	0.4375	94	142	1	5970386
	11.20	0.4409	94	142	1	5970099
	11.30	0.4449	94	142	1	5970107
	11.40	0.4488	94	142	1	5970111
	11.50	0.4528	94	142	1	5970115
29/64	11.51	0.4531	94	142	1	5970431
	11.60	0.4567	94	142	1	5970119
	11.70	0.4606	94	142	1	5970124
	11.80	0.4646	94	142	1	5970128
	11.90	0.4685	101	151	1	5970131
15/32	11.91	0.4688	101	151	1	5970409
	12.00	0.4724	101	151	1	5970142
	12.10	0.4764	101	151	1	5970148
	12.20	0.4803	101	151	1	5970397
	12.30	0.4843	101	151	1	5970427
31/64	12.30	0.4843	101	151	1	5970467
	12.40	0.4882	101	151	1	5970450
	12.50	0.4921	101	151	1	5970489
	12.60	0.4961	101	151	1	5970522
	12.70	0.5000	101	151	1	5970527
1/2	12.70	0.5000	101	151	1	5970029
	12.80	0.5039	101	151	1	5970530
	12.90	0.5079	101	151	1	5970533
	13.00	0.5118	101	151	1	5970535
	14.00	0.5512	108	160	1	5970407

# ADX STANDARD LENGTH DRILL

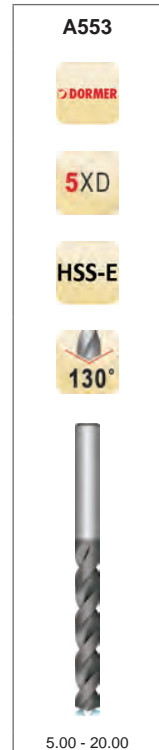
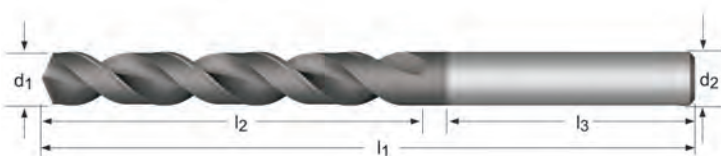


## Multi-Application, Premium Cobalt Coolant Feed w/ Reinforced Shank

### A553

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

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



5.00 - 20.00

$d_1$ $\varnothing h_8$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ $\varnothing h_6$ mm	Pack Qty	A553
5.00	0.1969	36	79	36	6	1	5971370
5.20	0.2047	38	79	36	6	1	5971464
5.50	0.2165	40	79	36	6	1	5971554
6.00	0.2362	43	79	36	6	1	5971566
6.30	0.2480	46	87	36	8	1	5971376
6.50	0.2559	47	87	36	8	1	5971378
6.80	0.2677	48	87	36	8	1	5971386
6.90	0.2717	48	87	36	8	1	5971390
7.00	0.2756	48	87	36	8	1	5971395
7.40	0.2913	54	94	36	8	1	5971404
7.50	0.2953	54	94	36	8	1	5971409
8.00	0.3150	58	94	36	8	1	5971424
8.50	0.3346	75	130	40	10	1	5971428
8.70	0.3425	75	130	40	10	1	5971430
9.00	0.3543	75	130	40	10	1	5971434
9.50	0.3740	75	130	40	10	1	5971443
10.00	0.3937	75	130	40	10	1	5969984
10.20	0.4016	87	150	45	12	1	5969988
10.30	0.4055	87	150	45	12	1	5969993
10.50	0.4134	87	150	45	12	1	5969998
11.00	0.4330	94	150	45	12	1	5970005
11.30	0.4449	94	150	45	12	1	5970011
11.50	0.4528	94	150	45	12	1	5970017
12.00	0.4724	94	150	45	12	1	5970020
12.50	0.4921	101	160	45	14	1	5970030
13.00	0.5118	101	160	45	14	1	5970035
13.50	0.5315	101	160	45	14	1	5970048
14.00	0.5512	101	160	45	14	1	5970058
14.25	0.5610	108	170	48	16	1	5970063
14.50	0.5709	108	170	48	16	1	5970068
15.00	0.5906	108	170	48	16	1	5970080
15.25	0.6004	108	170	48	16	1	5970083
15.50	0.6102	108	170	48	16	1	5970088

$d_1$ $\varnothing h_8$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	$l_3$ mm	$d_2$ $\varnothing h_6$ mm	Pack Qty	A553
16.00	0.6299	108	170	48	16	1	5970094
16.50	0.6496	125	190	48	18	1	5970104
17.00	0.6693	125	190	48	18	1	5970113
17.50	0.6890	130	190	48	18	1	5970127
17.75	0.6988	130	190	48	18	1	5970134
18.00	0.7087	130	190	48	18	1	5970137
19.00	0.7480	135	200	50	20	1	5970153
19.25	0.7579	140	200	50	20	1	5970156
20.00	0.7874	140	200	50	20	1	5970167

# PFX JOBBER LENGTH DRILL



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

### A900

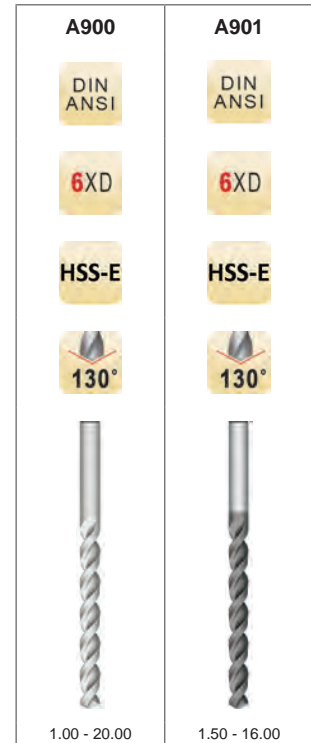
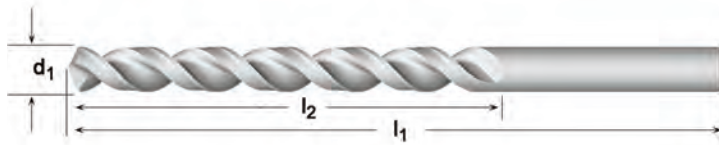
1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.1 3.2 3.3 3.4 4.1 4.2

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

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



$d_1$ Øh <sub>8</sub> Inch	$d_1$ Øh <sub>8</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	A900	A901
	1.00	0.0394	12	34	1	5970610	—
	1.10	0.0433	14	36	1	5970612	—
3/64	1.19	0.0469	19	44	1	5971100	—
	1.20	0.0472	16	38	1	5970614	—
	1.25	0.0492	16	36	1	5970615	—
	1.30	0.0512	16	38	1	5970617	—
	1.40	0.0551	18	40	1	5970621	—
	1.50	0.0591	18	40	1	5970627	5971575
	1.55	0.0610	20	43	1	5970628	5971576
1/16	1.59	0.0625	22	48	1	5970644	5971586
	1.60	0.0630	20	43	1	5970630	5971578
	1.70	0.0669	20	43	1	5970633	—
	1.75	0.0689	22	46	1	5970635	5971580
	1.80	0.0709	22	46	1	5970638	5971582
	1.90	0.0748	22	46	1	5970641	5971585
5/64	1.98	0.0781	25	51	1	5971244	5971804
	2.00	0.0787	24	49	1	5971407	5971779
	2.10	0.0827	24	49	1	5971410	5971787
	2.15	0.0846	27	53	1	5971415	5971791
	2.20	0.0866	27	53	1	5971421	—
	2.30	0.0906	27	53	1	5971432	—
3/32	2.38	0.0937	32	57	1	5971289	5971688
	2.40	0.0945	30	57	1	5971442	5971799
	2.50	0.0984	30	57	1	5971445	5971606
	2.60	0.1024	30	57	1	5971450	5971609
	2.70	0.1063	33	61	1	5971455	5971611
7/64	2.78	0.1094	38	67	1	5970898	5971718
	2.80	0.1102	33	61	1	5971460	—
	2.90	0.1142	33	61	1	5971466	5971614
	3.00	0.1181	33	61	1	5971513	5971637
	3.10	0.1220	36	65	1	5971517	5971645
1/8	3.18	0.1250	41	70	1	5970659	5971592
	3.20	0.1260	36	65	1	5971521	5971649
	3.30	0.1299	36	65	1	5971529	5971653

d <sub>1</sub> Øh <sub>8</sub> Inch	d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	A900	A901
	3.40	0.1339	39	70	1	5971098	5971656
	3.50	0.1378	39	70	1	5971123	5971661
9/64	3.57	0.1406	44	73	1	5971016	5971934
	3.60	0.1417	39	70	1	5971164	5971665
	3.70	0.1457	39	70	1	5971223	5971670
	3.80	0.1496	43	75	1	5971273	5971674
	3.90	0.1535	43	75	1	5971281	5971677
5/32	3.97	0.1563	51	79	1	5971240	5971801
	4.00	0.1575	43	75	1	5971115	5971719
	4.10	0.1614	43	75	1	5971117	5971726
	4.20	0.1654	43	75	1	5971120	5971730
	4.30	0.1693	47	80	1	5971126	5971738
11/64	4.37	0.1719	54	83	1	5970728	5971616
	4.40	0.1732	47	80	1	5971129	5971741
	4.50	0.1772	47	80	1	5971132	5971746
	4.60	0.1811	47	80	1	5971136	5971750
	4.70	0.1850	47	80	1	5971140	5971756
3/16	4.76	0.1875	59	89	1	5971285	5971681
	4.80	0.1890	52	86	1	5971144	5971759
	4.90	0.1929	52	86	1	5971147	5971763
	5.00	0.1969	52	86	1	5971183	5971767
	5.10	0.2008	52	86	1	5971188	5971771
13/64	5.16	0.2031	62	92	1	5971534	5971657
	5.20	0.2047	52	86	1	5971192	5971775
	5.30	0.2087	52	86	1	5971197	5971783
	5.40	0.2126	57	93	1	5971202	5971608
	5.50	0.2165	57	93	1	5971207	5971651
7/32	5.56	0.2188	64	95	1	5970891	5971714
	5.60	0.2205	57	93	1	5971212	5971700
	5.70	0.2244	57	93	1	5971218	5971744
	5.80	0.2283	57	93	1	5971227	5971786
	5.90	0.2323	57	93	1	5971231	5971793
15/64	5.95	0.2344	67	98	1	5971360	5971687
	6.00	0.2362	57	93	1	5971253	5971615
	6.10	0.2402	63	101	1	5971256	5971619
	6.20	0.2441	63	101	1	5971260	5971622
	6.30	0.2480	63	101	1	5971264	5971627
1/4	6.35	0.2500	70	102	1	5970655	5971588
	6.40	0.2520	63	101	1	5971277	5971631
	6.50	0.2559	63	101	1	5970865	5971636
	6.60	0.2598	63	101	1	5970907	5971639
	6.70	0.2638	63	101	1	5970963	5971643
17/64	6.75	0.2656	73	105	1	5971377	5971641
	6.80	0.2677	69	109	1	5971005	5971647
	6.90	0.2717	69	109	1	5971044	5971655
	7.00	0.2756	69	109	1	5971050	5971659
	7.10	0.2795	69	109	1	5971053	5971663
9/32	7.14	0.2812	75	108	1	5971009	5971927
	7.20	0.2835	69	109	1	5971056	5971667
	7.30	0.2874	69	109	1	5971059	5971671
	7.40	0.2913	69	109	1	5970869	5971675
	7.50	0.2953	69	109	1	5970872	5971680
19/64	7.54	0.2969	78	111	1	5971405	5971734
	7.60	0.2992	75	117	1	5970875	5971684
	7.70	0.3031	75	117	1	5970878	5971691
	7.80	0.3071	75	117	1	5970882	5971695
	7.90	0.3110	75	117	1	5970885	5971705
5/16	7.94	0.3125	81	114	1	5971234	5971797
	8.00	0.3150	75	117	1	5970902	5971722
	8.10	0.3189	75	117	1	5970914	5971725
	8.20	0.3228	75	117	1	5970918	5971729
	8.30	0.3268	75	117	1	5970924	5971733
21/64	8.33	0.3280	84	117	1	5971483	5971618
	8.40	0.3307	75	117	1	5970928	5971737
	8.50	0.3346	75	117	1	5970932	5971742
	8.60	0.3386	81	125	1	5970937	5971748



# PFX JOBBER LENGTH DRILL



d <sub>1</sub> Øh <sub>8</sub> Inch	d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	A900	A901
	8.70	0.3425	81	125	1	5970942	5971752
11/32	8.73	0.3437	87	121	1	5970723	5971613
	8.80	0.3465	81	125	1	5970949	5971755
	8.90	0.3504	81	125	1	5970953	5971758
	9.00	0.3543	81	125	1	5970958	5971762
	9.10	0.3583	81	125	1	5970967	5971766
23/64	9.13	0.3594	89	124	1	5971492	5971621
	9.20	0.3622	81	125	1	5970972	5971770
	9.30	0.3661	81	125	1	5970973	5971774
	9.40	0.3701	81	125	1	5970978	5971778
	9.50	0.3740	81	125	1	5970981	5971782
3/8	9.52	0.3750	92	127	1	5971102	5971693
	9.60	0.3780	87	133	1	5970986	5971790
	9.70	0.3819	87	133	1	5970989	5971811
	9.80	0.3858	87	133	1	5970993	5971833
	9.90	0.3898	87	133	1	5970997	5971853
25/64	9.92	0.3906	95	130	1	5971500	5971625
	10.00	0.3937	87	133	1	5970663	5971594
	10.20	0.4016	87	133	1	5970667	5971595
	10.30	0.4055	87	133	1	5970671	5971596
13/32	10.32	0.4063	98	133	1	5971525	5971652
	10.40	0.4094	87	133	1	5970674	5971597
	10.50	0.4134	87	133	1	5970679	5971598
27/64	10.72	0.4219	100	137	1	5971505	5971629
	10.80	0.4252	94	142	1	5970689	5971600
	11.00	0.4331	94	142	1	5970692	5971601
7/16	11.11	0.4375	103	140	1	5970888	5971710
	11.50	0.4528	94	142	1	5970709	5971607
29/64	11.51	0.4531	106	143	1	5971510	5971633
	11.80	0.4646	94	142	1	5970713	5971610
15/32	11.91	0.4688	110	146	1	5971358	5971679
	12.00	0.4724	101	151	1	5970732	5971620
31/64	12.30	0.4843	111	149	1	5971104	5971698
	12.50	0.4921	101	151	1	5970741	5971626
1/2	12.70	0.5000	101	151	1	5970648	—
	13.00	0.5118	101	151	1	5971429	5971644
33/64	13.10	0.5156	122	168	1	5971106	5971703
	13.50	0.5315	108	160	1	5971479	5971648
35/64	13.89	0.5469	122	168	1	5971109	5971708
	14.00	0.5512	108	160	1	5971537	5971660
9/16	14.29	0.5625	122	168	1	5971001	5971882
	14.50	0.5709	114	169	1	5971541	5971664
37/64	14.68	0.5781	122	168	1	5971111	5971713
	15.00	0.5906	114	169	1	5971354	5971672
19/32	15.08	0.5937	132	181	1	5971401	5971685
39/64	15.48	0.6094	132	181	1	5971113	5971715
	15.50	0.6102	120	178	1	5971356	5971676
5/8	15.88	0.6250	132	181	1	5971248	5971612
	16.00	0.6299	120	178	1	5971362	5971604
41/64	16.27	0.6406	132	181	1	5971152	—
	16.50	0.6496	125	184	1	5971364	—
21/32	16.67	0.6562	132	181	1	5971476	—
	17.00	0.6693	125	184	1	5971369	—
43/64	17.07	0.6719	143	194	1	5971156	—
11/16	17.46	0.6875	143	194	1	5970717	—
	17.50	0.6890	130	191	1	5971373	—
45/64	17.86	0.7031	130	191	1	5971161	—
	18.00	0.7087	130	191	1	5971385	—
23/32	18.26	0.7187	130	191	1	5971490	—
	18.50	0.7283	135	198	1	5971389	—
47/64	18.65	0.7344	135	198	1	5971169	—
	19.00	0.7480	135	198	1	5971393	—
3/4	19.05	0.7500	135	198	1	5971293	—
49/64	19.45	0.7656	135	198	1	5971177	—
	19.50	0.7677	140	205	1	5971397	—
25/32	19.84	0.7812	140	205	1	5971496	—
	20.00	0.7874	140	205	1	5971472	—

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

### A940

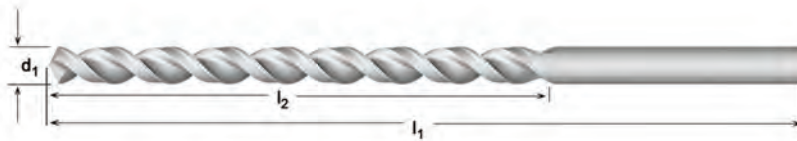
1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3 3.2 3.3 3.4 4.1 4.2 4.3

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

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



$d_1$ Ø <sub>h8</sub> Inch	$d_1$ Ø <sub>h8</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	A940	A941
	1.00	0.0394	33	56	1	5973055	5972873
	1.10	0.0433	37	60	1	5973058	—
3/64	1.19	0.0469	29	57	1	5973218	5972521
	1.20	0.0472	41	65	1	5973059	—
	1.30	0.0512	41	65	1	5973060	—
	1.40	0.0551	45	70	1	5973062	—
	1.50	0.0591	45	70	1	5972881	5972878
1/16	1.59	0.0625	44	76	1	5972905	5972883
	1.60	0.0630	50	76	1	5972885	—
	1.70	0.0669	50	76	1	5972890	—
	1.80	0.0709	53	80	1	5972895	—
	1.90	0.0748	53	80	1	5972900	—
5/64	1.98	0.0781	51	95	1	5972177	5973006
	2.00	0.0787	56	85	1	5973278	5972594
	2.10	0.0827	56	85	1	5973282	—
	2.20	0.0866	59	90	1	5973286	—
	2.30	0.0906	59	90	1	5973289	—
3/32	2.38	0.0937	57	108	1	5973207	5972517
	2.40	0.0945	62	95	1	5973084	—
	2.50	0.0984	62	95	1	5973087	5972596
	2.60	0.1024	62	95	1	5973090	—
	2.70	0.1063	66	100	1	5973092	—
7/64	2.78	0.1094	64	117	1	5972281	5972945
	2.80	0.1102	66	100	1	5973095	—
	2.90	0.1142	66	100	1	5973098	—
	3.00	0.1181	66	100	1	5973142	5972469
	3.10	0.1220	69	106	1	5973146	5972471
1/8	3.18	0.1250	70	130	1	5972921	5972896
	3.20	0.1260	69	106	1	5973151	5972475
	3.30	0.1299	69	106	1	5973156	5972479
	3.40	0.1339	73	112	1	5973161	5972483
	3.50	0.1378	73	112	1	5973170	5972487
9/64	3.57	0.1406	76	137	1	5972865	5972365

# PFX 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	5973175	5972493
	3.70	0.1457	73	112	1	5973183	5972501
	3.80	0.1496	78	119	1	5973187	5972505
	3.90	0.1535	78	119	1	5973195	5972509
5/32	3.97	0.1563	76	137	1	5972173	5972958
	4.00	0.1575	78	119	1	5973252	5972551
	4.10	0.1614	78	119	1	5973256	5972554
	4.20	0.1654	78	119	1	5973259	5972557
	4.30	0.1693	82	126	1	5973263	5972559
11/64	4.37	0.1719	86	146	1	5972990	5972963
	4.40	0.1732	82	126	1	5973266	5972561
	4.50	0.1772	82	126	1	5973274	5972562
	4.60	0.1811	82	126	1	5972119	5972564
	4.70	0.1850	82	126	1	5972164	5972566
3/16	4.76	0.1875	86	146	1	5973202	5972513
	4.80	0.1890	87	132	1	5972210	5972570
	4.90	0.1929	87	132	1	5972254	5972572
	5.00	0.1969	87	132	1	5972125	5972574
	5.10	0.2008	87	132	1	5972129	5972576
13/64	5.16	0.2031	92	152	1	5973021	5972996
	5.20	0.2047	87	132	1	5972133	5972578
	5.30	0.2087	87	132	1	5972137	5972580
	5.40	0.2126	91	139	1	5972141	5972582
	5.50	0.2165	91	139	1	5972145	5972584
7/32	5.56	0.2188	92	152	1	5972278	5972940
	5.60	0.2205	91	139	1	5972148	5972586
	5.70	0.2244	91	139	1	5972152	5972588
	5.80	0.2283	91	139	1	5972156	5972592
	5.90	0.2323	91	139	1	5972160	5972850
15/64	5.95	0.2344	95	156	1	5973046	5972448
	6.00	0.2362	91	139	1	5972185	5973049
	6.10	0.2402	97	148	1	5972189	5973051
	6.20	0.2441	97	148	1	5972193	5973054
	6.30	0.2480	97	148	1	5972198	5973056
1/4	6.35	0.2500	95	156	1	5972916	5972892
	6.40	0.2520	97	148	1	5972203	5972856
	6.50	0.2559	97	148	1	5972206	5972860
	6.60	0.2598	97	148	1	5972214	5972864
	6.70	0.2638	97	148	1	5972218	5972868
17/64	6.75	0.2656	98	159	1	5973080	5972541
	6.80	0.2677	102	156	1	5972222	5972871
	6.90	0.2717	102	156	1	5972226	5972876
	7.00	0.2756	102	156	1	5972230	5972880
	7.10	0.2795	102	156	1	5972234	5972886
9/32	7.14	0.2812	98	159	1	5972861	5973047
	7.20	0.2835	102	156	1	5972238	5972891
	7.30	0.2874	102	156	1	5972243	5972897
	7.40	0.2913	102	156	1	5972247	5972906
	7.50	0.2953	102	156	1	5972250	5972910
19/64	7.54	0.2969	102	162	1	5973270	5972590
	7.60	0.2992	109	165	1	5972258	5972915
	7.70	0.3031	109	165	1	5972262	5972920
	7.80	0.3071	109	165	1	5972266	5972925
	7.90	0.3110	109	165	1	5972270	5972930
5/16	7.94	0.3125	102	162	1	5972167	5972901
	8.00	0.3150	109	165	1	5972285	5972950
	8.10	0.3189	109	165	1	5972289	5972961
	8.20	0.3228	109	165	1	5972293	5972966
	8.30	0.3268	109	165	1	5972299	5972972
21/64	8.33	0.3281	105	165	1	5973109	5972598
	8.40	0.3307	109	165	1	5972832	5972976
	8.50	0.3346	109	165	1	5972869	5972980
	8.60	0.3386	115	175	1	5972922	5972984
	8.70	0.3425	115	175	1	5972974	5972988
11/32	8.73	0.3438	105	165	1	5972986	5972957

d <sub>1</sub> Ø <sub>h8</sub> Inch	d <sub>1</sub> Ø <sub>h8</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	A940	A941
	8.80	0.3465	115	175	1	5973017	5972992
	8.90	0.3504	115	175	1	5973027	5972997
	9.00	0.3543	115	175	1	5973031	5973001
	9.10	0.3583	115	175	1	5973035	5973009
23/64	9.13	0.3594	108	171	1	5973120	5972600
	9.20	0.3622	115	175	1	5973039	5973012
	9.30	0.3661	115	175	1	5972835	5973016
	9.40	0.3701	115	175	1	5972837	5973020
	9.50	0.3740	115	175	1	5972840	5973024
3/8	9.52	0.3750	108	171	1	5973223	5972525
	9.60	0.3780	121	184	1	5972843 <sup>1)</sup>	5973028 <sup>1)</sup>
	9.70	0.3819	121	184	1	5972846 <sup>1)</sup>	5973032 <sup>1)</sup>
	9.80	0.3858	121	184	1	5972849 <sup>1)</sup>	5973036 <sup>1)</sup>
	9.90	0.3898	121	184	1	5972853 <sup>1)</sup>	5973040 <sup>1)</sup>
25/64	9.92	0.3906	111	178	1	5973129 <sup>1)</sup>	5972455 <sup>1)</sup>
	10.00	0.3937	121	184	1	5972926 <sup>1)</sup>	5972904 <sup>1)</sup>
	10.20	0.4016	121	184	1	5972936 <sup>1)</sup>	5972908 <sup>1)</sup>
	10.30	0.4055	121	184	1	5972941 <sup>1)</sup>	5972913 <sup>1)</sup>
13/32	10.32	0.4063	111	178	1	5973018 <sup>1)</sup>	5972993 <sup>1)</sup>
	10.50	0.4134	121	184	1	5972954 <sup>1)</sup>	5972927 <sup>1)</sup>
27/64	10.72	0.4219	117	184	1	5973133 <sup>1)</sup>	5972460 <sup>1)</sup>
	11.00	0.4331	128	195	1	5972964 <sup>1)</sup>	5972938 <sup>1)</sup>
7/16	11.11	0.4375	117	184	1	5972274 <sup>1)</sup>	5972935 <sup>1)</sup>
	11.20	0.4409	128	195	1	5972968 <sup>1)</sup>	5972944 <sup>1)</sup>
	11.50	0.4528	128	195	1	5972971 <sup>1)</sup>	5972949 <sup>1)</sup>
29/64	11.51	0.4531	121	190	1	5973138 <sup>1)</sup>	5972465 <sup>1)</sup>
	11.80	0.4646	128	195	1	5972975 <sup>1)</sup>	5972952 <sup>1)</sup>
15/32	11.91	0.4688	121	190	1	5973044 <sup>1)</sup>	5973022 <sup>1)</sup>
	12.00	0.4724	134	205	1	5972994 <sup>1)</sup>	5972967 <sup>1)</sup>
	12.20	0.4803	134	205	1	5972998 <sup>1)</sup>	5972970 <sup>1)</sup>
31/64	12.30	0.4843	121	197	1	5973233 <sup>1)</sup>	5972529 <sup>1)</sup>
	12.50	0.4921	134	205	1	5973002 <sup>1)</sup>	5972978 <sup>1)</sup>
1/2	12.70	0.5000	121	197	1	5972911 <sup>1)</sup>	5972887 <sup>1)</sup>
	13.00	0.5118	134	205	1	5973010 <sup>1)</sup>	5972985 <sup>1)</sup>
33/64	13.10	0.5156	121	203	1	5973236 <sup>1)</sup>	5972533 <sup>1)</sup>
17/32	13.49	0.5311	121	203	1	5973057 <sup>1)</sup>	—
	13.50	0.5315	140	214	1	5973014 <sup>1)</sup>	5972989 <sup>1)</sup>
35/64	13.89	0.5469	124	210	1	5973240 <sup>1)</sup>	5972537 <sup>1)</sup>
	14.00	0.5512	140	214	1	5973029 <sup>1)</sup>	5973000 <sup>1)</sup>
9/16	14.29	0.5625	124	210	1	5972857 <sup>1)</sup>	5973043 <sup>1)</sup>
	14.50	0.5709	144	220	1	5973033 <sup>1)</sup>	5973004 <sup>1)</sup>
37/64	14.68	0.5781	124	222	1	5973244 <sup>1)</sup>	5972546 <sup>1)</sup>
	15.00	0.5906	144	220	1	5973037 <sup>1)</sup>	5973008 <sup>1)</sup>
19/32	15.08	0.5937	124	222	1	5973228 <sup>1)</sup>	5972568 <sup>1)</sup>
39/64	15.48	0.6094	124	222	1	5973248 <sup>1)</sup>	5972548 <sup>1)</sup>
	15.50	0.6102	149	227	1	5973042 <sup>1)</sup>	5973013 <sup>1)</sup>
5/8	15.88	0.6250	124	222	1	5972182 <sup>1)</sup>	5973045 <sup>1)</sup>
	16.00	0.6299	149	227	1	5973048 <sup>1)</sup>	5972497 <sup>1)</sup>
41/64	16.27	0.6406	130	229	1	5972296 <sup>1)</sup>	—
	16.50	0.6496	154	235	1	5973050 <sup>1)</sup>	—
21/32	16.67	0.6563	130	229	1	5973106 <sup>1)</sup>	—
	17.00	0.6693	154	235	1	5973052 <sup>1)</sup>	—
43/64	17.07	0.6719	137	235	1	5972302 <sup>1)</sup>	—
11/16	17.46	0.6875	137	235	1	5972979 <sup>1)</sup>	—
	17.50	0.6890	158	241	1	5973053 <sup>1)</sup>	—
45/64	17.86	0.7031	143	241	1	5972305 <sup>1)</sup>	—
	18.00	0.7087	158	241	1	5973116 <sup>1)</sup>	—
23/32	18.26	0.7188	143	241	1	5973113 <sup>1)</sup>	—
47/64	18.65	0.7344	149	248	1	5972307 <sup>1)</sup>	—
	19.00	0.7480	162	247	1	5973165 <sup>1)</sup>	—
3/4	19.05	0.7500	149	248	1	5973213 <sup>1)</sup>	—
49/64	19.45	0.7656	152	251	1	5972309 <sup>1)</sup>	—
25/32	19.84	0.7812	152	251	1	5973125 <sup>1)</sup>	—
	20.00	0.7874	166	254	1	5973101 <sup>1)</sup>	—

<sup>1)</sup> <10xD

# PFX EXTRA LENGTH DRILL



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

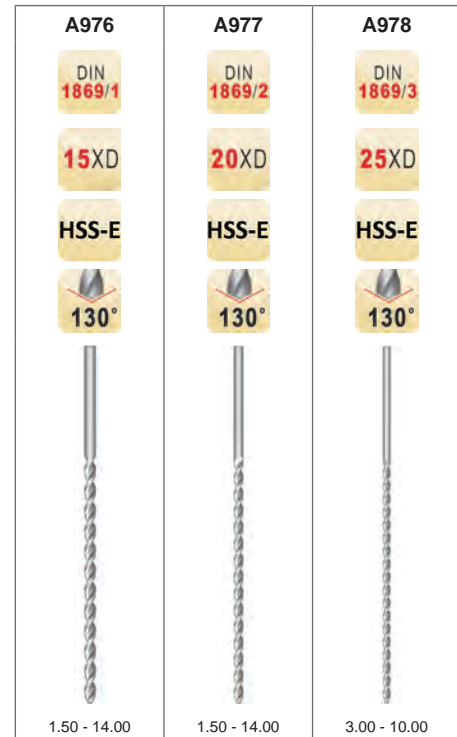
A976

A977

A978

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

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.



$d_1$ $\varnothing h_8$ 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	—	5973247 <sup>1)</sup>	—
	1.50	0.0591	75	115	1	5972589	—	—
1/16	1.59	0.0625	100	150	1	—	5973251 <sup>1)</sup>	—
	2.00	0.0787	110	160	1	—	5973305 <sup>1)</sup>	—
	2.00	0.0787	85	125	1	5972618	—	—
	2.10	0.0827	85	125	1	5972622	—	—
	2.20	0.0866	90	135	1	5972625	—	—
	2.30	0.0906	90	135	1	5972629	—	—
3/32	2.38	0.0937	115	170	1	—	5973122 <sup>1)</sup>	—
	2.40	0.0945	95	140	1	5972633	—	—
	2.50	0.0984	95	140	1	5972642	—	—
	2.60	0.1024	95	140	1	5972646	—	—
	2.70	0.1063	100	150	1	5972650	—	—
	2.80	0.1102	100	150	1	5972654	—	—
	2.90	0.1142	100	150	1	5972658	—	—
	3.00	0.1181	100	150	1	5972662	—	—
	3.00	0.1181	130	190	1	—	5973110	—
	3.00	0.1181	160	240	1	—	—	5973199 <sup>1)</sup>
	3.10	0.1220	105	155	1	5972666	—	—
1/8	3.18	0.1250	105	155	1	5972595	—	—
1/8	3.18	0.1250	135	200	1	—	5973260	—
	3.20	0.1260	105	155	1	5972670	—	—
	3.30	0.1299	105	155	1	5972674	—	—
	3.40	0.1339	115	165	1	5972676	—	—
	3.50	0.1378	115	165	1	5972686	—	—
	3.50	0.1378	145	210	1	—	5973114	—
	3.50	0.1378	180	265	1	—	—	5973204
	3.60	0.1417	115	165	1	5973077	—	—
	3.70	0.1457	115	165	1	5973111	—	—

<sup>1)</sup> Dormer Standard

d <sub>1</sub> Ø <sub>h<sub>8</sub></sub> Inch	d <sub>1</sub> Ø <sub>h<sub>8</sub></sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	A976	A977	A978
	3.80	0.1496	120	175	1	5973167	—	—
	3.90	0.1535	120	175	1	5973215	—	—
5/32	3.97	0.1563	120	175	1	5973155	—	—
	4.00	0.1575	120	175	1	5973276	—	—
	4.00	0.1575	150	220	1	—	5973127	—
	4.00	0.1575	190	280	1	—	—	5973220
	4.10	0.1614	120	175	1	5973279	—	—
	4.20	0.1654	120	175	1	5973284	—	—
	4.30	0.1693	125	185	1	5973081	—	—
	4.40	0.1732	125	185	1	5973083	—	—
	4.50	0.1772	125	185	1	5973086	—	—
	4.50	0.1772	160	235	1	—	5973132	—
	4.50	0.1772	200	295	1	—	—	5973216
	4.60	0.1811	125	185	1	5973089	—	—
	4.70	0.1850	125	185	1	5973093	—	—
3/16	4.76	0.1875	135	195	1	5973264	—	—
3/16	4.76	0.1875	170	245	1	—	5973118	—
	4.80	0.1890	135	195	1	5973096	—	—
	4.90	0.1929	135	195	1	5973097	—	—
	5.00	0.1969	135	195	1	5973102	—	—
	5.00	0.1969	170	245	1	—	5973136	—
	5.00	0.1969	210	315	1	—	—	5973220
	5.10	0.2008	135	195	1	5973104	—	—
	5.20	0.2047	135	195	1	5973107	—	—
	5.30	0.2087	135	195	1	5973115	—	—
	5.40	0.2126	140	205	1	5973119	—	—
	5.50	0.2165	140	205	1	5973124	—	—
	5.50	0.2165	180	260	1	—	5973141	—
	5.50	0.2165	225	330	1	—	—	5973226
	5.60	0.2205	140	205	1	5973128	—	—
	5.70	0.2244	140	205	1	5973135	—	—
	5.80	0.2283	140	205	1	5973140	—	—
	5.90	0.2323	140	205	1	5973145	—	—
	6.00	0.2362	140	205	1	5973160	—	—
	6.00	0.2362	180	260	1	—	5973148	—
	6.00	0.2362	225	330	1	—	—	5973231
	6.10	0.2402	150	215	1	5973171	—	—
	6.20	0.2441	150	215	1	5973176	—	—
	6.30	0.2480	150	215	1	5973180	—	—
1/4	6.35	0.2500	150	215	1	5972593	—	—
1/4	6.35	0.2500	190	275	1	—	5973220	—
1/4	6.35	0.2500	235	350	1	—	—	5973220
	6.40	0.2520	150	215	1	5973185	—	—
	6.50	0.2559	150	215	1	5973190	—	—
	6.50	0.2559	190	275	1	—	5973153	—
	6.50	0.2559	235	350	1	—	—	5973238
	6.60	0.2598	150	215	1	5973193	—	—
	6.70	0.2638	150	215	1	5973197	—	—
	6.80	0.2677	155	225	1	5973201	—	—
	6.90	0.2717	155	225	1	5973205	—	—
	7.00	0.2756	155	225	1	5973210	—	—
	7.00	0.2756	200	290	1	—	5973163	—
	7.00	0.2756	250	370	1	—	—	5973242
	7.50	0.2953	155	225	1	5973220	—	—
	7.50	0.2953	200	290	1	—	5973220	—
	7.50	0.2953	250	370	1	—	—	5973220
5/16	7.94	0.3125	165	240	1	5973150	—	—
	8.00	0.3150	165	240	1	5973230	—	—
	8.00	0.3150	210	305	1	—	5973172	—
	8.00	0.3150	265	390	1	—	—	5973250
	8.50	0.3346	165	240	1	5973235	—	—
	8.50	0.3346	210	305	1	—	5973220	—
	8.50	0.3346	265	390	1	—	—	5973220
11/32	8.73	0.3437	175	250	1	5972606	—	—
11/32	8.73	0.3437	220	320	1	—	5973220	—

# PFX 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
	9.00	0.3543	175	250	1	5973239	—	—
	9.00	0.3543	220	320	1	—	5973181	—
	9.00	0.3543	280	410	1	—	—	5973262
	9.50	0.3740	175	250	1	5973220	—	—
	9.50	0.3740	220	320	1	—	5973220	—
	9.50	0.3740	280	410	1	—	—	5973220
3/8	9.52	0.3750	185	265	1	5973220	—	—
	10.00	0.3937	185	265	1	5972597	—	—
	10.00	0.3937	235	340	1	—	5973268	—
	10.00	0.3937	295	430	1	—	—	5973194
	10.50	0.4134	185	265	1	5973220	—	—
	10.50	0.4134	235	340	1	—	5973220	—
	11.00	0.4331	195	280	1	5972601	—	—
	11.00	0.4331	250	365	1	—	5973158	—
7/16	11.11	0.4375	195	280	1	5973225	—	—
	11.50	0.4528	195	280	1	5972602	—	—
	11.50	0.4528	250	365	1	—	5973220	—
	12.00	0.4724	205	295	1	5972608	—	—
	12.00	0.4724	260	375	1	—	5973295	—
	12.50	0.4921	205	295	1	5972610	—	—
	12.50	0.4921	260	375	1	—	5973299	—
1/2	12.70	0.5000	205	295	1	5972591	—	—
	13.00	0.5118	205	295	1	5972613	—	—
	13.00	0.5118	260	375	1	—	5973220	—
	14.00	0.5512	215	310	1	5972615	—	—
	14.00	0.5512	270	390	1	—	5973303 <sup>1)</sup>	—



**General Purpose Jobber Length**

\* Sets Available on pgs. 224--227

**R10P** - Fractional Sizes

**R15P** - Letter Sizes

**R18P** - Wire Gauge Sizes

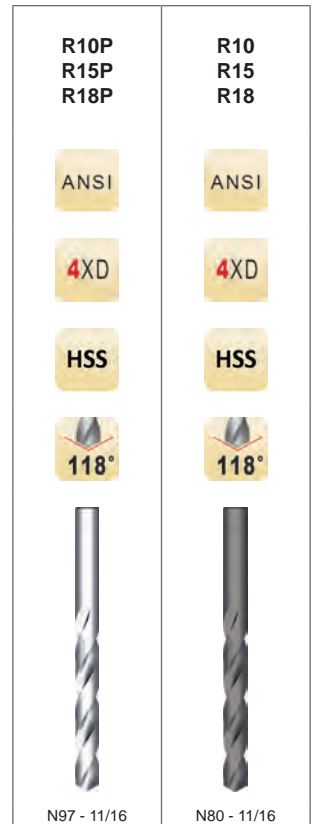
Bright Finish improves chip flow in soft or non-ferrous materials

**R10** - Fractional Sizes

**R15** - Letter Sizes

**R18** - Wire Gauge Sizes

Steam tempered to reduce wear and chip welding in harder ferrous materials for increased wear resistance and lubricity.



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø letter	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	R10P R15P R18P	R10 R15 R18
	97		0.0059	1/16	3/4	12	5999308	—
	96		0.0063	1/16	3/4	12	5999303	—
	95		0.0067	1/16	3/4	12	5999300	—
	94		0.0071	1/16	3/4	12	5999296	—
	93		0.0075	1/16	3/4	12	5999292	—
	92		0.0079	1/16	3/4	12	5999288	—
	91		0.0083	5/64	3/4	12	5999280	—
	90		0.0087	5/64	3/4	12	5999276	—
	89		0.0091	5/64	3/4	12	5999269	—
	88		0.0095	5/64	3/4	12	5999265	—
	87		0.0100	5/64	3/4	12	5999261	—
	86		0.0105	3/32	3/4	12	5999258	—
	85		0.0110	3/32	3/4	12	5999254	—
	84		0.0115	3/32	3/4	12	5999250	—
	83		0.0120	3/32	3/4	12	5999247	—
	82		0.0125	3/32	3/4	12	5999238	—
	81		0.0130	3/32	3/4	12	5999234	—
	80		0.0135	1/8	3/4	12	5999230	5999193
	79		0.0145	1/8	3/4	12	5999223	5999190
1/64			0.0156	3/16	3/4	12	5998515	5998664
	78		0.0160	3/16	7/8	12	5999220	5999189
	77		0.0180	3/16	7/8	12	5999217	5999188
	76		0.0200	3/16	7/8	12	5999214	5999187
	75		0.0210	1/4	1"	12	5999212	5999186
	74		0.0225	1/4	1"	12	5999209	5999184
	73		0.0240	5/16	1.1/8	12	5999393	5999180
	72		0.0250	5/16	1.1/8	12	5999389	5999178
	71		0.0260	3/8	1.1/4	12	5999385	5999176
	70		0.0280	3/8	1.1/4	12	5999382	5999174
	69		0.0292	1/2	1.3/8	12	5999328	5999170

# JOBBER DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R10P R15P R18P	R10 R15 R18
	68		0.0310	1/2	1.3/8	12	5999284	5999166
1/32			0.0313	1/2	1.3/8	12	5998506	5998656
	67		0.0320	1/2	1.3/8	12	5999242	5999164
	66		0.0330	1/2	1.3/8	12	5999205	5999161
	65		0.0350	5/8	1.1/2	12	5999154	5999158
	64		0.0360	5/8	1.1/2	12	5999148	5999153
	63		0.0370	5/8	1.1/2	12	5999145	5999150
	62		0.0380	5/8	1.1/2	12	5999143	5999147
	61		0.0390	11/16	1.5/8	12	5999141	5999144
	60		0.0400	11/16	1.5/8	12	5999137	5999138
	59		0.0410	11/16	1.5/8	12	5999128	5999131
	58		0.0420	11/16	1.5/8	12	5999124	5999127
	57		0.0430	3/4	1.3/4	12	5999120	5999123
	56		0.0465	3/4	1.3/4	12	5999116	5999119
3/64			0.0469	3/4	1.3/4	12	5998282	5998725
	55		0.0520	7/8	1.7/8	12	5999109	5999251
	54		0.0550	7/8	1.7/8	12	5999106	5999246
	53		0.0595	7/8	1.7/8	12	5999103	5999243
1/16			0.0625	7/8	1.7/8	12	5998498	5998648
	52		0.0635	7/8	1.7/8	12	5999100	5999239
	51		0.0670	1"	2"	12	5999097	5999231
	50		0.0700	1"	2"	12	5999094	5999199
	49		0.0730	1"	2"	12	5999088	5999155
	48		0.0760	1"	2"	12	5999086	5999115
5/64			0.0781	1"	2"	12	5998325	5998646
	47		0.0785	1"	2"	12	5999083	5998437
	46		0.0810	1.1/8	2.1/8	12	5999077	5998432
	45		0.0820	1.1/8	2.1/8	12	5999073	5998428
	44		0.0860	1.1/8	2.1/8	12	5999070	5998424
	43		0.0890	1.1/4	2.1/4	12	5999067	5998418
	42		0.0935	1.1/4	2.1/4	12	5999064	5998414
3/32			0.0938	1.1/4	2.1/4	12	5998275	5998720
	41		0.0960	1.3/8	2.3/8	12	5999061	5998411
	40		0.0980	1.3/8	2.3/8	12	5999057	5998408
	39		0.0995	1.3/8	2.3/8	12	5999049	5998400
	38		0.1015	1.7/16	2.1/2	12	5999045	5998396
	37		0.1040	1.7/16	2.1/2	12	5999037	5998389
	36		0.1065	1.7/16	2.1/2	12	5999032	5998385
7/64			0.1094	1.1/2	2.5/8	12	5998340	5998791
	35		0.1100	1.1/2	2.5/8	12	5999028	5998381
	34		0.1110	1.1/2	2.5/8	12	5999024	5998377
	33		0.1130	1.1/2	2.5/8	12	5999021	5998373
	32		0.1160	1.5/8	2.3/4	12	5999018	5998370
	31		0.1200	1.5/8	2.3/4	12	5999014	5998366
1/8			0.1250	1.5/8	2.3/4	12	5998519	5998672
	30		0.1285	1.5/8	2.3/4	12	5999010	5998363
	29		0.1360	1.3/4	2.7/8	12	5999001	5998357
	28		0.1405	1.3/4	2.7/8	12	5999167	5998351
9/64			0.1406	1.3/4	2.7/8	12	5998350	5998809
	27		0.1440	1.7/8	3"	12	5999163	5998348
	26		0.1470	1.7/8	3"	12	5999160	5998345
	25		0.1495	1.7/8	3"	12	5999157	5998342
	24		0.1520	2"	3.1/8	12	5999151	5998339
	23		0.1540	2"	3.1/8	12	5999112	5998336
5/32			0.1563	2"	3.1/8	12	5998323	5998764
	22		0.1570	2"	3.1/8	12	5999080	5998333
	21		0.1590	2.1/8	3.1/4	12	5999041	5998330
	20		0.1610	2.1/8	3.1/4	12	5998996	5998327
	19		0.1660	2.1/8	3.1/4	12	5999228	5998318
	18		0.1695	2.1/8	3.1/4	12	5999224	5998315
11/64			0.1719	2.1/8	3.1/4	12	5998539	5998681
	17		0.1730	2.3/16	3.3/8	12	5999221	5998312
	16		0.1770	2.3/16	3.3/8	12	5999218	5998309

d <sub>1</sub> ∅ Inch	d <sub>1</sub> ∅ Nr.	d <sub>1</sub> ∅ letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R10P R15P R18P	R10 R15 R18
	15		0.1800	2.3/16	3.3/8	12	5999215	5998306
	14		0.1820	2.3/16	3.3/8	12	5999211	5998302
	13		0.1850	2.5/16	3.1/2	12	5999208	5998297
3/16			0.1875	2.5/16	3.1/2	12	5998272	5998718
	12		0.1890	2.5/16	3.1/2	12	5999206	5998293
	11		0.1910	2.5/16	3.1/2	12	5999203	5998288
	10		0.1935	2.7/16	3.5/8	12	5999201	5998285
	9		0.1960	2.7/16	3.5/8	12	5999272	5999195
	8		0.1990	2.7/16	3.5/8	12	5999226	5999192
	7		0.2010	2.7/16	3.5/8	12	5999374	5999172
13/64			0.2031	2.7/16	3.5/8	12	5998296	5998687
	6		0.2040	2.1/2	3.3/4	12	5999132	5999134
	5		0.2055	2.1/2	3.3/4	12	5999091	5999182
	4		0.2090	2.1/2	3.3/4	12	5999053	5998404
	3		0.2130	2.1/2	3.3/4	12	5999005	5998360
7/32			0.2188	2.1/2	3.3/4	12	5998337	5998745
	2		0.2210	2.5/8	3.7/8	12	5999235	5998324
	1		0.2280	2.5/8	3.7/8	12	5999197	5998450
		A	0.2340	2.5/8	3.7/8	12	5998837	5998811
15/64			0.2344	2.5/8	3.7/8	12	5998365	5998693
		B	0.2380	2.3/4	4"	12	5998840	5998732
		C	0.2421	2.3/4	4"	12	5998843	5998988
		D	0.2461	2.3/4	4"	12	5998845	5999093
1/4			0.2500	2.3/4	4"	12	5998511	5998660
		E	0.2571	2.7/8	4.1/8	12	5998854	5999099
		F	0.2610	2.7/8	4.1/8	12	5998857	5999102
17/64			0.2656	2.7/8	4.1/8	12	5998417	5998699
		H	0.2661	2.7/8	4.1/8	12	5998860	5999105
		I	0.2720	2.7/8	4.1/8	12	5998863	5998810
		J	0.2772	2.7/8	4.1/8	12	5998866	5998814
		K	0.2811	2.15/16	4.1/4	12	5998869	5998819
9/32			0.2813	2.15/16	4.1/4	12	5998347	5998805
		L	0.2902	2.15/16	4.1/4	12	5998873	5998822
		M	0.2949	3.1/16	4.3/8	12	5998876	5998825
19/64			0.2969	3.1/16	4.3/8	12	5998425	5998704
		N	0.3020	3.1/16	4.3/8	12	5998882	5998828
5/16			0.3125	3.3/16	4.1/2	6	5998320	5998756
		O	0.3161	3.3/16	4.1/2	6	5998889	5998831
		P	0.3228	3.5/16	4.5/8	6	5998893	5998834
21/64			0.3281	3.5/16	4.5/8	6	5998252	5998708
		Q	0.3319	3.7/16	4.3/4	6	5998899	5999304
		R	0.3390	3.7/16	4.3/4	6	5998902	5999347
11/32			0.3437	3.7/16	4.3/4	6	5998530	5998678
		S	0.3480	3.1/2	4.7/8	6	5998906	5999396
		T	0.3580	3.1/2	4.7/8	6	5998912	5999426
23/64			0.3594	3.1/2	4.7/8	6	5998255	5998710
		U	0.3680	3.5/8	5"	6	5998916	5999430
3/8			0.3750	3.5/8	5"	6	5998287	5998728
		V	0.3772	3.5/8	5"	6	5998922	5999432
		W	0.3858	3.3/4	5.1/8	6	5998926	5999434
25/64			0.3906	3.3/4	5.1/8	6	5998259	5998712
		X	0.3969	3.3/4	5.1/8	6	5998929	5999436
		Y	0.4039	3.7/8	5.1/4	6	5998934	5999263
13/32			0.4063	3.7/8	5.1/4	6	5998248	5998684
		Z	0.4130	3.7/8	5.1/4	6	5999257	5999267
27/64			0.4219	3.15/16	5.3/8	6	5998264	5998714
7/16			0.4375	4.1/16	5.1/2	6	5998334	5998713
29/64			0.4531	4.3/16	5.5/8	6	5998268	5998716
15/32			0.4687	4.5/16	5.3/4	6	5998331	5998690
31/64			0.4844	4.3/8	5.7/8	6	5998292	5998731
1/2			0.5000	4.1/2	6"	6	5998502	5998653
33/64			0.5156	4.13/16	6.5/8	1	5998300	5998735
17/32			0.5313	4.13/16	6.5/8	1	5998409	5998696

# JOBBER DRILL



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø letter	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	R10P R15P R18P	R10 R15 R18
35/64			0.5469	4.13/16	6.5/8	1	5998303	5998736
9/16			0.5625	4.13/16	6.5/8	1	5998343	5998800
37/64			0.5781	4.13/16	6.5/8	1	5998307	5998740
19/32			0.5937	5.3/16	7.1/8	1	5998421	5998703
39/64			0.6094	5.3/16	7.1/8	1	5998310	5998744
5/8			0.6250	5.3/16	7.1/8	1	5998328	5998686
41/64			0.6406	5.3/16	7.1/8	1	5998313	5998749
21/32			0.6563	5.3/16	7.1/8	1	5998429	5998706
43/64			0.6719	5.5/8	7.5/8	1	5998316	5998752
11/16			0.6875	5.5/8	7.5/8	1	5998525	5998675

## General Purpose Jobber Length, Fractional

\* Sets Available on pg. 225

### A012

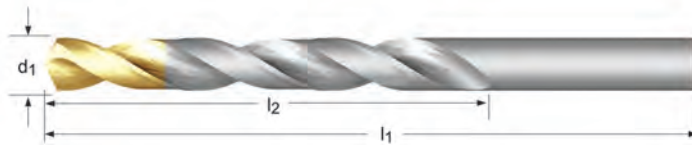
Low thrust design self centering Split Point for easier penetration.  
TiN Coated Tip increases surface hardness and improves tool life.

### A012S

Select A012 sizes available in a pouch pack.

1/16 thru 3/16 2 per pack

13/64 thru 1/2 1 per pack



\* Bright / No split point Below N46

$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø letter	$d_1$ Ø mm	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	A012	A012S
	80		0.34	0.0135	1/8	3/4	10	5966768 *	—
	79		0.37	0.0145	1/8	3/4	10	5966762 *	—
1/64			0.40	0.0156	3/16	3/4	10	5966740 *	—
	78		0.41	0.0160	3/16	7/8	10	5966758 *	—
	77		0.46	0.0180	3/16	7/8	10	5966754 *	—
	76		0.51	0.0200	3/16	7/8	10	5966749 *	—
	75		0.53	0.0210	1/4	1"	10	5966746 *	—
	74		0.57	0.0225	1/4	1"	10	5966741 *	—
	73		0.61	0.0240	5/16	1.1/8	10	5966735 *	—
	72		0.64	0.0250	5/16	1.1/8	10	5966731 *	—
	71		0.66	0.0260	3/8	1.1/4	10	5966727 *	—
	70		0.71	0.0280	3/8	1.1/4	10	5966723 *	—
	69		0.742	0.0292	1/2	1.3/8	10	5966716 *	—
	68		0.79	0.0310	1/2	1.3/8	10	5966711 *	—
1/32			0.79	0.0313	1/2	1.3/8	10	5966639 *	—
	67		0.81	0.0320	1/2	1.3/8	10	5966708 *	—
	66		0.84	0.0330	1/2	1.3/8	10	5966703 *	—
	65		0.89	0.0350	5/8	1.1/2	10	5966697 *	—
	64		0.91	0.0360	5/8	1.1/2	10	5966687 *	—
	63		0.94	0.0370	5/8	1.1/2	10	5966682 *	—
	62		0.97	0.0380	5/8	1.1/2	10	5966677 *	—
	61		0.99	0.0390	11/16	1.5/8	10	5966672 *	—
	60		1.02	0.0400	11/16	1.5/8	10	5966668 *	—
	59		1.04	0.0410	11/16	1.5/8	10	5966662 *	—
	58		1.07	0.0420	11/16	1.5/8	10	5966658 *	—
	57		1.09	0.0430	3/4	1.3/4	10	5966654 *	—
	56		1.18	0.0465	3/4	1.3/4	10	5966650 *	—
3/64			1.19	0.0469	3/4	1.3/4	10	5966635 *	—
	55		1.32	0.0520	7/8	1.7/8	10	5966828 *	—
	54		1.40	0.0550	7/8	1.7/8	10	5966825 *	—
	53		1.51	0.0595	7/8	1.7/8	10	5966822 *	—
1/16			1.59	0.0625	7/8	1.7/8	2	—	6524892 *

# JOBBER DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	A012	A012S
1/16			1.59	0.0625	7/8	1.7/8	10	5966594 *	—
	52		1.61	0.0635	7/8	1.7/8	10	5966819 *	—
	51		1.70	0.0669	1"	2"	10	5966812 *	—
	50		1.78	0.0700	1"	2"	10	5966778 *	—
	49		1.85	0.0730	1"	2"	10	5966692 *	—
	48		1.93	0.0760	1"	2"	10	5966642 *	—
5/64			1.98	0.0781	1"	2"	2	—	6524893 *
5/64			1.98	0.0781	1"	2"	10	5966684 *	—
	47		1.99	0.0785	1"	2"	10	5967082 *	—
	46		2.06	0.0810	1.1/8	2.1/8	10	5967070	—
	45		2.08	0.0820	1.1/8	2.1/8	10	5967067	—
	44		2.18	0.0860	1.1/8	2.1/8	10	5967063	—
	43		2.26	0.0890	1.1/4	2.1/4	10	5967061	—
	42		2.38	0.0935	1.1/4	2.1/4	10	5967056	—
3/32			2.38	0.0938	1.1/4	2.1/4	2	—	6524894
3/32			2.38	0.0938	1.1/4	2.1/4	10	5966631	—
	41		2.44	0.0960	1.3/8	2.3/8	10	5967053	—
	40		2.49	0.0980	1.3/8	2.3/8	10	5967049	—
	39		2.53	0.0995	1.3/8	2.3/8	10	5967043	—
	38		2.58	0.1015	1.7/16	2.1/2	10	5967040	—
	37		2.64	0.1040	1.7/16	2.1/2	10	5967034	—
	36		2.71	0.1065	1.7/16	2.1/2	10	5967031	—
7/64			2.78	0.1094	1.1/2	2.5/8	2	—	6524895
7/64			2.78	0.1094	1.1/2	2.5/8	10	5966707	—
	35		2.79	0.1100	1.1/2	2.5/8	10	5967029	—
	34		2.82	0.1110	1.1/2	2.5/8	10	5967026	—
	33		2.87	0.1130	1.1/2	2.5/8	10	5967023	—
	32		2.95	0.1160	1.5/8	2.3/4	10	5967017	—
	31		3.05	0.1200	1.5/8	2.3/4	10	5967014	—
1/8			3.18	0.1250	1.5/8	2.3/4	2	—	6524896
1/8			3.18	0.1250	1.5/8	2.3/4	10	5966747	—
	30		3.26	0.1285	1.5/8	2.3/4	10	5967011	—
	29		3.45	0.1360	1.3/4	2.7/8	10	5967005	—
	28		3.57	0.1405	1.3/4	2.7/8	10	5966999	—
9/64			3.57	0.1405	1.3/4	2.7/8	2	—	6524897
9/64			3.57	0.1406	1.3/4	2.7/8	10	5966724	—
	27		3.66	0.1440	1.7/8	3"	10	5966996	—
	26		3.73	0.1470	1.7/8	3"	10	5966992	—
	25		3.80	0.1495	1.7/8	3"	10	5966987	—
	24		3.86	0.1520	2"	3.1/8	10	5966983	—
	23		3.91	0.1540	2"	3.1/8	10	5966979	—
5/32	5/32		3.97	0.1563	2"	3.1/8	2	—	6524898
5/32			3.97	0.1563	2"	3.1/8	10	5966680	—
	22		3.99	0.1570	2"	3.1/8	10	5966975	—
	21		4.04	0.1590	2.1/8	3.1/4	10	5966971	—
	20		4.09	0.1610	2.1/8	3.1/4	10	5966969	—
	19		4.22	0.1660	2.1/8	3.1/4	10	5966952	—
	18		4.31	0.1695	2.1/8	3.1/4	10	5966948	—
11/64			4.37	0.1719	2.1/8	3.1/4	2	—	6524899
11/64			4.37	0.1719	2.1/8	3.1/4	10	5966759	—
	17		4.39	0.1730	2.3/16	3.3/8	10	5966943	—
	16		4.50	0.1770	2.3/16	3.3/8	10	5966938	—
	15		4.57	0.1800	2.3/16	3.3/8	10	5966933	—
	14		4.62	0.1820	2.3/16	3.3/8	10	5966928	—
	13		4.70	0.1850	2.5/16	3.1/2	10	5966923	—
3/16			4.76	0.1875	2.5/16	3.1/2	2	—	6524900
3/16			4.76	0.1875	2.5/16	3.1/2	10	5966629	—
	12		4.80	0.1890	2.5/16	3.1/2	10	5966919	—
	11		4.85	0.1910	2.5/16	3.1/2	10	5966915	—
	10		4.92	0.1935	2.7/16	3.5/8	10	5966910	—
	9		4.98	0.1960	2.7/16	3.5/8	10	5966771	—
	8		5.06	0.1990	2.7/16	3.5/8	10	5966765	—
	7		5.11	0.2010	2.7/16	3.5/8	10	5966720	—
13/64			5.16	0.2031	2.7/16	3.5/8	1	—	6524901
13/64			5.16	0.2031	2.7/16	3.5/8	10	5966599	—

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	A012	A012S
	6		5.18	0.2040	2.1/2	3.3/4	10	5966667	—
	5		5.22	0.2055	2.1/2	3.3/4	10	5966739	—
	4		5.31	0.2090	2.1/2	3.3/4	10	5967045	—
	3		5.41	0.2130	2.1/2	3.3/4	10	5967008	—
7/32			5.56	0.2188	2.1/2	3.3/4	1	—	6524902
7/32			5.56	0.2188	2.1/2	3.3/4	10	5966704	—
	2		5.61	0.2210	2.5/8	3.7/8	10	5966964	—
	1		5.79	0.2280	2.5/8	3.7/8	10	5967094	—
		A	5.94	0.2340	2.5/8	3.7/8	10	5967301	—
15/64			5.95	0.2344	2.5/8	3.7/8	1	—	6524903
15/64			5.95	0.2344	2.5/8	3.7/8	10	5966603	—
		B	6.03	0.2380	2.3/4	4"	10	5967304	—
		C	6.15	0.2420	2.3/4	4"	10	5967308	—
		D	6.25	0.2460	2.3/4	4"	10	5967312	—
1/4			6.35	0.2500	2.3/4	4"	1	—	6524904
1/4			6.35	0.2500	2.3/4	4"	10	5966688	—
		E	6.35	0.2500	2.3/4	4"	10	5967317	—
		F	6.53	0.2570	2.7/8	4.1/8	10	5967323	—
		G	6.63	0.2610	2.7/8	4.1/8	10	5966901	—
17/64			6.75	0.2656	2.7/8	4.1/8	1	—	6524905
17/64			6.75	0.2656	2.7/8	4.1/8	10	5966607	—
		H	6.76	0.2660	2.7/8	4.1/8	10	5966958	—
		I	6.91	0.2720	2.7/8	4.1/8	10	5967002	—
		J	7.04	0.2770	2.7/8	4.1/8	10	5967037	—
		K	7.14	0.2810	2.15/16	4.1/4	10	5967077	—
9/32			7.14	0.2813	2.15/16	4.1/4	1	—	6524906
9/32			7.14	0.2813	2.15/16	4.1/4	10	5966717	—
		L	7.37	0.2900	2.15/16	4.1/4	10	5967086	—
		M	7.49	0.2950	3.1/16	4.3/8	10	5967088	—
19/64			7.54	0.2968	3.1/16	4.3/8	1	—	6524907
19/64			7.54	0.2968	3.1/16	4.3/8	10	5966610	—
		N	7.67	0.3020	3.1/16	4.3/8	10	5967091	—
5/16			7.94	0.3125	3.3/16	4.1/2	1	—	6524908
5/16			7.94	0.3125	3.3/16	4.1/2	10	5966676	—
		O	8.03	0.3160	3.3/16	4.1/2	10	5966774	—
		P	8.20	0.3230	3.5/16	4.5/8	10	5966782	—
21/64			8.33	0.3281	3.5/16	4.5/8	1	—	6524909
21/64			8.33	0.3281	3.5/16	4.5/8	10	5966615	—
		Q	8.43	0.3320	3.7/16	4.3/4	10	5966785	—
		R	8.61	0.3390	3.7/16	4.3/4	10	5966788	—
11/32			8.73	0.3437	3.7/16	4.3/4	1	—	6524910
11/32			8.73	0.3437	3.7/16	4.3/4	10	5966755	—
		S	8.84	0.3480	3.1/2	4.7/8	10	5966792	—
		T	9.09	0.3580	3.1/2	4.7/8	10	5966795	—
23/64			9.13	0.3594	3.1/2	4.7/8	1	—	6524911
23/64			9.13	0.3594	3.1/2	4.7/8	10	5966621	—
		U	9.35	0.3680	3.5/8	5"	10	5966797	—
3/8			9.52	0.3750	3.5/8	5"	1	—	6524912
3/8			9.52	0.3750	3.5/8	5"	10	5966637	—
		V	9.58	0.3770	3.5/8	5"	10	5966800	—
		W	9.80	0.3860	3.3/4	5.1/8	10	5966803	—
25/64			9.92	0.3906	3.3/4	5.1/8	1	—	6524913
25/64			9.92	0.3906	3.3/4	5.1/8	10	5966623	—
		X	10.08	0.3970	3.3/4	5.1/8	5	5966806	—
		Y	10.26	0.4040	3.7/8	5.1/4	5	5966809	—
13/32			10.32	0.4063	3.7/8	5.1/4	1	—	6524914
13/32			10.32	0.4063	3.7/8	5.1/4	5	5966598	—
		Z	10.49	0.4130	3.7/8	5.1/4	5	5966814	—
27/64			10.72	0.4219	3.15/16	5.3/8	1	—	6524915
27/64			10.72	0.4219	3.15/16	5.3/8	5	5966625	—
7/16			11.11	0.4375	4.1/16	5.1/2	1	—	6524916
7/16			11.11	0.4375	4.1/16	5.1/2	5	5966699	—
29/64			11.51	0.4531	4.3/16	5.5/8	1	—	6524917
29/64			11.51	0.4531	4.3/16	5.5/8	5	5966627	—
15/32			11.91	0.4687	4.5/16	5.3/4	1	—	6524918



# JOBBER DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	A012	A012S
15/32			11.91	0.4687	4.5/16	5.3/4	5	5966601	—
31/64			12.30	0.4844	4.3/8	5.7/8	1	—	6524919
31/64			12.30	0.4844	4.3/8	5.7/8	5	5966643	—
1/2			12.70	0.5000	4.1/2	6"	1	—	6524920
1/2			12.70	0.5000	4.1/2	6"	5	5966617	—
33/64			13.10	0.5156	4.13/16	6.5/8	1	5966645	—
17/32			13.49	0.5313	4.13/16	6.5/8	1	5966605	—
35/64			13.89	0.5469	4.13/16	6.5/8	1	5966647	—
9/16			14.29	0.5625	4.13/16	6.5/8	1	5966713	—
37/64			14.68	0.5781	4.13/16	6.5/8	1	5966651	—
19/32			15.08	0.5937	5.3/16	7.1/8	1	5966609	—
39/64			15.48	0.6094	5.3/16	7.1/8	1	5966655	—
5/8			15.88	0.6250	5.3/16	7.1/8	1	5966693	—
21/32			16.67	0.6563	5.3/16	7.1/8	1	5966613	—
11/16			17.46	0.6875	5.5/8	7.5/8	1	5966751	—
45/64			17.86	0.7031	5.5/8	7.5/8	1	5966660	—
23/32			18.26	0.7188	5.5/8	7.5/8	1	5966619	—
47/64			18.65	0.7344	6"	8"	1	5966664	—
3/4			19.05	0.7500	6"	8"	1	5966633	—

## General Purpose Jobber Length, DIN Standard

\* Sets Available on pg. 228-230

**2A** Bright Finish improves chip flow in soft or non-ferrous materials

**2AB** Steam tempered for increased wear resistance & lubricity.  
**A100**

**A002** Low thrust design self centering Split Point for easier penetration. TiN Coated Tip increases wear resistance and improves tool life.  
**A002S**

\* Bright Below 2mm

\* No split point below 2mm



2A	2AB	A100	A002	A002S
0.15 - 15.00	1.00 - 17.50	0.20 - 20.00	1.00 - 16.00	1.00 - 16.00

$d_1$ $\varnothing_{h_8}$ mm	$d_1$ $\varnothing_{h_8}$ "/Nr./letter	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	2A	2AB	A100	A002	A002S
0.15		0.0059	1.5	19	6000290	—	—	—	—
0.16		0.0063	1.5	19	6000292	—	—	—	—
0.17		0.0067	1.5	19	6000294	—	—	—	—
0.18		0.0070	1.5	19	6000297	—	—	—	—
0.19		0.0075	1.5	19	6000300	—	—	—	—
0.20		0.0078	2.5	19	6000303	—	5967598	—	—
0.21		0.0083	2.5	19	6000308	—	—	—	—
0.22		0.0087	2.5	19	6000311	—	—	—	—
0.23		0.0091	2.5	19	6000314	—	—	—	—
0.24		0.0094	2.5	19	6000317	—	—	—	—
0.25		0.0098	3	19	6000320	—	5967601	—	—
0.26		0.0102	3	19	6000323	—	—	—	—
0.27		0.0106	3	19	6000326	—	—	—	—
0.28		0.0110	3	19	6000329	—	—	—	—
0.29		0.0114	3	19	6000332	—	—	—	—
0.30		0.0118	3	19	6000335	—	5967603	—	—
0.32		0.0126	4	19	6000339	—	5967605	—	—
0.34	80	0.0135	4	19	—	—	5966767	—	—
0.34		0.0134	4	19	6000342	—	—	—	—
0.35		0.0138	4	19	6000345	—	5967609	—	—
0.36		0.0142	4	19	6000348	—	—	—	—
0.38	79	0.0145	4	19	—	—	5966761	—	—
0.38		0.0150	4	19	6000351	—	5967611	—	—
0.40	1/64	0.0156	5	20	—	—	5966604	—	—
0.40		0.0157	5	20	6000354	—	5967613	—	—
0.42	78	0.0160	5	20	—	—	5966757	—	—
0.42		0.0165	5	20	6000357	—	5967614	—	—
0.44		0.0173	5	20	6000361	—	—	—	—
0.45		0.0177	5	20	6000365	—	5967616	—	—
0.46	77	0.0180	5	20	—	—	5966753	—	—
0.46		0.0181	5	20	6000370	—	—	—	—

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

**A100 and A002:** 0.20mm - 10.00mm = 10; X - 13.00mm = 5; 33/64 and above = 1

**A002S:** 0.20mm - 5.00mm = 2; 13/64 - 13.00mm = 1

d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> Øh <sub>8</sub> "/Nr./letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	2A	2AB	A100	A002	A002S
0.48		0.0189	5	20	6000380	—	5967618	—	—
0.50		0.0197	6	22	6000385	—	5967619	—	—
	76	0.0200	6	22	—	—	5966750	—	—
0.52		0.0205	6	22	—	—	5967621	—	—
	75	0.0210	6	22	—	—	5966745	—	—
0.55		0.0217	7	24	6000389	—	5967623	—	—
	74	0.0225	7	24	—	—	5966742	—	—
0.58		0.0228	7	24	—	—	5967625	—	—
0.60		0.0236	7	24	6000393	—	5967628	—	—
	73	0.0240	8	26	—	—	5966738	—	—
0.62		0.0244	8	26	—	—	5967631	—	—
	72	0.0250	8	26	—	—	5966730	—	—
0.65		0.0256	8	26	6000397	—	5967633	—	—
	71	0.0260	8	26	—	—	5966726	—	—
0.68		0.0268	9	28	—	—	5967635	—	—
0.70		0.0276	9	28	6000401	—	5967637	—	—
	70	0.0280	9	28	—	—	5966722	—	—
0.72		0.0283	9	28	—	—	5967639	—	—
	69	0.0292	9	28	—	—	5966714	—	—
0.75		0.0295	9	28	6000404	—	5967641	—	—
0.78		0.0307	10	30	—	—	5967643	—	—
	68	0.0310	10	30	—	—	5966710	—	—
	1/32	0.0313	10	30	—	—	5966600	—	—
0.80		0.0315	10	30	6000408	—	5967645	—	—
	67	0.0320	10	30	—	—	5966706	—	—
0.82		0.0323	10	30	—	—	5967647	—	—
	66	0.0330	10	30	—	—	5966702	—	—
0.85		0.0335	10	30	6000412	—	5967651	—	—
0.88		0.0346	11	32	—	—	5967654	—	—
	65	0.0350	11	32	—	—	5966698	—	—
0.90		0.0354	11	32	6000416	—	5967655	—	—
	64	0.0360	11	32	—	—	5966694	—	—
0.92		0.0362	11	32	—	—	5967659	—	—
	63	0.0370	11	32	—	—	5966683	—	—
0.95		0.0374	11	32	6000423	—	5967662	—	—
	62	0.0380	12	34	—	—	5966678	—	—
0.98		0.0386	12	34	—	—	5967667	—	—
	61	0.0390	12	34	—	—	5966673	—	—
1.00		0.0394	12	34	6000604	6000475	5966592	5966835	—
	60	0.0400	12	34	—	—	5966669	—	—
	59	0.0410	12	34	—	—	5966661	—	—
1.05		0.0413	12	34	—	—	5966612	—	—
	58	0.0420	14	36	—	—	5966657	—	—
	57	0.0430	14	36	—	—	5966653	—	—
1.10		0.0433	14	36	6000607	6000506	5966634	5966837	—
1.15		0.0453	14	36	6000610	6000544	5966674	—	—
	56	0.0465	14	36	—	—	5966649	—	—
	3/64	0.0469	16	38	—	—	5967048	5967192	—
1.20		0.0472	16	38	6000613	6000582	5966686	5966839	—
1.25		0.0492	16	38	6000616	6000615	5966691	—	—
1.30		0.0512	16	38	6000620	6000624	5966696	5966841	—
	55	0.0520	16	38	—	—	5966646	—	—
1.35		0.0531	18	40	6000625	6000629	5966701	—	—
	54	0.0550	18	40	—	—	5966820	—	—
1.40		0.0551	18	40	6000630	6000633	5966572	5966842	—
1.45		0.0571	18	40	6000634	6000638	5966573	—	—
1.50		0.0591	18	40	6000637	6000478	5966574	5966846	—
	53	0.0595	20	43	—	—	5966817	—	—
1.55		0.0610	20	43	6000647	6000481	5966575	—	—
	1/16	0.0625	20	43	—	—	5966596	5966856	—
1.60		0.0630	20	43	6000652	6000485	5966576	5966848	—
	52	0.0635	20	43	—	—	5966813	—	—

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = **12**; 8.00mm - 12.50mm = **6**; 12.70mm and above = **1**  
**A100 and A002:** 0.20mm - 10.00mm = **10**; X - 13.00mm = **5**; 33/64 and above = **1**  
**A002S:** 0.20mm - 5.00mm = **2**; 13/64 - 13.00mm = **1**

$d_1$ $\varnothing h_8$ mm	$d_1$ $\varnothing h_8$ "/Nr./letter	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	2A	2AB	A100	A002	A002S
1.65		0.0650	20	43	6000655	—	5966577	—	—
1.70		0.0669	20	43	6000659	6000487	5966578	5966850	—
	51	0.0670	22	46	—	—	5966810	—	—
1.75		0.0689	22	46	6000663	6000490	5966579	—	—
	50	0.0700	22	46	—	—	5966805	—	—
1.80		0.0709	22	46	6000667	6000493	5966590	5966852	—
1.85		0.0728	22	46	—	—	5966591	—	—
	49	0.0730	22	46	—	—	5966734	—	—
1.90		0.0748	22	46	6000671	6000495	5966593	5966854	—
	48	0.0760	24	49	—	—	5966689	—	—
1.95		0.0768	24	49	6790303	6000498	5966595	—	—
	5/64	0.0781	24	49	—	—	5966763	5967299	—
	47	0.0785	24	49	—	—	5966640	—	—
2.00		0.0787	24	49	6000694	6000609	5967000	5967411	6524831
2.05		0.0807	24	49	—	—	5967030	—	—
	46	0.0810	24	49	—	—	5967060	—	—
	45	0.0820	24	49	—	—	5967055	—	—
2.10		0.0827	24	49	6000697	6000612	5967066	5967415	—
2.15		0.0846	27	53	6000700	—	5967075	—	—
	44	0.0860	27	53	—	—	5967052	—	—
2.20		0.0866	27	53	6000703	6000619	5967078	5967419	—
2.25		0.0886	27	53	6000705	—	5967080	—	—
	43	0.0890	27	53	—	—	5967050	—	—
2.30		0.0906	27	53	6000707	6000517	5967084	5967424	—
2.35		0.0925	27	53	6000711	6000554	5966904	—	—
	42	0.0935	30	57	—	—	5967047	—	—
	3/32	0.0937	30	57	—	—	5967046	5967187	—
2.40		0.0945	30	57	6000713	6000587	5966908	5967429	—
	41	0.0960	30	57	—	—	5967044	—	—
2.45		0.0965	30	57	—	—	5966912	—	—
	40	0.0980	30	57	—	—	5967041	—	—
2.50		0.0984	30	57	6000716	6000623	5966920	5967434	6524832
	39	0.0995	30	57	—	—	5967035	—	—
2.55		0.1004	30	57	—	—	5966925	—	—
	38	0.1015	30	57	—	—	5967032	—	—
2.60		0.1024	30	57	6000718	6000668	5966929	5967439	—
	37	0.1040	30	57	—	—	5967027	—	—
2.65		0.1043	30	57	—	—	5966935	—	—
2.70		0.1063	33	61	6000719	6000677	5966941	5967444	—
	36	0.1065	33	61	—	—	5967021	—	—
2.75		0.1083	33	61	6000722	—	5966946	—	—
	7/64	0.1093	33	61	—	—	5968101	5967216	—
	35	0.1100	33	61	—	—	5967019	—	—
2.82		0.1102	33	61	—	—	5966951	5967449	—
	34	0.1110	33	61	—	—	5967016	—	—
2.85		0.1122	33	61	—	—	5966961	—	—
	33	0.1130	33	61	—	—	5967013	—	—
2.90		0.1142	33	61	6000725	6000681	5966965	5967453	—
	32	0.1160	33	61	—	—	5967010	—	—
2.95		0.1161	33	61	—	—	5966968	—	—
3.00		0.1181	33	61	6000728	6000686	5967003	5967311	6524833
	31	0.1200	36	65	—	—	5967007	—	—
3.10		0.1220	36	65	6000730	6000690	5967006	5967320	—
3.15		0.1240	36	65	—	—	5967009	—	—
	1/8	0.1250	36	65	—	—	5966606	5966862	6524834
3.20		0.1260	36	65	6000732	6000522	5967012	5967325	6524835
3.25		0.1280	36	65	6000736	6000526	5967015	5967327	—
	30	0.1285	36	65	—	—	5967004	—	—
3.30		0.1299	36	65	6000738	6000530	5967018	5967331	6524836
3.40		0.1339	39	70	6000740	6000534	5967020	5967150	—
	29	0.1360	39	70	—	—	5966998	—	—
3.50		0.1378	39	70	6000742	6000537	5967022	5967154	6524837

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = **12**; 8.00mm - 12.50mm = **6**; 12.70mm and above = **1**  
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$d_1$ $\varnothing h_8$ mm	$d_1$ $\varnothing h_8$ "/Nr./letter	$d_1$ decimal inch	$l_2$ mm	$l_1$ mm	2A	2AB	A100	A002	A002S
	28	0.1405	39	70	—	—	5966995	—	—
	9/64	0.1406	39	70	—	—	5968015	5967297	—
3.60		0.1417	39	70	6000744	6000540	5967025	5967160	—
	27	0.1440	39	70	—	—	5966988	—	—
3.70		0.1457	39	70	6000746	6000543	5967028	5967165	—
	26	0.1470	39	70	—	—	5966984	—	—
3.75		0.1476	39	70	—	—	5967033	—	—
	25	0.1495	43	75	—	—	5966980	—	—
3.80		0.1496	43	75	—	—	5967036	5967171	—
	24	0.1520	43	75	—	—	5966977	—	—
3.90		0.1535	43	75	—	—	5967039	5967175	—
	23	0.1540	43	75	—	—	5966973	—	—
	5/32	0.1562	43	75	—	—	5966756	5967296	6524838
	22	0.1570	43	75	—	—	5966970	—	—
4.00		0.1575	43	75	6000749	6000546	5966715	5967226	6524839
	21	0.1590	43	75	—	—	5966966	—	—
	20	0.1610	43	75	—	—	5966962	—	—
4.10		0.1614	43	75	6000751	6000549	5966760	5967230	6524860
4.20		0.1654	43	75	6000754	6000552	5966791	5967234	6524861
	19	0.1660	43	75	—	—	5966953	—	—
4.25		0.1673	43	75	—	—	5966827	—	—
4.30		0.1693	47	80	—	—	5966832	5967237	—
4.30		0.1693	47	80	6000757	6000557	5966832	5967237	—
	18	0.1695	47	80	—	—	5966942	—	—
	11/64	0.1719	47	80	—	—	5967389	5966940	—
	17	0.1730	47	80	—	—	5966937	—	—
4.40		0.1732	47	80	6000764	6000560	5966834	5967240	—
	16	0.1770	47	80	—	—	5966932	—	—
4.50		0.1772	47	80	6000747	6000563	5966836	5967246	6524862
	15	0.1800	47	80	—	—	5966927	—	—
4.60		0.1811	47	80	6000790	6000565	5966838	5967249	—
	14	0.1820	47	80	—	—	5966922	—	—
4.70		0.1850	47	80	—	—	5966671	5967251	—
	13	0.1850	47	80	—	—	5966918	—	—
4.75		0.1870	47	80	—	—	5966675	—	—
	3/16	0.1875	52	86	—	—	5967042	5967180	6524863
	12	0.1890	52	86	—	—	5966914	—	—
4.80		0.1890	52	86	6000824	6000568	5966679	5967254	—
	11	0.1910	52	86	—	—	5966909	—	—
4.90		0.1929	52	86	—	—	5966685	5967257	—
	10	0.1935	52	86	—	—	5966905	—	—
	9	0.1960	52	86	—	—	5966770	—	—
5.00		0.1968	52	86	6000861	6000571	5966700	5967260	6524864
	8	0.1990	52	86	—	—	5966764	—	—
5.10		0.2008	52	86	6000915	6000574	5966705	5967263	—
	7	0.2010	52	86	—	—	5966719	—	—
	13/64	0.2031	52	86	—	—	5967369	5967372	6524865
	6	0.2040	52	86	—	—	5966666	—	—
5.20		0.2047	52	86	6000922	6000578	5966709	5967266	—
	5	0.2055	52	86	—	—	5966773	—	—
5.25		0.2067	52	86	—	—	5966712	—	—
5.30		0.2087	52	86	6000927	6000580	5966718	5967269	—
	4	0.2090	57	93	—	—	5967038	—	—
5.40		0.2126	57	93	6000932	6000584	5966721	5967272	—
	3	0.2130	57	93	—	—	5967001	—	—
5.50		0.2165	57	93	6000936	6000590	5966725	5967278	6524866
	7/32	0.2187	57	93	—	—	5968097	5967212	6524867
5.60		0.2205	57	93	6000752	6000593	5966729	5967281	—
	2	0.2210	57	93	—	—	5966957	—	—
5.70		0.2244	57	93	6000755	6000596	5966733	5967285	—
5.75		0.2264	57	93	6000758	6000599	5966737	—	—
	1	0.2280	57	93	—	—	5966900	—	—

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = **12**; 8.00mm - 12.50mm = **6**; 12.70mm and above = **1**  
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d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> Øh <sub>8</sub> "/Nr./letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	2A	2AB	A100	A002	A002S
5.80		0.2283	57	93	6000761	6000602	5966744	5967288	—
5.90		0.2323	57	93	—	—	5966748	5967290	—
	A	0.2340	57	93	—	—	5967671	—	—
	15/64	0.2344	57	93	—	—	5967391	5967394	—
6.00		0.2362	57	93	6000765	6000605	5966769	5967307	6524868
	B	0.2380	63	101	—	—	5967676	—	—
6.10		0.2402	63	101	6000770	6000608	5966772	5967315	—
	C	0.2420	63	101	—	—	5967680	—	—
6.20		0.2441	63	101	6000775	6000611	5966775	5967151	—
	D	0.2460	63	101	—	—	5967685	—	—
6.25		0.2461	63	101	—	—	5966777	—	—
6.30		0.2480	63	101	6000780	6000614	5966780	5967208	—
	1/4	0.2500	63	101	—	—	5966602	5966860	6524869
	E	0.2500	63	101	—	—	5967694	—	—
6.40		0.2520	63	101	6000784	6000618	5966783	5967247	—
6.50		0.2559	63	101	6000787	6000626	5966786	5967282	6524870
	F	0.2570	63	101	—	—	5966895	—	—
6.60		0.2598	63	101	6000793	6000631	5966789	5967321	—
	G	0.2610	63	101	—	—	5966947	—	—
6.70		0.2638	63	101	6000796	6000636	5966794	5967328	—
	17/64	0.2656	69	109	—	—	5967404	5967400	6524871
6.75		0.2657	69	109	6000801	6000641	5966798	—	—
	H	0.2660	69	109	—	—	5966991	—	—
6.80		0.2677	69	109	6000804	6000645	5966801	5967332	6524872
6.90		0.2717	69	109	—	—	5966804	5967336	—
	I	0.2720	69	109	—	—	5967024	—	—
7.00		0.2756	69	109	6000807	6000649	5966807	5967340	6524873
	J	0.2770	69	109	—	—	5967057	—	—
7.10		0.2795	69	109	—	—	5966811	5967156	—
	K	0.2810	69	109	—	—	5967065	—	—
	9/32	0.2812	69	109	—	—	5968012	5967293	—
7.20		0.2835	69	109	6000809	6000653	5966815	5967161	—
7.25		0.2854	69	109	6000812	6000657	5966818	—	—
7.30		0.2874	69	109	6000815	6000661	5966821	5967164	—
	L	0.2900	69	109	—	—	5967069	—	—
7.40		0.2913	69	109	6000818	6000664	5966824	5967174	—
	M	0.2950	69	109	—	—	5967071	—	—
7.50		0.2953	69	109	6000821	6000672	5966830	5967181	6524874
	19/64	0.2968	75	117	—	—	5966955	5967406	—
7.60		0.2992	75	117	6000827	5999556	5967921	5967186	—
	N	0.3020	75	117	—	—	5967074	—	—
7.70		0.3031	75	117	—	—	5967965	5967191	—
7.75		0.3051	75	117	—	—	5967999	—	—
7.80		0.3071	75	117	6000831	5999592	5968028	5967196	—
7.85		0.3091	75	117	—	5999632	—	—	—
7.90		0.3110	75	117	6000833	5999678	5968081	5967201	—
	5/16	0.3125	75	117	—	—	5966752	5967294	6524875
8.00		0.3150	75	117	6000836	5999717	5968105	5967219	6524876
	O	0.3160	75	117	—	—	5966776	—	—
8.10		0.3189	75	117	6000839	5999724	5967926	5967222	—
	P	0.3230	75	117	—	—	5966779	—	—
8.20		0.3228	75	117	6000842	5999728	5967932	5967227	6524877
8.25		0.3248	75	117	6000846	5999732	5967935	—	—
8.30		0.3268	75	117	—	—	5967940	5967231	—
	21/64	0.3281	75	117	—	—	5966982	5967460	—
8.40		0.3307	75	117	6000850	5999735	5967944	5967235	—
	Q	0.3320	75	117	—	—	5966781	—	—
8.50		0.3346	75	117	6000853	5999561	5967950	5967239	6524878
8.60		0.3386	81	125	6000857	5999564	5967954	5967242	—
	R	0.3390	81	125	—	—	5966784	—	—
8.70		0.3425	81	125	6000864	5999565	5967956	—	—
	11/32	0.3437	81	125	—	—	5967367	5966930	—
8.75		0.3445	81	125	6000868	5999568	5967959	—	—

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**A100 and A002:** 0.20mm - 10.00mm = **10**; X - 13.00mm = **5**; 33/64 and above = **1**

**A002S:** 0.20mm - 5.00mm = **2**; 13/64 - 13.00mm = **1**

d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> Øh <sub>8</sub> "/Nr./letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	2A	2AB	A100	A002	A002S
8.80		0.3465	81	125	6000872	5999571	5967962	5967252	—
	S	0.3480	81	125	—	—	5966787	—	—
8.90		0.3504	81	125	6000877	5999574	5967967	5967255	—
9.00		0.3543	81	125	6000881	5999578	5967970	5967258	6524879
	T	0.3580	81	125	—	—	5966790	—	—
9.10		0.3583	81	125	—	—	5967973	5967261	—
	23/64	0.3594	81	125	—	—	5966986	5967145	—
9.20		0.3622	81	125	—	—	5967976	5967264	—
9.25		0.3642	81	125	—	—	5967979	—	—
9.30		0.3661	81	125	6000890	5999582	5967982	5967267	—
	U	0.3680	81	125	—	—	5966793	—	—
9.40		0.3701	81	125	6000895	5999586	5967985	5967270	—
9.50		0.3740	81	125	6000900	5999589	5967988	5967273	6524880
	3/8	0.3750	87	133	—	—	5967051	5967197	6524881
	V	0.3770	87	133	—	—	5966796	—	—
9.60		0.3780	87	133	6000905	5999596	5967993	5967276	—
9.70		0.3819	87	133	6000910	5999600	5967996	5967279	—
9.75		0.3839	87	133	—	—	5968001	—	—
9.80		0.3858	87	133	6000918	5999604	5968004	5967284	—
	W	0.3860	87	133	—	—	5966799	—	—
9.90		0.3898	87	133	6000867	5999608	5968007	5967287	—
	25/64	0.3906	87	133	—	—	5966990	5967199	—
10.00		0.3937	87	133	6000678	6000501	5966608	5966864	6524882
	X	0.3970	87	133	—	—	5966802	—	—
10.10		0.3976	87	133	—	—	5966611	5966868	—
10.20		0.4016	87	133	6000682	6000503	5966614	5966870	6524883
10.25		0.4035	87	133	—	—	5966616	—	—
	Y	0.4040	87	133	—	—	5966808	—	—
10.30		0.4055	87	133	6000689	6000510	5966618	5966872	—
	13/32	0.4062	87	133	—	—	5967365	5967370	—
10.40		0.4094	87	133	—	—	5966620	5966874	—
	Z	0.4130	87	133	—	—	5966571	—	—
10.50		0.4134	87	133	6000621	6000512	5966622	5966876	6524884
10.60		0.4173	87	133	6000675	—	5966624	5966878	—
10.70		0.4213	94	142	—	—	5966626	5966880	—
	27/64	0.4219	94	142	—	—	5966994	5967243	—
10.75		0.4232	94	142	—	—	5966628	—	—
10.80		0.4252	94	142	6000709	6000515	5966630	5966882	—
10.90		0.4291	94	142	6000734	6000519	5966632	5966884	—
11.00		0.4331	94	142	6000760	6000523	5966636	5966886	6524885
11.10		0.4370	94	142	—	—	5966638	5966890	—
	7/16	0.4375	94	142	—	—	5968091	5967205	—
11.20		0.4409	94	142	6000768	6000529	5966641	5966892	—
11.25		0.4429	94	142	—	—	5966644	—	—
11.30		0.4449	94	142	6000772	6000532	5966648	5966894	—
11.40		0.4488	94	142	6000778	6000535	5966652	5966898	—
11.50		0.4528	94	142	6000782	6000539	5966656	5966903	6524886
	29/64	0.4531	94	142	—	—	5966997	5967275	—
11.60		0.4567	94	142	—	—	5966659	5966907	—
11.70		0.4606	94	142	6000628	6000541	5966665	5966913	—
11.75		0.4626	94	142	—	—	5966670	—	—
11.80		0.4646	94	142	6000635	6000547	5966681	5966917	—
11.90		0.4685	101	151	—	—	5967300	5966924	—
	15/32	0.4687	101	151	—	—	5967387	5967392	—
12.00		0.4724	101	151	6000640	6000550	5967421	5967337	6524887
12.10		0.4764	101	151	6000644	6000555	5967431	5967362	—
12.20		0.4803	101	151	6000648	6000558	5967436	5967384	—
12.25		0.4823	101	151	—	—	5967441	—	—
12.30		0.4843	101	151	—	—	5967445	5967409	—
	31/64	0.4843	101	151	—	—	5967054	5967203	—
12.40		0.4882	101	151	—	—	5967306	5967457	—
12.50		0.4921	101	151	6000651	6000561	5967310	5967464	6524888

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = **12**; 8.00mm - 12.50mm = **6**; 12.70mm and above = **1**  
**A100 and A002:** 0.20mm - 10.00mm = **10**; X - 13.00mm = **5**; 33/64 and above = **1**  
**A002S:** 0.20mm - 5.00mm = **2**; 13/64 - 13.00mm = **1**



d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> Øh <sub>8</sub> "/Nr./letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	2A	2AB	A100	A002	A002S
12.60		0.4961	101	151	—	—	5967314	5967469	—
	1/2	0.5000	101	151	—	—	5966597	5966858	6524889
12.70		0.5000	101	151	—	6000566	5967318	5967473	—
12.75		0.5020	101	151	—	—	5967322	—	—
12.80		0.5039	101	151	6000660	6000569	5967326	5967476	—
12.90		0.5079	101	151	—	6000572	5967330	5967342	—
13.00		0.5118	101	151	6000670	6000575	5967334	5967345	6524890
	33/64	0.5156	101	151	—	—	5967058	5967209	—
13.10		0.5157	101	151	—	—	5967338	5967346	—
13.20		0.5197	101	151	—	—	5967341	5967348	—
13.25		0.5217	108	160	—	—	5967347	5967350	—
13.30		0.5236	108	160	—	—	5967349	5967352	—
13.40		0.5276	108	160	—	—	5967351	5967354	—
	17/32	0.5313	108	160	—	—	5967402	5967398	—
13.50		0.5315	108	160	6000679	6000579	5967353	5967356	—
13.60		0.5354	108	160	—	—	5967355	5967358	—
13.70		0.5394	108	160	—	—	5967357	5967360	—
13.75		0.5413	108	160	—	—	5967359	5967364	—
13.80		0.5433	108	160	—	—	5967361	5967366	—
	35/64	0.5469	108	160	—	—	5967062	5967215	—
13.90		0.5472	108	160	—	—	5967363	5967368	—
14.00		0.5512	108	160	6000683	6000585	5967371	5967374	—
14.25		0.5610	114	169	—	—	5967373	5967376	—
	9/16	0.5625	114	169	—	—	5968009	5967291	—
14.50		0.5709	114	169	6000687	6000588	5967375	5967378	—
	37/64	0.5781	114	169	—	—	5967072	5967220	—
14.75		0.5807	114	169	—	—	5967377	5967380	—
15.00		0.5906	114	169	6000691	6000591	5967379	5967382	—
	19/32	0.5937	120	178	—	—	5966897	5967403	—
15.25		0.6004	120	178	—	—	5967381	5967386	—
	39/64	0.6094	120	178	—	—	5966663	5967223	—
15.50		0.6102	120	178	—	6000594	5967383	5967388	—
15.75		0.6201	120	178	—	—	5967385	5967390	—
	5/8	0.6250	120	178	—	—	5966766	5967303	—
16.00		0.6299	120	178	—	6000597	5967393	5967396	—
	41/64	0.6406	125	184	—	—	5966690	—	—
16.50		0.6496	125	184	—	6000600	5967395	—	—
	21/32	0.6562	125	184	—	—	5966978	—	—
17.00		0.6693	125	184	—	6000603	5967397	—	—
	43/64	0.6719	130	191	—	—	5966695	—	—
	11/16	0.6875	130	191	—	—	5967344	—	—
17.50		0.6890	130	191	—	6000606	5967399	—	—
18.00		0.7087	130	191	—	—	5967408	—	—
18.50		0.7283	135	198	—	—	5967412	—	—
19.00		0.7480	135	198	—	—	5967417	—	—
19.50		0.7677	140	205	—	—	5967426	—	—
20.00		0.7874	140	205	—	—	5966974	—	—

Package quantities: **2A and 2AB:** 0.15mm - 7.90mm = **12**; 8.00mm - 12.50mm = **6**; 12.70mm and above = **1**  
**A100 and A002:** 0.20mm - 10.00mm = **10**; X - 13.00mm = **5**; 33/64 and above = **1**  
**A002S:** 0.20mm - 5.00mm = **2**; 13/64 - 13.00mm = **1**

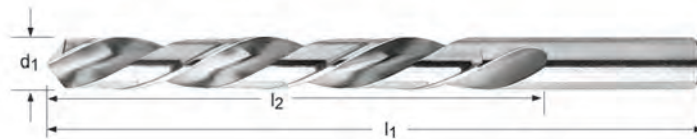
# JOBBER DRILL



## General Purpose Jobber Length - Left Hand

\* Sets Available on pg. 231

**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	5995605
3/64	0.0469	3/4	1.3/4	12	5995489
1/16	0.0625	7/8	1.7/8	12	5995596
5/64	0.0781	1"	2"	12	5995508
3/32	0.0938	1.1/4	2.1/4	12	5995486
7/64	0.1094	1.1/2	2.5/8	12	5995519
1/8	0.1250	1.5/8	2.3/4	12	5995464
9/64	0.1406	1.3/4	2.7/8	12	5995527
5/32	0.1563	2"	3.1/8	12	5995504
11/64	0.1719	2.1/8	3.1/4	12	5995466
3/16	0.1875	2.5/16	3.1/2	12	5995484
13/64	0.2031	2.7/16	3.5/8	12	5995468
7/32	0.2188	2.1/2	3.3/4	12	5995515
15/64	0.2344	2.5/8	3.7/8	12	5995470
1/4	0.2500	2.3/4	4"	12	5995463
17/64	0.2656	2.7/8	4.1/8	12	5995471
9/32	0.2813	2.15/16	4.1/4	12	5995523
19/64	0.2969	3.1/16	4.3/8	12	5995472
5/16	0.3125	3.3/16	4.1/2	6	5995501
21/64	0.3281	3.5/16	4.5/8	6	5995475
11/32	0.3437	3.7/16	4.3/4	6	5995465
23/64	0.3594	3.1/2	4.7/8	6	5995477
3/8	0.3750	3.5/8	5"	6	5995492
25/64	0.3906	3.3/4	5.1/8	6	5995478
13/32	0.4063	3.7/8	5.1/4	6	5995467
27/64	0.4219	3.15/16	5.3/8	6	5995480
7/16	0.4375	4.1/16	5.1/2	6	5995511
29/64	0.4531	4.3/16	5.5/8	6	5995482
15/32	0.4687	4.5/16	5.3/4	6	5995469
31/64	0.4844	4.3/8	5.7/8	6	5995495
1/2	0.5000	4.1/2	6"	6	5995602

## General Purpose Jobber Length - Left Hand

**A101** Left hand helix for use in machines where spindle is counter-clockwise & can be used to remove broken parts without damaging threaded holes.



**A101**

DIN  
**338**

**4XD**

**HSS**

**118°**



1.00 - 12.00

$d_1$ $\varnothing h_8$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	<b>A101</b>
1.00	0.0394	12	34	5968016
1.10	0.0433	14	36	5968019
1.20	0.0472	16	38	5968022
1.25	0.0492	16	38	5968025
1.30	0.0512	16	38	5968032
1.40	0.0551	18	40	5968037
1.50	0.0591	18	40	5968042
1.60	0.0630	20	43	5968047
1.70	0.0669	20	43	5968052
1.80	0.0709	22	46	5968062
1.90	0.0748	22	46	5968067
2.00	0.0787	24	49	5967908
2.10	0.0827	24	49	5967955
2.20	0.0866	27	53	5967987
2.30	0.0906	27	53	5968021
2.40	0.0945	30	57	5968069
2.50	0.0984	30	57	5968082
2.60	0.1024	30	57	5968087
2.70	0.1063	33	61	5968093
2.80	0.1102	33	61	5968098
2.90	0.1142	33	61	5967912
3.00	0.1181	33	61	5967917
3.20	0.1260	36	65	5967920
3.30	0.1299	36	65	5967924
3.50	0.1378	39	70	5967928
3.80	0.1496	43	75	5967933
4.00	0.1575	43	75	5967939
4.20	0.1654	43	75	5967943
4.50	0.1772	47	80	5967948
4.80	0.1890	52	86	5967952
5.00	0.1969	52	86	5967958
5.10	0.2008	52	86	5967961
5.20	0.2047	52	86	5967964

# JOBBER DRILL



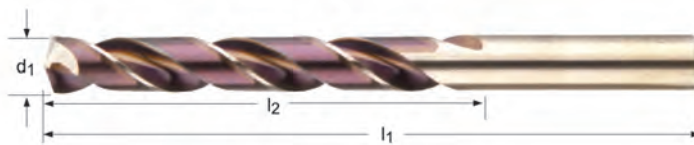
$d_1$ $\varnothing h_8$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	A101
5.50	0.2165	57	93	5967966
6.00	0.2362	57	93	5967969
6.50	0.2559	63	101	5967972
7.00	0.2756	69	109	5967975
7.50	0.2953	69	109	5967978
8.00	0.3150	75	117	5967981
8.50	0.3346	75	117	5967984
9.00	0.3543	81	125	5967990
10.00	0.3937	87	133	5968072
11.00	0.4331	94	142	5968077
12.00	0.4724	101	151	5968086

**Heavy Duty Jobber Length (HX Series)**

\* HX10 set available on pg. 233

- 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.



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø letter	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	HX10	HX18	HX15
1/16			0.0625	7/8	1.7/8	12	5996242	—	—
	52		0.0635	7/8	1.7/8	12	—	5995473	—
	51		0.0670	1"	2"	12	—	5995462	—
	50		0.0700	1"	2"	12	—	5995923	—
	49		0.0730	1"	2"	12	—	5995914	—
	48		0.0760	1"	2"	12	—	5995910	—
5/64			0.0781	1"	2"	12	5996298	—	—
	47		0.0785	1"	2"	12	—	5995907	—
	46		0.0810	1.1/8	2.1/8	12	—	5995903	—
	45		0.0820	1.1/8	2.1/8	12	—	5995897	—
	44		0.0860	1.1/8	2.1/8	12	—	5995894	—
	43		0.0890	1.1/4	2.1/4	12	—	5995890	—
	42		0.0935	1.1/4	2.1/4	12	—	5995886	—
3/32			0.0938	1.1/4	2.1/4	12	5996274	—	—
	41		0.0960	1.3/8	2.3/8	12	—	5995881	—
	40		0.0980	1.3/8	2.3/8	12	—	5995872	—
	39		0.0995	1.3/8	2.3/8	12	—	5995864	—
	38		0.1015	1.7/16	2.1/2	12	—	5995860	—
	37		0.1040	1.7/16	2.1/2	12	—	5995857	—
	36		0.1065	1.7/16	2.1/2	12	—	5995853	—
7/64			0.1094	1.1/2	2.5/8	12	5996310	—	—
	35		0.1100	1.1/2	2.5/8	12	—	5995850	—
	34		0.1110	1.1/2	2.5/8	12	—	5995846	—
	33		0.1130	1.1/2	2.5/8	12	—	5995843	—
	32		0.1160	1.5/8	2.3/4	12	—	5995841	—
	31		0.1200	1.5/8	2.3/4	12	—	5995833	—
1/8			0.1250	1.5/8	2.3/4	12	5996326	—	—
	30		0.1285	1.5/8	2.3/4	12	—	5995829	—
	29		0.1360	1.3/4	2.7/8	12	—	5995823	—
	28		0.1405	1.3/4	2.7/8	12	—	5995819	—
9/64			0.1406	1.3/4	2.7/8	12	5996318	—	—
	27		0.1440	1.7/8	3"	12	—	5995815	—
	26		0.1470	1.7/8	3"	12	—	5995811	—

# JOBBER DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	HX10	HX18	HX15
	25		0.1495	1.7/8	3"	12	—	5995807	—
	24		0.1520	2"	3.1/8	12	—	5995804	—
	23		0.1540	2"	3.1/8	12	—	5995800	—
5/32			0.1563	2"	3.1/8	12	5996295	—	—
	22		0.1570	2"	3.1/8	12	—	5995791	—
	21		0.1590	2.1/8	3.1/4	12	—	5995788	—
	20		0.1610	2.1/8	3.1/4	12	—	5995784	—
	19		0.1660	2.1/8	3.1/4	12	—	5995777	—
	18		0.1695	2.1/8	3.1/4	12	—	5995772	—
11/64			0.1719	2.1/8	3.1/4	12	5996397	—	—
	17		0.1730	2.3/16	3.3/8	12	—	5995768	—
	16		0.1770	2.3/16	3.3/8	12	—	5995765	—
	15		0.1800	2.3/16	3.3/8	12	—	5995760	—
	14		0.1820	2.3/16	3.3/8	12	—	5995756	—
	13		0.1850	2.5/16	3.1/2	12	—	5995932	—
3/16			0.1875	2.5/16	3.1/2	12	5996270	—	—
	12		0.1890	2.5/16	3.1/2	12	—	5995930	—
	11		0.1910	2.5/16	3.1/2	12	—	5995929	—
	10		0.1935	2.7/16	3.5/8	12	—	5995926	—
	9		0.1960	2.7/16	3.5/8	12	—	5995592	—
	8		0.1990	2.7/16	3.5/8	12	—	5995584	—
	7		0.2010	2.7/16	3.5/8	12	—	5995539	—
13/64			0.2031	2.7/16	3.5/8	12	5996407	—	—
	6		0.2040	2.1/2	3.3/4	12	—	5995498	—
	5		0.2055	2.1/2	3.3/4	12	—	5995917	—
	4		0.2090	2.1/2	3.3/4	12	—	5995868	—
	3		0.2130	2.1/2	3.3/4	12	—	5995825	—
7/32			0.2188	2.1/2	3.3/4	12	5996307	—	—
	2		0.2210	2.5/8	3.7/8	12	—	5995780	—
	1		0.2280	2.5/8	3.7/8	12	—	5995920	—
		A	0.2340	2.5/8	3.7/8	12	—	—	5996320
15/64			0.2344	2.5/8	3.7/8	12	5996413	—	—
		B	0.2374	2.3/4	4"	12	—	—	5996329
		C	0.2421	2.3/4	4"	12	—	—	5996332
		D	0.2461	2.3/4	4"	12	—	—	5996334
1/4		E	0.2500	2.3/4	4"	12	5996282	—	—
		F	0.2571	2.7/8	4.1/8	12	—	—	5996340
		G	0.2610	2.7/8	4.1/8	12	—	—	5996342
17/64			0.2656	2.7/8	4.1/8	12	—	—	—
		H	0.2661	2.7/8	4.1/8	12	—	—	5996345
		I	0.2720	2.7/8	4.1/8	12	—	—	5996346
		J	0.2772	2.7/8	4.1/8	12	—	—	5996349
		K	0.2811	2.15/16	4.1/4	12	—	—	5996352
9/32			0.2813	2.15/16	4.1/4	12	5996314	—	—
		L	0.2902	2.15/16	4.1/4	12	—	—	5996359
		M	0.2949	3.1/16	4.3/8	12	—	—	5996362
19/64			0.2969	3.1/16	4.3/8	12	5996247	—	—
		N	0.3020	3.1/16	4.3/8	12	—	—	5996366
5/16			0.3125	3.3/16	4.1/2	6	5996290	—	—
		O	0.3161	3.3/16	4.1/2	6	—	—	5996370
		P	0.3228	3.5/16	4.5/8	6	—	—	5996374
21/64			0.3281	3.5/16	4.5/8	6	5996251	—	—
		Q	0.3319	3.7/16	4.3/4	6	—	—	5996378
		R	0.3390	3.7/16	4.3/4	6	—	—	5996381
11/32			0.3437	3.7/16	4.3/4	6	5996356	—	—
		S	0.3480	3.1/2	4.7/8	6	—	—	5996386
		T	0.3580	3.1/2	4.7/8	6	—	—	5996390
23/64			0.3594	3.1/2	4.7/8	6	5996254	—	—
		U	0.3680	3.5/8	5"	6	—	—	5996394
3/8			0.3750	3.5/8	5"	6	5996278	—	—
		V	0.3772	3.5/8	5"	6	—	—	5996399
		W	0.3858	3.3/4	5.1/8	6	—	—	5995751
25/64			0.3906	3.3/4	5.1/8	6	5996258	—	—
		X	0.3969	3.3/4	5.1/8	6	—	—	5995795
		Y	0.4039	3.7/8	5.1/4	6	—	—	5995837

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	HX10	HX18	HX15
13/32			0.4063	3.7/8	5.1/4	6	5996403	—	—
		Z	0.4130	3.7/8	5.1/4	6	—	—	5995876
27/64			0.4219	3.15/16	5.3/8	6	5996262	—	—
7/16			0.4375	4.1/16	5.1/2	6	5996303	—	—
29/64			0.4531	4.3/16	5.5/8	6	5996267	—	—
15/32			0.4687	4.5/16	5.3/4	6	5996410	—	—
31/64			0.4844	4.3/8	5.7/8	6	5996286	—	—
1/2			0.5000	4.1/2	6"	6	5996236	—	—



# JOBBER DRILL



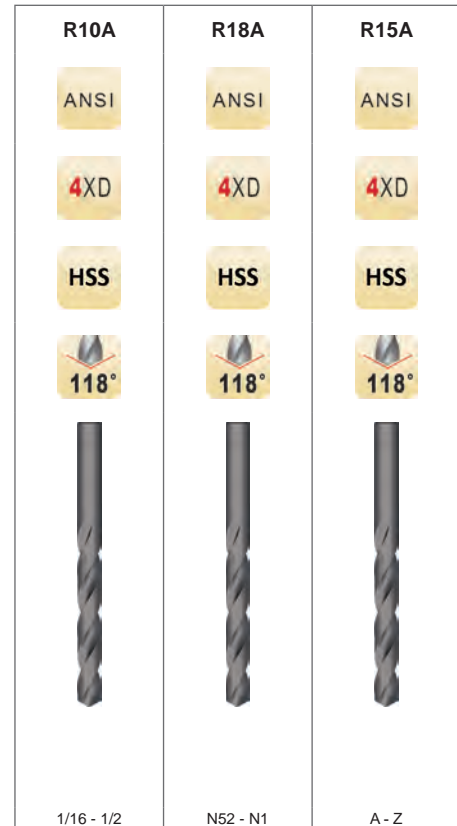
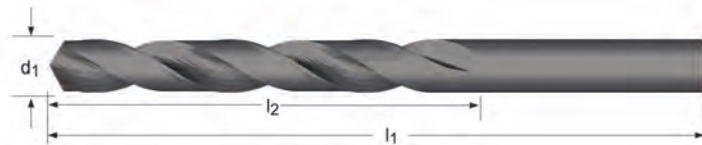
## General Purpose Jobber Length (NAS 907 Type A)

**R10A** - Fractional Sizes

**R18A** - Wire Gauge Sizes

**R15A** - Letter Sizes

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



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø letter	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	R10A	R18A	R15A
1/16			0.0625	7/8	1.7/8	12	5997500	—	—
	52		0.0635	7/8	1.7/8	12	—	5999185	—
	51		0.0670	1"	2"	12	—	5999183	—
	50		0.0700	1"	2"	12	—	5999181	—
	49		0.0730	1"	2"	12	—	5999175	—
	48		0.0760	1"	2"	12	—	5999146	—
5/64			0.0781	1"	2"	12	5997578	—	—
	47		0.0785	1"	2"	12	—	5999101	—
	46		0.0810	1.1/8	2.1/8	12	—	5999068	—
	45		0.0820	1.1/8	2.1/8	12	—	5999026	—
	44		0.0860	1.1/8	2.1/8	12	—	5999428	—
	43		0.0890	1.1/4	2.1/4	12	—	5999424	—
	42		0.0935	1.1/4	2.1/4	12	—	5999422	—
3/32			0.0938	1.1/4	2.1/4	12	5997565	—	—
	41		0.0960	1.3/8	2.3/8	12	—	5999419	—
	40		0.0980	1.3/8	2.3/8	12	—	5999416	—
	39		0.0995	1.3/8	2.3/8	12	—	5999410	—
	38		0.1015	1.7/16	2.1/2	12	—	5999407	—
	37		0.1040	1.7/16	2.1/2	12	—	5999404	—
	36		0.1065	1.7/16	2.1/2	12	—	5999401	—
7/64			0.1094	1.1/2	2.5/8	12	5997587	—	—
	35		0.1100	1.1/2	2.5/8	12	—	5999399	—
	34		0.1110	1.1/2	2.5/8	12	—	5999392	—
	33		0.1130	1.1/2	2.5/8	12	—	5999388	—
	32		0.1160	1.5/8	2.3/4	12	—	5999384	—
	31		0.1200	1.5/8	2.3/4	12	—	5999380	—
1/8			0.1250	1.5/8	2.3/4	12	5997510	—	—
	30		0.1285	1.5/8	2.3/4	12	—	5999376	—
	29		0.1360	1.3/4	2.7/8	12	—	5999368	—
	28		0.1405	1.3/4	2.7/8	12	—	5999363	—
9/64			0.1406	1.3/4	2.7/8	12	5997596	—	—
	27		0.1440	1.7/8	3"	12	—	5999359	—
	26		0.1470	1.7/8	3"	12	—	5999352	—

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R10A	R18A	R15A
	25		0.1495	1.7/8	3"	12	—	5999343	—
	24		0.1520	2"	3.1/8	12	—	5999339	—
	23		0.1540	2"	3.1/8	12	—	5999335	—
5/32			0.1563	2"	3.1/8	12	5997576	—	—
	22		0.1570	2"	3.1/8	12	—	5999331	—
	21		0.1590	2.1/8	3.1/4	12	—	5999327	—
	20		0.1610	2.1/8	3.1/4	12	—	5999323	—
	19		0.1660	2.1/8	3.1/4	12	—	5999313	—
	18		0.1695	2.1/8	3.1/4	12	—	5999311	—
11/64			0.1719	2.1/8	3.1/4	12	5997514	—	—
	17		0.1730	2.3/16	3.3/8	12	—	5999307	—
	16		0.1770	2.3/16	3.3/8	12	—	5999298	—
	15		0.1800	2.3/16	3.3/8	12	—	5999294	—
	14		0.1820	2.3/16	3.3/8	12	—	5999290	—
	13		0.1850	2.5/16	3.1/2	12	—	5999286	—
3/16			0.1875	2.5/16	3.1/2	12	5997560	—	—
	12		0.1890	2.5/16	3.1/2	12	—	5999282	—
	11		0.1910	2.5/16	3.1/2	12	—	5999278	—
	10		0.1935	2.7/16	3.5/8	12	—	5999275	—
	9		0.1960	2.7/16	3.5/8	12	—	5999042	—
	8		0.1990	2.7/16	3.5/8	12	—	5999039	—
	7		0.2010	2.7/16	3.5/8	12	—	5999035	—
13/64			0.2031	2.7/16	3.5/8	12	5997523	—	—
	6		0.2040	2.1/2	3.3/4	12	—	5999031	—
	5		0.2055	2.1/2	3.3/4	12	—	5999179	—
	4		0.2090	2.1/2	3.3/4	12	—	5999413	—
	3		0.2130	2.1/2	3.3/4	12	—	5999372	—
7/32			0.2188	2.1/2	3.3/4	12	5997584	—	—
	2		0.2210	2.5/8	3.7/8	12	—	5999317	—
	1		0.2280	2.5/8	3.7/8	12	—	5999271	—
		A	0.2340	2.5/8	3.7/8	12	—	—	5998650
15/64			0.2344	2.5/8	3.7/8	12	5997530	—	—
		B	0.2374	2.3/4	4"	12	—	—	5998654
		C	0.2421	2.3/4	4"	12	—	—	5998658
		D	0.2461	2.3/4	4"	12	—	—	5998662
1/4		E	0.2500	2.3/4	4"	12	5997506	—	—
		F	0.2571	2.7/8	4.1/8	12	—	—	5998670
		G	0.2610	2.7/8	4.1/8	12	—	—	5998674
17/64			0.2656	2.7/8	4.1/8	12	5997533	—	—
		H	0.2661	2.7/8	4.1/8	12	—	—	5998677
		I	0.2720	2.7/8	4.1/8	12	—	—	5998680
		J	0.2772	2.7/8	4.1/8	12	—	—	5998683
		K	0.2811	2.15/16	4.1/4	12	—	—	5998689
9/32			0.2813	2.15/16	4.1/4	12	5997593	—	—
		L	0.2902	2.15/16	4.1/4	12	—	—	5998692
		M	0.2949	3.1/16	4.3/8	12	—	—	5998695
19/64			0.2969	3.1/16	4.3/8	12	5997536	—	—
		N	0.3020	3.1/16	4.3/8	12	—	—	5998698
5/16			0.3125	3.3/16	4.1/2	6	5997573	—	—
		O	0.3161	3.3/16	4.1/2	6	—	—	5998700
		P	0.3228	3.5/16	4.5/8	6	—	—	5998702
21/64			0.3281	3.5/16	4.5/8	6	5997540	—	—
		Q	0.3319	3.7/16	4.3/4	6	—	—	5998705
		R	0.3390	3.7/16	4.3/4	6	—	—	5998707
11/32			0.3437	3.7/16	4.3/4	6	5997512	—	—
		S	0.3480	3.1/2	4.7/8	6	—	—	5998709
		T	0.3580	3.1/2	4.7/8	6	—	—	5998711
23/64			0.3594	3.1/2	4.7/8	6	5997544	—	—
		U	0.3680	3.5/8	5"	6	—	—	5998715
3/8			0.3750	3.5/8	5"	6	5997568	—	—
		V	0.3772	3.5/8	5"	6	—	—	5998717
		W	0.3858	3.3/4	5.1/8	6	—	—	5998719
25/64			0.3906	3.3/4	5.1/8	6	—	—	—
		X	0.3969	3.3/4	5.1/8	6	—	—	5998722
		Y	0.4039	3.7/8	5.1/4	6	—	—	5998726

# JOBBER DRILL



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø letter	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	R10A	R18A	R15A
13/32			0.4063	3.7/8	5.1/4	6	5997517	—	—
		Z	0.4130	3.7/8	5.1/4	6	—	—	5998729
27/64			0.4219	3.15/16	5.3/8	6	5997552	—	—
7/16			0.4375	4.1/16	5.1/2	6	5997581	—	—
29/64			0.4531	4.3/16	5.5/8	6	5997555	—	—
15/32			0.4687	4.5/16	5.3/4	6	5997526	—	—
31/64			0.4844	4.3/8	5.7/8	6	5997571	—	—
1/2			0.5000	4.1/2	6"	6	5997503	—	—

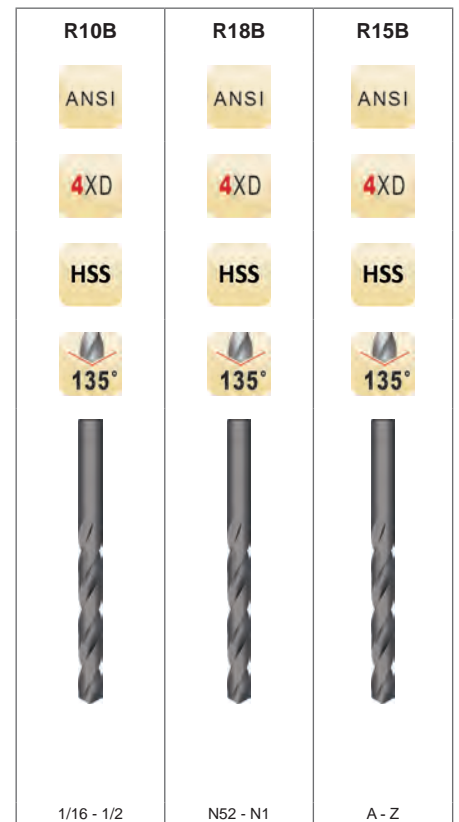
**Heavy Duty Jobber Length (NAS 907 Type B)**

**R10B** - Fractional Sizes

**R18B** - Wire Gauge Sizes

**R15B** - Letter Sizes

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



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø letter	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	R10B	R18B	R15B
1/16			0.0625	7/8	1.7/8	12	5997600	—	—
	52		0.0635	7/8	1.7/8	12	—	5997656	—
	51		0.0670	1"	2"	12	—	5997649	—
	50		0.0700	1"	2"	12	—	5997801	—
	49		0.0730	1"	2"	12	—	5997792	—
	48		0.0760	1"	2"	12	—	5997788	—
5/64			0.0781	1"	2"	12	5998027	—	—
	47		0.0785	1"	2"	12	—	5997778	—
	46		0.0810	1.1/8	2.1/8	12	—	5997739	—
	45		0.0820	1.1/8	2.1/8	12	—	5997715	—
	44		0.0860	1.1/8	2.1/8	12	—	5997686	—
	43		0.0890	1.1/4	2.1/4	12	—	5997643	—
	42		0.0935	1.1/4	2.1/4	12	—	5999177	—
3/32			0.0938	1.1/4	2.1/4	12	5998007	—	—
	41		0.0960	1.3/8	2.3/8	12	—	5999173	—
	40		0.0980	1.3/8	2.3/8	12	—	5999171	—
	39		0.0995	1.3/8	2.3/8	12	—	5999168	—
	38		0.1015	1.7/16	2.1/2	12	—	5999165	—
	37		0.1040	1.7/16	2.1/2	12	—	5999162	—
	36		0.1065	1.7/16	2.1/2	12	—	5999159	—
7/64			0.1094	1.1/2	2.5/8	12	5998037	—	—
	35		0.1100	1.1/2	2.5/8	12	—	5999156	—
	34		0.1110	1.1/2	2.5/8	12	—	5999152	—
	33		0.1130	1.1/2	2.5/8	12	—	5999149	—
	32		0.1160	1.5/8	2.3/4	12	—	5999139	—
	31		0.1200	1.5/8	2.3/4	12	—	5999135	—
1/8			0.1250	1.5/8	2.3/4	12	5997612	—	—
	30		0.1285	1.5/8	2.3/4	12	—	5999130	—
	29		0.1360	1.3/4	2.7/8	12	—	5999122	—
	28		0.1405	1.3/4	2.7/8	12	—	5999118	—
9/64			0.1406	1.3/4	2.7/8	12	5998049	—	—
	27		0.1440	1.7/8	3"	12	—	5999113	—

# JOBBER DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R10B	R18B	R15B
	26		0.1470	1.7/8	3"	12	—	5999110	—
	25		0.1495	1.7/8	3"	12	—	5999107	—
	24		0.1520	2"	3.1/8	12	—	5999104	—
	23		0.1540	2"	3.1/8	12	—	5999098	—
5/32			0.1563	2"	3.1/8	12	5998023	—	—
	22		0.1570	2"	3.1/8	12	—	5999095	—
	21		0.1590	2.1/8	3.1/4	12	—	5999092	—
	20		0.1610	2.1/8	3.1/4	12	—	5999089	—
	19		0.1660	2.1/8	3.1/4	12	—	5999082	—
	18		0.1695	2.1/8	3.1/4	12	—	5999079	—
11/64			0.1719	2.1/8	3.1/4	12	5997620	—	—
	17		0.1730	2.3/16	3.3/8	12	—	5999076	—
	16		0.1770	2.3/16	3.3/8	12	—	5999074	—
	15		0.1800	2.3/16	3.3/8	12	—	5999071	—
	14		0.1820	2.3/16	3.3/8	12	—	5999065	—
	13		0.1850	2.5/16	3.1/2	12	—	5999062	—
3/16			0.1875	2.5/16	3.1/2	12	5998174	—	—
	12		0.1890	2.5/16	3.1/2	12	—	5999058	—
	11		0.1910	2.5/16	3.1/2	12	—	5999054	—
	10		0.1935	2.7/16	3.5/8	12	—	5999050	—
	9		0.1960	2.7/16	3.5/8	12	—	5997670	—
	8		0.1990	2.7/16	3.5/8	12	—	5997666	—
	7		0.2010	2.7/16	3.5/8	12	—	5997663	—
13/64			0.2031	2.7/16	3.5/8	12	5997625	—	—
	6		0.2040	2.1/2	3.3/4	12	—	5997660	—
	5		0.2055	2.1/2	3.3/4	12	—	5997796	—
	4		0.2090	2.1/2	3.3/4	12	—	5999169	—
	3		0.2130	2.1/2	3.3/4	12	—	5999126	—
7/32			0.2188	2.1/2	3.3/4	12	5998034	—	—
	2		0.2210	2.5/8	3.7/8	12	—	5999085	—
	1		0.2280	2.5/8	3.7/8	12	—	5999046	—
		A	0.2340	2.5/8	3.7/8	12	—	—	5998734
15/64			0.2344	2.5/8	3.7/8	12	5998001	—	—
		B	0.2380	2.3/4	4"	12	—	—	5998737
		C	0.2421	2.3/4	4"	12	—	—	5998741
		D	0.2461	2.3/4	4"	12	—	—	5998748
1/4			0.2500	2.3/4	4"	12	5997608	—	—
		F	0.2571	2.7/8	4.1/8	12	—	—	5998757
		G	0.2610	2.7/8	4.1/8	12	—	—	5998761
17/64			0.2656	2.7/8	4.1/8	12	5998045	—	—
		H	0.2661	2.7/8	4.1/8	12	—	—	5998765
		I	0.2720	2.7/8	4.1/8	12	—	—	5998768
		J	0.2772	2.7/8	4.1/8	12	—	—	5998773
		K	0.2811	2.15/16	4.1/4	12	—	—	5998777
9/32			0.2813	2.15/16	4.1/4	12	5998041	—	—
		L	0.2902	2.15/16	4.1/4	12	—	—	5998782
		M	0.2949	3.1/16	4.3/8	12	—	—	5998787
19/64			0.2969	3.1/16	4.3/8	12	5998080	—	—
		N	0.3020	3.1/16	4.3/8	12	—	—	5998795
5/16			0.3125	3.3/16	4.1/2	6	5998020	—	—
		O	0.3161	3.3/16	4.1/2	6	—	—	5998975
		P	0.3228	3.5/16	4.5/8	6	—	—	5999015
21/64			0.3281	3.5/16	4.5/8	6	5998114	—	—
		Q	0.3319	3.7/16	4.3/4	6	—	—	5999055
		R	0.3390	3.7/16	4.3/4	6	—	—	5999090
11/32			0.3437	3.7/16	4.3/4	6	5997616	—	—
		S	0.3480	3.1/2	4.7/8	6	—	—	5999125
		T	0.3580	3.1/2	4.7/8	6	—	—	5999133
23/64			0.3594	3.1/2	4.7/8	6	5998154	—	—
		U	0.3680	3.5/8	5"	6	—	—	5999136
3/8			0.3750	3.5/8	5"	6	5998011	—	—
		V	0.3772	3.5/8	5"	6	—	—	5999140
		W	0.3858	3.3/4	5.1/8	6	—	—	5999142
25/64			0.3906	3.3/4	5.1/8	6	5998162	—	—
		X	0.3969	3.3/4	5.1/8	6	—	—	5998979

$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø letter	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	R10B	R18B	R15B
		Y	0.4039	3.7/8	5.1/4	6	—	—	5998983
13/32			0.4063	3.7/8	5.1/4	6	5997622	—	—
		Z	0.4130	3.7/8	5.1/4	6	—	—	5998986
27/64			0.4219	3.15/16	5.3/8	6	5998166	—	—
7/16			0.4375	4.1/16	5.1/2	6	5998031	—	—
29/64			0.4531	4.3/16	5.5/8	6	5998170	—	—
15/32			0.4687	4.5/16	5.3/4	6	5997632	—	—
31/64			0.4844	4.3/8	5.7/8	6	5998016	—	—
1/2			0.5000	4.1/2	6"	6	5997604	—	—

**High Helix Jobber Length**

\* Sets Available on pg. 232

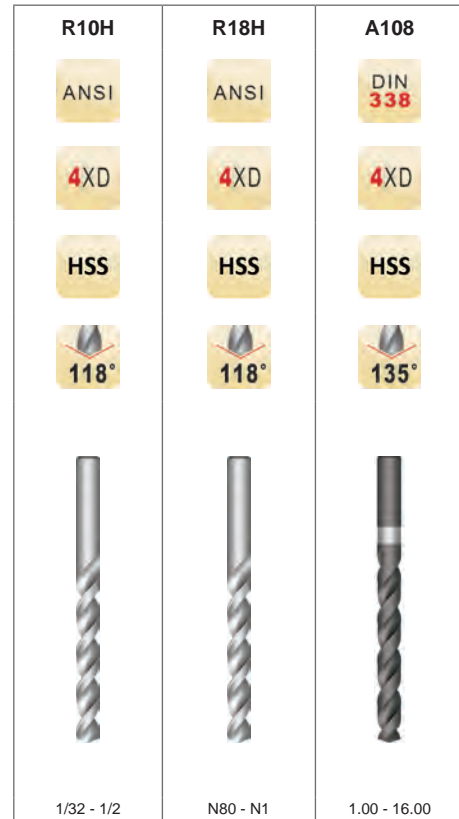
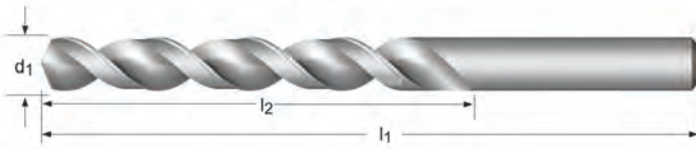
**R10H** - Fractional Sizes

**R18H** - Wire Gauge Sizes

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

**A108** - Fractional & Metric Sizes

Low thrust design self centering Split Point for easier penetration. Steam tempered for increased wear resistance & lubricity. Fast spiral for stainless.



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø mm	$d_1$ decimal Inch	$l_2$ Inch	$l_2$ mm	$l_1$ Inch	$l_1$ mm	Pack Qty	R10H	R18H	A108
	80		0.0135	1/8		3/4		12	—	5998444	—
	79		0.0145	1/8		3/4		12	—	5998435	—
	78		0.0160	3/16		7/8		12	—	5998392	—
	77		0.0180	3/16		7/8		12	—	5998354	—
	76		0.0200	3/16		7/8		12	—	5998321	—
	75		0.0210	1/4		1"		12	—	5998278	—
	74		0.0225	1/4		1"		12	—	5998119	—
	73		0.0240	5/16		1.1/8		12	—	5998112	—
	72		0.0250	5/16		1.1/8		12	—	5998109	—
	71		0.0260	3/8		1.1/4		12	—	5998106	—
	70		0.0280	3/8		1.1/4		12	—	5998103	—
	69		0.0292	1/2		1.3/8		12	—	5998097	—
	68		0.0310	1/2		1.3/8		12	—	5998094	—
1/32			0.0313	1/2		1.3/8		12	5998353	—	—
	67		0.0320	1/2		1.3/8		12	—	5998090	—
	66		0.0330	1/2		1.3/8		12	—	5998087	—
	65		0.0350	5/8		1.1/2		12	—	5998084	—
	64		0.0360	5/8		1.1/2		12	—	5998078	—
	63		0.0370	5/8		1.1/2		12	—	5998075	—
	62		0.0380	5/8		1.1/2		12	—	5998072	—
	61		0.0390	11/16		1.5/8		12	—	5998069	—
		1.00	0.0394		12		34	10	—	—	5968323
	60		0.0400	11/16		1.5/8		12	—	5998066	—
	59		0.0410	11/16		1.5/8		12	—	5998060	—
	58		0.0420	11/16		1.5/8		12	—	5998057	—
	57		0.0430	3/4		1.3/4		12	—	5998055	—
		1.10	0.0433		14		36	10	—	—	5968333
	56		0.0465	3/4		1.3/4		12	—	5998051	—
3/64			0.0469	3/4		1.3/4		12	5998386	—	—
		1.20	0.0472		16		38	10	—	—	5968338
		1.30	0.0512		16		38	10	—	—	5968343
	55		0.0520	7/8		1.7/8		12	—	5998043	—
	54		0.0550	7/8		1.7/8		12	—	5998039	—



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> Inch	l <sub>1</sub> mm	Pack Qty	R10H	R18H	A108
		1.40	0.0551		18		40	10	—	—	5968351
		1.50	0.0591		18		40	10	—	—	5968176
	53		0.0595	7/8		1.7/8		12	—	5998035	—
1/16			0.0625	7/8		1.7/8		12	5998346	—	—
1/16			0.0625		20		43	10	—	—	5968200
		1.60	0.0630		20		43	10	—	—	5968184
	52		0.0635	7/8		1.7/8		12	—	5998032	—
		1.70	0.0669		20		43	10	—	—	5968188
	51		0.0670	1"		2"		12	—	5998028	—
	50		0.0700	1"		2"		12	—	5998024	—
		1.80	0.0709		22		46	10	—	—	5968192
	49		0.0730	1"		2"		12	—	5998015	—
		1.90	0.0748		22		46	10	—	—	5968196
	48		0.0760	1"		2"		12	—	5998012	—
5/64			0.0781	1"		2"		12	5998406	—	—
5/64			0.0781		24		49	10	—	—	5968398
	47		0.0785	1"		2"		12	—	5998008	—
		2.00	0.0787		24		49	10	—	—	5968295
	46		0.0810	1.1/8		2.1/8		12	—	5998000	—
	45		0.0820	1.1/8		2.1/8		12	—	5997997	—
		2.10	0.0827		24		49	10	—	—	5968302
	44		0.0860	1.1/8		2.1/8		12	—	5997994	—
		2.20	0.0866		27		53	10	—	—	5968307
	43		0.0890	1.1/4		2.1/4		12	—	5997991	—
		2.30	0.0906		27		53	10	—	—	5968311
	42		0.0935	1.1/4		2.1/4		12	—	5997988	—
3/32			0.0938	1.1/4		2.1/4		12	5998382	—	—
3/32			0.0938		30		57	10	—	—	5968314
		2.40	0.0945		30		57	10	—	—	5968315
	41		0.0960	1.3/8		2.3/8		12	—	5997985	—
	40		0.0980	1.3/8		2.3/8		12	—	5997982	—
		2.50	0.0984		30		57	10	—	—	5968318
	39		0.0995	1.3/8		2.3/8		12	—	5997978	—
	38		0.1015	1.7/16		2.1/2		12	—	5997975	—
		2.60	0.1024		30		57	10	—	—	5968328
	37		0.1040	1.7/16		2.1/2		12	—	5998135	—
		2.70	0.1063		33		61	10	—	—	5968280
	36		0.1065	1.7/16		2.1/2		12	—	5998131	—
7/64			0.1094	1.1/2		2.5/8		12	5998422	—	—
7/64			0.1094		33		61	10	—	—	5968179
	35		0.1100	1.1/2		2.5/8		12	—	5998127	—
		2.80	0.1102		33		61	10	—	—	5968341
	34		0.1110	1.1/2		2.5/8		12	—	5998123	—
	33		0.1130	1.1/2		2.5/8		12	—	5998116	—
		2.90	0.1142		33		61	10	—	—	5968376
	32		0.1160	1.5/8		2.3/4		12	—	5998081	—
		3.00	0.1181		33		61	10	—	—	5968400
	31		0.1200	1.5/8		2.3/4		12	—	5998047	—
		3.10	0.1220		36		65	10	—	—	5968423
1/8			0.1250	1.5/8		2.3/4		12	5998358	—	—
1/8			0.1250		36		65	10	—	—	5968209
		3.20	0.1260		36		65	10	—	—	5968427
	30		0.1285	1.5/8		2.3/4		12	—	5998004	—
		3.30	0.1299		36		65	10	—	—	5968428
		3.40	0.1339		39		70	10	—	—	5968430
	29		0.1360	1.3/4		2.7/8		12	—	5998265	—
		3.50	0.1378		39		70	10	—	—	5968433
	28		0.1405	1.3/4		2.7/8		12	—	5998257	—
9/64			0.1406	1.3/4		2.7/8		12	5998430	—	—
9/64			0.1406		39		70	10	—	—	5968256
		3.60	0.1417		39		70	10	—	—	5968289
	27		0.1440	1.7/8		3"		12	—	5998253	—
		3.70	0.1457		39		70	10	—	—	5968294
	26		0.1470	1.7/8		3"		12	—	5998249	—
	25		0.1495	1.7/8		3"		12	—	5998245	—

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> Inch	l <sub>1</sub> mm	Pack Qty	R10H	R18H	A108
		3.80	0.1496		43		75	10	—	—	5968299
	24		0.1520	2"		3.1/8		12	—	5998242	—
		3.90	0.1535		43		75	10	—	—	5968304
	23		0.1540	2"		3.1/8		12	—	5998239	—
5/32			0.1563	2"		3.1/8		12	5998402	—	—
5/32			0.1563		43		75	10	—	—	5968396
	22		0.1570	2"		3.1/8		12	—	5998236	—
		4.00	0.1575		43		75	10	—	—	5968322
	21		0.1590	2.1/8		3.1/4		12	—	5998233	—
	20		0.1610	2.1/8		3.1/4		12	—	5998229	—
		4.10	0.1614		43		75	10	—	—	5968331
		4.20	0.1654		43		75	10	—	—	5968336
	19		0.1660	2.1/8		3.1/4		12	—	5998221	—
		4.30	0.1693		47		80	10	—	—	5968346
	18		0.1695	2.1/8		3.1/4		12	—	5998219	—
11/64			0.1719	2.1/8		3.1/4		12	5998364	—	—
11/64			0.1719		47		80	10	—	—	5968238
	17		0.1730	2.3/16		3.3/8		12	—	5998216	—
		4.40	0.1732		47		80	10	—	—	5968350
	16		0.1770	2.3/16		3.3/8		12	—	5998214	—
		4.50	0.1772		47		80	10	—	—	5968353
	15		0.1800	2.3/16		3.3/8		12	—	5998212	—
		4.60	0.1811		47		80	10	—	—	5968357
	14		0.1820	2.3/16		3.3/8		12	—	5998210	—
	13		0.1850	2.5/16		3.1/2		12	—	5998208	—
		4.70	0.1850		47		80	10	—	—	5968360
3/16			0.1875	2.5/16		3.1/2		12	5998378	—	—
3/16			0.1875		52		86	10	—	—	5968310
	12		0.1890	2.5/16		3.1/2		12	—	5998206	—
		4.80	0.1890		52		86	10	—	—	5968363
	11		0.1910	2.5/16		3.1/2		12	—	5998204	—
		4.90	0.1929		52		86	10	—	—	5968366
	10		0.1935	2.7/16		3.5/8		12	—	5998202	—
	10		0.1935		52		86	10	—	—	6305901
	9		0.1960	2.7/16		3.5/8		12	—	5998447	—
		5.00	0.1969		52		86	10	—	—	5968369
	8		0.1990	2.7/16		3.5/8		12	—	5998440	—
		5.10	0.2008		52		86	10	—	—	5968371
	7		0.2010	2.7/16		3.5/8		12	—	5998100	—
13/64			0.2031	2.7/16		3.5/8		12	5998369	—	—
13/64			0.2031		52		86	10	—	—	5968266
	6		0.2040	2.1/2		3.3/4		12	—	5998063	—
		5.20	0.2047		52		86	10	—	—	5968374
	5		0.2055	2.1/2		3.3/4		12	—	5998019	—
		5.30	0.2087		52		86	10	—	—	5968379
	4		0.2090	2.1/2		3.3/4		12	—	5997980	—
		5.40	0.2126		57		93	10	—	—	5968382
	3		0.2130	2.1/2		3.3/4		12	—	5997970	—
		5.50	0.2165		57		93	10	—	—	5968384
7/32			0.2188	2.1/2		3.3/4		12	5998419	—	—
7/32			0.2188					10	—	—	5968175
		5.60	0.2205		57		93	10	—	—	5968386
	2		0.2210	2.5/8		3.7/8		12	—	5998226	—
		5.70	0.2244		57		93	10	—	—	5968388
	1		0.2280	2.5/8		3.7/8		12	—	5998197	—
		5.80	0.2283		57		93	10	—	—	5968390
		5.90	0.2323		57		93	10	—	—	5968392
15/64			0.2344	2.5/8		3.7/8		12	5998451	—	—
15/64			0.2344		57		93	10	—	—	6305902
		6.00	0.2362		57		93	10	—	—	5968402
		6.10	0.2402		63		101	10	—	—	5968405
		6.20	0.2441		63		101	10	—	—	5968406
		6.30	0.2480		63		101	10	—	—	5968409
1/4			0.2500	2.3/4		4"		12	5998356	—	—
1/4			0.2500		63		101	10	—	—	5968206

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> Inch	l <sub>1</sub> mm	Pack Qty	R10H	R18H	A108
		6.40	0.2520		63		101	10	—	—	5968411
		6.50	0.2559		63		101	10	—	—	5968412
		6.60	0.2598		63		101	10	—	—	5968414
		6.70	0.2638		63		101	10	—	—	5968417
17/64			0.2656	2.7/8		4.1/8		12	5998476	—	—
17/64			0.2656		69		109	10	—	—	6305903
		6.80	0.2677		69		109	10	—	—	5968419
		6.90	0.2717		69		109	10	—	—	5968421
		7.00	0.2756		69		109	10	—	—	5968425
		7.10	0.2795		69		109	10	—	—	5968167
9/32			0.2813	2.15/16		4.1/4		12	5998426	—	—
9/32			0.2813		69		109	10	—	—	5968253
		7.20	0.2835		69		109	10	—	—	5968208
		7.30	0.2874		69		109	10	—	—	5968239
		7.40	0.2913		69		109	10	—	—	5968278
		7.50	0.2953		69		109	10	—	—	5968330
19/64			0.2969	3.1/16		4.3/8		12	5998512	—	—
19/64			0.2969		75		117	10	—	—	6305904
		7.60	0.2992		75		117	10	—	—	5968340
		7.70	0.3031		75		117	10	—	—	5968345
		7.80	0.3071		75		117	10	—	—	5968349
		7.90	0.3110		75		117	10	—	—	5968354
5/16			0.3125	3.3/16		4.1/2		6	5998398	—	—
5/16			0.3125		75		117	10	—	—	5968394
		8.00	0.3150		75		117	10	—	—	5968182
		8.10	0.3189		75		117	10	—	—	5968187
		8.20	0.3228		75		117	10	—	—	5968191
		8.30	0.3268		75		117	10	—	—	5968195
21/64			0.3281	3.5/16		4.5/8		6	5998520	—	—
21/64			0.3281		75		117	10	—	—	6305905
		8.40	0.3307		75		117	10	—	—	5968199
		8.50	0.3346		75		117	10	—	—	5968202
		8.60	0.3386		81		125	10	—	—	5968205
		8.70	0.3425		81		125	10	—	—	5968211
11/32			0.3437	3.7/16		4.3/4		6	5998361	—	—
11/32			0.3437		81		125	10	—	—	5968235
		8.80	0.3465		81		125	10	—	—	5968214
		8.90	0.3504		81		125	10	—	—	5968216
		9.00	0.3543		81		125	10	—	—	5968219
		9.10	0.3583		81		125	10	—	—	5968221
23/64			0.3594	3.1/2		4.7/8		6	5998524	—	—
23/64			0.3594		81		125	10	—	—	6305906
		9.20	0.3622		81		125	10	—	—	5968224
		9.30	0.3661		81		125	10	—	—	5968227
		9.40	0.3701		81		125	10	—	—	5968230
		9.50	0.3740		81		125	10	—	—	5968233
3/8			0.3750	3.5/8		5"		6	5998391	—	—
3/8			0.3750		87		133	10	—	—	5968317
		9.60	0.3780		87		133	10	—	—	5968236
		9.70	0.3819		87		133	10	—	—	5968242
		9.80	0.3858		87		133	10	—	—	5968245
		9.90	0.3898		87		133	10	—	—	5968250
25/64			0.3906	3.3/4		5.1/8		6	5998529	—	—
25/64			0.3906		87		133	10	—	—	6305907
		10.00	0.3937		87		133	10	—	—	5968213
		10.20	0.4016		87		133	5	—	—	5968217
13/32			0.4063	3.7/8		5.1/4		6	5998371	—	—
13/32			0.4063		87		133	5	—	—	5968263
		10.50	0.4134		87		133	5	—	—	5968220
27/64			0.4219	3.15/16		5.3/8		6	5998534	—	—
27/64			0.4219		94		142	5	—	—	6305908
		10.80	0.4252		94		142	5	—	—	5968223
		11.00	0.4331		94		142	5	—	—	5968226
7/16			0.4375	4.1/16		5.1/2		6	5998410	—	—
7/16			0.4375		94		142	5	—	—	5968172

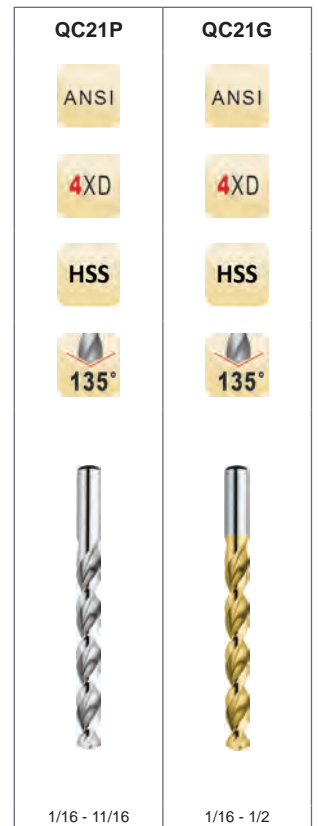
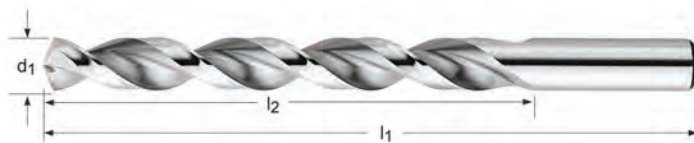
d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> Inch	l <sub>1</sub> mm	Pack Qty	R10H	R18H	A108
		11.50	0.4528		94		142	5	—	—	5968229
29/64			0.4531	4.3/16		5.5/8		6	5998374	—	—
29/64			0.4531		94		142	5	—	—	6305909
		11.80	0.4646		94		142	5	—	—	5968232
15/32			0.4687	4.5/16		5.3/4		6	5998415	—	—
15/32			0.4687		101		151	5	—	—	5968285
		12.00	0.4724		101		151	5	—	—	5968241
31/64			0.4844	4.3/8		5.7/8		6	5998394	—	—
31/64			0.4844		101		151	5	—	—	6305920
		12.50	0.4921		101		151	5	—	—	5968248
1/2			0.5000	4.1/2		6		5	5967881	—	—
1/2			0.5000		101		151	5	—	—	5968203
		12.80	0.5039		101		151	5	—	—	5968251
		12.90	0.5079		101		151	5	—	—	5968254
		13.00	0.5118		101		151	5	—	—	5968257
		13.50	0.5315		108		160	5	—	—	5968260
		14.00	0.5512		108		160	5	—	—	5968269
		14.50	0.5709		114		169	1	—	—	5968271
		15.00	0.5906		114		169	1	—	—	5968273
		15.25	0.6004		120		178	1	—	—	5968279
		15.50	0.6102		120		178	1	—	—	5968283
		16.00	0.6299		120		178	1	—	—	5968290

**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	5997086	5996259
52	0.0635	7/8	1.7/8	12	5997021	5996240
51	0.0670	1"	2"	12	5997017	5996237
50	0.0700	1"	2"	12	5997013	5996405
49	0.0730	1"	2"	12	5997008	5996396
48	0.0760	1"	2"	12	5997005	5996392
5/64	0.0781	1"	2"	12	5996799	5996341
47	0.0785	1"	2"	12	5997002	5996384
46	0.0810	1.1/8	2.1/8	12	5996999	5996344
45	0.0820	1.1/8	2.1/8	12	5997179	5996311
44	0.0860	1.1/8	2.1/8	12	5997175	5996272
43	0.0890	1.1/4	2.1/4	12	5997170	5996233
42	0.0935	1.1/4	2.1/4	12	5997166	5996301
3/32	0.0938	1.1/4	2.1/4	12	5996944	5996327
41	0.0960	1.3/8	2.3/8	12	5997155	5996294
40	0.0980	1.3/8	2.3/8	12	5997108	5996291
39	0.0995	1.3/8	2.3/8	12	5997032	5996281
38	0.1015	1.7/16	2.1/2	12	5996993	5996277
37	0.1040	1.7/16	2.1/2	12	5997040	5996273
36	0.1065	1.7/16	2.1/2	12	5997033	5996268
7/64	0.1094	1.1/2	2.5/8	12	5996818	5996353
35	0.1100	1.1/2	2.5/8	12	5997029	5996264
34	0.1110	1.1/2	2.5/8	12	5997025	5996261
33	0.1130	1.1/2	2.5/8	12	5997020	5996257
32	0.1160	1.5/8	2.3/4	12	5997016	5996250
31	0.1200	1.5/8	2.3/4	12	5997014	5996246
1/8	0.1250	1.5/8	2.3/4	12	5997097	5996269
30	0.1285	1.5/8	2.3/4	12	5997010	5996243
29	0.1360	1.3/4	2.7/8	12	5997004	5996235
28	0.1405	1.3/4	2.7/8	12	5997000	5996232
9/64	0.1406	1.3/4	2.7/8	12	5996829	5996360
27	0.1440	1.7/8	3"	12	5996995	5996229
26	0.1470	1.7/8	3"	12	5996992	5996227

# JOBBER DRILL



d <sub>1</sub> Ø "/Nr./letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	QC21P	QC21G
25	0.1495	1.7/8	3"	12	5996990	5996225
24	0.1520	2"	3.1/8	12	5996988	5996223
23	0.1540	2"	3.1/8	12	5996986	5996219
5/32	0.1563	2"	3.1/8	12	5996795	5996338
22	0.1570	2"	3.1/8	12	5996984	5996217
21	0.1590	2.1/8	3.1/4	12	5996982	5996216
20	0.1610	2.1/8	3.1/4	12	5996980	5996213
19	0.1660	2.1/8	3.1/4	12	5996976	5996210
18	0.1695	2.1/8	3.1/4	12	5996972	5996208
11/64	0.1719	2.1/8	3.1/4	12	5997112	5996279
17	0.1730	2.3/16	3.3/8	12	5996970	5996206
16	0.1770	2.3/16	3.3/8	12	5996968	5996204
15	0.1800	2.3/16	3.3/8	12	5996966	5996202
14	0.1820	2.3/16	3.3/8	12	5996964	5996198
13	0.1850	2.5/16	3.1/2	12	5996962	5996196
3/16	0.1875	2.5/16	3.1/2	12	5996938	5996325
12	0.1890	2.5/16	3.1/2	12	5996960	5996194
11	0.1910	2.5/16	3.1/2	12	5996958	5996192
10	0.1935	2.7/16	3.5/8	12	5996955	5996190
9	0.1960	2.7/16	3.5/8	12	5997039	5996255
8	0.1990	2.7/16	3.5/8	12	5997035	5996252
7	0.2010	2.7/16	3.5/8	12	5997028	5996248
13/64	0.2031	2.7/16	3.5/8	12	5997120	5996287
6	0.2040	2.1/2	3.3/4	12	5997024	5996244
5	0.2055	2.1/2	3.3/4	12	5997011	5996401
4	0.2090	2.1/2	3.3/4	12	5997071	5996285
3	0.2130	2.1/2	3.3/4	12	5997006	5996239
7/32	0.2188	2.1/2	3.3/4	12	5996814	5996351
2	0.2210	2.5/8	3.7/8	12	5996978	5996211
1	0.2280	2.5/8	3.7/8	12	5996952	5996187
A	0.2340	2.5/8	3.7/8	12	5996520	—
15/64	0.2344	2.5/8	3.7/8	12	5997128	5996293
B	0.2374	2.3/4	4"	12	5996524	—
C	0.2421	2.3/4	4"	12	5996531	—
D	0.2461	2.3/4	4"	12	5996535	—
1/4	0.2500	2.3/4	4"	12	5997093	5996265
F	0.2571	2.7/8	4.1/8	12	5996543	—
G	0.2610	2.7/8	4.1/8	12	5996547	—
17/64	0.2656	2.7/8	4.1/8	12	5997134	5996296
H	0.2661	2.7/8	4.1/8	12	5996551	—
I	0.2720	2.7/8	4.1/8	12	5996555	—
J	0.2772	2.7/8	4.1/8	12	5996559	—
K	0.2811	2.15/16	4.1/4	12	5996563	—
9/32	0.2813	2.15/16	4.1/4	12	5996825	5996357
L	0.2902	2.15/16	4.1/4	12	5996566	—
M	0.2949	3.1/16	4.3/8	12	5996571	—
19/64	0.2969	3.1/16	4.3/8	12	5997147	5996300
N	0.3020	3.1/16	4.3/8	12	5996946	—
5/16	0.3125	3.3/16	4.1/2	6	5996792	5996336
O	0.3161	3.3/16	4.1/2	6	5997043	—
P	0.3228	3.5/16	4.5/8	6	5997047	—
21/64	0.3281	3.5/16	4.5/8	6	5997161	5996304
Q	0.3319	3.7/16	4.3/4	6	5997051	—
R	0.3390	3.7/16	4.3/4	6	5997055	—
11/32	0.3437	3.7/16	4.3/4	6	5997105	5996276
S	0.3480	3.1/2	4.7/8	6	5997059	—
T	0.3580	3.1/2	4.7/8	6	5997062	—
23/64	0.3594	3.1/2	4.7/8	6	5996766	5996308
U	0.3680	3.5/8	5"	6	5997065	—
3/8	0.3750	3.5/8	5"	6	5996947	5996330
V	0.3772	3.5/8	5"	6	5997068	—
W	0.3858	3.3/4	5.1/8	6	5997074	—
25/64	0.3906	3.3/4	5.1/8	6	5996811	5996315
X	0.3969	3.3/4	5.1/8	6	5997077	—
Y	0.4039	3.7/8	5.1/4	6	5997080	—

$d_1$ 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	5997116	5996283
Z	0.4130	3.7/8	5.1/4	6	5997083	—
27/64	0.4219	3.15/16	5.3/8	6	5996848	5996319
7/16	0.4375	4.1/16	5.1/2	6	5996806	5996347
29/64	0.4531	4.3/16	5.5/8	6	5996893	5996322
15/32	0.4687	4.5/16	5.3/4	6	5997124	5996289
31/64	0.4844	4.3/8	5.7/8	6	5996950	5996333
1/2	0.5000	4.1/2	6"	6	5997090	5996263
33/64	0.5156	4.13/16	6.5/8	1	5996953	—
17/32	0.5313	4.13/16	6.5/8	1	5997131	—
35/64	0.5469	4.13/16	6.5/8	1	5996771	—
9/16	0.5625	4.13/16	6.5/8	1	5996822	—
37/64	0.5781	4.13/16	6.5/8	1	5996775	—
19/32	0.5937	5.3/16	7.1/8	1	5997141	—
39/64	0.6094	5.3/16	7.1/8	1	5996778	—
5/8	0.6250	5.3/16	7.1/8	1	5996802	—
41/64	0.6406	5.3/16	7.1/8	1	5996782	—
21/32	0.6563	5.3/16	7.1/8	1	5997151	—
43/64	0.6719	5.5/8	7.5/8	1	5996787	—
11/16	0.6875	5.5/8	7.5/8	1	5997101	—



# JOBBER DRILL

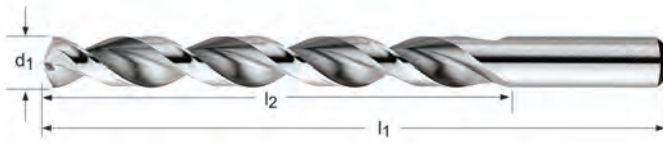


## General Purpose Jobber Length Parabolic Flute, Metric

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	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	QC21PM	QC21GM
1.50	0.0591	18	40	12	5996576	5996450
2.00	0.0787	24	49	12	5996644	5996467
2.50	0.0984	30	57	12	5996648	5996469
3.00	0.1181	33	61	12	5996655	5996471
3.50	0.1378	39	70	12	5996908	—
4.00	0.1575	43	75	12	5996949	5996475
4.50	0.1772	47	80	12	5996974	—
5.00	0.1969	52	86	12	5996997	5996479
5.20	0.2047	52	86	12	5997036	5996483
5.50	0.2165	57	93	12	5997044	5996167
5.60	0.2205	57	93	12	5997048	5996200
6.00	0.2362	57	93	12	5997052	5996221
6.50	0.2559	63	101	12	5997056	5996253
6.80	0.2677	69	109	12	5996914	5996297
7.00	0.2756	69	109	12	5996923	5996305
7.50	0.2953	69	109	12	5996926	5996309
8.00	0.3150	75	117	6	5996929	5996313
8.20	0.3228	75	117	6	5996931	5996317
8.50	0.3346	75	117	6	5996934	5996171
8.60	0.3386	81	125	6	5996937	5996174
9.00	0.3543	81	125	6	5996940	5996177
9.50	0.3740	81	125	6	5996943	5996180
10.00	0.3937	87	133	6	5996579	5996452
10.50	0.4134	87	133	6	5996582	5996454
11.00	0.4331	94	142	6	5996585	5996455
11.50	0.4528	94	142	6	5996588	—
12.00	0.4724	101	151	6	5996591	5996461
12.50	0.4921	101	151	6	5996594	5996463
13.00	0.5118	101	151	1	5996597	5996465
13.50	0.5315	108	160	1	5996601	—
14.00	0.5512	108	160	1	5996610	—
14.50	0.5709	114	169	1	5996615	—
15.00	0.5906	114	169	1	5996619	—
15.50	0.6102	120	178	1	5996623	—
16.00	0.6299	120	178	1	5996627	—
16.50	0.6496	125	184	1	5996631	—
17.00	0.6693	125	184	1	5996635	—
17.50	0.6890	130	191	1	5996640	—

**Heavy Duty Jobber Length (NAS 907 Type J)**

\* Sets Available on pg. 234-235

**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 tempered for wear resistance & lubricity. For enhanced tool life in ferrous materials



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> Inch	l <sub>1</sub> mm	Pack Qty	R10CO	R18CO	R15CO	2ACO
	80			0.0135	1/8		3/4		12	—	<sup>1)</sup> 5997848	—	—
	79			0.0145	1/8		3/4		12	—	<sup>1)</sup> 5997842	—	—
1/64				0.0156	3/16		3/4		12	5998146	<sup>1)</sup> —	—	—
	78			0.0160	3/16		7/8		12	—	<sup>1)</sup> 5997840	—	—
	77			0.0180	3/16		7/8		12	—	<sup>1)</sup> 5997837	—	—
	76			0.0200	3/16		7/8		12	—	<sup>1)</sup> 5997831	—	—
	75			0.0210	1/4		1"		12	—	<sup>1)</sup> 5997828	—	—
	74			0.0225	1/4		1"		12	—	<sup>1)</sup> 5997825	—	—
	73			0.0240	5/16		1.1/8		12	—	<sup>1)</sup> 5997822	—	—
	72			0.0250	5/16		1.1/8		12	—	<sup>1)</sup> 5997819	—	—
	71			0.0260	3/8		1.1/4		12	—	<sup>1)</sup> 5997816	—	—
	70			0.0280	3/8		1.1/4		12	—	<sup>1)</sup> 5997813	—	—
	69			0.0292	1/2		1.3/8		12	—	<sup>1)</sup> 5997807	—	—
	68			0.0310	1/2		1.3/8		12	—	<sup>1)</sup> 5997804	—	—
1/32				0.0313	1/2		1.3/8		12	5998139	<sup>1)</sup> —	—	—
	67			0.0320	1/2		1.3/8		12	—	<sup>1)</sup> 5997798	—	—
	66			0.0330	1/2		1.3/8		12	—	<sup>1)</sup> 5997794	—	—
	65			0.0350	5/8		1.1/2		12	—	<sup>1)</sup> 5997791	—	—
	64			0.0360	5/8		1.1/2		12	—	<sup>1)</sup> 5997787	—	—
	63			0.0370	5/8		1.1/2		12	—	<sup>1)</sup> 5997783	—	—
	62			0.0380	5/8		1.1/2		12	—	<sup>1)</sup> 5997781	—	—
	61			0.0390	11/16		1.5/8		12	—	<sup>1)</sup> 5997779	—	—
		1.00		0.0394		12		34	12	—	—	—	5999612
	60			0.0400	11/16		1.5/8		12	—	5997776	—	—
	59			0.0410	11/16		1.5/8		12	—	5997768	—	—
		1.05		0.0413		12		34	12	—	—	—	5999614
	58			0.0420	11/16		1.5/8		12	—	5997762	—	—
	57			0.0430	3/4		1.3/4		12	—	5997758	—	—
		1.10		0.0433		14		36	12	—	—	—	5999618
		1.15		0.0453		14		36	12	—	—	—	5999621
	56			0.0465	3/4		1.3/4		12	—	5997753	—	—
3/64				0.0469	3/4		1.3/4		12	5998182	—	—	—

<sup>1)</sup> No Split Point

# COBALT JOBBER DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> Inch	l <sub>1</sub> mm	Pack Qty	R10CO	R18CO	R15CO	2ACO
			1.20	0.0472		16		38	12	—	—	—	5999625
			1.25	0.0492		16		38	12	—	—	—	5999629
			1.30	0.0512		16		38	12	—	—	—	5999635
	55		0.0520	7/8		1.7/8		12	12	—	5997752	—	—
			1.35	0.0531		18		40	12	—	—	—	5999639
			1.40	0.0551		18		40	12	—	—	—	5999643
	54		0.0550	7/8		1.7/8		12	12	—	5997749	—	—
			1.45	0.0571		18		40	12	—	—	—	5999648
			1.50	0.0591		18		40	12	—	—	—	5999652
	53		0.0595	7/8		1.7/8		12	12	—	5997745	—	—
			1.55	0.0610		20		43	12	—	—	—	5999656
1/16			0.0625	7/8		1.7/8		12	12	5998132	—	—	—
			1.60	0.0630		20		43	12	—	—	—	5999660
	52		0.0635	7/8		1.7/8		12	12	—	5997743	—	—
			1.65	0.0650		20		43	12	—	—	—	5999666
			1.70	0.0669		20		43	12	—	—	—	5999671
	51		0.0670	1"		2"		12	12	—	5997740	—	—
			1.75	0.0689		22		46	12	—	—	—	5999674
	50		0.0700	1"		2"		12	12	—	5997737	—	—
			1.80	0.0709		22		46	12	—	—	—	5999682
			1.85	0.0728		22		46	12	—	—	—	5999686
	49		0.0730	1"		2"		12	12	—	5997888	—	—
			1.90	0.0748		22		46	12	—	—	—	5999689
	48		0.0760	1"		2"		12	12	—	5997883	—	—
			1.95	0.0768		24		49	12	—	—	—	5999694
5/64			0.0781	1"		2"		12	12	5998215	—	—	—
	47		0.0785	1"		2"		12	12	—	5997879	—	—
			2.00	0.0787		24		49	12	—	—	—	6000762
			2.05	0.0807		24		49	12	—	—	—	6000766
	46		0.0810	1.1/8		2.1/8		12	12	—	5997875	—	—
	45		0.0820	1.1/8		2.1/8		12	12	—	5997868	—	—
			2.10	0.0827		24		49	12	—	—	—	6000771
	44		0.0860	1.1/8		2.1/8		12	12	—	5997835	—	—
			2.20	0.0866		27		53	12	—	—	—	6000776
	43		0.0890	1.1/4		2.1/4		12	12	—	5997802	—	—
			2.30	0.0906		27		53	12	—	—	—	6000622
			2.35	0.0925		27		53	12	—	—	—	6000627
	42		0.0935	1.1/4		2.1/4		12	12	—	5997764	—	—
3/32			0.0938	1.1/4		2.1/4		12	12	5998179	—	—	—
			2.40	0.0945		30		57	12	—	—	—	6000632
	41		0.0960	1.3/8		2.3/8		12	12	—	5997730	—	—
	40		0.0980	1.3/8		2.3/8		12	12	—	5997784	—	—
			2.50	0.0984		30		57	12	—	—	—	6000639
	39		0.0995	1.3/8		2.3/8		12	12	—	5997772	—	—
	38		0.1015	1.7/16		2.1/2		12	12	—	5997770	—	—
			2.60	0.1024		30		57	12	—	—	—	6000642
	37		0.1040	1.7/16		2.1/2		12	12	—	5997767	—	—
			2.70	0.1063		33		61	12	—	—	—	6000646
	36		0.1065	1.7/16		2.1/2		12	12	—	5997763	—	—
7/64			0.1094	1.1/2		2.5/8		12	12	5998225	—	—	—
	35		0.1100	1.1/2		2.5/8		12	12	—	5997759	—	—
			2.80	0.1102		33		61	12	—	—	—	6000650
	34		0.1110	1.1/2		2.5/8		12	12	—	5997755	—	—
	33		0.1130	1.1/2		2.5/8		12	12	—	5997751	—	—
			2.90	0.1142		33		61	12	—	—	—	6000654
	32		0.1160	1.5/8		2.3/4		12	12	—	5997748	—	—
			3.00	0.1181		33		61	12	—	—	—	6000658
	31		0.1200	1.5/8		2.3/4		12	12	—	5997746	—	—
			3.10	0.1220		36		65	12	—	—	—	6000662
1/8			0.1250	1.5/8		2.3/4		12	12	5998150	—	—	—
			3.20	0.1260		36		65	12	—	—	—	6000669
			3.25	0.1280		36		65	12	—	—	—	6000673
	30		0.1285	1.5/8		2.3/4		12	12	—	5997736	—	—
			3.30	0.1299		36		65	12	—	—	—	6000676
			3.40	0.1339		39		70	12	—	—	—	6000680

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> Inch	l <sub>1</sub> mm	Pack Qty	R10CO	R18CO	R15CO	2ACO
	29			0.1360	1.3/4		2.7/8		12	—	5997731	—	—
			3.50	0.1378		39		70	12	—	—	—	6000684
9/64	28			0.1405	1.3/4		2.7/8		12	—	5997729	—	—
				0.1406	1.3/4		2.7/8		12	5998234	—	—	—
			3.60	0.1417		39		70	12	—	—	—	6000688
	27			0.1440	1.7/8		3"		12	—	5997727	—	—
			3.70	0.1457		39		70	12	—	—	—	6000692
	26			0.1470	1.7/8		3"		12	—	5997725	—	—
			3.75	0.1476		39		70	12	—	—	—	6000695
			3.80	0.1496		43		75	12	—	—	—	6000698
	25			0.1495	1.7/8		3"		12	—	5997723	—	—
	24			0.1520	2"		3.1/8		12	—	5997721	—	—
	23			0.1540	2"		3.1/8		12	—	5997719	—	—
5/32				0.1563	2"		3.1/8		12	5998211	—	—	—
	22			0.1570	2"		3.1/8		12	—	5997717	—	—
			4.00	0.1575		43		75	12	—	—	—	6000701
	21			0.1590	2.1/8		3.1/4		12	—	5997713	—	—
	20			0.1610	2.1/8		3.1/4		12	—	5997711	—	—
			4.10	0.1614		43		75	12	—	—	—	6000706
			4.20	0.1654		43		75	12	—	—	—	6000708
	19			0.1660	2.1/8		3.1/4		12	—	5997706	—	—
			4.25	0.1673		43		75	12	—	—	—	6000710
			4.30	0.1693		47		80	12	—	—	—	6000712
	18			0.1695	2.1/8		3.1/4		12	—	5997703	—	—
11/64				0.1719	2.1/8		3.1/4		12	5998185	—	—	—
	17			0.1730	2.3/16		3.3/8		12	—	5997700	—	—
			4.40	0.1732		47		80	12	—	—	—	6000714
			4.50	0.1772		47		80	12	—	—	—	6000717
	16			0.1770	2.3/16		3.3/8		12	—	5997697	—	—
	15			0.1800	2.3/16		3.3/8		12	—	5997695	—	—
	14			0.1820	2.3/16		3.3/8		12	—	5997692	—	—
			4.70	0.1850		47		80	12	—	—	—	6000720
	13			0.1850	2.5/16		3.1/2		12	—	5997689	—	—
3/16				0.1875	2.5/16		3.1/2		12	5998176	—	—	—
			4.80	0.1890		52		86	12	—	—	—	6000723
	12			0.1890	2.5/16		3.1/2		12	—	5997683	—	—
	11			0.1910	2.5/16		3.1/2		12	—	5997680	—	—
	10			0.1935	2.7/16		3.5/8		12	—	5997678	—	—
	9			0.1960	2.7/16		3.5/8		12	—	5997851	—	—
			5.00	0.1969		52		86	12	—	—	—	6000726
	8			0.1990	2.7/16		3.5/8		12	—	5997845	—	—
			5.10	0.2008		52		86	12	—	—	—	6000729
	7			0.2010	2.7/16		3.5/8		12	—	5997810	—	—
13/64				0.2031	2.7/16		3.5/8		12	5998243	—	—	—
	6			0.2040	2.1/2		3.3/4		12	—	5997773	—	—
			5.20	0.2047		52		86	12	—	—	—	6000733
	5			0.2055	2.1/2		3.3/4		12	—	5997735	—	—
			5.25	0.2067		52		86	12	—	—	—	6000735
			5.30	0.2087		52		86	12	—	—	—	6000737
	4			0.2090	2.1/2		3.3/4		12	—	5997775	—	—
	3			0.2130	2.1/2		3.3/4		12	—	5997733	—	—
			5.50	0.2165		57		93	12	—	—	—	6000739
7/32				0.2188	2.1/2		3.3/4		12	5998222	—	—	—
			5.60	0.2205		57		93	12	—	—	—	6000741
	2			0.2210	2.5/8		3.7/8		12	—	5997709	—	—
			5.70	0.2244		57		93	12	—	—	—	6000743
	1			0.2280	2.5/8		3.7/8		12	—	5997674	—	—
			5.90	0.2323		57		93	12	—	—	—	6000745
15/64		A		0.2340	2.5/8		3.7/8		12	—	—	5998992	—
				0.2344	2.5/8		3.7/8		12	5998294	—	—	—
			6.00	0.2362		57		93	12	—	—	—	6000748
		B		0.2374	2.3/4		4"		12	—	—	5998995	—
			6.10	0.2402		63		101	12	—	—	—	6000750
		C		0.2421	2.3/4		4"		12	—	—	5998999	—
			6.20	0.2441		63		101	12	—	—	—	6000753

# COBALT JOBBER DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> Inch	l <sub>1</sub> mm	Pack Qty	R10CO	R18CO	R15CO	2ACO
		D		0.2461	2.3/4		4"		12	—	—	5999003	—
			6.30	0.2480		63		101	12	—	—	—	6000759
1/4		E		0.2500	2.3/4		4"		12	5998143	—	—	—
			6.40	0.2520		63		101	12	—	—	—	6000538
			6.50	0.2559		63		101	12	—	—	—	6000570
		F		0.2571	2.7/8		4.1/8		12	—	—	5999011	—
			6.60	0.2598		63		101	12	—	—	—	6000601
		G		0.2610	2.7/8		4.1/8		12	—	—	5999019	—
			6.70	0.2638		63		101	12	—	—	—	6000643
17/64				0.2656	2.7/8		4.1/8		12	5998301	—	—	—
		H		0.2661	2.7/8		4.1/8		12	—	—	5999022	—
			6.80	0.2677		69		109	12	—	—	—	6000685
			6.90	0.2717		69		109	12	—	—	—	6000693
		I		0.2720	2.7/8		4.1/8		12	—	—	5999025	—
			7.00	0.2756		69		109	12	—	—	—	6000696
		J		0.2772	2.7/8		4.1/8		12	—	—	5999029	—
			7.10	0.2795		69		109	12	—	—	—	6000699
		K		0.2811	2.15/16		4.1/4		12	—	—	5999033	—
9/32				0.2813	2.15/16		4.1/4		12	5998231	—	—	—
			7.20	0.2835		69		109	12	—	—	—	6000702
			7.25	0.2854		69		109	12	—	—	—	6000542
			7.30	0.2874		69		109	12	—	—	—	6000545
		L		0.2902	2.15/16		4.1/4		12	—	—	5999036	—
		M		0.2949	3.1/16		4.3/8		12	—	—	5999040	—
			7.50	0.2953		69		109	12	—	—	—	6000548
19/64				0.2969	3.1/16		4.3/8		12	5998148	—	—	—
		N		0.3020	3.1/16		4.3/8		12	—	—	5999044	—
			7.80	0.3071		75		117	12	—	—	—	6000551
			7.90	0.3110		75		117	12	—	—	—	6000553
5/16				0.3125	3.3/16		4.1/2		6	5998209	—	—	—
			8.00	0.3150		75		117	6	—	—	—	6000556
		O		0.3161	3.3/16		4.1/2		6	—	—	5999048	—
			8.20	0.3228		75		117	6	—	—	—	6000559
		P		0.3228	3.5/16		4.5/8		6	—	—	5999051	—
21/64				0.3281	3.5/16		4.5/8		6	5998156	—	—	—
			8.40	0.3307		75		117	6	—	—	—	6000562
		Q		0.3319	3.7/16		4.3/4		6	—	—	5999059	—
			8.50	0.3346		75		117	6	—	—	—	6000564
		R		0.3390	3.7/16		4.3/4		6	—	—	5999063	—
11/32				0.3437	3.7/16		4.3/4		6	5998141	—	—	—
			8.80	0.3465		81		125	6	—	—	—	6000567
		S		0.3480	3.1/2		4.7/8		6	—	—	5999066	—
			8.90	0.3504		81		125	6	—	—	—	6000573
			9.00	0.3543		81		125	6	—	—	—	6000576
		T		0.3580	3.1/2		4.7/8		6	—	—	5999069	—
			9.10	0.3583		81		125	6	—	—	—	6000577
23/64				0.3594	3.1/2		4.7/8		6	5998160	—	—	—
			9.20	0.3622		81		125	6	—	—	—	6000581
			9.30	0.3661		81		125	6	—	—	—	6000583
		U		0.3680	3.5/8		5"		6	—	—	5999072	—
			9.40	0.3701		81		125	6	—	—	—	6000586
			9.50	0.3740		81		125	6	—	—	—	6000589
3/8				0.3750	3.5/8		5"		6	5998188	—	—	—
		V		0.3772	3.5/8		5"		6	—	—	5999075	—
			9.60	0.3780		87		133	6	—	—	—	6000592
			9.70	0.3819		87		133	6	—	—	—	6000595
			9.80	0.3858		87		133	6	—	—	—	6000598
		W		0.3858	3.3/4		5.1/8		6	—	—	5999078	—
25/64				0.3906	3.3/4		5.1/8		6	5998164	—	—	—
			10.00	0.3937		87		133	6	—	—	—	5999696
		X		0.3969	3.3/4		5.1/8		6	—	—	5999081	—
			10.20	0.4016		87		133	6	—	—	—	5999699
		Y		0.4039	3.7/8		5.1/4		6	—	—	5999084	—
13/32				0.4063	3.7/8		5.1/4		6	5998213	—	—	—
		Z		0.4130	3.7/8		5.1/4		6	—	—	5999087	—

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> Inch	l <sub>1</sub> mm	Pack Qty	R10CO	R18CO	R15CO	2ACO
			10.50	0.4134		87		133	6	—	—	—	5999705
27/64				0.4219	3.15/16		5.3/8		6	5998168	—	—	—
			10.80	0.4252		94		142	6	—	—	—	5999708
			11.00	0.4331		94		142	6	—	—	—	5999711
7/16				0.4375	4.1/16		5.1/2		6	5998220	—	—	—
			11.20	0.4409		94		142	6	—	—	—	5999714
			11.50	0.4528		94		142	6	—	—	—	5999721
29/64				0.4531	4.3/16		5.5/8		6	5998172	—	—	—
			11.80	0.4646		94		142	6	—	—	—	6000617
15/32				0.4687	4.5/16		5.3/4		6	5998286	—	—	—
			12.00	0.4724		101		151	6	—	—	—	6000665
			12.20	0.4803		101		151	6	—	—	—	6000704
31/64				0.4844	4.3/8		5.7/8		6	5998191	—	—	—
			12.50	0.4921		101		151	6	—	—	—	6000731
1/2				0.5000	4.1/2		6"		6	5998136	—	—	—
			13.00	0.5118		101		151	1	—	—	—	6000756
33/64				0.5156	4.13/16		6.5/8		1	5998195	—	—	—
17/32				0.5313	4.13/16		6.5/8		1	5998298	—	—	—
35/64				0.5469	4.13/16		6.5/8		1	5998198	—	—	—
9/16				0.5625	4.13/16		6.5/8		1	5998228	—	—	—
37/64				0.5781	4.13/16		6.5/8		1	5998201	—	—	—
19/32				0.5937	5.3/16		7.1/8		1	5998305	—	—	—
39/64				0.6094	5.3/16		7.1/8		1	5998203	—	—	—
5/8				0.6250	5.3/16		7.1/8		1	5998217	—	—	—
41/64				0.6406	5.3/16		7.1/8		1	5998205	—	—	—
21/32				0.6563	5.3/16		7.1/8		1	5998152	—	—	—
43/64				0.6719	5.5/8		7.5/8		1	5998207	—	—	—
11/16				0.6875	5.5/8		7.5/8		1	5998158	—	—	—

# COBALT JOBBER DRILL

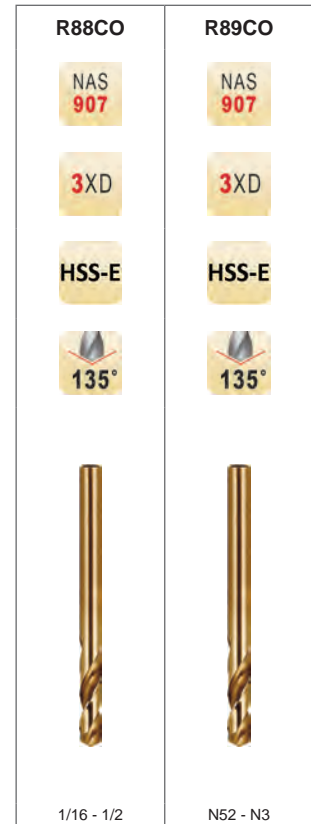


## Heavy Duty Jobber Length (NAS 907 Type D)

**R88CO** - Fractional Sizes

**R89CO** - Wire Gauge Sizes

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



$d_1$ Ø Inch	$d_1$ 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	6000151	—
	52	0.0635	7/16	1.7/8	12	—	6000044
	51	0.0670	1/2	2"	12	—	6000011
	50	0.0700	1/2	2"	12	—	5999977
	49	0.0730	1/2	2"	12	—	5999855
5/64		0.0781	1/2	2"	12	5999756	—
	46	0.0810	9/16	2.1/8	12	—	5999850
	45	0.0820	9/16	2.1/8	12	—	5999846
	44	0.0860	9/16	2.1/8	12	—	5999844
	43	0.0890	5/8	2.1/4	12	—	5999839
	42	0.0935	5/8	2.1/4	12	—	5999836
3/32		0.0938	5/8	2.1/4	12	5999740	—
	41	0.0960	5/8	2.3/8	12	—	5999832
	40	0.0980	13/16	2.3/8	12	—	5999829
	39	0.0995	13/16	2.3/8	12	—	5999826
	36	0.1065	13/16	2.1/2	12	—	5999824
7/64		0.1094	13/16	2.5/8	12	5999767	—
	31	0.1200	7/8	2.3/4	12	—	5999818
1/8		0.1250	7/8	2.3/4	12	6000163	—
	30	0.1285	15/16	2.3/4	12	—	5999815
	29	0.1360	15/16	2.7/8	12	—	5999808
9/64		0.1406	15/16	2.7/8	12	5999774	—
	27	0.1440	1"	3"	12	—	5999806
	26	0.1470	1"	3"	12	—	5999803
	25	0.1495	1"	3"	12	—	5999801
	24	0.1520	1"	3.1/8	12	—	5999799
5/32		0.1563	1"	3.1/8	12	5999752	—
	22	0.1570	1.1/16	3.1/8	12	—	5999797
	21	0.1590	1.1/16	3.1/4	12	—	5999795
	20	0.1610	1.1/16	3.1/4	12	—	5999790
11/64		0.1719	1.1/16	3.1/4	12	6000176	—
	16	0.1770	1.1/8	3.3/8	12	—	5999788
	13	0.1850	1.1/8	3.1/2	12	—	5999785



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R88CO	R89CO
3/16		0.1875	1.1/8	3.1/2	12	5999738	—
	12	0.1890	1.1/8	3.1/2	12	—	5999782
	11	0.1910	1.3/16	3.1/2	12	—	5999779
	10	0.1935	1.3/16	3.5/8	12	—	5999775
	9	0.1960	1.3/16	3.5/8	12	—	6000120
	8	0.1990	1.3/16	3.5/8	12	—	6000115
	7	0.2010	1.3/16	3.5/8	12	—	6000109
13/64		0.2031	1.3/16	3.5/8	12	5999763	—
	6	0.2040	1.1/4	3.3/4	12	—	6000073
	5	0.2055	1.1/4	3.3/4	12	—	5999863
	3	0.2130	1.1/4	3.3/4	12	—	5999812
7/32		0.2188	1.1/4	3.3/4	12	5999765	—
15/64		0.2344	1.5/16	3.7/8	12	5999821	—
1/4		0.2500	1.3/8	4"	12	6000159	—
17/64		0.2656	1.7/16	4.1/8	12	5999859	—
9/32		0.2813	1.1/2	4.1/4	12	5999771	—
19/64		0.2969	1.9/16	4.3/8	12	5999867	—
5/16		0.3125	1.5/8	4.1/2	6	5999749	—
21/64		0.3281	1.11/16	4.5/8	6	5999874	—
11/32		0.3437	1.11/16	4.3/4	6	6000167	—
23/64		0.3594	1.3/4	4.7/8	6	5999879	—
3/8		0.3750	1.13/16	5"	6	5999744	—
25/64		0.3906	1.7/8	5.1/8	6	5999883	—
13/32		0.4063	1.15/16	5.1/4	6	5999720	—
27/64		0.4219	2"	5.3/8	6	5999727	—
7/16		0.4375	2.1/16	5.1/2	6	5999762	—
29/64		0.4531	2.1/8	5.5/8	6	5999731	—
15/32		0.4687	2.1/8	5.3/4	6	5999792	—
31/64		0.4844	2.3/16	5.7/8	6	5999746	—
1/2		0.5000	2.1/4	6"	6	6000155	—

# SCREW MACHINE DRILL



## General Purpose Screw Machine Length

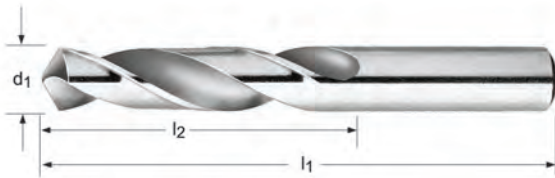
\* Sets Available on pg. 236

**R40** - Fractional Sizes

**R41** - Wire Gauge Sizes

**R42** - Letter Sizes

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



1) Sizes 45/64 and larger are steam tempered

2) 1" reduced shank

3) 1-1/4" reduced shank

4) 1-1/2" reduced shank

R40	R41	R42
ANSI	ANSI	ANSI
2.5XD	2.5XD	2.5XD
HSS	HSS	HSS
118°	118°	118°
3/64 - 2"	N60 - N1	A - Z

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R40	R41	R42
	60		0.0400	1/2	1.3/8	12	—	5999309	—
	59		0.0410	1/2	1.3/8	12	—	5999301	—
	58		0.0420	1/2	1.3/8	12	—	5999297	—
	57		0.0430	1/2	1.3/8	12	—	5999293	—
	56		0.0465	1/2	1.3/8	12	—	5999289	—
3/64			0.0469	1/2	1.3/8	12	5998475	—	—
	55		0.0520	5/8	1.5/8	12	—	5999285	—
	54		0.0550	5/8	1.5/8	12	—	5999281	—
	53		0.0595	5/8	1.5/8	12	—	5999277	—
1/16			0.0625	5/8	1.5/8	12	5998567	—	—
	52		0.0635	11/16	1.11/16	12	—	5999268	—
	51		0.0670	11/16	1.11/16	12	—	5999264	—
	50		0.0700	11/16	1.11/16	12	—	5999260	—
	49		0.0730	11/16	1.11/16	12	—	5999253	—
	48		0.0760	11/16	1.11/16	12	—	5999249	—
5/64			0.0781	11/16	1.11/16	12	5998532	—	—
	47		0.0785	11/16	1.11/16	12	—	5999245	—
	46		0.0810	3/4	1.3/4	12	—	5999241	—
	45		0.0820	3/4	1.3/4	12	—	5999237	—
	44		0.0860	3/4	1.3/4	12	—	5999233	—
	43		0.0890	3/4	1.3/4	12	—	5999420	—
	42		0.0935	3/4	1.3/4	12	—	5999417	—
3/32			0.0938	3/4	1.3/4	12	5998638	—	—
	41		0.0960	13/16	1.13/16	12	—	5999414	—
	40		0.0980	13/16	1.13/16	12	—	5999411	—
	39		0.0995	13/16	1.13/16	12	—	5999357	—
	38		0.1015	13/16	1.13/16	12	—	5999315	—
	37		0.1040	13/16	1.13/16	12	—	5999273	—
	36		0.1065	13/16	1.13/16	12	—	5999227	—
7/64			0.1094	13/16	1.13/16	12	5998576	—	—
	35		0.1100	7/8	1.7/8	12	—	5998883	—
	34		0.1110	7/8	1.7/8	12	—	5998875	—
	33		0.1130	7/8	1.7/8	12	—	5998872	—
	32		0.1160	7/8	1.7/8	12	—	5998868	—
	31		0.1200	7/8	1.7/8	12	—	5998865	—

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R40	R41	R42
1/8			0.1250	7/8	1.7/8	12	5998575	—	—
	30		0.1285	15/16	1.15/16	12	—	5998862	—
	29		0.1360	15/16	1.15/16	12	—	5998855	—
	28		0.1405	15/16	1.15/16	12	—	5998852	—
9/64			0.1406	15/16	1.15/16	12	5998592	—	—
	27		0.1440	1"	2.1/16	12	—	5998849	—
	26		0.1470	1"	2.1/16	12	—	5998846	—
	25		0.1495	1"	2.1/16	12	—	5998839	—
	24		0.1520	1"	2.1/16	12	—	5998836	—
	23		0.1540	1"	2.1/16	12	—	5998833	—
5/32			0.1563	1"	2.1/16	12	5998527	—	—
	22		0.1570	1.1/16	2.1/8	12	—	5998830	—
	21		0.1590	1.1/16	2.1/8	12	—	5998826	—
	20		0.1610	1.1/16	2.1/8	12	—	5998823	—
	19		0.1660	1.1/16	2.1/8	12	—	5998817	—
	18		0.1695	1.1/16	2.1/8	12	—	5998813	—
11/64			0.1719	1.1/16	2.1/8	12	5998587	—	—
	17		0.1730	1.1/8	2.3/16	12	—	5998807	—
	16		0.1770	1.1/8	2.3/16	12	—	5998801	—
	15		0.1800	1.1/8	2.3/16	12	—	5998797	—
	14		0.1820	1.1/8	2.3/16	12	—	5998793	—
	13		0.1850	1.1/8	2.3/16	12	—	5998789	—
3/16			0.1875	1.1/8	2.3/16	12	5998634	—	—
	12		0.1890	1.3/16	2.1/4	12	—	5998785	—
	11		0.1910	1.3/16	2.1/4	12	—	5998780	—
	10		0.1935	1.3/16	2.1/4	12	—	5998776	—
	9		0.1960	1.3/16	2.1/4	12	—	5999322	—
	8		0.1990	1.3/16	2.1/4	12	—	5999319	—
	7		0.2010	1.3/16	2.1/4	12	—	5999312	—
13/64			0.2031	1.3/16	2.1/4	12	5998608	—	—
	6		0.2040	1.1/4	2.3/8	12	—	5999305	—
	5		0.2055	1.1/4	2.3/8	12	—	5999256	—
	4		0.2090	1.1/4	2.3/8	12	—	5999405	—
	3		0.2130	1.1/4	2.3/8	12	—	5998858	—
7/32			0.2188	1.1/4	2.3/8	12	5998574	—	—
	2		0.2210	1.5/16	2.7/16	12	—	5998820	—
	1		0.2280	1.5/16	2.7/16	12	—	5998771	—
		A	0.2340	1.5/16	2.7/16	12	—	—	5999326
15/64			0.2344	1.5/16	2.7/16	12	5998619	—	—
		B	0.2374	1.3/8	2.1/2	12	—	—	5999330
		C	0.2421	1.3/8	2.1/2	12	—	—	5999334
		D	0.2461	1.3/8	2.1/2	12	—	—	5998908
1/4		E	0.2500	1.3/8	2.1/2	12	5998572	—	—
		F	0.2571	1.7/16	2.5/8	12	—	—	5998915
		G	0.2610	1.7/16	2.5/8	12	—	—	5998919
17/64			0.2656	1.7/16	2.5/8	12	5998625	—	—
		H	0.2661	1.1/2	2.11/16	12	—	—	5998923
		I	0.2720	1.1/2	2.11/16	12	—	—	5998927
		J	0.2772	1.1/2	2.11/16	12	—	—	5998932
		K	0.2811	1.1/2	2.11/16	12	—	—	5998935
9/32			0.2813	1.1/2	2.11/16	12	5998585	—	—
		L	0.2902	1.9/16	2.3/4	12	—	—	5998938
		M	0.2949	1.9/16	2.3/4	12	—	—	5998944
19/64			0.2969	1.9/16	2.3/4	12	5998633	—	—
		N	0.3020	1.5/8	2.13/16	12	—	—	5998947
5/16			0.3125	1.5/8	2.13/16	6	5998523	—	—
		O	0.3161	1.11/16	2.15/16	6	—	—	5998950
		P	0.3228	1.11/16	2.15/16	6	—	—	5998951
21/64			0.3281	1.11/16	2.15/16	6	5998645	—	—
		Q	0.3319	1.11/16	3"	6	—	—	5998953
		R	0.3390	1.11/16	3"	6	—	—	5998955
11/32			0.3437	1.11/16	3"	6	5998584	—	—
		S	0.3480	1.3/4	3.1/16	6	—	—	5998957
		T	0.3580	1.3/4	3.1/16	6	—	—	5998959
23/64			0.3594	1.3/4	3.1/16	6	5998655	—	—

# SCREW MACHINE DRILL



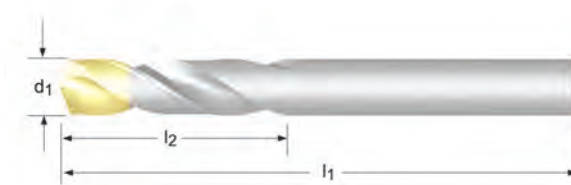
d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R40	R41	R42
		U	0.3680	1.13/16	3.1/8	6	—	—	5998961
3/8			0.3750	1.13/16	3.1/8	6	5998478	—	—
		V	0.3772	1.7/8	3.1/4	6	—	—	5998963
		W	0.3858	1.7/8	3.1/4	6	—	—	5998968
25/64			0.3906	1.7/8	3.1/4	6	5998507	—	—
		X	0.3969	1.15/16	3.5/16	6	—	—	5998970
		Y	0.4039	1.15/16	3.5/16	6	—	—	5998972
13/32			0.4063	1.15/16	3.5/16	6	5998605	—	—
		Z	0.4130	2"	3.3/8	6	—	—	5998974
27/64			0.4219	2"	3.3/8	6	5998588	—	—
7/16			0.4375	2.1/16	3.7/16	6	5998571	—	—
29/64			0.4531	2.1/8	3.9/16	6	5998631	—	—
15/32			0.4687	2.1/8	3.5/8	6	5998616	—	—
31/64			0.4844	2.3/16	3.11/16	6	5998484	—	—
1/2			0.5000	2.1/4	3.3/4	6	5998570	—	—
33/64			0.5156	2.3/8	3.7/8	1	5998487	—	—
17/32			0.5313	2.3/8	3.7/8	1	5998621	—	—
35/64			0.5469	2.1/2	4"	1	5998490	—	—
9/16			0.5625	2.1/2	4"	1	5998582	—	—
37/64			0.5781	2.5/8	4.1/8	1	5998493	—	—
19/32			0.5937	2.5/8	4.1/8	1	5998629	—	—
39/64			0.6094	2.3/4	4.1/4	1	5998496	—	—
5/8			0.6250	2.3/4	4.1/4	1	5998538	—	—
41/64			0.6406	2.7/8	4.1/2	1	5998499	—	—
21/32			0.6563	2.7/8	4.1/2	1	5998641	—	—
43/64			0.6719	2.7/8	4.5/8	1	5998503	—	—
11/16			0.6875	2.7/8	4.5/8	1	5998578	—	—
45/64			0.7031	3"	4.3/4	1	5998510 <sup>1)</sup>	—	—
23/32			0.7188	3"	4.3/4	1	5998649 <sup>1)</sup>	—	—
47/64			0.7344	3.1/8	5"	1	5998514 <sup>1)</sup>	—	—
3/4			0.7500	3.1/8	5"	1	5998644 <sup>1)</sup>	—	—
49/64			0.7656	3.1/4	5.1/8	1	5998518 <sup>1)</sup>	—	—
25/32			0.7813	3.1/4	5.1/8	1	5998471 <sup>1)</sup>	—	—
51/64			0.7969	3.3/8	5.1/4	1	5998541 <sup>1)</sup>	—	—
13/16			0.8125	3.3/8	5.1/4	1	5998602 <sup>1)</sup>	—	—
53/64			0.8281	3.1/2	5.3/8	1	5998545 <sup>1)</sup>	—	—
27/32			0.8438	3.1/2	5.3/8	1	5998553 <sup>1)</sup>	—	—
55/64			0.8594	3.1/2	5.1/2	1	5998549 <sup>1)</sup>	—	—
7/8			0.8750	3.1/2	5.1/2	1	5998579 <sup>1)</sup>	—	—
57/64			0.8906	3.5/8	5.5/8	1	5998559 <sup>1)</sup>	—	—
29/32			0.9063	3.5/8	5.5/8	1	5998624 <sup>1)</sup>	—	—
59/64			0.9219	3.3/4	5.3/4	1	5998562 <sup>1)</sup>	—	—
15/16			0.9375	3.3/4	5.3/4	1	5998611 <sup>1)</sup>	—	—
61/64			0.9531	3.7/8	5.7/8	1	5998565 <sup>1)</sup>	—	—
31/32			0.9688	3.7/8	5.7/8	1	5998481 <sup>1)</sup>	—	—
63/64			0.9844	4"	6"	1	5998568 <sup>1)</sup>	—	—
1"			1.0000	4"	6"	1	5998671 <sup>1)</sup>	—	—
1.1/16			1.0625	4"	6.1/4	1	5998505 <sup>1) 2)</sup>	—	—
1.1/8			1.1250	4"	6.3/8	1	5998517 <sup>1) 2)</sup>	—	—
1.3/16			1.1875	4.1/4	6.5/8	1	5998536 <sup>1) 2)</sup>	—	—
1.1/4			1.2500	4.3/8	6.3/4	1	5998513 <sup>1) 2)</sup>	—	—
1.5/16			1.3125	4.3/8	7"	1	5998551 <sup>1) 3)</sup>	—	—
1.3/8			1.3750	4.1/2	7.1/8	1	5998544 <sup>1) 3)</sup>	—	—
1.7/16			1.4375	4.3/4	7.3/8	1	5998558 <sup>1) 3)</sup>	—	—
1.1/2			1.5000	4.7/8	7.1/2	1	5998509 <sup>1) 3)</sup>	—	—
1.9/16			1.5625	4.7/8	7.3/4	1	5998564 <sup>1) 4)</sup>	—	—
1.5/8			1.6250	4.7/8	7.3/4	1	5998555 <sup>1) 4)</sup>	—	—
1.3/4			1.7500	5.1/8	8"	1	5998540 <sup>1) 4)</sup>	—	—
1.13/16			1.8125	5.3/8	8.1/4	1	5998526 <sup>1) 4)</sup>	—	—
1.7/8			1.8750	5.3/8	8.1/4	1	5998561 <sup>1) 4)</sup>	—	—
1.15/16			1.9375	5.5/8	8.1/2	1	5998531 <sup>1) 4)</sup>	—	—
2"			2.0000	5.5/8	8.1/2	1	5998637 <sup>1) 4)</sup>	—	—

## General Purpose Screw Machine Length

\* Sets Available on pg. 237

**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

\* 2mm and smaller are bright with no split point

$d_1$ $\varnothing h_8$ Inch	$d_1$ $\varnothing h_8$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	<b>A022</b>
	0.50	0.0197	3	20	10	5966728
	0.60	0.0236	3.5	21	10	5966732
	0.70	0.0276	4.5	23	10	5966736
1/32	0.79	0.0313	13	35	10	5967183
	0.80	0.0315	5	24	10	5966743
	0.90	0.0354	5.5	25	10	5967157
	1.00	0.0394	6	26	10	5967213
	1.10	0.0433	7	28	10	5967253
3/64	1.19	0.0469	13	35	10	5967112
	1.20	0.0472	8	30	10	5967286
	1.30	0.0512	8	30	10	5967324
	1.40	0.0551	9	32	10	5967333
	1.50	0.0591	9	32	10	5967335
1/16	1.59	0.0625	16	41	10	5967173
	1.60	0.0630	10	34	10	5967339
	1.70	0.0669	10	34	10	5967343
	1.80	0.0709	11	36	10	5967166
	1.90	0.0748	11	36	10	5967169
5/64	1.98	0.0781	17	43	10	5966840
	2.00	0.0787	12	38	10	5967096
	2.10	0.0827	12	38	10	5967118
	2.20	0.0866	13	40	10	5967140
	2.25	0.0886	13	40	10	5967179
	2.30	0.0906	13	40	10	5967189
3/32	2.38	0.0937	20	45	10	5967110
	2.40	0.0945	14	43	10	5967194
	2.50	0.0984	14	43	10	5967200
	2.60	0.1024	14	43	10	5967206
	2.65	0.1043	14	43	10	5967064
	2.70	0.1063	16	46	10	5967068
7/64	2.78	0.1094	22	47	10	5966875
	2.80	0.1102	16	46	10	5967073
	2.90	0.1142	16	46	10	5967076

# 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	5967079
	3.10	0.1220	18	49	10	5967081
1/8	3.18	0.1250	23	49	10	5967193
	3.20	0.1260	18	49	10	5967083
	3.25	0.1280	18	49	10	5967087
	3.30	0.1299	18	49	10	5967090
	3.40	0.1339	20	52	10	5967093
	3.50	0.1378	20	52	10	5967098
9/64	3.57	0.1406	25	50	10	5966963
	3.60	0.1417	20	52	10	5967100
	3.70	0.1457	20	52	10	5967102
	3.80	0.1496	22	55	10	5967104
	3.90	0.1535	22	55	10	5967106
5/32	3.97	0.1563	26	53	10	5967184
	4.00	0.1575	22	55	10	5967116
	4.10	0.1614	22	55	10	5967120
	4.20	0.1654	22	55	10	5967122
	4.30	0.1693	24	58	10	5967124
11/64	4.37	0.1719	28	55	10	5967277
	4.40	0.1732	24	58	10	5967126
	4.50	0.1772	24	58	10	5967128
	4.60	0.1811	24	58	10	5967130
	4.70	0.1850	24	58	10	5967132
3/16	4.76	0.1875	30	57	10	5967108
	4.80	0.1890	26	62	10	5967134
	4.90	0.1929	26	62	10	5967136
	5.00	0.1969	26	62	10	5967138
	5.10	0.2008	26	62	10	5967142
13/64	5.16	0.2031	31	58	10	5967305
	5.20	0.2047	26	62	10	5967144
	5.30	0.2087	26	62	10	5967147
	5.40	0.2126	28	66	10	5967149
	5.50	0.2165	28	66	10	5967153
7/32	5.56	0.2188	33	61	10	5966873
	5.60	0.2205	28	66	10	5967158
	5.70	0.2244	28	66	10	5967162
	5.80	0.2283	28	66	10	5967167
	5.90	0.2323	28	66	10	5967170
15/64	5.95	0.2344	34	63	10	5967329
	6.00	0.2362	28	66	10	5966885
	6.10	0.2402	31	70	10	5966921
	6.20	0.2441	31	70	10	5966972
	6.30	0.2480	31	70	10	5966981
1/4	6.35	0.2500	36	65	10	5967188
	6.40	0.2520	31	70	10	5966985
	6.50	0.2559	31	70	10	5966989
	6.60	0.2598	31	70	10	5966993
	6.70	0.2638	31	70	10	5966843
	6.80	0.2677	34	74	10	5966845
	6.90	0.2717	34	74	10	5966847
	7.00	0.2756	34	74	10	5966849
	7.10	0.2795	34	74	10	5966851
9/32	7.14	0.2813	40	70	10	5966960
	7.20	0.2835	34	74	10	5966853
	7.30	0.2874	34	74	10	5966855
	7.40	0.2913	34	74	10	5966857
	7.50	0.2953	34	74	10	5966859
	7.60	0.2992	37	79	10	5966861
	7.70	0.3031	37	79	10	5966865
	7.80	0.3071	37	79	10	5966867
	7.90	0.3110	37	79	10	5966869
5/16	7.94	0.3125	43	73	10	5967176
	8.00	0.3150	37	79	10	5966877
	8.10	0.3189	37	79	10	5966879
	8.20	0.3228	37	79	10	5966881

$d_1$ $\varnothing_{h_8}$ Inch	$d_1$ $\varnothing_{h_8}$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	A022
	8.30	0.3268	37	79	10	5966883
	8.40	0.3307	37	79	10	5966887
	8.50	0.3346	37	79	10	5966889
	8.60	0.3386	40	84	10	5966891
	8.70	0.3425	40	84	10	5966893
11/32	8.73	0.3438	45	78	10	5967274
	8.80	0.3465	40	84	10	5966896
	8.90	0.3504	40	84	10	5966899
	9.00	0.3543	40	84	10	5966902
	9.10	0.3583	40	84	10	5966906
	9.20	0.3622	40	84	10	5966911
	9.30	0.3661	40	84	10	5966916
	9.40	0.3701	40	84	10	5966926
	9.50	0.3740	40	84	10	5966931
3/8	9.52	0.3750	48	81	10	5967114
	9.60	0.3780	43	89	10	5966934
	9.70	0.3819	43	89	10	5966939
	9.80	0.3858	43	89	10	5966944
	9.90	0.3898	43	89	10	5966949
	10.00	0.3937	43	89	10	5967198
	10.10	0.3976	43	89	5	5967207
	10.20	0.4016	43	89	5	5967211
	10.30	0.4055	43	89	5	5967217
13/32	10.32	0.4062	51	86	5	5967302
	10.40	0.4094	43	89	5	5967221
	10.50	0.4134	43	89	5	5967224
	10.60	0.4173	43	89	5	5967228
	10.70	0.4213	47	95	5	5967233
	10.80	0.4252	47	95	5	5967238
	10.90	0.4291	47	95	5	5967241
	11.00	0.4331	47	95	5	5967244
	11.10	0.4370	47	95	5	5967248
7/16	11.11	0.4375	54	89	5	5966871
	11.20	0.4409	47	95	5	5967250
	11.30	0.4449	47	95	5	5967256
	11.50	0.4528	47	95	5	5967259
	11.60	0.4567	47	95	5	5967262
	11.70	0.4606	47	95	5	5967265
	11.80	0.4646	47	95	5	5967268
	11.90	0.4685	51	102	5	5967271
	12.00	0.4724	51	102	5	5967280
	12.10	0.4764	51	102	5	5967283
	12.20	0.4803	51	102	5	5967289
	12.50	0.4921	51	102	5	5967292
1/2	12.70	0.5000	60	98	5	5967178
	13.00	0.5118	51	102	5	5967295
	13.50	0.5315	54	107	1	5967298
	14.00	0.5512	54	107	1	5967309
9/16	14.29	0.5625	67	105	1	5966956
	14.50	0.5709	56	111	1	5967313
	15.00	0.5906	56	111	1	5967316
	15.50	0.6102	58	115	1	5967319
5/8	15.88	0.6250	73	111	1	5966863
	16.00	0.6299	58	115	1	5967059

# SCREW MACHINE DRILL



## Heavy Duty Screw Machine Length (NAS 907 Type C)

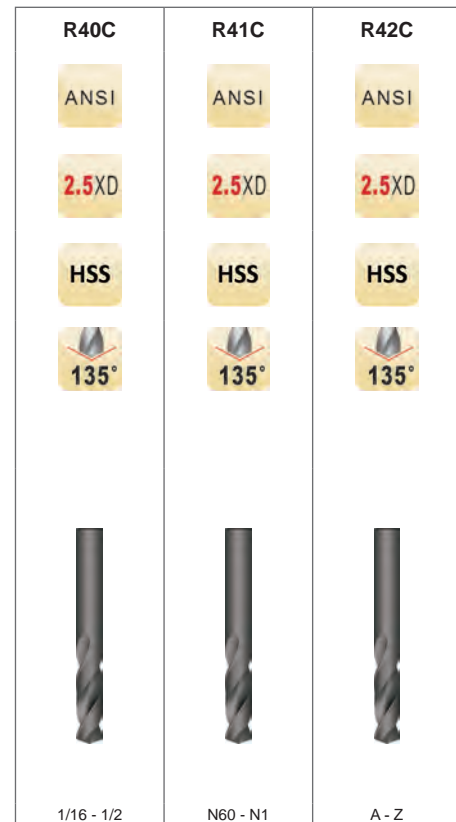
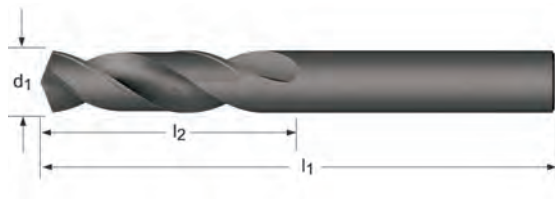
\* Sets Available on pg. 238

**R40C** - Fractional Sizes

**R41C** - Wire Gauge Sizes

**R42C** - Letter Sizes

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



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø 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	—	5998673 <sup>1)</sup>	—
	59		0.0410	1/2	1.3/8	12	—	5998665 <sup>1)</sup>	—
	58		0.0420	1/2	1.3/8	12	—	5998661 <sup>1)</sup>	—
	57		0.0430	1/2	1.3/8	12	—	5998657 <sup>1)</sup>	—
	56		0.0465	1/2	1.3/8	12	—	5998651 <sup>1)</sup>	—
	55		0.0520	5/8	1.5/8	12	—	5998647 <sup>1)</sup>	—
	54		0.0550	5/8	1.5/8	12	—	5998642 <sup>1)</sup>	—
	53		0.0595	5/8	1.5/8	12	—	5998635 <sup>1)</sup>	—
1/16			0.0625	5/8	1.5/8	12	5999397	—	—
	52		0.0635	11/16	1.11/16	12	—	5998630	—
	51		0.0670	11/16	1.11/16	12	—	5998626	—
	50		0.0700	11/16	1.11/16	12	—	5998623	—
	49		0.0730	11/16	1.11/16	12	—	5998615	—
	48		0.0760	11/16	1.11/16	12	—	5998612	—
5/64			0.0781	11/16	1.11/16	12	5999447	—	—
	47		0.0785	11/16	1.11/16	12	—	5998610	—
	46		0.0810	3/4	1.3/4	12	—	5998607	—
	45		0.0820	3/4	1.3/4	12	—	5998604	—
	44		0.0860	3/4	1.3/4	12	—	5998598	—
	43		0.0890	3/4	1.3/4	12	—	5998594	—
	42		0.0935	3/4	1.3/4	12	—	5998591	—
3/32			0.0938	3/4	1.3/4	12	5999441	—	—
	41		0.0960	13/16	1.13/16	12	—	5998589	—
	40		0.0980	13/16	1.13/16	12	—	5998586	—
	39		0.0995	13/16	1.13/16	12	—	5998580	—
	38		0.1015	13/16	1.13/16	12	—	5998577	—
	37		0.1040	13/16	1.13/16	12	—	5998573	—
	36		0.1065	13/16	1.13/16	12	—	5998569	—
7/64			0.1094	13/16	1.13/16	12	5999450	—	—
	35		0.1100	7/8	1.7/8	12	—	5998563	—
	34		0.1110	7/8	1.7/8	12	—	5998560	—

<sup>1)</sup> Not Split Point



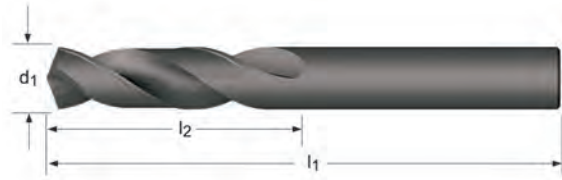
d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R40C	R41C	R42C
	33		0.1130	7/8	1.7/8	12	—	5998557	—
	32		0.1160	7/8	1.7/8	12	—	5998554	—
	31		0.1200	7/8	1.7/8	12	—	5998550	—
1/8			0.1250	7/8	1.7/8	12	5999409	—	—
	30		0.1285	15/16	1.15/16	12	—	5998547	—
	29		0.1360	15/16	1.15/16	12	—	5998537	—
	28		0.1405	15/16	1.15/16	12	—	5998533	—
9/64			0.1406	15/16	1.15/16	12	5999452	—	—
	27		0.1440	1"	2.1/16	12	—	5998528	—
	26		0.1470	1"	2.1/16	12	—	5998697	—
	25		0.1495	1"	2.1/16	12	—	5998694	—
	24		0.1520	1"	2.1/16	12	—	5998691	—
	23		0.1540	1"	2.1/16	12	—	5998688	—
5/32			0.1563	1"	2.1/16	12	5999446	—	—
	22		0.1570	1.1/16	2.1/8	12	—	5998682	—
	21		0.1590	1.1/16	2.1/8	12	—	5998639	—
	20		0.1610	1.1/16	2.1/8	12	—	5998601	—
	19		0.1660	1.1/16	2.1/8	12	—	5998521	—
	18		0.1695	1.1/16	2.1/8	12	—	5998628	—
11/64			0.1719	1.1/16	2.1/8	12	5999415	—	—
	17		0.1730	1.1/8	2.3/16	12	—	5998620	—
	16		0.1770	1.1/8	2.3/16	12	—	5998617	—
	15		0.1800	1.1/8	2.3/16	12	—	5998613	—
	14		0.1820	1.1/8	2.3/16	12	—	5998609	—
	13		0.1850	1.1/8	2.3/16	12	—	5998606	—
3/16			0.1875	1.1/8	2.3/16	12	5999440	—	—
	12		0.1890	1.3/16	2.1/4	12	—	5998603	—
	11		0.1910	1.3/16	2.1/4	12	—	5998600	—
	10		0.1935	1.3/16	2.1/4	12	—	5998597	—
	9		0.1960	1.3/16	2.1/4	12	—	5998685	—
	8		0.1990	1.3/16	2.1/4	12	—	5998679	—
	7		0.2010	1.3/16	2.1/4	12	—	5998676	—
13/64			0.2031	1.3/16	2.1/4	12	5999421	—	—
	6		0.2040	1.1/4	2.3/8	12	—	5998669	—
	5		0.2055	1.1/4	2.3/8	12	—	5998618	—
	4		0.2090	1.1/4	2.3/8	12	—	5998583	—
	3		0.2130	1.1/4	2.3/8	12	—	5998543	—
7/32			0.2188	1.1/4	2.3/8	12	5999449	—	—
	2		0.2210	1.5/16	2.7/16	12	—	5998566	—
	1		0.2280	1.5/16	2.7/16	12	—	5998595	—
		A	0.2340	1.5/16	2.7/16	12	—	—	5999338
15/64			0.2344	1.5/16	2.7/16	12	5999425	—	—
		B	0.2380	1.3/8	2.1/2	12	—	—	5999342
		C	0.2420	1.3/8	2.1/2	12	—	—	5999346
		D	0.2460	1.3/8	2.1/2	12	—	—	5999350
1/4			0.2500	1.3/8	2.1/2	12	5999406	—	—
		E	0.2500	1.3/8	2.1/2	12	—	—	—
		F	0.2570	1.7/16	2.5/8	12	—	—	5999362
		G	0.2610	1.7/16	2.5/8	12	—	—	5999367
17/64			0.2656	1.7/16	2.5/8	12	5999427	—	—
		H	0.2660	1.1/2	2.11/16	12	—	—	5999373
		I	0.2720	1.1/2	2.11/16	12	—	—	5999377
		J	0.2770	1.1/2	2.11/16	12	—	—	5999381
		K	0.2810	1.1/2	2.11/16	12	—	—	5999386
9/32			0.2813	1.1/2	2.11/16	12	5999451	—	—
		L	0.2900	1.9/16	2.3/4	12	—	—	5999390
		M	0.2950	1.9/16	2.3/4	12	—	—	5999395
19/64			0.2969	1.9/16	2.3/4	12	5999429	—	—
		N	0.3020	1.5/8	2.13/16	12	—	—	5999398
5/16			0.3125	1.5/8	2.13/16	6	5999444	—	—
		O	0.3160	1.11/16	2.15/16	6	—	—	5999402
		P	0.3230	1.11/16	2.15/16	6	—	—	5999408
21/64			0.3281	1.11/16	2.15/16	6	5999433	—	—
		Q	0.3320	1.11/16	3"	6	—	—	5998896
		R	0.3390	1.11/16	3"	6	—	—	5998941
11/32			0.3437	1.11/16	3"	6	5999412	—	—

# SCREW MACHINE DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R40C	R41C	R42C
		S	0.3480	1.3/4	3.1/16	6	—	—	5998965
		T	0.3580	1.3/4	3.1/16	6	—	—	5998994
23/64			0.3594	1.3/4	3.1/16	6	5999435	—	—
		U	0.3680	1.13/16	3.1/8	6	—	—	5999038
3/8			0.3750	1.13/16	3.1/8	6	5999442	—	—
		V	0.3770	1.7/8	3.1/4	6	—	—	5999047
		W	0.3860	1.7/8	3.1/4	6	—	—	5999052
25/64			0.3906	1.7/8	3.1/4	6	5999437	—	—
		X	0.3970	1.15/16	3.5/16	6	—	—	5999056
		Y	0.4040	1.15/16	3.5/16	6	—	—	5999060
13/32			0.4063	1.15/16	3.5/16	6	5999418	—	—
		Z	0.4130	2"	3.3/8	6	—	—	5998903
27/64			0.4219	2"	3.3/8	6	5999438	—	—
7/16			0.4375	2.1/16	3.7/16	6	5999448	—	—
29/64			0.4531	2.1/8	3.9/16	6	5999439	—	—
15/32			0.4687	2.1/8	3.5/8	6	5999423	—	—
31/64			0.4844	2.3/16	3.11/16	6	5999443	—	—
1/2			0.5000	2.1/4	3.3/4	6	5999400	—	—

**4ASM** Low thrust design self centering Split Point for easier penetration. Steam tempered 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	6000967 <sup>1)</sup>
1.25	0.0492	8	30	12	6000969 <sup>1)</sup>
1.30	0.0512	8	30	12	6000971 <sup>1)</sup>
1.65	0.0650	11	34	12	6000973
2.00	0.0787	12	38	12	6001002
2.30	0.0906	13	40	12	6001010
2.40	0.0945	14	43	12	6000362
2.50	0.0984	14	43	12	6000414
3.00	0.1181	16	46	12	6000456
3.10	0.1220	18	49	12	6000483
3.20	0.1260	18	49	12	6000514
3.30	0.1299	18	49	12	6000521
3.40	0.1339	20	52	12	6000524
3.50	0.1378	20	52	12	6000527
3.70	0.1457	20	52	12	6000531
4.00	0.1575	22	55	12	6000368
4.20	0.1654	22	55	12	6000373
4.50	0.1772	24	58	12	6000379
5.00	0.1969	26	62	12	6000384
5.50	0.2165	28	66	12	6000388
5.70	0.2244	28	66	12	6000392
5.80	0.2283	28	66	12	6000396
6.00	0.2362	28	66	12	6000400
6.20	0.2441	31	70	12	6000406
6.40	0.2520	31	70	12	6000410
6.50	0.2559	31	70	12	6000418
6.60	0.2598	31	70	12	6000422
6.80	0.2677	34	74	12	6000426
6.90	0.2717	34	74	12	6000431
7.00	0.2756	34	74	12	6000437
7.20	0.2835	34	74	12	6000441
7.50	0.2953	37	79	12	6000444

<sup>1)</sup> Not Split Point

# SCREW MACHINE DRILL



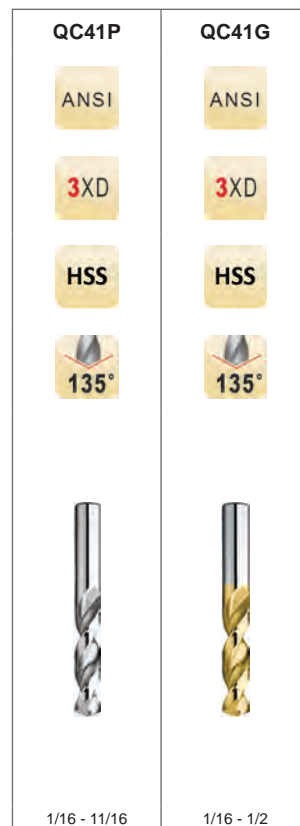
<b>d<sub>1</sub></b> <b>Ø</b> <b>mm</b>	<b>d<sub>1</sub></b> <b>decimal</b> <b>Inch</b>	<b>l<sub>2</sub></b> <b>mm</b>	<b>l<sub>1</sub></b> <b>mm</b>	<b>Pack</b> <b>Qty</b>	<b>4ASM</b>
8.00	0.3150	37	79	6	6000447
8.10	0.3189	37	79	6	6000450
8.40	0.3307	37	79	6	6000453
8.50	0.3346	37	79	6	6000460
8.70	0.3425	40	84	6	6000462
9.00	0.3543	40	84	6	6000464
9.10	0.3583	40	84	6	6000466
9.20	0.3622	40	84	6	6000468
9.30	0.3661	40	84	6	6000470
9.50	0.3740	40	84	6	6000472
9.70	0.3819	43	89	6	6000474
10.00	0.3937	43	89	6	6000975
10.20	0.4016	43	89	6	6000977
10.50	0.4134	43	89	6	6000981
10.80	0.4252	47	95	6	6000982
11.00	0.4331	47	95	6	6000984
11.20	0.4409	47	95	6	6000986
11.50	0.4528	47	95	6	6000988
11.80	0.4646	47	95	6	6000990
12.00	0.4724	51	102	6	6000993
12.20	0.4803	51	102	6	6000995
12.50	0.4921	51	102	6	6000997

**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.



$d_1$ 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	5997255	5996945
5/64	0.0781	11/16	1.11/16	12	5997589	5997492
3/32	0.0938	3/4	1.3/4	12	5997553	5997338
40	0.0980	13/16	1.13/16	12	5997238	5996924
39	0.0995	13/16	1.13/16	12	5997234	5996917
38	0.1015	13/16	1.13/16	12	5997231	5996912
37	0.1040	13/16	1.13/16	12	5997228	5996909
36	0.1065	13/16	1.13/16	12	5997226	5996904
7/64	0.1094	13/16	1.13/16	12	5997602	5997502
35	0.1100	7/8	1.7/8	12	5997224	5996900
34	0.1110	7/8	1.7/8	12	5997220	5996896
33	0.1130	7/8	1.7/8	12	5997218	5996889
32	0.1160	7/8	1.7/8	12	5997216	5996886
31	0.1200	7/8	1.7/8	12	5997214	5996882
1/8	0.1250	7/8	1.7/8	12	5997265	5996954
30	0.1285	15/16	1.15/16	12	5997212	5996874
29	0.1360	15/16	1.15/16	12	5997208	5996869
28	0.1405	15/16	1.15/16	12	5997206	5996865
9/64	0.1406	15/16	1.15/16	12	5997618	5997349
27	0.1440	1"	2.1/16	12	5997203	5996861
26	0.1470	1"	2.1/16	12	5997200	5996857
25	0.1495	1"	2.1/16	12	5997194	5996853
24	0.1520	1"	2.1/16	12	5997191	5996996
23	0.1540	1"	2.1/16	12	5997188	5996991
5/32	0.1563	1"	2.1/16	12	5997586	5997487
22	0.1570	1.1/16	2.1/8	12	5997185	5996989
21	0.1590	1.1/16	2.1/8	12	5997182	5996987
20	0.1610	1.1/16	2.1/8	12	5997178	5996983
19	0.1660	1.1/16	2.1/8	12	5997168	5996933
18	0.1695	1.1/16	2.1/8	12	5997163	5996892
11/64	0.1719	1.1/16	2.1/8	12	5997274	5996957
17	0.1730	1.1/8	2.3/16	12	5997158	5996846
16	0.1770	1.1/8	2.3/16	12	5997304	5997410

# SCREW MACHINE DRILL



d <sub>1</sub> Ø "/Nr.	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	QC41P	QC41G
15	0.1800	1.1/8	2.3/16	12	5997300	5997402
14	0.1820	1.1/8	2.3/16	12	5997296	5997394
13	0.1850	1.1/8	2.3/16	12	5997292	5997390
3/16	0.1875	1.1/8	2.3/16	12	5997550	5996985
12	0.1890	1.3/16	2.1/4	12	5997282	5997386
11	0.1910	1.3/16	2.1/4	12	5997247	5997382
10	0.1935	1.3/16	2.1/4	12	5997222	5997378
9	0.1960	1.3/16	2.1/4	12	5997252	5996942
8	0.1990	1.3/16	2.1/4	12	5997249	5996939
7	0.2010	1.3/16	2.1/4	12	5997245	5996936
13/64	0.2031	1.3/16	2.1/4	12	5997286	5996963
6	0.2040	1.1/4	2.3/8	12	5997243	5996930
5	0.2055	1.1/4	2.3/8	12	5997241	5996927
4	0.2090	1.1/4	2.3/8	12	5997236	5996922
3	0.2130	1.1/4	2.3/8	12	5997210	5996871
7/32	0.2188	1.1/4	2.3/8	12	5997599	5997498
2	0.2210	1.5/16	2.7/16	12	5997173	5996961
1	0.2280	1.5/16	2.7/16	12	5997197	5997375
15/64	0.2344	1.5/16	2.7/16	12	5997570	5996967
1/4	0.2500	1.3/8	2.1/2	12	5997262	5996951
17/64	0.2656	1.7/16	2.5/8	12	5997651	5996969
9/32	0.2812	1.1/2	2.11/16	12	5997615	5997345
19/64	0.2969	1.9/16	2.3/4	12	5997699	5996971
5/16	0.3125	1.5/8	2.13/16	6	5997583	5997463
21/64	0.3281	1.11/16	2.15/16	6	5997705	5996973
11/32	0.3437	1.11/16	3"	6	5997271	5996956
23/64	0.3594	1.3/4	3.1/16	6	5997707	5996975
3/8	0.3750	1.13/16	3.1/8	6	5997556	5997383
25/64	0.3906	1.7/8	3.1/4	6	5997539	5996977
13/32	0.4063	1.15/16	3.5/16	6	5997278	5996959
27/64	0.4219	2"	3.3/8	6	5997543	5996979
7/16	0.4375	2.1/16	3.7/16	6	5997595	5997495
29/64	0.4531	2.1/8	3.9/16	6	5997546	5996981
15/32	0.4687	2.1/8	3.5/8	6	5997535	5996965
31/64	0.4844	2.3/16	3.3/4	6	5997559	5997431
1/2	0.5000	2.1/4	3.3/4	6	5997259	5996948
33/64	0.5156	2.3/8	3.7/8	1	5997562	—
17/32	0.5313	2.3/8	3.7/8	1	5997606	—
35/64	0.5469	2.1/2	4"	1	5997564	—
9/16	0.5625	2.1/2	4"	1	5997610	—
37/64	0.5781	2.5/8	4.1/8	1	5997567	—
19/32	0.5937	2.5/8	4.1/8	1	5997694	—
5/8	0.6250	2.3/4	4.1/4	1	5997592	—
11/16	0.6875	2.7/8	4.5/8	1	5997268	—

## 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

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

118°



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	5971007
0.16	0.0063	1.4	25	1	10	5971119
0.17	0.0067	1.4	25	1	10	5971157
0.18	0.0070	1.4	25	1	10	5971205
0.20	0.0078	1.8	25	1	10	5971249
0.22	0.0087	1.8	25	1	10	5971292
0.25	0.0098	2.2	25	1	10	5971298
0.27	0.0106	2.2	25	1	10	5971301
0.28	0.0110	2.2	25	1	10	5971303
0.30	0.0118	2.2	25	1	10	5971306
0.35	0.0138	2.8	25	1	10	5971122
0.38	0.0150	2.8	25	1	10	5971125
0.39	0.0154	3.6	25	1	10	5971128
0.40	0.0157	3.6	25	1	10	5971131
0.45	0.0177	3.6	25	1	10	5971135
0.50	0.0197	4.0	25	1	10	5971139
0.55	0.0217	4.5	25	1	10	5971143
0.60	0.0236	4.5	25	1	10	5971148
0.62	0.0244	5.0	25	1	10	5971150
0.65	0.0256	5.0	25	1	10	5971154
0.70	0.0276	5.6	25	1	10	5971160
0.75	0.0295	5.6	25	1	10	5971163
0.80	0.0315	6.3	25	1.5	10	5971167
0.85	0.0335	6.3	25	1.5	10	5971171
0.90	0.0354	7.1	25	1.5	10	5971176
0.95	0.0374	7.1	25	1.5	10	5971181
1.00	0.0394	8.0	25	1.5	10	5971186
1.05	0.0413	8.0	25	1.5	10	5971191
1.10	0.0433	9.0	25	1.5	10	5971195
1.20	0.0472	10.0	25	1.5	10	5971200
1.30	0.0512	10.0	25	1.5	10	5971210
1.40	0.0551	11.2	25	1.5	10	5971214

## Heavy Duty Screw Machine Length

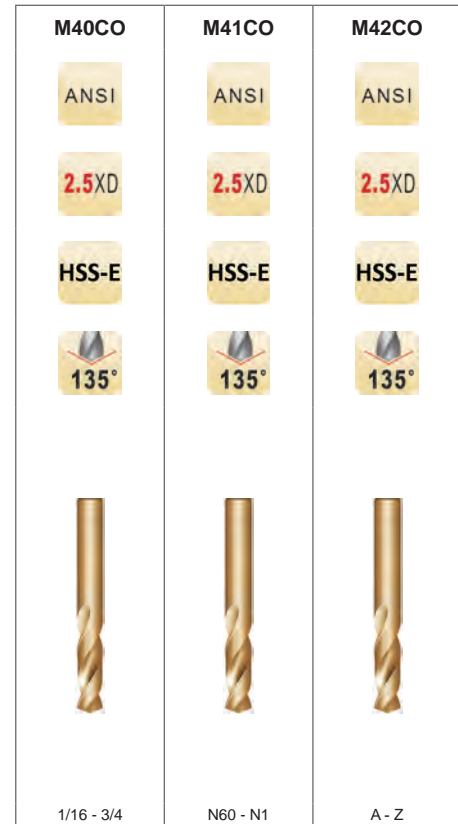
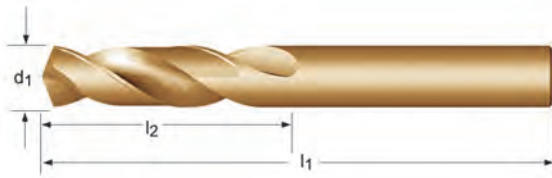
\* Sets Available on pg. 239

**M40CO** - Fractional Sizes

**M41CO** - Wire Gauge Sizes

**M42CO** - Letter Sizes

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



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø 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	—	5996169 <sup>1)</sup>	—
	59		0.0410	1/2	1.3/8	12	—	5996164 <sup>1)</sup>	—
	58		0.0420	1/2	1.3/8	12	—	5996162 <sup>1)</sup>	—
	57		0.0430	1/2	1.3/8	12	—	5996158 <sup>1)</sup>	—
	56		0.0465	1/2	1.3/8	12	—	5996154 <sup>1)</sup>	—
	55		0.0520	5/8	1.5/8	12	—	5996150 <sup>1)</sup>	—
	54		0.0550	5/8	1.5/8	12	—	5996146 <sup>1)</sup>	—
	53		0.0595	5/8	1.5/8	12	—	5996142 <sup>1)</sup>	—
1/16			0.0625	5/8	1.5/8	12	5996129	—	—
	52		0.0635	11/16	1.11/16	12	—	5996134	—
	51		0.0670	11/16	1.11/16	12	—	5996130	—
	50		0.0700	11/16	1.11/16	12	—	5996126	—
	49		0.0730	11/16	1.11/16	12	—	5996118	—
	48		0.0760	11/16	1.11/16	12	—	5996114	—
5/64			0.0781	11/16	1.11/16	12	5995991	—	—
	47		0.0785	11/16	1.11/16	12	—	5996109	—
	46		0.0810	3/4	1.3/4	12	—	5996106	—
	45		0.0820	3/4	1.3/4	12	—	5996103	—
	44		0.0860	3/4	1.3/4	12	—	5996101	—
	43		0.0890	3/4	1.3/4	12	—	5996095	—
	42		0.0935	3/4	1.3/4	12	—	5996091	—
3/32			0.0938	3/4	1.3/4	12	5995958	—	—
	41		0.0960	13/16	1.13/16	12	—	5996089	—
	40		0.0980	13/16	1.13/16	12	—	5996085	—
	39		0.0995	13/16	1.13/16	12	—	5996079	—
	38		0.1015	13/16	1.13/16	12	—	5996076	—
	37		0.1040	13/16	1.13/16	12	—	5996073	—
	36		0.1065	13/16	1.13/16	12	—	5996069	—
7/64			0.1094	13/16	1.13/16	12	5996005	—	—
	35		0.1100	7/8	1.7/8	12	—	5996065	—
	34		0.1110	7/8	1.7/8	12	—	5996057	—
	33		0.1130	7/8	1.7/8	12	—	5996052	—

<sup>1)</sup> Not Split Point



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	M40CO	M41CO	M42CO
	32		0.1160	7/8	1.7/8	12	—	5996049	—
	31		0.1200	7/8	1.7/8	12	—	5996045	—
1/8			0.1250	7/8	1.7/8	12	5996145	—	—
	30		0.1285	15/16	1.15/16	12	—	5996041	—
	29		0.1360	15/16	1.15/16	12	—	5996031	—
	28		0.1405	15/16	1.15/16	12	—	5996027	—
9/64			0.1406	15/16	1.15/16	12	5996019	—	—
	27		0.1440	1"	2.1/16	12	—	5996021	—
	26		0.1470	1"	2.1/16	12	—	5996017	—
	25		0.1495	1"	2.1/16	12	—	5996188	—
	24		0.1520	1"	2.1/16	12	—	5996185	—
	23		0.1540	1"	2.1/16	12	—	5996183	—
5/32			0.1563	1"	2.1/16	12	5995987	—	—
	22		0.1570	1.1/16	2.1/8	12	—	5996181	—
	21		0.1590	1.1/16	2.1/8	12	—	5996175	—
	20		0.1610	1.1/16	2.1/8	12	—	5996138	—
	19		0.1660	1.1/16	2.1/8	12	—	5996061	—
	18		0.1695	1.1/16	2.1/8	12	—	5996012	—
11/64			0.1719	1.1/16	2.1/8	12	5995976	—	—
	17		0.1730	1.1/8	2.3/16	12	—	5996058	—
	16		0.1770	1.1/8	2.3/16	12	—	5996050	—
	15		0.1800	1.1/8	2.3/16	12	—	5996046	—
	14		0.1820	1.1/8	2.3/16	12	—	5996042	—
	13		0.1850	1.1/8	2.3/16	12	—	5996038	—
3/16			0.1875	1.1/8	2.3/16	12	5995954	—	—
	12		0.1890	1.3/16	2.1/4	12	—	5996034	—
	11		0.1910	1.3/16	2.1/4	12	—	5996030	—
	10		0.1935	1.3/16	2.1/4	12	—	5996026	—
	9		0.1960	1.3/16	2.1/4	12	—	5996489	—
	8		0.1990	1.3/16	2.1/4	12	—	5996178	—
	7		0.2010	1.3/16	2.1/4	12	—	5996172	—
13/64			0.2031	1.3/16	2.1/4	12	5996054	—	—
	6		0.2040	1.1/4	2.3/8	12	—	5996166	—
	5		0.2055	1.1/4	2.3/8	12	—	5996122	—
	4		0.2090	1.1/4	2.3/8	12	—	5996081	—
	3		0.2130	1.1/4	2.3/8	12	—	5996035	—
7/32			0.2188	1.1/4	2.3/8	12	5996002	—	—
	2		0.2210	1.5/16	2.7/16	12	—	5996098	—
	1		0.2280	1.5/16	2.7/16	12	—	5996023	—
		A	0.2340	1.5/16	2.7/16	12	—	—	5996525
15/64			0.2344	1.5/16	2.7/16	12	5996068	—	—
		B	0.2380	1.3/8	2.1/2	12	—	—	5996569
		C	0.2420	1.3/8	2.1/2	12	—	—	5996603
		D	0.2460	1.3/8	2.1/2	12	—	—	5996646
1/4			0.2500	1.3/8	2.1/2	12	5996137	—	—
		F	0.2570	1.7/16	2.5/8	12	—	—	5996657
		G	0.2610	1.7/16	2.5/8	12	—	—	5996661
17/64			0.2656	1.7/16	2.5/8	12	5996075	—	—
		H	0.2660	1.1/2	2.11/16	12	—	—	5996664
		I	0.2720	1.1/2	2.11/16	12	—	—	5996493
		J	0.2770	1.1/2	2.11/16	12	—	—	5996497
		K	0.2810	1.1/2	2.11/16	12	—	—	5996500
9/32			0.2813	1.1/2	2.11/16	12	5996015	—	—
		L	0.2900	1.9/16	2.3/4	12	—	—	5996503
		M	0.2950	1.9/16	2.3/4	12	—	—	5996506
19/64			0.2969	1.9/16	2.3/4	12	5995938	—	—
		N	0.3020	1.5/8	2.13/16	12	—	—	5996509
5/16			0.3125	1.5/8	2.13/16	6	5995983	—	—
		O	0.3160	1.11/16	2.15/16	6	—	—	5996512
		P	0.3230	1.11/16	2.15/16	6	—	—	5996515
21/64			0.3281	1.11/16	2.15/16	6	5995942	—	—
		Q	0.3320	1.11/16	3"	6	—	—	5996518
		R	0.3390	1.11/16	3"	6	—	—	5996521
11/32			0.3437	1.11/16	3"	6	5995956	—	—
		S	0.3480	1.3/4	3.1/16	6	—	—	5996529

# COBALT SCREW MACHINE DRILL

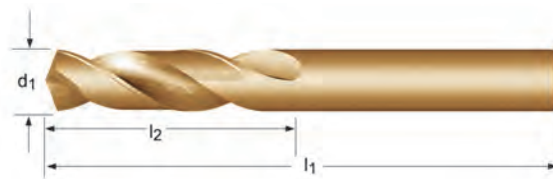


d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	M40CO	M41CO	M42CO
		T	0.3580	1.3/4	3.1/16	6	—	—	5996532
23/64			0.3594	1.3/4	3.1/16	6	5995946	—	—
		U	0.3680	1.13/16	3.1/8	6	—	—	5996536
3/8			0.3750	1.13/16	3.1/8	6	5995962	—	—
		V	0.3770	1.7/8	3.1/4	6	—	—	5996540
		W	0.3860	1.7/8	3.1/4	6	—	—	5996544
25/64			0.3906	1.7/8	3.1/4	6	5995948	—	—
		X	0.3970	1.15/16	3.5/16	6	—	—	5996548
		Y	0.4040	1.15/16	3.5/16	6	—	—	5996553
13/32			0.4063	1.15/16	3.5/16	6	5996011	—	—
		Z	0.4130	2"	3.3/8	6	—	—	5996557
27/64			0.4219	2"	3.3/8	6	5995950	—	—
7/16			0.4375	2.1/16	3.7/16	6	5995998	—	—
29/64			0.4531	2.1/8	3.9/16	6	5995952	—	—
15/32			0.4687	2.1/8	3.5/8	6	5996063	—	—
31/64			0.4844	2.3/16	3.11/16	6	5995964	—	—
1/2			0.5000	2.1/4	3.3/4	6	5996133	—	—
33/64			0.5156	2.3/8	3.7/8	1	5995966	—	—
17/32			0.5313	2.3/8	3.7/8	1	5996071	—	—
35/64			0.5469	2.1/2	4"	1	5995968	—	—
9/16			0.5625	2.1/2	4"	1	5996008	—	—
37/64			0.5781	2.5/8	4.1/8	1	5995969	—	—
19/32			0.5937	2.5/8	4.1/8	1	5995936	—	—
39/64			0.6094	2.3/4	4.1/4	1	5995970	—	—
5/8			0.6250	2.3/4	4.1/4	1	5995994	—	—
41/64			0.6406	2.7/8	4.1/2	1	5995972	—	—
21/32			0.6563	2.7/8	4.1/2	1	5995940	—	—
43/64			0.6719	2.7/8	4.5/8	1	5995974	—	—
11/16			0.6875	2.7/8	4.5/8	1	5995934	—	—
45/64			0.7031	3"	4.3/4	1	5995978	—	—
23/32			0.7188	3"	4.3/4	1	5995944	—	—
47/64			0.7344	3.1/8	5"	1	5995981	—	—
3/4			0.7500	3.1/8	5"	1	5995960	—	—

**Heavy Duty Screw Machine Length, Metric**

**4ASMCO**

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



4ASMCO

DIN  
1897

2.5XD

HSS-E

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	6001006
2.50	0.0984	14	43	12	6001014
3.00	0.1181	16	46	12	6001019
3.10	0.1220	18	49	12	6001024
3.20	0.1260	18	49	12	6001030
3.30	0.1299	18	49	12	6000870
3.40	0.1339	20	52	12	6000875
3.50	0.1378	20	52	12	6000884
3.60	0.1417	20	52	12	6000888
3.70	0.1457	20	52	12	6000893
4.00	0.1575	22	55	12	6000899
4.10	0.1614	22	55	12	6000904
4.20	0.1654	22	55	12	6000909
4.70	0.1850	24	58	12	6000914
4.80	0.1890	26	62	12	6000920
4.90	0.1929	26	62	12	6000930
5.00	0.1969	26	62	12	6000935
5.10	0.2008	26	62	12	6000940
5.50	0.2165	28	66	12	6000944
5.70	0.2244	28	66	12	6000946
6.00	0.2362	28	66	12	6000947
6.40	0.2520	31	70	12	6000950
6.50	0.2559	31	70	12	6000953
6.80	0.2677	34	74	12	6000955
7.00	0.2756	34	74	12	6000957
8.00	0.3150	37	79	6	6000960
8.50	0.3346	37	79	6	6000962
9.50	0.3740	40	84	6	6000964
9.80	0.3858	43	89	6	6000966
10.00	0.3937	43	89	6	6001166
10.20	0.4016	43	89	6	6001170
10.50	0.4134	43	89	6	6001182
11.00	0.4331	47	95	6	6000863
11.20	0.4409	47	95	6	6000925
11.50	0.4528	47	95	6	6000959
12.00	0.4724	51	102	6	6000979

# TAPER LENGTH DRILL



## General Purpose Taper Length

\* Sets Available on pg. 240

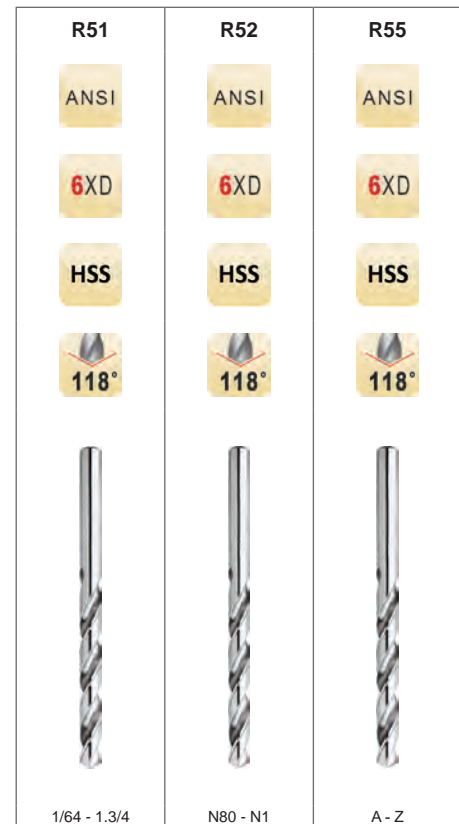
**R51** - Fractional Sizes

**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.

\* Sizes 45/64 and larger are steam tempered



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø 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	—	5999626	—
	79		0.0145	5/16	1.1/2	12	—	5999617	—
1/64			0.0156	5/16	1.1/2	12	5999668	—	—
	78		0.0160	5/16	1.1/2	12	—	5999613	—
	77		0.0180	5/16	1.1/2	12	—	5999607	—
	76		0.0200	5/16	1.1/2	12	—	5999567	—
	75		0.0210	5/16	1.1/2	12	—	5999541	—
	74		0.0225	5/16	1.1/2	12	—	5999519	—
	73		0.0240	5/16	1.1/2	12	—	5999496	—
	72		0.0250	5/16	1.1/2	12	—	6000270	—
	71		0.0260	3/4	2"	12	—	6000264	—
	70		0.0280	3/4	2"	12	—	6000262	—
	69		0.0292	3/4	2"	12	—	6000257	—
	68		0.0310	3/4	2"	12	—	6000254	—
1/32			0.0313	3/4	2"	12	5999661	—	—
	67		0.0320	3/4	2"	12	—	6000250	—
	66		0.0330	3/4	2"	12	—	6000248	—
	65		0.0350	3/4	2"	12	—	6000245	—
	64		0.0360	3/4	2"	12	—	6000242	—
	63		0.0370	3/4	2"	12	—	6000239	—
	62		0.0380	3/4	2"	12	—	6000232	—
	61		0.0390	1.1/8	2.1/4	12	—	6000229	—
	60		0.0400	1.1/8	2.1/4	12	—	6000226	—
	59		0.0410	1.1/8	2.1/4	12	—	6000221	—
	58		0.0420	1.1/8	2.1/4	12	—	6000218	—
	57		0.0430	1.1/8	2.1/4	12	—	6000215	—
	56		0.0465	1.1/8	2.1/4	12	—	6000212	—
3/64			0.0469	1.1/8	2.1/4	12	5999764	—	—
	55		0.0520	1.3/4	3"	12	—	6000209	—
	54		0.0550	1.3/4	3"	12	—	6000206	—
	53		0.0595	1.3/4	3"	12	—	6000200	—
1/16			0.0625	1.3/4	3"	12	5999654	—	—

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R51	R52	R55
	52		0.0635	2"	3.3/4	12	—	6000197	—
	51		0.0670	2"	3.3/4	12	—	6000194	—
	50		0.0700	2"	3.3/4	12	—	6000191	—
	49		0.0730	2"	3.3/4	12	—	6000183	—
	48		0.0760	2"	3.3/4	12	—	6000179	—
5/64			0.0781	2"	3.3/4	12	6000231	—	—
	47		0.0785	2.1/4	4.1/4	12	—	6000177	—
	46		0.0810	2.1/4	4.1/4	12	—	6000173	—
	45		0.0820	2.1/4	4.1/4	12	—	6000170	—
	44		0.0860	2.1/4	4.1/4	12	—	6000164	—
	43		0.0890	2.1/4	4.1/4	12	—	6000160	—
	42		0.0935	2.1/4	4.1/4	12	—	6000157	—
3/32			0.0938	2.1/4	4.1/4	12	5999759	—	—
	41		0.0960	2.1/2	4.5/8	12	—	6000153	—
	40		0.0980	2.1/2	4.5/8	12	—	6000149	—
	39		0.0995	2.1/2	4.5/8	12	—	6000141	—
	38		0.1015	2.1/2	4.5/8	12	—	6000136	—
	37		0.1040	2.1/2	4.5/8	12	—	6000132	—
	36		0.1065	2.1/2	4.5/8	12	—	6000128	—
7/64			0.1094	2.1/2	4.5/8	12	6000266	—	—
	35		0.1100	2.3/4	5.1/8	12	—	6000283	—
	34		0.1110	2.3/4	5.1/8	12	—	6000280	—
	33		0.1130	2.3/4	5.1/8	12	—	6000277	—
	32		0.1160	2.3/4	5.1/8	12	—	6000273	—
	31		0.1200	2.3/4	5.1/8	12	—	6000267	—
1/8			0.1250	2.3/4	5.1/8	12	5999672	—	—
	30		0.1285	3"	5.3/8	12	—	6000235	—
	29		0.1360	3"	5.3/8	12	—	6000168	—
	28		0.1405	3"	5.3/8	12	—	6000121	—
9/64			0.1406	3"	5.3/8	12	6000279	—	—
	27		0.1440	3"	5.3/8	12	—	5999750	—
	26		0.1470	3"	5.3/8	12	—	5999743	—
	25		0.1495	3"	5.3/8	12	—	5999741	—
	24		0.1520	3"	5.3/8	12	—	5999737	—
	23		0.1540	3"	5.3/8	12	—	5999734	—
5/32			0.1563	3"	5.3/8	12	6000228	—	—
	22		0.1570	3.3/8	5.3/4	12	—	5999730	—
	21		0.1590	3.3/8	5.3/4	12	—	5999726	—
	20		0.1610	3.3/8	5.3/4	12	—	5999723	—
	19		0.1660	3.3/8	5.3/4	12	—	5999716	—
	18		0.1695	3.3/8	5.3/4	12	—	5999712	—
11/64			0.1719	3.3/8	5.3/4	12	5999688	—	—
	17		0.1730	3.3/8	5.3/4	12	—	5999706	—
	16		0.1770	3.3/8	5.3/4	12	—	5999703	—
	15		0.1800	3.3/8	5.3/4	12	—	5999701	—
	14		0.1820	3.3/8	5.3/4	12	—	5999697	—
	13		0.1850	3.3/8	5.3/4	12	—	5999693	—
3/16			0.1875	3.3/8	5.3/4	12	5999757	—	—
	12		0.1890	3.5/8	6"	12	—	5999691	—
	11		0.1910	3.5/8	6"	12	—	5999687	—
	10		0.1935	3.5/8	6"	12	—	5999683	—
	9		0.1960	3.5/8	6"	12	—	5999499	—
	8		0.1990	3.5/8	6"	12	—	5999622	—
	7		0.2010	3.5/8	6"	12	—	6000259	—
13/64			0.2031	3.5/8	6"	12	5999698	—	—
	6		0.2040	3.5/8	6"	12	—	6000223	—
	5		0.2055	3.5/8	6"	12	—	6000187	—
	4		0.2090	3.5/8	6"	12	—	6000145	—
	3		0.2130	3.5/8	6"	12	—	6000203	—
7/32			0.2188	3.5/8	6"	12	6000263	—	—
	2		0.2210	3.3/4	6.1/8	12	—	5999719	—
	1		0.2280	3.3/4	6.1/8	12	—	5999679	—
		A	0.2340	3.3/4	6.1/8	12	—	—	5999547
15/64			0.2344	3.3/4	6.1/8	12	5999704	—	—
		B	0.2380	3.3/4	6.1/8	12	—	—	5999549

# TAPER LENGTH DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R51	R52	R55
		C	0.2420	3.3/4	6.1/8	12	—	—	5999551
		D	0.2460	3.3/4	6.1/8	12	—	—	5999553
1/4		E	0.2500	3.3/4	6.1/8	12	5999664	—	—
		F	0.2570	3.7/8	6.1/4	12	—	—	5999558
		G	0.2610	3.7/8	6.1/4	6	—	—	6000451
17/64			0.2656	3.7/8	6.1/4	6	5999713	—	—
		H	0.2660	3.7/8	6.1/4	6	—	—	6000454
		I	0.2720	3.7/8	6.1/4	6	—	—	6000457
		J	0.2770	3.7/8	6.1/4	6	—	—	6000459
		K	0.2810	3.7/8	6.1/4	6	—	—	6000298
9/32			0.2813	3.7/8	6.1/4	6	6000276	—	—
		L	0.2900	4"	6.3/8	6	—	—	6000301
		M	0.2950	4"	6.3/8	6	—	—	6000304
19/64			0.2969	4"	6.3/8	6	5999718	—	—
		N	0.3020	4"	6.3/8	6	—	—	6000307
5/16			0.3125	4"	6.3/8	6	6000381	—	—
		O	0.3161	4.1/8	6.1/2	6	—	—	6000310
		P	0.3230	4.1/8	6.1/2	6	—	—	6000313
21/64			0.3281	4.1/8	6.1/2	6	5999725	—	—
		Q	0.3320	4.1/8	6.1/2	6	—	—	6000316
		R	0.3390	4.1/8	6.1/2	6	—	—	6000319
11/32			0.3437	4.1/8	6.1/2	6	5999684	—	—
		S	0.3480	4.1/4	6.3/4	6	—	—	6000322
		T	0.3580	4.1/4	6.3/4	6	—	—	6000325
23/64			0.3594	4.1/4	6.3/4	6	5999733	—	—
		U	0.3680	4.1/4	6.3/4	6	—	—	6000331
3/8			0.3750	4.1/4	6.3/4	6	5999766	—	—
		V	0.3770	4.3/8	7"	6	—	—	6000333
		W	0.3860	4.3/8	7"	6	—	—	6000336
25/64			0.3906	4.3/8	7"	6	5999739	—	—
		X	0.3970	4.3/8	7"	6	—	—	6000338
		Y	0.4040	4.3/8	7"	6	—	—	6000341
13/32			0.4063	4.3/8	7"	6	5999695	—	—
		Z	0.4130	4.5/8	7.1/4	6	—	—	6000344
27/64			0.4219	4.5/8	7.1/4	6	5999748	—	—
7/16			0.4375	4.5/8	7.1/4	6	6000261	—	—
29/64			0.4531	4.3/4	7.1/2	6	5999754	—	—
15/32			0.4687	4.3/4	7.1/2	6	5999702	—	—
31/64			0.4844	4.3/4	7.3/4	6	5999770	—	—
1/2			0.5000	4.3/4	7.3/4	6	5999657	—	—
33/64			0.5156	4.3/4	8"	1	5999776	—	—
17/32			0.5313	4.3/4	8"	1	5999707	—	—
35/64			0.5469	4.7/8	8.1/4	1	6000225	—	—
9/16			0.5625	4.7/8	8.1/4	1	6000272	—	—
37/64			0.5781	4.7/8	8.3/4	1	6000258	—	—
19/32			0.5937	4.7/8	8.3/4	1	5999715	—	—
39/64			0.6094	4.7/8	8.3/4	1	6000289	—	—
5/8			0.6250	4.7/8	8.3/4	1	6000234	—	—
41/64			0.6406	5.1/8	9"	1	6000321	—	—
21/32			0.6563	5.1/8	9"	1	5999722	—	—
43/64			0.6719	5.3/8	9.1/4	1	6000358	—	—
11/16			0.6875	5.3/8	9.1/4	1	5999680	—	—
45/64			0.7031	5.5/8	9.1/2	1	6000366 <sup>1)</sup>	—	—
23/32			0.7188	5.5/8	9.1/2	1	5999729 <sup>1)</sup>	—	—
47/64			0.7344	5.7/8	9.3/4	1	6000371 <sup>1)</sup>	—	—
3/4			0.7500	5.7/8	9.3/4	1	5999761 <sup>1)</sup>	—	—
49/64			0.7656	6"	9.7/8	1	6000376 <sup>1)</sup>	—	—
25/32			0.7813	6"	9.7/8	1	5999736 <sup>1)</sup>	—	—
51/64			0.7969	6.1/8	10"	1	6000237 <sup>1)</sup>	—	—
13/16			0.8125	6.1/8	10"	1	5999692 <sup>1)</sup>	—	—
53/64			0.8281	6.1/8	10"	1	6000240 <sup>1)</sup>	—	—
27/32			0.8438	6.1/8	10"	1	5999742 <sup>1)</sup>	—	—
55/64			0.8594	6.1/8	10"	1	6000243 <sup>1)</sup>	—	—
7/8			0.8750	6.1/8	10"	1	6000269 <sup>1)</sup>	—	—
57/64			0.8906	6.1/8	10"	1	6000246 <sup>1)</sup>	—	—

<sup>1)</sup> steam tempered

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	R51	R52	R55
29/32			0.9063	6.1/8	10"	1	5999751 <sup>1)</sup>	—	—
59/64			0.9219	6.1/8	10.3/4	1	6000251 <sup>1)</sup>	—	—
15/16			0.9375	6.1/8	10.3/4	1	5999700 <sup>1)</sup>	—	—
61/64			0.9531	6.3/8	11"	1	6000253 <sup>1)</sup>	—	—
31/32			0.9688	6.3/8	11"	1	5999768 <sup>1)</sup>	—	—
63/64			0.9844	6.3/8	11"	1	6000255 <sup>1)</sup>	—	—
1"			1.0000	6.3/8	11"	1	5998971 <sup>1)</sup>	—	—
1.1/64			1.0156	6.1/2	11.1/8	1	5998984 <sup>1)</sup>	—	—
1.1/32			1.0312	6.1/2	11.1/8	1	5998978 <sup>1)</sup>	—	—
1.3/64			1.0469	6.5/8	11.1/4	1	5999710 <sup>1)</sup>	—	—
1.1/16			1.0625	6.5/8	11.1/4	1	5998973 <sup>1)</sup>	—	—
1.5/64			1.0781	6.7/8	11.1/2	1	5999781 <sup>1)</sup>	—	—
1.3/32			1.0937	6.7/8	11.1/2	1	5999633 <sup>1)</sup>	—	—
1.7/64			1.1094	7.1/8	11.3/4	1	5999641 <sup>1)</sup>	—	—
1.1/8			1.1250	7.1/8	11.3/4	1	5998987 <sup>1)</sup>	—	—
1.9/64			1.1406	7.1/4	11.7/8	1	5999649 <sup>1)</sup>	—	—
1.5/32			1.1563	7.1/4	11.7/8	1	5999778 <sup>1)</sup>	—	—
1.11/64			1.1719	7.3/8	12"	1	5998990 <sup>1)</sup>	—	—
1.3/16			1.1875	7.3/8	12"	1	5999004 <sup>1)</sup>	—	—
1.13/64			1.2031	7.1/2	12.1/8	1	5998993 <sup>1)</sup>	—	—
1.7/32			1.2187	7.1/2	12.1/8	1	5999637 <sup>1)</sup>	—	—
1.15/64			1.2344	7.7/8	12.1/2	1	5998997 <sup>1)</sup>	—	—
1.1/4			1.2500	7.7/8	12.1/2	1	5998981 <sup>1)</sup>	—	—
1.5/16			1.3125	8.5/8	14.1/4	1	5999773 <sup>1)</sup>	—	—
1.3/8			1.3750	8.7/8	14.1/2	1	5999745 <sup>1)</sup>	—	—
1.7/16			1.4375	9.1/8	14.3/4	1	5999787 <sup>1)</sup>	—	—
1.1/2			1.5000	9.3/8	15"	1	5998976 <sup>1)</sup>	—	—
1.9/16			1.5625	9.5/8	15.1/4	1	5999645 <sup>1)</sup>	—	—
1.5/8			1.6250	9.7/8	15.5/8	1	5999784 <sup>1)</sup>	—	—
1.3/4			1.7500	10.1/2	16.1/4	1	5999676 <sup>1)</sup>	—	—

<sup>1)</sup> steam tempered

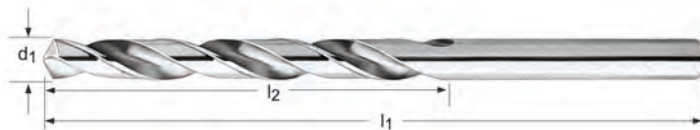
# TAPER LENGTH DRILL



## 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.

\* 18mm and larger are steam tempered



5ATL

DIN  
340

6XD

HSS

118°



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	6000480
1.20	0.0472	41	65	12	6000486
1.25	0.0492	41	65	12	6000489
1.30	0.0512	41	65	12	6000492
1.40	0.0551	45	70	12	6000494
1.50	0.0591	45	70	12	6000496
1.60	0.0630	50	76	12	6000499
1.70	0.0669	50	76	12	6000502
1.80	0.0709	53	80	12	6000505
1.90	0.0748	53	80	12	6000508
2.00	0.0787	56	85	12	6000810
2.10	0.0827	56	85	12	6000813
2.15	0.0846	59	90	12	6000816
2.20	0.0866	59	90	12	6000819
2.30	0.0906	59	90	12	6000822
2.40	0.0945	62	95	12	6000825
2.50	0.0984	62	95	12	6000828
3.00	0.1181	66	100	12	6000912
3.10	0.1220	69	106	12	6000917
3.20	0.1260	69	106	12	6000926
3.30	0.1299	69	106	12	6001365
3.40	0.1339	73	112	12	6001416
3.50	0.1378	73	112	12	6001458
3.60	0.1417	73	112	12	6001480
3.70	0.1457	73	112	12	6001504
3.80	0.1496	78	119	12	6001508
4.00	0.1575	78	119	12	6001370
4.20	0.1654	78	119	12	6001374
4.30	0.1693	82	126	12	6001379
4.50	0.1772	82	126	12	6001384
4.60	0.1811	82	126	12	6001389
4.80	0.1890	87	132	12	6001392



d <sub>1</sub> Ø mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	5ATL
5.00	0.1969	87	132	12	6001399
5.50	0.2165	91	139	12	6001404
5.60	0.2205	91	139	12	6001407
5.70	0.2244	91	139	12	6001411
6.00	0.2362	91	139	12	6001421
6.40	0.2520	97	148	6	6001426
6.50	0.2559	97	148	6	6001431
6.80	0.2677	102	156	6	6001435
7.00	0.2756	102	156	6	6001440
7.20	0.2835	102	156	6	6001444
7.50	0.2953	102	156	6	6001450
7.80	0.3071	109	165	6	6001452
8.00	0.3150	109	165	6	6001454
8.20	0.3228	109	165	6	6001456
8.50	0.3346	109	165	6	6001460
9.00	0.3543	115	175	6	6001462
9.20	0.3622	115	175	6	6001464
9.50	0.3740	115	175	6	6001466
9.80	0.3858	121	184	6	6001468
10.00	0.3937	121	184	6	6000511
10.20	0.4016	121	184	6	6000518
10.50	0.4134	121	184	6	6000763
11.00	0.4331	128	195	6	6000802
11.20	0.4409	128	195	6	6000834
11.50	0.4528	128	195	6	6000871
12.00	0.4724	134	205	6	6000921
12.50	0.4921	134	205	6	6000931
13.00	0.5118	134	205	1	6000939
13.50	0.5315	140	214	1	6000943
13.80	0.5433	140	214	1	6000945
14.00	0.5512	140	214	1	6000769
14.50	0.5709	144	220	1	6000773
15.00	0.5906	144	220	1	6000777
15.50	0.6102	149	227	1	6000781
16.00	0.6299	149	227	1	6000785
16.50	0.6496	154	235	1	6000788
17.00	0.6693	154	235	1	6000791
17.50	0.6890	158	241	1	6000794
18.00	0.7087	158	241	1	6000797 <sup>1)</sup>
18.50	0.7283	162	247	1	6000799 <sup>1)</sup>
19.00	0.7480	162	247	1	6000805 <sup>1)</sup>
19.50	0.7677	166	254	1	6000808 <sup>1)</sup>
20.00	0.7874	166	254	1	6000830 <sup>1)</sup>
20.50	0.8071	171	261	1	6000837 <sup>1)</sup>
21.00	0.8268	171	261	1	6000840 <sup>1)</sup>
21.50	0.8465	176	268	1	6000844 <sup>1)</sup>
22.00	0.8661	176	268	1	6000845 <sup>1)</sup>
22.50	0.8858	180	275	1	6000848 <sup>1)</sup>
23.00	0.9055	180	275	1	6000852 <sup>1)</sup>
23.50	0.9252	180	275	1	6000855 <sup>1)</sup>
24.00	0.9449	185	282	1	6000858 <sup>1)</sup>
24.50	0.9646	185	282	1	6000860 <sup>1)</sup>
25.00	0.9843	185	282	1	6000866 <sup>1)</sup>
25.50	1.0039	190	290	1	6000876 <sup>1)</sup>
26.00	1.0236	190	290	1	6000880 <sup>1)</sup>
26.50	1.0433	190	290	1	6000885 <sup>1)</sup>
27.00	1.0630	195	298	1	6000889 <sup>1)</sup>
28.00	1.1024	195	298	1	6000894 <sup>1)</sup>
28.50	1.1220	201	307	1	6000898 <sup>1)</sup>
29.00	1.1417	201	307	1	6000902 <sup>1)</sup>
29.50	1.1614	201	307	1	6000907 <sup>1)</sup>
30.00	1.1811	201	307	1	6001510 <sup>1)</sup>
30.50	1.2008	207	316	1	6001512 <sup>1)</sup>
31.00	1.2205	207	316	1	6001514 <sup>1)</sup>

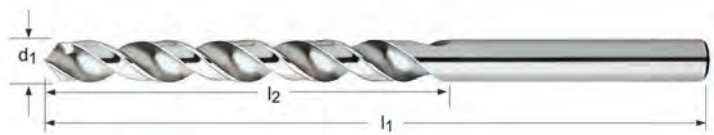
<sup>1)</sup> steam tempered

# 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

118°



1/16 - 1/2

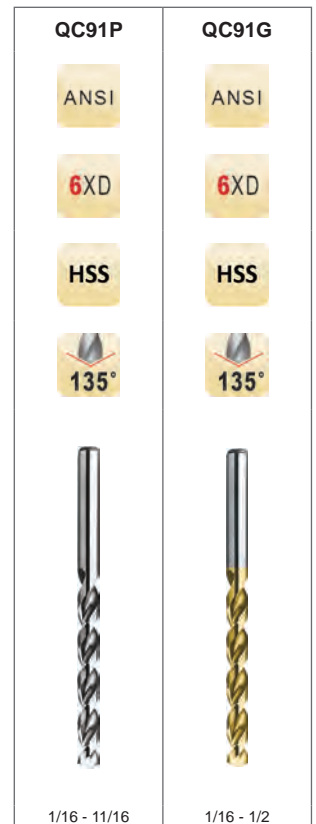
$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	R51FS
1/16	0.0625	1.3/4	3"	12	5998977
5/64	0.0781	2"	3.3/4	12	5998917
3/32	0.0938	2.1/4	4.1/4	12	5998788
7/64	0.1094	2.1/2	4.5/8	12	5998747
1/8	0.1250	2.3/4	5.1/8	12	5998985
9/64	0.1406	3"	5.3/8	12	5998755
5/32	0.1563	3"	5.3/8	12	5998913
11/64	0.1719	3.3/8	5.3/4	12	5998991
3/16	0.1875	3.3/8	5.3/4	12	5998743
13/64	0.2031	3.5/8	6"	12	5999002
7/32	0.2188	3.5/8	6"	12	5998924
15/64	0.2344	3.3/4	6.1/8	12	5999009
1/4	0.2500	3.3/4	6.1/8	12	5998982
17/64	0.2656	3.7/8	6.1/4	6	5999013
9/32	0.2813	3.7/8	6.1/4	6	5998751
19/64	0.2969	4"	6.3/8	6	5999017
5/16	0.3125	4"	6.3/8	6	5998905
21/64	0.3281	4.1/8	6.1/2	6	5999023
11/32	0.3437	4.1/8	6.1/2	6	5998989
23/64	0.3594	4.1/4	6.3/4	6	5999027
3/8	0.3750	4.1/4	6.3/4	6	5998829
25/64	0.3906	4.3/8	7"	6	5999030
13/32	0.4063	4.3/8	7"	6	5998998
27/64	0.4219	4.5/8	7.1/4	6	5999034
7/16	0.4375	4.5/8	7.1/4	6	5998920
29/64	0.4531	4.3/4	7.1/2	6	5999043
15/32	0.4687	4.3/4	7.1/2	6	5999006
31/64	0.4844	4.3/4	7.3/4	6	5998861
1/2	0.5000	4.3/4	7.3/4	6	5998980

**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 <sub>1</sub> Ø "/Nr.	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	QC91P	QC91G
1/16	0.0625	1.3/4	3"	12	5997190	5996826
52	0.0635	2"	3.3/4	12	5997169	5996809
51	0.0670	2"	3.3/4	12	5997164	5996805
50	0.0700	2"	3.3/4	12	5997159	5996801
49	0.0730	2"	3.3/4	12	5997149	5996794
48	0.0760	2"	3.3/4	12	5997145	—
5/64	0.0781	2"	3.3/4	12	5997426	5997143
47	0.0785	2.1/4	4.1/4	12	5997142	5996788
46	0.0810	2.1/4	4.1/4	12	5997135	5996780
45	0.0820	2.1/4	4.1/4	12	5997132	5996777
44	0.0860	2.1/4	4.1/4	12	5997126	5996773
43	0.0890	2.1/4	4.1/4	12	5997122	5996769
42	0.0935	2.1/4	4.1/4	12	5997118	5996765
3/32	0.0938	2.1/4	4.1/4	12	5997472	5996895
41	0.0960	2.1/2	4.5/8	12	5997114	5996762
40	0.0980	2.1/2	4.5/8	12	5997109	5996759
39	0.0995	2.1/2	4.5/8	12	5997099	5996753
38	0.1015	2.1/2	4.5/8	12	5997095	5996750
37	0.1040	2.1/2	4.5/8	12	5997242	5996920
36	0.1065	2.1/2	4.5/8	12	5997240	5996916
7/64	0.1094	2.1/2	4.5/8	12	5997439	5997198
35	0.1100	2.3/4	5.1/8	12	5997239	5996911
34	0.1110	2.3/4	5.1/8	12	5997237	5996907
33	0.1130	2.3/4	5.1/8	12	5997233	—
32	0.1160	2.3/4	5.1/8	12	5997213	5996855
31	0.1200	2.3/4	5.1/8	12	5997184	5996820
1/8	0.1250	2.3/4	5.1/8	12	5997199	5996834
30	0.1285	3"	5.3/8	12	5997138	5996784
29	0.1360	3"	5.3/8	12	5998036	5996793
28	0.1405	3"	5.3/8	12	5998029	5996785
9/64	0.1406	3"	5.3/8	12	5997451	5997204
27	0.1440	3"	5.3/8	12	5998026	—
26	0.1470	3"	5.3/8	12	5998021	5996774

# TAPER LENGTH DRILL



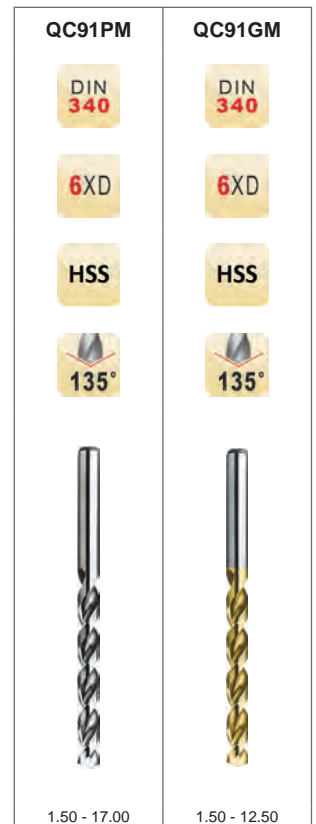
d <sub>1</sub> Ø "/Nr.	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	QC91P	QC91G
25	0.1495	3"	5.3/8	12	5998017	5996770
24	0.1520	3"	5.3/8	12	5998013	5996767
23	0.1540	3"	5.3/8	12	5998009	—
5/32	0.1563	3"	5.3/8	12	5997421	5997098
22	0.1570	3.3/8	5.3/4	12	5998006	—
21	0.1590	3.3/8	5.3/4	12	5998002	5996757
20	0.1610	3.3/8	5.3/4	12	5997998	5996754
19	0.1660	3.3/8	5.3/4	12	5997989	5996745
18	0.1695	3.3/8	5.3/4	12	5997986	5996743
11/64	0.1719	3.3/8	5.3/4	12	5997207	5996840
17	0.1730	3.3/8	5.3/4	12	5997983	5996741
16	0.1770	3.3/8	5.3/4	12	5997979	5996739
15	0.1800	3.3/8	5.3/4	12	5997976	5996737
14	0.1820	3.3/8	5.3/4	12	5997973	5996735
13	0.1850	3.3/8	5.3/4	12	5997971	5996733
3/16	0.1875	3.3/8	5.3/4	12	5997445	5996891
12	0.1890	3.5/8	6"	12	5997968	—
11	0.1910	3.5/8	6"	12	5997966	5996729
10	0.1935	3.5/8	6"	12	5997964	—
9	0.1960	3.5/8	6"	12	5997187	5996823
8	0.1990	3.5/8	6"	12	5997181	5996817
7	0.2010	3.5/8	6"	12	5997177	5996815
13/64	0.2031	3.5/8	6"	12	5997211	5996847
6	0.2040	3.5/8	6"	12	5997174	5996812
5	0.2055	3.5/8	6"	12	5997154	5996798
4	0.2090	3.5/8	6"	12	5997103	5996756
3	0.2130	3.5/8	6"	12	5997089	5996746
7/32	0.2188	3.5/8	6"	12	5997435	5997195
2	0.2210	3.3/4	6.1/8	12	5997995	5996751
1	0.2280	3.3/4	6.1/8	12	5997960	—
15/64	0.2344	3.3/4	6.1/8	12	5997217	5996859
1/4	0.2500	3.3/4	6.1/8	12	5997196	5996831
17/64	0.2656	3.7/8	6.1/4	6	5997221	5996863
9/32	0.2813	3.7/8	6.1/4	6	5997448	5997201
19/64	0.2969	4"	6.3/8	6	5997225	5996867
5/16	0.3125	4"	6.3/8	6	5997416	5997063
21/64	0.3281	4.1/8	6.1/2	6	5997229	5996870
11/32	0.3437	4.1/8	6.1/2	6	5997205	5996837
23/64	0.3594	4.1/4	6.3/4	6	5997230	—
3/8	0.3750	4.1/4	6.3/4	6	5997497	5996903
25/64	0.3906	4.3/8	7"	6	5997232	5996878
13/32	0.4063	4.3/8	7"	6	5997209	5996844
27/64	0.4219	4.5/8	7.1/4	6	5997235	5996881
7/16	0.4375	4.5/8	7.1/4	6	5997432	5997189
29/64	0.4531	4.3/4	7.1/2	6	5997398	5996884
15/32	0.4687	4.3/4	7.1/2	6	5997215	—
31/64	0.4844	4.3/4	7.3/4	6	5997531	—
1/2	0.5000	4.3/4	7.3/4	6	5997193	5996828
33/64	0.5156	4.3/4	8"	1	5997538	—
17/32	0.5313	4.3/4	8"	1	5997219	—
35/64	0.5469	4.7/8	8.1/4	1	5997541	—
9/16	0.5625	4.7/8	8.1/4	1	5997442	—
37/64	0.5781	4.7/8	8.3/4	1	5997545	—
19/32	0.5937	4.7/8	8.3/4	1	5997223	—
5/8	0.6250	4.7/8	8.3/4	1	5997429	—
21/32	0.6563	5.1/8	9"	1	5997227	—
11/16	0.6875	5.3/8	9.1/4	1	5997202	—

## 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	5997412	5996902
2.00	0.0787	56	85	12	5998048	5996804
2.50	0.0984	62	95	12	5998052	5996808
3.00	0.1181	66	100	12	5997892	5996673
3.50	0.1378	73	112	12	5997896	5996675
4.00	0.1575	78	119	12	5997899	5996679
4.50	0.1772	82	126	12	5997904	5996681
5.00	0.1969	87	132	12	5997907	5996685
5.20	0.2047	87	132	12	5997911	5996687
5.50	0.2165	91	139	12	5997915	5996690
6.00	0.2362	91	139	12	5997921	5996696
6.50	0.2559	97	148	6	5997926	5996700
6.80	0.2677	102	156	6	5997933	—
7.00	0.2756	102	156	6	5997936	5996706
8.00	0.3150	109	165	6	5997941	5996710
8.20	0.3228	109	165	6	5997944	—
8.50	0.3346	109	165	6	5997948	5996714
8.60	0.3386	115	175	6	5997952	5996716
9.00	0.3543	115	175	6	5997955	5996718
9.50	0.3740	115	175	6	5997958	—
10.00	0.3937	121	184	6	5997417	5996668
10.50	0.4134	121	184	6	5997422	5996702
11.00	0.4331	128	195	6	5997425	—
12.00	0.4724	134	205	6	5997433	5996789
12.50	0.4921	134	205	6	5997436	5996796
13.00	0.5118	134	205	1	5997438	—
13.50	0.5315	140	214	1	5997441	—
14.00	0.5512	140	214	1	5997447	—
15.00	0.5906	144	220	1	5997929	—
15.50	0.6102	149	227	1	5997962	—
16.00	0.6299	149	227	1	5997992	—
17.00	0.6693	154	235	1	5998040	—

# COBALT TAPER LENGTH DRILL

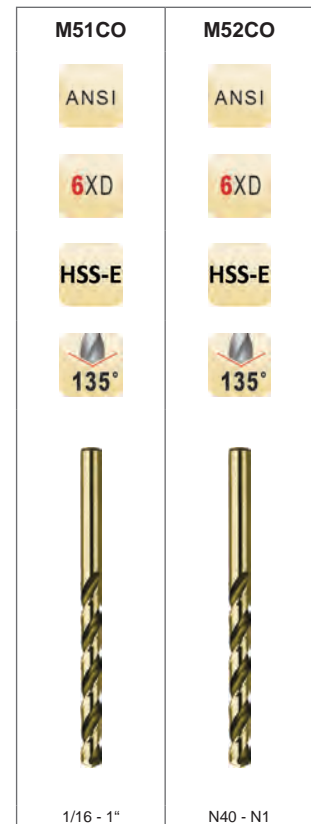


## Heavy Duty Taper Length

**M51CO** - Fractional Sizes

**M52CO** - Wire Gauge Sizes

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



$d_1$ Ø Inch	$d_1$ 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	5996565	—
5/64		0.0781	2"	3.3/4	12	5996328	—
3/32		0.0938	2.1/4	4.1/4	12	5996444	—
	40	0.0980	2.1/2	4.5/8	12	—	5995712
	39	0.0995	2.1/2	4.5/8	12	—	5995706
	36	0.1065	2.1/2	4.5/8	12	—	5995704
7/64		0.1094	2.1/2	4.5/8	12	5996373	—
	35	0.1100	2.3/4	5.1/8	12	—	5995702
	34	0.1110	2.3/4	5.1/8	12	—	5995701
	33	0.1130	2.3/4	5.1/8	12	—	5995699
	32	0.1160	2.3/4	5.1/8	12	—	5995697
	31	0.1200	2.3/4	5.1/8	12	—	5995695
1/8		0.1250	2.3/4	5.1/8	12	5996577	—
	30	0.1285	3"	5.3/8	12	—	5995693
	29	0.1360	3"	5.3/8	12	—	5995838
	28	0.1405	3"	5.3/8	12	—	5995834
9/64		0.1406	3"	5.3/8	12	5996391	—
	27	0.1440	3"	5.3/8	12	—	5995830
	26	0.1470	3"	5.3/8	12	—	5995827
	25	0.1495	3"	5.3/8	12	—	5995817
	24	0.1520	3"	5.3/8	12	—	5995774
5/32		0.1563	3"	5.3/8	12	5996324	—
	22	0.1570	3.3/8	5.3/4	12	—	5995737
	21	0.1590	3.3/8	5.3/4	12	—	5995710
	20	0.1610	3.3/8	5.3/4	12	—	5995688
	19	0.1660	3.3/8	5.3/4	12	—	5996431
	18	0.1695	3.3/8	5.3/4	12	—	5996427
11/64		0.1719	3.3/8	5.3/4	12	5996586	—
	17	0.1730	3.3/8	5.3/4	12	—	5996425
	16	0.1770	3.3/8	5.3/4	12	—	5996421
	15	0.1800	3.3/8	5.3/4	12	—	5996419
	14	0.1820	3.3/8	5.3/4	12	—	5996416

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	M51CO	M52CO
	13	0.1850	3.3/8	5.3/4	12	—	5996414
3/16		0.1875	3.3/8	5.3/4	12	5996440	—
	12	0.1890	3.5/8	6"	12	—	5996411
	11	0.1910	3.5/8	6"	12	—	5996408
	10	0.1935	3.5/8	6"	12	—	5996404
	9	0.1960	3.5/8	6"	12	—	5995720
	8	0.1990	3.5/8	6"	12	—	5995718
	7	0.2010	3.5/8	6"	12	—	5995716
13/64		0.2031	3.5/8	6"	12	5996596	—
	5	0.2055	3.5/8	6"	12	—	5995714
	4	0.2090	3.5/8	6"	12	—	5995708
	3	0.2130	3.5/8	6"	12	—	5995691
7/32		0.2188	3.5/8	6"	12	5996369	—
	2	0.2210	3.3/4	6.1/8	12	—	5996437
	1	0.2280	3.3/4	6.1/8	12	—	5996395
15/64		0.2344	3.3/4	6.1/8	12	5996609	—
1/4		0.2500	3.3/4	6.1/8	12	5996574	—
17/64		0.2656	3.7/8	6.1/4	6	5996618	—
9/32		0.2813	3.7/8	6.1/4	6	5996387	—
19/64		0.2969	4"	6.3/8	6	5996626	—
5/16		0.3125	4"	6.3/8	6	5996323	—
21/64		0.3281	4.1/8	6.1/2	6	5996634	—
11/32		0.3437	4.1/8	6.1/2	6	5996583	—
23/64		0.3594	4.1/4	6.3/4	6	5996642	—
3/8		0.3750	4.1/4	6.3/4	6	5996449	—
25/64		0.3906	4.3/8	7"	6	5996266	—
13/32		0.4063	4.3/8	7"	6	5996592	—
27/64		0.4219	4.5/8	7.1/4	6	5996354	—
7/16		0.4375	4.5/8	7.1/4	6	5996365	—
29/64		0.4531	4.3/4	7.1/2	6	5996434	—
15/32		0.4687	4.3/4	7.1/2	6	5996607	—
31/64		0.4844	4.3/4	7.3/4	6	5996275	—
1/2		0.5000	4.3/4	7.3/4	6	5996572	—
33/64		0.5156	4.3/4	8"	1	5996280	<sup>1)</sup> —
17/32		0.5313	4.3/4	8"	1	5996613	<sup>1)</sup> —
35/64		0.5469	4.7/8	8.1/4	1	5996284	<sup>1)</sup> —
9/16		0.5625	4.7/8	8.1/4	1	5996383	<sup>1)</sup> —
37/64		0.5781	4.7/8	8.3/4	1	5996288	<sup>1)</sup> —
19/32		0.5937	4.7/8	8.3/4	1	5996621	<sup>1)</sup> —
39/64		0.6094	4.7/8	8.3/4	1	5996292	<sup>1)</sup> —
5/8		0.6250	4.7/8	8.3/4	1	5996331	<sup>1)</sup> —
41/64		0.6406	5.1/8	9"	1	5996299	<sup>1)</sup> —
21/32		0.6563	5.1/8	9"	1	5996630	<sup>1)</sup> —
43/64		0.6719	5.3/8	9.1/4	1	5996302	<sup>1)</sup> —
11/16		0.6875	5.3/8	9.1/4	1	5996580	<sup>1)</sup> —
45/64		0.7031	5.5/8	9.1/2	1	5996306	<sup>1)</sup> —
23/32		0.7188	5.5/8	9.1/2	1	5996638	<sup>1)</sup> —
47/64		0.7344	5.7/8	9.3/4	1	5996312	<sup>1)</sup> —
3/4		0.7500	5.7/8	9.3/4	1	5996446	<sup>1)</sup> —
49/64		0.7656	6"	9.7/8	1	5996321	<sup>1)</sup> —
25/32		0.7813	6"	9.7/8	1	5996650	<sup>1)</sup> —
51/64		0.7969	6.1/8	10"	1	5996335	<sup>1)</sup> —
13/16		0.8125	6.1/8	10"	1	5996589	<sup>1)</sup> —
53/64		0.8281	6.1/8	10"	1	5996339	<sup>1)</sup> —
27/32		0.8438	6.1/8	10"	1	5996316	<sup>1)</sup> —
55/64		0.8594	6.1/8	10"	1	5996343	<sup>1)</sup> —
7/8		0.8750	6.1/8	10"	1	5996377	<sup>1)</sup> —
57/64		0.8906	6.1/8	10"	1	5996348	<sup>1)</sup> —
29/32		0.9063	6.1/8	10"	1	5996400	<sup>1)</sup> —
59/64		0.9219	6.1/8	10.3/4	1	5996350	<sup>1)</sup> —
15/16		0.9375	6.1/8	10.3/4	1	5996599	<sup>1)</sup> —
61/64		0.9531	6.3/8	11"	1	5996358	<sup>1)</sup> —
31/32		0.9688	6.3/8	11"	1	5996271	<sup>1)</sup> —
63/64		0.9844	6.3/8	11"	1	5996361	<sup>1)</sup> —
1"		1.0000	6.3/8	11"	1	5996560	<sup>1)</sup> —

<sup>1)</sup> Notched Point

# EXTRA LENGTH DRILL

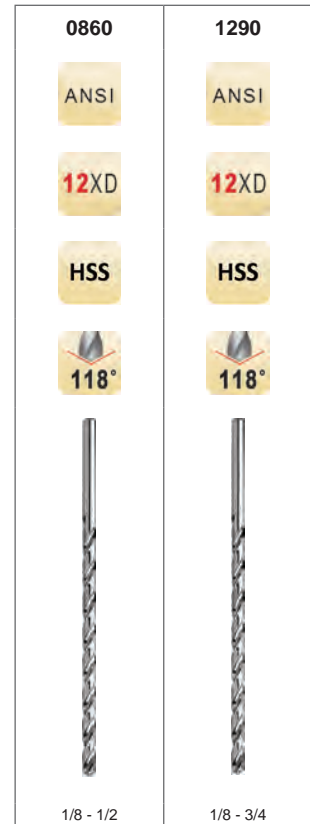


## General Purpose Extra Length

**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	6000278	—
1/8	0.1250	9"	12"	1	—	6000178
9/64	0.1406	9"	12"	1	—	5999809
5/32	0.1563	6"	8"	1	6000129	—
5/32	0.1563	9"	12"	1	—	5999924
11/64	0.1719	9"	12"	1	—	6000189
3/16	0.1875	6"	8"	1	6000117	—
3/16	0.1875	9"	12"	1	—	6000244
13/64	0.2031	9"	12"	1	—	6000199
7/32	0.2188	6"	8"	1	6000137	—
7/32	0.2188	9"	12"	1	—	5999971
15/64	0.2344	9"	12"	1	—	6000205
1/4	0.2500	6"	8"	1	6000274	—
1/4	0.2500	9"	12"	1	—	6000174
17/64	0.2656	9"	12"	1	—	6000211
9/32	0.2813	6"	8"	1	6000140	—
9/32	0.2813	9"	12"	1	—	5999978
19/64	0.2969	9"	12"	1	—	6000217
5/16	0.3125	6"	8"	1	6000124	—
5/16	0.3125	9"	12"	1	—	5999880
21/64	0.3281	9"	12"	1	—	6000224
11/32	0.3437	6"	8"	1	6000099	—
11/32	0.3437	9"	12"	1	—	6000186
23/64	0.3594	9"	12"	1	—	6000233
3/8	0.3750	6"	8"	1	6000119	—
3/8	0.3750	9"	12"	1	—	6000249
25/64	0.3906	9"	12"	1	—	6000236
13/32	0.4063	6"	8"	1	6000103	—
13/32	0.4063	9"	12"	1	—	6000196
27/64	0.4219	9"	12"	1	—	6000238
7/16	0.4375	6"	8"	1	6000134	—
7/16	0.4375	9"	12"	1	—	5999969



$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	0860	1290
29/64	0.4531	9"	12"	1	—	6000241
15/32	0.4687	6"	8"	1	6000106	—
15/32	0.4687	9"	12"	1	—	6000202
31/64	0.4844	9"	12"	1	—	6000252
1/2	0.5000	6"	8"	1	6000271	—
1/2	0.5000	9"	12"	1	—	6000165
33/64	0.5156	9"	12"	1	—	6000256 <sup>1)</sup>
17/32	0.5313	9"	12"	1	—	6000208 <sup>1)</sup>
35/64	0.5469	9"	12"	1	—	6000265 <sup>1)</sup>
9/16	0.5625	9"	12"	1	—	5999974 <sup>1)</sup>
37/64	0.5781	9"	12"	1	—	5999804 <sup>1)</sup>
19/32	0.5937	9"	12"	1	—	6000214 <sup>1)</sup>
39/64	0.6094	9"	12"	1	—	5999840 <sup>1)</sup>
5/8	0.6250	9"	12"	1	—	5999964 <sup>1)</sup>
21/32	0.6563	9"	12"	1	—	6000220 <sup>1)</sup>
11/16	0.6875	9"	12"	1	—	6000181 <sup>1)</sup>
23/32	0.7188	9"	12"	1	—	6000230 <sup>1)</sup>
3/4	0.7500	9"	12"	1	—	6000247 <sup>1)</sup>

1) 33/64 and larger are steam tempered

**General Purpose Extra Length**

**1511** Bright Finish improves chip flow in soft or  
**1813** non-ferrous materials

**A125** Steam tempered for increased wear resistance & lubricity.



1813 Series - 33/64 and larger are steam tempered

1511 Series - 17/32 and larger are steam tempered

A125 Series - under 3/32 are bright



d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	d <sub>1</sub> Øh <sub>8</sub> mm	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	1511	1813	A125
	0.0551	1.40			100	160	1	—	—	5968821
	0.0591	1.50			100	160	1	—	—	5968831
	0.0591	1.50			80	125	1	—	—	5968826
1/16	0.0625	1.59			100	160	1	—	—	5968847
1/16	0.0625	1.59			80	125	1	—	—	5968843
	0.0709	1.80			100	160	1	—	—	5968837
5/64	0.0781	1.98			100	160	1	—	—	5968859
5/64	0.0781	1.98			80	125	1	—	—	5968854
	0.0787	2.00			100	160	1	—	—	5968519
	0.0787	2.00			80	125	1	—	—	5968514
	0.0866	2.20			100	160	1	—	—	5968523
3/32	0.0938	2.38			100	160	1	—	—	5968651
3/32	0.0938	2.38			80	125	1	—	—	5968649
	0.0984	2.50			100	160	1	—	—	5968533
	0.0984	2.50			80	125	1	—	—	5968528
7/64	0.1094	2.78			100	160	1	—	—	5968960
7/64	0.1094	2.78			80	125	1	—	—	5969172
	0.1181	3.00			100	160	1	—	—	5968611
	0.1181	3.00			150	200	1	—	—	5968616
	0.1181	3.00			200	250	1	—	—	5968620
1/8	0.1250	3.18			100	160	1	—	—	5968186
1/8	0.1250	3.18			150	200	1	—	—	5968038
1/8	0.1250	3.18			200	250	1	—	—	5968043
1/8	0.1250	3.18			250	310	1	—	—	5968048
	0.1299	3.30			100	160	1	—	—	5968624
	0.1378	3.50			100	160	1	—	—	5968627
	0.1378	3.50			150	200	1	—	—	5968630
	0.1378	3.50			200	250	1	—	—	5968633
9/64	0.1406	3.57			100	160	1	—	—	5969048
9/64	0.1406	3.57			150	200	1	—	—	5969052
9/64	0.1406	3.57			250	310	1	—	—	5969063
5/32	0.1563	3.97			100	160	1	—	—	5968834

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	d <sub>1</sub> Øh <sub>8</sub> mm	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	1511	1813	A125
5/32	0.1563	3.97			150	200	1	—	—	5968839
5/32	0.1563	3.97			200	250	1	—	—	5968844
5/32	0.1563	3.97			250	310	1	—	—	5968849
	0.1575	4.00			100	160	1	—	—	5968727
	0.1575	4.00			150	200	1	—	—	5968731
	0.1575	4.00			200	250	1	—	—	5968737
	0.1575	4.00			250	310	1	—	—	5968740
11/64	0.1719	4.37			100	160	1	—	—	5968123
11/64	0.1719	4.37			150	200	1	—	—	5968127
11/64	0.1719	4.37			250	310	1	—	—	5968129
	0.1772	4.50			100	160	1	—	—	5968743
	0.1772	4.50			150	200	1	—	—	5968747
	0.1772	4.50			200	250	1	—	—	5968751
	0.1772	4.50			250	310	1	—	—	5968756
3/16	0.1875	4.76			100	160	1	—	—	5968636
3/16	0.1875	4.76			150	200	1	—	—	5968638
3/16	0.1875	4.76			200	250	1	—	—	5968643
3/16	0.1875	4.76			250	310	1	—	—	5968645
3/16	0.1875	4.76			300	400	1	—	—	5968647
3/16	0.1875		11"	15"			1	5999851	—	—
	0.1969	5.00			100	160	1	—	—	5968762
	0.1969	5.00			150	200	1	—	—	5968767
	0.1969	5.00			200	250	1	—	—	5968777
	0.1969	5.00			250	310	1	—	—	5968781
	0.1969	5.00			300	400	1	—	—	5968786
13/64	0.2031	5.16			150	200	1	—	—	5968151
13/64	0.2031	5.16			200	250	1	—	—	5968153
13/64	0.2031	5.16			250	310	1	—	—	5968154
	0.2165	5.50			150	200	1	—	—	5968791
	0.2165	5.50			200	250	1	—	—	5968797
	0.2165	5.50			250	310	1	—	—	5968802
7/32	0.2188	5.56			150	200	1	—	—	5969164
7/32	0.2188	5.56			200	250	1	—	—	5969167
7/32	0.2188	5.56			250	310	1	—	—	5969170
15/64	0.2344	5.95			150	200	1	—	—	5968170
15/64	0.2344	5.95			200	250	1	—	—	5968500
15/64	0.2344	5.95			250	310	1	—	—	5968546
	0.2362	6.00			150	200	1	—	—	5968874
	0.2362	6.00			200	250	1	—	—	5968883
	0.2362	6.00			250	310	1	—	—	5968886
	0.2362	6.00			300	400	1	—	—	5968890
1/4	0.2500	6.35			150	200	1	—	—	5968146
1/4	0.2500	6.35			200	250	1	—	—	5968169
1/4	0.2500	6.35			250	310	1	—	—	5968174
1/4	0.2500	6.35			300	400	1	—	—	5968178
1/4	0.2500	6.35			400	460	1	—	—	5968181
1/4	0.2500		11"	15"			1	5999817	—	—
1/4	0.2500		13"	18"			1	—	5999892	—
	0.2559	6.50			150	200	1	—	—	5968894
	0.2559	6.50			200	250	1	—	—	5968897
	0.2559	6.50			250	310	1	—	—	5968899
17/64	0.2656	6.75			150	200	1	—	—	5968660
17/64	0.2656	6.75			200	250	1	—	—	5968665
17/64	0.2656	6.75			400	460	1	—	—	5968667
17/64	0.2656		13"	18"			1	—	5999928	—
	0.2756	7.00			150	200	1	—	—	5968902
	0.2756	7.00			200	250	1	—	—	5968904
	0.2756	7.00			250	310	1	—	—	5968906
9/32	0.2813	7.14			150	200	1	—	—	5969030
9/32	0.2813	7.14			200	250	1	—	—	5969034
9/32	0.2813	7.14			250	310	1	—	—	5969039
9/32	0.2813	7.14			400	460	1	—	—	5969043
9/32	0.2813		13"	18"			1	—	6000288	—
	0.2953	7.50			150	200	1	—	—	5968908
	0.2953	7.50			200	250	1	—	—	5968912

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	d <sub>1</sub> Øh <sub>8</sub> mm	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	1511	1813	A125
	0.2953	7.50			250	310	1	—	—	5968954
19/64	0.2969	7.54			250	310	1	—	—	5968507
19/64	0.2969	7.54			400	460	1	—	—	5968510
19/64	0.2969		13"	18"			1	—	5999937	—
5/16	0.3125	7.94			150	200	1	—	—	5968807
5/16	0.3125	7.94			200	250	1	—	—	5968811
5/16	0.3125	7.94			250	310	1	—	—	5968815
5/16	0.3125	7.94			300	400	1	—	—	5968820
5/16	0.3125	7.94			400	460	1	—	—	5968829
5/16	0.3125		11"	15"			1	5999862	—	—
5/16	0.3125		13"	18"			1	—	6000434	—
	0.3150	8.00			200	250	1	—	—	5968970
	0.3150	8.00			250	310	1	—	—	5968974
	0.3150	8.00			300	400	1	—	—	5968977
21/64	0.3281	8.33			250	310	1	—	—	5968542
21/64	0.3281	8.33			400	460	1	—	—	5968551
21/64	0.3281		13"	18"			1	—	5999945	—
	0.3346	8.50			200	250	1	—	—	5968981
	0.3346	8.50			250	310	1	—	—	5968985
11/32	0.3437	8.73			200	250	1	—	—	5968113
11/32	0.3437	8.73			250	310	1	—	—	5968116
11/32	0.3437	8.73			300	400	1	—	—	5968119
11/32	0.3437	8.73			400	460	1	—	—	5968122
11/32	0.3437		11"	15"			1	5999823	—	—
11/32	0.3437		13"	18"			1	—	5999900	—
	0.3543	9.00			200	250	1	—	—	5968990
	0.3543	9.00			250	310	1	—	—	5968995
	0.3543	9.00			300	400	1	—	—	5969000
23/64	0.3594	9.13			250	310	1	—	—	5968569
23/64	0.3594	9.13			400	460	1	—	—	5968574
23/64	0.3594		13"	18"			1	—	5999951	—
	0.3740	9.50			200	250	1	—	—	5969010
	0.3740	9.50			250	310	1	—	—	5969015
3/8	0.3750	9.52			200	250	1	—	—	5968657
3/8	0.3750	9.52			250	310	1	—	—	5968658
3/8	0.3750	9.52			300	400	1	—	—	5968659
3/8	0.3750	9.52			400	460	1	—	—	5968662
3/8	0.3750		11"	15"			1	5999858	—	—
3/8	0.3750		13"	18"			1	—	6000306	—
25/64	0.3906	9.92			250	310	1	—	—	5968584
25/64	0.3906	9.92			400	460	1	—	—	5968589
25/64	0.3906		13"	18"			1	—	5999957	—
	0.3937	10.00			200	250	1	—	—	5968061
	0.3937	10.00			250	310	1	—	—	5968066
	0.3937	10.00			300	400	1	—	—	5968071
13/32	0.4063	10.32			200	250	1	—	—	5968142
13/32	0.4063	10.32			250	310	1	—	—	5968144
13/32	0.4063	10.32			400	460	1	—	—	5968148
13/32	0.4063		13"	18"			1	—	5999909	—
	0.4134	10.50			200	250	1	—	—	5968076
	0.4134	10.50			250	310	1	—	—	5968080
	0.4134	10.50			300	400	1	—	—	5968085
27/64	0.4219	10.72			250	310	1	—	—	5968594
27/64	0.4219		13"	18"			1	—	5999960	—
	0.4331	11.00			200	250	1	—	—	5968094
	0.4331	11.00			250	310	1	—	—	5968099
	0.4331	11.00			300	400	1	—	—	5968102
7/16	0.4375	11.11			200	250	1	—	—	5969004
7/16	0.4375	11.11			250	310	1	—	—	5969057
7/16	0.4375	11.11			300	400	1	—	—	5969113
7/16	0.4375	11.11			400	460	1	—	—	5969158
7/16	0.4375		11"	15"			1	5999869	—	—
7/16	0.4375		13"	18"			1	—	6000281	—
29/64	0.4531	11.51			250	310	1	—	—	5968597
29/64	0.4531	11.51			400	460	1	—	—	5968606

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	d <sub>1</sub> Øh <sub>8</sub> mm	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	Pack Qty	1511	1813	A125
29/64	0.4531		13"	18"			1	—	5999967	—
15/32	0.4688	11.91			200	250	1	—	—	5968162
15/32	0.4687	11.91			250	310	1	—	—	5968164
15/32	0.4687	11.91			400	460	1	—	—	5968166
15/32	0.4687		13"	18"			1	—	5999917	—
	0.4724	12.00			200	250	1	—	—	5968130
	0.4724	12.00			250	310	1	—	—	5968132
	0.4724	12.00			300	400	1	—	—	5968134
31/64	0.4844	12.30			250	310	1	—	—	5968720
31/64	0.4844	12.30			400	460	1	—	—	5968772
31/64	0.4844		13"	18"			1	—	6000337	—
1/2	0.5000	12.70			200	250	1	—	—	5968857
1/2	0.5000	12.70			250	310	1	—	—	5968030
1/2	0.5000	12.70			300	400	1	—	—	5968089
1/2	0.5000	12.70			400	460	1	—	—	5968125
1/2	0.5000		11"	15"			1	5999814	—	—
1/2	0.5000		13"	18"			1	—	5999888	—
	0.5118	13.00			250	310	1	—	—	5968136
	0.5118	13.00			300	400	1	—	—	5968138
33/64	0.5156	13.10			250	310	1	—	—	5968825
33/64	0.5156	13.10			400	460	1	—	—	5968879
33/64	0.5156		13"	18"			1	—	6000375	—
17/32	0.5313	13.49			250	310	1	—	—	5968603
17/32	0.5313	13.49			400	460	1	—	—	5968641
17/32	0.5313		11"	15"			1	5999833	—	—
17/32	0.5313		13"	18"			1	—	5999920	—
35/64	0.5469	13.89			250	310	1	—	—	5968910
35/64	0.5469	13.89			400	460	1	—	—	5968914
35/64	0.5469		13"	18"			1	—	6000419	—
	0.5512	14.00			250	310	1	—	—	5968156
	0.5512	14.00			300	400	1	—	—	5968158
9/16	0.5625	14.29			250	310	1	—	—	5969020
9/16	0.5625	14.29			400	460	1	—	—	5969025
9/16	0.5625		11"	15"			1	5999875	—	—
9/16	0.5625		13"	18"			1	—	6000286	—
37/64	0.5781	14.68			250	310	1	—	—	5968916
37/64	0.5781		13"	18"			1	—	6000427	—
19/32	0.5937	15.08			250	310	1	—	—	5968669
19/32	0.5937	15.08			400	460	1	—	—	5968671
19/32	0.5937		13"	18"			1	—	5999933	—
39/64	0.6094	15.48			250	310	1	—	—	5968918
39/64	0.6094	15.48			400	460	1	—	—	5968920
39/64	0.6094		13"	18"			1	—	6000430	—
5/8	0.6250	15.88			250	310	1	—	—	5968864
5/8	0.6250	15.88			400	460	1	—	—	5968869
5/8	0.6250		11"	15"			1	5999865	—	—
5/8	0.6250		13"	18"			1	—	6000438	—
21/32	0.6563	16.67			250	310	1	—	—	5968536
21/32	0.6563	16.67			400	460	1	—	—	5968540
21/32	0.6563		11"	15"			1	5999835	—	—
21/32	0.6563		13"	18"			1	—	5999940	—
11/16	0.6875	17.46			250	310	1	—	—	5968107
11/16	0.6875	17.46			400	460	1	—	—	5968110
11/16	0.6875		11"	15"			1	5999820	—	—
11/16	0.6875		13"	18"			1	—	5999896	—
23/32	0.7188	18.26			250	310	1	—	—	5968556
23/32	0.7188	18.26			400	460	1	—	—	5968562
23/32	0.7188		11"	15"			1	5999843	—	—
23/32	0.7188		13"	18"			1	—	5999948	—
3/4	0.7500	19.05			250	310	1	—	—	5968653
3/4	0.7500	19.05			400	460	1	—	—	5968655
3/4	0.7500		11"	15"			1	5999854	—	—
3/4	0.7500		13"	18"			1	—	6000275	—
25/32	0.7813	19.84			400	460	1	—	—	5968579
25/32	0.7813		11"	15"			1	5999848	—	—

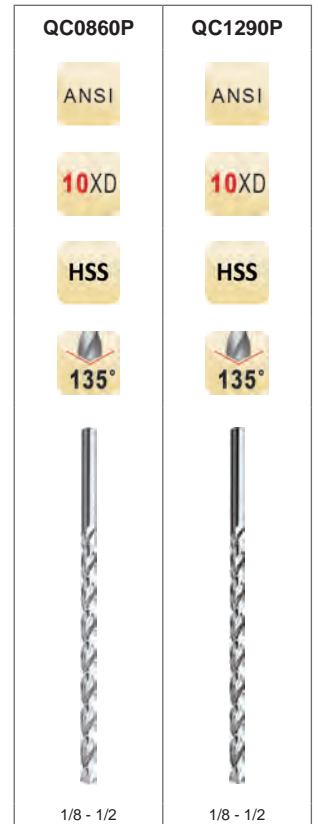
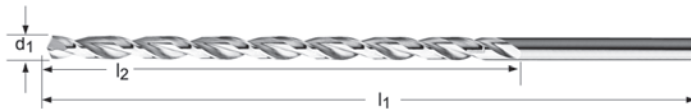
$d_1$ Ø Inch	$d_1$ decimal Inch	$d_1$ Ø <sub>h<sub>8</sub></sub> mm	$l_2$ Inch	$l_1$ Inch	$l_2$ mm	$l_1$ mm	Pack Qty	1511	1813	A125
25/32	0.7813		13"	18"			1	—	5999954	—
13/16	0.8125	20.64			400	460	1	—	—	5968140
13/16	0.8125		11"	15"			1	5999827	—	—
13/16	0.8125		13"	18"			1	—	5999904	—
7/8	0.8750	22.22			400	460	1	—	—	5968965
7/8	0.8750		11"	15"			1	5999872	—	—
7/8	0.8750		13"	18"			1	—	6000284	—
15/16	0.9375	23.81			400	460	1	—	—	5968160
15/16	0.9375		11"	15"			1	5999830	—	—
15/16	0.9375		13"	18"			1	—	5999912	—
1"	1.0000	25.40			400	460	1	—	—	5968053
1"	1.0000		11"	15"			1	5999811	—	—
1"	1.0000		13"	18"			1	—	5999885	—

**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 <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	QC0860P	QC1290P
1/8	0.1250	6"	8"	1	5995727	—
1/8	0.1250	9"	12"	1	—	5996453
9/64	0.1406	6"	8"	1	5995814	—
9/64	0.1406	9"	12"	1	—	5996464
5/32	0.1563	6"	8"	1	5995797	—
5/32	0.1563	9"	12"	1	—	5996456
11/64	0.1719	6"	8"	1	5995734	—
11/64	0.1719	9"	12"	1	—	5996504
3/16	0.1875	6"	8"	1	5995781	—
3/16	0.1875	9"	12"	1	—	5996441
13/64	0.2031	6"	8"	1	5995744	—
13/64	0.2031	9"	12"	1	—	5996550
7/32	0.2188	6"	8"	1	5995806	—
7/32	0.2188	9"	12"	1	—	5996460
15/64	0.2344	6"	8"	1	5995748	—
15/64	0.2344	9"	12"	1	—	5996558
1/4	0.2500	6"	8"	1	5995725	—
1/4	0.2500	9"	12"	1	—	5996417
17/64	0.2656	6"	8"	1	5995752	—
17/64	0.2656	9"	12"	1	—	5996562
9/32	0.2813	6"	8"	1	5995810	—
9/32	0.2813	9"	12"	1	—	5996462
19/64	0.2969	6"	8"	1	5995754	—
19/64	0.2969	9"	12"	1	—	5996422
5/16	0.3125	6"	8"	1	5995794	—
5/16	0.3125	9"	12"	1	—	5996451
21/64	0.3281	6"	8"	1	5995758	—
21/64	0.3281	9"	12"	1	—	5996426
11/32	0.3437	6"	8"	1	5995730	—
11/32	0.3437	9"	12"	1	—	5996476
23/64	0.3594	6"	8"	1	5995762	—
23/64	0.3594	9"	12"	1	—	5996429
3/8	0.3750	6"	8"	1	5995786	—

# EXTRA LENGTH DRILL



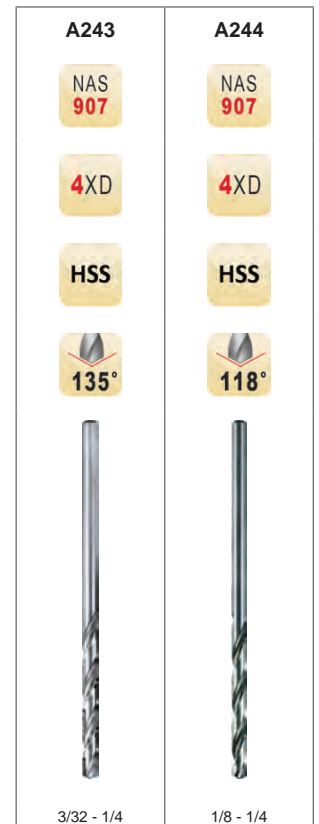
$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	QC0860P	QC1290P
3/8	0.3750	9"	12"	1	—	5996445
25/64	0.3906	6"	8"	1	5995766	—
25/64	0.3906	9"	12"	1	—	5996430
13/32	0.4063	6"	8"	1	5995740	—
13/32	0.4063	9"	12"	1	—	5996542
27/64	0.4219	6"	8"	1	5995770	—
27/64	0.4219	9"	12"	1	—	5996433
7/16	0.4375	6"	8"	1	5995803	—
7/16	0.4375	9"	12"	1	—	5996458
29/64	0.4531	6"	8"	1	5995778	—
15/32	0.4687	6"	8"	1	5995746	—
15/32	0.4687	9"	12"	1	—	5996554
31/64	0.4844	6"	8"	1	5995790	—
1/2	0.5000	6"	8"	1	5995722	—
1/2	0.5000	9"	12"	1	—	5995821



## Aircraft Extension (NAS 907)

**A243 (NAS 907 Type B)** Low thrust design self centering 135° Split Point for easier penetration. Bright Finish improves chip flow in soft or non-ferrous materials.

**A244 (NAS 907 Type A)** Low thrust design self centering 118° Split Point for easier penetration. Bright Finish improves chip flow in soft or non-ferrous materials.



$d_1$ $\varnothing h_8$ Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	A243	A244
3/32	0.0938	1.1/4	6"	10	5968855	—
40	0.0980	1.3/8	6"	10	5968835	—
1/8	0.1250	1.5/8	6"	10	5968845	5968875
30	0.1285	1.5/8	6"	10	5968830	—
5/32	0.1563	2"	6"	10	5968861	5968884
21	0.1590	2.1/8	6"	10	5968822	—
20	0.1610	2.1/8	6"	10	5968818	—
3/16	0.1875	2.5/16	6"	10	5968850	5968880
11	0.1910	2.5/16	6"	10	5968813	—
10	0.1935	2.7/16	6"	10	5968803	—
1/4	0.2500	2.3/4	6"	10	5968840	5968870

# AIRCRAFT EXTENSION DRILL



## Aircraft Extension (NAS 907 Type B)

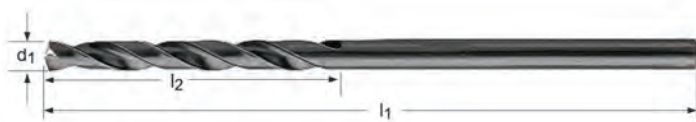
**500-6** - Fractional Sizes

**501-6** - Wire Gauge Sizes

**502-6** - Letter Sizes

Low thrust design self centering 135° Split Point for easier penetration. Steam tempered for increased wear resistance & lubricity.

6" overall length.



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø 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	—	6001340 <sup>1)</sup>	—
	59		0.0410	11/16	6"	12	—	6001332 <sup>1)</sup>	—
	58		0.0420	11/16	6"	12	—	6001329 <sup>1)</sup>	—
	57		0.0430	3/4	6"	12	—	6001326 <sup>1)</sup>	—
	56		0.0465	3/4	6"	12	—	6001323 <sup>1)</sup>	—
3/64			0.0469	3/4	6"	12	6001203	—	—
	55		0.0520	7/8	6"	12	—	6001320 <sup>1)</sup>	—
	54		0.0550	7/8	6"	12	—	6001317 <sup>1)</sup>	—
	53		0.0595	7/8	6"	12	—	6001314 <sup>1)</sup>	—
1/16			0.0625	7/8	6"	12	6001270	—	—
	52		0.0635	7/8	6"	12	—	6001311	—
	51		0.0670	1"	6"	12	—	6001309	—
	50		0.0700	1"	6"	12	—	6001302	—
	49		0.0730	1"	6"	12	—	6001296	—
	48		0.0760	1"	6"	12	—	6001293	—
5/64			0.0781	1"	6"	12	6001212	—	—
	47		0.0785	1"	6"	12	—	6001289	—
	46		0.0810	1.1/8	6"	12	—	6001285	—
	45		0.0820	1.1/8	6"	12	—	6001282	—
	44		0.0860	1.1/8	6"	12	—	6001276	—
	43		0.0890	1.1/4	6"	12	—	6001271	—
	42		0.0935	1.1/4	6"	12	—	6001268	—
3/32			0.0938	1.1/4	6"	12	6001201	—	—
	41		0.0960	1.3/8	6"	12	—	6001448	—
	40		0.0980	1.3/8	6"	12	—	6001446	—
	39		0.0995	1.3/8	6"	12	—	6001439	—
	38		0.1015	1.7/16	6"	12	—	6001427	—
	37		0.1040	1.7/16	6"	12	—	6001371	—
	36		0.1065	1.7/16	6"	12	—	6001337	—
7/64			0.1094	1.1/2	6"	12	6001220	—	—
	35		0.1100	1.1/2	6"	12	—	6001305	—
	34		0.1110	1.1/2	6"	12	—	6001261	—

<sup>1)</sup> Not Split Point

d <sub>1</sub> ∅ Inch	d <sub>1</sub> ∅ Nr.	d <sub>1</sub> ∅ letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	500-6	501-6	502-6
	33		0.1130	1.1/2	6"	12	—	6001507	—
	32		0.1160	1.5/8	6"	12	—	6001503	—
	31		0.1200	1.5/8	6"	12	—	6001502	—
1/8			0.1250	1.5/8	6"	12	6001288	—	—
	30		0.1285	1.5/8	6"	12	—	6001500	—
	29		0.1360	1.3/4	6"	12	—	6001496	—
	28		0.1405	1.3/4	6"	12	—	6001494	—
9/64			0.1406	1.3/4	6"	12	6001224	—	—
	27		0.1440	1.7/8	6"	12	—	6001492	—
	26		0.1470	1.7/8	6"	12	—	6001490	—
	25		0.1495	1.7/8	6"	12	—	6001489	—
	24		0.1520	2"	6"	12	—	6001487	—
	23		0.1540	2"	6"	12	—	6001483	—
5/32			0.1563	2"	6"	12	6001211	—	—
	22		0.1570	2"	6"	12	—	6001481	—
	21		0.1590	2.1/8	6"	12	—	6001479	—
	20		0.1610	2.1/8	6"	12	—	6001477	—
	19		0.1660	2.1/8	6"	12	—	6001473	—
	18		0.1695	2.1/8	6"	12	—	6001471	—
11/64			0.1719	2.1/8	6"	12	6001142	—	—
	17		0.1730	2.3/16	6"	12	—	6001469	—
	16		0.1770	2.3/16	6"	12	—	6001467	—
	15		0.1800	2.3/16	6"	12	—	6001465	—
	14		0.1820	2.3/16	6"	12	—	6001461	—
	13		0.1850	2.5/16	6"	12	—	6001459	—
3/16			0.1875	2.5/16	6"	12	6001199	—	—
	12		0.1890	2.5/16	6"	12	—	6001457	—
	11		0.1910	2.5/16	6"	12	—	6001455	—
	10		0.1935	2.7/16	6"	12	—	6001453	—
	9		0.1960	2.7/16	6"	12	—	6001349	—
	8		0.1990	2.7/16	6"	12	—	6001346	—
	7		0.2010	2.7/16	6"	12	—	6001343	—
13/64			0.2031	2.7/16	6"	12	6001150	—	—
	6		0.2040	2.1/2	6"	12	—	6001334	—
	5		0.2055	2.1/2	6"	12	—	6001299	—
	4		0.2090	2.1/2	6"	12	—	6001443	—
	3		0.2130	2.1/2	6"	12	—	6001498	—
7/32			0.2188	2.1/2	6"	12	6001218	—	—
	2		0.2210	2.5/8	6"	12	—	6001475	—
	1		0.2280	2.5/8	6"	12	—	6001451	—
		A	0.2340	2.5/8	6"	12	—	—	6001257
15/64			0.2344	2.5/8	6"	12	6001160	—	—
		B	0.2380	2.3/4	6"	12	—	—	6001260
		C	0.2420	2.3/4	6"	12	—	—	6001265
		D	0.2460	2.3/4	6"	12	—	—	6001272
1/4			0.2500	2.3/4	6"	12	6001284	—	—
		E	0.2570	2.7/8	6"	12	—	—	6001281
		F	0.2610	2.7/8	6"	6	—	—	6001286
17/64			0.2656	2.7/8	6"	6	6001167	—	—
		H	0.2660	2.7/8	6"	6	—	—	6001290
		I	0.2720	2.7/8	6"	6	—	—	6001294
		J	0.2770	2.7/8	6"	6	—	—	6001297
		K	0.2810	2.15/16	6"	6	—	—	6001303
9/32			0.2813	2.15/16	6"	6	6001222	—	—
		L	0.2900	2.15/16	6"	6	—	—	6001306
		M	0.2950	3.1/16	6"	6	—	—	6001308
19/64			0.2969	3.1/16	6"	6	6001172	—	—
		N	0.3020	3.1/16	6"	6	—	—	6001310
5/16			0.3125	3.3/16	6"	6	6001209	—	—
		O	0.3160	3.3/16	6"	6	—	—	6001313
		P	0.3230	3.5/16	6"	6	—	—	6001316
21/64			0.3281	3.5/16	6"	6	6001177	—	—
		Q	0.3320	3.7/16	6"	6	—	—	6001319
		R	0.3390	3.7/16	6"	6	—	—	6001322
11/32			0.3437	3.7/16	6"	6	6001292	—	—

# AIRCRAFT EXTENSION DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	500-6	501-6	502-6
		S	0.3480	3.1/2	6"	6	—	—	6001325
		T	0.3580	3.1/2	6"	6	—	—	6001328
23/64			0.3594	3.1/2	6"	6	6001180	—	—
		U	0.3680	3.5/8	6"	6	—	—	6001336
3/8			0.3750	3.5/8	6"	6	6001204	—	—
		V	0.3770	3.5/8	6"	6	—	—	6001339
		W	0.3860	3.3/4	6"	6	—	—	6001342
25/64			0.3906	3.3/4	6"	6	6001185	—	—
		X	0.3970	3.3/4	6"	6	—	—	6001345
		Y	0.4040	3.7/8	6"	6	—	—	6001348
13/32			0.4063	3.7/8	6"	6	6001146	—	—
		Z	0.4130	3.7/8	6"	6	—	—	6001351
27/64			0.4219	3.15/16	6"	6	6001192	—	—
7/16			0.4375	4.1/16	6"	6	6001216	—	—
29/64			0.4531	4.3/16	6"	6	6001195	—	—
15/32			0.4687	4.5/16	6"	6	6001155	—	—
31/64			0.4844	4.3/8	6"	6	6001207	—	—
1/2			0.5000	4.1/2	6"	6	6001280	—	—

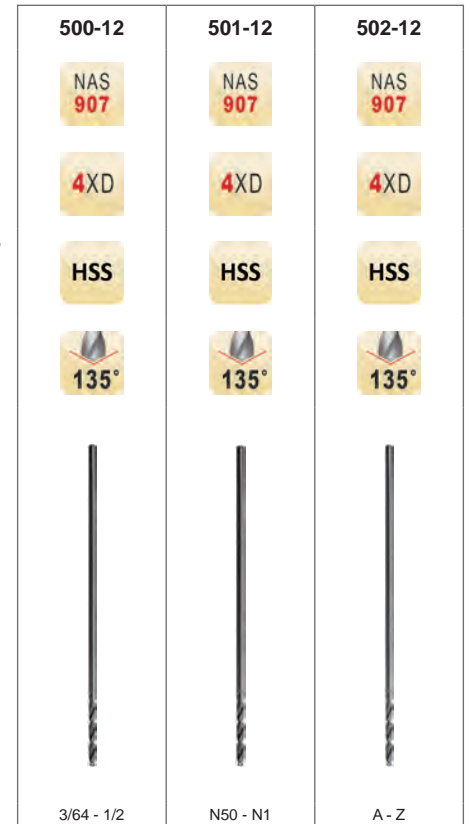
**Aircraft Extension (NAS 907 Type B)**

**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 tempered for increased wear resistance & lubricity.  
 12" Over All Length



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø 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	6001382 <sup>1)</sup>	—	—
1/16			0.0625	7/8	12"	12	6001315	—	—
	50		0.0700	1"	12"	12	—	6001441	—
	49		0.0730	1"	12"	12	—	6001425	—
	48		0.0760	1"	12"	12	—	6001420	—
5/64			0.0781	1"	12"	12	6001408	—	—
	47		0.0785	1"	12"	12	—	6001415	—
	46		0.0810	1.1/8	12"	12	—	6001410	—
	45		0.0820	1.1/8	12"	12	—	6001406	—
	44		0.0860	1.1/8	12"	12	—	6001401	—
	43		0.0890	1.1/4	12"	12	—	6001396	—
	42		0.0935	1.1/4	12"	12	—	6001394	—
3/32			0.0938	1.1/4	12"	12	6001377	—	—
	41		0.0960	1.3/8	12"	12	—	6001386	—
	40		0.0980	1.3/8	12"	12	—	6001381	—
	37		0.1040	1.7/16	12"	12	—	6001509	—
	36		0.1065	1.7/16	12"	12	—	6001506	—
7/64			0.1094	1.1/2	12"	12	6001189	—	—
	31		0.1200	1.5/8	12"	12	—	6001485	—
1/8			0.1250	1.5/8	12"	12	6001324	—	—
	30		0.1285	1.5/8	12"	12	—	6001463	—
	29		0.1360	1.3/4	12"	12	—	6001375	—
9/64			0.1406	1.3/4	12"	12	6001236	—	—
	27		0.1440	1.7/8	12"	12	—	6001275	—
	26		0.1470	1.7/8	12"	12	—	6001266	—
	25		0.1495	1.7/8	12"	12	—	6001262	—
	23		0.1540	2"	12"	12	—	6001258	—
5/32			0.1563	2"	12"	12	6001402	—	—
	22		0.1570	2"	12"	12	—	6001254	—
	21		0.1590	2.1/8	12"	12	—	6001250	—
	20		0.1610	2.1/8	12"	12	—	6001247	—
	19		0.1660	2.1/8	12"	12	—	6001245	—

<sup>1)</sup> Not Split Point

# AIRCRAFT EXTENSION DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	500-12	501-12	502-12
	18		0.1695	2.1/8	12"	12	—	6001242	—
11/64			0.1719	2.1/8	12"	12	6001333	—	—
	17		0.1730	2.3/16	12"	12	—	6001240	—
	16		0.1770	2.3/16	12"	12	—	6001238	—
	13		0.1850	2.5/16	12"	12	—	6001234	—
3/16			0.1875	2.5/16	12"	6	6001372	—	—
	12		0.1890	2.5/16	12"	6	—	6001232	—
	11		0.1910	2.5/16	12"	6	—	6001231	—
	10		0.1935	2.7/16	12"	6	—	6001229	—
	9		0.1960	2.7/16	12"	6	—	6001449	—
	7		0.2010	2.7/16	12"	6	—	6001445	—
13/64			0.2031	2.7/16	12"	6	6001338	—	—
	5		0.2055	2.1/2	12"	6	—	6001436	—
	4		0.2090	2.1/2	12"	6	—	6001515	—
	3		0.2130	2.1/2	12"	6	—	6001430	—
7/32			0.2188	2.1/2	12"	6	6001134	—	—
	1		0.2280	2.5/8	12"	6	—	6001226	—
		A	0.2340	2.5/8	12"	6	—	—	6001352
15/64			0.2344	2.5/8	12"	6	6001344	—	—
		B	0.2380	2.3/4	12"	6	—	—	6001355
		C	0.2420	2.3/4	12"	6	—	—	6001358
		D	0.2460	2.3/4	12"	6	—	—	6001361
1/4			0.2500	2.3/4	12"	6	6001321	—	—
		F	0.2570	2.7/8	12"	6	—	—	6001368
		G	0.2610	2.7/8	12"	6	—	—	6001376
17/64			0.2656	2.7/8	12"	6	6001347	—	—
		H	0.2660	2.7/8	12"	6	—	—	6001380
		I	0.2720	2.7/8	12"	6	—	—	6001385
		J	0.2770	2.7/8	12"	6	—	—	6001390
		K	0.2810	2.15/16	12"	6	—	—	6001395
9/32			0.2813	2.15/16	12"	6	6001214	—	—
		L	0.2900	2.15/16	12"	6	—	—	6001400
		M	0.2950	3.1/16	12"	6	—	—	6001405
19/64			0.2969	3.1/16	12"	6	6001350	—	—
		N	0.3020	3.1/16	12"	6	—	—	6001414
5/16			0.3125	3.3/16	12"	6	6001397	—	—
		O	0.3160	3.3/16	12"	6	—	—	6001419
		P	0.3230	3.5/16	12"	6	—	—	6001424
21/64			0.3281	3.5/16	12"	6	6001353	—	—
		Q	0.3320	3.7/16	12"	6	—	—	6001434
		R	0.3390	3.7/16	12"	6	—	—	6001251
11/32			0.3437	3.7/16	12"	6	6001327	—	—
		S	0.3480	3.1/2	12"	3	—	—	6001300
		T	0.3580	3.1/2	12"	3	—	—	6001331
23/64			0.3594	3.1/2	12"	3	6001356	—	—
		U	0.3680	3.5/8	12"	3	—	—	6001367
3/8			0.3750	3.5/8	12"	3	6001388	—	—
		V	0.3770	3.5/8	12"	3	—	—	6001423
		W	0.3860	3.3/4	12"	3	—	—	6001432
25/64			0.3906	3.3/4	12"	3	6001359	—	—
		X	0.3970	3.3/4	12"	3	—	—	6001438
		Y	0.4040	3.7/8	12"	3	—	—	6001442
13/32			0.4063	3.7/8	12"	3	6001335	—	—
		Z	0.4130	3.7/8	12"	3	—	—	6001447
27/64			0.4219	3.15/16	12"	3	6001366	—	—
7/16			0.4375	4.1/16	12"	3	6001417	—	—
29/64			0.4531	4.3/16	12"	3	6001369	—	—
15/32			0.4687	4.5/16	12"	3	6001341	—	—
31/64			0.4844	4.3/8	12"	3	6001393	—	—
1/2			0.5000	4.1/2	12"	3	6001318	—	—

## 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 tempered for wear resistance and lubricity. For enhanced tool life in ferrous materials.



d <sub>1</sub> Ø Inch	d <sub>1</sub>	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	CO500-6	CO501-6	CO500-12	CO501-12
1/16		0.0625	7/8	12"	12	—	—	5995755	—
1/16		0.0625	7/8	6"	12	5995809	—	—	—
	52	0.0635	7/8	6"	12	—	5996131	—	—
	51	0.0670	1"	6"	12	—	5996127	—	—
	50	0.0700	1"	6"	12	—	5996123	—	—
	49	0.0730	1"	6"	12	—	5996116	—	—
	48	0.0760	1"	6"	12	—	5996113	—	—
5/64		0.0781	1"	12"	12	—	—	5995796	—
5/64		0.0781	1"	6"	12	5995848	—	—	—
	47	0.0785	1"	6"	12	—	5996110	—	—
	46	0.0810	1.1/8	6"	12	—	5996107	—	—
	45	0.0820	1.1/8	6"	12	—	5996104	—	—
	44	0.0860	1.1/8	6"	12	—	5996097	—	—
	43	0.0890	1.1/4	6"	12	—	5996094	—	—
	42	0.0935	1.1/4	6"	12	—	5996092	—	—
3/32		0.0938	1.1/4	12"	12	—	—	5995787	—
3/32		0.0938	1.1/4	6"	12	5995842	—	—	—
	41	0.0960	1.3/8	6"	12	—	5996088	—	—
	40	0.0980	1.3/8	12"	12	—	—	—	5995909
	40	0.0980	1.3/8	6"	12	—	5996086	—	—
	39	0.0995	1.3/8	6"	12	—	5996080	—	—
	38	0.1015	1.7/16	6"	12	—	5996077	—	—
	37	0.1040	1.7/16	6"	12	—	5996072	—	—
	36	0.1065	1.7/16	6"	12	—	5996067	—	—
7/64		0.1094	1.1/2	12"	12	—	—	5995802	—
7/64		0.1094	1.1/2	6"	12	5995854	—	—	—
	35	0.1100	1.1/2	6"	12	—	5996060	—	—
	34	0.1110	1.1/2	6"	12	—	5996056	—	—
	33	0.1130	1.1/2	6"	12	—	5996053	—	—
	32	0.1160	1.5/8	6"	12	—	5996047	—	—
	31	0.1200	1.5/8	6"	12	—	5996044	—	—
1/8		0.1250	1.5/8	12"	12	—	—	5995763	—
1/8		0.1250	1.5/8	6"	12	5995818	—	—	—

# AIRCRAFT EXTENSION DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub>	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	CO500-6	CO501-6	CO500-12	CO501-12
	30	0.1285	1.5/8	12"	12	—	—	—	5995899
	30	0.1285	1.5/8	6"	12	—	5996040	—	—
	29	0.1360	1.3/4	12"	12	—	—	—	5995895
	29	0.1360	1.3/4	6"	12	—	5996033	—	—
	28	0.1405	1.3/4	6"	12	—	5996029	—	—
9/64		0.1406	1.3/4	12"	12	—	—	5995805	—
9/64		0.1406	1.3/4	6"	12	5995858	—	—	—
	27	0.1440	1.7/8	12"	12	—	—	—	5995891
	27	0.1440	1.7/8	6"	12	—	5996024	—	—
	26	0.1470	1.7/8	6"	12	—	5996018	—	—
	25	0.1495	1.7/8	6"	12	—	5996014	—	—
	24	0.1520	2"	6"	12	—	5996010	—	—
	23	0.1540	2"	6"	12	—	5996007	—	—
5/32		0.1563	2"	12"	12	—	—	5995792	—
5/32		0.1563	2"	6"	12	5995845	—	—	—
	22	0.1570	2"	6"	12	—	5996004	—	—
	21	0.1590	2.1/8	12"	12	—	—	—	5995887
	21	0.1590	2.1/8	6"	12	—	5996000	—	—
	20	0.1610	2.1/8	12"	12	—	—	—	5995883
	20	0.1610	2.1/8	6"	12	—	5995996	—	—
	19	0.1660	2.1/8	12"	12	—	—	—	5995877
	19	0.1660	2.1/8	6"	12	—	5995988	—	—
	18	0.1695	2.1/8	6"	12	—	5995984	—	—
11/64		0.1719	2.1/8	12"	12	—	—	5995767	—
11/64		0.1719	2.1/8	6"	12	5995822	—	—	—
	17	0.1730	2.3/16	6"	12	—	5996159	—	—
	16	0.1770	2.3/16	12"	12	—	—	—	5995873
	16	0.1770	2.3/16	6"	12	—	5996155	—	—
	15	0.1800	2.3/16	6"	12	—	5996151	—	—
	14	0.1820	2.3/16	6"	12	—	5996147	—	—
	13	0.1850	2.5/16	6"	12	—	5996139	—	—
3/16		0.1875	2.5/16	12"	6	—	—	5995779	—
3/16		0.1875	2.5/16	6"	12	5995839	—	—	—
	12	0.1890	2.5/16	6"	12	—	5996100	—	—
	11	0.1910	2.5/16	12"	12	—	—	—	5995869
	11	0.1910	2.5/16	6"	12	—	5996064	—	—
	10	0.1935	2.7/16	12"	6	—	—	—	5995861
	10	0.1935	2.7/16	6"	12	—	5996022	—	—
	9	0.1960	2.7/16	6"	12	—	5995556	—	—
	8	0.1990	2.7/16	6"	12	—	5995507	—	—
	7	0.2010	2.7/16	6"	12	—	5996143	—	—
13/64		0.2031	2.7/16	12"	6	—	—	5995771	—
13/64		0.2031	2.7/16	6"	12	5995831	—	—	—
	6	0.2040	2.1/2	6"	12	—	5996135	—	—
	5	0.2055	2.1/2	6"	12	—	5996119	—	—
	4	0.2090	2.1/2	6"	12	—	5996083	—	—
	3	0.2130	2.1/2	6"	12	—	5996037	—	—
7/32		0.2188	2.1/2	12"	6	—	—	5995799	—
7/32		0.2188	2.1/2	6"	12	5995851	—	—	—
	2	0.2210	2.5/8	12"	6	—	—	—	5995880
	2	0.2210	2.5/8	6"	12	—	5995992	—	—
	1	0.2280	2.5/8	6"	12	—	5995980	—	—
15/64		0.2344	2.5/8	12"	6	—	—	5995775	—
15/64		0.2344	2.5/8	6"	12	5995835	—	—	—
1/4		0.2500	2.3/4	12"	6	—	—	5995759	—
1/4		0.2500	2.3/4	6"	12	5995813	—	—	—

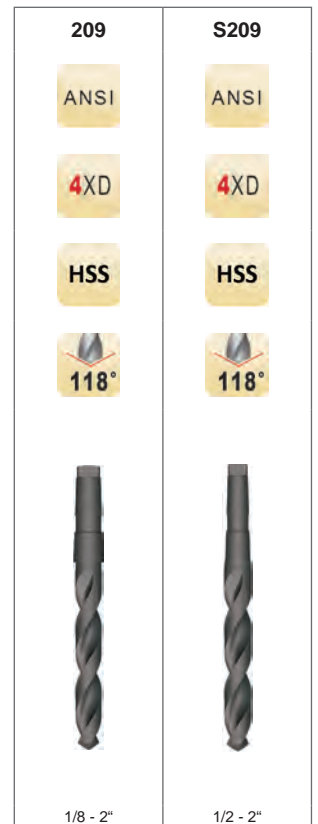
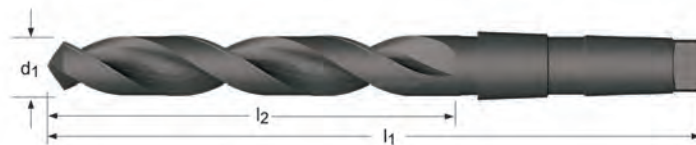


**General Purpose Taper Shank**

**209** Standard Taper Type

**S209** Small Taper Type

Steam tempered for increased tool life & lubricity.



$d_1$ 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	6001003	—
9/64	0.1406	2.1/8	5.3/8	1	1	6001068	—
5/32	0.1563	2.1/8	5.3/8	1	1	6001011	—
11/64	0.1719	2.1/2	5.3/4	1	1	6001018	—
3/16	0.1875	2.1/2	5.3/4	1	1	6001135	—
13/64	0.2031	2.3/4	6"	1	1	6001032	—
7/32	0.2188	2.3/4	6"	1	1	6001056	—
15/64	0.2344	2.7/8	6.1/8	1	1	6001048	—
1/4	0.2500	2.7/8	6.1/8	1	1	6001000	—
17/64	0.2656	3"	6.1/4	1	1	6001054	—
9/32	0.2813	3"	6.1/4	1	1	6001065	—
19/64	0.2969	3.1/8	6.3/8	1	1	6001060	—
5/16	0.3125	3.1/8	6.3/8	1	1	6001196	—
21/64	0.3281	3.1/4	6.1/2	1	1	6001095	—
11/32	0.3437	3.1/4	6.1/2	1	1	6001012	—
23/64	0.3594	3.1/2	6.3/4	1	1	6001101	—
3/8	0.3750	3.1/2	6.3/4	1	1	6001144	—
25/64	0.3906	3.5/8	7"	1	1	6001112	—
13/32	0.4063	3.5/8	7"	1	1	6001027	—
27/64	0.4219	3.7/8	7.1/4	1	1	6001118	—
7/16	0.4375	3.7/8	7.1/4	1	1	6001050	—
29/64	0.4531	4.1/8	7.1/2	1	1	6001125	—
15/32	0.4687	4.1/8	7.1/2	1	1	6001046	—
31/64	0.4844	4.3/8	8.1/4	2	1	6001152	—
1/2	0.5000	4.3/8	7.3/4	1	1	—	5999934
1/2	0.5000	4.3/8	8.1/4	2	1	6000998	—
33/64	0.5156	4.5/8	8"	1	1	—	5999791
33/64	0.5156	4.5/8	8.1/2	2	1	6001161	—
17/32	0.5313	4.5/8	8"	1	1	—	5999777
17/32	0.5313	4.5/8	8.1/2	2	1	6001051	—
35/64	0.5469	4.7/8	8.1/4	1	1	—	5999793
35/64	0.5469	4.7/8	8.3/4	2	1	6001005	—
9/16	0.5625	4.7/8	8.1/4	1	1	—	5999807

# TAPER SHANK DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	MTS	Pack Qty	209	S209
9/16	0.5625	4.7/8	8.3/4	2	1	6001062	—
37/64	0.5781	4.7/8	8.3/4	2	1	6001053	—
19/32	0.5937	4.7/8	8.3/4	2	1	6001057	—
39/64	0.6094	4.7/8	8.3/4	2	1	6001086	—
5/8	0.6250	4.7/8	8.3/4	2	1	6001015	—
41/64	0.6406	5.1/8	9"	2	1	6001120	—
21/32	0.6563	5.1/8	9"	2	1	6001093	—
43/64	0.6719	5.3/8	9.1/4	2	1	6001175	—
11/16	0.6875	5.3/8	9.1/4	2	1	6001008	—
45/64	0.7031	5.5/8	9.1/2	2	1	6001186	—
23/32	0.7188	5.5/8	9.1/2	2	1	6001098	—
47/64	0.7344	5.7/8	9.3/4	2	1	6001190	—
3/4	0.7500	5.7/8	9.3/4	2	1	6001139	—
49/64	0.7656	6"	9.7/8	2	1	6001193	—
25/32	0.7813	6"	9.7/8	2	1	6001104	—
51/64	0.7969	6.1/8	10"	2	1	—	5999794
51/64	0.7969	6.1/8	10.3/4	3	1	6001021	—
13/16	0.8125	6.1/8	10"	2	1	—	5999772
13/16	0.8125	6.1/8	10.3/4	3	1	6001023	—
53/64	0.8281	6.1/8	10"	2	1	—	5999796
53/64	0.8281	6.1/8	10.3/4	3	1	6001025	—
27/32	0.8438	6.1/8	10"	2	1	—	5999783
27/32	0.8438	6.1/8	10.3/4	3	1	6001115	—
55/64	0.8594	6.1/8	10.3/4	3	1	6001031	—
7/8	0.8750	6.1/8	10"	2	1	—	5999805
7/8	0.8750	6.1/8	10.3/4	3	1	6001059	—
57/64	0.8906	6.1/8	10.3/4	3	1	6001035	—
29/32	0.9063	6.1/8	10"	2	1	—	5999786
29/32	0.9063	6.1/8	10.3/4	3	1	6001122	—
59/64	0.9219	6.1/8	10.3/4	3	1	6001039	—
15/16	0.9375	6.1/8	10.3/4	3	1	6001037	—
61/64	0.9531	6.3/8	11"	3	1	6001043	—
31/32	0.9688	6.3/8	11"	3	1	6001148	—
63/64	0.9844	6.3/8	11"	3	1	6001047	—
1"	1.0000	6.3/8	11"	3	1	5999465	—
1.1/64	1.0156	6.1/2	11.1/8	3	1	5999470	—
1.1/32	1.0312	6.1/2	11.1/8	3	1	5999468	—
1.3/64	1.0469	6.5/8	11.1/4	3	1	5999506	—
1.1/16	1.0625	6.5/8	11.1/4	3	1	5999466	—
1.5/64	1.0781	6.7/8	12.1/2	4	1	6000992	—
1.3/32	1.0937	6.7/8	11.1/2	3	1	—	6000482
1.3/32	1.0937	6.7/8	12.1/2	4	1	5999502	—
1.7/64	1.1094	7.1/8	11.3/4	3	1	—	5999914
1.7/64	1.1094	7.1/8	12.3/4	4	1	6001157	—
1.1/8	1.1250	7.1/8	11.3/4	3	1	—	6000436
1.1/8	1.1250	7.1/8	12.3/4	4	1	5999471	—
1.9/64	1.1406	7.1/4	11.7/8	3	1	—	5999930
1.9/64	1.1406	7.1/4	12.7/8	4	1	6001181	—
1.5/32	1.1563	7.1/4	11.7/8	3	1	—	5999769
1.5/32	1.1563	7.1/4	12.7/8	4	1	5999518	—
1.11/64	1.1719	7.3/8	12"	3	1	—	6000443
1.11/64	1.1719	7.3/8	13"	4	1	5999475	—
1.3/16	1.1875	7.3/8	12"	3	1	—	6000476
1.3/16	1.1875	7.3/8	13"	4	1	5999500	—
1.13/64	1.2031	7.1/2	12.1/8	3	1	—	6000449
1.7/32	1.2187	7.1/2	12.1/8	3	1	—	5999870
1.7/32	1.2187	7.1/2	13.1/8	4	1	6001109	—
1.15/64	1.2344	7.7/8	13.1/2	4	1	5999481	—
1.1/4	1.2500	7.7/8	12.1/2	3	1	—	6000433
1.1/4	1.2500	7.7/8	13.1/2	4	1	5999469	—
1.17/64	1.2656	8.1/2	14.1/8	4	1	5999483	—
1.9/32	1.2813	8.1/2	14.1/8	4	1	6001178	—
1.19/64	1.2969	8.5/8	14.1/4	4	1	5999486	—
1.5/16	1.3125	8.5/8	14.1/4	4	1	5999514	—
1.21/64	1.3281	8.3/4	14.3/8	4	1	5999488	—

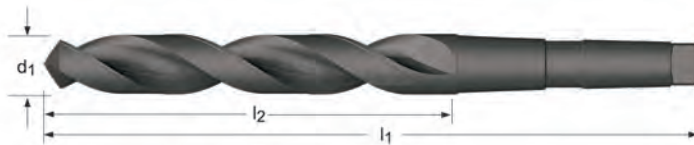
d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	MTS	Pack Qty	209	S209
1.11/32	1.3437	8.3/4	14.3/8	4	1	5999474	—
1.3/8	1.3750	8.7/8	14.1/2	4	1	5999508	—
1.13/32	1.4063	9"	14.5/8	4	1	5999477	—
1.27/64	1.4219	9.1/8	14.3/4	4	1	5999494	—
1.7/16	1.4375	9.1/8	14.3/4	4	1	6001075	—
1.15/32	1.4687	9.1/4	14.7/8	4	1	5999480	—
1.31/64	1.4844	9.3/8	15"	4	1	5999512	—
1.1/2	1.5000	9.3/8	15"	4	1	5999467	—
1.33/64	1.5156	9.3/8	15"	4	1	—	6000491
1.17/32	1.5313	9.3/8	15"	4	1	—	6000461
1.17/32	1.5313	9.3/8	16.3/8	5	1	5999482	—
1.35/64	1.5469	9.5/8	15.1/4	4	1	—	6000497
1.9/16	1.5625	9.5/8	15.1/4	4	1	—	5999926
1.9/16	1.5625	9.5/8	16.5/8	5	1	6001173	—
1.19/32	1.5937	9.7/8	15.1/2	4	1	—	6000463
1.39/64	1.6094	10"	15.5/8	4	1	—	6000504
1.5/8	1.6250	10"	15.5/8	4	1	—	5999828
1.5/8	1.6250	10"	17"	5	1	6001042	—
1.21/32	1.6563	10.1/8	15.3/4	4	1	—	6000465
1.11/16	1.6875	10.1/8	15.3/4	4	1	—	6000440
1.11/16	1.6875	10.1/8	17.1/8	5	1	5999472	—
1.47/64	1.7344	10.3/8	16.1/4	4	1	—	6000520
1.3/4	1.7500	10.1/8	17.1/8	5	1	5999504	—
1.3/4	1.7500	10.3/8	16.1/4	4	1	—	6000484
1.25/32	1.7813	10.3/8	16.1/4	4	1	—	6000469
1.13/16	1.8125	10.1/8	17.1/8	5	1	5999476	—
1.13/16	1.8125	10.3/8	16.1/4	4	1	—	6000446
1.7/8	1.8750	10.1/2	16.1/2	4	1	—	5999922
1.7/8	1.8750	10.3/8	17.3/8	5	1	6001164	—
1.15/16	1.9375	10.3/8	17.3/8	5	1	5999479	—
1.15/16	1.9375	10.5/8	16.5/8	4	1	—	6000455
1.31/32	1.9687	10.5/8	16.5/8	4	1	—	6000488
2"	2.0000	10.3/8	17.3/8	5	1	6001063	—
2"	2.0000	10.5/8	16.5/8	4	1	—	5999780

**General Purpose Taper Shank, Metric**

**5ATS** Steam tempered for increased wear resistance & lubricity.

**A350** Long series. Steam tempered for increased wear resistance & lubricity.

**A530** TiN Coating increases wear resistance and improves tool life. Thinned Point design above 14mm diameter to reduce thrust and improve chip formation.



5ATS	A350	A530
5.00 - 50.00	5.00 - 50.00	8.50 - 40.00

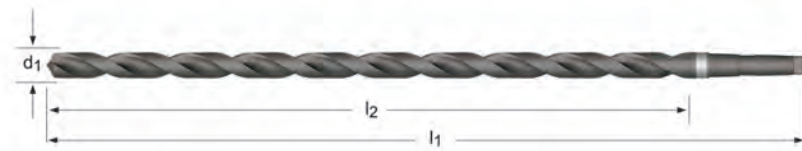
d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	MTS	Pack Qty	5ATS	A350	A530
5.00	0.1969	74	155	1	1	—	5969914	—
5.00	0.1969	52	133	1	1	6001263	—	—
5.50	0.2165	80	161	1	1	—	5969918	—
5.50	0.2165	57	138	1	1	6001267	—	—
6.00	0.2362	80	161	1	1	—	5970237	—
6.00	0.2362	57	138	1	1	6001278	—	—
6.50	0.2559	63	144	1	1	6001283	—	—
6.70	0.2638	86	167	1	1	—	5970279	—
6.80	0.2677	93	174	1	1	—	5970322	—
6.80	0.2677	69	150	1	1	6001287	—	—
7.00	0.2756	93	174	1	1	—	5970363	—
7.00	0.2756	69	150	1	1	6001291	—	—
7.50	0.2953	93	174	1	1	—	5970371	—
7.50	0.2953	69	150	1	1	6001298	—	—
8.00	0.3150	100	181	1	1	—	5970375	—
8.00	0.3150	75	156	1	1	6001301	—	—
8.40	0.3307	100	181	1	1	—	5970378	—
8.50	0.3346	100	181	1	1	—	5970382	—
8.50	0.3346	75	156	1	1	6001304	—	5970277
8.75	0.3445	107	188	1	1	—	5970207	—
9.00	0.3543	107	188	1	1	—	5970209	—
9.00	0.3543	81	162	1	1	6001307	—	5970281
9.50	0.3740	107	188	1	1	—	5970211	—
9.50	0.3740	81	162	1	1	6001312	—	—
9.80	0.3858	116	197	1	1	—	5970215	—
10.00	0.3937	116	197	1	1	—	5969555	—
10.00	0.3937	87	168	1	1	6001470	—	5970037
10.20	0.4016	116	197	1	1	—	5969559	—
10.20	0.4016	87	168	1	1	6001472	—	5970047
10.50	0.4134	116	197	1	1	—	5969564	—
10.50	0.4134	87	168	1	1	6001474	—	5970052
10.70	0.4213	125	206	1	1	—	5969571	—
11.00	0.4331	125	206	1	1	—	5969575	—

d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	MTS	Pack Qty	5ATS	A350	A530
11.00	0.4331	94	175	1	1	6001476	—	5970057
11.50	0.4528	125	206	1	1	—	5969581	—
11.50	0.4528	94	175	1	1	6001478	—	5970062
11.75	0.4626	125	206	1	1	—	5969585	—
11.75	0.4626	94	175	1	1	—	—	5970067
11.80	0.4646	125	206	1	1	—	5969590	—
12.00	0.4724	134	215	1	1	—	5969595	—
12.00	0.4724	101	182	1	1	6001482	—	5970071
12.20	0.4803	101	182	1	1	6001484	—	—
12.50	0.4921	134	215	1	1	—	5969600	—
12.50	0.4921	101	182	1	1	6001486	—	5970075
12.80	0.5039	101	182	1	1	6001488	—	—
13.00	0.5118	134	215	1	1	—	5969605	—
13.00	0.5118	101	182	1	1	6001491	—	5970079
13.50	0.5315	142	223	1	1	—	5969609	—
13.50	0.5315	108	189	1	1	6001493	—	5970084
13.80	0.5433	108	189	1	1	6001495	—	—
14.00	0.5512	142	223	1	1	—	5969613	—
14.00	0.5512	108	189	1	1	6001497	—	5970087
14.25	0.5610	147	245	2	1	—	5969621	—
14.25	0.5610	114	212	2	1	6001499	—	—
14.50	0.5709	147	245	2	1	—	5969625	—
14.50	0.5709	114	212	2	1	6001501	—	5970095
14.75	0.5807	147	245	2	1	—	5969630	—
14.75	0.5807	114	212	2	1	6001505	—	—
15.00	0.5906	147	245	2	1	—	5969635	—
15.00	0.5906	114	212	2	1	6001009	—	5970098
15.25	0.6004	120	218	2	1	—	—	5970101
15.25	0.6004	153	251	2	1	—	5969638	—
15.50	0.6102	153	251	2	1	—	5969642	—
15.50	0.6102	120	218	2	1	6001088	—	5970105
15.75	0.6201	153	251	2	1	—	5969647	—
15.75	0.6201	120	218	2	1	6001119	—	—
16.00	0.6299	153	251	2	1	—	5969651	—
16.00	0.6299	120	218	2	1	6001165	—	5970108
16.25	0.6398	159	257	2	1	—	5969655	—
16.50	0.6496	159	257	2	1	—	5969657	—
16.50	0.6496	125	223	2	1	6001179	—	5970114
16.75	0.6594	159	257	2	1	—	5969663	—
17.00	0.6693	159	257	2	1	—	5969717	—
17.00	0.6693	125	223	2	1	6001187	—	5970117
17.25	0.6791	165	263	2	1	—	5969775	—
17.50	0.6890	165	263	2	1	—	5969834	—
17.50	0.6890	130	228	2	1	6001020	—	5970121
18.00	0.7087	165	263	2	1	—	5969878	—
18.00	0.7087	130	228	2	1	6001026	—	5970125
18.50	0.7283	171	269	2	1	—	5969916	—
18.50	0.7283	135	233	2	1	6001029	—	5970129
19.00	0.7480	171	269	2	1	—	5969920	—
19.00	0.7480	135	233	2	1	6001034	—	5970135
19.50	0.7677	177	275	2	1	—	5969922	—
19.50	0.7677	140	238	2	1	6001038	—	5970206
19.75	0.7776	177	275	2	1	—	5969924	—
20.00	0.7874	177	275	2	1	—	5969927	—
20.00	0.7874	140	238	2	1	6001041	—	5970243
20.25	0.7972	184	282	2	1	—	5969723	—
20.50	0.8071	184	282	2	1	—	5969727	—
20.50	0.8071	145	243	2	1	6001045	—	5970284
21.00	0.8268	184	282	2	1	—	5969731	—
21.00	0.8268	145	243	2	1	6001049	—	5970327
21.50	0.8465	191	289	2	1	—	5969737	—
21.50	0.8465	150	248	2	1	6001052	—	5970368
22.00	0.8661	191	289	2	1	—	5969742	—
22.00	0.8661	150	248	2	1	6001058	—	5970377
22.50	0.8858	198	296	2	1	—	5969746	—

d <sub>1</sub> Øh <sub>8</sub> mm	d <sub>1</sub> decimal Inch	l <sub>2</sub> mm	l <sub>1</sub> mm	MTS	Pack Qty	5ATS	A350	A530
22.50	0.8858	155	253	2	1	6001061	—	5970381
23.00	0.9055	198	296	2	1	—	5969751	—
23.00	0.9055	155	253	2	1	6001064	—	5970384
23.50	0.9252	198	319	3	1	—	5969756	—
23.50	0.9252	155	276	3	1	6001067	—	5970387
24.00	0.9449	206	327	3	1	—	5969764	—
24.00	0.9449	160	281	3	1	6001070	—	5970212
24.50	0.9646	206	327	3	1	—	5969770	—
24.50	0.9646	160	281	3	1	6001073	—	5970214
25.00	0.9843	206	327	3	1	—	5969780	—
25.00	0.9843	160	281	3	1	6001076	—	5970217
25.50	1.0039	165	286	3	1	—	—	5970220
25.50	1.0039	214	335	3	1	—	5969786	—
26.00	1.0236	214	335	3	1	—	5969791	—
26.00	1.0236	165	286	3	1	6001082	—	5970223
26.50	1.0433	214	335	3	1	—	5969796	—
26.50	1.0433	165	286	3	1	6001085	—	5970226
27.00	1.0630	222	343	3	1	—	5969802	—
27.00	1.0630	170	291	3	1	6001091	—	5970229
27.50	1.0827	170	291	3	1	—	—	5970231
27.50	1.0827	222	343	3	1	—	5969805	—
28.00	1.1024	222	343	3	1	—	5969808	—
28.00	1.1024	170	291	3	1	6001099	—	5970235
28.50	1.1220	175	296	3	1	—	—	5970238
29.00	1.1417	230	351	3	1	—	5969813	—
29.00	1.1417	175	296	3	1	6001105	—	5970246
29.50	1.1614	175	296	3	1	—	—	5970250
30.00	1.1811	230	351	3	1	—	5969817	—
30.00	1.1811	175	296	3	1	6001107	—	5970253
30.50	1.2008	239	360	3	1	—	5969826	—
31.00	1.2205	239	360	3	1	—	5969838	—
31.00	1.2205	180	301	3	1	6001113	—	5970257
31.50	1.2402	239	360	3	1	—	5969844	—
32.00	1.2598	248	397	4	1	—	5969848	—
32.00	1.2598	185	334	4	1	6001123	—	5970262
33.00	1.2992	185	334	4	1	—	—	5970266
33.00	1.2992	248	397	4	1	—	5969852	—
34.00	1.3386	257	406	4	1	—	5969855	—
34.00	1.3386	190	339	4	1	6001137	—	—
35.00	1.3780	257	406	4	1	—	5969859	—
35.00	1.3780	190	339	4	1	6001147	—	5970270
36.00	1.4173	267	416	4	1	—	5969863	—
36.00	1.4173	195	344	4	1	6001156	—	—
37.00	1.4567	267	416	4	1	—	5969867	—
37.00	1.4567	195	344	4	1	6001169	—	—
38.00	1.4961	277	426	4	1	—	5969871	—
38.00	1.4961	200	349	4	1	6001295	—	—
39.00	1.5354	277	426	4	1	—	5969874	—
40.00	1.5748	277	426	4	1	—	5969882	—
40.00	1.5748	200	349	4	1	6001362	—	5970275
41.00	1.6142	287	436	4	1	—	5969886	—
42.00	1.6535	287	436	4	1	—	5969889	—
42.00	1.6535	205	354	4	1	6001422	—	—
43.00	1.6929	298	447	4	1	—	5969893	—
44.00	1.7323	298	447	4	1	—	5969897	—
44.00	1.7323	210	359	4	1	6001433	—	—
45.00	1.7717	298	447	4	1	—	5969902	—
46.00	1.8110	310	459	4	1	—	5969905	—
47.00	1.8504	310	459	4	1	—	5969909	—
48.00	1.8898	321	470	4	1	—	5969912	—
50.00	1.9685	321	470	4	1	—	5970204	—
50.00	1.9685	220	369	4	1	6001273	—	—

## General Purpose Taper Shank - Extra Length

**A345** Steam tempered for increase wear resistance & lubricity.



A345

DIN  
1870/1

10XD

HSS

118°



8.00 - 40.00

$d_1$ $\varnothing h_8$ 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	5969532
	8.50	0.3346	165	265	1	1	5969538
	9.00	0.3543	175	275	1	1	5969541
	9.50	0.3740	175	275	1	1	5969546
3/8	9.52	0.3750	185	285	1	1	5969149
	10.00	0.3937	185	285	1	1	5969159
13/32	10.32	0.4063	185	285	1	1	5968967
	10.50	0.4134	185	285	1	1	5969162
	11.00	0.4331	195	300	1	1	5969165
7/16	11.11	0.4375	195	300	1	1	5969520
	11.50	0.4528	195	300	1	1	5969168
29/64	11.51	0.4531	205	310	1	1	5969141
	12.00	0.4724	205	310	1	1	5968952
	12.50	0.4921	205	310	1	1	5968956
1/2	12.70	0.5000	205	310	1	1	5969153
	13.00	0.5118	205	310	1	1	5968959
17/32	13.49	0.5313	220	325	1	1	5969012
	13.50	0.5315	220	325	1	1	5968963
	14.00	0.5512	220	325	1	1	5968971
9/16	14.29	0.5625	220	340	2	1	5969550
37/64	14.68	0.5781	220	340	2	1	5969669
	15.00	0.5906	220	340	2	1	5968979
39/64	15.48	0.6094	230	355	2	1	5969479
	15.50	0.6102	230	355	2	1	5968983
5/8	15.88	0.6250	230	355	2	1	5969505
	16.00	0.6299	230	355	2	1	5968992
41/64	16.27	0.6406	230	355	2	1	5969489
	16.50	0.6496	230	355	2	1	5968997
21/32	16.67	0.6563	230	355	2	1	5969062
	17.00	0.6693	230	355	2	1	5969002
11/16	17.46	0.6875	245	370	2	1	5968949
	17.50	0.6890	245	370	2	1	5969007

# 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	18.00	0.7087	245	370	2	1	5969018
	18.50	0.7283	245	370	2	1	5969023
	19.00	0.7480	245	370	2	1	5969028
	19.05	0.7500	260	385	2	1	5969145
	19.50	0.7677	260	385	2	1	5969033
	20.00	0.7874	260	385	2	1	5969038
	20.50	0.8071	260	385	2	1	5969046
	21.00	0.8268	260	385	2	1	5969051
	21.50	0.8465	270	405	2	1	5969056
	22.00	0.8661	270	405	2	1	5969067
7/8	22.22	0.8750	270	405	2	1	5969525
	22.50	0.8858	270	405	2	1	5969074
	23.00	0.9055	270	405	2	1	5969076
	23.50	0.9252	270	425	3	1	5969082
	24.00	0.9449	290	440	3	1	5969090
	24.50	0.9646	290	440	3	1	5969095
	25.00	0.9843	290	440	3	1	5969105
	25.40	1.0000	290	440	3	1	5968945 <sup>1)</sup>
1"	25.50	1.0039	290	440	3	1	5969110 <sup>1)</sup>
	26.00	1.0236	290	440	3	1	5969114 <sup>1)</sup>
	26.50	1.0433	290	440	3	1	5969119 <sup>1)</sup>
	27.00	1.0630	305	460	3	1	5969125 <sup>1)</sup>
	28.00	1.1024	305	460	3	1	5969133 <sup>1)</sup>
	29.00	1.1417	305	460	3	1	5969138 <sup>1)</sup>
	30.00	1.1811	305	460	3	1	5969156 <sup>1)</sup>
	1.1/4	31.75	1.2500	320	480	3	1
31.00		1.2205	320	480	3	1	5969468 <sup>1)</sup>
32.00		1.2598	320	505	4	1	5969515 <sup>1)</sup>
33.00		1.2992	320	505	4	1	5969567 <sup>1)</sup>
34.00		1.3386	340	530	4	1	5969617 <sup>1)</sup>
35.00		1.3780	340	530	4	1	5969661 <sup>1)</sup>
36.00		1.4173	340	530	4	1	5969665 <sup>1)</sup>
37.00		1.4567	340	530	4	1	5969667 <sup>1)</sup>
38.00		1.4961	360	555	4	1	5969671 <sup>1)</sup>
1.1/2		38.10	1.5000	360	555	4	1
	39.00	1.5354	360	555	4	1	5969475 <sup>1)</sup>
	40.00	1.5748	360	555	4	1	5969483 <sup>1)</sup>

<sup>1)</sup> < 10xD



## 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**

\* Lands are steam tempered 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	—	5972581
8.50	0.3346	210	330	1	1	—	5972585
9.00	0.3543	220	345	1	1	—	5972587
10.00	0.3937	185	285	1	1	5972410	—
10.00	0.3937	235	360	1	1	—	5972462
10.50	0.4134	235	360	1	1	—	5972466
11.00	0.4331	195	300	1	1	5972452	—
11.00	0.4331	250	375	1	1	—	5972470
11.50	0.4528	250	375	1	1	—	5972473
12.00	0.4724	205	310	1	1	5972499	—
12.00	0.4724	260	395	1	1	—	5972478
12.50	0.4921	205	310	1	1	5972542	—
12.50	0.4921	260	395	1	1	—	5972484
13.00	0.5118	205	310	1	1	5972549	—
13.00	0.5118	260	395	1	1	—	5972488
13.50	0.5315	220	325	1	1	5972550	—
13.50	0.5315	275	410	1	1	—	5972491
14.00	0.5512	220	325	1	1	5972552	—
14.00	0.5512	275	410	1	1	—	5972495
14.50	0.5709	220	340	2	1	5972555 <sup>1)</sup>	—
14.50	0.5709	275	425	2	1	—	5972503 <sup>2)</sup>
15.00	0.5906	220	340	2	1	5972372 <sup>1)</sup>	—
15.00	0.5906	275	425	2	1	—	5972507 <sup>2)</sup>
15.50	0.6102	230	355	2	1	5972376 <sup>1)</sup>	—
15.50	0.6102	295	445	2	1	—	5972511 <sup>2)</sup>
16.00	0.6299	230	355	2	1	5972380 <sup>1)</sup>	—
16.00	0.6299	295	445	2	1	—	5972515 <sup>2)</sup>
16.50	0.6496	230	355	2	1	5972384 <sup>1)</sup>	—
16.50	0.6496	295	445	2	1	—	5972518 <sup>2)</sup>
17.00	0.6693	230	355	2	1	5972387 <sup>1)</sup>	—
17.00	0.6693	295	445	2	1	—	5972522 <sup>2)</sup>

<sup>1)</sup> < 15xD  
<sup>2)</sup> < 20xD

# TAPER SHANK DRILL



$d_1$ $\varnothing_{h_8}$ mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	MTS	Pack Qty	A951	A952
17.50	0.6890	245	370	2	1	5972390 <sup>1)</sup>	—
17.50	0.6890	310	465	2	1	—	5972526 <sup>2)</sup>
18.00	0.7087	245	370	2	1	5972394 <sup>1)</sup>	—
18.00	0.7087	310	465	2	1	—	5972530 <sup>2)</sup>
18.50	0.7283	245	370	2	1	5972398 <sup>1)</sup>	—
18.50	0.7283	310	465	2	1	—	5972534 <sup>2)</sup>
19.00	0.7480	245	370	2	1	5972402 <sup>1)</sup>	—
19.00	0.7480	310	465	2	1	—	5972538 <sup>2)</sup>
19.50	0.7677	260	385	2	1	5972406 <sup>1)</sup>	—
19.50	0.7677	325	490	2	1	—	5972545 <sup>2)</sup>
20.00	0.7874	260	385	2	1	5972414 <sup>1)</sup>	—
20.00	0.7874	325	490	2	1	—	5972560 <sup>2)</sup>
21.00	0.8268	260	385	2	1	5972416 <sup>1)</sup>	—
21.00	0.8268	325	490	2	1	—	5972583 <sup>2)</sup>
22.00	0.8661	270	405	2	1	5972420 <sup>1)</sup>	—
22.00	0.8661	345	515	2	1	—	5972604 <sup>2)</sup>
23.00	0.9055	270	405	2	1	5972424 <sup>1)</sup>	—
23.00	0.9055	345	515	2	1	—	5972638 <sup>2)</sup>
24.00	0.9449	290	440	3	1	5972428 <sup>1)</sup>	—
24.00	0.9449	365	555	3	1	—	5972681 <sup>2)</sup>
25.00	0.9843	290	440	3	1	5972432 <sup>1)</sup>	—
25.00	0.9843	365	555	3	1	—	5972690 <sup>2)</sup>
26.00	1.0236	290	440	3	1	5972435 <sup>1)</sup>	—
26.00	1.0236	365	555	3	1	—	5972695 <sup>2)</sup>
27.00	1.0630	305	460	3	1	5972439 <sup>1)</sup>	—
27.00	1.0630	385	580	3	1	—	5972699 <sup>2)</sup>
28.00	1.1024	305	460	3	1	5972443 <sup>1)</sup>	—
28.00	1.1024	385	580	3	1	—	5972705 <sup>2)</sup>
29.00	1.1417	305	460	3	1	5972447 <sup>1)</sup>	—
29.00	1.1417	385	580	3	1	—	5972563 <sup>2)</sup>
30.00	1.1811	305	460	3	1	5972457 <sup>1)</sup>	—
30.00	1.1811	385	580	3	1	—	5972565 <sup>2)</sup>
31.00	1.2205	410	610	3	1	—	5972567 <sup>2)</sup>
32.00	1.2598	410	635	4	1	—	5972569 <sup>2)</sup>
33.00	1.2992	410	635	4	1	—	5972571 <sup>2)</sup>
34.00	1.3386	430	665	4	1	—	5972573 <sup>2)</sup>
35.00	1.3780	430	665	4	1	—	5972575 <sup>2)</sup>
38.00	1.4961	460	695	4	1	—	5972577 <sup>2)</sup>
40.00	1.5748	460	695	4	1	—	5972579 <sup>2)</sup>

<sup>1)</sup> < 15xD

<sup>2)</sup> < 20xD

## Cobalt Heavy Duty Taper Shank

**209CO** Notched Point reduces thrust. Cobalt base material with Bronze tempered for wear resistance and lubricity. Suitable for ferrous materials.



209CO

ANSI

4XD

HSS-E

135°



1/4 - 1.1/2

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	MTS	Pack Qty	209CO
1/4	0.2500	2.7/8	6.1/8	1	1	6000767
9/32	0.2813	3"	6.1/4	1	1	6000887
5/16	0.3125	3.1/8	6.3/8	1	1	6000843
11/32	0.3437	3.1/4	6.1/2	1	1	6000841
3/8	0.3750	3.1/2	7.3/8	2	1	6000800
13/32	0.4063	3.5/8	7.1/2	2	1	6000929
27/64	0.4219	3.7/8	7.3/4	2	1	6000789
7/16	0.4375	3.7/8	7.3/4	2	1	6000869
29/64	0.4531	4.1/8	8"	2	1	6000795
15/32	0.4687	4.1/8	8"	2	1	6000942
31/64	0.4844	4.3/8	8.1/4	2	1	6000811
1/2	0.5000	4.3/8	8.1/4	2	1	6001028
33/64	0.5156	4.5/8	8.1/2	2	1	6000814
17/32	0.5313	4.5/8	8.1/2	2	1	6000948
35/64	0.5469	4.7/8	8.3/4	2	1	6000817
9/16	0.5625	4.7/8	8.3/4	2	1	6000882
37/64	0.5781	4.7/8	8.3/4	2	1	6000820
19/32	0.5937	4.7/8	8.3/4	2	1	6000951
39/64	0.6094	4.7/8	8.3/4	2	1	6000823
5/8	0.6250	4.7/8	8.3/4	2	1	6000847
41/64	0.6406	5.1/8	9"	2	1	6000826
21/32	0.6563	5.1/8	9.3/4	3	1	6000774
43/64	0.6719	5.3/8	10"	3	1	6000829
11/16	0.6875	5.3/8	10"	3	1	6000806
45/64	0.7031	5.5/8	10.1/4	3	1	6000832
23/32	0.7188	5.5/8	10.1/4	3	1	6000779
47/64	0.7344	5.7/8	10.1/2	3	1	6000835
3/4	0.7500	5.7/8	10.1/2	3	1	6000798
49/64	0.7656	6"	10.5/8	3	1	6000838
25/32	0.7813	6"	10.5/8	3	1	6000783
51/64	0.7969	6.1/8	10.3/4	3	1	6000849
13/16	0.8125	6.1/8	10.3/4	3	1	6000873
53/64	0.8281	6.1/8	10.3/4	3	1	6000851

# 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	6000786
55/64	0.8594	6.1/8	10.3/4	3	1	6000854
7/8	0.8750	6.1/8	10.3/4	3	1	6000878
57/64	0.8906	6.1/8	10.3/4	3	1	6000856
29/32	0.9062	6.1/8	10.3/4	3	1	6000792
59/64	0.9219	6.1/8	10.3/4	3	1	6000859
15/16	0.9375	6.1/8	10.3/4	3	1	6000938
61/64	0.9531	6.3/8	11"	3	1	6000862
31/32	0.9688	6.3/8	11"	3	1	6000803
63/64	0.9844	6.3/8	11"	3	1	6000865
1"	1.0000	6.3/8	11"	3	1	6000952
1.1/64	1.0156	6.1/2	12.1/8	4	1	6000965
1.1/32	1.0312	6.1/2	12.1/8	4	1	6000958
1.1/16	1.0625	6.5/8	12.1/4	4	1	6000954
1.3/32	1.0937	6.7/8	12.1/2	4	1	6000989
1.7/64	1.1094	7.1/8	12.3/4	4	1	6001007
1.1/8	1.1250	7.1/8	12.3/4	4	1	6000968
1.11/64	1.1719	7.3/8	13"	4	1	6000972
1.3/16	1.1875	7.3/8	13"	4	1	6000985
1.7/32	1.2188	7.1/2	13.1/8	4	1	6001004
1.1/4	1.2500	7.7/8	13.1/2	4	1	6000961
1.9/32	1.2813	8.1/2	14.1/8	4	1	6001013
1.11/32	1.3437	8.3/4	14.3/8	4	1	6000970
1.3/8	1.3750	8.7/8	14.1/2	4	1	6000991
1.7/16	1.4375	9.1/8	14.3/4	4	1	6001001
1.1/2	1.5000	9.3/8	15"	4	1	6000956

## Metric Cobalt Heavy Duty Taper Shank

**A730** Notched Point reduces thrust. Cobalt base material with Bronze tempered for wear resistance and lubricity. Suitable for ferrous materials.



A730

DIN  
345

4XD

HSS-E

118°



1/4 - 1.1/2

$d_1$ Ø mm	$d_1$ decimal mm	$l_2$ mm	$l_1$ mm	MTS	Pack Qty	A730
10.00	0.3937	87	168	1	1	5971219
10.20	0.4016	87	168	1	1	5971222
10.50	0.4134	87	168	1	1	5971226
10.80	0.4252	94	175	1	1	5971230
11.00	0.4331	94	175	1	1	5971235
11.50	0.4528	94	175	1	1	5971237
11.80	0.4646	94	175	1	1	5971242
12.00	0.4724	101	182	1	1	5971246
12.20	0.4803	101	182	1	1	5971252
12.50	0.4921	101	182	1	1	5971257
12.80	0.5039	101	182	1	1	5971262
13.00	0.5118	101	182	1	1	5971266
13.50	0.5315	108	189	1	1	5971269
13.80	0.5433	108	189	1	1	5971272
14.00	0.5512	108	189	1	1	5971276
14.25	0.5610	114	212	2	1	5971280
14.50	0.5709	114	212	2	1	5971284
14.75	0.5807	114	212	2	1	5971288
15.00	0.5906	114	212	2	1	5971296
15.25	0.6004	120	218	2	1	5971165
15.50	0.6102	120	218	2	1	5971221
15.75	0.6201	120	218	2	1	5971265
16.00	0.6299	120	218	2	1	5971305
16.25	0.6398	120	218	2	1	5971331
16.50	0.6496	125	223	2	1	5971335
17.00	0.6693	125	223	2	1	5971337
17.25	0.6791	130	228	2	1	5971339
17.50	0.6890	130	228	2	1	5971341
17.75	0.6988	130	228	2	1	5971174
18.00	0.7087	130	228	2	1	5971179
18.25	0.7185	135	233	2	1	5971184
18.50	0.7283	135	233	2	1	5971190
18.75	0.7382	135	233	2	1	5971194

# COBALT TAPER SHANK DRILL



d <sub>1</sub> Ø mm	d <sub>1</sub> decimal mm	l <sub>2</sub> mm	l <sub>1</sub> mm	MTS	Pack Qty	A730
19.00	0.7480	135	233	2	1	5971199
19.25	0.7579	140	238	2	1	5971203
19.50	0.7677	140	238	2	1	5971208
19.75	0.7776	140	238	2	1	5971213
20.00	0.7874	140	238	2	1	5971217
20.25	0.7972	145	243	2	1	5971225
20.50	0.8071	145	243	2	1	5971229
20.75	0.8169	145	243	2	1	5971233
21.00	0.8268	145	243	2	1	5971238
21.50	0.8465	150	248	2	1	5971241
22.00	0.8661	150	248	2	1	5971245
22.50	0.8858	155	253	2	1	5971250
23.00	0.9055	155	253	2	1	5971254
23.50	0.9252	155	276	3	1	5971258
24.00	0.9449	160	281	3	1	5971261
24.50	0.9646	160	281	3	1	5971268
25.00	0.9843	160	281	3	1	5971271
25.50	1.0039	165	286	3	1	5971275
26.00	1.0236	165	286	3	1	5971279
26.50	1.0433	165	286	3	1	5971283
27.00	1.0630	170	291	3	1	5971286
27.50	1.0827	170	291	3	1	5971290
28.00	1.1024	170	291	3	1	5971294
28.50	1.1220	175	296	3	1	5971299
29.00	1.1417	175	296	3	1	5971302
30.00	1.1811	175	296	3	1	5971310
31.00	1.2205	180	301	3	1	5971314
32.00	1.2598	185	334	4	1	5971319

**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 - 1.5/8



d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	MTS	Pack Qty	T400
1/2	0.5000	4.3/8	8.1/4	2	1	5999981
17/32	0.5312	4.5/8	8.1/2	2	1	5999997
9/16	0.5625	4.7/8	8.3/4	2	1	6000268
5/8	0.6250	4.7/8	8.3/4	2	1	6000227
21/32	0.6562	5.1/8	9"	2	1	6000018
3/4	0.7500	5.7/8	9.3/4	2	1	6000144
25/32	0.7812	6"	9.7/8	2	1	6000024
7/8	0.8750	6.1/8	10.3/4	3	1	6000260
1"	1.0000	6.3/8	11"	3	1	5999994
1.1/32	1.0312	6.1/2	11.1/8	3	1	6000036
1.1/16	1.0625	6.5/8	11.1/4	3	1	6000027
1.1/8	1.1250	7.1/8	12.3/4	4	1	6000042
1.5/32	1.1562	7.1/4	12.7/8	4	1	5999955
1.1/4	1.2500	7.7/8	13.1/2	4	1	6000039
1.5/16	1.3125	8.5/8	14.1/4	4	1	5999952
1.11/32	1.3438	8.3/4	14.3/8	4	1	5999889
1.3/8	1.3750	8.7/8	14.1/2	4	1	5999946
1.1/2	1.5000	9.3/8	15"	4	1	6000033
1.9/16	1.5625	9.5/8	16.5/8	5	1	5999975
1.5/8	1.6250	10"	17"	5	1	5999961

# REDUCED SHANK DRILL



## General Purpose Reduced Shank - 1/2" Shank

**A170** Silver & Deming Drills. Steam tempered for increased wear resistance & lubricity.



A170



13.00 - 1.1/2

$d_1$ Øh <sub>8</sub> Inch	$d_1$ Øh <sub>8</sub> mm	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$l_2$ mm	$l_1$ mm	Pack Qty	A170
	13.00	0.5118					1	5968873
33/64	13.10	0.5157	3.1/8	6"			1	5968798
17/32	13.49	0.5313	3.1/8	6"			1	5968708
	13.50	0.5315			83	156	1	5968882
35/64	13.89	0.5469	3.1/8	6"			1	5968804
	14.00	0.5512			83	156	1	5968889
9/16	14.29	0.5625	3.1/8	6"			1	5969849
	14.50	0.5709			83	156	1	5968893
37/64	14.68	0.5781	3.1/8	6"			1	5968809
	15.00	0.5906			83	156	1	5968688
19/32	15.08	0.5937	3.1/8	6"			1	5968725
39/64	15.48	0.6094	3.1/8	6"			1	5968814
	15.50	0.6102			83	156	1	5968690
5/8	15.88	0.6250	3.1/8	6"			1	5968848
	16.00	0.6299			84	157	1	5968695
41/64	16.27	0.6406	3.1/8	6"			1	5968823
	16.50	0.6496			84	157	1	5968699
21/32	16.67	0.6563	3.1/8	6"			1	5968738
	17.00	0.6693			84	157	1	5968702
43/64	17.07	0.6719	3.1/8	6"			1	5968828
11/16	17.46	0.6875	3.1/8	6"			1	5968819
	17.50	0.6890			84	157	1	5968705
45/64	17.86	0.7031	3.1/8	6"			1	5968833
	18.00	0.7087			84	157	1	5968711
23/32	18.26	0.7188	3.1/8	6"			1	5968754
	18.50	0.7283			84	157	1	5968713
47/64	18.65	0.7344	3.1/8	6"			1	5968838
	19.00	0.7480			84	157	1	5968719
3/4	19.05	0.7500	3.1/8	6"			1	5968788
49/64	19.45	0.7656	3"	6"			1	5968842
	19.50	0.7677			81	158	1	5968722
25/32	19.84	0.7812	3"	6"			1	5968771
	20.00	0.7874			81	158	1	5968729



$d_1$ $\varnothing_{h_8}$ Inch	$d_1$ $\varnothing_{h_8}$ mm	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$l_2$ mm	$l_1$ mm	Pack Qty	A170
51/64	20.24	0.7969	3"	6"			1	5968853
13/16	20.64	0.8125	3"	6"			1	5968885
	21.00	0.8268			82	158	1	5968733
53/64	21.03	0.8281	3"	6"			1	5968858
27/32	21.43	0.8437	3"	6"			1	5968776
55/64	21.83	0.8594	3"	6"			1	5968862
	22.00	0.8661			82	158	1	5968745
7/8	22.22	0.8750	3"	6"			1	5969793
57/64	22.62	0.8906	3"	6"			1	5968868
	23.00	0.9055			82	158	1	5968749
29/32	23.02	0.9062	3"	6"			1	5968783
59/64	23.42	0.9220	3"	6"			1	5968878
15/16	23.81	0.9375	3"	6"			1	5968692
	24.00	0.9449			83	159	1	5968758
61/64	24.21	0.9531	3"	6"			1	5969699
31/32	24.61	0.9688	3"	6"			1	5968793
	25.00	0.9843			83	159	1	5968766
63/64	25.00	0.9844	3"	6"			1	5969741
1"	25.40	1.0000	3"	6"			1	5969709
1.1/32	26.19	1.0312	3"	6"			1	5969721
1.1/16	26.99	1.0625	3"	6"			1	5969714
1.7/64	28.18	1.1094	3"	6"			1	5968685
1.1/8	28.58	1.1250	3"	6"			1	5969733
1.9/64	28.97	1.1406	3"	6"			1	5968761
1.5/32	29.37	1.1563	3"	6"			1	5969794
1.3/16	30.16	1.1875	3"	6"			1	5969769
1.7/32	30.96	1.2188	3"	6"			1	5969818
1.1/4	31.75	1.2500	3"	6"			1	5969725
1.5/16	33.34	1.3125	3"	6"			1	5969789
1.3/8	34.93	1.3750	3"	6"			1	5969784
1.7/16	36.51	1.4375	3"	6"			1	5969809
1.1/2	38.10	1.5000	3"	6"			1	5969718

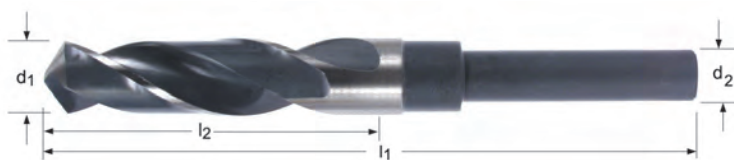
# REDUCED SHANK DRILL



## General Purpose Reduced Shank - 1/2" Shank

\* Sets Available on pg. 241

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



R56

ANSI

4XD

HSS

118°



33/64 - 1.1/2

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	Pack Qty	R56
33/64	0.5156	3"	6"	1/2	1	5999983
17/32	0.5313	3"	6"	1/2	1	5999953
35/64	0.5469	3"	6"	1/2	1	5999986
9/16	0.5625	3"	6"	1/2	1	5999536
37/64	0.5781	3"	6"	1/2	1	5999989
19/32	0.5937	3"	6"	1/2	1	5999956
39/64	0.6094	3"	6"	1/2	1	5999992
5/8	0.6250	3"	6"	1/2	1	5999628
41/64	0.6406	3"	6"	1/2	1	5999995
21/32	0.6563	3"	6"	1/2	1	5999959
43/64	0.6719	3"	6"	1/2	1	6000001
11/16	0.6875	3"	6"	1/2	1	5999944
45/64	0.7031	3"	6"	1/2	1	5999527
23/32	0.7188	3"	6"	1/2	1	5999962
47/64	0.7344	3"	6"	1/2	1	5999550
3/4	0.7500	3"	6"	1/2	1	5999976
49/64	0.7656	3"	6"	1/2	1	5999584
25/32	0.7813	3"	6"	1/2	1	5999968
51/64	0.7969	3"	6"	1/2	1	5999670
13/16	0.8125	3"	6"	1/2	1	5999947
53/64	0.8281	3"	6"	1/2	1	5999677
27/32	0.8438	3"	6"	1/2	1	5999970
55/64	0.8594	3"	6"	1/2	1	5999681
7/8	0.8750	3"	6"	1/2	1	5999534
57/64	0.8906	3"	6"	1/2	1	5999685
29/32	0.9063	3"	6"	1/2	1	5999973
59/64	0.9219	3"	6"	1/2	1	5999690
15/16	0.9375	3"	6"	1/2	1	5999950
61/64	0.9531	3"	6"	1/2	1	5999530
31/32	0.9688	3"	6"	1/2	1	5999980
63/64	0.9844	3"	6"	1/2	1	5999532
1"	1.0000	3"	6"	1/2	1	6000010
1.1/64	1.0156	3"	6"	1/2	1	5999856

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	Pack Qty	R56
1.1/32	1.0312	3"	6"	1/2	1	5999847
1.3/64	1.0469	3"	6"	1/2	1	5999903
1.1/16	1.0625	3"	6"	1/2	1	6000013
1.5/64	1.0781	3"	6"	1/2	1	5999919
1.3/32	1.0937	3"	6"	1/2	1	5999899
1.7/64	1.1094	3"	6"	1/2	1	5999935
1.1/8	1.1250	3"	6"	1/2	1	5999860
1.9/64	1.1406	3"	6"	1/2	1	5999941
1.5/32	1.1563	3"	6"	1/2	1	5999915
1.11/64	1.1719	3"	6"	1/2	1	5999868
1.3/16	1.1875	3"	6"	1/2	1	5999895
1.13/64	1.2031	3"	6"	1/2	1	5999876
1.7/32	1.2187	3"	6"	1/2	1	5999927
1.15/64	1.2344	3"	6"	1/2	1	5999891
1.1/4	1.2500	3"	6"	1/2	1	5999852
1.9/32	1.2813	3"	6"	1/2	1	5999938
1.5/16	1.3125	3"	6"	1/2	1	5999911
1.11/32	1.3437	3"	6"	1/2	1	5999864
1.3/8	1.3750	3"	6"	1/2	1	5999908
1.13/32	1.4063	3"	6"	1/2	1	5999871
1.7/16	1.4375	3"	6"	1/2	1	5999923
1.15/32	1.4687	3"	6"	1/2	1	5999881
1.1/2	1.5000	3"	6"	1/2	1	5999842

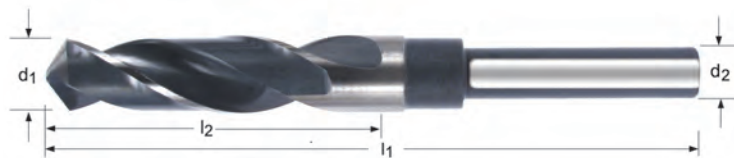
# REDUCED SHANK DRILL



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

\* Sets Available on pg. 241

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



R57

ANSI

4XD

HSS

118°



33/64 - 1.1/2

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	Pack Qty	R57
33/64	0.5156	3"	6"	1/2	1	6000017
17/32	0.5313	3"	6"	1/2	1	5999640
35/64	0.5469	3"	6"	1/2	1	6000047
9/16	0.5625	3"	6"	1/2	1	6000045
37/64	0.5781	3"	6"	1/2	1	6000080
19/32	0.5937	3"	6"	1/2	1	5999644
39/64	0.6094	3"	6"	1/2	1	6000123
5/8	0.6250	3"	6"	1/2	1	6000021
41/64	0.6406	3"	6"	1/2	1	6000171
21/32	0.6563	3"	6"	1/2	1	5999647
43/64	0.6719	3"	6"	1/2	1	6000180
11/16	0.6875	3"	6"	1/2	1	5999624
45/64	0.7031	3"	6"	1/2	1	6000184
23/32	0.7188	3"	6"	1/2	1	5999651
47/64	0.7344	3"	6"	1/2	1	6000188
3/4	0.7500	3"	6"	1/2	1	5999667
49/64	0.7656	3"	6"	1/2	1	6000192
25/32	0.7813	3"	6"	1/2	1	5999655
51/64	0.7969	3"	6"	1/2	1	6000023
13/16	0.8125	3"	6"	1/2	1	5999631
53/64	0.8281	3"	6"	1/2	1	6000026
27/32	0.8438	3"	6"	1/2	1	5999659
55/64	0.8594	3"	6"	1/2	1	6000029
7/8	0.8750	3"	6"	1/2	1	6000043
57/64	0.8906	3"	6"	1/2	1	6000032
29/32	0.9063	3"	6"	1/2	1	5999663
59/64	0.9219	3"	6"	1/2	1	6000035
15/16	0.9375	3"	6"	1/2	1	5999636
61/64	0.9531	3"	6"	1/2	1	6000038
31/32	0.9688	3"	6"	1/2	1	5999675
63/64	0.9844	3"	6"	1/2	1	6000041
1"	1.0000	3"	6"	1/2	1	5999538
1.1/64	1.0156	3"	6"	1/2	1	5999548

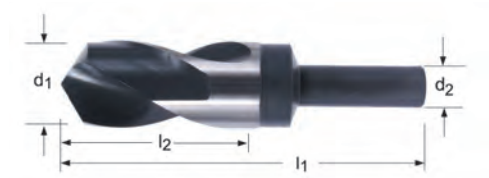
d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	Pack Qty	R57
1.1/32	1.0312	3"	6"	1/2	1	5999545
1.3/64	1.0469	3"	6"	1/2	1	5999580
1.1/16	1.0625	3"	6"	1/2	1	5999540
1.5/64	1.0781	3"	6"	1/2	1	5999598
1.3/32	1.0937	3"	6"	1/2	1	5999577
1.7/64	1.1094	3"	6"	1/2	1	5999610
1.1/8	1.1250	3"	6"	1/2	1	5999552
1.9/64	1.1406	3"	6"	1/2	1	5999620
1.5/32	1.1563	3"	6"	1/2	1	5999594
1.11/64	1.1719	3"	6"	1/2	1	5999557
1.3/16	1.1875	3"	6"	1/2	1	5999573
1.13/64	1.2031	3"	6"	1/2	1	5999562
1.7/32	1.2187	3"	6"	1/2	1	5999606
1.15/64	1.2344	3"	6"	1/2	1	5999570
1.1/4	1.2500	3"	6"	1/2	1	5999546
1.9/32	1.2813	3"	6"	1/2	1	5999616
1.5/16	1.3125	3"	6"	1/2	1	5999590
1.11/32	1.3437	3"	6"	1/2	1	5999554
1.3/8	1.3750	3"	6"	1/2	1	5999588
1.13/32	1.4063	3"	6"	1/2	1	5999559
1.7/16	1.4375	3"	6"	1/2	1	5999602
1.15/32	1.4687	3"	6"	1/2	1	5999566
1.1/2	1.5000	3"	6"	1/2	1	5999543

# REDUCED SHANK DRILL



## General Purpose Reduced Shank - 3/4" Shank

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



R58

ANSI

1.5XD

HSS

118°



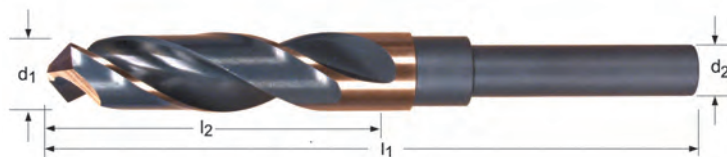
1" - 2"

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	Pack Qty	R58
1"	1.0000	3"	6"	3/4	1	6000049
1.1/32	1.0312	3"	6"	3/4	1	6000058
1.1/16	1.0625	3"	6"	3/4	1	6000052
1.3/32	1.0937	3"	6"	3/4	1	6000092
1.1/8	1.1250	3"	6"	3/4	1	6000064
1.5/32	1.1563	3"	6"	3/4	1	6000111
1.3/16	1.1875	3"	6"	3/4	1	6000089
1.7/32	1.2187	3"	6"	3/4	1	6000126
1.1/4	1.2500	3"	6"	3/4	1	6000061
1.9/32	1.2813	3"	6"	3/4	1	6000143
1.5/16	1.3125	3"	6"	3/4	1	6000107
1.11/32	1.3437	3"	6"	3/4	1	6000070
1.3/8	1.3750	3"	6"	3/4	1	6000102
1.13/32	1.4063	3"	6"	3/4	1	6000077
1.7/16	1.4375	3"	6"	3/4	1	6000118
1.15/32	1.4687	3"	6"	3/4	1	6000086
1.1/2	1.5000	3"	6"	3/4	1	6000054
1.9/16	1.5625	3"	6"	3/4	1	6000138
1.5/8	1.6250	3"	6"	3/4	1	6000114
1.11/16	1.6875	3"	6"	3/4	1	6000067
1.3/4	1.7500	3"	6"	3/4	1	6000096
1.13/16	1.8125	3"	6"	3/4	1	6000074
1.7/8	1.8750	3"	6"	3/4	1	6000131
1.15/16	1.9375	3"	6"	3/4	1	6000083
2"	2.0000	3"	6"	3/4	1	6000147

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

\* Sets Available on pg. 241

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



R56CO

ANSI

4XD

HSS-E

118°



33/64 - 1"

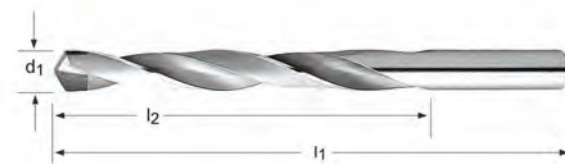
$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	Pack Qty	R56CO
33/64	0.5156	3"	6"	1/2	1	6000402
17/32	0.5313	3"	6"	1/2	1	6000364
35/64	0.5469	3"	6"	1/2	1	6000409
9/16	0.5625	3"	6"	1/2	1	6000007
37/64	0.5781	3"	6"	1/2	1	6000413
19/32	0.5937	3"	6"	1/2	1	6000367
39/64	0.6094	3"	6"	1/2	1	6000417
5/8	0.6250	3"	6"	1/2	1	6000439
41/64	0.6406	3"	6"	1/2	1	6000420
21/32	0.6563	3"	6"	1/2	1	6000372
43/64	0.6719	3"	6"	1/2	1	6000424
11/16	0.6875	3"	6"	1/2	1	6000350
45/64	0.7031	3"	6"	1/2	1	6000428
23/32	0.7188	3"	6"	1/2	1	6000377
47/64	0.7344	3"	6"	1/2	1	6000432
3/4	0.7500	3"	6"	1/2	1	6000394
49/64	0.7656	3"	6"	1/2	1	6000435
25/32	0.7813	3"	6"	1/2	1	6000382
51/64	0.7969	3"	6"	1/2	1	6000442
13/16	0.8125	3"	6"	1/2	1	6000353
53/64	0.8281	3"	6"	1/2	1	6000448
27/32	0.8438	3"	6"	1/2	1	6000386
55/64	0.8594	3"	6"	1/2	1	5999837
7/8	0.8750	3"	6"	1/2	1	6000004
57/64	0.8906	3"	6"	1/2	1	5999886
29/32	0.9063	3"	6"	1/2	1	6000390
59/64	0.9219	3"	6"	1/2	1	5999931
15/16	0.9375	3"	6"	1/2	1	6000356
61/64	0.9531	3"	6"	1/2	1	5999965
31/32	0.9688	3"	6"	1/2	1	6000398
63/64	0.9844	3"	6"	1/2	1	5999998
1"	1.0000	3"	6"	1/2	1	6000347

# SPECIAL PURPOSE DRILL



## Jobber Length Carbide Tipped

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



D444

ANSI

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	6001915
1/8	0.1250	1.5/8	2.3/4	1	6001948
30	0.1285	1.5/8	2.3/4	1	6001912
29	0.1360	1.3/4	2.7/8	1	6001904
9/64	0.1406	1.3/4	2.7/8	1	6001721
25	0.1495	1.7/8	3"	1	6001901
5/32	0.1563	2"	3.1/8	1	6001707
21	0.1590	2.1/8	3.1/4	1	6001898
20	0.1610	2.1/8	3.1/4	1	6001895
19	0.1660	2.1/8	3.1/4	1	6001892
18	0.1695	2.1/8	3.1/4	1	6001886
11/64	0.1719	2.1/8	3.1/4	1	6001953
17	0.1730	2.3/16	3.3/8	1	6001882
15	0.1800	2.3/16	3.3/8	1	6001879
14	0.1820	2.3/16	3.3/8	1	6001875
13	0.1850	2.5/16	3.1/2	1	6001865
3/16	0.1875	2.5/16	3.1/2	1	6001853
11	0.1910	2.5/16	3.1/2	1	6001861
10	0.1935	2.7/16	3.5/8	1	6001856
9	0.1960	2.7/16	3.5/8	1	6001920
7	0.2010	2.7/16	3.5/8	1	6001918
13/64	0.2031	2.7/16	3.5/8	1	6001959
3	0.2130	2.1/2	3.3/4	1	6001907
7/32	0.2188	2.1/2	3.3/4	1	6001714
1	0.2280	2.5/8	3.7/8	1	6001851
15/64	0.2344	2.5/8	3.7/8	1	6001969
B	0.2380	2.3/4	4"	1	6001966
C	0.2420	2.3/4	4"	1	6001972
1/4 (E)	0.2500	2.3/4	4"	1	6001945
F	0.2570	2.7/8	4.1/8	1	6001978
G	0.2610	2.7/8	4.1/8	1	6001981
17/64	0.2656	2.7/8	4.1/8	1	6001697
H	0.2660	2.7/8	4.1/8	1	6001821



$d_1$ Ø "/Nr./letter	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	D444
I	0.2720	2.7/8	4.1/8	1	6001826
J	0.2770	2.7/8	4.1/8	1	6001831
K	0.2810	2.15/16	4.1/4	1	6001838
9/32	0.2813	2.15/16	4.1/4	1	6001718
L	0.2900	2.15/16	4.1/4	1	6001842
19/64	0.2969	3.1/16	4.3/8	1	6001732
N	0.3020	3.1/16	4.3/8	1	6001847
5/16	0.3125	3.3/16	4.1/2	1	6001703
O	0.3160	3.3/16	4.1/2	1	6001924
P	0.3230	3.5/16	4.5/8	1	6001926
21/64	0.3281	3.5/16	4.5/8	1	6001756
Q	0.3320	3.7/16	4.3/4	1	6001928
R	0.3390	3.7/16	4.3/4	1	6001930
11/32	0.3437	3.7/16	4.3/4	1	6001950
S	0.3480	3.1/2	4.7/8	1	6001932
T	0.3580	3.1/2	4.7/8	1	6001934
23/64	0.3594	3.1/2	4.7/8	1	6001789
U	0.3680	3.5/8	5"	1	6001938
3/8	0.3750	3.5/8	5"	1	6001859
25/64	0.3906	3.3/4	5.1/8	1	6001834
13/32	0.4063	3.7/8	5.1/4	1	6001956
Z	0.4130	3.7/8	5.1/4	1	6001940
27/64	0.4219	3.15/16	5.3/8	1	6001843
7/16	0.4375	4.1/16	5.1/2	1	6001711
29/64	0.4531	4.3/16	5.5/8	1	6001849
15/32	0.4687	4.5/16	5.3/4	1	6001962
31/64	0.4844	4.3/8	5.7/8	1	6001700
1/2	0.5000	4.1/2	6"	1	6001942

# SPECIAL PURPOSE DRILL



## Jobber Length Carbide Tipped

**A160** Heavy-Duty Brazed Carbide Tipped for abrasive materials or non-ferrous materials.

A160

DIN  
338

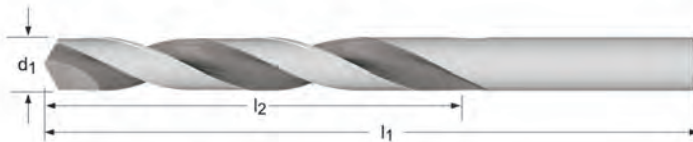
4XD

HSS  
HM

118°



4.00 - 16.00



$d_1$ Øh <sub>8</sub> mm	$d_1$ decimal Inch	$l_2$ mm	$l_1$ mm	Pack Qty	A160
4.00	0.1575	43	75	1	5969608
4.50	0.1772	47	80	1	5969616
5.00	0.1969	52	86	1	5969620
5.50	0.2165	57	93	1	5969624
6.00	0.2362	57	93	1	5969628
6.50	0.2559	63	101	1	5969632
6.80	0.2677	69	109	1	5969636
7.00	0.2756	69	109	1	5969639
7.50	0.2953	69	109	1	5969643
8.00	0.3150	75	117	1	5969646
8.50	0.3346	75	117	1	5969650
9.00	0.3543	81	125	1	5969658
9.50	0.3740	81	125	1	5969659
10.00	0.3937	87	133	1	5969553
10.20	0.4016	87	133	1	5969561
10.50	0.4134	87	133	1	5969566
11.00	0.4331	94	142	1	5969572
11.50	0.4528	94	142	1	5969578
12.00	0.4724	101	151	1	5969582
13.00	0.5118	101	151	1	5969586
14.00	0.5512	108	160	1	5969594
15.00	0.5906	114	169	1	5969599
16.00	0.6299	120	178	1	5969604

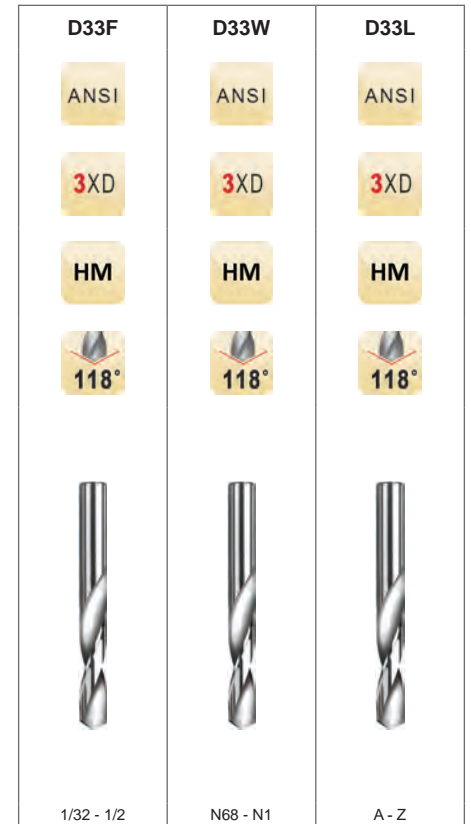
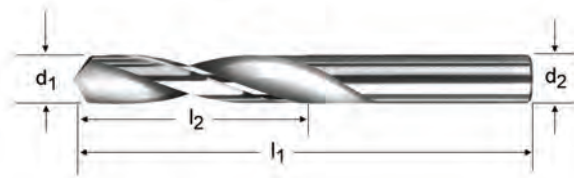
## General Purpose Solid Carbide Jobber Length

**D33F** - Fractional Sizes

**D33W** - Wire Gauge Sizes

**D33L** - Letter Sizes

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



$d_1$ Ø Inch	$d_1$ Ø Nr.	$d_1$ Ø letter	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	Pack Qty	D33F	D33W	D33L	
1/32	68		0.0310	5/16	1.1/4	1	—	6001815	—	
			0.0313	5/16	1.1/4	1	6002760	—	—	
		67		0.0320	5/16	1.1/4	1	—	6002214	—
		66		0.0330	5/16	1.1/4	1	—	6002208	—
		65		0.0350	5/8	1.3/8	1	—	6002205	—
		64		0.0360	5/8	1.3/8	1	—	6002202	—
		63		0.0370	5/8	1.3/8	1	—	6002199	—
		62		0.0380	5/8	1.3/8	1	—	6002197	—
		61		0.0390	5/8	1.3/8	1	—	6002194	—
		60		0.0400	3/4	1.1/2	1	—	6002192	—
		59		0.0410	3/4	1.1/2	1	—	6002188	—
		58		0.0420	3/4	1.1/2	1	—	6002186	—
3/64		57	0.0430	3/4	1.1/2	1	—	6002182	—	
		56	0.0465	3/4	1.1/2	1	—	6002180	—	
			0.0469	3/4	1.1/2	1	6002731	—	—	
		55		0.0520	3/4	1.1/2	1	—	6002178	—
		54		0.0550	3/4	1.1/2	1	—	6002175	—
		53		0.0595	3/4	1.1/2	1	—	6002172	—
				0.0625	3/4	1.1/2	1	6002738	—	—
		52		0.0635	3/4	1.1/2	1	—	6002169	—
1/16		51	0.0670	3/4	1.1/2	1	—	6002166	—	
		50	0.0700	7/8	1.3/4	1	—	6002163	—	
		49	0.0730	7/8	1.3/4	1	—	6002157	—	
		48	0.0760	7/8	1.3/4	1	—	6002151	—	
				0.0781	7/8	1.3/4	1	6002736	—	—
		47		0.0785	7/8	1.3/4	1	—	6002147	—
5/64		46	0.0810	7/8	1.3/4	1	—	6002145	—	
		45	0.0820	7/8	1.3/4	1	—	6002140	—	
		44	0.0860	1"	2"	1	—	6002136	—	
		43	0.0890	1"	2"	1	—	6002132	—	
		42	0.0935	1"	2"	1	—	6002128	—	
				0.0938	1"	2"	1	6002730	—	—
3/32		41	0.0960	1"	2"	1	—	6002124	—	

# SOLID CARBIDE DRILL



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	D33F	D33W	D33L
	40		0.0980	1"	2"	1	—	6002120	—
	39		0.0995	1.1/4	2.1/4	1	—	6002106	—
	38		0.1015	1.1/4	2.1/4	1	—	6002103	—
	37		0.1040	1.1/4	2.1/4	1	—	6002098	—
	36		0.1065	1.1/4	2.1/4	1	—	6002091	—
7/64			0.1094	1.1/4	2.1/4	1	6002740	—	—
	35		0.1100	1.1/4	2.1/4	1	—	6002086	—
	34		0.1110	1.1/4	2.1/4	1	—	6002082	—
	33		0.1130	1.1/4	2.1/4	1	—	6002077	—
	32		0.1160	1.1/4	2.1/4	1	—	6002073	—
	31		0.1200	1.1/4	2.1/4	1	—	6002069	—
1/8			0.1250	1.1/4	2.1/4	1	6002763	—	—
	30		0.1285	1.3/8	2.1/2	1	—	6002064	—
	29		0.1360	1.3/8	2.1/2	1	—	6002224	—
	28		0.1405	1.3/8	2.1/2	1	—	6002221	—
9/64			0.1406	1.3/8	2.1/2	1	6002742	—	—
	27		0.1440	1.3/8	2.1/2	1	—	6002217	—
	26		0.1470	1.3/8	2.1/2	1	—	6002211	—
	25		0.1495	1.3/8	2.1/2	1	—	6002184	—
	24		0.1520	1.3/8	2.1/2	1	—	6002154	—
	23		0.1540	1.3/8	2.1/2	1	—	6002112	—
5/32			0.1563	1.3/8	2.1/2	1	6002735	—	—
	22		0.1570	1.3/8	2.1/2	1	—	6002055	—
	21		0.1590	1.3/8	2.1/2	1	—	6002473	—
	20		0.1610	1.3/8	2.1/2	1	—	6002468	—
	19		0.1660	1.5/8	2.3/4	1	—	6002460	—
	18		0.1695	1.5/8	2.3/4	1	—	6002457	—
11/64			0.1719	1.5/8	2.3/4	1	6002765	—	—
	17		0.1730	1.5/8	2.3/4	1	—	6002454	—
	16		0.1770	1.5/8	2.3/4	1	—	6002451	—
	15		0.1800	1.5/8	2.3/4	1	—	6002448	—
	14		0.1820	1.5/8	2.3/4	1	—	6002444	—
	13		0.1850	1.5/8	2.3/4	1	—	6002441	—
3/16			0.1875	1.5/8	2.3/4	1	6002729	—	—
	12		0.1890	1.5/8	2.3/4	1	—	6002438	—
	11		0.1910	1.5/8	2.3/4	1	—	6002432	—
	10		0.1935	1.5/8	2.3/4	1	—	6002429	—
	9		0.1960	1.3/4	3"	1	—	6001936	—
	8		0.1990	1.3/4	3"	1	—	6001909	—
	7		0.2010	1.3/4	3"	1	—	6001872	—
13/64			0.2031	1.3/4	3"	1	6002704	—	—
	6		0.2040	1.3/4	3"	1	—	6002190	—
	5		0.2055	1.3/4	3"	1	—	6002160	—
	4		0.2090	1.3/4	3"	1	—	6002117	—
	3		0.2130	1.3/4	3"	1	—	6002227	—
7/32			0.2188	1.3/4	3"	1	6002739	—	—
	2		0.2210	1.3/4	3"	1	—	6002463	—
	1		0.2280	1.3/4	3"	1	—	6002426	—
		A	0.2340	2"	3.1/4	1	—	—	6002743
15/64			0.2344	2"	3.1/4	1	6002711	—	—
		B	0.2380	2"	3.1/4	1	—	—	6002744
		C	0.2420	2"	3.1/4	1	—	—	6002745
		D	0.2460	2"	3.1/4	1	—	—	6002746
1/4			0.2500	2"	3.1/4	1	6002762	—	—
		F	0.2570	2"	3.1/4	1	—	—	6002747
		G	0.2610	2.1/8	3.1/2	1	—	—	6002748
17/64			0.2656	2.1/8	3.1/2	1	6002714	—	—
		H	0.2660	2.1/8	3.1/2	1	—	—	6002750
		I	0.2720	2.1/8	3.1/2	1	—	—	6002751
		J	0.2770	2.1/8	3.1/2	1	—	—	6002752
		K	0.2810	2.1/8	3.1/2	1	—	—	6002753
9/32			0.2813	2.1/8	3.1/2	1	6002741	—	—
		L	0.2900	2.1/8	3.1/2	1	—	—	6002754
		M	0.2950	2.3/8	4"	1	—	—	6002755
19/64			0.2969	2.3/8	4"	1	6002718	—	—

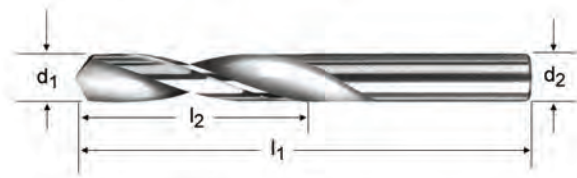
d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø Nr.	d <sub>1</sub> Ø letter	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	D33F	D33W	D33L
		N	0.3020	2.3/8	4"	1	—	—	6002756
5/16			0.3125	2.3/8	4"	1	6002734	—	—
		O	0.3160	2.3/8	4"	1	—	—	6002757
		P	0.3230	2.3/8	4"	1	—	—	6002758
21/64			0.3281	2.3/8	4"	1	6002723	—	—
		Q	0.3320	2.3/8	4"	1	—	—	6002759
		R	0.3390	2.3/8	4"	1	—	—	6002761
11/32			0.3437	2.3/8	4"	1	6002764	—	—
		S	0.3480	2.3/8	4"	1	—	—	6002301
		T	0.3580	2.3/4	4.1/4	1	—	—	6002360
23/64			0.3594	2.3/4	4.1/4	1	6002724	—	—
		U	0.3680	2.3/4	4.1/4	1	—	—	6002403
3/8			0.3750	2.3/4	4.1/4	1	6002732	—	—
		V	0.3770	2.3/4	4.1/4	1	—	—	6002435
		W	0.3860	2.7/8	4.1/2	1	—	—	6002470
25/64			0.3906	2.7/8	4.1/2	1	6002725	—	—
		X	0.3970	2.7/8	4.1/2	1	—	—	6002477
		Y	0.4040	2.7/8	4.1/2	1	—	—	6002480
13/32			0.4063	2.7/8	4.1/2	1	6002702	—	—
		Z	0.4130	2.7/8	4.1/2	1	—	—	6002483
27/64			0.4219	2.7/8	4.1/2	1	6002726	—	—
7/16			0.4375	2.7/8	4.1/2	1	6002737	—	—
29/64			0.4531	3"	4.3/4	1	6002728	—	—
15/32			0.4687	3"	4.3/4	1	6002707	—	—
31/64			0.4844	3"	4.3/4	1	6002733	—	—
1/2			0.5000	3"	4.3/4	1	6002749	—	—

# 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

118°

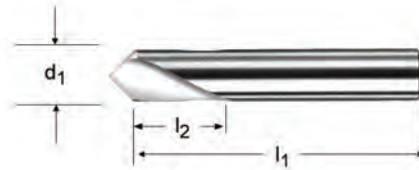


1.00 - 12.00

$d_1$ Ø	$d_1$ decimal	$l_2$	$l_1$	Pack Qty	D33M
mm	Inch	inch	inch		
1.00	0.0394	5/8	1.1/2	1	6002316
1.50	0.0591	3/4	1.1/2	1	6002320
2.00	0.0787	7/8	1.3/4	1	6002353
2.05	0.0807	7/8	1.3/4	1	6002364
2.50	0.0984	1"	2"	1	6002368
3.00	0.1181	1.1/4	2.1/4	1	6002373
3.30	0.1299	1.3/8	2.1/2	1	6002378
3.50	0.1378	1.3/8	2.1/2	1	6002382
4.00	0.1575	1.3/8	2.1/2	1	6002386
4.50	0.1772	1.5/8	2.3/4	1	6002390
5.00	0.1969	1.3/4	3"	1	6002394
5.50	0.2165	1.3/4	3"	1	6002397
6.00	0.2362	2"	3.1/4	1	6002400
6.50	0.2559	2"	3.1/4	1	6002406
7.00	0.2756	2.1/8	3.1/2	1	6002409
7.50	0.2953	2.3/8	4"	1	6002412
8.00	0.3150	2.3/8	4"	1	6002415
8.50	0.3346	2.3/8	4"	1	6002418
9.00	0.3543	2.3/4	4.1/4	1	6002420
9.50	0.3740	2.3/4	4.1/4	1	6002423
10.00	0.3937	2.7/8	4.1/2	1	6002324
10.50	0.4134	2.7/8	4.1/2	1	6002328
10.75	0.4232	2.7/8	4.1/2	1	6002333
11.00	0.4331	2.7/8	4.1/2	1	6002338
11.50	0.4528	3"	4.3/4	1	6002342
12.00	0.4724	3"	4.3/4	1	6002347

**General Purpose Solid Carbide Standard Length - Spotting Drill**

**DS-90** Provides 90°, 120° or 142° included angle spot locations or chamfers for follow-up drilling & tapping operations.  
**DS-120**  
**DS-142**



DS-90	DS-120	DS-142
ANSI	ANSI	ANSI
1XD	1XD	1XD
HM	HM	HM
90°	120°	142°
1/8 - 1/2	1/8 - 1/2	1/8 - 1/2

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	DS-90	DS-120	DS-142
1/8	0.1250	3/8	2"	1	6002225	7378063	7378069
3/16	0.1875	3/4	3"	1	6002228	7378064	7378970
1/4	0.2500	3/4	3"	1	6002392	7378068	7378974
5/16	0.3125	1"	2.1/2	1	6002232	7378066	7378972
3/8	0.3750	1"	3"	1	6002230	7378065	7378971
1/2	0.5000	1"	4"	1	6002389	7378067	7378973

# SPECIAL PURPOSE DRILL



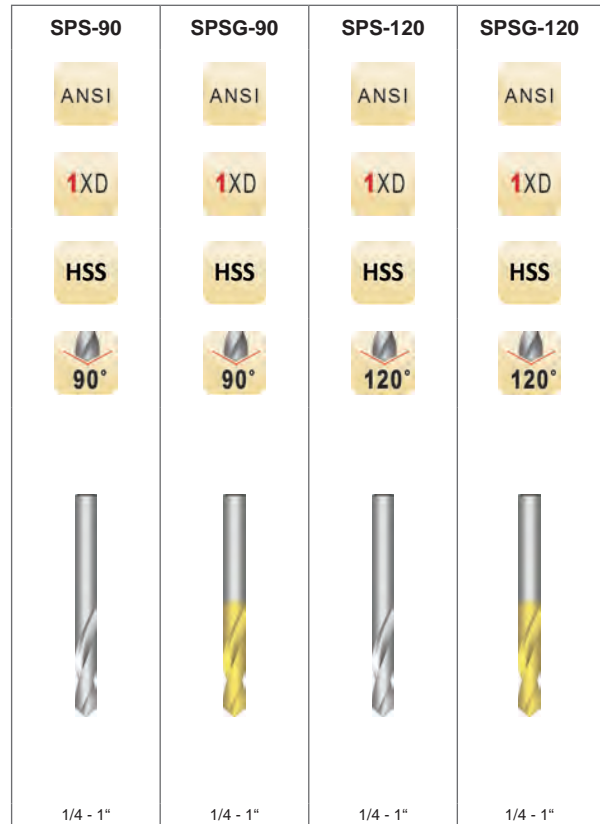
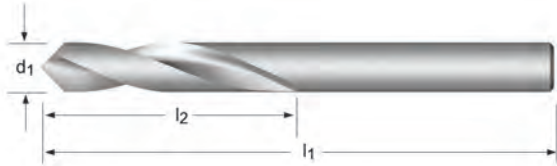
## Spotting Drill - Short Length

**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.



$d_1$ 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	6000094	6000142	6000072	6000113
3/8	0.3750	1.1/8	3.1/8	1	6000100	6000150	6000078	6000127
1/2	0.5000	1.3/8	3.3/4	1	6000090	6000139	6000069	6000110
5/8	0.6250	1.5/8	4.3/8	1	6000104	6000154	6000081	6000133
3/4	0.7500	1.7/8	5"	1	6000097	6000146	6000075	6000116
1"	1.0000	2.1/4	6"	1	6000087	6000135	6000066	6000108



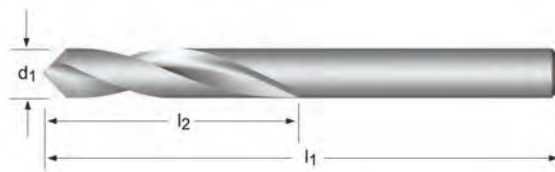
**Spotting Drill - Regular Length**

**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
ANSI	ANSI	ANSI	ANSI
1XD	1XD	1XD	1XD
HSS	HSS	HSS	HSS
90°	90°	120°	120°
1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 1/2"

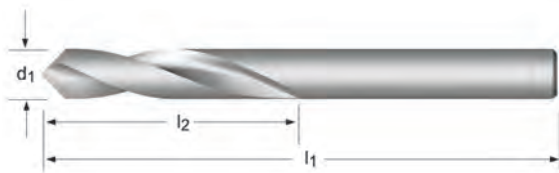
d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	SPR-90	SPRG-90	SPR-120	SPRG-120
1/4	0.2500	3/4	4"	1	6000101	6000055	6000082	6000166
3/8	0.3750	1.1/8	5"	1	6000112	6000060	6000088	6000213
1/2	0.5000	1.3/8	6"	1	6000098	6000222	6000079	6000122
5/8	0.6250	1.5/8	7"	1	6000050	6000063	6000091	—
3/4	0.7500	1.7/8	8"	1	6000105	6000057	6000085	—
1"	1.0000	2.1/4	8"	1	6000095	6000219	6000076	—

# 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 - 5/8	1/4 - 1/2

$d_1$ 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	6000025	6000062	6000005	6000046
3/8	0.3750	1.1/8	7"	1	6000031	6000068	6000014	6000051
1/2	0.5000	1.3/8	8"	1	6000022	6000059	6000002	6000040
5/8	0.6250	1.5/8	9"	1	6000034	—	6000016	—
3/4	0.7500	1.7/8	10"	1	6000028	6000065	—	—
1"	1.0000	2.1/4	10"	1	6000019	6000056	—	—

**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

ANSI

1XD

HM

N0 - N6

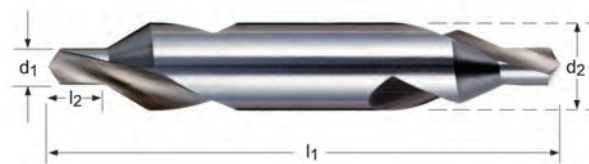
Nr.	$d_1$ Ø Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	Pack Qty	DC
0	1/32	1/32	1.1/2	1/8	1	6002219
1	3/64	3/64	1.1/2	1/8	1	6002246
2	5/64	5/64	2"	3/16	1	6002278
3	7/64	7/64	2"	1/4	1	6002325
4	1/8	1/8	2.1/8	5/16	1	6002372
5	3/16	3/16	2.3/4	7/16	1	6002380
6	7/32	7/32	3"	1/2	1	6002384

# 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 <sub>1</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	Pack Qty	76HA
000	0.0200	0.0300	1.1/4	1/8	12	6001210
00	0.0250	0.0300	1.1/8	1/8	12	6001208
0	1/32	0.0380	1.1/8	1/8	12	6001205
1	3/64	3/64	1.1/4	1/8	12	6001213
2	5/64	5/64	1.7/8	3/16	12	6001215
3	7/64	7/64	2"	1/4	12	6001217
4	1/8	1/8	2.1/8	5/16	12	6001219
5	3/16	3/16	2.3/4	7/16	6	6001221
6	7/32	7/32	3"	1/2	6	6001223
7	1/4	1/4	3.1/4	5/8	1	6001225
8	5/16	5/16	3.1/2	3/4	1	6001227

## General Purpose Combined Drill and Countersink (Center Drill)

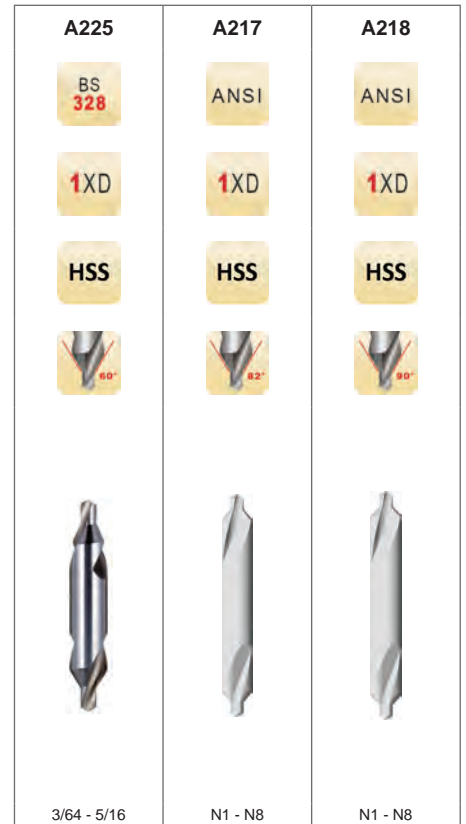
**A225** 60° C'sink. Bright Finish improves chip flow in soft or non-ferrous materials

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

**A217SET** 5 pc. set consists of N1, N2, N3, N4 & N5

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

**A218SET** 5 pc. set consists of N1, N2, N3, N4 & N5



Nr.	d <sub>1</sub> ∅ Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> max/min Inch	l <sub>1</sub> Inch	d <sub>2</sub> ∅ Inch	Pack Qty	A225	A217	A218
BS1	3/64	0.0469	5/64 - 1/16	1.1/2	1/8	1	5969157	—	—
BS2	1/16	0.0625	3/32 - 5/64	1.3/4	3/16	1	5969160	—	—
BS3	3/32	0.0938	5/32 - 1/8	2"	1/4	1	5969163	—	—
BS4	1/8	0.1250	3/16 - 5/32	2.1/4	5/16	1	5969166	—	—
BS5	3/16	0.1875	9/32 - 1/4	2.1/2	7/16	1	5969169	—	—
BS5A	7/32	0.2188	5/16 - 9/32	2.3/4	1/2	1	5969171	—	—
BS6	1/4	0.2500	3/8 - 5/16	3"	5/8	1	5969173	—	—
BS7	5/16	0.3125	15/32 - 13/32	3.1/2	3/4	1	5969174	—	—
1		0.0469	.055-.067	1.1/4	1/8	1	—	5969408	—
1		0.0469	.055-.067	1.1/4	1/8	1	—	—	5968986
2		0.0781	.094-.106	1.7/8	3/16	1	—	5969412	—
2		0.0781	.094-.106	1.7/8	3/16	1	—	—	5969045
3		0.1094	.130-.154	2"	1/4	1	—	5969415	—
3		0.1094	.130-.154	2"	1/4	1	—	—	5969099
4		0.1250	.150-.173	2.1/8	5/16	1	—	5969418	—
4		0.1250	.150-.173	2.1/8	5/16	1	—	—	5969147
5		0.1875	.232-.256	2.3/4	7/16	1	—	5969420	—
5		0.1875	.232-.256	2.3/4	7/16	1	—	—	5969175
6		0.2188	.272-.295	3"	1/2	1	—	5969422	—
6		0.2188	.272-.295	3"	1/2	1	—	—	5969177
7		0.2500	.315-.339	3.1/4	5/8	1	—	5969423	—
7		0.2500	.315-.339	3.1/4	5/8	1	—	—	5969178
8		0.3125	.394-.417	3.1/2	3/4	1	—	5969424	—
8		0.3125	.394-.417	3.1/2	3/4	1	—	—	5969179

Set	Style	Pieces per set	Contents of set	Pack Qty	A217 set	A218 set
A217SET	A217	5	N1, N2, N3, N4, N5	1	5969426	—
A218SET	A218	5	N1, N2, N3, N4, N5	1	—	5969180

# SPECIAL PURPOSE DRILL

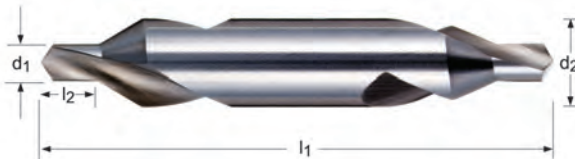


## Cobalt Combined Drill and Countersink (Center Drill)

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

### A221SET

5 peice set includes N1, N2, N3, N4 & N5



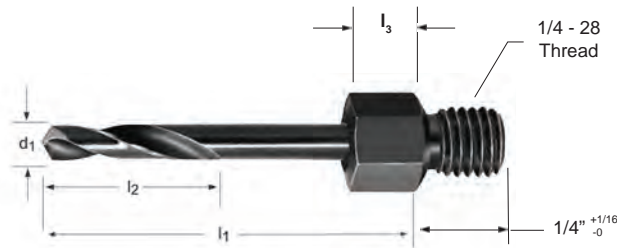
Nr.	Set	d <sub>1</sub> Ø Inch	Style	d <sub>1</sub> decimal Inch	Pieces per Set	l <sub>2</sub> Inch	Contents of set	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	Pack Qty	A221	A221SET
00		0.025		0.0250		1/32		1.1/8	1/8	1	5969071	<sup>1)</sup> —
0		1/32		0.0313		1/32		1.1/8	1/8	1	5969065	<sup>1)</sup> —
1		3/64		0.0469		3/64		1.1/4	1/8	1	5969075	—
2		5/64		0.0781		5/64		1.7/8	3/16	1	5969079	—
3		7/64		0.1094		7/64		2"	1/4	1	5969085	—
4		1/8		0.1250		1/8		2.1/8	5/16	1	5969089	—
5		3/16		0.1875		3/16		2.3/4	7/16	1	5969094	—
6		7/32		0.2188		7/32		3"	1/2	1	5969104	—
7		1/4		0.2500		1/4		3.1/4	5/8	1	5969109	—
8		5/16		0.3125		5/16		3.1/2	3/4	1	5969115	—
	A221SET		A221		5		N1, N2, N3, N4, N5			1	—	5969120




<sup>1)</sup> single ended only

**HSS, Threaded Hex Shank Drills**

- TS41HS** - Stub, Wire Gauge Sizes
- TS40HS** - Stub, Fractional Sizes
- TS42HS** - Stub, Letter Sizes
- TS18HS** - Short, Wire Gauge Sizes
- TS10HS** - Short, Fractional Sizes
- TS15HS** - Short, Letter Sizes
- TS52HS** - Long, Wire Gauge Sizes
- TS51HS** - Long, Fractional Sizes
- TS55HS** - Long, Letter Sizes

**NAS-965 Type B** Steam tempered for increased wear resistance & lubricity. Shank design for drilling in confined spaces. Low thrust design self centering Split Point for easier penetration. 1/4-28 thread



<b>TS41HS</b> <b>TS40HS</b> <b>TS42HS</b>	<b>TS18HS</b> <b>TS10HS</b> <b>TS15HS</b>	<b>TS52HS</b> <b>TS51HS</b> <b>TS55HS</b>
<b>HSS</b>	<b>HSS</b>	<b>HSS</b>
<b>135°</b>	<b>135°</b>	<b>135°</b>
		
N50 - N1 3/32 - 3/8 A - G	N50 - N1 3/32 - 3/8 A - G	N50 - N1 3/32 - 3/8 A - G

d <sub>1</sub> Ø Nr.	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>3</sub> Inch	Pack Qty	TS41HS TS40HS TS42HS	TS18HS TS10HS TS15HS	TS52HS TS51HS TS55HS
N50	5/16	1/2	1/8	1	7877827	—	—
N50	9/16	1"	1/4	1	—	7877968	—
N50	7/8	2 1/8	1/4	1	—	—	7878029
3/32	5/16	1/2	1/8	1	7877828	—	—
3/32	9/16	1"	1/4	1	—	7877969	—
3/32	7/8	2 1/8	1/4	1	—	—	7878030
N40	5/16	1/2	1/8	1	7877829	—	—
N40	9/16	1"	1/4	1	—	7877970	—
N40	7/8	2 1/8	1/4	1	—	—	7878031
N39	5/16	1/2	1/8	1	7877910	—	—
N39	9/16	1"	1/4	1	—	7877971	—
N39	7/8	2 1/8	1/4	1	—	—	7878032
N38	5/16	1/2	1/8	1	7877911	—	—
N38	9/16	1"	1/4	1	—	7877972	—
N38	7/8	2 1/8	1/4	1	—	—	7878033
N37	5/16	1/2	1/8	1	7877912	—	—
N37	9/16	1"	1/4	1	—	7877973	—
N37	7/8	2 1/8	1/4	1	—	—	7878034
N36	5/16	1/2	1/8	1	7877913	—	—
N36	9/16	1"	1/4	1	—	7877974	—
N36	7/8	2 1/8	1/4	1	—	—	7878035
7/64	5/16	1/2	1/8	1	7877914	—	—
7/64	9/16	1"	1/4	1	—	7877975	—
7/64	7/8	2 1/8	1/4	1	—	—	7878036
N35	5/16	1/2	1/8	1	7877915	—	—
N35	9/16	1"	1/4	1	—	7877976	—
N35	7/8	2 1/8	1/4	1	—	—	7878037
N34	5/16	1/2	1/8	1	7877916	—	—
N34	9/16	1"	1/4	1	—	7877977	—
N34	7/8	2 1/8	1/4	1	—	—	7878038
N33	5/16	1/2	1/8	1	7877917	—	—

# SPECIAL PURPOSE DRILL



d <sub>1</sub> Ø Nr.	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>3</sub> Inch	Pack Qty	TS41HS	TS18HS	TS52HS
					TS40HS	TS10HS	TS51HS
					TS42HS	TS15HS	TS55HS
N33	9/16	1"	1/4	1	—	7877978	—
N33	7/8	2 1/8	1/4	1	—	—	7878039
N32	5/16	1/2	1/8	1	7877918	—	—
N32	9/16	1"	1/4	1	—	7877979	—
N32	7/8	2 1/8	1/4	1	—	—	7878040
N31	5/16	1/2	1/8	1	7877919	—	—
N31	9/16	1"	1/4	1	—	7877980	—
N31	7/8	2 1/8	1/4	1	—	—	7878041
1/8	5/16	1/2	1/8	1	7877920	—	—
1/8	9/16	1"	1/4	1	—	7877981	—
1/8	7/8	2 1/8	1/4	1	—	—	7878042
N30	5/16	9/16	1/8	1	7877921	—	—
N30	9/16	1 1/4	1/4	1	—	7877982	—
N30	1 1/8	2 1/8	1/4	1	—	—	7878043
N29	5/16	9/16	1/8	1	7877922	—	—
N29	9/16	1 1/4	1/4	1	—	7877983	—
N29	1 1/8	2 1/8	1/4	1	—	—	7878044
N28	5/16	9/16	1/8	1	7877923	—	—
N28	9/16	1 1/4	1/4	1	—	7877984	—
N28	1 1/8	2 1/8	1/4	1	—	—	7878045
9/64	5/16	9/16	1/8	1	7877924	—	—
9/64	9/16	1 1/4	1/4	1	—	7877985	—
9/64	1 1/8	2 1/8	1/4	1	—	—	7878046
N27	5/16	9/16	1/8	1	7877925	—	—
N27	9/16	1 1/4	1/4	1	—	7877986	—
N27	1 1/8	2 1/8	1/4	1	—	—	7878047
N26	5/16	9/16	1/8	1	7877926	—	—
N26	9/16	1 1/4	1/4	1	—	7877987	—
N26	1 1/8	2 1/8	1/4	1	—	—	7878048
N25	5/16	9/16	1/8	1	7877927	—	—
N25	9/16	1 1/4	1/4	1	—	7877988	—
N25	1 1/8	2 1/8	1/4	1	—	—	7878049
N24	5/16	9/16	1/8	1	7877928	—	—
N24	9/16	1 1/4	1/4	1	—	7877989	—
N24	1 1/8	2 1/8	1/4	1	—	—	7878050
N23	5/16	9/16	1/8	1	7877929	—	—
N23	9/16	1 1/4	1/4	1	—	7877990	—
N23	1 1/8	2 1/8	1/4	1	—	—	7878051
5/32	5/16	9/16	1/8	1	7877930	—	—
5/32	9/16	1 1/4	1/4	1	—	7877991	—
5/32	1 1/8	2 1/8	1/4	1	—	—	7878052
N22	5/16	9/16	1/8	1	7877931	—	—
N22	9/16	1 1/4	1/4	1	—	7877992	—
N22	1 1/8	2 1/8	1/4	1	—	—	7878053
N21	5/16	9/16	1/8	1	7877932	—	—
N21	9/16	1 1/4	1/4	1	—	7877993	—
N21	1 1/8	2 1/8	1/4	1	—	—	7878054
N20	5/16	9/16	1/8	1	7877933	—	—
N20	9/16	1 1/4	1/4	1	—	7877994	—
N20	1 1/8	2 1/8	1/4	1	—	—	7878055
N19	5/16	9/16	1/8	1	7877934	—	—
N19	9/16	1 1/4	1/4	1	—	7877995	—
N19	1 1/8	2 1/8	1/4	1	—	—	7878056
N18	5/16	9/16	1/8	1	7877935	—	—
N18	9/16	1 1/4	1/4	1	—	7877996	—
N18	1 1/8	2 1/8	1/4	1	—	—	7878057
11/64	5/16	9/16	1/8	1	7877936	—	—
11/64	9/16	1 1/4	1/4	1	—	7877997	—
11/64	1 1/8	2 1/8	1/4	1	—	—	7878357
N17	5/16	9/16	1/8	1	7877937	—	—
N17	9/16	1 1/4	1/4	1	—	7877998	—
N17	1 1/8	2 1/8	1/4	1	—	—	7878059



d <sub>1</sub> Ø Nr.	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>3</sub> Inch	Pack Qty	TS41HS TS40HS TS42HS	TS18HS TS10HS TS15HS	TS52HS TS51HS TS55HS
N16	5/16	9/16	1/8	1	7877938	—	—
N16	9/16	1 1/4	1/4	1	—	7877999	—
N16	1 1/8	2 1/8	1/4	1	—	—	7878060
N15	5/16	9/16	1/8	1	7877939	—	—
N15	9/16	1 1/4	1/4	1	—	7878000	—
N15	1 1/8	2 1/8	1/4	1	—	—	7878061
N14	5/16	9/16	1/8	1	7877940	—	—
N14	9/16	1 1/4	1/4	1	—	7878001	—
N14	1 1/8	2 1/8	1/4	1	—	—	7878062
N13	5/16	9/16	1/8	1	7877941	—	—
N13	9/16	1 1/4	1/4	1	—	7878002	—
N13	1 1/8	2 1/8	1/4	1	—	—	7878063
3/16	5/16	9/16	1/8	1	7877942	—	—
3/16	9/16	1 1/4	1/4	1	—	7878003	—
3/16	1 1/8	2 1/8	1/4	1	—	—	7878064
N12	5/16	9/16	1/8	1	7877943	—	—
N12	9/16	1 1/4	1/4	1	—	7878004	—
N12	1 1/8	2 1/8	1/4	1	—	—	7878065
N11	5/16	9/16	1/8	1	7877944	—	—
N11	9/16	1 1/4	1/4	1	—	7878005	—
N11	1 1/8	2 1/8	1/4	1	—	—	7878066
N10	5/16	9/16	1/8	1	7877945	—	—
N10	9/16	1 1/4	1/4	1	—	7878006	—
N10	1 1/8	2 1/8	1/4	1	—	—	7878067
N9	5/16	5/8	1/4	1	7877946	—	—
N9	9/16	1 1/4	5/16	1	—	7878007	—
N9	1 1/8	2 1/8	5/16	1	—	—	7878068
N8	5/16	5/8	1/4	1	7877947	—	—
N8	9/16	1 1/4	5/16	1	—	7878008	—
N8	1 1/8	2 1/8	5/16	1	—	—	7878069
N7	5/16	5/8	1/4	1	7877948	—	—
N7	9/16	1 1/4	5/16	1	—	7878009	—
N7	1 1/8	2 1/8	5/16	1	—	—	7878070
13/64	5/16	5/8	1/4	1	7877949	—	—
13/64	9/16	1 1/4	5/16	1	—	7878010	—
13/64	1 1/8	2 1/8	5/16	1	—	—	7878071
N6	5/16	5/8	1/4	1	7877950	—	—
N6	9/16	1 1/4	5/16	1	—	7878011	—
N6	1 1/8	2 1/8	5/16	1	—	—	7878072
N5	5/16	5/8	1/4	1	7877951	—	—
N5	9/16	1 1/4	5/16	1	—	7878012	—
N5	1 1/8	2 1/8	5/16	1	—	—	7878073
N4	5/16	5/8	1/4	1	7877952	—	—
N4	9/16	1 1/4	5/16	1	—	7878013	—
N4	1 1/8	2 1/8	5/16	1	—	—	7878074
N3	5/16	5/8	1/4	1	7877953	—	—
N3	9/16	1 1/4	5/16	1	—	7878014	—
N3	1 1/8	2 1/8	5/16	1	—	—	7878075
7/32	5/16	5/8	1/4	1	7877954	—	—
7/32	9/16	1 1/4	5/16	1	—	7878015	—
7/32	1 1/8	2 1/8	5/16	1	—	—	7878076
N2	5/16	5/8	1/4	1	7877955	—	—
N2	9/16	1 1/4	5/16	1	—	7878016	—
N2	1 1/8	2 1/8	5/16	1	—	—	7878077
N1	5/16	5/8	1/4	1	7877956	—	—
N1	9/16	1 1/4	5/16	1	—	7878017	—
N1	1 1/8	2 1/8	5/16	1	—	—	7878078
A	5/16	5/8	1/4	1	7877957	—	—
A	9/16	1 1/4	5/16	1	—	7878018	—
A	1 1/8	2 1/8	5/16	1	—	—	7878079
15/64	5/16	5/8	1/4	1	7877958	—	—
15/64	9/16	1 1/4	5/16	1	—	7878019	—
15/64	1 1/8	2 1/8	5/16	1	—	—	7878080
B	5/16	5/8	1/4	1	7877959	—	—

# SPECIAL PURPOSE DRILL

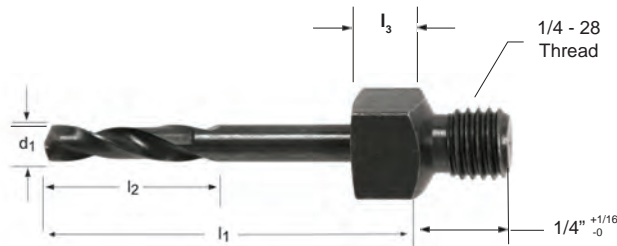


d <sub>1</sub> Ø Nr.	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>3</sub> Inch	Pack Qty	TS41HS TS40HS TS42HS	TS18HS TS10HS TS15HS	TS52HS TS51HS TS55HS
B	9/16	1 1/4	5/16	1	—	7878020	—
B	1 1/8	2 1/8	5/16	1	—	—	7878081
C	5/16	5/8	1/4	1	7877960	—	—
C	9/16	1 1/4	5/16	1	—	7878021	—
C	1 1/8	2 1/8	5/16	1	—	—	7878082
D	5/16	5/8	1/4	1	7877961	—	—
D	9/16	1 1/4	5/16	1	—	7878022	—
D	1 1/8	2 1/8	5/16	1	—	—	7878083
1/4	5/16	5/8	1/4	1	7877962	—	—
1/4	9/16	1 1/4	5/16	1	—	7878023	—
1/4	1 1/8	2 1/8	5/16	1	—	—	7878084
F	5/16	5/8	1/4	1	7877963	—	—
F	9/16	1 1/4	5/16	1	—	7878024	—
F	1 1/8	2 1/8	5/16	1	—	—	7878085
G	5/16	5/8	1/4	1	7877964	—	—
G	9/16	1 1/4	5/16	1	—	7878025	—
G	1 1/8	2 1/8	5/16	1	—	—	7878086
9/32	5/16	5/8	1/4	1	7877965	—	—
9/32	9/16	1 1/4	5/16	1	—	7878026	—
9/32	1 1/8	2 1/8	5/16	1	—	—	7878087
5/16	5/16	5/8	1/4	1	7877966	—	—
5/16	9/16	1 1/4	5/16	1	—	7878027	—
5/16	1 1/8	2 1/8	5/16	1	—	—	7878088
3/8	5/16	5/8	1/4	1	7877967	—	—
3/8	9/16	1 1/4	5/16	1	—	7878028	—
3/8	1 1/8	2 1/8	5/16	1	—	—	7878089

**Cobalt, Threaded Square Shank Drills**

- TS41CO** - Stub, Wire Gauge Sizes
- TS40CO** - Stub, Fractional Sizes
- TS42CO** - Stub, Letter Sizes
- TS18CO** - Short, Wire Gauge Sizes
- TS10CO** - Short, Fractional Sizes
- TS15CO** - Short, Letter Sizes
- TS52CO** - Long, Wire Gauge Sizes
- TS51CO** - Long, Fractional Sizes
- TS55CO** - Long, Wire Gauge Sizes

**NAS-965 Type D** Steam tempered for increased wear resistance & lubricity. Shank design for drilling in confined spaces. Low thrust design self centering Split Point for easier penetration. 1/4-28 thread



TS41CO TS40CO TS42CO	TS18CO TS10CO TS15CO	TS52CO TS51CO TS55CO
HSS-E	HSS-E	HSS-E
135°	135°	135°
N50 - N1 3/32 - 3/8 A - G	N50 - N1 3/32 - 3/8 A - G	N50 - N1 3/32 - 3/8 A - G

d <sub>1</sub> Ø Nr.	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>3</sub> Inch	Pack Qty	TS41CO TS40CO TS42CO	TS18CO TS10CO TS15CO	TS52CO TS51CO TS55CO
N50	5/16	1/2	1/8	1	7878110	—	—
N50	9/16	1"	1/4	1	—	7878171	—
N50	7/8	2 1/8	1/4	1	—	—	7878232
3/32	5/16	1/2	1/8	1	7878111	—	—
3/32	9/16	1"	1/4	1	—	7878172	—
3/32	7/8	2 1/8	1/4	1	—	—	7878233
N40	5/16	1/2	1/8	1	7878112	—	—
N40	9/16	1"	1/4	1	—	7878173	—
N40	7/8	2 1/8	1/4	1	—	—	7878234
N39	5/16	1/2	1/8	1	7878113	—	—
N39	9/16	1"	1/4	1	—	7878174	—
N39	7/8	2 1/8	1/4	1	—	—	7878235
N38	5/16	1/2	1/8	1	7878114	—	—
N38	9/16	1"	1/4	1	—	7878175	—
N38	7/8	2 1/8	1/4	1	—	—	7878236
N37	5/16	1/2	1/8	1	7878115	—	—
N37	9/16	1"	1/4	1	—	7878176	—
N37	7/8	2 1/8	1/4	1	—	—	7878237
N36	5/16	1/2	1/8	1	7878116	—	—
N36	9/16	1"	1/4	1	—	7878177	—
N36	7/8	2 1/8	1/4	1	—	—	7878238
7/64	5/16	1/2	1/8	1	7878117	—	—
7/64	9/16	1"	1/4	1	—	7878178	—
7/64	7/8	2 1/8	1/4	1	—	—	7878239
N35	5/16	1/2	1/8	1	7878118	—	—
N35	9/16	1"	1/4	1	—	7878179	—
N35	7/8	2 1/8	1/4	1	—	—	7878240
N34	5/16	1/2	1/8	1	7878119	—	—
N34	9/16	1"	1/4	1	—	7878180	—
N34	7/8	2 1/8	1/4	1	—	—	7878241
N33	5/16	1/2	1/8	1	7878120	—	—

# SPECIAL PURPOSE DRILL



d <sub>1</sub> Ø Nr.	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>3</sub> Inch	Pack Qty	TS41CO	TS18CO	TS52CO
					TS40CO	TS10CO	TS51CO
					TS42CO	TS15CO	TS55CO
N33	9/16	1"	1/4	1	—	7878181	—
N33	7/8	2 1/8	1/4	1	—	—	7878242
N32	5/16	1/2	1/8	1	7878121	—	—
N32	9/16	1"	1/4	1	—	7878182	—
N32	7/8	2 1/8	1/4	1	—	—	7878243
N31	5/16	1/2	1/8	1	7878122	—	—
N31	9/16	1"	1/4	1	—	7878183	—
N31	7/8	2 1/8	1/4	1	—	—	7878244
1/8	5/16	1/2	1/8	1	7878123	—	—
1/8	9/16	1"	1/4	1	—	7878184	—
1/8	7/8	2 1/8	1/4	1	—	—	7878245
N30	5/16	9/16	1/8	1	7878124	—	—
N30	9/16	1 1/4	1/4	1	—	7878185	—
N30	1 1/8	2 1/8	1/4	1	—	—	7878246
N29	5/16	9/16	1/8	1	7878125	—	—
N29	9/16	1 1/4	1/4	1	—	7878186	—
N29	1 1/8	2 1/8	1/4	1	—	—	7878247
N28	5/16	9/16	1/8	1	7878126	—	—
N28	9/16	1 1/4	1/4	1	—	7878187	—
N28	1 1/8	2 1/8	1/4	1	—	—	7878248
9/64	5/16	9/16	1/8	1	7878127	—	—
9/64	9/16	1 1/4	1/4	1	—	7878188	—
9/64	1 1/8	2 1/8	1/4	1	—	—	7878249
N27	5/16	9/16	1/8	1	7878128	—	—
N27	9/16	1 1/4	1/4	1	—	7878189	—
N27	1 1/8	2 1/8	1/4	1	—	—	7878250
N26	5/16	9/16	1/8	1	7878129	—	—
N26	9/16	1 1/4	1/4	1	—	7878190	—
N26	1 1/8	2 1/8	1/4	1	—	—	7878251
N25	5/16	9/16	1/8	1	7878130	—	—
N25	9/16	1 1/4	1/4	1	—	7878191	—
N25	1 1/8	2 1/8	1/4	1	—	—	7878252
N24	5/16	9/16	1/8	1	7878131	—	—
N24	9/16	1 1/4	1/4	1	—	7878192	—
N24	1 1/8	2 1/8	1/4	1	—	—	7878253
N23	5/16	9/16	1/8	1	7878132	—	—
N23	9/16	1 1/4	1/4	1	—	7878193	—
N23	1 1/8	2 1/8	1/4	1	—	—	7878254
5/32	5/16	9/16	1/8	1	7878133	—	—
5/32	9/16	1 1/4	1/4	1	—	7878194	—
5/32	1 1/8	2 1/8	1/4	1	—	—	7878255
N22	5/16	9/16	1/8	1	7878134	—	—
N22	9/16	1 1/4	1/4	1	—	7878195	—
N22	1 1/8	2 1/8	1/4	1	—	—	7878256
N21	5/16	9/16	1/8	1	7878135	—	—
N21	9/16	1 1/4	1/4	1	—	7878196	—
N21	1 1/8	2 1/8	1/4	1	—	—	7878257
N20	5/16	9/16	1/8	1	7878136	—	—
N20	9/16	1 1/4	1/4	1	—	7878197	—
N20	1 1/8	2 1/8	1/4	1	—	—	7878258
N19	5/16	9/16	1/8	1	7878137	—	—
N19	9/16	1 1/4	1/4	1	—	7878198	—
N19	1 1/8	2 1/8	1/4	1	—	—	7878259
N18	5/16	9/16	1/8	1	7878138	—	—
N18	9/16	1 1/4	1/4	1	—	7878199	—
N18	1 1/8	2 1/8	1/4	1	—	—	7878260
11/64	5/16	9/16	1/8	1	7878139	—	—
11/64	9/16	1 1/4	1/4	1	—	7878200	—
11/64	1 1/8	2 1/8	1/4	1	—	—	7878261
N17	5/16	9/16	1/8	1	7878140	—	—
N17	9/16	1 1/4	1/4	1	—	7878201	—
N17	1 1/8	2 1/8	1/4	1	—	—	7878262

d <sub>1</sub> Ø Nr.	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>3</sub> Inch	Pack Qty	TS41CO	TS18CO	TS52CO
					TS40CO	TS10CO	TS51CO
					TS42CO	TS15CO	TS55CO
N16	5/16	9/16	1/8	1	7878141	—	—
N16	9/16	1 1/4	1/4	1	—	7878202	—
N16	1 1/8	2 1/8	1/4	1	—	—	7878263
N15	5/16	9/16	1/8	1	7878142	—	—
N15	9/16	1 1/4	1/4	1	—	7878203	—
N15	1 1/8	2 1/8	1/4	1	—	—	7878264
N14	5/16	9/16	1/8	1	7878143	—	—
N14	9/16	1 1/4	1/4	1	—	7878204	—
N14	1 1/8	2 1/8	1/4	1	—	—	7878265
N13	5/16	9/16	1/8	1	7878144	—	—
N13	9/16	1 1/4	1/4	1	—	7878205	—
N13	1 1/8	2 1/8	1/4	1	—	—	7878266
3/16	5/16	9/16	1/8	1	7878145	—	—
3/16	9/16	1 1/4	1/4	1	—	7878206	—
3/16	1 1/8	2 1/8	1/4	1	—	—	7878267
N12	5/16	9/16	1/8	1	7878146	—	—
N12	9/16	1 1/4	1/4	1	—	7878207	—
N12	1 1/8	2 1/8	1/4	1	—	—	7878268
N11	5/16	9/16	1/8	1	7878147	—	—
N11	9/16	1 1/4	1/4	1	—	7878208	—
N11	1 1/8	2 1/8	1/4	1	—	—	7878269
N10	5/16	9/16	1/8	1	7878148	—	—
N10	9/16	1 1/4	1/4	1	—	7878209	—
N10	1 1/8	2 1/8	1/4	1	—	—	7878270
N9	5/16	5/8	1/4	1	7878149	—	—
N9	9/16	1 1/4	5/16	1	—	7878210	—
N9	1 1/8	2 1/8	5/16	1	—	—	7878271
N8	5/16	5/8	1/4	1	7878150	—	—
N8	9/16	1 1/4	5/16	1	—	7878211	—
N8	1 1/8	2 1/8	5/16	1	—	—	7878272
N7	5/16	5/8	1/4	1	7878151	—	—
N7	9/16	1 1/4	5/16	1	—	7878212	—
N7	1 1/8	2 1/8	5/16	1	—	—	7878273
13/64	5/16	5/8	1/4	1	7878152	—	—
13/64	9/16	1 1/4	5/16	1	—	7878213	—
13/64	1 1/8	2 1/8	5/16	1	—	—	7878274
N6	5/16	5/8	1/4	1	7878153	—	—
N6	9/16	1 1/4	5/16	1	—	7878214	—
N6	1 1/8	2 1/8	5/16	1	—	—	7878275
N5	5/16	5/8	1/4	1	7878154	—	—
N5	9/16	1 1/4	5/16	1	—	7878215	—
N5	1 1/8	2 1/8	5/16	1	—	—	7878276
N4	5/16	5/8	1/4	1	7878155	—	—
N4	9/16	1 1/4	5/16	1	—	7878216	—
N4	1 1/8	2 1/8	5/16	1	—	—	7878277
N3	5/16	5/8	1/4	1	7878156	—	—
N3	9/16	1 1/4	5/16	1	—	7878217	—
N3	1 1/8	2 1/8	5/16	1	—	—	7878278
7/32	5/16	5/8	1/4	1	7878157	—	—
7/32	9/16	1 1/4	5/16	1	—	7878218	—
7/32	1 1/8	2 1/8	5/16	1	—	—	7878279
N2	5/16	5/8	1/4	1	7878158	—	—
N2	9/16	1 1/4	5/16	1	—	7878219	—
N2	1 1/8	2 1/8	5/16	1	—	—	7878280
N1	5/16	5/8	1/4	1	7878159	—	—
N1	9/16	1 1/4	5/16	1	—	7878220	—
N1	1 1/8	2 1/8	5/16	1	—	—	7878281
A	5/16	5/8	1/4	1	7878160	—	—
A	9/16	1 1/4	5/16	1	—	7878221	—
A	1 1/8	2 1/8	5/16	1	—	—	7878079
15/64	5/16	5/8	1/4	1	7878161	—	—
15/64	9/16	1 1/4	5/16	1	—	7878222	—
15/64	1 1/8	2 1/8	5/16	1	—	—	7878283
B	5/16	5/8	1/4	1	7878162	—	—

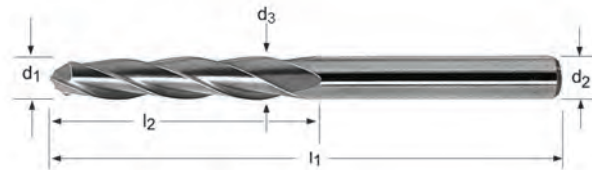
# SPECIAL PURPOSE DRILL



d <sub>1</sub> Ø Nr.	l <sub>2</sub> Inch	l <sub>1</sub> Inch	l <sub>3</sub> Inch	Pack Qty	TS41CO TS40CO TS42CO	TS18CO TS10CO TS15CO	TS52CO TS51CO TS55CO
B	9/16	1 1/4	5/16	1	—	7878223	—
B	1 1/8	2 1/8	5/16	1	—	—	7878081
C	5/16	5/8	1/4	1	7878163	—	—
C	9/16	1 1/4	5/16	1	—	7878224	—
C	1 1/8	2 1/8	5/16	1	—	—	7878082
D	5/16	5/8	1/4	1	7878164	—	—
D	9/16	1 1/4	5/16	1	—	7878225	—
D	1 1/8	2 1/8	5/16	1	—	—	7878083
1/4	5/16	5/8	1/4	1	7878165	—	—
1/4	9/16	1 1/4	5/16	1	—	7878226	—
1/4	1 1/8	2 1/8	5/16	1	—	—	7878287
F	5/16	5/8	1/4	1	7878166	—	—
F	9/16	1 1/4	5/16	1	—	7878227	—
F	1 1/8	2 1/8	5/16	1	—	—	7878085
G	5/16	5/8	1/4	1	7878167	—	—
G	9/16	1 1/4	5/16	1	—	7878228	—
G	1 1/8	2 1/8	5/16	1	—	—	7878086
9/32	5/16	5/8	1/4	1	7878168	—	—
9/32	9/16	1 1/4	5/16	1	—	7878229	—
9/32	1 1/8	2 1/8	5/16	1	—	—	7878290
5/16	5/16	5/8	1/4	1	7878169	—	—
5/16	9/16	1 1/4	5/16	1	—	7878230	—
5/16	1 1/8	2 1/8	5/16	1	—	—	7878291
3/8	5/16	5/8	1/4	1	7878170	—	—
3/8	9/16	1 1/4	5/16	1	—	7878231	—
3/8	1 1/8	2 1/8	5/16	1	—	—	7878292

**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



N1 - N4

Router Nr.	$d_1$ Ø Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	$d_3$ Ø Inch	# of Flutes	Pack Qty	ATR41
1	0.0810	0.0980	13/16	2"	0.0980	3	12	5989076
2	0.1100	0.1280	7/8	2.1/4	0.1280	3	12	5995742
3	0.1650	0.1875	1.1/16	2.1/2	0.1875	3	12	5995783
4	0.2240	0.2500	1.1/4	2.3/4	0.2500	4	12	5995826

# JOBBER DRILL SETS



## General Purpose Jobber Length Sets

**C15R10P** Bright Finish improves chip flow in  
**C29R10P** soft or non-ferrous materials



**C15R10** Steam tempered reduces wear  
**C29R10** and chip welding in harder ferrous materials.



C15R10P C29R10P	C15R10 C29R10
Set	Set

Set	Style	Pieces per Set	Sizes	Pack Qty	R10P Sets	R10 Sets
C15R10	R10	15	1/16 - 1/2 x 32nds	1	—	5995533
C29R10	R10	29	1/16 - 1/2 x 64ths	1	—	5995628
C15R10P	R10P	15	1/16-1/2 x 32nds	1	5995528	—
C29R10P	R10P	29	1/16 - 1/2 x 64ths	1	5995624	—



**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 tempered for increased wear resistance & lubricity.  
**C60R18**



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

Set	Style	Pieces per Set	Sizes	Pack Qty	A097	R18 sets	R18P sets
12	A012	60	Nr.1 - Nr.60	1	5967709	—	—
14	A012	26	A - Z	1	5967714	—	—
18	A012	29	1/16 - 1/2 x 1/64	1	5967571	—	—
20	A012	15	1/16 - 1/2 x 1/32	1	5967576	—	—
30	A012	115	1/16 - 1/2 x 1/64, Nr.1 - Nr.60, A-Z	1	5967581	—	—
60	A012	13	1/16 - 1/4 x 1/64	1	5967586	—	—
C20R18	R18	20	N61 - N80	1	—	5995552	—
C60R18	R18	60	N1 - N60	1	—	5995674	—
C20R18P	R18P	20	N61 - N80	1	—	—	5995547
C60R18P	R18P	60	N1 - N60	1	—	—	5995672

# JOBBER DRILL SETS



## General Purpose Jobber Length and Combination Sets

### C26R15P

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



### C26R15

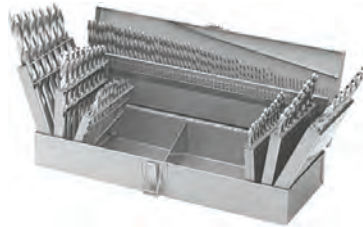
Steam tempered for increased wear resistance & lubricity.



### C114COMBP

### C115COMBP

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

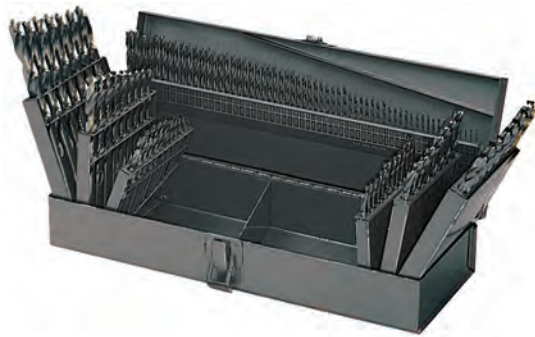


C26R15P	C26R15	C115COMBP	C114COMBP
Set	Set	Set	Set

Set	Style	Pieces per Set	Sizes	Pack Qty	C26R15P	C26R15	C115COMBP	C114COMBP
C114COMBP	R10P, R18P, R10PM	114	1/16-1/2 x 64ths, N1-N60, 1-13mm x 5 mm	1	—	—	—	5995643
C115COMBP	R10P, R18P, R15P	115	1/16-1/2 x 64ths, N1-6N0, A-Z	1	—	—	5995681	—
C26R15	R15	26	A - Z	1	—	5995597	—	—
C26R15P	R15P	26	A - Z	1	5995593	—	—	—

**General Purpose Jobber Length Combination Sets**

**C114COMB** Steam tempered for increased wear resistance & lubricity.  
**C115COMB**



C114COMB	C115COMB
ANSI	ANSI
4XD	4XD
HSS	HSS
118°	118°
Set	Set

Set	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	5995676	—
C115COMB	R10, R18, R15	115	1/16-1/2 x 64ths, N1-N60, A-Z	1	—	5995683

**General Purpose Jobber Length Metric Sets**

**A191** Steam tempered for increased wear resistance & lubricity.  
**A190**



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



**C252AB** Steam tempered for increased wear resistance & lubricity.  
**C502AB**



A191	A190	C252A	C252AB C502AB
Set	Set	Set	Set

Set	Style	Pieces per Set	Sizes	Pack Qty	A191	A190	C252A	C252AB C502AB
12	A100	60	No.1 - No.60	1	—	5969705	—	—
18	A100	29	1/16 inch - 1/2 inch x 1/64 inch	1	—	5969712	—	—
20	A100	15	1/16 inch - 1/2 inch x 1/32 inch	1	—	5969715	—	—
201	A100	19	1.0 mm - 10.0 mm x 0.5 mm	1	—	5969724	—	—
202	A100	51	1.0 mm - 6.0 mm x 0.1 mm	1	—	5969728	—	—
203	A100	41	6.0 mm - 10.0 mm x 0.1 mm	1	—	5969732	—	—
204	A100	25	1.0 mm - 13.0 mm x 0.5 mm	1	—	5969738	—	—
206	A100	29	1.0 mm - 13.0 mm x 0.5 mm + 3.3 mm, 4.2 mm, 6.8 mm, 10.2 mm	1	—	5969747	—	—
209	A100	91	1.0 mm - 10.0 mm x 0.1 mm	1	—	5969752	—	—
3	A100	21	1/16 inch - 3/8 inch x 1/64 inch	1	—	5969754	—	—
31M	A100	20	0.3 mm - 1.0 mm x 0.05 mm + 0.38 mm, 0.52 mm, 0.58 mm, 0.78 mm, 0.82 mm	1	5969762	—	—	—
413	A100	13	1.5 mm - 6.5 mm x 0.5 mm + 3.3 mm, 4.2 mm	1	5969772	—	—	—
419	A100	19	1.0 mm - 10.0 mm x 0.5 mm	1	5969777	—	—	—
61-80	A100	20	No.61 - No. 80	1	5969782	—	—	—
C252A	2A	25	1.0mm - 13mm x .5mm	1	—	—	5995581	—
C252AB	2AB	25	1.0mm - 13mm x .5mm	1	—	—	—	5995577
C502AB	2AB	50	1.0mm - 5.9mm x .1mm	1	—	—	—	5995661

**General Purpose Jobber Length Metric Sets**

**A094** Low thrust design self centering Split Point for easier penetration. TiN Coated Tip increases wear resistance and improves tool life.



A094

DIN 338

4XD

HSS

118°



Set

Set	Sizes	Pieces per Set	Sizes	Pack Qty	A094
413	A002	13	1.5 mm - 6.5 mm x 0.5 mm + 3.3 mm, 4.2 mm	1	6610302
419	A002	19	1.0 mm - 10.0 mm x 0.5 mm	1	6610303

## General Purpose Jobber Length Metric Sets

**A095** Low thrust design self centering Split Point for easier penetration. TiN Coated Tip increases wear resistance and improves tool life.



A095

DIN  
338

4XD

HSS

118°



Set

Set	Style	Pieces per Set	C	Pack Qty	A095
18	A002	29	1/16 inch - 1/2 inch x 1/64 inch	1	5967564
20	A002	15	1/16 inch - 1/2 inch x 1/32 inch	1	6610305
200	A002	24	1.0 mm - 10.5 mm x 0.5 mm + 3.3 mm, 4.2 mm, 6.8 mm, 10.2 mm	1	6610306
201	A002	19	1.0 mm - 10.0 mm x 0.5 mm	1	5967607
202	A002	51	1.0 mm - 6.0 mm x 0.1 mm	1	5967627
203	A002	41	6.0 mm - 10.0 mm x 0.1 mm	1	5967649
204	A002	25	1.0 mm - 13.0 mm x 0.5 mm	1	5967689
206	A002	29	1.0 mm - 13.0 mm x 0.5 mm + 3.3 mm, 4.2 mm, 6.8 mm, 10.2 mm	1	5967699
209	A002	91	1.0 mm - 10.0 mm x 0.1 mm	1	5967704

**General Purpose Jobber Length Left Hand Sets**

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



C15L10	C29L10
Set	Set

Set	Style	Pieces per Set	Sizes	Pack Qty	C15L10	C29L10
C15L10	L10	15	1/16-1/2 x 32nds, Left Hand	1	5995520	—
C29L10	L10	29	1/16 - 1/2 x 64ths, Left Hand	1	—	5995612

## High Helix Jobber Length Set

**A287** Low thrust design self centering Split Point for easier penetration. Steam tempered surface treatment for increased wear resistance & lubricity. Fast spiral helix for improved chip flow when drilling stainless steel.



A287

ANSI

4XD

HSS

135°



Set

Set	Style	Pieces per Set	C	Pack Qty	A287
18	A108	29	1/16 - 1/2 x 1/64	1	5969853



**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

135°



Set

Set	Style	Pieces per Set	Sizes	Pack Qty	C29HX10
C29HX10	HX10	29	1/16 - 1/2 x 64ths	1	5995609

# JOBBER DRILL SETS



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

**C13R10CO**

**C15R10CO**

**C21R10CO**

**C29R10CO**

**C60R18CO**

**C26R15CO**

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



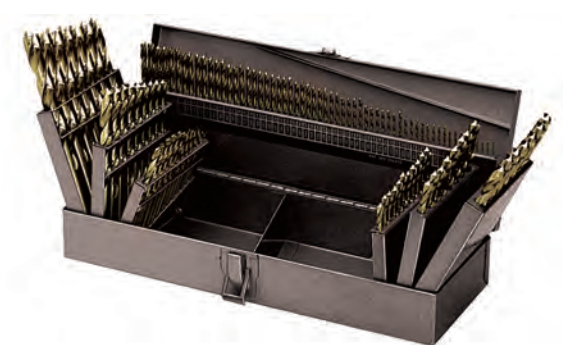
C13R10CO C15R10CO C21R10CO C29R10CO	C26R15CO	C60R18CO
ANSI	ANSI	ANSI
4XD	4XD	4XD
HSS-E	HSS-E	HSS-E
135°	135°	135°
Set	Set	Set

Set	Style	Pieces per Set	Sizes	Pack Qty	C29R10CO	C26R15CO	C60R18CO
C13R10CO	R10CO	13	1/16-1/4 x 64ths	1	5995685	—	—
C15R10CO	R10CO	15	1/16-1/2 x 32nds	1	5995524	—	—
C21R10CO	R10CO	21	1/16-3/8 x 64ths	1	5995560	—	—
C26R15CO	R15CO	26	A - Z	1	—	5995589	—
C29R10CO	R10CO	29	1/16 - 1/2 x 64ths	1	5995620	—	—
C60R18CO	R18CO	60	N1 - N60	1	—	—	5995670

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

**C115COMBC** Low thrust design self centering 135° Split Point for easier penetration. Cobalt base material with Bronze tempered for wear resistance and lubricity. Suitable for ferrous materials.

**C114COMBC**



C115COMBC	C114COMBC
Set	Set

Set	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	—	5995600
C115COMBC	R10CO, R18CO, R15CO	115	1/16-1/2 x 64ths, N1-N60, A-Z	1	5995679	—

# 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

Set	Style	Pieces per Set	Sizes	Pack Qty	C29R40	C60R41	C26R42
C26R42	R42	26	A - Z	1	—	—	5995604
C29R40	R40	29	1/16-1/2 x 64ths	1	5995635	—	—
C60R41	R41	60	N1 - N60	1	—	5995608	—

**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

Set	Style	Pieces per Set	Sizes	Pack Qty	A088
200S	A022	24	1.0 mm - 10.5 mm x 0.5 mm + 3.3 mm, 4.2 mm, 6.8 mm, 10.2 mm	1	5966976

# SCREW MACHINE DRILL SETS



## Heavy Duty Screw Machine Drill Set

**C29R40C**

**C60R41C**

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



C29R40C	C60R41C
Set	Set

Set	Style	Pieces per Set	Sizes	Pack Qty	C29R40C	C60R41C
C29R40C	R40C	29	1/16 - 1/2 x 64ths	1	5995632	—
C60R41C	R41C	60	N1 - N60	1	—	5995677

**Cobalt Heavy Duty Screw Machine Drill Sets**

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

**C60M41CO**

**C26M42CO**



C29M40CO	C60M41CO	C26M42CO
ANSI	ANSI	ANSI
2.5XD	2.5XD	2.5XD
HSS-E	HSS-E	HSS-E
135°	135°	135°
Set	Set	Set

Set	Style	Pieces per Set	Sizes	Pack Qty	C29M40CO	C60M41CO	C26M42CO
C26M42CO	M42CO	26	A - Z	1	—	—	5995585
C29M40CO	M40CO	29	1/16 - 1/2 x 64ths	1	5995616	—	—
C60M41CO	M41CO	60	N1 - N60	1	—	5995667	—

# 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.



**C29R51**

ANSI

6XD

HSS

118°



Set

Set	Style	Pieces per Set	Sizes	Pack Qty	C29R51
C29R51	R51	29	1/16 - 1/2 x 64ths	1	5995639



**Reduced Shank Drill Sets**

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

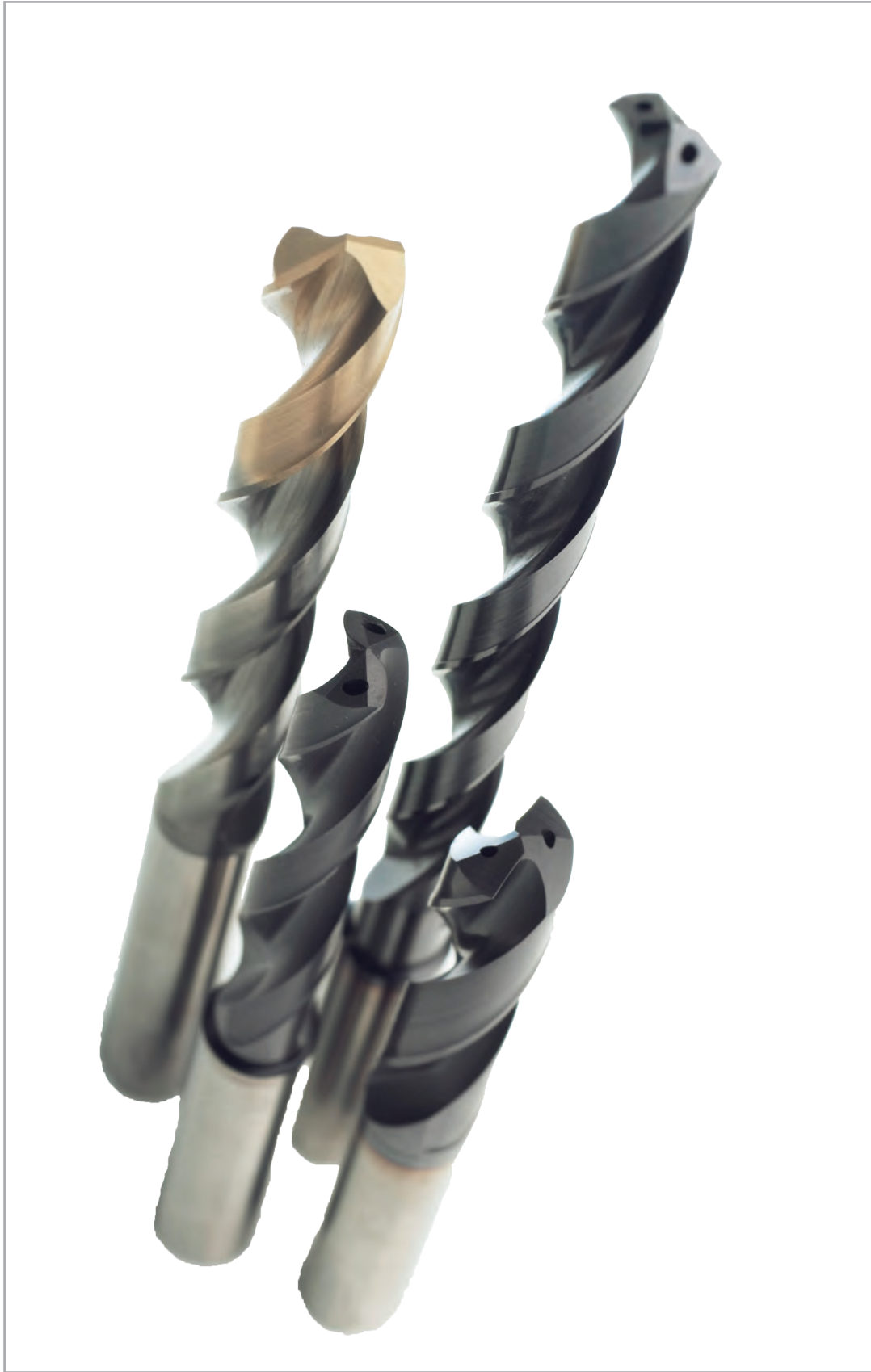
**C8R57** Silver & Deming Drills with **Tri-Flat** Shank. Steam tempered for increased wear resistance & lubricity.

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



Set	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	5995647	—	—
C8R56	R56	8	1/2" Reduced Shank, 9/16 - 1" x 16ths, S&D	1	5995703	—	—
C8R56CO	R56CO	8	1/2" Reduced Shank, 9/16 - 1" x 16ths, S&D	1	—	—	5995682
C8R57	R57	8	1/2" Reduced Shank, 9/16 - 1" x 16ths, S&D	1	—	5995726	—

\*1/2" R56 drill is a straight shank, not a reduced shank



# Visual Index - Taps

## How to Use This Chart:
































































- 1) Determine your Workpiece Material from the Application Material Groups (AMG) below.
- 2) Use the icons to find Product Features.
- 3) Find the Surface Feet Per Minute (SFM)  
example: 361 = SFM

Application Material Groups (AMG)			Hardness HRC	ISO
1. Steel	1.1 Magnetic soft steel	12L14, 12L15	<120 HB	P 1
	1.2 Structural Steel/ case carburising steel	1005-1025, 1214, 1215, A36	<200 HB	P 1
	1.3 Plain Carbon steel	1030-1060, 1050-1060, 1144-1146	<24	P 2
	1.4 Alloy steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	<24	P 3
	1.5 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>24<38	P 4
	1.6 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>38	H 1
	1.7 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	49-55	H 3
	1.8 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	55-63	H 4
2. Stainless Steel	2.1 Free machining Stainless Steel	200, 303, 416, 420F, 430F, 440	<24	M 1
	2.2 Austenitic	301, 302, 304, 316, 321, 330, CUSTOM 455, AM-350	<24	M 3
	2.3 Ferritic + Austenitic, Martensitic	318-329, 400-446, DUPLEX	<32	M 2
	2.4 Precipitation Hardened	15-5PH, Custom 450 17-4PH	<32	S 2
3. Cast Iron	3.1 Lamellar graphite	Grey, G10, Gg40, J431C, A48 CLASS 20	<150 HB	K 1
	3.2 Lamellar graphite	Grey, GG25-Gg40, J158, A48 CLASS 40-60	>150 HB<32	K 2
	3.3 Nodular graphite/ Malleable Cast Iron	A220, A436, A439, A602, Black, GGG40-GGG70	<200 HB	K 3
	3.4 Nodular graphite/ Malleable Cast Iron	Black Gts/Gtw, J434C	>200 HB<32	K 4
4. Titanium	4.1 Titanium, unalloyed	Commercially Pure	<200 HB	S 1
	4.2 Titanium, alloyed	6Al4V, 6Al4V-2Sn, Monel, Monel K	<28	S 2
	4.3 Titanium, alloyed	6Al4V-4Mo, 7Al14V-4Mo, 4911-4967	>28<38	S 3
5. Nickel	5.1 Nickel, unalloyed	Commercially Pure, 17644, 200, 5553	<150 HB	S 1
	5.2 Nickel, alloyed	Monel 400, Hastelloy C, Inconel 625, Waspaloy	<28	S 2
	5.3 Nickel, alloyed	Inconel 718, Nimonic 75-95, Rene 41, Inconel 825, A286	>28<38	S 3
6. Copper	6.1 Copper	Commercially Pure	<100 HB	N 3
	6.2 $\beta$ -Brass, Bronze	314-340, 350-370	<200 HB	N 4
	6.3 $\alpha$ -Brass	Alloyed Cu + Al + Fe, Long Chipping	<200 HB	N 3
	6.4 High Strength Bronze	Amppco 18-25	<49	N 4
7. Aluminium Magnesium	7.1 Al, Mg, unalloyed	Commercially Pure	<100 HB	N 1
	7.2 Al alloyed, Si<0.5%	6061 T6, 7075, 314-340	<150 HB	N 1
	7.3 Al alloyed, Si>0.5%<10%	6061 T6, 380-390	<120 HB	N 1
	7.4 Al alloyed, Si>10% Mg alloys	Magnesium Whisker Reinforced	<120 HB	N 2
8. Synthetic Materials	8.1 Thermoplastics	Ulramid, Polystrol	---	O
	8.2 Thermosetting plastics	Bakelit, Pertinax	---	O
	8.3 Reinforced plastic materials	CFK, GFKAFK	---	O
9. Hard Mat.	9.1 Cermets (Metal-ceramics)	Ferrotic	<54	H
10. Graphite	10.1 Standard graphite		---	O

# Visual Index - Taps

Thread Form:	UNC	UNC	UNF	UNF	M	M	MF	MF	UNC	UNF	UNC	UNF	UNC	UNF	UNC	
Standard:	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI
Class of Fit:	2BX	2BX	2BX	2BX	6HX	6HX	6HX	6HX	2B	2B	2B 3B	2B 3B	2B	2B	2BX	
Hole Type:																
Depth of Cut:	2XD	2.5XD	2XD	2.5XD	2XD	2.5XD	2XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	
Tool Material:	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	
Chamfer:	C 2-3	E 1.5-2	C 2-3	E 1.5-2	C 2-3	E 1.5-2	C 2-3	E 1.5-2	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	
Flute Geometry:																
Direction of Cut:																
Finish/Coating:	TiAIN Top	TiAIN Top	TiAIN Top	TiAIN Top	TiAIN Top	TiAIN Top	TiAIN Top	TiAIN Top	TiAIN Top	TiAIN Top	Super B	Super B	TiAIN Top	TiAIN Top	TiAIN Top	
Coolant Through:																
Style:	E814	E815	E914	E915	E630	E631	E770	E771	E809	E909	E813	E913	E811	E911	E816	
Range:	1/4 - 1"	1/4 - 1"	No.10 - 7/8	1/4 - 1"	M5 - M24	M6 - M24	M8 - M14	M10 - M14	No.4 - 1"	No.10 - 1"	No.4 - 1"	No.10 - 1"	No.4 - 1"	No.10 - 1"	No.4 - 3/4	
Page #	259	259	259	259	260	260	260	260	261	261	262	262	264	264	265	
AMG																ISO
1.1									■ 108	■ 108						P 1
1.2									■ 95	■ 95	● 72	● 72				P 1
1.3									■ 75	■ 75	● 59	● 59				P 2
1.4									● 69	● 69	● 52	● 52	■ 98	■ 98		P 3
1.5									● 43	● 42	● 33	● 33	■ 66	■ 66	● 55	P 4
1.6													● 36	● 36	■ 42	H 1
1.7															● 22	H 3
1.8																H 4
2.1											■ 46	■ 46				M 1
2.2											■ 33	■ 33				M 3
2.3											■ 20	■ 20				M 2
2.4																S 2
3.1	■ 98	■ 98	■ 98	■ 98	■ 98	■ 98	■ 98	■ 98								K 1
3.2	■ 82	■ 82	■ 82	■ 82	■ 82	■ 82	■ 82	■ 82								K 2
3.3	■ 115	■ 115	■ 115	■ 115	■ 115	■ 115	■ 115	■ 115								K 3
3.4	● 82	● 82	● 82	● 82	● 82	● 82	● 82	● 82								K 4
4.1																S 1
4.2																S 2
4.3													● 33	● 33	● 42	S 3
5.1															■ 26	S 1
5.2													● 33	● 33	● 16	S 2
5.3															■ 10	S 3
6.1									■ 39	■ 39						N 3
6.2	● 98	● 98	● 98	● 98	● 98	● 98	● 98	● 98	● 98	● 98						N 3
6.3									■ 66	■ 66						N 3
6.4	● 16	● 16	● 16	● 16	● 16	● 16	● 16	● 16								N 4
7.1																N 1
7.2																N 1
7.3																N 1
7.4	● 66	● 66	● 66	● 66	● 66	● 66	● 66	● 66								N 2
8.1																O
8.2	■ 49	■ 49	■ 49	■ 49	■ 49	■ 49	■ 49	■ 49								O
8.3																O
9.1																H
10.1																O

# Visual Index - Taps

	UNF	M	MF	M	MF	M	MF	M	MF	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	M
	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI
	2BX	6H	6H	6H	6H	6H	6H	6H	6H	2B	2B	2B 3B	2B 3B	2B	2B	2BX	2BX	6H
																		
	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2XD	2XD	2.5XD	2.5XD	2.5XD	2.5XD	1.5XD	1.5XD	2XD
	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM
	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3
										$\lambda 40^\circ$	$\lambda 40^\circ$	$\lambda 40^\circ$	$\lambda 40^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 15^\circ$	$\lambda 15^\circ$	$\lambda 40^\circ$
																		
	TIAIN Top	TIAIN Top	TIAIN Top	Super B	Super B	TIAIN Top	TIAIN Top	TIAIN Top	TIAIN Top	TIAIN Top	TIAIN Top	Super B	Super B	TIAIN Top	TIAIN Top	TIAIN Top	TIAIN Top	TIAIN Top
																		
	E916	E625	E765	E629	E769	E627	E767	E817	E917	E808	E908	E812	E912	E810	E910	E805	E905	E624
	No. 10 - 3/4	M4 - M24	M8 - M18	M4 - M24	M8 - M18	M3 - M24	M8 - M14	M3 - M12	M3 - M12	No.4 - 1"	No.10 - 1"	No.4 - 1"	No.10 - 1"	No.4 - 1"	No.10 - 1"	No.4 - 3/4	No.10 - 3/4	M4 - M24
	265	266	266	267	267	268	268	269	269	270	270	271	271	273	273	274	274	275
AMG																		
1.1		■ 108	■ 108							■ 108	■ 108							■ 108
1.2		■ 95	■ 95	● 72	● 72					■ 95	■ 95	● 72	● 72					■ 95
1.3		■ 75	■ 75	● 59	● 59					■ 75	■ 75	● 59	● 59					■ 75
1.4		● 69	● 69	● 52	● 52	■ 98	■ 98			● 69	● 69	● 52	● 52	■ 98	■ 98			● 69
1.5	● 55	● 43	● 43	● 33	● 33	■ 66	■ 66	● 55	● 55	● 43	● 43	● 33	● 33	■ 66	■ 66	● 55	● 55	● 43
1.6	■ 42					● 36	● 36	■ 42	■ 42					● 36	● 36	■ 42	■ 42	
1.7	● 22							● 22	● 22							● 22	● 22	
1.8																		
2.1				■ 46	■ 46									■ 46	■ 46			M1
2.2				■ 33	■ 33									■ 33	■ 33			M3
2.3				■ 20	■ 20									■ 20	■ 20			M2
2.4																		S2
3.1																		K1
3.2																		K2
3.3																		K3
3.4																		K4
4.1																		S1
4.2	● 42					● 33	● 33	● 42	● 42					● 33	● 33	● 42	● 42	S2
4.3	■ 26							■ 26	■ 26							■ 26	■ 26	S3
5.1																		S1
5.2	● 16					● 33	● 33	● 16	● 16					● 33	● 33	● 16	● 16	S2
5.3	■ 10							■ 10	■ 10							■ 10	■ 10	S3
6.1		■ 39	■ 39							■ 39	■ 39							■ 39
6.2		● 98	● 98							● 98	● 98							● 98
6.3		■ 66	■ 66							■ 66	■ 66							■ 66
6.4																		N4
7.1																		N1
7.2																		N1
7.3																		N1
7.4																		N2
8.1																		O
8.2																		O
8.3																		O
9.1																		H
10.1																		O





































































# Visual Index - Taps

	MF	M	MF	M	MF	M	MF	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF
	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	ANSI	ANSI	ANSI	ANSI	DIN 2184-1	DIN 2184-1
	6H	6H	6H	6H	6H	6H	6H	2B	2B	2B	2B	3B	3B	3B	3B	2B	2B
	2XD	2.5XD	2.5XD	2.5XD	2.5XD	1.5XD	1.5XD	3XD	3XD	3XD	3XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD
	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM	HSS PM	HSS PM	HSS PM	HSS PM	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E
	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	P	P	P	P	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	C 2-3
	$\lambda 40^\circ$	$\lambda 40^\circ$	$\lambda 40^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 15^\circ$	$\lambda 15^\circ$										
	E764	E628	E768	E626	E766	E806	E906	1672AP (UNC)	1672AP (UNF)	1674 (UNC)	1674 (UNF)	E025	E035	E026	E036	EP20	EP30
	M8 - M18	M4 - M24	M8 - M18	M3 - M24	M8 - M14	M3 - M12	M8 - M12	No.4 - 1"	No.10 - 3/4	1/4 - 1"	1/4 - 1"	No.6 - 1"	No.6 - 1"	No.2 - 1"	No.10 - 1"	No.4 - 1"	No.8 - 1"
	275	276	276	277	277	278	278	279	279	279	279	280	280	280	280	282	278
1.1	■ 108							110	110	120	120	82	82	82	82	82	82
1.2	■ 95	● 72	● 72					90	90	100	100	72	72	72	72	72	72
1.3	■ 75	● 59	● 59					55	55	65	65	59	59	59	59	59	59
1.4	● 69	● 52	● 52	■ 98	■ 98			55	55	65	65	52	52	52	52	52	52
1.5	● 43	● 33	● 33	■ 66	■ 66	● 55	● 55	45	45	50	50	33	33	33	33	33	33
1.6				● 36	● 36	■ 42	■ 42					16	16	16	16	16	16
1.7						● 22	● 22										
1.8																	
2.1		■ 46	■ 46					50	50	60	60			26	26		
2.2		■ 33	■ 33					40	40	40	40			23	23		
2.3		■ 20	■ 20					40	40	45	45			16	16		
2.4																	
3.1												49	49	49	49	49	49
3.2												26	26	26	26	26	26
3.3												49	49	49	49	49	49
3.4												26	26	26	26	26	26
4.1								35	35	40	40	33	33			33	33
4.2				● 33	● 33	● 42	● 42	25	25	30	30	16	16			16	16
4.3						■ 26	■ 26										
5.1								35	35	40	40	39	39			39	39
5.2				● 33	● 33	● 16	● 16	20	20	25	25	16	16			16	16
5.3						■ 10	■ 10										
6.1	■ 39							45	45	50	50	39	39			39	39
6.2	● 98							120	120	125	125	98	98			98	98
6.3	■ 66							100	100	110	110	66	66			66	66
6.4																	
7.1								85	85	95	95	52	52			52	52
7.2								100	100	120	120	115	115			115	115
7.3								85	85	95	95	66	66			66	66
7.4								30	30	40	40	49	49			49	49
8.1												98	98			98	98
8.2																	
8.3																	
9.1																	
10.1																	

# Visual Index - Taps






































































	UNC	UNF	UNC	UNF	M	MF	M	M	M	MF	M	M	MF	MF	M	M	MF
	DIN 2184-1	DIN 2184-1	ISO 529	ISO 529	DIN ANSI	DIN ANSI	DIN ANSI	ANSI	ANSI	ANSI	DIN 3741/10 376x12	DIN 3741/10 376x12	DIN 374	DIN 374	ISO 529	ISO 529	ISO 529
	2B	2B	2B	2B	6H	6H	6H	6H	6H	6H	6H	6H	6H	6H	6H	6H	6H
	2.5XD	2.5XD	2.5XD	2.5XD	3XD	3XD	3XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD
	HSS-E	HSS-E	HSS-E	HSS-E	HSS PM	HSS PM	HSS PM	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E
	B 3.5-5	C 2-3	B 3.5-5	B 3.5-5	P	P	P	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5	B 3.5-5
	ST	ST	ST	ST	TiCN	TiCN	TiCN		ST	ST		ST		ST		ST	ST
	EP21	EP31	E021	E031	1673AP (M)	1673AP (MF)	1675 (M)	E005	E006	E016	EP006H	EP016H	EP10	EP11	E000	E001	E011
	No.4 - 1"	No.8 - 1"	No.2 - 1"	No.8 - 1"	M4 - M24	M8 - M24	M12 - M20	M4 - M20	M4 - M20	M8 - M14	M2 - M30	M2 - M30	M4 - M30	M4 - M30	M1.6 - M24	M1.6 - M24	M4 - M24
	282	282	283	283	284	284	284	285	285	285	286	286	287	287	288	288	288
1.1	82	82	82	82	110	110	120	82	82	82	82	82	82	82	82	82	82
1.2	72	72	72	72	90	90	100	72	72	72	72	72	72	72	72	72	72
1.3	59	59	59	59	55	55	65	59	59	59	59	59	59	59	59	59	59
1.4	52	52	52	52	55	55	65	52	52	52	52	52	52	52	52	52	52
1.5	33	33	33	33	45	45	50	33	33	33	33	33	33	33	33	33	33
1.6	16	16	16	16				16	16	16	16	16	16	16	16	16	16
1.7																	
1.8																	
2.1	23	23	23	23	50	50	60		26	26		23		23		23	23
2.2	20	20	20	20	40	40	40		23	23		20		20		20	20
2.3	13	13	13	13	40	40	45		16	16		13		13		13	13
2.4																	
3.1	49	49	49	49				49	49	49	49	49	49	49	49	49	49
3.2	26	26	26	26				26	26	26	26	26	26	26	26	26	26
3.3	49	49	49	49				49	49	49	49	49	49	49	49	49	49
3.4	26	26	26	26				26	26	26	26	26	26	26	26	26	26
4.1					35	35	40	33			33		33		33		33
4.2					25	25	30	16			16		16		16		16
4.3																	
5.1					35	35	40	39			39		39		39		39
5.2					20	20	25	16			16		16		16		16
5.3																	
6.1					45	45	50	39			39		39		39		39
6.2					120	120	125	98			98		98		98		98
6.3					100	100	110	66			66		66		66		66
6.4																	
7.1					85	85	95	52			52		52		52		52
7.2					100	100	120	115			115		115		115		115
7.3					85	85	95	66			66		66		66		66
7.4					30	30	40	49			49		49		49		49
8.1								98			98		98		98		98
8.2																	
8.3																	
9.1																	
10.1																	

# Visual Index - Taps

	M	M	M	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF
	ISO 529	DIN 371	DIN 376	ANSI	ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	ANSI	ANSI	ANSI	ANSI	DIN 2184-1	DIN 2184-1	DIN 2184-1	DIN 2184-1
	6H	6HX	6HX	2B	2B	2B	2B	2B	2B	3B	3B	3B	3B	2B	2B	2B	2B
																	
	2.5XD	2XD	2XD	2.5XD	2.5XD	3XD	3XD	3XD	3XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD
	HSS-E	HSS-E PM	HSS-E PM	HSS	HSS	HSS PM	HSS PM	HSS PM	HSS PM	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E
	B 3.5-5	C 2-3	C 2-3			Semi-B	Semi-B	Semi-B	Semi-B	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3
																	
	TN	ST	ST	ST	ST	TiCN	TiCN	TiCN	TiCN			ST	ST				ST
																	
																	
	E000TiN	E201	E252	1985 (UNC)	1985 (UNF)	1676AP (UNC)	1676AP (UNF)	1678 (UNC)	1678 (UNF)	E027	E037	E028	E038	EX20	EX30	EX21	EX31
	M3 - M20	M3 - M10	M8 - M24	No.4 - 1"	No.4 - 7/8	No.4 - 1"	No.10 - 7/8	1/4 - 1"	1/4 - 7/8	No.6 - 1"	No.10 - 1"	No.4 - 1"	No.10 - 1"	No.4 - 1"	No.8 - 1"	No.4 - 1"	No.8 - 1"
	288	290	290	291	291	292	292	292	292	293	293	293	293	294	294	294	294
1.1	131			75	75	100	100	110	110	82	82	82	82	82	82	82	82
1.2	131			69	69	80	80	90	90	72	72	72	72	72	72	72	72
1.3	105			49	49	50	50	55	55	59	59	59	59	59	59	59	59
1.4	89			49	49	50	50	55	55	52	52	52	52	52	52	52	52
1.5	43			30	30	40	40	45	45	33	33	33	33	33	33	33	33
1.6	36			16	16						16			16			
1.7																	
1.8																	
2.1	26			36	36	45	45	50	50			23	23			23	23
2.2	23			20	20	30	30	35	35			20	20			20	20
2.3	16					35	35	40	40			13	13			13	13
2.4																	
3.1	72	49	49														
3.2	59	26	26														
3.3	82	49	49														
3.4	59	26	26														
4.1	49			20	20	30	30	35	35	33	33			33	33		
4.2	23			16	16	20	20	25	25	16	16			16	16		
4.3				7	7												
5.1	59			30	30	30	30	35	35	39	39			39	39		
5.2	26			16	16	15	15	20	20	16	16			16	16		
5.3				10	10												
6.1	59					40	40	45	45	39							
6.2	148	66	66			100	100	120	120	98							
6.3	115					90	90	100	100	66							
6.4		16	16														
7.1						80	80	90	90	52	52			52	52		
7.2						95	95	115	115	115	115			115	115		
7.3	98					80	80	90	90	66	66			66	66		
7.4	72	49	49			30	30	35	35	49	49			49	49		
8.1										98	98						
8.2	148	33	33														
8.3																	
9.1																	
10.1																	



# Visual Index - Taps

	UNC	UNF	M	MF	M	M	M	MF	M	M	MF	MF	M	M	MF	UNC	UNF	
	ISO 529	ISO 529	DIN ANSI	DIN ANSI	DIN ANSI	ANSI	ANSI	ANSI	DIN 374x10-376x12	DIN 374x10-376x12	DIN 374	DIN 374	ISO 529	ISO 529	ISO 529	ANSI	ANSI	
	2B	2B	6H	6H	6H	6H	6H	6H	6H	6H	6H	6H	6H	6H	6H	2B 3B	2B 3B	
																		
	2.5XD	2.5XD	3XD	3XD	3XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD			
	HSS-E	HSS-E	HSS PM	HSS PM	HSS PM	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS PM	HSS PM	
	C 2-3	C 2-3	Semi-B	Semi-B	Semi-B	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	C 2-3	E 1.5-2	E 1.5-2	
	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 50^\circ$	$\lambda 50^\circ$	$\lambda 50^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 45^\circ$	
																		
	ST	ST	TiCN	TiCN	TiCN	ST	ST	ST	ST	ST	ST	ST	ST	ST	ST	TN	TN	
																		
																		
	E023	E033	1677AP (M)	1677AP (MF)	1679 (M)(MF)	E007	E008	E018	EX006H	EX016H	EX10	EX11	E002	E003	E013	1641 (UNC)	1641 (UNF)	
	No.2 - 1"	No.8 - 1"	M4 - M24	M8 - M24	M6 - M24	M4 - M16	M4 - M20	M8 - M14	M2 - M64	M2 - M64	M4 - M30	M4 - M30	M2 - M24	M2 - M24	M4 - M22	No.4 - 1/2	No.10 - 3/8	
		295	295	296	296	296	297	297	297	298	298	299	299	300	300	300	301	301
1.1	82	82	100	100	110	82	82	82	82	82	82	82	82	82	82	82	150	150
1.2	72	72	80	80	90	72	72	72	72	72	72	72	72	72	72	72	125	125
1.3	59	59	50	50	55	59	59	59	59	59	59	59	59	59	59	59	90	90
1.4	52	52	50	50	55	52	52	52	52	52	52	52	52	52	52	52	90	90
1.5	33	33	40	40	45	33	33	33	33	33	33	33	33	33	33	33		
1.6		16																
1.7																		
1.8																		
2.1	23	23	45	45	50		23	23		23		23		23	23	70	70	
2.2	20	20	30	30	35		20	20		20		20		20	20	60	60	
2.3	13	13	35	35	40		13	13		13		13		13	13	50	50	
2.4																		
3.1																		
3.2																		
3.3																		
3.4																		
4.1			30	30	35	33			33		33		33			60	60	
4.2			20	20	25	16			16		16		16					
4.3																		
5.1			30	30	35	39			39		39		39			45	45	
5.2			15	15	20	16			16		16		16					
5.3																		
6.1			40	40	45											55	55	
6.2			100	100	120											180	180	
6.3			90	90	100											130	130	
6.4																		
7.1			80	80	89	52			52		52		52			180	180	
7.2			95	95	115	115			115		115		115			200	200	
7.3			80	80	90	66			66		66		66			230	230	
7.4			30	30	35	49			49		49		49					
8.1																		
8.2																		
8.3																		
9.1																		
10.1																		

# Visual Index - Taps

	M	UNC	UNF	UNC	UNF	M	MF	M	G	G	G	G	G	G	UNC	UNF	UNS
	ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI	DIN 5156	DIN 5156	DORMER ISO	DIN 5156	DIN 5156	DORMER ISO	ANSI	ANSI	ANSI
	6H	2B	2B	2B	2B	6H	6H	6H	Normal	Normal	Normal	Normal	Normal	Normal	2B 3B	2B 3B	3B
		3XD	3XD	3XD	3XD	3XD	3XD	3XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	1.5XD	1.5XD	1.5XD
	HSS PM	HSS PM	HSS PM	HSS PM	HSS PM	HSS PM	HSS PM	HSS PM	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS	HSS	HSS
	E 1.5-2	Semi-B	Semi-B	Semi-B	Semi-B	Semi-B	Semi-B	Semi-B	B 3.5-5	B 3.5-5	B 3.5-5	C 2-3	C 2-3	C 2-3			
	TIN	TIN Top	TIN Top	TIN Top	TIN Top	TIN Top	TIN Top	TIN Top		ST	ST		ST	ST			
	1671 (M)	1681AP (UNC)	1681AP (UNF)	1691AP (UNC)	1691AP (UNF)	1687AP (M)	1687AP (MF)	1697AP (M)	EP40	EP41	E041	EX40	EX41	E043	1500 (UNC)	1500 (UNF)	1500 (UNS)
	M3 - M10	No.4 - 1"	No.10 - 7/8	1/4 - 1"	5/16 - 1/2	M4 - M20	M10 - M16	M6 - M20	1/8 - 1"	1/8 - 1"	1/8 - 3/4	1/8 - 1.1/2	1/8 - 1.1/2	1/8 - 3/4	1/4 - 1.1/2	1/4 - 1.1/2	11/16 - 1"
	302	303	303	304	304	305	305	305	306	306	307	308	308	309	310	310	310
1.1	150	150	150	165	165	150	150	165	82	82	82	82	82	82	60	60	60
1.2	125	125	125	135	135	125	125	135	72	72	72	72	72	72	45	45	45
1.3	90	90	90	100	100	90	90	100	59	59	59	59	59	59	30	30	30
1.4	90	90	90	100	100	90	90	100	52	52	52	52	52	52	30	30	30
1.5									33	33	33	33	33	33	20	20	20
1.6									16	16	16				10	10	10
1.7																	
1.8																	
2.1	70	70	70	80	80	70	70	80		23	23		23	23	25	25	25
2.2	60	60	60	70	70	60	60	70		20	20		20	20	15	15	15
2.3	50	50	50	60	60	50	50	60		13	13		13	13	15	15	15
2.4																	
3.1									49	49	49				50	50	50
3.2									26	26	26				30	30	30
3.3									49	49	49				30	30	30
3.4									26	26	26				15	15	15
4.1	60	60	60	70	70	60	60	70	33			33			20	20	20
4.2									16			16			15	15	15
4.3																	
5.1	45	45	45	55	55	45	45	55	39			39			20	20	20
5.2									16			16			10	10	10
5.3																	
6.1	55	55	55	70	70	55	55	70	39						25	25	25
6.2	180	180	180	200	200	180	180	200	98						80	80	80
6.3	130	130	130	160	160	130	130	160	66						60	60	60
6.4															10	10	10
7.1	180	180	180	200	200	180	180	200	52			52			50	50	50
7.2	200	200	200	240	240	200	200	240	115			115			100	100	100
7.3	230	230	230	260	260	230	230	260	66			66			75	75	75
7.4									49			49			20	20	20
8.1									98			98			25	25	25
8.2															15	15	15
8.3																	
9.1																	
10.1																	

# Visual Index - Taps

	UNC	UNF	UNC	UNF	UNC	UNF	M	MF	UNC	UNF	UNS	UNC	UNF	UNC	UNF	UNC	UNF
	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ISO 529	ISO 529	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI
	2B 3B	2B 3B	3B	3B	3B	3B	6H	6H	3B	3B	3B	2B 3B	2B 3B	3B	2B 3B	3B	3B
	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD
	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
			ST	ST	TN	TN											
	1528 (UNC)	1528 (UNF)	1500A (UNC)	1500A (UNF)	TN1500 (UNC)	TN1500 (UNF)	E500	E513	1500L (UNC)	1500L (UNF)	1500L (UNS)	E061	E071	1508 (UNC)	1508 (UNF)	1595 (UNC)	1595 (UNF)
	No.1 - No.12	No.0 - No.12	1/4 - 1"	1/4 - 7/8	1/4 - 7/8	1/4 - 3/4	M1 - M56	M3 - M50	1/4 - 1"	1/4 - 1"	1"	No.6 - 1.1/2	No.6 - 1.1/2	1/4 - 1/2	1/4 - 1/2	1/4 - 5/16	1/4 - 1/4
	310	310	313	313	314	314	315	317	319	319	319	320	320	321	321	321	321
1.1	60	60	60	60	59	59	23	23	60	60	60	72	72	60	60	66	66
1.2	45	45	45	45	46	46	20	20	45	45	45	66	66	45	45	59	59
1.3	30	30	30	30	30	30	16	16	30	30	30	52	52	30	30	39	39
1.4	30	30	30	30	30	30	13	13	30	30	30	39	39	30	30	39	39
1.5	20	20	20	20	20	20	10	10	20	20	20	23	23	20	20	26	26
1.6	10	10	10	10	10	10			10	10	10	13	13	10	10	16	16
1.7																	
1.8																	
2.1	25	25	25	25	26	26			25	25	25			25	25	30	30
2.2	15	15	15	15	26	26			15	15	15			15	15	20	20
2.3	15	15	15	15	16	16			15	15	15			15	15	20	20
2.4																	
3.1	50	50	50	50	49	49	39	39	50	50	50	39	39	50	50	46	46
3.2	30	30	30	30	30	30	23	23	30	30	30	23	23	30	30	26	26
3.3	30	30	30	30	30	30	33	33	30	30	30	33	33	30	30	26	26
3.4	15	15	15	15	16	16	16	16	15	15	15	16	16	15	15	16	16
4.1	20	20	20	20	20	20			20	20	20			20	20	20	20
4.2	15	15	15	15	16	16			15	15	15			15	15	16	16
4.3																7	7
5.1	20	20	20	20	20	20			20	20	20			20	20	26	26
5.2	10	10	10	10	10	10			10	10	10			10	10	10	10
5.3																	
6.1	25	25	25	25	26	26	13	13	25	25	25	39	39	25	25	30	30
6.2	80	80	80	80	79	79	33	33	80	80	80	98	98	80	80	89	89
6.3	60	60	60	60	59	59	23	23	60	60	60	66	66	60	60	69	69
6.4	10	10	10	10	10	10	7	7	10	10	10			10	10	10	10
7.1	50	50	50	50	49	49			50	50	50			50	50	49	49
7.2	100	100	100	100	98	98	39	39	100	100	100			100	100	98	98
7.3	75	75	75	75	75	75	23	23	75	75	75	66	66	75	75	66	66
7.4	20	20	20	20	20	20	16	16	20	20	20	49	49	20	20	20	20
8.1	25	25	25	25	30	30			25	25	25			25	25	98	98
8.2	15	15	15	15	16	16	16	16	15	15	15	39	39	15	15	26	26
8.3							10	10				23	23				
9.1																	
10.1																	

# Visual Index - Taps

	M	M	UNC	UNS	UNC	UNF	UNC	UNF	M	M	M	UNC	UNF	UNC	UNF	UNC	UNF
	ANSI	ISO 529	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ISO 529	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI
	6H	6H		2B	3B	3B	2B	2B	6H	6H	6H	2B 3B	2B 3B	2B	2B	3B	3B
	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD
	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
			P														
				N	N	N/ST	N/ST	N	N	TN			TN	TN			
	1700 (M)	E501	1500OV (UNC)	1505 (UNS)	1599 (UNC)	1599 (UNF)	1600 (UNC)	1600 (UNF)	1599 (M)	1599SB (M)	E504	1534 (UNC)	1534 (UNF)	TN1534 (UNC)	TN1534 (UNF)	1585 (UNC)	1585 (UNF)
	M1.6 - M36	M3 - M24	1/4 - 5/8	1.1/8 - 2"	1/4 - 3/4	1/4 - 3/4	1/4 - 3/4	1/4 - 3/4	M6 - M14	M6 - M12	M3 - M24	No.5 - No.12	No.5 - No.12	No.4 - No.12	No.10	1/4 - 3/4	1/4 - 3/4
		322	323	324	325	326	326	326	327	327	328	329	329	329	329	330	330
1.1	49	23	49	49							46	66	66	79	79	66	66
1.2	36	20	36	36							39	66	66	75	75	66	66
1.3	26	16	26	26							33	39	39	49	49	39	39
1.4	26	13	26	26							26	39	39	49	49	39	39
1.5	16	10	16	16							20	26	26	30	30	26	26
1.6	7		7	7								16	16	20	20	16	16
1.7																	
1.8																	
2.1	20		20	20								30	30	39	39	30	30
2.2	13		13	13								20	20	26	26	20	20
2.3	13		13	13								20	20	26	26	20	20
2.4																	
3.1	39	39	39	39	49	49	49	49	49	59	46	46	49	49	46	46	
3.2	26	23	26	26	36	36	36	36	36	36	39	26	26	30	30	26	26
3.3	26	33	26	26	36	36	36	36	36	36	72	26	26	30	30	26	26
3.4	13	16	13	13	20	20	20	20	20	20	39	16	16	20	20	16	16
4.1	16		16	16								20	20			20	20
4.2	13		13	13								16	16			16	16
4.3												7	7			7	7
5.1	16		16	16								26	26	30	30	26	26
5.2	7		7	7								10	10	13	13	10	10
5.3																	
6.1	20	13	20	20								30	30	39	39	30	30
6.2	66	33	66	66							66	89	89	115	115	89	89
6.3	49	23	49	49							46	69	69	89	89	69	69
6.4	7	7	7	7	13	13	13	13	13	13	13	10	10	13	13	10	10
7.1	39		39	39								49	49	66	66	49	49
7.2	79	39	79	79							79	98	98	125	125	98	98
7.3	59	23	59	59							46	66	66	79	79	66	66
7.4	16	16	16	16							33	20	20	26	26	20	20
8.1	26		26	26								98	98	121	121	98	98
8.2	13	16	13	13	13	13	13	13	13	13	33	26	26	30	30	26	26
8.3		10															
9.1																	
10.1																	

# Visual Index - Taps

	UNC	UNF	UNC	UNF	UNC	UNF	M	M	UNC	UNF	UNS	UNC	UNF	M	UNC	UNF	UNC
	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI
	2B 3B	2B 3B	2B 3B	3B	3B	3B	6H	6H	2B 3B	2B 3B	3B	2B 3B	2B 3B	6H	3B	2B 3B	2B 3B
	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	1.25XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD
	HSS	HSS	HSS	HSS	HSS-E	HSS-E	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
					P	P									P	P	
	ST	ST	TiN	TiN				TiN									
	1585A (UNC)	1585A (UNF)	TN1585 (UNC)	TN1585 (UNF)	1634 (UNC)	1634 (UNF)	1785M	TN1785	1534NR (UNC)	1534NR (UNF)	1534NR (UNS)	1585NR (UNC)	1585NR (UNF)	1785NR	1534NE (UNC)	1534NE (UNF)	1593 (UNC)
	1/4 - 3/4	1/4 - 3/4	1/4 - 1/2	1/4 - 1/2	No.4 - No.8	No.10	M2 - M18	M4 - M12	No.1 - No.12	No.0 - No.12	No.4	1/4 - 3/4	1/4 - 3/4	M1.6 - M20	No.4 - 1/2	No.10 - 1/2	No.6 - No.10
	330	330	330	330	332	332	333	333	334	334	334	336	336	337	338	338	339
1.1	66	66	79	79	66	66	66	79	66	66	66	66	66	66	66	66	66
1.2	66	66	75	75	66	66	66	75	66	66	66	59	59	59	66	66	66
1.3	39	39	49	49	39	39	39	49	39	39	39	46	46	46	39	39	39
1.4	39	39	49	49	39	39	39	49	39	39	39	33	33	33	39	39	39
1.5	26	26	30	30	26	26	26	30	26	26	26	16	16	16	26	26	26
1.6	16	16	20	20	16	16	16	20	16	16	16	10	10	10	16	16	16
1.7																	
1.8																	
2.1	30	30	39	39	30	30	30	39	30	30	30	20	20	20	30	30	30
2.2	20	20	26	26	20	20	20	26	20	20	20	13	13	13	20	20	20
2.3	20	20	26	26	20	20	20	26	20	20	20	10	10	10	20	20	20
2.4																	
3.1	46	46	49	49	46	46	46	49	46	46	46			46	46	46	46
3.2	26	26	30	30	26	26	26	30	26	26	26			26	26	26	26
3.3	26	26	30	30	26	26	26	30	26	26	26			26	26	26	26
3.4	16	16	20	20	16	16	16	20	16	16	16			16	16	16	16
4.1	20	20			20	20	20	20	20	20	20			20	20	20	20
4.2	16	16			16	16	16		16	16	16			16	16	16	16
4.3	7	7			7	7	7	7	7	7	7	10	10	10	7	7	7
5.1	26	26	30	30	26	26	26	30	26	26	26	33	33	33	26	26	26
5.2	10	10	13	13	10	10	10	13	10	10	10	13	13	13	10	10	10
5.3																	
6.1	30	30	39	39	30	30	30	39	30	30	30	33	33	33	30	30	30
6.2	89	89	115	115	89	89	89	115	89	89	89				89	89	89
6.3	69	69	89	89	69	69	69	89	69	69	69	49	49	49	69	69	69
6.4	10	10	13	13	10	10	10	13	10	10	10				10	10	10
7.1	49	49	66	66	49	49	49	66	49	49	49	33	33	33	49	49	49
7.2	98	98	125	125	98	98	98	125	98	98	98	82	82	82	98	98	98
7.3	66	66	79	79	66	66	66	79	66	66	66	43	43	43	66	66	66
7.4	20	20	26	26	20	20	20	26	20	20	20	33	33	33	20	20	20
8.1	98	98	121	121	98	98	98	121	98	98	98	66	66	66	98	98	98
8.2	26	26	30	30	26	26	26	30	26	26	26				26	26	26
8.3																	
9.1																	
10.1																	

# Visual Index - Taps

	UNF	UNC	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	M	UNC	UNF
	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI
	2B 3B	2B	3B	3B	3B	3B	3B	3B	2B 3B	2B 3B	3B	3B	3B	3B	6H	2B 3B	2B 3B
	2.5XD	2XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	2.5XD	1.25XD	2.5XD
	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
			$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 52^\circ$	$\lambda 52^\circ$	$\lambda 52^\circ$	$\lambda 52^\circ$	$\lambda 40^\circ$	$\lambda 40^\circ$	$\lambda 40^\circ$	$\lambda 40^\circ$	$\lambda 52^\circ$		
											ST	ST	ST	ST			
	1593 (UNF)	1585OV (UNC)	1582 (UNC)	1582 (UNF)	1586 (UNC)	1586 (UNF)	1587 (UNC)	1587 (UNF)	1588 (UNC)	1588 (UNF)	1590 (UNC)	1590 (UNF)	1591 (UNC)	1591 (UNF)	1788 (M)	1580 (UNC)	1580 (UNF)
	No.10	1/4 - 5/8	No.4 - No.10	No.10 - No.10	1/4 - 1/2	1/4 - 1/2	No.3 - No.12	No.4 - No.10	1/4 - 1/2	1/4 - 1/2	No.6 - No.10	No.6 - No.10	1/4 - 1/2	1/4 - 1/2	M3 - M12	No.2 - 3/8	No.10 - 3/8
	339	339	340	340	340	340	341	341	341	341	342	342	342	342	343	344	344
1.1	66	66	66	66	66	66					69	69	69	69		98	98
1.2	66	66	49	49	49	49					59	59	59	59		79	79
1.3	39	39	36	36	36	36					39	39	39	39		49	49
1.4	39	39	36	36	36	36					39	39	39	39		49	49
1.5	26	26									30	30	30	30		30	30
1.6	16	16															
1.7																	
1.8																	
2.1	30	30	26	26	26	26					30	30	30	30		39	39
2.2	20	20	20	20	20	20					26	26	26	26		30	30
2.3	20	20	20	20	20	20					20	20	20	20			
2.4																	
3.1	46	46															
3.2	26	26															
3.3	26	26															
3.4	16	16															
4.1	20	20	20	20	20	20					20	20	20	20		30	30
4.2	16	16	16	16	16	16					16	16	16	16		26	26
4.3	7	7	7	7	7	7					7	7	7	7			
5.1	26	26	20	20	20	20										30	30
5.2	10	10	16	16	16	16											
5.3											10	10	10	10			
6.1	30	30														30	39
6.2	89	89									30	30	30	30		79	121
6.3	69	69									79	79	79	79		79	98
6.4	10	10															
7.1	49	49									49	49	49	49		49	79
7.2	98	98									66	66	66	66		66	161
7.3	66	66									66	66	66	66		66	98
7.4	20	20															
8.1	98	98															
8.2	26	26															
8.3																	
9.1																	
10.1																	

# Visual Index - Taps

	M	UNC	UNF	M	UNC	UNF	NPT	NPT	NPT	NPT	NPT	NPT	NPT	
	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI	ANSI B94.9	ANSI B94.9	ANSI B94.9	ANSI B94.9	ANSI	
	6H	2B 3B	2B 3B	6H	2B	2B	Normal	Normal	Normal	Normal	Normal	Normal	Normal	
	2.5XD	3XD	3XD	3XD	2.5XD	2.5XD	2XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	
	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	
					E 1.5-2	E 1.5-2			C 2-3	C 2-3	C 2-3			
							TN		TN		N		ST	
	1580 (M)	3300 (UNC)	3300 (UNF)	3300 (M)	3306E (UNC)	3306E (UNF)	1541 (NPT)	TN1541	E710	E721	6541	1544 (NPT)	1545 (NPT)	1545A (NPT)
	M3 - M12	No.1 - 1/2	No.0 - 3/8	M3 - M10	No.4 - 5/16	No.10 - 5/16	1/16 - 2"	1/8 - 3/4	1/16 - 2"	1/8 - 1"	1/8 - 2"	1/16 - 1.1/4	1/8 - 1"	1/16 - 3/4
		345	346	346	347	348	348	349	349	350	350	351	352	353
1.1	98	98	98	98	98	98	13	16	13	13	13	13	13	13
1.2	79	79	79	79	79	79	13	16	13	13	13	13	13	13
1.3	49	49	49	49	49	49	20	23	20	20	20	20	20	20
1.4	49	49	49	49	49	49	16	20	16	16	16	16	16	16
1.5	30	30	30	30	30	30	10	13	10	10	10	10	10	10
1.6														
1.7														
1.8														
2.1	39	39	39	39	39	39								
2.2	30	30	30	30	30	30								
2.3														
2.4														
3.1							20	23	20	20	20	20	20	20
3.2							13	16	13	13	13	13	13	13
3.3							20	23	20	20	20	20	20	20
3.4							13	16	13	13	13	13	13	13
4.1	30	30	30	30	30	30								
4.2	26	26	26	26	26	26								
4.3														
5.1	30	30	30	30	30	30								
5.2														
5.3														
6.1	39	39	39	39	39	39								
6.2	121	121	121	121	121	121	36	39	36	36	36	36	36	36
6.3	98	98	98	98	98	98								
6.4														
7.1	79	79	79	79	79	79								
7.2	161	161	161	161	161	161								
7.3	98	98	98	98	98	98	36	39	36	36	36	36	36	36
7.4							23	26	23	23	23	23	23	23
8.1							13	16	13	13	13	13	13	13
8.2														
8.3														
9.1														
10.1														

# Visual Index - Taps

	NPT	NPT	NPT	NPTF	NPTF	NPTF	NPTF	NPTF	NPSM	NPSF	Rc	G	UNC	UNF	
	ANSI	ANSI	ANSI B94.9	ANSI	ANSI	ANSI	ANSI	ANSI B94.9	ANSI	ANSI	ISO 2284	ISO 2284	ANSI	ANSI	
	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	3B	3B	
	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	
			C 2-3					C 2-3			C 2-3				
	1548 (NPT)	1568 (NPT)	E711	1543 (NPTF)	TN1543	1549 (NPTF)	1567 (NPTF)	E712	1542 (NPS)	1592 (NPSF)	E550	E547	1572 (UNC)	1572 (UNF)	
	1/16 - 1"	1/8 - 1.1/2"	1/8 - 1.1/2"	1/16 - 1"	1/8 - 3/4	1/16 - 3/4	1/8 - 1"	1/16 - 1.1/4	1/8 - 1"	1/8 - 3/4	1/8 - 2"	1/8 - 2"	No.4 - 1/2	No.10 - 1/4	
		354	355	356	357	357	358	359	360	361	361	362	363	364	364
1.1	13	13	13	13	16	13	13	13	13	13	72	23	49	49	
1.2	13	13	13	13	16	13	13	13	13	13	66	20	30	30	
1.3	20	20	20	20	23	20	20	20	20	20	52	16	26	26	
1.4	16	16	16	16	20	16	16	16	16	16	39	13	26	26	
1.5	10	10	10	10	13	10	10	10	10	10	23	10			
1.6											13				
1.7															
1.8															
2.1											23		16	16	
2.2											16		7	7	
2.3											23				
2.4															
3.1	20	20	20	20	23	20	20	20	20	20	39	39			
3.2	13	13	13	13	16	13	13	13	13	13	23	23			
3.3	20	20	20	20	23	20	20	20	20	20	33	33			
3.4	13	13	13	13	16	13	13	13	13	13	16	16			
4.1															
4.2															
4.3															
5.1															
5.2															
5.3															
6.1											39	13	26	26	
6.2	36	36	36	36	39	36	36	36	36	36	98	33	66	66	
6.3											66	23	49	49	
6.4											13	7			
7.1													39	39	
7.2											115	39	79	79	
7.3	36	36	36	36	39	36	36	36	36	36	66	23	59	59	
7.4	23	23	23	23	26	23	23	23	23	23	49	16	16	16	
8.1	13	13	13	13	16	13	13	13	13	13					
8.2											39	16			
8.3											23	10			
9.1															
10.1															



# Visual Index - Taps

	UNC	UNF	EGM	EGM	UNC	UNC	UNF	UNC	UNF	M	NPT
	ANSI	ANSI	DORMER ISO	DORMER ISO	ANSI	ANSI	ANSI	DORMER DIN	DORMER DIN	DORMER ISO	ANSI
	2B 3B	2B 3B	6H	6H	3B	2B	2B	2B	Medium	6H	Normal
	1.5XD	1.5XD	1.5XD	2XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD	1.5XD
	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
			C 2-3	C 2-3	P			C 2-3	C 2-3	C 2-3	
			$\lambda 40^\circ$	$\lambda 40^\circ$	$\lambda 15^\circ$	$\lambda 15^\circ$	$\lambda 15^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 27^\circ$
							ST	ST	ST		
	1578 (UNC)	1578 (UNF)	E620	E621	1519 (UNC)	1994 (UNC)	1994 (UNF)	E651	E654	E650	E653
	No.4 - 1/4	No.10 - 1/4	M3 - M16	M3 - M16	1/4 - 3/4	No.4 - 1/2	No.10 - 1/2	No.6 - 5/8	No.8 - 5/8	M3 - M16	1/8 - 1"
	364	364	365	365	366	367	367	368	368	369	370
1.1	66	66	23		49	82	82	82	82	82	82
1.2	59	59	20	59	36	72	72	72	72	72	72
1.3	46	46	16	46	26	59	59	59	59	59	59
1.4	33	33	13	33	26	49	49	49	49	49	49
1.5	16	16	10	16	16						
1.6	10	10			7						
1.7											
1.8											
2.1	20	20		20	20						
2.2	13	13		13	13						
2.3	10	10		10	13						
2.4											
3.1			39		39						
3.2			23		26	26	26	26	26	26	26
3.3			33		26						
3.4			16		13						
4.1					16						
4.2					13						
4.3	10	10									
5.1	33	33			16						
5.2	13	13		13	7						
5.3											
6.1	33	33	13		20						
6.2			33		66	98	98	98	98	98	98
6.3	49	49	23		49	66	66	66	66	66	66
6.4			7		7						
7.1	33	33		33	39	59	59	59	59	59	59
7.2	82	82	39	82	79	115	115	115	115	115	115
7.3	43	43	23	43	59						
7.4	33	33	16	33	16						
8.1	66	66			26	98	98	98	98	98	98
8.2			16		13						
8.3			10								
9.1											
10.1											

# List Number Index - Taps



Pgs. 243 - 373

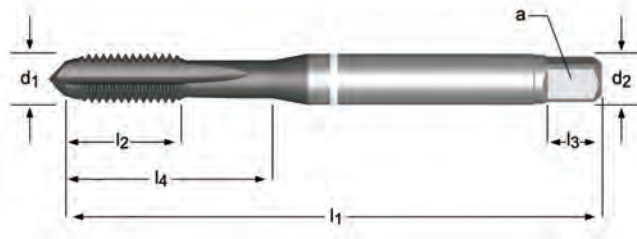
1215.....	371	1672AP.....	279	E036.....	280	E811.....	264
1500.....	310	1673AP.....	284	E037.....	293	E812.....	271
1500A.....	313	1674.....	279	E038.....	293	E813.....	262
1500L.....	319	1675.....	284	E041.....	307	E814.....	259
1500OV.....	324	1676AP.....	292	E043.....	309	E815.....	259
1505.....	325	1677AP.....	296	E061.....	320	E816.....	265
1508.....	321	1678.....	292	E071.....	320	E817.....	269
1519.....	366	1679.....	296	E201.....	290	E905.....	274
1528.....	310	1681AP.....	303	E252.....	290	E906.....	278
1534.....	329	1687AP.....	305	E500.....	315	E908.....	270
1534NE.....	338	1691AP.....	304	E501.....	323	E909.....	261
1534NR.....	334	1697AP.....	305	E504.....	328	E910.....	273
1541.....	349	1700M.....	322	E513.....	317	E911.....	264
1542.....	361	1785M.....	333	E547.....	363	E912.....	271
1543.....	357	1785NR.....	337	E550.....	362	E913.....	262
1544.....	352	1788M.....	343	E620.....	365	E914.....	259
1545.....	353	1985.....	291	E621.....	365	E915.....	259
1545A.....	353	1994.....	367	E624.....	275	E916.....	265
1548.....	354	229CSET.....	373	E625.....	266	E917.....	269
1549.....	358	3300.....	346	E626.....	277	EP006H.....	286
1567.....	359	3300M.....	347	E627.....	268	EP016H.....	286
1568.....	355	3306E.....	348	E628.....	276	EP10.....	287
1572.....	364	3850.....	372	E629.....	267	EP11.....	287
1578.....	364	6541.....	351	E630.....	260	EP20.....	282
1580.....	344	E000.....	288	E631.....	260	EP21.....	282
1580M.....	345	E000TIN.....	288	E650.....	369	EP30.....	282
1582.....	340	E001.....	288	E651.....	368	EP31.....	282
1585.....	330	E002.....	300	E653.....	370	EP40.....	306
1585A.....	330	E003.....	300	E654.....	368	EP41.....	306
1585NR.....	336	E005.....	285	E710.....	350	EX006H.....	298
1585OV.....	339	E006.....	285	E711.....	356	EX016H.....	298
1586.....	340	E007.....	297	E712.....	360	EX10.....	299
1587.....	341	E008.....	297	E721.....	350	EX11.....	299
1588.....	341	E011.....	288	E764.....	275	EX20.....	294
1590.....	342	E013.....	300	E765.....	266	EX21.....	294
1591.....	342	E016.....	285	E766.....	277	EX30.....	294
1592.....	361	E018.....	297	E767.....	268	EX31.....	294
1593.....	339	E021.....	283	E768.....	276	EX40.....	308
1595.....	321	E023.....	295	E769.....	267	EX41.....	308
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1599SB.....	327	E027.....	293	E805.....	274	TN1541.....	349
1600.....	326	E028.....	293	E806.....	278	TN1543.....	357
1634.....	332	E031.....	283	E808.....	270	TN1585.....	330
1641.....	301	E033.....	295	E809.....	261	TN1785.....	333
1671.....	302	E035.....	280	E810.....	273		

**DIN ANSI Machine Tap, White Shark for Cast Iron**

**E814** Designed for semi-bottoming or through hole tapping in Cast Iron applications. Premium HSCo Powder Metal substrate with TiAlN-Top Coating combine to offer superior abrasion resistance, higher operating speeds, improved thread quality, reduced cycle times and longer tool life.

**E815** Coolant through design allows for higher tapping speeds and better tool life. This design eliminates the problems associated with inadequate coolant supply in some applications. Full Bottoming.

- 3.1 3.2 3.3 8.2
- 3.4 6.2 6.4 7.4



E814	E815	E914	E915
UNC	UNC	UNF	UNF
DIN ANSI	DIN ANSI	DIN ANSI	DIN ANSI
2BX	2BX	2BX	2BX
2XD	2.5XD	2XD	2.5XD
HSS-E PM	HSS-E PM	HSS-E PM	HSS-E PM
C 2-3	E 1.5-2	C 2-3	E 1.5-2
1/4 - 1"	1/4 - 1"	No.10 - 7/8	1/4 - 1"

Pack Qty = 1 pc

UNC	UNF	TPI	l <sub>1</sub> Inch	l <sub>2</sub> Inch	l <sub>4</sub> Inch	d <sub>2</sub> Ø Inch	a Inch	l <sub>3</sub> Inch	No. of flutes	Flute Width	Flute Depth	Limits	E814	E815	E914	E915
	10	32	2.756	0.551	1.102	0.194	0.150	0.250	4	4.10	N21	H4	—	—	7350222	—
1/4	20		3.150	0.591	0.984	0.255	0.189	0.310	4	5.10	N7	H5	7350203	7350231	—	—
	1/4	28	3.150	0.591	0.984	0.255	0.189	0.310	4	5.50	N3	H5	—	—	7350223	—
	1/4	28	3.150	0.591	0.984	0.255	0.189	0.310	4	5.50	N3	H4	—	—	—	7350240
5/16		18	3.543	0.709	1.339	0.318	0.236	0.380	4	6.60	F	H5	7350204	—	—	—
5/16		18	3.543	0.787	1.339	0.318	0.236	0.380	4	6.60	F	H5	—	7350232	—	—
	5/16	24	3.543	0.709	1.339	0.318	0.236	0.380	4	6.90	I	H5	—	—	7350224	—
	5/16	24	3.543	0.787	1.339	0.318	0.236	0.380	4	6.90	I	H5	—	—	—	7350241
3/8		16	3.937	0.787	1.535	0.381	0.284	0.440	4	8.00	5/16	H5	7350205	7350233	—	—
	3/8	24	3.543	0.787	1.476	0.381	0.284	0.440	4	8.50	Q	H5	—	—	7350225	7350242
7/16		14	3.937	0.787	—	0.323	0.240	0.410	4	9.40	U	H5	7350206	7350234	—	—
	7/16	20	3.937	0.787	—	0.323	0.240	0.410	4	9.90	25/64	H5	—	—	7350226	7350243
1/2		13	4.331	0.906	—	0.367	0.273	0.440	4	10.80	27/64	H5	7350207	7350235	—	—
	1/2	20	3.937	0.827	—	0.367	0.273	0.440	4	11.50	29/64	H5	—	—	7350227	7350244
5/8		11	4.331	0.906	—	0.480	0.358	0.560	4	13.50	17/32	H5	7350208	7350236	—	—
	5/8	18	3.937	0.827	—	0.480	0.358	0.560	4	14.50	37/64	H5	—	—	7350228	7350245
3/4		10	4.921	1.181	—	0.590	0.439	0.690	4	16.50	21/32	H5	7350209	7350237	—	—
	3/4	16	4.331	0.906	—	0.590	0.439	0.690	4	17.50	11/16	H6	—	—	7350229	—
	3/4	16	4.331	0.906	—	0.590	0.439	0.690	4	17.50	11/16	H5	—	—	—	7350246
7/8		9	5.512	1.339	—	0.697	0.520	0.750	4	19.50	49/64	H6	7350220	7350238	—	—
	7/8	14	4.921	0.906	—	0.697	0.520	0.750	4	20.40	13/16	H6	—	—	7350230	7350247
1"		8	6.299	1.417	—	0.800	0.597	0.810	4	22.25	7/8	H6	7350221	7350239	—	—
	1"	12	5.512	1.063	—	0.800	0.597	0.810	4	23.25	59/64	H6	—	—	—	7350248

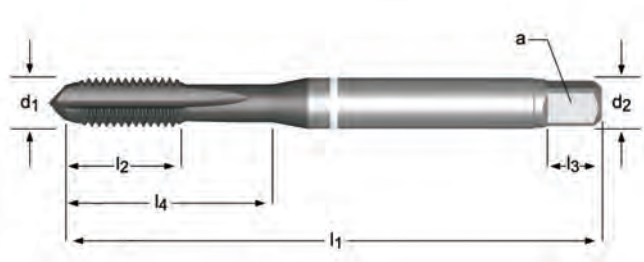
Note: Sizes up to 3/8" have male centers on both ends • Sizes over 3/8" have female centers on both ends.

## DIN ANSI Machine Tap, White Shark for Cast Iron

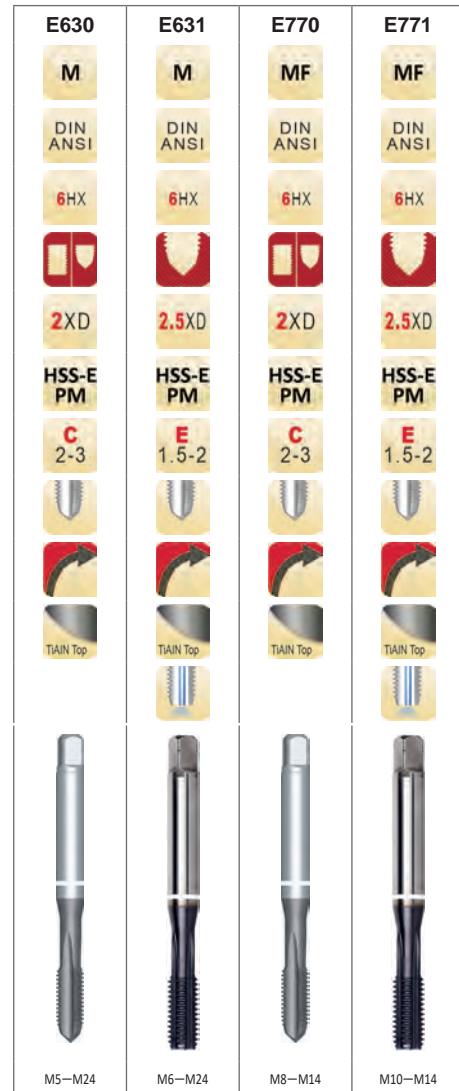
**E630** **E770** Designed for semi-bottoming or through hole tapping in Cast Iron applications. Premium HSCo Powder Metal substrate with TiAlN-Top Coating combine to offer superior abrasion resistance, higher operating speeds, improved thread quality, reduced cycle times and longer tool life.

**E631** **E771** Coolant through design allows for higher tapping speeds and better tool life. This design eliminates the problems associated with inadequate coolant supply in some applications. Full Bottoming.

- 3.1 3.2 3.3 8.2
- 3.4 6.2 6.4 7.4



Pack Qty = 1 pc



M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> Ø Inch	a Inch	l <sub>3</sub> mm	No. of flutes	Flute Length	Flute Angle	Limits	E630	E631	E770	E771
5		0.80	70	13	25	0.194	0.150	6	4	4.20	N19	D4	7350249	—	—	—
6		1.00	80	15	25	0.255	0.189	8	4	5.00	N9	D5	—	7350265	—	—
6		1.00	80	15	30	0.255	0.189	8	4	5.00	N9	D5	7350250	—	—	—
	8	1.00	90	18	35	0.318	0.236	10	4	7.00	J	D5	—	—	7350259	—
8		1.25	90	18	35	0.318	0.236	10	4	6.80	H	D5	7350251	—	—	—
8		1.25	90	20	34	0.318	0.236	10	4	6.80	H	D5	—	7350266	—	—
	10	1.00	90	20	35	0.381	0.284	11	4	9.00	T	D6	—	—	7350260	—
	10	1.25	100	20	39	0.381	0.284	11	4	8.80	11/32	D6	—	—	7350261	7350274
10		1.50	100	20	39	0.381	0.284	11	4	8.50	Q	D6	7350252	7350267	—	—
	12	1.25	100	21	—	0.367	0.273	11	4	10.80	27/64	D6	—	—	7350262	7350275
	12	1.50	100	21	—	0.367	0.273	11	4	10.50	Z	D6	—	—	7350263	7350276
12		1.75	110	23	—	0.367	0.273	11	4	10.30	Y	D6	7350253	7350268	—	—
	14	1.50	100	21	—	0.429	0.320	13	4	12.50	31/64	D7	—	—	7350264	7350277
14		2.00	110	23	—	0.429	0.320	13	4	12.00	15/32	D7	7350254	7350269	—	—
16		2.00	110	23	—	0.480	0.358	14	4	14.00	35/64	D7	7350255	7350270	—	—
18		2.50	125	30	—	0.542	0.404	16	4	15.50	39/64	D7	7350256	7350271	—	—
20		2.50	140	30	—	0.652	0.487	18	4	17.50	11/16	D7	7350257	7350272	—	—
24		3.00	160	38	—	0.760	0.567	19	4	21.00	53/64	D8	7350258	7350273	—	—

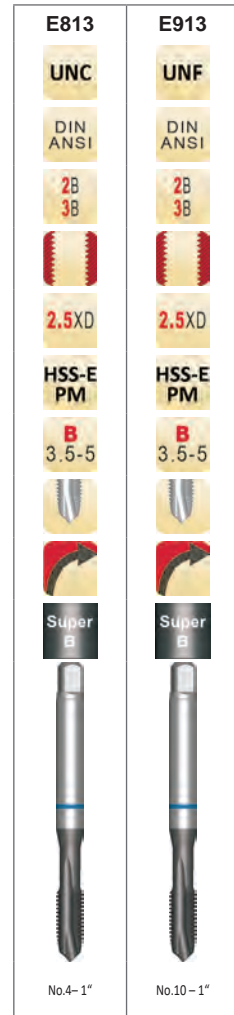
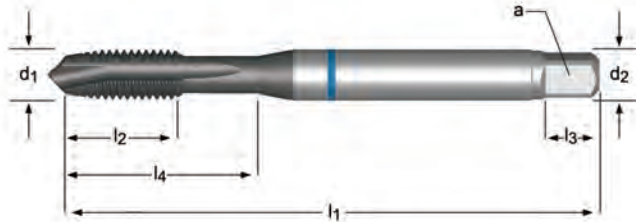
Note: Sizes up to M10 have male centers on both ends • Sizes over M10 have female centers on both ends.



## DIN ANSI Machine Tap, Blue Shark for Stainless Steel

**E813** Designed for superior performance through hole tapping in a wide range of Stainless Steel types. Premium HSCo Powder Metal substrate with Super-B (TiAlN+WC/C) Coating combined with an additional edge treatment to offer improved thread quality and longer tool life. Available in both 2B and 3B Class of Fit to cover a wide range of applications.

- 2.1 2.2 2.3
- 1.2 1.3 1.4 1.5



Pack Qty = 1 pc

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch	$d_2$ Ø Inch	$a$ Inch	$l_3$ Inch	No. of flutes			Limits	E813	E913
4		40	2.205	0.354	0.709	0.141	0.108	0.190	3	2.35	N43	H2	7350278	—
6		32	2.205	0.433	0.787	0.141	0.108	0.190	3	2.85	N36	H3	7350279	—
8		32	2.480	0.512	0.827	0.168	0.129	0.250	3	3.50	N29	H3	7350280	—
10		24	2.756	0.551	1.102	0.194	0.150	0.250	3	3.90	N25	H3	7350281	—
	10	32	2.756	0.551	1.102	0.194	0.150	0.250	3	4.10	N21	H3	—	7350299
1/4		20	3.150	0.591	0.984	0.255	0.189	0.310	3	5.10	N7	H5	7350282	—
1/4		20	3.150	0.591	0.984	0.255	0.189	0.310	3	5.10	N7	H3	7350283	—
	1/4	28	3.150	0.591	0.984	0.255	0.189	0.310	3	5.50	N3	H5	—	7350300
	1/4	28	3.150	0.591	0.984	0.255	0.189	0.310	3	5.50	N3	H3	—	7350301
5/16		18	3.543	0.709	1.339	0.318	0.236	0.380	3	6.60	F	H5	7350284	—
5/16		18	3.543	0.709	1.339	0.318	0.236	0.380	3	6.60	F	H3	7350285	—
	5/16	24	3.543	0.709	1.339	0.318	0.236	0.380	3	6.90	I	H4	—	7350302
	5/16	24	3.543	0.709	1.339	0.318	0.236	0.380	3	6.90	I	H3	—	7350303
3/8		16	3.937	0.787	1.535	0.381	0.284	0.440	3	8.00	5/16	H3	7350287	—
3/8		16	3.937	0.787	1.535	0.381	0.284	0.440	3	8.00	5/16	H5	7350286	—
	3/8	24	3.543	0.787	1.476	0.381	0.284	0.440	3	8.50	Q	H4	—	7350304
	3/8	24	3.543	0.787	1.476	0.381	0.284	0.440	3	8.50	Q	H3	—	7350305
5/8		11	4.331	0.906	—	0.480	0.358	0.560	4	13.50	17/32	H5	7350291	—
5/8		11	4.331	0.906	—	0.480	0.358	0.560	4	13.50	17/32	H3	7350292	—
7/16		14	3.937	0.787	—	0.323	0.240	0.410	4	9.40	U	H5	7350288	—
	7/16	20	3.937	0.787	—	0.323	0.240	0.410	4	9.90	25/64	H5	—	7350306
1/2		13	4.331	0.906	—	0.367	0.273	0.440	4	10.80	27/64	H5	7350289	—
1/2		13	4.331	0.906	—	0.367	0.273	0.440	4	10.80	27/64	H3	7350290	—
	1/2	20	3.937	0.827	—	0.367	0.273	0.440	4	11.50	29/64	H5	—	7350307
	1/2	20	3.937	0.827	—	0.367	0.273	0.440	4	11.50	29/64	H3	—	7350308

Note: Sizes up to 3/8" have male centers on both ends • Sizes over 3/8" have female centers on both ends.

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch	$d_2$ $\varnothing$ Inch	$a$ Inch	$l_3$ Inch	No. of flutes			Limits	E813	E913
	5/8	18	3.937	0.827	—	0.480	0.358	0.560	4	14.50	37/64	H5	—	7350309
	5/8	18	3.937	0.827	—	0.480	0.358	0.560	4	14.50	37/64	H3	—	7350310
3/4		10	4.921	1.181	—	0.590	0.439	0.690	4	16.50	21/32	H5	7350293	—
3/4		10	4.921	1.181	—	0.590	0.439	0.690	4	16.50	21/32	H3	7350294	—
	3/4	16	4.331	0.906	—	0.590	0.439	0.690	4	17.50	11/16	H5	—	7350311
	3/4	16	4.331	0.906	—	0.590	0.439	0.690	4	17.50	11/16	H3	—	7350312
7/8		9	5.512	1.339	—	0.697	0.520	0.750	4	19.50	49/64	H6	7350295	—
7/8		9	5.512	1.339	—	0.697	0.520	0.750	4	19.50	49/64	H4	7350296	—
	7/8	14	4.921	0.906	—	0.697	0.520	0.750	4	20.40	13/16	H6	—	7350313
	7/8	14	4.921	0.906	—	0.697	0.520	0.750	4	20.40	13/16	H4	—	7350314
1"		8	6.299	1.417	—	0.800	0.597	0.810	4	22.25	7/8	H6	7350297	—
1"		8	6.299	1.417	—	0.800	0.597	0.810	4	22.25	7/8	H4	7350298	—
	1"	12	5.512	1.063	—	0.800	0.597	0.810	4	23.25	59/64	H6	—	7350315
	1"	12	5.512	1.063	—	0.800	0.597	0.810	4	23.25	59/64	H4	—	7350316

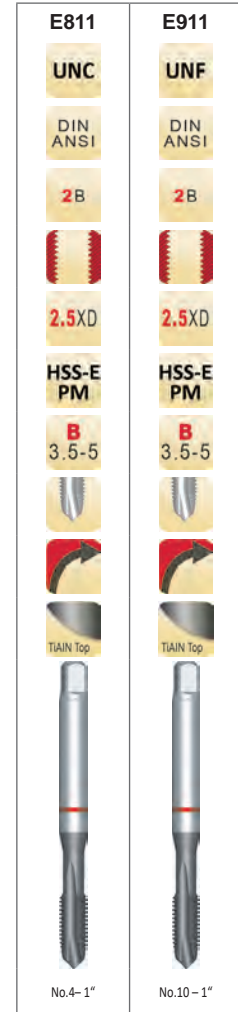
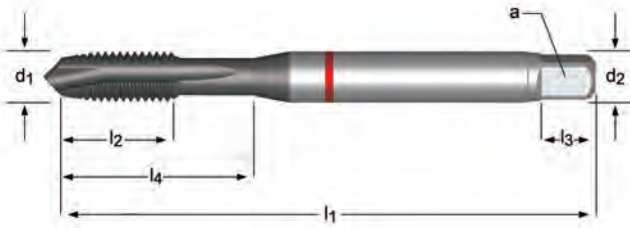
Note: Sizes up to 3/8" have male centers on both ends • Sizes over 3/8" have female centers on both ends.

## DIN ANSI Machine Tap, Red Shark for Alloy Steels

**E811** Designed for high performance through hole tapping in most medium Alloy Steels. The TiAlN-Top Coating combined with an additional edge treatment provides excellent performance and consistency in high production applications.

**E911**

- 1.4 1.5
- 1.6 4.2 5.2



Pack Qty = 1 pc

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch	$d_2$ Ø Inch	$a$ Inch	$l_3$ Inch	No. of flutes			Limits	E811	E911
4		40	2.205	0.354	0.709	0.141	0.108	0.190	3	2.35	N43	H2	7350391	—
6		32	2.205	0.433	0.787	0.141	0.108	0.190	3	2.85	N36	H2	7350392	—
8		32	2.480	0.512	0.827	0.168	0.129	0.250	3	3.50	N29	H3	7350393	—
	10	32	2.756	0.551	1.102	0.194	0.150	0.250	3	4.10	N21	H3	—	7350404
10		24	2.756	0.551	1.102	0.194	0.150	0.250	3	3.90	N25	H3	7350394	—
	1/4	28	3.150	0.591	0.984	0.255	0.189	0.310	3	5.50	N3	H4	—	7350405
1/4		20	3.150	0.591	0.984	0.255	0.189	0.310	3	5.10	N7	H5	7350395	—
	5/16	24	3.543	0.709	1.339	0.318	0.236	0.380	3	6.90	I	H4	—	7350406
5/16		18	3.543	0.709	1.339	0.318	0.236	0.380	3	6.60	F	H5	7350396	—
	3/8	24	3.543	0.787	1.476	0.318	0.284	0.440	3	8.50	Q	H4	—	7350407
3/8		16	3.543	0.787	1.535	0.381	0.284	0.440	3	8.00	5/16	H4	7350397	—
	7/16	20	3.937	0.787	—	0.323	0.240	0.410	3	9.90	25/64	H5	—	7350408
7/16		14	3.937	0.787	—	0.323	0.240	0.410	3	9.40	U	H5	7350398	—
	1/2	20	3.937	0.827	—	0.367	0.273	0.440	3	11.50	29/64	H5	—	7350409
1/2		13	4.331	0.906	—	0.367	0.273	0.440	3	10.80	27/64	H5	7350399	—
	5/8	18	3.937	0.827	—	0.480	0.358	0.560	3	14.50	37/64	H5	—	7350410
5/8		11	4.331	0.906	—	0.480	0.358	0.560	3	13.50	17/32	H5	7350400	—
	3/4	16	4.331	0.906	—	0.590	0.439	0.690	4	17.50	11/16	H5	—	7350411
3/4		10	4.921	1.181	—	0.590	0.439	0.690	4	16.50	21/32	H5	7350401	—
	7/8	14	4.921	0.906	—	0.697	0.520	0.750	4	20.40	13/16	H6	—	7350412
7/8		9	5.512	1.339	—	0.697	0.520	0.750	4	19.50	49/64	H6	7350402	—
	1"	12	5.512	1.063	—	0.800	0.597	0.810	4	23.25	59/64	H6	—	7350413
1"		8	6.299	1.417	—	0.800	0.597	0.810	4	22.25	7/8	H6	7350403	—

Note: Sizes up to 3/8" have male centers on both ends • Sizes over 3/8" have female centers on both ends.

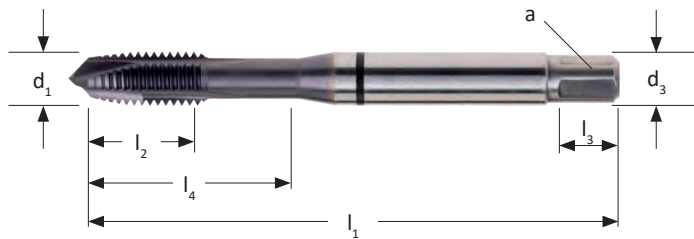


## DIN-ANSI Machine Tap Black Shark for Hard Alloys, Plug Style

**E816** Designed for high performance through hole tapping in high strength and heat resistant work-materials with hardness up to 45HRC. The TiAlN-Top coating combined with geometry that significantly increases cutting edge strength, provides excellent performance and consistency in hard and difficult to machine materials.

**E916**

- 1.6 4.3 5.3
- 1.5 1.7 4.2 5.2



E816	E916
UNC	UNF
DIN ANSI	DIN ANSI
2BX	2BX
2.5XD	2.5XD
HSS-E PM	HSS-E PM
B 3.5-5	B 3.5-5
TiAlN Top	TiAlN Top
No.4-3/4	No.10-3/4

Pack Qty = 1 pc

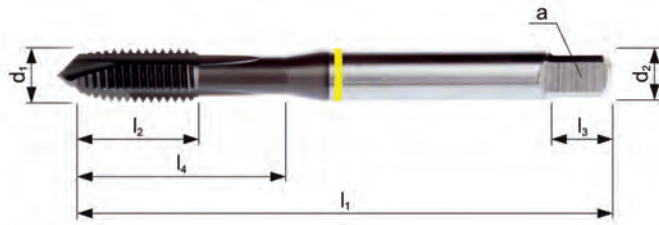
UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	No. of flutes			Limits	E816	E916
4		40	2.205	0.472	0.827	0.141	0.108	0.190	3	2.35	N43	H2	7812046	—
6		32	2.480	0.551	0.866	0.168	0.129	0.250	3	2.85	N36	H3	7812047	—
8		32	2.756	0.610	1.102	0.194	0.150	0.250	3	3.50	N29	H3	7812048	—
10		24	3.150	0.669	1.024	0.255	0.189	0.310	3	3.90	N25	H3	7812049	—
	10	32	3.150	0.669	1.024	0.255	0.189	0.310	3	4.10	N21	H3	—	7812107
1/4		20	3.543	0.807	1.378	0.318	0.236	0.380	3	5.10	N7	H5	7812100	—
	1/4	28	3.543	0.807	1.339	0.318	0.236	0.380	3	5.50	N3	H4	—	7812108
5/16		18	3.937	0.906	1.535	0.381	0.236	0.440	3	6.60	F	H5	7812101	—
	5/16	24	3.937	0.906	1.535	0.381	0.284	0.440	3	6.90	I	H4	—	7812109
3/8		16	3.937	0.787	1.535	0.381	0.236	0.440	3	8.00	5/16	H5	7812102	—
	3/8	24	3.937	0.787	1.535	0.381	0.284	0.440	3	8.50	Q	H4	—	7812110
7/16		14	3.937	0.787	—	0.323	0.240	0.410	4	9.40	U	H5	7812103	—
	7/16	20	3.937	0.787	—	0.323	0.240	0.440	4	9.90	25/64	H5	—	7812111
1/2		13	4.331	0.906	—	0.367	0.273	0.440	4	10.80	27/64	H5	7812104	—
	1/2	20	4.331	0.906	—	0.367	0.273	0.440	4	11.50	29/64	H5	—	7812112
5/8		11	4.331	0.906	—	0.480	0.358	0.560	4	13.50	17/32	H5	7812105	—
	5/8	18	4.331	0.906	—	0.480	0.358	0.560	4	14.50	37/64	H5	—	7812113
3/4		10	4.921	1.181	—	0.590	0.440	0.690	4	16.50	21/32	H5	7812106	—
	3/4	16	4.921	1.181	—	0.590	0.440	0.690	4	17.50	11/16	H5	—	7812114

Note: Sizes up to 3/8" have male centers on both ends • Sizes over 3/8" have female centers on both ends.

## DIN ANSI Machine Tap, Yellow Shark for Low Alloy Steels

**E625** Designed for through hole tapping in low Alloy Steel applications.  
**E765** Premium HSCo Powder Metal substrate with TiAlN-Top Coating combine to offer superior abrasion resistance, higher operating speeds, improved thread quality, reduced cycle times and longer tool life.

- 1.1 1.2 1.3 6.1 6.3
- 1.4 1.5 6.2



Pack Qty = 1 pc

M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> ∅ Inch	a Inch	l <sub>3</sub> mm	No. of flutes	↔	↔	Limits	E625	E765
4		0.70	63	12	21	0.168	0.129	6	3	3.30	N30	D4	7350492	—
5		0.80	70	13	25	0.194	0.150	6	3	4.20	N19	D4	7350493	—
6		1.00	80	15	30	0.255	0.189	8	3	5.00	N9	D5	7350494	—
	8	1.00	90	18	35	0.318	0.236	10	3	7.00	J	D5	—	7350503
8		1.25	90	18	35	0.318	0.236	10	3	6.80	H	D5	7350495	—
	10	1.25	100	20	39	0.381	0.284	11	3	8.80	11/32	D6	—	7350504
10		1.50	100	20	39	0.381	0.284	11	3	8.50	Q	D6	7350496	—
	12	1.25	100	21	—	0.367	0.273	11	3	10.80	27/64	D6	—	7350505
	12	1.50	100	21	—	0.367	0.273	11	3	10.50	Z	D6	—	7350506
12		1.75	110	23	—	0.367	0.273	11	3	10.30	Y	D6	7350497	—
	14	1.50	100	21	—	0.429	0.320	13	3	12.50	31/64	D7	—	7350507
14		2.00	110	23	—	0.429	0.320	13	3	12.00	15/32	D7	7350498	—
	16	1.50	100	21	—	0.480	0.358	14	3	14.50	9/16	D7	—	7350508
16		2.00	110	23	—	0.480	0.358	14	3	14.00	35/64	D7	7350499	—
	18	1.50	110	24	—	0.542	0.404	16	3	16.50	41/64	D7	—	7350509
18		2.50	125	30	—	0.542	0.404	16	3	15.50	39/64	D7	7350500	—
20		2.50	140	30	—	0.652	0.487	18	3	17.50	11/16	D7	7350501	—
24		3.00	160	38	—	0.760	0.567	19	4	21.00	53/64	D8	7350502	—

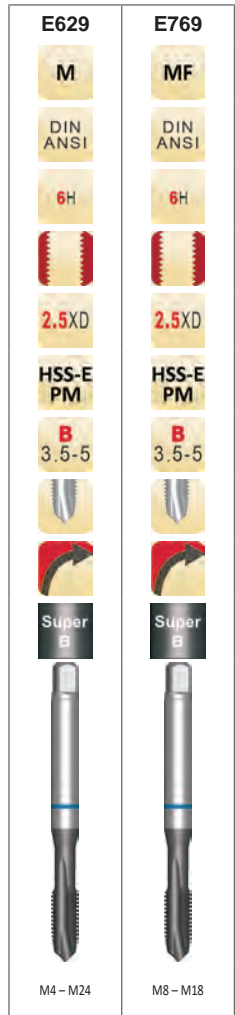
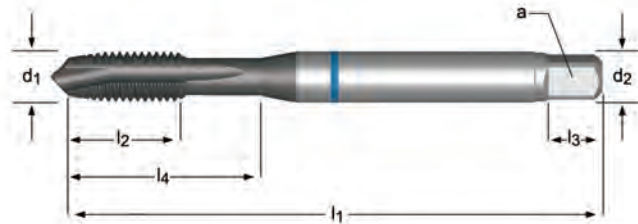
Note: Sizes up to M10 have male centers on both ends • Sizes over M10 have female centers on both ends.

## DIN ANSI Machine Tap, Blue Shark for Stainless Steel

**E629** Designed for superior performance through hole tapping in a wide range of Stainless Steel types. Premium HSCo Powder Metal substrate with Super-B (TiAlN+WC/C) Coating combined with an additional edge treatment to offer improved thread quality and longer tool life. Available in both 2B and 3B Class of Fit to cover a wide range of applications.

**E769**

- 2.1 2.2 2.3
- 1.2 1.3 1.4 1.5



Pack Qty = 1 pc

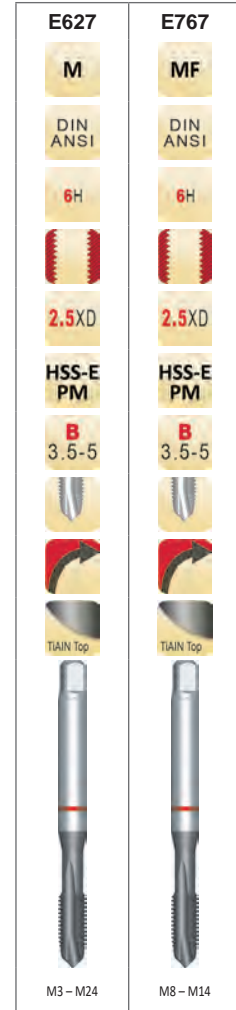
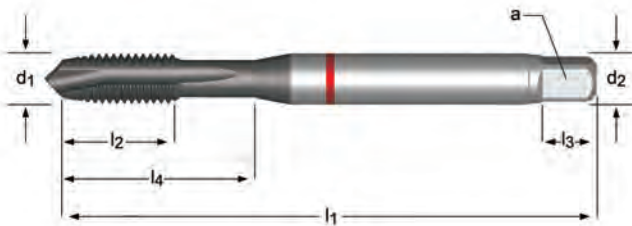
M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> Ø Inch	a Inch	l <sub>3</sub> mm	No. of flutes			Limits	E629	E769
4		0.70	63	12	21	0.168	0.129	6	3	3.30	N30	D4	7350317	—
5		0.80	70	13	25	0.194	0.150	6	3	4.20	N19	D4	7350318	—
6		1.00	80	15	30	0.255	0.189	8	3	5.00	N9	D5	7350319	—
	8	1.00	90	18	35	0.318	0.236	10	3	7.00	J	D5	—	7350328
8		1.25	90	18	35	0.318	0.236	10	3	6.80	H	D5	7350320	—
	10	1.25	100	20	39	0.381	0.284	11	3	8.80	11/32	D6	—	7350329
10		1.50	100	20	39	0.381	0.284	11	3	8.50	Q	D6	7350321	—
	12	1.25	100	21	—	0.367	0.273	11	4	10.80	27/64	D6	—	7350330
	12	1.50	100	21	—	0.367	0.273	11	4	10.50	Z	D6	—	7350331
12		1.75	110	23	—	0.367	0.273	11	4	10.30	Y	D6	7350322	—
	14	1.50	100	21	—	0.429	0.320	13	4	12.50	31/64	D7	—	7350332
14		2.00	110	23	—	0.429	0.320	13	4	12.00	15/32	D7	7350323	—
	16	1.50	100	21	—	0.480	0.358	14	4	14.50	9/16	D7	—	7350333
16		2.00	110	23	—	0.480	0.358	14	4	14.00	35/64	D7	7350324	—
	18	1.50	110	24	—	0.542	0.404	16	4	16.50	41/64	D7	—	7350334
18		2.50	125	30	—	0.542	0.404	16	4	15.50	39/64	D7	7350325	—
20		2.50	140	30	—	0.652	0.487	18	4	17.50	11/16	D7	7350326	—
24		3.00	160	38	—	0.760	0.567	19	4	21.00	53/64	D8	7350327	—

Note: Sizes up to M10 have male centers on both ends • Sizes over M10 have female centers on both ends.

## DIN ANSI Machine Tap, Red Shark for Alloy Steels

**E627** Designed for high performance through hole tapping in most medium Alloy Steels. The TiAlN-Top Coating combined with an additional edge treatment provides excellent performance and consistency in high production applications.

- 1.4 1.5
- 1.6 4.2 5.2



Pack Qty = 1 pc

M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> Ø Inch	∠ a Inch	l <sub>3</sub> mm	No. of flutes	↔	↔	Limits	E627	E767
3		0.50	56	9	18	0.141	0.108	5	3	2.50	N40	D3	7350414	—
4		0.70	63	12	21	0.168	0.129	6	3	3.30	N30	D4	7350415	—
5		0.80	70	13	25	0.194	0.150	6	3	4.20	N19	D4	7350416	—
6		1.00	80	15	30	0.255	0.189	8	3	5.00	N9	D5	7350417	—
	8	1.00	90	18	35	0.318	0.236	10	3	7.00	J	D5	—	7350426
8		1.25	90	18	35	0.318	0.236	10	3	6.80	H	D5	7350418	—
	10	1.25	100	20	39	0.381	0.284	11	3	8.80	11/32	D6	—	7350427
10		1.50	100	20	39	0.381	0.284	11	3	8.50	Q	D6	7350419	—
	12	1.50	100	21	—	0.367	0.273	11	3	10.50	Z	D6	—	7350428
12		1.75	110	23	—	0.367	0.273	11	3	10.30	Y	D6	7350420	—
	14	1.50	100	21	—	0.429	0.320	13	3	12.50	31/64	D7	—	7350429
14		2.00	110	23	—	0.429	0.320	13	3	12.00	15/32	D7	7350421	—
16		2.00	110	23	—	0.480	0.358	14	3	14.00	35/64	D7	7350422	—
18		2.50	125	30	—	0.542	0.404	16	4	15.50	39/64	D7	7350423	—
20		2.50	140	30	—	0.652	0.487	18	4	17.50	11/16	D7	7350424	—
24		3.00	160	38	—	0.760	0.567	19	4	21.00	53/64	D8	7350425	—

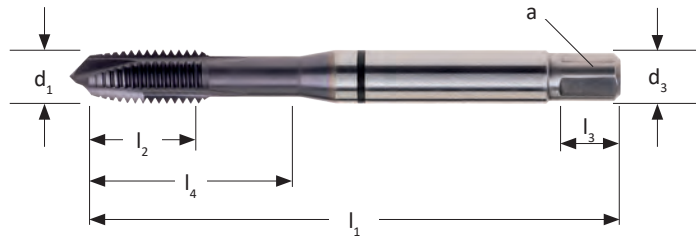
Note: Sizes up to M10 have male centers on both ends • Sizes over M10 have female centers on both ends.

## DIN-ANSI Machine Tap Black Shark for Hard Alloys, Plug Style

**E817** Designed for high performance through hole tapping in high strength and heat resistant work-materials with hardness up to 45HRC. The TiAlN-Top coating combined with geometry that significantly increases cutting edge strength, provides excellent performance and consistency in hard and difficult to machine materials.

**E917**

- 1.6 4.3 5.3
- 1.5 1.7 4.2 5.2



<b>E816</b>	<b>E916</b>
<b>M</b>	<b>MF</b>
<b>DIN ANSI</b>	<b>DIN ANSI</b>
<b>6H</b>	<b>6H</b>
<b>2.5XD</b>	<b>2.5XD</b>
<b>HSS-E PM</b>	<b>HSS-E PM</b>
<b>B 3.5-5</b>	<b>B 3.5-5</b>
<b>TiAlN Top</b>	<b>TiAlN Top</b>
M3-M12	M8-M12

Pack Qty = 1 pc

M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> ∅ Inch	a Inch	l <sub>3</sub> mm	No. of flutes			Limits	E817	E917
3		0.50	63	15	22	0.168	0.129	6	3	2.50	N40	D3	7812115	—
4		0.70	70	16	28	0.194	0.150	6	3	3.30	N30	D4	7812116	—
5		0.80	80	17	26	0.255	0.189	8	3	4.20	N19	D4	7812117	—
6		1.00	90	21	35	0.318	0.236	10	3	5.00	N9	D5	7812118	—
8		1.25	100	23	39	0.381	0.284	11	3	6.80	H	D5	7812119	—
	8	1.00	100	23	39	0.381	0.284	11	3	7.00	J	D5	—	7812122
10		1.50	100	20	38	0.381	0.284	11	3	8.50	Q	D6	7812120	—
	10	1.25	100	20	38	0.381	0.284	11	3	8.80	11/32	D5	—	7812123
12		1.75	110	23	-	0.367	0.273	11	4	10.30	Y	D6	7812121	—
	12	1.25	110	23	-	0.367	0.273	11	4	10.80	27/64	D5	—	7812124
	12	1.50	110	23	-	0.367	0.273	11	4	10.50	Z	D5	—	7812125

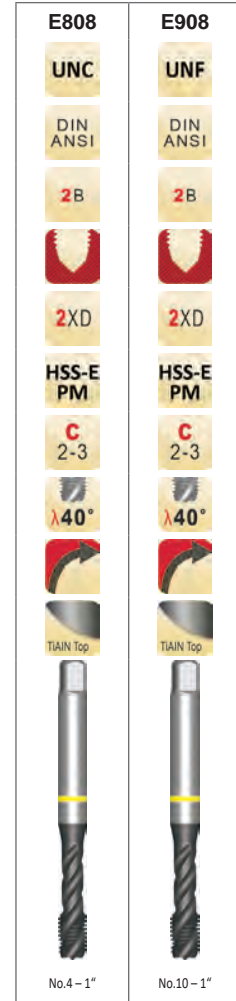
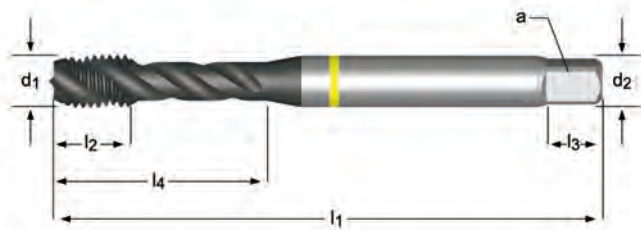
Note: Sizes up to M10 have male centers on both ends • Sizes over M10 have female centers on both ends.

## DIN ANSI Machine Tap, Yellow for Low Alloy Steels

**E808** Designed for blind hole tapping in low Alloy Steel applications. Premium HSCo Powder Metal substrate with TiAlN-Top Coating combined with a special 40° Spiral Flute geometry prevents nesting and reduces the risk of re-cutting chips on reversal allowing taps to operate at higher speeds while providing improved thread quality.

**E908**

- 1.1 1.2 1.3 6.1 6.3
- 1.4 1.5 6.2



Pack Qty = 1 pc

UNC	UNF	TPI	l <sub>1</sub> Inch	l <sub>2</sub> Inch	l <sub>4</sub> Inch	d <sub>2</sub> Ø Inch	a Inch	l <sub>3</sub> Inch	No. of flutes			Limits	E808	E908
4		40	2.205	0.256	0.709	0.141	0.108	0.236	3	2.35	N43	H2	7350510	—
6		32	2.205	0.256	0.787	0.141	0.108	0.190	3	2.85	N36	H2	7350511	—
8		32	2.480	0.276	0.827	0.168	0.129	0.250	3	3.50	N29	H3	7350512	—
10		24	2.756	0.315	1.102	0.194	0.150	0.250	3	3.90	N25	H3	7350513	—
	10	32	2.756	0.315	1.102	0.194	0.150	0.250	3	4.10	N21	H3	—	7350523
1/4		20	3.150	0.394	0.984	0.255	0.189	0.310	3	5.10	N7	H5	7350514	—
	1/4	28	3.150	0.394	0.984	0.255	0.189	0.310	3	5.50	N3	H4	—	7350524
5/16		18	3.543	0.472	1.339	0.318	0.236	0.380	3	6.60	F	H5	7350515	—
	5/16	24	3.543	0.472	1.339	0.318	0.236	0.380	3	6.90	I	H4	—	7350525
3/8		16	3.937	0.591	1.535	0.381	0.284	0.440	3	8.00	5/16	H4	7350516	—
	3/8	24	3.543	0.591	1.476	0.381	0.284	0.440	3	8.50	Q	H4	—	7350526
7/16		14	3.937	0.591	—	0.323	0.240	0.410	3	9.40	U	H5	7350517	—
	7/16	20	3.937	0.591	—	0.323	0.240	0.410	3	9.90	25/64	H5	—	7350527
1/2		13	4.331	0.709	—	0.367	0.273	0.440	3	10.80	27/64	H5	7350518	—
	1/2	20	3.937	0.709	—	0.367	0.273	0.440	3	11.50	29/64	H5	—	7350528
5/8		11	4.331	0.787	—	0.480	0.358	0.560	4	13.50	17/32	H5	7350519	—
	5/8	18	3.937	0.591	—	0.480	0.358	0.560	4	14.50	37/64	H5	—	7350529
3/4		10	4.921	0.984	—	0.590	0.439	0.690	4	16.50	21/32	H5	7350520	—
	3/4	16	4.331	0.984	—	0.590	0.439	0.690	4	17.50	11/16	H5	—	7350530
7/8		9	5.512	0.984	—	0.697	0.520	0.750	4	19.50	49/64	H6	7350521	—
	7/8	14	4.921	0.984	—	0.697	0.520	0.750	4	20.40	13/16	H6	—	7350531
1"		8	6.299	1.181	—	0.800	0.597	0.810	4	22.25	7/8	H6	7350522	—
	1"	12	5.512	1.063	—	0.800	0.597	0.810	4	23.25	59/64	H6	—	7350532

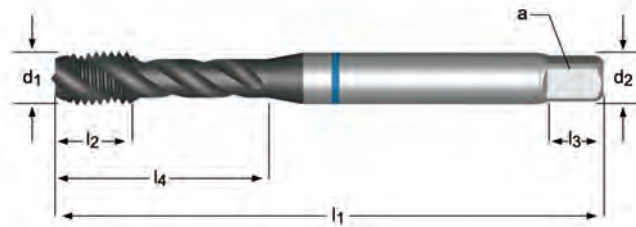
Note: Sizes up to 3/8" have male centers on both ends • Sizes over 3/8" have female centers on both ends.

## DIN ANSI Machine Tap, Blue Shark for Stainless Steel

**E812** Designed for superior performance blind hole tapping in a wide range of Stainless Steel types. Premium HSCo Powder Metal substrate with Super-B (TiAlN+WC/C) Coating combined with an additional edge treatment and a 40° Flute angle facilitates better chip evacuation offering improved thread quality and longer tool life. Available in both 2B and 3B Class of Fit to cover a wide range of applications.

**E912**



- 2.1 2.2 2.3
- 1.2 1.3 1.4 1.5



<b>E812</b>	<b>E912</b>
<b>UNC</b>	<b>UNF</b>
<b>DIN ANSI</b>	<b>DIN ANSI</b>
<b>2B</b> <b>3B</b>	<b>2B</b> <b>3B</b>
<b>2.5XD</b>	<b>2.5XD</b>
<b>HSS-E PM</b>	<b>HSS-E PM</b>
<b>C</b> 2-3	<b>C</b> 2-3
No.4-1"	No.10-1"

Pack Qty = 1 pc

UNC	UNF	TPI	l <sub>1</sub> Inch	l <sub>2</sub> Inch	l <sub>4</sub> Inch	d <sub>2</sub> Ø Inch	∠ a Inch	l <sub>3</sub> Inch	No. of flutes			Limits	E812	E912
4		40	2.205	0.256	0.709	0.141	0.108	0.236	3	2.35	N43	H2	7350335	—
6		32	2.205	0.256	0.787	0.141	0.108	0.190	3	2.80	N36	H3	7350336	—
8		32	2.480	0.276	0.827	0.168	0.129	0.250	3	3.50	N29	H3	7350337	—
10		24	2.756	0.315	1.102	0.194	0.150	0.250	3	3.90	N25	H3	7350338	—
	10	32	2.756	0.315	1.102	0.194	0.150	0.250	3	4.10	N21	H3	—	7350356
1/4		20	3.150	0.394	0.984	0.255	0.189	0.310	3	5.10	N7	H5	7350339	—
1/4		20	3.150	0.394	0.984	0.255	0.189	0.310	3	5.10	N7	H3	7350340	—
	1/4	28	3.150	0.394	0.984	0.255	0.189	0.310	3	5.50	N3	H5	—	7350357
	1/4	28	3.150	0.394	0.984	0.255	0.189	0.310	3	5.50	N3	H3	—	7350358
5/16		18	3.543	0.472	1.339	0.318	0.236	0.380	3	6.60	F	H5	7350341	—
5/16		18	3.543	0.472	1.339	0.318	0.236	0.380	3	6.60	F	H3	7350342	—
	5/16	24	3.543	0.472	1.339	0.318	0.236	0.380	3	6.90	I	H4	—	7350359
	5/16	24	3.543	0.472	1.339	0.318	0.236	0.380	3	6.90	I	H3	—	7350360
3/8		16	3.937	0.591	1.535	0.381	0.284	0.440	3	8.00	5/16	H5	7350343	—
3/8		16	3.937	0.591	1.535	0.381	0.284	0.440	3	8.00	5/16	H3	7350344	—
	3/8	24	3.543	0.591	1.476	0.318	0.284	0.440	3	8.50	Q	H4	—	7350361
	3/8	24	3.543	0.591	1.476	0.318	0.284	0.440	3	8.50	Q	H3	—	7350362
7/16		14	3.937	0.591	—	0.323	0.240	0.410	4	9.40	U	H5	7350345	—
	7/16	20	3.937	0.591	—	0.323	0.240	0.410	4	9.90	25/64	H5	—	7350363
1/2		13	4.331	0.709	—	0.367	0.273	0.440	4	10.70	27/64	H5	7350346	—
1/2		13	4.331	0.709	—	0.367	0.273	0.440	4	10.70	27/64	H3	7350347	—
	1/2	20	3.937	0.709	—	0.367	0.273	0.440	4	11.50	29/64	H5	—	7350364
	1/2	20	3.937	0.709	—	0.367	0.273	0.440	4	11.50	29/64	H3	—	7350365
5/8		11	4.331	0.787	—	0.480	0.358	0.560	4	13.50	17/32	H5	7350348	—
5/8		11	4.331	0.787	—	0.480	0.358	0.560	4	13.50	17/32	H3	7350349	—
	5/8	18	3.937	0.591	—	0.480	0.358	0.560	4	14.50	37/64	H5	—	7350366
	5/8	18	3.937	0.591	—	0.480	0.358	0.560	4	14.50	37/64	H3	—	7350367

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch	$d_2$ $\varnothing$ Inch	$\square$ a Inch	$l_3$ Inch	No. of flutes			Limits	E812	E912
3/4		10	4.921	0.984	—	0.590	0.439	0.690	4	16.50	21/32	H5	7350350	—
3/4		10	4.921	0.984	—	0.590	0.439	0.690	4	16.50	21/32	H3	7350351	—
	3/4	16	4.331	0.984	—	0.590	0.439	0.690	4	17.50	11/16	H5	—	7350368
	3/4	16	4.331	0.984	—	0.590	0.439	0.690	4	17.50	11/16	H3	—	7350369
7/8		9	5.512	0.984	—	0.697	0.520	0.750	4	19.50	49/64	H6	7350352	—
7/8		9	5.512	0.984	—	0.697	0.520	0.750	4	19.50	49/64	H4	7350353	—
	7/8	14	4.921	0.984	—	0.697	0.520	0.750	4	20.40	13/16	H6	—	7350370
	7/8	14	4.921	0.984	—	0.697	0.520	0.750	4	20.40	13/16	H4	—	7350371
1"		8	6.299	1.181	—	0.800	0.597	0.810	4	22.25	7/8	H6	7350354	—
1"		8	6.299	1.181	—	0.800	0.597	0.810	4	22.25	7/8	H4	7350355	—
	1"	12	5.512	1.063	—	0.800	0.597	0.810	4	23.25	59/64	H6	—	7350372
	1"	12	5.512	1.063	—	0.800	0.597	0.810	4	23.25	59/64	H4	—	7350373

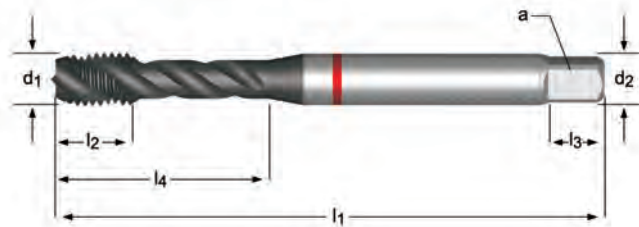
Note: Sizes up to 3/8" have male centers on both ends • Sizes over 3/8" have female centers on both ends.



## DIN ANSI Machine Tap, Red Shark for Alloy Steels

**E810** Designed for high performance blind hole tapping in most medium Alloy Steels.  
**E910** The TiAlN-Top Coating combined with a special 45° Flute Geometry and an additional edge treatment provides excellent performance and consistency in high production applications. The back taper built into this design further facilitates chip evacuation and reduces torque when the tap reverses. It is recommended to use a toolholder with minimal float or soft start.

- 1.4 1.5
- 1.6 4.2 5.2



<b>E810</b>	<b>E910</b>
<b>UNC</b>	<b>UNF</b>
DIN ANSI	DIN ANSI
<b>2B</b>	<b>2B</b>
<b>2.5XD</b>	<b>2.5XD</b>
<b>HSS-E PM</b>	<b>HSS-E PM</b>
<b>C 2-3</b>	<b>C 2-3</b>
No.4-1"	No.10-1"

Pack Qty = 1 pc

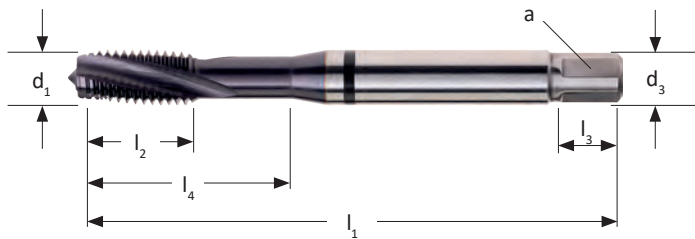
UNC	UNF	TPI	l <sub>1</sub> Inch	l <sub>2</sub> Inch	l <sub>4</sub> Inch	d <sub>2</sub> Ø Inch	∠ a Inch	l <sub>3</sub> Inch	No. of flutes			Limits	E810	E910
4		40	2.205	0.256	0.709	0.141	0.108	0.236	3	2.35	N43	H2	7350430	—
6		32	2.205	0.256	0.787	0.141	0.108	0.190	3	2.85	N36	H2	7350431	—
8		32	2.480	0.276	0.827	0.168	0.129	0.250	3	3.50	N29	H3	7350432	—
10		24	2.756	0.315	1.102	0.194	0.150	0.250	3	3.90	N25	H3	7350433	—
	10	32	2.756	0.315	1.102	0.194	0.150	0.250	3	4.10	N21	H3	—	7350443
1/4		20	3.150	0.394	0.984	0.255	0.189	0.310	3	5.10	N7	H5	7350434	—
	1/4	28	3.150	0.394	0.984	0.255	0.189	0.310	3	5.50	N3	H4	—	7350444
5/16		18	3.543	0.472	1.339	0.318	0.236	0.380	3	6.60	F	H5	7350435	—
	5/16	24	3.543	0.472	1.339	0.318	0.236	0.380	3	6.9	I	H4	—	7350445
3/8		16	3.937	0.591	1.535	0.381	0.284	0.440	3	8.00	5/16	H4	7350436	—
	3/8	24	3.543	0.591	1.476	0.381	0.284	0.440	3	8.50	Q	H4	—	7350446
7/16		14	3.937	0.591	—	0.323	0.240	0.410	3	9.40	U	H5	7350437	—
	7/16	20	3.937	0.591	—	0.323	0.240	0.410	3	9.90	25/64	H5	—	7350447
1/2		13	4.331	0.709	—	0.367	0.273	0.440	3	10.80	27/64	H5	7350438	—
	1/2	20	3.937	0.709	—	0.367	0.273	0.440	3	11.50	29/64	H5	—	7350448
5/8		11	4.331	0.787	—	0.480	0.358	0.560	4	13.50	17/32	H5	7350439	—
	5/8	18	3.937	0.591	—	0.480	0.358	0.560	4	14.50	37/64	H5	—	7350449
3/4		10	4.921	0.984	—	0.590	0.439	0.690	4	16.50	21/32	H5	7350440	—
	3/4	16	4.331	0.984	—	0.590	0.439	0.690	4	17.50	11/16	H5	—	7350450
7/8		9	5.512	0.984	—	0.697	0.520	0.750	4	19.50	49/64	H6	7350441	—
	7/8	14	4.921	0.984	—	0.697	0.520	0.750	4	20.40	13/16	H6	—	7350451
1"		8	6.299	1.181	—	0.800	0.597	0.810	4	22.25	7/8	H6	7350442	—
	1"	12	5.512	1.063	—	0.800	0.597	0.810	4	23.25	59/64	H6	—	7350452

Note: Sizes up to 3/8" have male centers on both ends • Sizes over 3/8" have female centers on both ends.

## DIN-ANSI Machine Tap Black Shark for Hard Alloys, Spiral Flute

**E805** Designed for high performance blind hole tapping in high strength and heat-resistant work-materials with hardness up to 45HRC. The TiAlN-Top coating combined with geometry what significantly increases cutting edge strength, provides excellent performance and consistency in hard and difficult to machine materials.

- 1.6 4.3 5.3
- 1.5 1.7 4.2 5.2



E805	E905
UNC	UNF
DIN ANSI	DIN ANSI
2BX	2BX
1.5XD	1.5XD
HSS-E PM	HSS-E PM
C 2-3	C 2-3
λ15°	λ15°
TiAlN Top	TiAlN Top
No.4-3/4	No.10-3/4

Pack Qty = 1 pc

UNC	UNF	TPI	l <sub>1</sub> Inch	l <sub>2</sub> Inch	l <sub>4</sub> Inch	d <sub>2</sub> ∅ Inch	a Inch	l <sub>3</sub> Inch	No. of flutes			Limits	E805	E905
4		40	2.205	0.472	0.827	0.141	0.108	0.190	3	2.35	N43	H2	7812126	—
6		32	2.480	0.551	0.866	0.168	0.129	0.250	3	2.85	N36	H2	7812127	—
8		32	2.756	0.610	1.102	0.194	0.150	0.250	3	3.50	N29	H3	7812128	—
10		24	3.150	0.669	1.024	0.255	0.189	0.310	3	3.90	N25	H3	7812129	—
	10	32	3.150	0.669	1.024	0.255	0.189	0.310	3	4.10	N21	H3	—	7812137
1/4		20	3.543	0.807	1.378	0.318	0.236	0.380	3	5.10	N7	H5	7812130	—
	1/4	28	3.543	0.807	1.339	0.318	0.236	0.380	3	5.50	N3	H4	—	7812138
5/16		18	3.937	0.906	1.535	0.381	0.236	0.440	3	6.60	F	H5	7812131	—
	5/16	24	3.937	0.906	1.535	0.381	0.284	0.440	3	6.90	I	H4	—	7812139
3/8		16	3.937	0.787	1.535	0.381	0.236	0.440	3	8.00	5/16	H5	7812132	—
	3/8	24	3.937	0.787	1.535	0.381	0.284	0.440	3	8.50	Q	H4	—	7812140
7/16		14	3.937	0.787	-	0.323	0.240	0.410	4	9.40	U	H5	7812133	—
	7/16	20	3.937	0.787	-	0.325	0.240	0.440	4	9.90	25/64	H5	—	7812141
1/2		13	4.331	0.906	-	0.367	0.273	0.440	4	10.80	27/64	H5	7812134	—
	1/2	20	4.331	0.906	-	0.367	0.273	0.440	4	11.50	29/64	H5	—	7812142
5/8		11	4.331	0.906	-	0.480	0.358	0.560	4	13.50	17/32	H5	7812135	—
	5/8	18	4.331	0.906	-	0.480	0.358	0.560	4	14.50	37/64	H5	—	7812143
3/4		10	4.921	1.181	-	0.590	0.440	0.690	4	16.50	21/32	H5	7812136	—
	3/4	16	4.921	1.181	-	0.590	0.440	0.690	4	17.50	11/16	H5	—	7812144

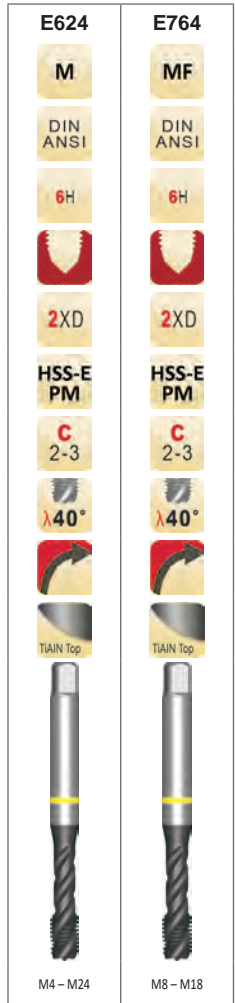
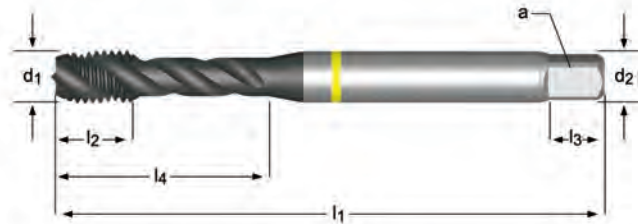
Note: Sizes up to 3/8" have male centers on both ends • Sizes over 3/8" have female centers on both ends.

## DIN ANSI Machine Tap, Yellow for Low Alloy Steels

**E624** Designed for blind hole tapping in low Alloy Steel applications. Premium HSCo Powder Metal substrate with TiAlN-Top Coating combined with a special 40° Spiral Flute geometry prevents nesting and reduces the risk of re-cutting chips on reversal allowing taps to operate at higher speeds while providing improved thread quality.

**E764**

- 1.1 1.2 1.3 6.1 6.3
- 1.4 1.5 6.2



Pack Qty = 1 pc

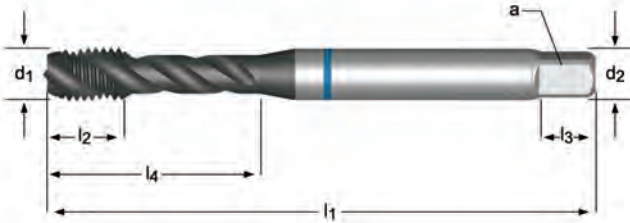
M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> Ø Inch	a Inch	l <sub>3</sub> mm	No. of flutes	↔	↔	Limits	E624	E764
4		0.70	63	7	21	0.168	0.129	6	3	3.30	N30	D4	7350533	—
5		0.80	70	8	25	0.194	0.150	6	3	4.20	N19	D4	7350534	—
6		1.00	80	10	30	0.255	0.189	8	3	5.00	N9	D5	7350535	—
	8	1.00	90	13	35	0.318	0.236	10	3	7.00	J	D5	—	7350544
8		1.25	90	13	35	0.318	0.236	10	3	6.80	H	D5	7350536	—
	10	1.25	100	15	39	0.381	0.284	11	3	8.80	11/32	D6	—	7350545
10		1.50	100	15	39	0.381	0.284	11	3	8.50	Q	D6	7350537	—
	12	1.25	100	15	—	0.367	0.273	11	3	10.80	27/64	D6	—	7350546
	12	1.50	100	15	—	0.367	0.273	11	3	10.50	Z	D6	—	7350547
12		1.75	110	18	—	0.367	0.273	11	3	10.30	Y	D6	7350538	—
	14	1.50	100	15	—	0.429	0.320	13	3	12.50	31/64	D7	—	7350548
14		2.00	110	20	—	0.429	0.320	13	3	12.00	15/32	D7	7350539	—
	16	1.50	100	15	—	0.480	0.358	14	4	14.50	9/16	D7	—	7350549
16		2.00	110	20	—	0.480	0.358	14	4	14.00	35/64	D7	7350540	—
	18	1.50	110	17	—	0.542	0.404	16	4	16.50	41/64	D7	—	7350550
18		2.50	125	25	—	0.542	0.404	16	4	15.50	39/64	D7	7350541	—
20		2.50	140	25	—	0.652	0.487	18	4	17.50	11/16	D7	7350542	—
24		3.00	160	30	—	0.760	0.567	19	4	21.00	53/64	D8	7350543	—

Note: Sizes up to M10 have male centers on both ends • Sizes over M10 have female centers on both ends.

## DIN ANSI Machine Tap, Blue Shark for Stainless Steel

**E628** Designed for superior performance blind hole tapping in a wide range of Stainless Steel types. Premium HSCo Powder Metal substrate with Super-B (TiAlN+WC/C) Coating combined with an additional edge treatment and a 40° Flute angle facilitates better chip evacuation offering improved thread quality and longer tool life. Available in both 2B and 3B Class of Fit to cover a wide range of applications.

- 2.1 2.2 2.3
- 1.2 1.3 1.4 1.5



<b>E628</b>	<b>E768</b>
M	MF
DIN ANSI	DIN ANSI
6H	6H
2.5XD	2.5XD
HSS-E PM	HSS-E PM
C 2-3	C 2-3
M4 - M24	M8 - M18

Pack Qty = 1 pc

M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> Ø Inch	a Inch	l <sub>3</sub> mm	No. of flutes			Limits	E628	E768
4		0.70	63	7	21	0.168	0.129	6	3	3.30	N30	D4	7350374	—
5		0.80	70	8	25	0.194	0.150	6	3	4.20	N19	D4	7350375	—
6		1.00	80	10	30	0.255	0.189	8	3	5.00	N9	D5	7350376	—
	8	1.00	90	13	35	0.318	0.236	10	3	7.00	J	D5	—	7350385
8		1.25	90	13	35	0.318	0.236	10	3	6.80	H	D5	7350377	—
	10	1.25	100	15	39	0.381	0.284	11	3	8.80	11/32	D6	—	7350386
10		1.50	100	15	39	0.381	0.284	11	3	8.50	Q	D6	7350378	—
	12	1.50	100	15	—	0.367	0.273	11	4	10.50	Z	D6	—	7350387
12		1.75	110	18	—	0.367	0.273	11	4	10.30	Y	D6	7350379	—
	14	1.50	100	15	—	0.429	0.320	13	4	12.50	31/64	D7	—	7350388
14		2.00	110	20	—	0.429	0.320	13	4	12.00	15/32	D7	7350380	—
	16	1.50	100	15	—	0.480	0.358	14	4	14.50	9/16	D7	—	7350389
16		2.00	110	20	—	0.480	0.358	14	4	14.00	35/64	D7	7350381	—
	18	1.50	110	17	—	0.542	0.404	16	4	16.50	41/64	D7	—	7350390
18		2.50	125	25	—	0.542	0.404	16	4	15.50	39/64	D7	7350382	—
20		2.50	140	25	—	0.652	0.487	18	4	17.50	11/16	D7	7350383	—
24		3.00	160	30	—	0.760	0.567	19	4	21.00	53/64	D8	7350384	—

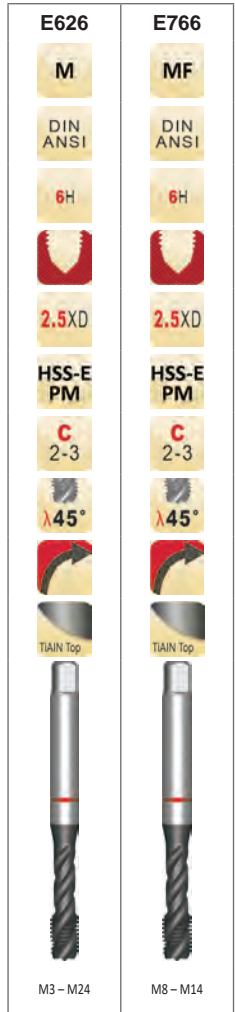
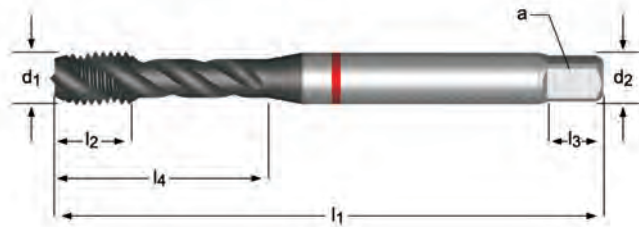
Note: Sizes up to M10 have male centers on both ends • Sizes over M10 have female centers on both ends.

## DIN ANSI Machine Tap, Red Shark for Alloy Steels

**E626** Designed for high performance blind hole tapping in most medium Alloy Steels. The TiAlN-Top Coating combined with a special 45° Flute Geometry and an additional edge treatment provides excellent performance and consistency in high production applications. The back taper built into this design further facilitates chip evacuation and reduces torque when the tap reverses. It is recommended to use a toolholder with minimal float or soft start.

**E766**

- 1.4 1.5
- 1.6 4.2 5.2



Pack Qty = 1 pc

M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> ∅ Inch	a Inch	l <sub>3</sub> mm	No. of flutes	↔	↔	Limits	E626	E766
3		0.50	56	6	18	0.141	0.108	5	3	2.50	N40	D3	7350453	—
4		0.70	63	7	21	0.168	0.129	6	3	3.30	N30	D4	7350454	—
5		0.80	70	8	25	0.194	0.150	6	3	4.20	N19	D4	7350455	—
6		1.00	80	10	30	0.255	0.189	8	3	5.00	N9	D5	7350456	—
	8	1.00	90	13	35	0.318	0.236	10	3	7.00	J	D5	—	7350465
8		1.25	90	13	35	0.318	0.236	10	3	6.80	H	D5	7350457	—
	10	1.25	100	15	39	0.381	0.284	11	3	8.80	11/32	D6	—	7350466
10		1.50	100	15	39	0.381	0.284	11	3	8.50	Q	D6	7350458	—
	12	1.25	100	15	—	0.367	0.273	11	3	10.80	27/64	D6	—	7350467
12		1.75	110	18	—	0.367	0.273	11	3	10.30	Y	D6	7350459	—
	14	1.50	100	15	—	0.429	0.320	13	3	12.50	31/64	D7	—	7350468
14		2.00	110	20	—	0.429	0.320	13	3	12.00	15/32	D7	7350460	—
16		2.00	110	20	—	0.480	0.358	14	4	14.00	35/64	D7	7350461	—
18		2.50	125	25	—	0.542	0.404	16	4	15.50	39/64	D7	7350462	—
20		2.50	140	25	—	0.652	0.487	18	4	17.50	11/16	D7	7350463	—
24		3.00	160	30	—	0.760	0.567	19	4	21.00	53/64	D8	7350464	—

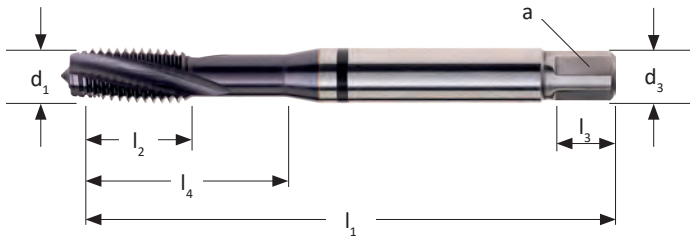
Note: Sizes up to M10 have male centers on both ends • Sizes over M10 have female centers on both ends.

## DIN-ANSI Machine Tap Black Shark for Hard Alloys, Plug Style

**E806** Designed for high performance blind hole tapping in high strength and heat-resistant work-materials with hardness up to 45HRC. The TiAlN-Top coating combined with geometry what significantly increases cutting edge strength, provides excellent performance and consistency in hard and difficult to machine materials.

**E906**

- 1.6 4.3 5.3
- 1.5 1.7 4.2 5.2



E806	E906
M	MF
DIN ANSI	DIN ANSI
6H	6H
1.5XD	1.5XD
HSS-E PM	HSS-E PM
C 2-3	C 2-3
λ15°	λ15°
TiAlN Top	TiAlN Top
M3-M12	M8-M12

Pack Qty = 1 pc

M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> Ø mm	∠ a Inch	l <sub>3</sub> mm	No. of flutes			Limits	E806	E906
3		0.50	63	15	22	0.168	0.129	6	3	2.50	N40	D3	7812145	—
4		0.70	70	16	28	0.194	0.150	6	3	3.30	N30	D4	7812146	—
5		0.80	80	17	26	0.255	0.189	8	3	4.20	N19	D4	7812147	—
6		1.00	90	21	35	0.318	0.236	10	3	5.00	N9	D5	7812148	—
8		1.25	100	23	39	0.381	0.284	11	3	6.80	H	D5	7812149	—
	8	1.00	100	23	39	0.381	0.284	11	3	7.00	J	D5	—	7812152
10		1.50	100	20	38	0.381	0.284	11	3	8.50	Q	D6	7812150	—
12		1.75	110	23	-	0.367	0.273	11	4	10.30	Y	D6	7812151	—
	10	1.25	100	20	38	0.381	0.284	11	3	8.80	11/32	D5	—	7812153
	12	1.25	110	23	-	0.367	0.273	11	4	10.80	27/64	D5	—	7812155
	12	1.50	110	23	-	0.367	0.273	11	4	10.50	Z	D5	—	7812154

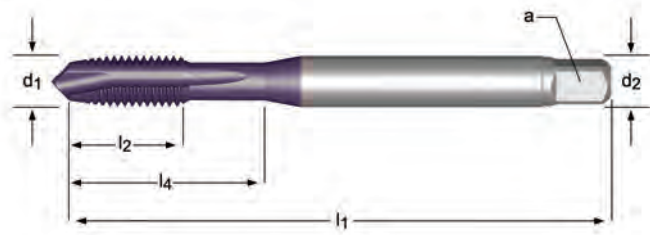
Note: Sizes up to M10 have male centers on both ends • Sizes over M10 have female centers on both ends.

## MXP Multi-Application, Plug Chamfer

**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
- 2.4
- 4.1
- 4.2
- 5.1
- 5.2
- 6.1
- 6.2
- 6.3
- 7.1
- 7.2
- 7.3
- 7.4



1672AP		1674 Coolant Through	
UNC	UNF	UNC	UNF
DIN ANSI		DIN ANSI	
2B		2B	
HSS PM		HSS PM	
No.4 - 1"		1/4 - 1"	

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch (Neck Length)	$d_2$ Ø Inch	$\square$ a Inch	# of Flutes	Limits	Pack Qty	1672AP	1674
4		40	2.205	0.433	0.709	0.141	0.110	2	H2	1	6204859	<sup>1)</sup> —
6		32	2.205	0.472	0.787	0.141	0.110	2	H3	1	6204864	<sup>1)</sup> —
8		32	2.480	0.512	0.827	0.168	0.131	3	H3	1	6204869	<sup>1)</sup> —
	10	32	2.756	0.512	0.984	0.194	0.152	3	H3	1	6204852	<sup>1)</sup> —
10		24	2.756	0.591	0.984	0.194	0.152	3	H3	1	6204851	<sup>1)</sup> —
	1/4	28	3.150	0.669	1.181	0.255	0.191	3	H4	1	6204850	<sup>1)</sup> 6007893 <sup>1)</sup>
1/4		20	3.150	0.669	1.181	0.255	0.191	3	H5	1	6204849	<sup>1)</sup> 6007890 <sup>1)</sup>
	5/16	24	3.543	0.669	1.378	0.318	0.238	3	H4	1	6204861	<sup>1)</sup> —
5/16		18	3.543	0.787	1.378	0.318	0.238	3	H5	1	6204860	<sup>1)</sup> 6007922 <sup>1)</sup>
	3/8	24	3.937	0.709	1.535	0.381	0.286	3	H4	1	6204858	<sup>1)</sup> —
3/8		16	3.937	0.866	1.535	0.381	0.286	3	H5	1	6204857	<sup>1)</sup> 6007914 <sup>1)</sup>
	7/16	20	3.937	0.866		0.323	0.242	3	H5	1	6204866	<sup>2)</sup> —
7/16		14	3.937	0.866		0.323	0.242	3	H5	1	6204865	<sup>2)</sup> —
	1/2	20	3.937	0.866		0.367	0.275	3	H5	1	—	—
	1/2	20	3.937	0.866		0.397	0.275	3	H5	1	6204848	<sup>2)</sup> —
1/2		13	4.331	0.984		0.367	0.275	3	H5	1	6204847	<sup>2)</sup> 6008101 <sup>2)</sup>
	5/8	18	3.937	0.866		0.480	0.360	4	H5	1	6204863	<sup>2)</sup> —
5/8		11	4.331	1.063		0.480	0.360	4	H5	1	6204862	<sup>2)</sup> 6007931 <sup>2)</sup>
	3/4	16	4.331	0.984		0.590	0.442	4	H5	1	6204856	<sup>2)</sup> —
3/4		10	4.921	1.181		0.590	0.442	4	H5	1	6204855	<sup>2)</sup> —
3/4		10	4.921	1.181		0.590	0.442	4	H5	1	—	6007905 <sup>2)</sup>
7/8		9	5.512	1.260		0.697	0.523	4	H6	1	6204868	<sup>2)</sup> —
1"		8	6.299	1.417		0.800	0.600	4	H6	1	6204854	<sup>2)</sup> — <sup>2)</sup>

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks



# SPIRAL POINT TAPS



## Multi-Application, Plug Chamfer

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

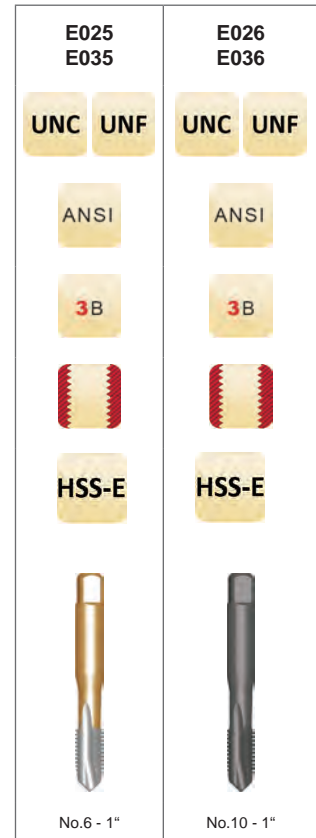
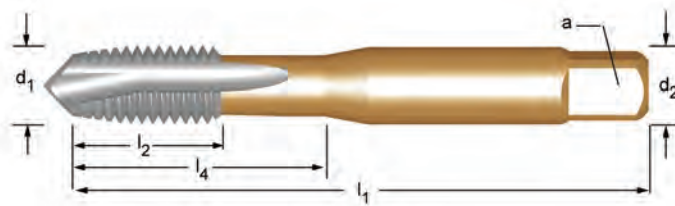
*E025 = UNC Sizes, E035 = UNF Sizes*

**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**

**E026** Premium substrate with steam tempered surface treatment  
**E036** 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**





UNC		UNF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$a$ Inch	# 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	—	5974126	<sup>1)</sup>
4		40	1.7/8	0.6091	0.1410	0.1100	2	H2	N43	2.35	0.6091	1	—	5974153	<sup>1)</sup>
5		40	1.15/16	0.7404	0.1410	0.1100	2	H2	N38	2.65	0.7404	1	—	5974159	<sup>1)</sup>
	6	40	2"	0.2610	0.1410	0.1100	2	H2	N33	2.95	0.5938	1	5974546	—	<sup>1)</sup>
6		32	2"	0.2610	0.1410	0.1100	2	H2	N36	2.85	0.5938	1	5974057	5974184	<sup>1)</sup>
	8	36	2.1/8	0.2484	0.1680	0.1310	2	H2	N29	3.50	0.6526	1	5974557	—	<sup>1)</sup>
8		32	2.1/8	0.2484	0.1680	0.1310	2	H2	N29	3.50	0.6526	1	5974068	5974203	<sup>1)</sup>
	10	32	2.3/8	0.4303	0.1940	0.1520	2	H2	N21	4.10	0.8434	1	5974585	5974592	<sup>1)</sup>
10		24	2.3/8	0.4303	0.1940	0.1520	2	H3	N25	3.90	0.8434	1	5974031	5974116	<sup>1)</sup>
	12	28	2.3/8	0.4173	0.2200	0.1650	2	H3	N14	4.70	0.8848	1	—	5974596	<sup>1)</sup>
12		24	2.3/8	0.4173	0.2200	0.1650	2	H3	N16	4.50	0.8848	1	5974034	5974121	<sup>1)</sup>
	1/4	28	2.1/2	0.5075	0.2550	0.1910	2	H3	N3	5.50	1.0073	1	5973974	5974581	<sup>1)</sup>
	1/4	28	2.1/2	0.5075	0.2550	0.1910	3	H3	N3	5.50	1.0073	1	5974542	5974589	<sup>1)</sup>
1/4		20	2.1/2	0.5075	0.2550	0.1910	2	H3	N7	5.10	1.0073	1	5974027	5974097	<sup>1)</sup>
1/4		20	2.1/2	0.5075	0.2550	0.1910	3	H3	N7	5.10	1.0073	1	5974029	5974110	<sup>1)</sup>
1/4		20	2.1/2	0.5075	0.2550	0.1910	3	H11	N7	5.10	1.0073	1	—	5974106	<sup>1)3)</sup>
	5/16	24	2.23/32	0.5939	0.3180	0.2380	2	H3	I	6.90	1.1891	1	5974736	5974618	<sup>1)</sup>
	5/16	24	2.23/32	0.5939	0.3180	0.2380	3	H3	I	6.90	1.1891	1	5974740	5974624	<sup>1)</sup>
5/16		18	2.23/32	0.5939	0.3180	0.2380	2	H3	F	6.60	1.1891	1	5974044	5974164	<sup>1)</sup>
5/16		18	2.23/32	0.5939	0.3180	0.2380	3	H3	F	6.60	1.1891	1	5974047	5974173	<sup>1)</sup>
5/16		18	2.23/32	0.5939	0.3180	0.2380	3	H11	F	6.60	1.1891	1	—	5974169	<sup>1)3)</sup>
	3/8	24	2.15/16	0.6020	0.3810	0.2860	2	H3	Q	8.50	1.2915	1	5974725	5974608	<sup>1)</sup>
	3/8	24	2.15/16	0.6020	0.3810	0.2860	3	H3	Q	8.50	1.2915	1	5974732	5974613	<sup>1)</sup>
3/8		16	2.15/16	0.6020	0.3810	0.2860	2	H3	5/16	8.00	1.2915	1	5974039	5974135	<sup>1)</sup>
3/8		16	2.15/16	0.6020	0.3810	0.2860	3	H3	5/16	8.00	1.2915	1	5974041	5974145	<sup>1)</sup>
3/8		16	2.15/16	0.6020	0.3810	0.2860	3	H11	5/16	8.00	1.2915	1	—	5974140	<sup>1)3)</sup>
	7/16	20	3.5/32	0.9055	0.3230	0.2420	3	H3	25/64	9.90	—	1	5974549	5974633	<sup>2)</sup>
7/16		14	3.5/32	0.9055	0.3230	0.2420	3	H3	U	9.40	—	1	5974060	5974188	<sup>2)</sup>
	1/2	20	3.3/8	0.9055	0.3670	0.2750	2	H3	29/64	11.50	—	1	5973965	5974573	<sup>2)</sup>

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks

<sup>3)</sup> Oversize +.005", not 3B



UNC	UNF	TPI	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> ∅ Inch	a Inch	# of Flutes	Limits			l <sub>4</sub> Inch	Pack Qty	E025 E035	E026 E036
	1/2	20	3.3/8	0.9055	0.3670	0.2750	3	H3	29/64	11.50	—	1	5973968 <sup>2)</sup>	5974577 <sup>2)</sup>
1/2		13	3.3/8	0.9055	0.3670	0.2750	2	H3	27/64	10.80	—	1	5974219 <sup>2)</sup>	5974081 <sup>2)</sup>
1/2		13	3.3/8	0.9055	0.3670	0.2750	3	H3	27/64	10.80	—	1	5974025 <sup>2)</sup>	5974090 <sup>2)</sup>
1/2		13	3.3/8	0.9055	0.3670	0.2750	3	H11	27/64	10.80	—	1	—	5974085 <sup>2)3)</sup>
	9/16	18	3.19/32	0.9843	0.4290	0.3220	3	H3	33/64	12.90	—	1	5974561 <sup>2)</sup>	5974648 <sup>2)</sup>
9/16		12	3.19/32	0.9843	0.4290	0.3220	3	H3	31/64	12.20	—	1	5974072 <sup>2)</sup>	5974009 <sup>2)</sup>
	5/8	18	3.13/16	0.9843	0.4800	0.3600	3	H3	37/64	14.50	—	1	5974743 <sup>2)</sup>	5974628 <sup>2)</sup>
5/8		11	3.13/16	0.9843	0.4800	0.3600	3	H3	17/32	13.50	—	1	5974053 <sup>2)</sup>	5974177 <sup>2)</sup>
5/8		11	3.13/16	0.9843	0.4800	0.3600	3	H11	17/32	13.50	—	1	—	5974181 <sup>2)3)</sup>
	3/4	16	4.1/4	1.1614	0.5900	0.4420	3	H3	11/16	17.50	—	1	5974686 <sup>2)</sup>	5974605 <sup>2)</sup>
3/4		10	4.1/4	1.1614	0.5900	0.4420	3	H4	21/32	16.50	—	1	5974036 <sup>2)</sup>	5974130 <sup>2)</sup>
	7/8	14	4.11/16	1.1614	0.6970	0.5230	3	H4	13/16	20.40	—	1	5974553 <sup>2)</sup>	5974643 <sup>2)</sup>
7/8		9	4.11/16	1.1614	0.6970	0.5230	3	H4	49/64	19.50	—	1	5974064 <sup>2)</sup>	5974192 <sup>2)</sup>
	1"	12	5.1/8	1.3976	0.8000	0.6000	3	H4	59/64	23.25	—	1	— <sup>2)</sup>	5974565 <sup>2)</sup>
	1"	14	5.1/8	1.3976	0.8000	0.6000	3	H4	59/64	23.50	—	1	5973962 <sup>2)</sup>	5974569 <sup>2)</sup>
1"		8	5.1/8	1.3976	0.8000	0.6000	3	H4	7/8	22.25	—	1	5974215 <sup>2)</sup>	5974078 <sup>2)</sup>

<sup>1)</sup> Reinforced Shanks  
<sup>2)</sup> Reduced Shanks  
<sup>3)</sup> Oversize +.005", not 3B

# SPIRAL POINT TAPS



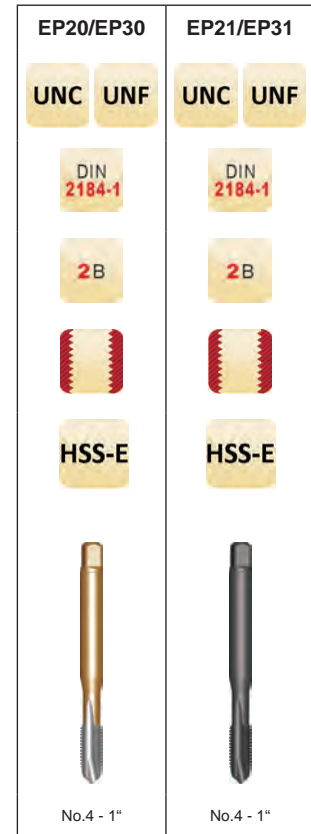
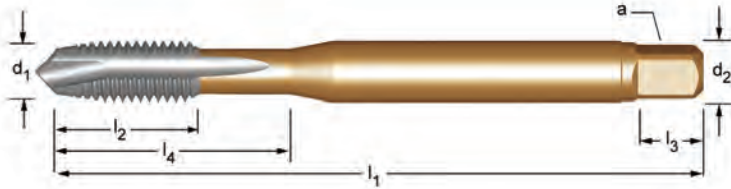
## Multi-Application, Plug Chamfer

**EP20/  
EP30** Premium substrate for through hole tapping in tough or abrasive materials. Bronze tempered 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 tempered 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



UNC	UNF	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> ∅ mm	a mm	l <sub>3</sub> mm	# of Flutes	l <sub>4</sub> mm	Limits	Pack Qty	EP20/EP30	EP21/ EP31	
4		40	2.845	56	9	3.5	2.7	6	3	2.35	18	H2	1	5973735 <sup>1)</sup>	5973914 <sup>1)</sup>
5		40	3.175	56	10	3.5	2.7	6	3	2.65	18	H2	1	5973737 <sup>1)</sup>	5973957 <sup>1)</sup>
6		32	3.505	56	11	4.0	3.0	6	3	2.85	20	H2	1	5973745 <sup>1)</sup>	5973995 <sup>1)</sup>
	8	36	4.166	63	12	4.5	3.4	8	3	3.5	21	H3	1	5973871 <sup>1)</sup>	5973927 <sup>1)</sup>
8		32	4.166	63	12	4.5	3.4	8	3	3.5	21	H3	1	5973752 <sup>1)</sup>	5973818 <sup>1)</sup>
	10	32	4.826	70	13	6.0	4.9	8	3	4.1	25	H3	1	5973834 <sup>1)</sup>	5973889 <sup>1)</sup>
10		24	4.826	70	13	6.0	4.9	8	3	3.9	25	H3	1	5973723 <sup>1)</sup>	5973760 <sup>1)</sup>
12		24	5.486	80	15	6.0	4.9	8	3	4.5	30	H3	1	5973725 <sup>1)</sup>	5973764 <sup>1)</sup>
	1/4	28	6.350	80	15	7.0	5.5	8	3	5.5	30	H4	1	5973829 <sup>1)</sup>	5973884 <sup>1)</sup>
1/4		20	6.350	80	15	7.0	5.5	8	3	5.1	30	H5	1	5973720 <sup>1)</sup>	5973758 <sup>1)</sup>
	5/16	24	7.938	90	18	8.0	6.2	9	3	6.9	35	H4	1	5973844 <sup>1)</sup>	5973904 <sup>1)</sup>
5/16		18	7.938	90	18	8.0	6.2	9	3	6.6	35	H5	1	5973741 <sup>1)</sup>	5973989 <sup>1)</sup>
	3/8	24	9.525	100	20	10.0	8.0	11	3	8.5	39	H4	1	5973841 <sup>1)</sup>	5973899 <sup>1)</sup>
3/8		16	9.525	100	20	10.0	8.0	11	3	8	39	H5	1	5973732 <sup>1)</sup>	5973858 <sup>1)</sup>
	7/16	20	11.112	100	20	8.0	6.2	9	3	9.9	-	H5	1	5973853 <sup>2)</sup>	5973919 <sup>2)</sup>
7/16		14	11.112	100	20	8.0	6.2	9	3	9.4	-	H5	1	5973747 <sup>2)</sup>	5973997 <sup>2)</sup>
	1/2	20	12.700	110	23	9.0	7.0	10	3	11.5	-	H5	1	5973826 <sup>2)</sup>	5973879 <sup>2)</sup>
1/2		13	12.700	110	23	9.0	7.0	10	3	10.8	-	H5	1	5973716 <sup>2)</sup>	5973756 <sup>2)</sup>
	5/8	18	15.875	110	25	12.0	9.0	12	3	14.5	-	H5	1	5973848 <sup>2)</sup>	5973909 <sup>2)</sup>
5/8		11	15.875	110	25	12.0	9.0	12	3	13.5	-	H5	1	5973743 <sup>2)</sup>	5973993 <sup>2)</sup>
	3/4	16	19.050	125	30	14.0	11.0	14	4	17.5	-	H5	1	5973837 <sup>2)</sup>	5973894 <sup>2)</sup>
3/4		10	19.050	125	30	14.0	11.0	14	4	16.5	-	H5	1	5973729 <sup>2)</sup>	5973810 <sup>2)</sup>
	7/8	14	22.225	140	34	18.0	14.5	17	4	20.4	-	H6	1	5973866 <sup>2)</sup>	5973923 <sup>2)</sup>
7/8		9	22.225	140	34	18.0	14.5	17	4	19.5	-	H6	1	5973749 <sup>2)</sup>	5973999 <sup>2)</sup>
	1"	12	25.400	160	38	18.0	14.5	17	4	23.25	-	H6	1	5973822 <sup>2)</sup>	5973874 <sup>2)</sup>
1"		8	25.400	160	38	18.0	14.5	17	4	22.25	-	H6	1	5973714 <sup>2)</sup>	5973754 <sup>2)</sup>

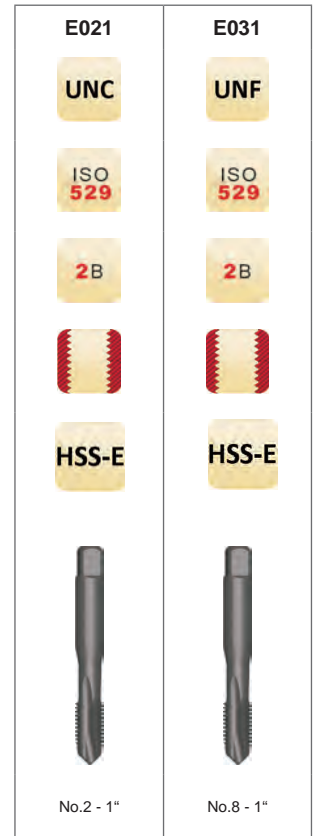
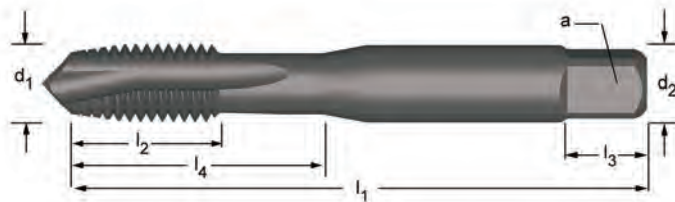
**Note: DIN shank and square dimensions will necessitate metric holders**

<sup>1)</sup> Reinforced Shanks  
<sup>2)</sup> Reduced Shanks

## Multi-Application, PLUG CHAMFER

**E021** Premium substrate with steam tempered surface  
**E031** 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**



UNC	UNF	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of Flutes	↔	l <sub>4</sub> mm	Limits	Pack Qty	E021	E031
2		56	2.184	44.5	9.5	2.80	2.24	5	2	1.85	9.5	H2	1	5974319 <sup>1)</sup>	—
4		40	2.845	48	14	3.15	2.50	5	3	2.35	14	H2	1	5974331 <sup>1)</sup>	—
5		40	3.175	48	12.5	3.15	2.50	5	3	2.65	12.5	H2	1	5974336 <sup>1)</sup>	—
6		32	3.505	50	16	3.55	2.80	5	3	2.85	16	H3	1	5974354 <sup>1)</sup>	—
	8	36	4.166	53	9.5	4.5	3.55	6	3	3.50	17	H3	1	—	5973839 <sup>1)</sup>
8		32	4.166	53	9.5	4.50	3.55	6	3	3.50	17	H3	1	5974369 <sup>1)</sup>	—
	10	32	4.826	58	11	5.0	4.00	7	3	4.10	20	H3	1	—	5973806 <sup>1)</sup>
10		24	4.826	58	11	5.00	4.00	7	3	3.90	20	H3	1	5974311 <sup>1)</sup>	—
12		24	5.486	62	12	5.60	4.50	7	3	4.50	21	H3	1	5974315 <sup>1)</sup>	—
	1/4	28	6.350	66	13	6.3	5.00	8	3	5.50	26	H4	1	—	5973803 <sup>1)</sup>
1/4		20	6.350	66	13	6.30	5.00	8	3	5.10	26	H5	1	5974305 <sup>1)</sup>	—
	5/16	24	7.938	72	16	8.0	6.30	9	3	6.90	29	H4	1	—	5973819 <sup>1)</sup>
5/16		18	7.938	72	16	8.00	6.30	9	3	6.60	29	H5	1	5974346 <sup>1)</sup>	—
	3/8	24	9.525	80	18	10.0	8.00	11	3	8.50	32	H4	1	—	5973815 <sup>1)</sup>
3/8		16	9.525	80	18	10.00	8.00	11	3	8.00	32	H5	1	5974327 <sup>1)</sup>	—
	7/16	20	11.112	85	19	8.0	6.30	9	3	9.90	-	H5	1	—	5973827 <sup>2)</sup>
7/16		14	11.112	85	19	8.00	6.30	9	3	9.40	-	H5	1	5974359 <sup>2)</sup>	—
	1/2	20	12.700	89	22	9.0	7.10	10	3	11.50	-	H5	1	—	5973800 <sup>2)</sup>
1/2		13	12.700	89	22	9.00	7.10	10	3	10.80	-	H5	1	5974301 <sup>2)</sup>	—
	9/16	18	14.288	95	24	11.2	9.00	12	3	12.90	-	H5	1	—	5973842 <sup>2)</sup>
	5/8	18	15.875	102	24	12.5	10.00	13	3	14.50	-	H5	1	—	5973823 <sup>2)</sup>
5/8		11	15.875	102	24	12.50	10.00	13	3	13.50	-	H5	1	5974350 <sup>2)</sup>	—
	3/4	16	19.050	112	29	14.0	11.20	14	4	17.50	-	H5	1	—	5973813 <sup>2)</sup>
3/4		10	19.050	112	29	14.00	11.20	14	4	16.50	-	H5	1	5974323 <sup>2)</sup>	—
	7/8	14	22.225	118	29	16.0	12.50	16	4	20.40	-	H6	1	—	5973831 <sup>2)</sup>
7/8		9	22.225	118	29	16.00	12.50	16	4	19.50	-	H6	1	5974364 <sup>2)</sup>	—
	1"	12	25.400	130	35	18.0	14.00	18	4	23.25	-	H6	1	—	5973798 <sup>2)</sup>
1"		8	25.400	130	35	18.00	14.00	18	4	22.25	-	H6	1	5974297 <sup>2)</sup>	—

**Note: ISO shank and square dimensions will necessitate metric holders**

<sup>1)</sup> Reinforced Shanks  
<sup>2)</sup> Reduced Shanks

# SPIRAL POINT TAPS



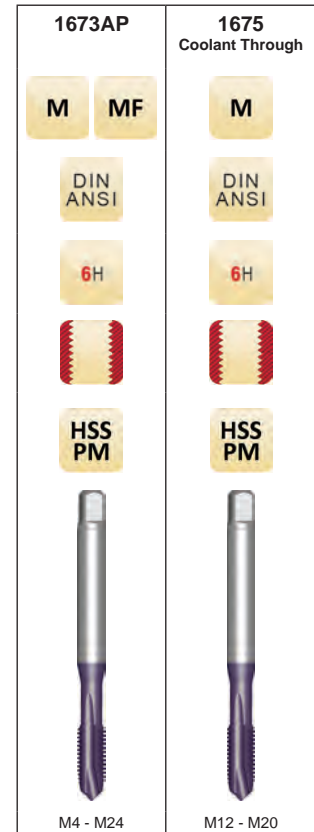
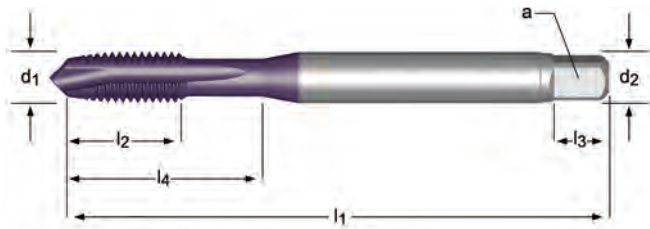
## MXP Multi-Application, Plug Chamfer, Metric



**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



M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> Inch (Neck Length)	d <sub>2</sub> ∅ Inch	a Inch	# of Flutes	Limits	Pack Qty	1673AP	1675
4		0.70	63	13	21	0.168	0.131	3	D4	1	6204884	<sup>1)</sup> —
5		0.80	70	15	25	0.194	0.152	3	D4	1	6204885	<sup>1)</sup> —
6		1.00	80	17	30	0.255	0.191	3	D5	1	6204886	<sup>1)</sup> —
	8	1.00	90	17	35	0.318	0.238	3	D5	1	6205008	<sup>1)</sup> —
8		1.25	90	20	35	0.318	0.238	3	D5	1	6204887	<sup>1)</sup> —
	10	1.25	100	16	39	0.381	0.286	3	D6	1	6204870	<sup>1)</sup> —
10		1.50	100	22	39	0.381	0.286	3	D6	1	6204871	<sup>1)</sup> —
	12	1.25	100	21		0.367	0.275	3	D6	1	6205009	<sup>2)</sup> —
	12	1.50	100	22		0.367	0.275	3	D6	1	6204872	<sup>2)</sup> —
12		1.75	110	24		0.367	0.275	3	D6	1	6204873	<sup>2)</sup> 6007959 <sup>2)</sup>
	14	1.50	100	22		0.429	0.322	4	D7	1	6204874	<sup>2)</sup> —
14		2.00	110	26		0.429	0.322	4	D7	1	6204875	<sup>2)</sup> —
	16	1.50	100	22		0.480	0.360	4	D7	1	6204876	<sup>2)</sup> —
16		2.00	110	27		0.480	0.360	4	D7	1	6204877	<sup>2)</sup> 6007991 <sup>2)</sup>
	18	1.50	110	25		0.542	0.406	4	D7	1	6204878	<sup>2)</sup> —
20		2.50	140	32		0.652	0.489	4	D7	1	6204881	<sup>2)</sup> 6008013 <sup>2)</sup>
	24	2.00	140	27		0.760	0.570	4	D8	1	6204882	<sup>2)</sup> —
24		3.00	160	34		0.760	0.570	4	D8	1	6204883	<sup>2)</sup> —

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks

## Multi-Application, Plug Chamfer

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

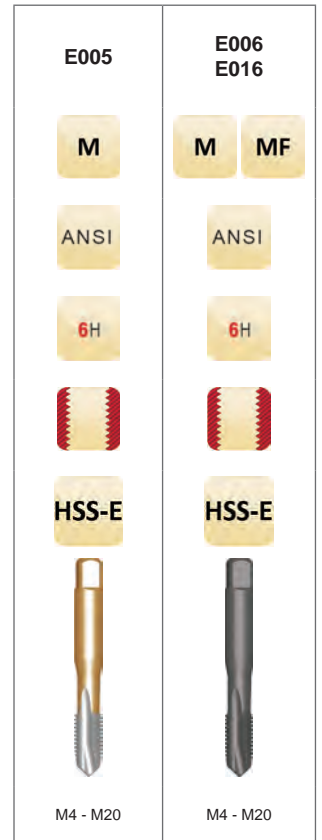
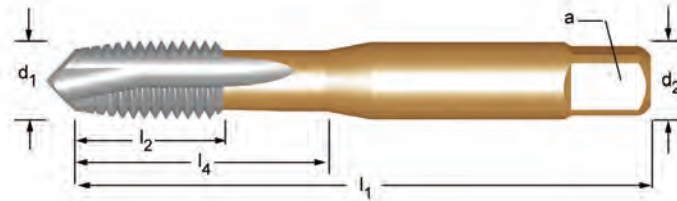
*E005 = Metric Coarse*

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 tempered 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



M	MF	P mm	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> Ø Inch	a Inch	# of Flutes	Flute Width	Flute Pitch	l <sub>4</sub> Inch	Limits	Pack Qty	E005	E006 E016
4		0.70	2.1/8	0.2484	0.1680	0.1310	2	3.30	N30	0.6526	D4	1	5974453	<sup>1)</sup> 5973941
4		0.70	2.1/8	0.2484	0.1680	0.1310	3	3.30	N30	0.6526	D4	1	5974457	<sup>1)</sup> 5973945
5		0.80	2.3/8	0.4303	0.1940	0.1520	2	4.20	N19	0.8434	D4	1	5974461	<sup>1)</sup> 5973949
5		0.80	2.3/8	0.4303	0.1940	0.1520	3	4.20	N19	0.8434	D4	1	5974465	<sup>1)</sup> 5973777
6		1.00	2.1/2	0.5075	0.2550	0.1910	2	5.00	N9	1.0073	D5	1	5974469	<sup>1)</sup> 5973778
6		1.00	2.1/2	0.5075	0.2550	0.1910	3	5.00	N9	1.0073	D5	1	5974473	<sup>1)</sup> 5973780
	8	1.00	2.23/32	0.5939	0.3180	0.2380	3	7.00	J	1.1891	D5	1	—	5973568
8		1.25	2.23/32	0.5939	0.3180	0.2380	2	6.80	H	1.1891	D5	1	5974476	<sup>1)</sup> 5973782
8		1.25	2.23/32	0.5939	0.3180	0.2380	3	6.80	H	1.1891	D5	1	5974479	<sup>1)</sup> 5973784
	10	1.00	2.15/16	0.6020	0.3810	0.2860	3	9.00	T	1.2915	D6	1	—	5973557
10		1.50	2.15/16	0.6020	0.3810	0.2860	2	8.50	Q	1.2915	D6	1	5974418	<sup>1)</sup> 5974482
10		1.50	2.15/16	0.6020	0.3810	0.2860	3	8.50	Q	1.2915	D6	1	5974422	<sup>1)</sup> 5974488
12		1.75	3.3/8	0.9055	0.3670	0.2750	2	10.30	Y		D6	1	5974426	<sup>2)</sup> 5973774
12		1.75	3.3/8	0.9055	0.3670	0.2750	3	10.30	Y		D6	1	5974430	<sup>2)</sup> 5973796
	14	1.50	3.19/32	0.9843	0.4290	0.3220	3	12.50	31/64		D7	1	—	5973561
14		2.00	3.19/32	0.9843	0.4290	0.3220	3	12.00	15/32		D7	1	5974434	<sup>2)</sup> 5973832
16		2.00	3.13/16	0.9843	0.4800	0.3600	3	14.00	35/64		D7	1	5974438	<sup>2)</sup> 5973878
18		2.50	4.1/32	1.1614	0.5420	0.4060	3	15.50	39/64		D7	1	5974442	<sup>2)</sup> 5973929
20		2.50	4.15/32	1.1614	0.6520	0.4890	3	17.50	11/16		D7	1	5974450	<sup>2)</sup> 5973937

<sup>1)</sup> Reinforced Shanks  
<sup>2)</sup> Reduced Shanks

# SPIRAL POINT TAPS



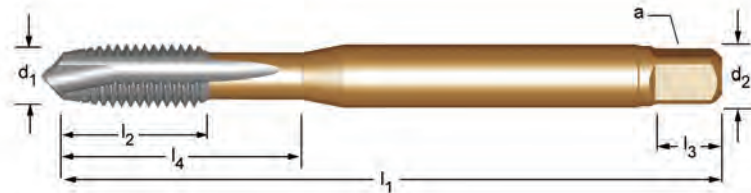
## Multi-Application, Plug Chamfer

**EP006H** Premium substrate for through hole tapping in tough or abrasive materials. Bronze tempered 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 tempered 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



M	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	a mm	l <sub>3</sub> mm	# of Flutes	l <sub>4</sub> mm	Limits	Pack Qty	EP006H	EP016H
2	0.40	50	6	2.8	2.1	5	2	1.6	9	D3	1	5973413 <sup>1)</sup> 5973473 <sup>1)</sup>
2.5	0.45	50	8	2.8	2.1	5	2	2.1	12.5	D3	1	5973414 <sup>1)</sup> 5973475 <sup>1)</sup>
3	0.50	56	10	2.2	1.8	4	3	2.5	18	D3	1	5973422 <sup>2)</sup> 5973495 <sup>2)</sup>
3	0.50	56	9	3.5	2.7	6	3	2.5	18	D3	1	5973420 <sup>1)</sup> 5973452 <sup>1)</sup>
3.5	0.60	56	11	4.0	3.0	6	3	2.9	20	D4	1	5973421 <sup>1)</sup> 5973474 <sup>1)</sup>
4	0.70	63	12	2.8	2.1	5	3	3.3	21	D4	1	5973428 <sup>2)</sup> 5973515 <sup>2)</sup>
4	0.70	63	12	4.5	3.4	6	3	3.3	21	D4	1	5973426 <sup>1)</sup> 5973511 <sup>1)</sup>
4.5	0.75	70	13	6.0	4.9	8	3	3.8	25	D4	1	5973427 <sup>1)</sup> 5973513 <sup>1)</sup>
5	0.80	70	13	3.5	2.7	6	3	4.2	25	D4	1	5973433 <sup>2)</sup> 5973436 <sup>2)</sup>
5	0.80	70	13	6.0	4.9	8	3	4.2	25	D4	1	5973431 <sup>1)</sup> 5973434 <sup>1)</sup>
6	1.00	80	15	4.5	3.4	6	3	5	30	D5	1	5973441 <sup>2)</sup> 5973442 <sup>2)</sup>
6	1.00	80	15	6.0	4.9	8	3	5	30	D5	1	5973437 <sup>1)</sup> 5973440 <sup>1)</sup>
7	1.00	80	15	7.0	5.5	8	3	6	30	D5	1	5973445 <sup>1)</sup> 5973446 <sup>1)</sup>
8	1.25	90	18	6.0	4.9	8	3	6.8	35	D5	1	5973449 <sup>2)</sup> 5973450 <sup>2)</sup>
8	1.25	90	18	8.0	6.2	9	3	6.8	35	D5	1	5973447 <sup>1)</sup> 5973448 <sup>1)</sup>
10	1.50	100	20	7.0	5.5	8	3	8.5	-	D6	1	5973423 <sup>2)</sup> 5973455 <sup>2)</sup>
10	1.50	100	20	10.0	8.0	11	3	8.5	39	D6	1	5973412 <sup>1)</sup> 5973453 <sup>1)</sup>
12	1.75	110	23	9.0	7.0	10	3	10.3	-	D6	1	5973461 <sup>2)</sup> 5973459 <sup>2)</sup>
14	2.00	110	25	11.0	9.0	12	3	12	-	D7	1	5973486 <sup>2)</sup> 5973465 <sup>2)</sup>
16	2.00	110	25	12.0	9.0	12	3	14	-	D7	1	5973489 <sup>2)</sup> 5973467 <sup>2)</sup>
18	2.50	125	30	14.0	11.0	14	4	15.5	-	D7	1	5973493 <sup>2)</sup> 5973471 <sup>2)</sup>
20	2.50	140	30	16.0	12.0	15	4	17.5	-	D7	1	5973415 <sup>2)</sup> 5973477 <sup>2)</sup>
22	2.50	140	34	18.0	14.5	17	4	19.5	-	D8	1	5973417 <sup>2)</sup> 5973480 <sup>2)</sup>
24	3.00	160	38	18.0	14.5	17	4	21	-	D8	1	5973418 <sup>2)</sup> 5973484 <sup>2)</sup>
27	3.00	160	38	20.0	16.0	19	4	24	-	D8	1	5973419 <sup>2)</sup> 5973429 <sup>2)</sup>
30	3.50	180	45	22.0	18.0	21	4	26.5	-	D9	1	5973424 <sup>2)</sup> 5973506 <sup>2)</sup>

**Note:** DIN shank and square dimensions will necessitate metric holders

<sup>1)</sup> Reinforced Shanks (DIN 371)

<sup>2)</sup> Reduced Shanks (DIN 376)

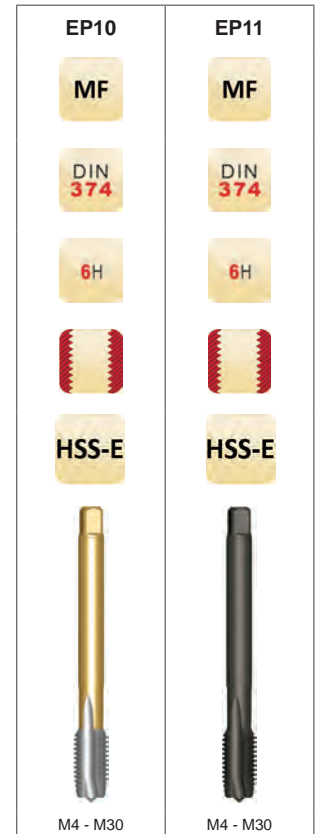
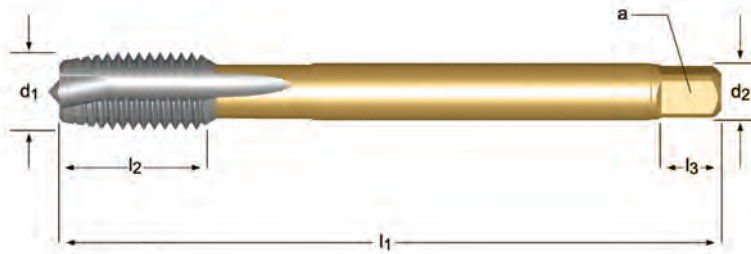
## Multi-Application, Plug Chamfer

**EP10** Premium substrate for through hole tapping in tough or abrasive materials. Bronze tempered 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 tempered 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



MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of Flutes	Limits	Pack Qty	EP10	EP11	
4	0.50	63	12	2.8	2.1	5	3	3.5	D4	1	5973502	5973691
5	0.50	70	13	3.5	2.7	6	3	4.5	D4	1	5973503	5973695
6	0.75	80	15	4.5	3.4	6	3	5.3	D5	1	5973504	5973699
8	0.75	80	15	6.0	4.9	8	3	7.3	D5	1	5973505	5973703
8	1.00	90	18	6.0	4.9	8	3	7	D5	1	5973507	5973711
10	0.75	90	18	7.0	5.5	8	3	9.3	D6	1	5973456	5973600
10	1.00	90	18	7.0	5.5	8	3	9	D6	1	5973458	5973663
10	1.25	100	20	7.0	5.5	8	3	8.8	D6	1	5973460	5973707
12	1.00	100	21	9.0	7.0	10	3	11	D6	1	5973462	5973738
12	1.25	100	21	9.0	7.0	10	3	10.8	D6	1	5973464	5973762
12	1.50	100	21	9.0	7.0	10	3	10.5	D6	1	5973466	5973766
14	1.00	100	21	11.0	9.0	12	3	13	D7	1	5973468	5973768
14	1.25	100	21	11.0	9.0	12	3	13	D7	1	5973470	5973770
14	1.50	100	21	11.0	9.0	12	3	12.5	D7	1	5973472	5973772
16	1.00	100	21	12.0	9.0	12	3	15	D7	1	5973476	5973606
16	1.50	100	21	12.0	9.0	12	3	14.5	D7	1	5973478	5973610
18	1.00	110	24	14.0	11.0	14	4	17	D7	1	5973481	5973615
18	1.50	110	24	14.0	11.0	14	4	16.5	D7	1	5973483	5973623
20	1.00	125	24	16.0	12.0	15	4	19	D7	1	5973485	5973628
20	1.50	125	24	16.0	12.0	15	4	18.5	D7	1	5973487	5973632
22	1.50	125	25	18.0	14.5	17	4	20.5	D8	1	5973488	5973637
24	1.50	140	28	18.0	14.5	17	4	22.5	D8	1	5973490	5973642
24	2.00	140	28	18.0	14.5	17	4	22	D8	1	5973492	5973654
25	1.50	140	28	18.0	14.5	17	4	23.5	D8	1	5973494	5973659
26	1.50	140	28	18.0	14.5	17	4	24.5	D8	1	5973496	5973668
27	1.50	140	28	20.0	16.0	19	4	25.5	D8	1	5973497	5973672
27	2.00	140	28	20.0	16.0	19	4	25	D8	1	5973498	5973676
28	1.50	140	28	20.0	16.0	19	4	26.5	D9	1	5973499	5973679
30	1.50	150	28	22.0	18.0	21	4	28.5	D9	1	5973500	5973683
30	2.00	150	28	22.0	18.0	21	4	28	D9	1	5973501	5973687

Note: DIN shank and square dimensions will necessitate metric holders



## Multi-Application, Plug Chamfer

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

*E000 = Metric Coarse, E000TIN = TiN Coated*

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

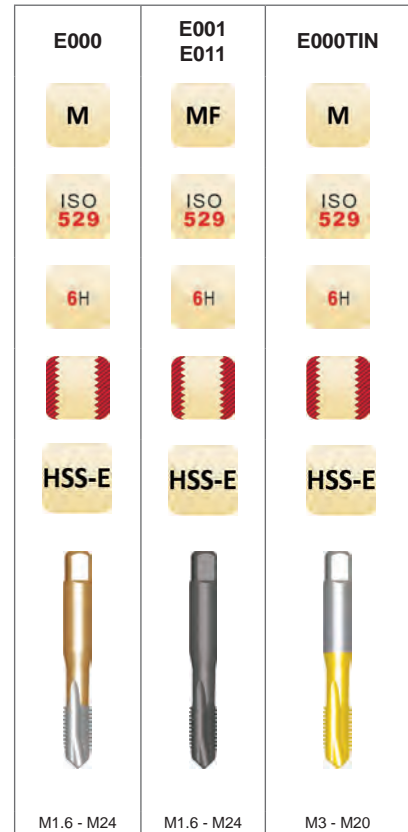
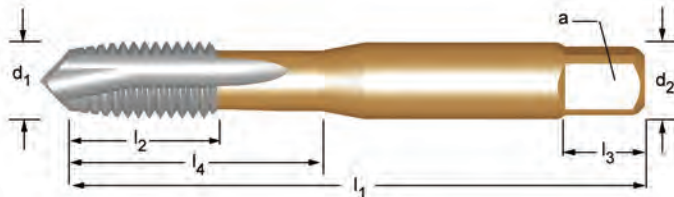
**E000TIN** E000 with a TiN coat

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  
5.1 5.2 6.1 6.2 6.3 7.3 7.4 8.2

**E001** Premium substrate with steam tempered 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




M	MF	P	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	a	l <sub>3</sub>	# of Flutes	l <sub>4</sub>	Limits	Pack Qty	E000	E001 E011	E000TIN
1.6		0.35	41	7	2.50	2.00	4	2	1.25	7	D3	5973759	<sup>1)</sup> 5973804	—
2		0.40	41	8	2.50	2.00	4	2	1.6	8	D3	5973771	<sup>1)</sup> 5973825	—
2.5		0.45	44.5	9.5	2.80	2.24	5	2	2.05	9.5	D3	5973775	<sup>1)</sup> 5973830	—
3		0.50	48	15	3.15	2.50	5	3	2.5	15	D3	5973783	<sup>1)</sup> 5973852	6196635 <sup>1)</sup>
3.5		0.60	50	16	3.55	2.80	5	3	2.9	16	D4	5973785	<sup>1)</sup> 5973857	—
4		0.50	53	17	4.0	3.15	6	3	3.5	17	D4	—	5974474	—
4		0.70	53	17	4.00	3.15	6	3	3.3	17	D4	5973788	<sup>1)</sup> 5973861	6196636 <sup>1)</sup>
5		0.50	58	11	5.0	4.00	7	3	4.5	22	D4	—	5974477	—
5		0.80	58	11	5.00	4.00	7	3	4.2	22	D4	5973790	<sup>1)</sup> 5973865	6196637 <sup>1)</sup>
6		0.50	66	13	6.3	5.00	8	3	5.5	26	D5	—	5974483	—
6		0.75	66	13	6.3	5.00	8	3	5.3	26	D5	—	5974486	—
6		1.00	66	13	6.30	5.00	8	3	5.0	26	D5	5973792	<sup>1)</sup> 5973870	6196638 <sup>1)</sup>
8		0.75	72	16	8.0	6.30	9	3	7.3	29	D5	—	5974489	—
8		1.00	72	16	8.0	6.30	9	3	7.0	29	D5	—	5974492	—
8		1.25	72	16	8.00	6.30	9	3	6.8	29	D5	5973802	<sup>1)</sup> 5973880	6196693 <sup>1)</sup>
10		1.00	80	18	10.0	8.00	11	3	9.0	34	D6	—	5974395	—
10		1.25	80	18	10.0	8.00	11	3	8.8	34	D6	—	5974400	—
10		1.50	80	18	10.00	8.00	11	3	8.5	34	D6	5973761	<sup>1)</sup> 5973807	6196690 <sup>1)</sup>
12		1.00	89	22	9.0	7.10	10	3	11.0	-	D6	—	5974405	—
12		1.25	89	22	9.0	7.10	10	3	10.8	-	D6	—	5974410	—
12		1.50	89	22	9.0	7.10	10	3	10.5	-	D6	—	5974415	—
12		1.75	89	22	9.00	7.10	10	3	10.3	-	D6	5973763	<sup>2)</sup> 5973809	6196691 <sup>2)</sup>
14		1.00	95	24	11.2	9.00	12	3	13.0	-	D7	—	5974419	—
14		1.25	95	24	11.2	9.00	12	3	12.8	-	D7	—	5974423	—
14		1.50	95	24	11.2	9.00	12	3	12.5	-	D7	—	5974427	—
14		2.00	95	24	11.20	9.00	12	3	12.0	-	D7	5973765	<sup>2)</sup> 5973812	—
16		1.00	102	24	12.5	10.00	13	3	15.0	-	D7	—	5974431	—
16		1.50	102	24	12.5	10.00	13	3	14.5	-	D7	—	5974435	—
16		2.00	102	24	12.50	10.00	13	3	14.0	-	D7	5973767	<sup>2)</sup> 5973817	6196692 <sup>2)</sup>

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks



M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> ∅ mm	□ a mm	l <sub>3</sub> mm	# of Flutes		l <sub>4</sub> mm	Limits	Pack Qty	E000	E001 E011	E000TIN
	18	1.00	112	29	14.0	11.20	14	4	17.0	-	D7	1	—	5974443 <sup>2)</sup>	—
	18	1.50	112	29	14.0	11.20	14	4	16.5	-	D7	1	—	5974447 <sup>2)</sup>	—
18		2.50	112	29	14.00	11.20	14	4	15.5	-	D7	1	5973769 <sup>2)</sup>	5973821 <sup>2)</sup>	—
	20	1.00	112	29	14.0	11.20	14	4	19.0	-	D7	1	—	5974452 <sup>2)</sup>	—
	20	1.50	112	29	14.0	11.20	14	4	18.5	-	D7	1	—	5974456 <sup>2)</sup>	—
	20	2.00	112	29	14.0	11.20	14	4	18.0	-	D7	1	—	5974459 <sup>2)</sup>	—
20		2.50	112	29	14.00	11.20	14	4	17.5	-	D7	1	5973776 <sup>2)</sup>	5973833 <sup>2)</sup>	6196639 <sup>2)</sup>
	22	1.50	118	29	16.0	12.50	16	4	20.5	-	D8	1	—	5974463 <sup>2)</sup>	—
	22	2.50	118	29	16.00	12.50	16	4	19.5	-	D8	1	5973779 <sup>2)</sup>	5973845 <sup>2)</sup>	—
	24	1.50	130	35	18.0	14.00	18	4	22.5	-	D8	1	—	5974467 <sup>2)</sup>	—
	24	2.00	130	35	18.0	14.00	18	4	22.0	-	D8	1	—	5974470 <sup>2)</sup>	—
24		3.00	130	35	18.00	14.00	18	4	21.0	-	D8	1	5973781 <sup>2)</sup>	5973849 <sup>2)</sup>	—

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks

# STRAIGHT FLUTE TAPS

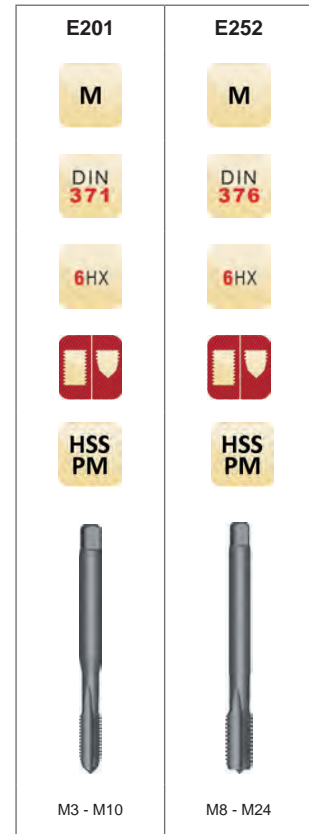
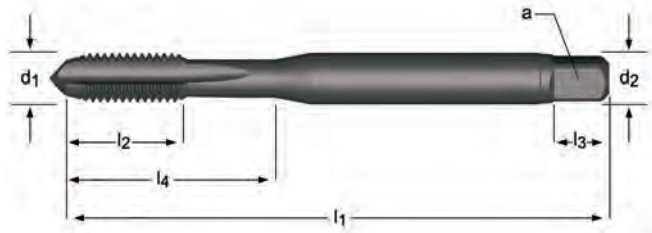


## For Cast Iron, Plug Chamfer

**E201** 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 tempered coating reduces wear and chip welding in abrasive materials.

**E252**

3.1 3.2 3.3 3.4 6.2 6.4 7.4 8.2



M	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of Flutes	l <sub>4</sub> mm	Limits	Pack Qty	E201	E252	
3	0.50	56	9	3.5	2.7	6	3	2.5	18	D3	1	5975842 <sup>1)</sup>	—
4	0.70	63	12	4.5	3.4	6	4	3.3	21	D4	1	5975692 <sup>1)</sup>	—
5	0.80	70	13	6.0	4.9	8	4	4.2	25	D4	1	5975694 <sup>1)</sup>	—
6	1.00	80	15	6.0	4.9	8	4	5.0	30	D5	1	5975696 <sup>1)</sup>	—
8	1.25	90	18	6.0	4.9	8	4	6.8		D5	1	—	5975463 <sup>1)</sup>
8	1.25	90	18	8.0	6.2	9	4	6.8	35	D5	1	5975698 <sup>1)</sup>	—
10	1.50	100	20	10.0	8.0	11	4	8.5	39	D6	1	5975838 <sup>1)</sup>	—
10	1.50	100	20	7.0	5.5	8	4	8.5		D6	1	—	5975917 <sup>2)</sup>
12	1.75	110	23	9.0	7.0	10	4	10.3		D6	1	—	5975921 <sup>2)</sup>
14	2.00	110	25	11.0	9.0	12	4	12.0		D7	1	—	5975929 <sup>2)</sup>
16	2.00	110	25	12.0	9.0	12	4	14.0		D7	1	—	5975258 <sup>2)</sup>
18	2.50	125	30	14.0	11.0	14	4	15.5		D7	1	—	5975304 <sup>2)</sup>
20	2.50	140	30	16.0	12.0	15	4	17.5		D7	1	—	5975347 <sup>2)</sup>
22	2.50	140	34	18.0	14.5	17	4	19.5		D8	1	—	5975394 <sup>2)</sup>
24	3.00	160	38	18.0	14.5	17	4	21.0		D8	1	—	5975449 <sup>2)</sup>

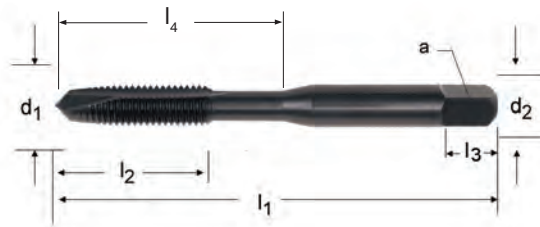
Note: DIN shank and square dimensions will necessitate metric holders

<sup>1)</sup> Reinforced Shanks  
<sup>2)</sup> Reduced Shanks

## DDX, High Hook, Plug Chamfer

**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 tempered 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



UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$a$ Inch	$l_3$ Inch	# of Flutes	$l_4$ Inch	Pack Qty	1985
	4	48	1.7/8	9/16	0.1410	0.1100	3/16	2	0.69	1	6008789 <sup>1)</sup>
4		40	1.7/8	9/16	0.1410	0.1100	3/16	2	0.69	1	6008784 <sup>1)</sup>
	5	44	1.15/16	5/8	0.1410	0.1100	3/16	2	0.75	1	6008797 <sup>1)</sup>
5		40	1.15/16	5/8	0.1410	0.1100	3/16	2	0.75	1	6008793 <sup>1)</sup>
	6	40	2"	11/16	0.1410	0.1100	3/16	2	0.78	1	6008939 <sup>1)</sup>
6		32	2"	11/16	0.1410	0.1100	3/16	2	0.78	1	6008889 <sup>1)</sup>
	8	36	2.1/8	3/4	0.1680	0.1310	1/4	2	0.81	1	6009104 <sup>1)</sup>
8		32	2.1/8	3/4	0.1680	0.1310	1/4	2	0.81	1	6009102 <sup>1)</sup>
	10	32	2.3/8	7/8	0.1940	0.1520	1/4	2	0.94	1	6008748 <sup>1)</sup>
10		24	2.3/8	7/8	0.1940	0.1520	1/4	2	0.94	1	6008744 <sup>1)</sup>
	1/4	28	2.1/2	1"	0.2550	0.1910	5/16	2	1.19	1	6008734 <sup>1)</sup>
1/4		20	2.1/2	1"	0.2550	0.1910	5/16	2	1.19	1	6008729 <sup>1)</sup>
	5/16	24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	1.31	1	6008807 <sup>1)</sup>
5/16		18	2.23/32	1.1/8	0.3180	0.2380	3/8	3	1.31	1	6008802 <sup>1)</sup>
	3/8	24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	1.44	1	6008780 <sup>1)</sup>
3/8		16	2.15/16	1.1/4	0.3810	0.2860	7/16	3	1.44	1	6008774 <sup>1)</sup>
	7/16	20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	—	1	6009058 <sup>2)</sup>
7/16		14	3.5/32	1.7/16	0.3230	0.2420	13/32	3	—	1	6009000 <sup>2)</sup>
	1/2	20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	—	1	6008724 <sup>2)</sup>
1/2		13	3.3/8	1.21/32	0.3670	0.2750	7/16	3	—	1	6008719 <sup>2)</sup>
	9/16	18	3.19/32	1.21/32	0.4290	0.3220	1/2	4	—	1	6008894 <sup>2)</sup>
9/16		12	3.19/32	1.21/32	0.4290	0.3220	1/2	4	—	1	6009106 <sup>2)</sup>
	5/8	18	3.13/16	1.13/16	0.4800	0.3600	9/16	4	—	1	6008824 <sup>2)</sup>
5/8		11	3.13/16	1.13/16	0.4800	0.3600	9/16	4	—	1	6008811 <sup>2)</sup>
	3/4	16	4.1/4	2"	0.5900	0.4420	11/16	4	—	1	6008770 <sup>2)</sup>
3/4		10	4.1/4	2"	0.5900	0.4420	11/16	4	—	1	6008760 <sup>2)</sup>
	7/8	14	4.11/16	2.7/32	0.6970	0.5230	3/4	4	—	1	6009096 <sup>2)</sup>
7/8		9	4.11/16	2.7/32	0.6970	0.5230	3/4	4	—	1	6009100 <sup>2)</sup>
1"		8	5.1/8	2.1/2	0.8000	0.6000	13/16	4	—	1	6008739 <sup>2)</sup>

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks

# APPLIX SPIRAL FLUTE TAP (48°-52°)



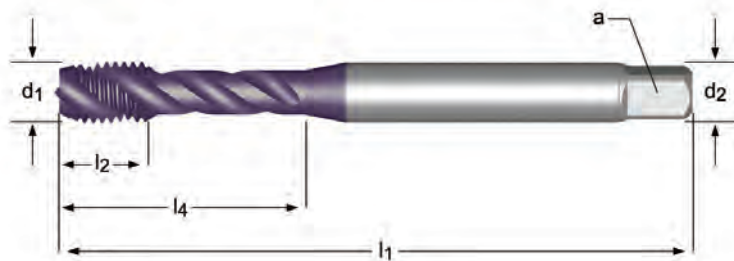
APPLIX®

## MXL Multi-Application, Semi-Bottoming

**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



1676AP(UNF)		1678(UNF)	
UNC	UNF	UNC	UNF
DIN ANSI		DIN ANSI	
2B		2B	
HSS PM		HSS PM	
No.4 - 1"		1/4 - 1"	

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch (Neck Length)	$d_2$ Ø Inch	$\square$ a Inch	# of Flutes	Limits	Pack Qty	1676AP	1678
4		40	2.205	0.236	0.709	0.141	0.110	3	H2	1	6204902	<sup>1)</sup> —
6		32	2.205	0.236	0.787	0.141	0.110	3	H2	1	6204907	<sup>1)</sup> —
8		32	2.480	0.236	0.827	0.168	0.131	3	H3	1	6204912	<sup>1)</sup> —
	10	32	2.756	0.354	0.984	0.194	0.152	3	H3	1	6204895	<sup>1)</sup> —
10		24	2.756	0.354	0.984	0.194	0.152	3	H3	1	6204894	<sup>1)</sup> —
	1/4	28	3.150	0.433	1.181	0.255	0.191	3	H4	1	6204893	<sup>1)</sup> 6008758 <sup>1)</sup>
1/4		20	3.150	0.433	1.181	0.255	0.191	3	H5	1	6204892	<sup>1)</sup> 6008750 <sup>1)</sup>
	5/16	24	3.543	0.472	1.378	0.318	0.238	3	H4	1	6204904	<sup>1)</sup> —
5/16		18	3.543	0.472	1.378	0.318	0.238	3	H5	1	6204903	<sup>1)</sup> 6008795 <sup>1)</sup>
	3/8	24	3.937	0.551	1.535	0.381	0.286	3	H4	1	6204901	<sup>1)</sup> —
3/8		16	3.937	0.551	1.535	0.381	0.286	3	H5	1	6204900	<sup>1)</sup> 6008781 <sup>1)</sup>
	7/16	20	3.937	0.591		0.323	0.242	3	H5	1	6204909	<sup>2)</sup> 6008825 <sup>2)</sup>
7/16		14	3.937	0.591		0.323	0.242	3	H5	1	6204908	<sup>2)</sup> 6008820 <sup>2)</sup>
	1/2	20	3.937	0.630		0.367	0.275	3	H5	1	6204891	<sup>2)</sup> —
1/2		13	4.331	0.630		0.367	0.275	3	H5	1	6204890	<sup>2)</sup> 6008735 <sup>2)</sup>
	5/8	18	3.937	0.745		0.480	0.360	3	H5	1	6204906	<sup>2)</sup> —
5/8		11	4.331	0.745		0.480	0.360	3	H5	1	6204905	<sup>2)</sup> 6008812 <sup>2)</sup>
	3/4	16	4.331	0.820		0.590	0.442	3	H5	1	6204899	<sup>2)</sup> —
3/4		10	4.921	0.820		0.590	0.442	3	H5	1	6204898	<sup>2)</sup> 6008771 <sup>2)</sup>
	7/8	14	4.921	0.910		0.697	0.523	4	H6	1	6204910	<sup>2)</sup> —
7/8		9	5.512	0.910		0.697	0.523	4	H6	1	6204911	<sup>2)</sup> 6204932 <sup>2)</sup>
1"		8	6.299	1.025		0.800	0.600	4	H6	1	6204897	<sup>2)</sup> 6008767 <sup>2)</sup>

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks

## Multi-Application, Semi-Bottoming

**E027**  
**E037**

Premium substrate for blind hole tapping in tough or abrasive materials. Bronze tempered 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*

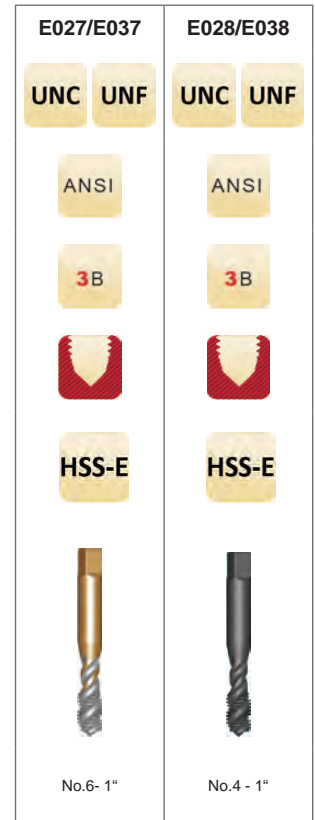
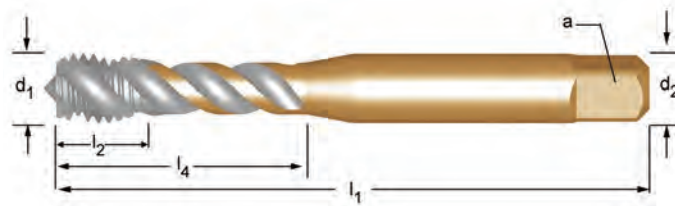
1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 6.1 6.2 6.3 7.1 7.2 7.3  
7.4 8.1

**E028**  
**E038**

Premium substrate with Steam tempered 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 1.6 2.1 2.2 2.3



UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	# of Flutes	Limits		$l_4$ Inch	Pack Qty	E027 E037	E028 E038	
4		40	1.7/8	0.6091	0.1410	0.1100	3	H2	N43	2.35	0.6091	1	—	5974035 <sup>1)</sup>
5		40	1.15/16	0.7404	0.1410	0.1100	3	H2	N38	2.65	0.7404	1	—	5974037 <sup>1)</sup>
6		32	2"	0.2610	0.1410	0.1100	3	H2	N36	2.85	0.5938	1	5974013	5974046 <sup>1)</sup>
8		32	2.1/8	0.2484	0.1680	0.1310	3	H2	N29	3.50	0.6526	1	5974017	5974058 <sup>1)</sup>
	10	32	2.3/8	0.2650	0.1940	0.1520	3	H2	N21	4.10	0.8434	1	5974670	5974718 <sup>1)</sup>
10		24	2.3/8	0.2650	0.1940	0.1520	3	H3	N25	3.90	0.8434	1	5974150	5974023 <sup>1)</sup>
12		24	2.3/8	0.2520	0.2200	0.1650	3	H3	N16	4.50	0.8848	1	5974158	5974026 <sup>1)</sup>
	1/4	28	2.1/2	0.3937	0.2550	0.1910	3	H3	N3	5.50	1.0993	1	5974666	5974715 <sup>1)</sup>
1/4		20	2.1/2	0.3937	0.2550	0.1910	3	H3	N7	5.10	1.0993	1	5974095	5974021 <sup>1)</sup>
	5/16	24	2.23/32	0.4567	0.3180	0.2380	3	H3	I	6.90	1.3094	1	5974682	5973856 <sup>1)</sup>
5/16		18	2.23/32	0.4567	0.3180	0.2380	3	H3	F	6.60	1.3094	1	5974171	5974040 <sup>1)</sup>
	3/8	24	2.15/16	0.5315	0.3810	0.2860	3	H3	Q	8.50	1.4415	1	5974677	5974729 <sup>1)</sup>
3/8		16	2.15/16	0.5315	0.3810	0.2860	3	H3	5/16	8.00	1.4415	1	5974168	5974030 <sup>1)</sup>
3/8		16	2.15/16	0.5315	0.3810	0.2860	3	H5	5/16	8.00	1.4415	1	—	5974032 <sup>1)3)</sup>
	7/16	20	3.5/32	0.6299	0.3230	0.2420	3	H3	25/64	9.90	-	1	5974693	5973958 <sup>2)</sup>
7/16		14	3.5/32	0.6299	0.3230	0.2420	3	H3	U	9.40	-	1	5974015	5974049 <sup>2)</sup>
	1/2	20	3.3/8	0.6890	0.3670	0.2750	3	H3	29/64	11.50	-	1	5974662	5974712 <sup>2)</sup>
1/2		13	3.3/8	0.6890	0.3670	0.2750	3	H3	27/64	10.80	-	1	5974052	5974020 <sup>2)</sup>
	9/16	18	3.19/32	0.7087	0.4290	0.3220	3	H3	33/64	12.90	-	1	5974700	5974006 <sup>2)</sup>
9/16		12	3.19/32	0.7087	0.4290	0.3220	3	H3	31/64	12.20	-	1	5974018	5974061 <sup>2)</sup>
	5/8	18	3.13/16	0.7087	0.4800	0.3600	3	H3	37/64	14.50	-	1	5974690	5973916 <sup>2)</sup>
5/8		11	3.13/16	0.7087	0.4800	0.3600	3	H3	17/32	13.50	-	1	5974011	5974043 <sup>2)</sup>
	3/4	16	4.1/4	0.8858	0.5900	0.4420	3	H3	11/16	17.50	-	1	5974673	5974721 <sup>2)</sup>
3/4		10	4.1/4	0.8858	0.5900	0.4420	3	H4	21/32	16.50	-	1	5974163	5974028 <sup>2)</sup>
	7/8	14	4.11/16	0.9843	0.6970	0.5230	3	H4	13/16	20.40	-	1	5974697	5973990 <sup>2)</sup>
7/8		9	4.11/16	0.9843	0.6970	0.5230	3	H4	49/64	19.50	-	1	5974016	5974055 <sup>2)</sup>
	1"	14	5.1/8	1.1811	0.8000	0.6000	3	H4	59/64	23.50	-	1	5974658	5974707 <sup>2)</sup>
1"		8	5.1/8	1.1811	0.8000	0.6000	3	H4	7/8	22.25	-	1	5974024	5974019 <sup>2)</sup>

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks

<sup>3)</sup> Class of fit: 2B

# SPIRAL FLUTE TAPS (45°)



## Multi-Application, Semi-Bottoming

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

**EX30**

EX20 = UNC Sizes, EX30 = UNF Sizes

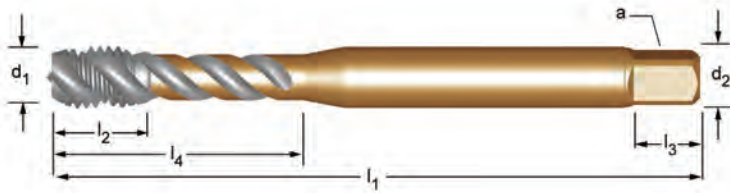
1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 7.1 7.2 7.3 7.4

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

**EX31**

EX21 = UNC Sizes, EX31 = UNF Sizes

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



UNC	UNF	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	a mm	l <sub>3</sub> mm	# of Flutes	Limits	l <sub>4</sub> mm	Pack Qty	EX20 EX30	EX21 EX31
4		40	2.845	56	6	3.5	2.7	6	3	2.35	H2	18	1	5973704 <sup>1)</sup> 5974042 <sup>1)</sup>
5		40	3.175	56	6	3.5	2.7	6	3	2.65	H2	18	1	5973708 <sup>1)</sup> 5974045 <sup>1)</sup>
6		32	3.505	56	7	4.0	3.0	6	3	2.85	H2	20	1	5973724 <sup>1)</sup> 5974054 <sup>1)</sup>
	8	36	4.166	63	7	4.5	3.4	8	3	3.5	H3	21	1	5974125 <sup>1)</sup> 5974191 <sup>1)</sup>
8		32	4.166	63	7	4.5	3.4	8	3	3.5	H3	21	1	5974132 <sup>1)</sup> 5974066 <sup>1)</sup>
	10	32	4.826	70	8	6.0	4.9	8	3	4.1	H3	25	1	5974087 <sup>1)</sup> 5974151 <sup>1)</sup>
10		24	4.826	70	8	6.0	4.9	8	3	3.9	H3	25	1	5973688 <sup>1)</sup> 5974238 <sup>1)</sup>
12		24	5.486	80	10	6.0	4.9	8	3	4.5	H3	30	1	5973692 <sup>1)</sup> 5974242 <sup>1)</sup>
	1/4	28	6.350	80	10	7.0	5.5	8	3	5.5	H4	30	1	5974083 <sup>1)</sup> 5974146 <sup>1)</sup>
1/4		20	6.350	80	10	7.0	5.5	8	3	5.1	H5	30	1	5973684 <sup>1)</sup> 5974234 <sup>1)</sup>
	5/16	24	7.938	90	12	8.0	6.2	9	3	6.9	H4	35	1	5974103 <sup>1)</sup> 5974167 <sup>1)</sup>
5/16		18	7.938	90	12	8.0	6.2	9	3	6.6	H5	35	1	5973713 <sup>1)</sup> 5974048 <sup>1)</sup>
	3/8	24	9.525	100	15	10.0	8.0	11	3	8.5	H4	39	1	5974098 <sup>1)</sup> 5974160 <sup>1)</sup>
3/8		16	9.525	100	15	10.0	8.0	11	3	8	H5	39	1	5973700 <sup>1)</sup> 5974038 <sup>1)</sup>
	7/16	20	11.112	100	15	8.0	6.2	9	3	9.9	H5	-	1	5974115 <sup>2)</sup> 5974176 <sup>2)</sup>
7/16		14	11.112	100	15	8.0	6.2	9	3	9.4	H5	-	1	5974033 <sup>2)</sup> 5974056 <sup>2)</sup>
	1/2	20	12.700	110	18	9.0	7.0	10	3	11.5	H5	-	1	5974076 <sup>2)</sup> 5974141 <sup>2)</sup>
1/2		13	12.700	110	18	9.0	7.0	10	3	10.8	H5	-	1	5973680 <sup>2)</sup> 5974228 <sup>2)</sup>
	5/8	18	15.875	110	20	12.0	9.0	12	4	14.5	H5	-	1	5974111 <sup>2)</sup> 5974172 <sup>2)</sup>
5/8		11	15.875	110	20	12.0	9.0	12	4	13.5	H5	-	1	5973718 <sup>2)</sup> 5974051 <sup>2)</sup>
	3/4	16	19.050	125	25	14.0	11.0	14	4	17.5	H5	-	1	5974092 <sup>2)</sup> 5974155 <sup>2)</sup>
3/4		10	19.050	125	25	14.0	11.0	14	4	16.5	H5	-	1	5973696 <sup>2)</sup> 5974245 <sup>2)</sup>
	7/8	14	22.225	140	25	18.0	14.5	17	4	20.4	H6	-	1	5974120 <sup>2)</sup> 5974180 <sup>2)</sup>
7/8		9	22.225	140	25	18.0	14.5	17	4	19.5	H6	-	1	5974074 <sup>2)</sup> 5974062 <sup>2)</sup>
	1"	12	25.400	160	30	18.0	14.5	17	4	23.25	H6	-	1	5974070 <sup>2)</sup> 5974137 <sup>2)</sup>
1"		8	25.400	160	30	18.0	14.5	17	4	22.25	H6	-	1	5973671 <sup>2)</sup> 5974187 <sup>2)</sup>

Note: DIN shank and square dimensions will necessitate metric holders

<sup>1)</sup> Reinforced Shanks

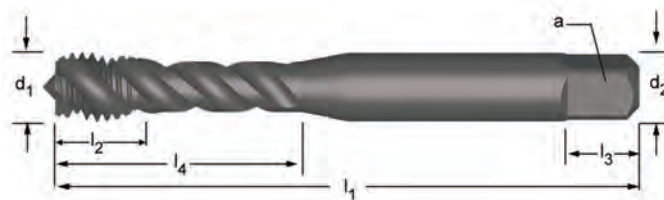
<sup>2)</sup> Reduced Shanks

## Multi-Application, Semi-Bottoming

**E023** Premium substrate with Steam tempered surface treatment  
**E033** 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**



E023/E033

UNC UNF

ISO  
529

2B



HSS-E



No.2 - 1"

UNC	UNF	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of Flutes	↔	l <sub>4</sub> mm	Limits	Pack Qty	E023 E033
2		56	2.184	44.5	9.5	2.80	2.24	5	2	1.85	9.5	H2	1	5974478 <sup>1)</sup>
4		40	2.845	48	6	3.15	2.50	5	3	2.35	14	H2	1	5974490 <sup>1)</sup>
5		40	3.175	48	6	3.15	2.50	5	3	2.65	12.5	H2	1	5974022 <sup>1)</sup>
6		32	3.505	50	6	3.55	2.80	5	3	2.85	16	H2	1	5974149 <sup>1)</sup>
	8	36	4.166	53	7	4.5	3.55	6	3	3.50	17	H3	1	5973953 <sup>1)</sup>
8		32	4.166	53	7	4.50	3.55	6	3	3.50	17	H3	1	5974211 <sup>1)</sup>
	10	32	4.826	58	8	5.0	4.00	7	3	4.10	20	H3	1	5973922 <sup>1)</sup>
10		24	4.826	58	8	5.00	4.00	7	3	3.90	20	HH3	1	5974471 <sup>1)</sup>
12		24	5.486	62	12	5.60	4.50	7	3	4.50	21	H3	1	5974475 <sup>1)</sup>
	1/4	28	6.350	66	10	6.3	5.00	8	3	5.50	28	H4	1	5973918 <sup>1)</sup>
1/4		20	6.350	66	10	6.30	5.00	8	3	5.10	28	H5	1	5974466 <sup>1)</sup>
	5/16	24	7.938	72	12	8.0	6.30	9	3	6.90	31	H4	1	5973938 <sup>1)</sup>
5/16		18	7.938	72	12	8.00	6.30	9	3	6.60	31	H5	1	5974050 <sup>1)</sup>
	3/8	24	9.525	80	15	10.0	8.00	11	3	8.50	34	H4	1	5973930 <sup>1)</sup>
3/8		16	9.525	80	15	10.00	8.00	11	3	8.00	34	H5	1	5974484 <sup>1)</sup>
	7/16	20	11.112	85	19	8.0	6.30	9	3	9.90	-	H5	1	5973946 <sup>2)</sup>
7/16		14	11.112	85	19	8.00	6.30	9	3	9.40	-	H5	1	5974196 <sup>2)</sup>
	1/2	20	12.700	89	22	9.0	7.10	10	3	11.50	-	H5	1	5973913 <sup>2)</sup>
1/2		13	12.700	89	19	9.00	7.10	10	3	10.80	-	H5	1	5974462 <sup>2)</sup>
	9/16	18	14.288	95	24	11.2	9.00	12	3	12.90	-	H5	1	5973956 <sup>2)</sup>
	5/8	18	15.875	102	24	12.5	10.00	13	4	14.50	-	H5	1	5973942 <sup>2)</sup>
5/8		11	15.875	102	24	12.50	10.00	13	4	13.50	-	H5	1	5974093 <sup>2)</sup>
	3/4	16	19.050	112	29	14.0	11.20	14	4	17.50	-	H5	1	5973926 <sup>2)</sup>
3/4		10	19.050	112	29	14.00	11.20	14	4	16.50	-	H5	1	5974481 <sup>2)</sup>
	7/8	14	22.225	118	29	16.0	12.50	16	4	20.40	-	H6	1	5973950 <sup>2)</sup>
7/8		9	22.225	118	29	16.00	12.50	16	4	19.50	-	H6	1	5974207 <sup>2)</sup>
	1"	12	25.400	130	35	18.0	14.00	18	4	23.25	-	H6	1	5973908 <sup>2)</sup>
1"		8	25.400	130	35	18.00	14.00	18	4	22.25	-	H6	1	5974458 <sup>2)</sup>

**Note: ISO shank and square dimensions will necessitate metric holders**

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks



# SPIRAL FLUTE TAP (48°-52°)



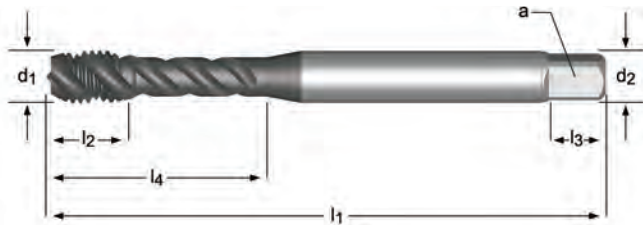
## APPLIX

### MXL Multi-Application, Semi-Bottoming

**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



1677AP(M)		1679(M)	
M	MF	M	MF
DIN ANSI		DIN ANSI	
6H		6H	
HSS PM		HSS PM	
M4 - M24		M6 - M24	

M	MF	TPI	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> Inch (Neck Length)	Limits	d <sub>2</sub> Ø Inch	□ a Inch	# of Flutes	Pack Qty	1677AP	1679(M)
4		0.70	63	6	21	D4	0.168	0.131	3	1	6204927	<sup>1)</sup> —
5		0.80	70	9	25	D4	0.194	0.152	3	1	6204928	<sup>1)</sup> —
6		1.00	80	11	30	D5	0.255	0.191	3	1	6204929	<sup>1)</sup> 6008613 <sup>1)</sup>
	8	1.00	90	12	35	D5	0.318	0.238	3	1	6205010	<sup>1)</sup> —
8		1.25	90	12	35	D5	0.318	0.238	3	1	6204930	<sup>1)</sup> 6008380 <sup>1)</sup>
	10	1.25	100	14	39	D6	0.381	0.286	3	1	6204913	<sup>1)</sup> 6008830
10		1.50	100	14	39	D6	0.381	0.286	3	1	6204914	<sup>1)</sup> 6008835 <sup>1)</sup>
	12	1.50	100	16		D6	0.367	0.275	3	1	6204915	<sup>2)</sup> —
12		1.75	110	16		D6	0.367	0.275	3	1	6204916	<sup>2)</sup> 6008845 <sup>2)</sup>
	14	1.50	100	18		D7	0.429	0.322	3	1	6204917	<sup>2)</sup> —
14		2.00	110	18		D7	0.429	0.322	3	1	6204918	<sup>2)</sup> 6008856 <sup>2)</sup>
16		2.00	110	19		D7	0.480	0.360	3	1	6204920	<sup>2)</sup> 6008422 <sup>2)</sup>
	18	1.50	110	21		D7	0.542	0.406	3	1	6204921	<sup>2)</sup> —
18		2.50	125	21		D7	0.542	0.406	3	1	6204922	<sup>2)</sup> 6008537 <sup>2)</sup>
	20	1.50	125	21		D7	0.652	0.489	3	1	6204923	<sup>2)</sup> —
20		2.50	140	21		D7	0.652	0.489	3	1	6204924	<sup>2)</sup> 6008606 <sup>2)</sup>
24		3.00	160	26		D8	0.760	0.570	4	1	6204926	<sup>2)</sup> 6008611 <sup>2)</sup>

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks



## Multi-Application, Semi-Bottoming

**E007** Premium substrate for blind hole tapping in tough or abrasive materials. Bronze tempered 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*

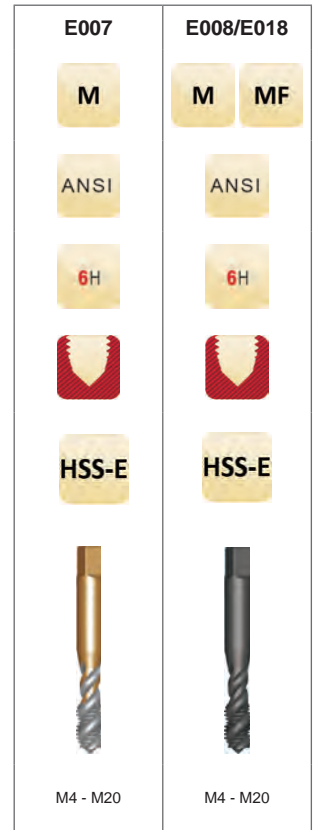
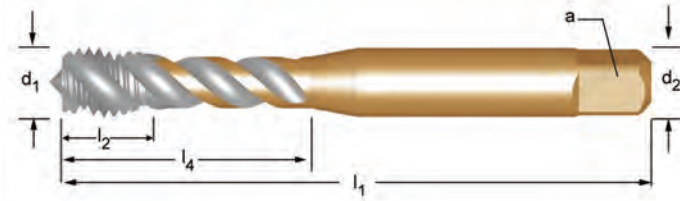
1.1 1.2 1.3 1.4 1.5 4.1 4.2 5.1 5.2 7.1 7.2 7.3 7.4

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

**E018**

*E008 = Metric Coarse, E018 = Metric Fine*

1.1 1.2 1.3 1.4 1.5 2.1 2.2 2.3



M	MF	P mm	$l_1$ Inch	$l_2$ Inch	$d_2 \text{ } \varnothing$ Inch	$\square$ a Inch	# of flutes	Limits		$l_4$ Inch	Pack Qty	E007	E008 E018	
4		0.70	2.1/8	0.2484	0.1680	0.1310	3	D4	3.30	N30	0.6526	1	5973801 <sup>1)</sup>	5973840 <sup>1)</sup>
5		0.80	2.3/8	0.2650	0.1940	0.1520	3	D4	4.20	N19	0.8434	1	5973805 <sup>1)</sup>	5973843 <sup>1)</sup>
6		1.00	2.1/2	0.3937	0.2550	0.1910	3	D5	5.00	N9	1.0993	1	5973808 <sup>1)</sup>	5973846 <sup>1)</sup>
	8	1.00	2.23/32	0.4567	0.3180	0.2380	3	D5	7.00	J	1.3094	1	—	5973601 <sup>1)</sup>
8		1.25	2.23/32	0.4567	0.3180	0.2380	3	D5	6.80	H	1.3094	1	5973811 <sup>1)</sup>	5973850 <sup>1)</sup>
	10	1.00	2.15/16	0.5315	0.3810	0.2860	3	D6	9.00	T	1.4415	1	—	5973589 <sup>1)</sup>
10		1.50	2.15/16	0.5315	0.3810	0.2860	3	D6	8.50	Q	1.4415	1	5973786 <sup>1)</sup>	5973814 <sup>1)</sup>
12		1.75	3.3/8	0.6890	0.3670	0.2750	3	D6	10.30	Y		1	5973787 <sup>2)</sup>	5973816 <sup>2)</sup>
	14	1.50	3.19/32	0.7087	0.4290	0.3220	3	D7	12.50	31/64		1	—	5973593 <sup>2)</sup>
14		2.00	3.19/32	0.7087	0.4290	0.3220	3	D7	12.00	15/32		1	— <sup>2)</sup>	5973820 <sup>2)</sup>
16		2.00	3.13/16	0.7087	0.4800	0.3600	3	D7	14.00	35/64		1	5973791 <sup>2)</sup>	5973824 <sup>2)</sup>
20		2.50	4.15/32	0.8858	0.6520	0.4890	3	D7	17.50	11/16		1	— <sup>2)</sup>	5973836 <sup>2)</sup>

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks

# SPIRAL FLUTE TAPS (45°)



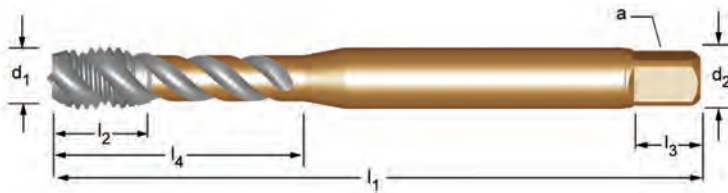
## Multi-Application, Semi-Bottoming

**EX006H** Premium substrate for blind hole tapping in tough or abrasive materials. Bronze tempered 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 tempered 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



M	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> ∅ mm	a mm	l <sub>3</sub> mm	# of Flutes	Flute Width	l <sub>4</sub> mm	Limits	Pack Qty	EX006H	EX016H
2	0.40	45	4	2.8	2.1	5	3	1.6	9	D3	1	5973751 <sup>1)</sup>	5973739 <sup>1)</sup>
2.5	0.45	50	4	2.8	2.1	5	3	2.05	12.5	D3	1	5973567 <sup>1)</sup>	5973742 <sup>1)</sup>
3	0.50	56	6	3.5	2.7	6	3	2.5	18	D3	1	5973590 <sup>1)</sup>	5973698 <sup>1)</sup>
3.5	0.60	56	7	4.0	3.0	6	3	2.9	20	D4	1	5973595 <sup>1)</sup>	5973702 <sup>1)</sup>
4	0.70	63	7	4.5	3.4	6	3	3.3	21	D4	1	5973630 <sup>1)</sup>	5973532 <sup>1)</sup>
5	0.80	70	8	6.0	4.9	8	3	4.2	25	D4	1	5973649 <sup>1)</sup>	5973544 <sup>1)</sup>
6	1.00	80	10	4.5	3.4	6	3	5	31	D5	1	5973677 <sup>2)</sup>	5973562 <sup>2)</sup>
6	1.00	80	10	6.0	4.9	8	3	5	31	D5	1	5973673 <sup>1)</sup>	5973559 <sup>1)</sup>
7	1.00	80	10	7.0	5.5	8	3	6	31	D5	1	5973690 <sup>1)</sup>	5973576 <sup>1)</sup>
8	1.25	90	13	6.0	4.9	8	3	6.8	35	D5	1	5973697 <sup>2)</sup>	5973584 <sup>2)</sup>
8	1.25	90	12	8.0	6.2	9	3	6.8	35	D5	1	5973694 <sup>1)</sup>	5973580 <sup>1)</sup>
10	1.50	100	15	7.0	5.5	8	3	8.5	39	D6	1	5973991 <sup>2)</sup>	5973712 <sup>2)</sup>
10	1.50	100	15	10.0	8.0	11	3	8.5	39	D6	1	5973986 <sup>1)</sup>	5973705 <sup>1)</sup>
12	1.75	110	16	9.0	7.0	10	3	10.3	-	D6	1	5973611 <sup>2)</sup>	5973717 <sup>2)</sup>
14	2.00	110	20	11.0	9.0	12	3	12	-	D7	1	5973709 <sup>2)</sup>	5973722 <sup>2)</sup>
16	2.00	110	20	12.0	9.0	12	4	14	-	D7	1	5973744 <sup>2)</sup>	5973730 <sup>2)</sup>
18	2.50	125	25	14.0	11.0	14	4	15.5	-	D7	1	5973748 <sup>2)</sup>	5973736 <sup>2)</sup>
20	2.50	140	25	16.0	12.0	15	4	17.5	-	D7	1	5973571 <sup>2)</sup>	5973524 <sup>2)</sup>
22	2.50	140	25	18.0	14.5	17	4	19.5	-	D8	1	5973578 <sup>2)</sup>	5973594 <sup>2)</sup>
24	3.00	160	30	18.0	14.5	17	4	21	-	D8	1	5973583 <sup>2)</sup>	5973644 <sup>2)</sup>
27	3.00	160	30	20.0	16.0	19	4	24	-	D8	1	5973586 <sup>2)</sup>	5973689 <sup>2)</sup>
30	3.50	180	36	22.0	18.0	21	4	26.5	-	D9	1	5973599 <sup>2)</sup>	5973706 <sup>2)</sup>
33	3.50	180	36	25.0	20.0	23	4	29.5	-	D9	1	5973604 <sup>2)</sup>	5973710 <sup>2)</sup>
36	4.00	200	40	28.0	22.0	25	4	32	-	D9	1	5973616 <sup>2)</sup>	5973526 <sup>2)</sup>
39	4.00	200	40	32.0	24.0	27	4	35	-	D9	1	5973624 <sup>2)</sup>	5973530 <sup>2)</sup>
42	4.50	200	45	32.0	24.0	27	4	37.5	-	D10	1	5973634 <sup>2)</sup>	5973534 <sup>2)</sup>
48	5.00	250	50	36.0	29.0	32	4	43	-	D11	1	5973646 <sup>2)</sup>	5973539 <sup>2)</sup>
52	5.00	250	50	40.0	32.0	35	5	47	-	D11	1	5973653 <sup>2)</sup>	5973547 <sup>2)</sup>
56	5.50	250	55	40.0	32.0	35	5	50.5	-	D11	1	5973658 <sup>2)</sup>	5973550 <sup>2)</sup>
64	6.00	315	60	50.0	39.0	42	6	58	-	D12	1	5973682 <sup>2)</sup>	5973565 <sup>2)</sup>

**Note: DIN shank and square dimensions will necessitate metric holders**

<sup>1)</sup> Reinforced Shanks (DIN 371)

<sup>2)</sup> Reduced Shanks (DIN 376)

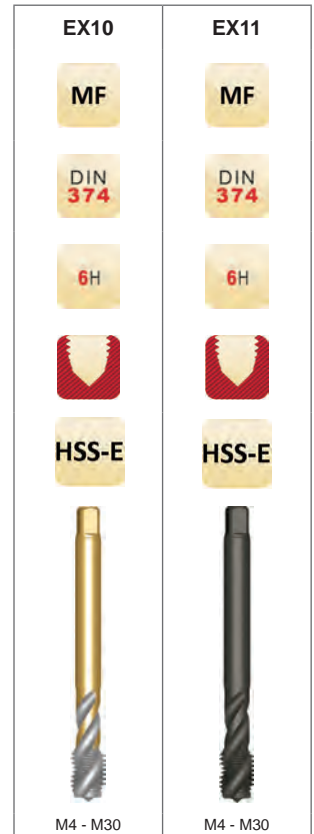
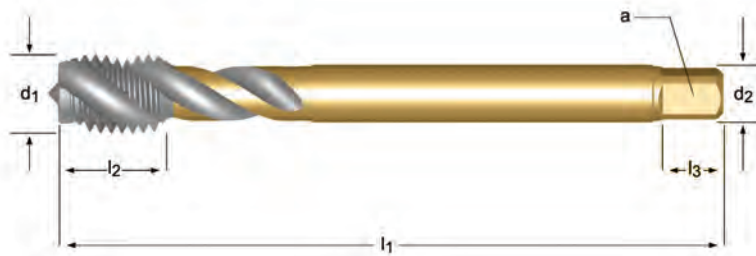
## Multi-Application, Semi-Bottoming

**EX10** Premium substrate for blind hole tapping in tough or abrasive materials. Bronze tempered 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 tempered 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



MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	a mm	l <sub>3</sub> mm	# of Flutes	Limits	Pack Qty	EX10	EX11	
4	0.50	63	7	2.8	2.1	5	3	3.5	D4	1	5973675	5973648
5	0.50	70	8	3.5	2.7	6	3	4.5	D4	1	5973721	5973652
6	0.75	80	10	4.5	3.4	6	3	5.3	D5	1	5973726	5973656
8	0.75	80	13	6.0	4.9	8	3	7.3	D5	1	5973728	5973662
8	1.00	90	13	6.0	4.9	8	3	7	D5	1	5973731	5973667
10	0.75	90	13	7.0	5.5	8	3	9.3	D6	1	5973591	5973733
10	1.00	90	13	7.0	5.5	8	3	9	D6	1	5973598	5973540
10	1.25	100	15	7.0	5.5	8	3	8.8	D6	1	5973603	5973543
12	1.00	100	15	9.0	7.0	10	3	11	D6	1	5973608	5973546
12	1.25	100	15	9.0	7.0	10	3	10.8	D6	1	5973613	5973549
12	1.50	100	15	9.0	7.0	10	3	10.5	D6	1	5973618	5973552
14	1.00	100	15	11.0	9.0	12	3	13	D7	1	5973621	5973555
14	1.25	100	15	11.0	9.0	12	3	12.8	D7	1	5973626	5973558
14	1.50	100	15	11.0	9.0	12	3	12.5	D7	1	5973631	5973563
16	1.00	100	15	12.0	9.0	12	4	15	D7	1	5973635	5973566
16	1.50	100	15	12.0	9.0	12	4	14.5	D7	1	5973639	5973570
18	1.00	110	17	14.0	11.0	14	4	17	D7	1	5973647	5973577
18	1.50	110	17	14.0	11.0	14	4	16.5	D7	1	5973651	5973582
20	1.00	125	17	16.0	12.0	15	4	19	D7	1	5973657	5973588
20	1.50	125	17	16.0	12.0	15	4	18.5	D7	1	5973661	5973592
22	1.50	125	17	18.0	14.5	17	4	20.5	D8	1	5973665	5973597
24	1.50	140	20	18.0	14.5	17	4	22.5	D8	1	5973670	5973602
24	2.00	140	20	18.0	14.5	17	4	22	D8	1	5973674	5973605
25	1.50	140	20	18.0	14.5	17	4	23.5	D8	1	5973678	5973609
26	1.50	140	20	18.0	14.5	17	4	24.5	D8	1	5973681	5973614
27	1.50	140	20	20.0	16.0	19	4	25.5	D8	1	5973685	5973619
27	2.00	140	20	20.0	16.0	19	4	25	D8	1	5973693	5973627
28	1.50	140	20	20.0	16.0	19	4	26.5	D9	1	5973535	5973636
30	1.50	150	20	22.0	18.0	21	4	28.5	D9	1	5973573	5973640
30	2.00	150	20	22.0	18.0	21	4	28	D9	1	5973622	5973645

Note: DIN shank and square dimensions will necessitate metric holders

# SPIRAL FLUTE TAPS (45°)



## Multi-Application, Semi-Bottoming

**E002** Premium substrate for blind hole tapping in tough or abrasive materials. Bronze tempered body and shank reduces rust and corrosion. Bright finish flutes improve chip flow in soft and non-ferrous materials.

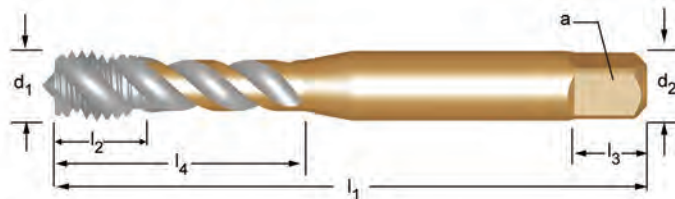
*E002 = Metric Coarse*

**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** Premium substrate with Steam tempered 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**



E002	E003 / E013
M	M MF
ISO 529	ISO 529
6H	6H
HSS-E	HSS-E
M2 - M24	M2 - M24

Note: ISO shank and square dimensions will necessitate metric holders

M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> ∅ mm	a mm	l <sub>3</sub> mm	# of Flutes	Limits		l <sub>4</sub> mm	Pack Qty	E002	E003 E013
2		0.40	41	8	2.50	2.00	4	2	D3	1.6	8	1	5974446 <sup>1)</sup>	5974357 <sup>1)</sup>
2.5		0.45	44.5	9.5	2.80	2.24	5	2	D3	2.05	9.5	1	5974485 <sup>1)</sup>	5974361 <sup>1)</sup>
3		0.50	48	6	3.15	2.50	5	3	D3	2.5	12.5	1	5974500 <sup>1)</sup>	5974380 <sup>1)</sup>
	4	0.50	53	7	4.0	3.15	6	3	D4	3.5	19	1	—	5973529 <sup>1)</sup>
4		0.70	53	7	4.00	3.15	6	3	D4	3.3	19	1	5974312 <sup>1)</sup>	5974390 <sup>1)</sup>
	5	0.50	58	8	5.0	4.0	7	3	D4	4.5	22	1	—	5973531 <sup>1)</sup>
5		0.80	58	8	5.00	4.00	7	3	D4	4.2	22	1	5974316 <sup>1)</sup>	5974394 <sup>1)</sup>
	6	0.50	66	10	6.3	5.0	8	3	D5	5.5	27	1	—	5973533 <sup>1)</sup>
	6	0.75	66	10	6.3	5.0	8	3	D5	5.3	27	1	—	5973536 <sup>1)</sup>
6		1.00	66	10	6.30	5.00	8	3	D5	5.0	27	1	5974320 <sup>1)</sup>	5974404 <sup>1)</sup>
	8	0.75	72	12	8.0	6.3	9	3	D5	7.3	31	1	—	5973538 <sup>1)</sup>
	8	1.00	72	12	8.0	6.3	9	3	D5	7.0	31	1	—	5973541 <sup>1)</sup>
8		1.25	72	12	8.00	6.30	9	3	D5	6.8	31	1	5974325 <sup>1)</sup>	5974414 <sup>1)</sup>
	10	1.00	80	15	10.0	8.0	11	3	D6	9.0	35	1	—	5973512 <sup>1)</sup>
	10	1.25	80	15	10.0	8.0	11	3	D6	8.8	35	1	—	5973514 <sup>1)</sup>
10		1.50	80	15	10.00	8.00	11	3	D6	8.5	35	1	5973886 <sup>1)</sup>	5974329 <sup>1)</sup>
	12	1.00	89	16	9.0	7.1	10	3	D6	11.0	-	1	—	5973516 <sup>2)</sup>
	12	1.25	89	16	9.0	7.1	10	3	D6	10.8	-	1	—	5973517 <sup>2)</sup>
	12	1.50	89	16	9.0	7.1	10	3	D6	10.5	-	1	—	5973518 <sup>2)</sup>
12		1.75	89	16	9.00	7.10	10	3	D6	10.3	-	1	5973895 <sup>2)</sup>	5974334 <sup>2)</sup>
	14	1.50	95	18	11.2	9.0	12	3	D7	12.5	-	1	—	5973519 <sup>2)</sup>
14		2.00	95	18	11.20	9.00	12	3	D7	12.0	-	1	5974304 <sup>2)</sup>	5974339 <sup>2)</sup>
	16	1.00	102	18	12.5	10.0	13	4	D7	15.0	-	1	—	5973520 <sup>2)</sup>
	16	1.50	102	18	12.5	10.0	13	4	D7	14.5	-	1	—	5973521 <sup>2)</sup>
16		2.00	102	18	12.50	10.00	13	4	D7	14.0	-	1	5974349 <sup>2)</sup>	5974344 <sup>2)</sup>
	18	1.50	112	29	14.0	11.2	14	4	D7	16.5	-	1	—	5973522 <sup>2)</sup>
18		2.50	112	29	14.00	11.20	14	4	D7	15.5	-	1	5974399 <sup>2)</sup>	5974352 <sup>2)</sup>
	20	1.50	112	29	14.0	11.2	14	4	D7	18.5	-	1	—	5973525 <sup>2)</sup>
20		2.50	112	29	14.00	11.20	14	4	D7	17.5	-	1	5974491 <sup>2)</sup>	5974366 <sup>2)</sup>
	22	1.50	118	29	16.0	12.5	16	4	D8	20.5	-	1	—	5973527 <sup>2)</sup>
22		2.50	118	29	16.00	12.50	16	4	D8	19.5	-	1	5974494 <sup>2)</sup>	5974371 <sup>2)</sup>
24		3.00	130	35	18.00	14.00	18	4	D8	21.0	-	1	5974497 <sup>2)</sup>	5974376 <sup>2)</sup>

<sup>1)</sup> Reinforced Shanks, <sup>2)</sup> Reduced Shanks

## Multi-Application / Lube Grooves, Full-Bottoming

**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 full bottoming style (1-2 thread chamfer) for blind hole tapping.

- 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



1641(UNC)	1641(UNF)
UNC	UNF
ANSI	ANSI
2B 3B	2B 3B
HSS PM	HSS PM
No.4 - 1/2	No.10 - 3/8

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch (Neck Length)	$l_3$ Inch	$d_2$ Ø Inch	$\square$ a Inch	Limits	Pack Qty	1641(UNC)	1641(UNF)
4		40	1.7/8	5/16	9/16	3/16	0.141	0.110	H3	1	6008526	—
4		40	1.7/8	5/16	9/16	3/16	0.141	0.110	H5	1	6008585	—
6		32	2"	3/8	11/16	3/16	0.141	0.110	H3	1	6008387	—
6		32	2"	3/8	11/16	3/16	0.141	0.110	H5	1	6008391	—
8		32	2.1/8	3/8	3/4	1/4	0.141	0.110	H3	1	6008411	—
8		32	2.1/8	3/8	3/4	1/4	0.141	0.110	H5	1	6008416	—
	10	32	2.3/8	1/2	7/8	1/4	0.194	0.152	H4	1	—	6008114
	10	32	2.3/8	1/2	7/8	1/4	0.194	0.152	H6	1	—	6008115
10		24	2.3/8	1/2	7/8	1/4	0.194	0.152	H6	1	6008113	—
	1/4	28	2.1/2	5/8	1"	5/16	0.255	0.191	H4	1	—	6008110
	1/4	28	2.1/2	5/8	1"	5/16	0.255	0.191	H6	1	—	6008111
1/4		20	2.1/2	5/8	1"	5/16	0.255	0.191	H4	1	6008108	—
1/4		20	2.1/2	5/8	1"	5/16	0.255	0.191	H6	1	6008109	—
	5/16	24	2.23/32	11/16	1.1/8	3/8	0.318	0.238	H7	1	—	6008383
5/16		18	2.23/32	11/16	1.1/8	3/8	0.318	0.238	H5	1	6008605	—
5/16		18	2.23/32	11/16	1.1/8	3/8	0.318	0.238	H7	1	6008608	—
	3/8	24	2.15/16	3/4	1.1/4	7/16	0.381	0.286	H7	1	—	6008476
3/8		16	2.15/16	3/4	1.1/4	7/16	0.381	0.286	H5	1	6008117	—
3/8		16	2.15/16	3/4	1.1/4	7/16	0.381	0.286	H7	1	6008374	—
1/2		13	3.3/8	15/16	1.21/32	7/16	0.367	0.275	H5	1	6008102	—
1/2		13	3.3/8	15/16	1.21/32	7/16	0.367	0.275	H8	1	6008104	—

# THREAD FORMING TAPS



## Multi-Application / Lube Grooves, Full-Bottoming

**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 full bottoming style for blind hole tapping.

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



1671(M)

M

ANSI

6H



HSS  
PM



M3 - M10

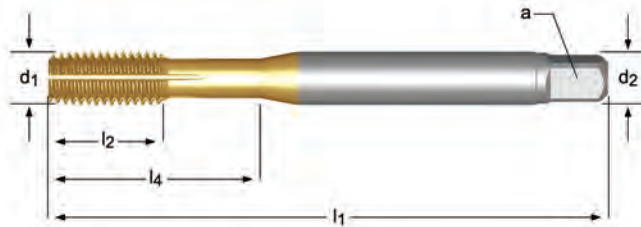
M	P mm	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch (Neck Length)	$l_3$ Inch	$d_2$ Ø Inch	$\square$ a Inch	Limits	Pack Qty	1671(M)
3	0.50	1.15/16	5/16	1/2	3/16	0.141	0.110	D5	1	6008385
4	0.70	2.1/8	3/8	3/4	1/4	0.168	0.131	D6	1	6008389
5	0.80	2.3/8	1/2	7/8	1/4	0.194	0.152	D7	1	6008393
6	1.00	2.1/2	5/8	1"	5/16	0.255	0.191	D8	1	6008397
8	1.00	2.23/32	11/16	1.1/8	3/8	0.318	0.238	D9	1	6008401
8	1.25	2.23/32	11/16	1.1/8	3/8	0.318	0.238	D9	1	6008405
10	1.50	2.15/16	3/4	1.1/4	7/16	0.381	0.286	D10	1	6008375

## MXR Multi-Application / Lube Grooves, Semi-Bottoming



**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.

- 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



1681AP(UNC)	1681AP(UNF)
<b>UNC</b>	<b>UNF</b>
<b>DIN ANSI</b>	<b>DIN ANSI</b>
<b>2B</b>	<b>2B</b>
<b>HSS PM</b>	<b>HSS PM</b>
No.4 - 1"	No.10 - 7/8

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch (Neck Length)	Limits	$d_2$ $\varnothing$ Inch	$a$ Inch	Pack Qty	1681AP (UNC)	1681AP (UNF)
4		40	2.205	0.433	0.709	H5	0.141	0.110	1	6204945	<sup>1)</sup> —
6		32	2.205	0.472	0.787	H5	0.141	0.110	1	6204950	<sup>1)</sup> —
8		32	2.480	0.512	0.827	H5	0.168	0.131	1	6204955	<sup>1)</sup> —
	10	32	2.756	0.512	0.984	H6	0.194	0.152	1	—	6204938 <sup>1)</sup>
10		24	2.756	0.591	0.984	H6	0.194	0.152	1	6204937	<sup>1)</sup> —
12		24	3.150	0.630	1.142	H6	0.220	0.165	1	6371643	<sup>1)</sup> —
	1/4	28	3.150	0.669	1.181	H6	0.255	0.191	1	—	6204936 <sup>1)</sup>
1/4		20	3.150	0.669	1.181	H6	0.255	0.191	1	6204935	<sup>1)</sup> —
	5/16	24	3.543	0.669	1.378	H7	0.318	0.238	1	—	6204947 <sup>1)</sup>
5/16		18	3.546	0.787	1.378	H7	0.318	0.238	1	6204946	<sup>1)</sup> —
	3/8	24	3.937	0.709	1.535	H7	0.381	0.286	1	—	6204944 <sup>1)</sup>
3/8		16	3.937	0.866	1.535	H7	0.381	0.286	1	6204943	<sup>1)</sup> —
	7/16	20	3.937	0.866	—	H8	0.323	0.242	1	—	6204952 <sup>2)</sup>
7/16		14	3.937	0.866	—	H8	0.323	0.242	1	6204951	<sup>2)</sup> —
	1/2	20	3.937	0.866	—	H8	0.397	0.275	1	—	6204934 <sup>2)</sup>
1/2		13	4.331	0.984	—	H8	0.367	0.275	1	6204933	<sup>2)</sup> —
5/8		11	4.331	1.063	—	H8	0.480	0.360	1	6204948	<sup>2)</sup> —
	3/4	16	4.331	0.984	—	H8	0.590	0.442	1	—	6204942 <sup>2)</sup>
3/4		10	4.921	1.181	—	H8	0.590	0.442	1	6204941	<sup>2)</sup> —
	7/8	14	4.921	1.024	—	H9	0.697	0.523	1	—	6204953 <sup>2)</sup>
7/8		9	5.512	1.260	—	H9	0.697	0.523	1	6204954	<sup>2)</sup> —
1"		8	6.299	1.417	—	H9	0.800	0.600	1	6204940	<sup>2)</sup> —

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks



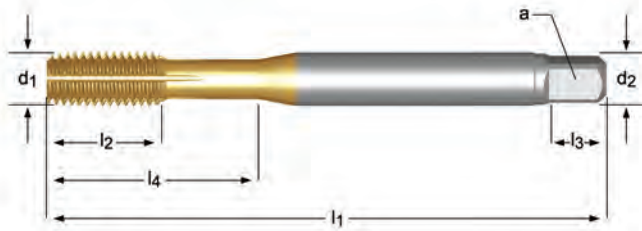
# THREAD FORMING TAPS



## MXR Multi-Application / Lube Grooves, Semi-Bottoming

**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



1691AP(UNC)	1691AP(UNF)
UNC	UNF
DIN ANSI	DIN ANSI
2B	2B
HSS PM	HSS PM
1/4 - 1"	5/16 - 1/2

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$l_4$ Inch (Neck Length)	Limits	$d_2$ $\varnothing$ Inch	$\square$ a Inch	Pack Qty	1691AP (UNC)	1691AP (UNF)
1/4		20	3.150	0.669	1.181	H6	0.255	0.191	1	6204976 <sup>1)</sup>	—
	5/16	24	3.543	0.669	1.378	H7	0.318	0.238	1	—	6204985 <sup>1)</sup>
5/16		18	3.546	0.787	1.378	H7	0.318	0.238	1	6204984 <sup>1)</sup>	—
	3/8	24	3.937	0.709	1.535	H7	0.381	0.286	1	—	6204983 <sup>1)</sup>
3/8		16	3.937	0.866	1.535	H7	0.381	0.286	1	6204982 <sup>1)</sup>	—
	7/16	20	3.937	0.866	—	H8	0.323	0.242	1	—	6204989 <sup>2)</sup>
	1/2	20	3.937	0.866	—	H8	0.397	0.275	1	—	6204975 <sup>2)</sup>
1/2		13	4.331	0.984	—	H8	0.367	0.275	1	6204974 <sup>2)</sup>	—
5/8		11	4.331	1.063	—	H8	0.480	0.360	1	6204986 <sup>2)</sup>	—
3/4		10	4.921	1.181	—	H8	0.590	0.442	1	6204980 <sup>2)</sup>	—
1"		8	6.299	1.417	—	H9	0.800	0.600	1	6204979 <sup>2)</sup>	—

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks



## MXR Multi-Application / Lube Grooves, Semi-Bottoming

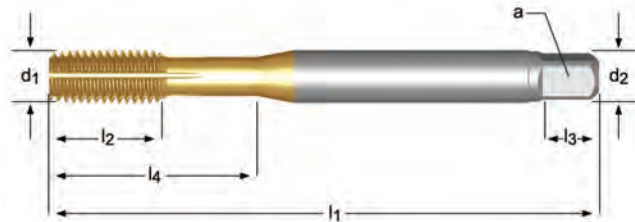


**1687AP** Premium PM substrate provides superior abrasion resistance and edge strength. Multiple Lube Groove design assures lubrication in the forming zone and eliminates the build up of hydraulic pressure in blind holes. The TiN-Top coating process reduces friction, prevents chip welding and improves 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



1687AP		1697AP	
M	MF	M	
DIN ANSI		DIN ANSI	
6H		6H	
HSS PM		HSS PM	
M4 - M20		M6 - M20	

M	MF	P mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>2</sub> Inch	l <sub>4</sub> Inch (Neck Length)	Limits	d <sub>2</sub> ∅ Inch	a Inch	Pack Qty	1687AP	1697AP
4		0.70	63	13		21	D6	0.168	0.131	1	6204970	<sup>1)</sup> —
5		0.80	70	15		25	D7	0.194	0.152	1	6204971	<sup>1)</sup> —
6		1.00	80	17		30	D8	0.255	0.191	1	6204972	<sup>1)</sup> 6205004
8		1.25	90	20		25	D9	0.318	0.238	1	6204973	<sup>1)</sup> —
8		1.25	90	20		35	D9	0.318	0.238	1	—	<sup>1)</sup> 6205005
	10	1.25	100	16		39	D10	0.381	0.286	1	6204956	<sup>1)</sup> —
10		1.50	100	22		39	D10	0.381	0.286	1	6204957	<sup>1)</sup> 6204991
	12	1.50	100	22			D11	0.367	0.275	1	6204958	<sup>2)</sup> —
12		1.75	110	24			D11	0.367	0.275	1	6204959	<sup>2)</sup> 6204993
	14	1.50	100	22			D10	0.429	0.322	1	6204960	<sup>2)</sup> —
14		2.00	110	26			D11	0.429	0.322	1	6204961	<sup>2)</sup> —
	16	1.50	100	22			D10	0.480	0.360	1	6204962	<sup>2)</sup> —
16		2.00	110	27			D11	0.480	0.360	1	6204963	<sup>2)</sup> 6204997
	20	1.50	125		25		D11	0.652	0.489	1	—	<sup>2)</sup> 6205000
20		2.50	140	32			D12	0.652	0.489	1	6204967	<sup>2)</sup> —

<sup>1)</sup> Reinforced Shanks

<sup>2)</sup> Reduced Shanks

# PIPE TAPS, STRAIGHT FLUTE



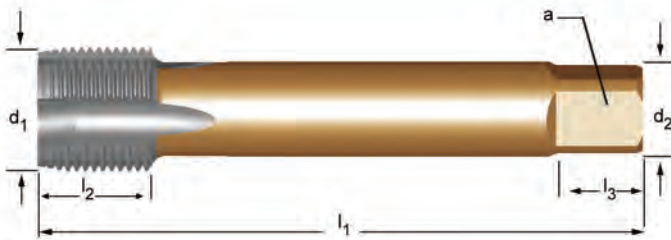
## Parallel Thread, G (BSP), Plug Style

**EP40** Bronze tempered 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 tempered 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



G(BSP)	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of flutes		Pack Qty	EP40	EP41
1/8	28	9.728	90	18	7.0	5.5	8	3	8.8	1	5973943	5973972
1/4	19	13.157	100	21	11.0	9.0	12	3	11.8	1	5973939	5973969
3/8	19	16.662	100	21	12.0	9.0	12	4	15.25	1	5973951	5973978
1/2	14	20.955	125	24	16.0	12.0	15	4	19	1	5973935	5973966
5/8	14	22.911	125	24	18.0	14.5	17	4	21	1	5973954	5973981
3/4	14	26.441	140	28	20.0	16.0	19	4	24.5	1	5973947	5973975
7/8	14	30.201	150	28	22.0	18.0	21	4	28.25	1	5973960	5973984
1"	11	33.249	160	30	25.0	20.0	23	4	30.75	1	5973931	5973963

**Note:** DIN shank and square dimensions will necessitate metric holders

## Parallel Thread, G(BSP), Plug Style

**E041** Steam tempered 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



**E041**

**G**

**DORMER ISO**

Normal

**HSS-E**

1/8 - 3/4

G(BSP)	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of Flutes		Pack Qty	E041
1/8	28	9.728	90	15	8.0	6.3	9	3	8.80	1	5973928
1/4	19	13.157	100	19	10.0	8.0	11	3	11.80	1	5973924
3/8	19	16.662	100	21	12.5	10.0	13	3	15.25	1	5973936
1/2	14	20.955	125	26	16.0	12.5	16	4	19.00	1	5973920
3/4	14	26.441	140	28	20.0	16.0	20	4	24.50	1	5973932

**Note:** ISO shank and square dimensions will necessitate metric holders

# PIPE TAPS, SPIRAL FLUTE



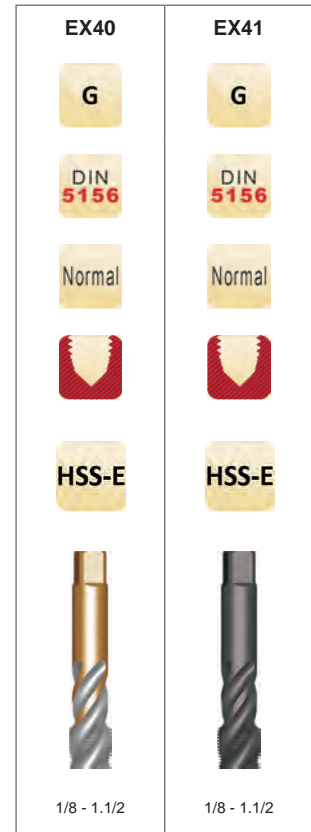
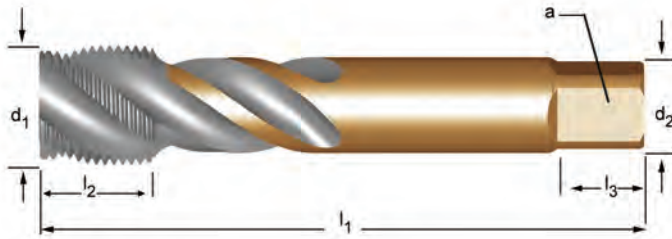
## Parallel Thread, G(BSP), Semi- Bottoming

**EX40** Bronze tempered 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 tempered 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



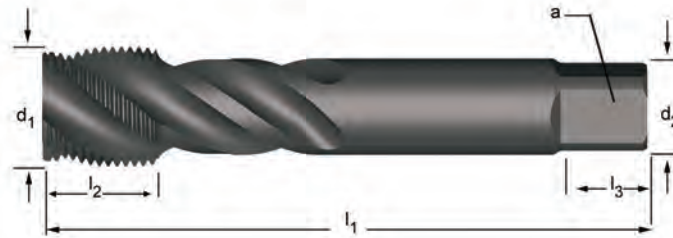
G(BSP)	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of flutes		Pack Qty	EX40	EX41
1/8	28	9.728	90	13	7.0	5.5	8	3	8.8	1	5974218	5973910
1/4	19	13.157	100	15	11.0	9.0	12	3	11.8	1	5974214	5973905
3/8	19	16.662	100	15	12.0	9.0	12	4	15.25	1	5974225	5973753
1/2	14	20.955	125	18	16.0	12.0	15	4	19	1	5974210	5973900
5/8	14	22.911	125	18	18.0	14.5	17	4	21	1	5974232	5973755
3/4	14	26.441	140	20	20.0	16.0	19	4	24.5	1	5974222	5973915
7/8	14	30.201	150	20	22.0	18.0	21	4	28.25	1	5973750	5973757
1"	11	33.249	160	22	25.0	20.0	23	4	30.75	1	5974195	5973773
1.1/8	11	37.897	170	22	28.0	22.0	25	4	35	1	5974206	5973890
1.1/4	11	41.910	170	22	32.0	24.0	27	4	39.5	1	5974202	5973838
1.1/2	11	47.803	190	23	36.0	29.0	32	4	45	1	5974199	5973797

**Note: DIN shank and square dimensions will necessitate metric holders**

## Parallel Thread, G(BSP), Semi-Bottoming

**E043** Steam tempered 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



E043

G

DORMER  
ISO

Normal



HSS-E



1/8 - 3/4

G(BSP)	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> ∅ mm	□ a mm	l <sub>3</sub> mm	# of flutes		Pack Qty	E043
1/8	28	9.728	90	15	8.0	6.3	9	3	8.80	1	5973967
1/4	19	13.157	100	19	10.0	8.0	11	3	11.80	1	5973964
3/8	19	16.662	100	21	12.5	10.0	13	4	15.25	1	5973973
1/2	14	20.955	125	26	16.0	12.5	16	4	19.00	1	5973961
3/4	14	26.441	140	28	20.0	16.0	20	4	24.50	1	5973970

**Note:** ISO shank and square dimensions will necessitate metric holders

# HAND TAPS



## General Purpose

**1500**  
**1500S**  
**1528**  
**1528S**

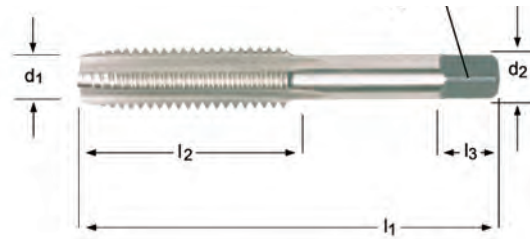
The most versatile taps for hand use or machine tapping in a wide variety of materials in through or blind hole applications. Available in 3 chamfer lengths - taper, plug, and bottoming.

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

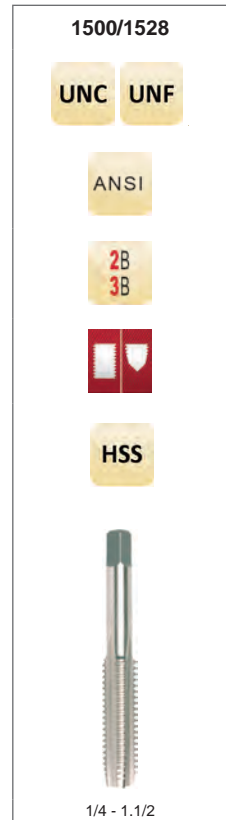
1500 - Fractional sizes

1528 - Machine screw sizes

1500S / 1528S - Sets include 1 of each tap (Taper, Plug, and Bottoming)



- Sizes 0 thru 3/8 have male centers on thread end
- Sizes larger than 3/8 all have female centers / flat ends



Nominal $d_1$	TPI UNC	TPI UNF	TPI UNS	$l_1$ Inch	$l_2$ Inch	$d_2$ $\varnothing$ Inch /	$\square$ a Inch	$l_3$ Inch	# 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	6007279	6007342	6007366	6006774
0		80		1.5/8	5/16	0.1410	0.1100	3/16	2	H2	1	—	6007368	6007369	—
1	64			1.11/16	3/8	0.1410	0.1100	3/16	2	H1	1	6007370	6007371	6007167	6006781
1		72		1.11/16	3/8	0.1410	0.1100	3/16	2	H1	1	6007181	6007184	6007189	6006785
2	56			1.3/4	7/16	0.1410	0.1100	3/16	2	H2	1	—	6007357	6007359	—
2	56			1.3/4	7/16	0.1410	0.1100	3/16	3	H1	1	6007341	6007350	6007354	—
2	56			1.3/4	7/16	0.1410	0.1100	3/16	3	H2	1	6007143	6007148	6007151	6006808
2		64		1.3/4	7/16	0.1410	0.1100	3/16	3	H2	1	—	—	—	6006811
3	48			1.13/16	1/2	0.1410	0.1100	3/16	2	H2	1	—	6007174	—	—
3	48			1.13/16	1/2	0.1410	0.1100	3/16	3	H2	1	6007178	6007180	6007190	6006817
3		56		1.13/16	1/2	0.1410	0.1100	3/16	3	H2	1	6007195	6007200	6007205	6006820
4	40			1.7/8	9/16	0.1410	0.1100	3/16	2	H2	1	—	6007250	6007255	—
4	40			1.7/8	9/16	0.1410	0.1100	3/16	3	H1	1	6007229	6007235	6007245	—
4	40			1.7/8	9/16	0.1410	0.1100	3/16	3	H2	1	6007260	6007265	6007270	6006826
4		48		1.7/8	9/16	0.1410	0.1100	3/16	3	H2	1	6007275	6007277	6007284	6006829
5	40			1.15/16	5/8	0.1410	0.1100	3/16	3	H2	1	6007298	6007303	6007307	6006832
5		44		1.15/16	5/8	0.1410	0.1100	3/16	3	H2	1	6007315	6007318	6007322	6006838
6	32			2"	11/16	0.1410	0.1100	3/16	2	H2	1	—	6006942	6007002	—
6	32			2"	11/16	0.1410	0.1100	3/16	2	H3	1	—	6007109	6007112	—
6	32			2"	11/16	0.1410	0.1100	3/16	3	H1	1	6007331	6007336	6007346	—
6	32			2"	11/16	0.1410	0.1100	3/16	3	H2	1	6007042	6007074	6007104	6006844
6	32			2"	11/16	0.1410	0.1100	3/16	3	H3	1	6007114	6007116	6006947	6006848
6		40		2"	11/16	0.1410	0.1100	3/16	3	H2	1	6006965	6006970	6006974	6006852

Nominal d <sub>1</sub>	TPI UNC	TPI UNF	TPI UNS	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> Ø Inch /	□ a Inch	l <sub>3</sub> Inch	# 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	—	6006984	6006988	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	2	H3	1	—	6007018	6007022	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	3	H2	1	—	6006991	6006999	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	3	H3	1	—	6007026	6007031	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	4	H1	1	—	6006980	—	—
8	32			2.1/8	3/4	0.1680	0.1310	1/4	4	H2	1	6007006	6007010	6007014	6006860
8	32			2.1/8	3/4	0.1680	0.1310	1/4	4	H3	1	6007034	6007037	6007039	6007159
8		36		2.1/8	3/4	0.1680	0.1310	1/4	4	H2	1	6007045	6007048	6007051	6007221
10	24			2.3/8	7/8	0.1940	0.1520	1/4	2	H2	1	—	6007216	6007225	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	—	6007253	6007259	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	3	H2	1	—	6007233	—	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	—	6007263	6007267	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	4	H1	1	—	6007209	—	—
10	24			2.3/8	7/8	0.1940	0.1520	1/4	4	H2	1	6007238	6007243	6007247	6006789
10	24			2.3/8	7/8	0.1940	0.1520	1/4	4	H3	1	6007273	6007285	6007294	6006792
10		32		2.3/8	7/8	0.1940	0.1520	1/4	2	H2	1	—	6007309	6007313	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	—	6007351	6007355	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	3	H2	1	—	6007324	6007328	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	—	6007358	6007360	—
10		32		2.3/8	7/8	0.1940	0.1520	1/4	4	H2	1	6007333	6007338	6007347	6006796
10		32		2.3/8	7/8	0.1940	0.1520	1/4	4	H3	1	6007361	6007362	6007363	6006799
12	24			2.3/8	15/16	0.2200	0.1650	9/32	4	H3	1	6007364	6007365	6007367	6006802
12		28		2.3/8	15/16	0.2200	0.1650	9/32	4	H3	1	6007136	6007186	6007240	6006805
1/4	20			2.1/2	1"	0.2550	0.1910	5/16	4	H1	1	6006971	6006976	6006987	—
1/4	20			2.1/2	1"	0.2550	0.1910	5/16	4	H2	1	6006993	6006995	6006997	—
1/4	20			2.1/2	1"	0.2550	0.1910	5/16	4	H3	1	6007003	6007007	6007011	6006718
1/4	20			2.1/2	1"	0.2550	0.1910	5/16	4	H5	1	—	6007015	6007019	—
1/4		28		2.1/2	1"	0.2550	0.1910	5/16	4	H2	1	—	6007035	6007038	—
1/4		28		2.1/2	1"	0.2550	0.1910	5/16	4	H3	1	6007041	6007044	6007047	6006949
1/4		28		2.1/2	1"	0.2550	0.1910	5/16	4	H4	1	—	6007050	6007054	—
5/16	18			2.23/32	1.1/8	0.3180	0.2380	3/8	4	H2	1	6007244	6007248	6007254	—
5/16	18			2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	1	6007257	6007262	6007274	6006960
5/16		24		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	1	6007301	6007306	6007317	6006964
3/8	16			2.15/16	1.1/4	0.3810	0.2860	7/16	4	H2	1	6007156	6007166	6007172	—
3/8	16			2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	6007176	6007182	6007185	6007121
3/8	16			2.15/16	1.1/4	0.3810	0.2860	7/16	4	H5	1	—	6007193	6007198	—
3/8		24		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	6007212	6007222	6007227	6006957
7/16	14			3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	1	6007402	6007406	6007410	6006979
7/16		20		3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	1	6007431	6007436	6007441	6006990
1/2	13			3.3/8	1.21/32	0.3670	0.2750	7/16	4	H2	1	—	6007063	6007095	—
1/2	13			3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	6007100	6007103	6007107	6006703
1/2	13			3.3/8	1.21/32	0.3670	0.2750	7/16	4	H5	1	—	6007110	6006941	—
1/2		20		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	6006948	6006953	6006956	6006707
9/16	12			3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	6007512	6007517	6007522	6007000
9/16		18		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	6007541	6007546	6007550	6007008
5/8	11			3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	1	6007476	6007532	6007584	6006966
5/8		18		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	1	6007607	6007380	6007384	6006975
3/4	10			4.1/4	2"	0.5900	0.4420	11/16	4	H3	1	6007344	6007349	6007353	6007119
3/4		16		4.1/4	2"	0.5900	0.4420	11/16	4	H3	1	6007133	6007138	6007141	6007120
7/8	9			4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	1	6007492	6007497	6007502	6006996
7/8		14		4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	1	6007468	6007473	6007481	6006994

# HAND TAPS

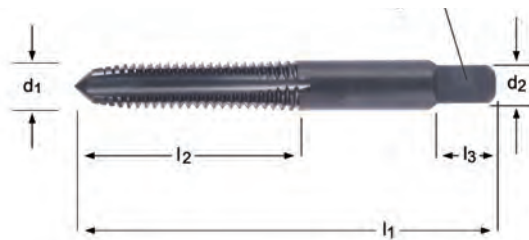


Nominal d <sub>1</sub>	TPI UNC	TPI UNF	TPI UNS	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> ∅ Inch /	□ a Inch	l <sub>3</sub> Inch	# of Flutes	Limits	Pack Qty	Taper	Plug	Bottoming	Sets
1"	8			5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	1	6007084	6007087	6007090	6007079
1"		12		5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	1	6007057	6007060	6007066	6007004
1"			14	5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	1	6007072	6007075	6007078	—
1.1/8	7			5.7/16	2.9/16	0.8960	0.6720	7/8	4	H4	1	6007086	6007089	6007091	6006691
1.1/8		12		5.7/16	2.9/16	0.8960	0.6720	7/8	4	H4	1	6007070	6007073	6007076	6006687
1.1/4	7			5.3/4	2.9/16	1.0210	0.7660	1"	4	H4	1	6007058	6007061	6007064	6006683
1.1/4		12		5.3/4	2.9/16	1.0210	0.7660	1"	6	H4	1	6007043	6007049	6007052	6006680
1.3/8	6			6.1/16	3"	1.1000	0.8310	1.1/16	4	H4	1	6007117	6006937	6006981	6006699
1.3/8		12		6.1/16	3"	1.1000	0.8310	1.1/16	6	H4	1	6007102	6007105	6007108	6006695
1.1/2	6			6.3/8	3"	1.2300	0.9250	1.1/8	4	H4	1	6007033	6007036	6007040	6006677
1.1/2		12		6.3/8	3"	1.2300	0.9250	1.1/8	6	H4	1	6007012	6007016	6007021	6006675



## General Purpose

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



<sup>1)</sup> Male centers on thread end

<sup>2)</sup> Female centers / flat ends

**1500A**

UNC
UNF

ANSI

3B

HSS

1/4 - 1"

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# 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	6006633 <sup>1)</sup>
	1/4	28	2.1/2	1.000	0.2550	0.1910	5/16	4	H3	Bottoming	1	6006651 <sup>1)</sup>
	5/16	24	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	6006623 <sup>1)</sup>
5/16		18	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	6006738 <sup>1)</sup>
	3/8	24	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	6006733 <sup>1)</sup>
3/8		16	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	6006728 <sup>1)</sup>
	7/16	20	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	6006627 <sup>2)</sup>
7/16		14	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	6006626 <sup>2)</sup>
	1/2	20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	6006622 <sup>2)</sup>
1/2		13	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	6007592 <sup>2)</sup>
	9/16	18	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	Plug	1	6006631 <sup>2)</sup>
9/16		12	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	Plug	1	6006630 <sup>2)</sup>
	5/8	18	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Plug	1	6006625 <sup>2)</sup>
5/8		11	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Plug	1	6006624 <sup>2)</sup>
	3/4	16	4.1/4	2"	0.5900	0.4420	11/16	4	H3	Plug	1	6006723 <sup>2)</sup>
3/4		10	4.1/4	2"	0.5900	0.4420	11/16	4	H3	Plug	1	6006713 <sup>2)</sup>
	7/8	14	4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	Plug	1	6006628 <sup>2)</sup>
7/8		9	4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	Plug	1	6006629 <sup>2)</sup>
1"		8	5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	Plug	1	6006673 <sup>2)</sup>

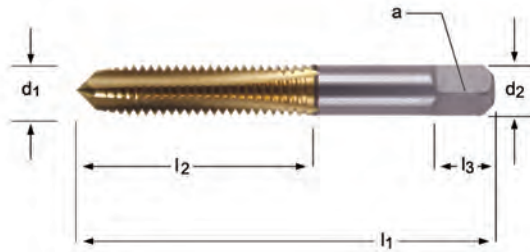
# HAND TAPS



## 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.



<sup>1)</sup> Male centers on thread end

<sup>2)</sup> Female centers / flat ends

**TN1500**

UNC
UNF

ANSI

3B

HSS

1/4 - 7/8

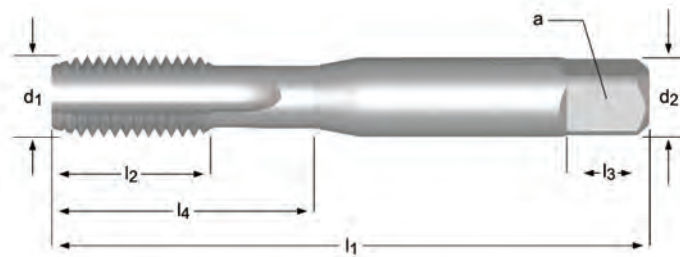
UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Chamfer	Pack Qty	TN1500
	1/4	28	2.1/2	1.0000	0.2550	0.1910	5/16	4	H3	Plug	1	6006700 <sup>1)</sup>
1/4		20	2.1/2	1.0000	0.2550	0.1910	5/16	4	H3	Plug	1	6006696 <sup>1)</sup>
	5/16	24	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	6006731 <sup>1)</sup>
5/16		18	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	6006722 <sup>1)</sup>
	3/8	24	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	6006717 <sup>1)</sup>
3/8		16	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	6006712 <sup>1)</sup>
	7/16	20	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	6006752 <sup>2)</sup>
7/16		14	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	6006748 <sup>2)</sup>
	1/2	20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	6006692 <sup>2)</sup>
1/2		13	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	6006686 <sup>2)</sup>
		13	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Bottoming	1	6006688 <sup>2)</sup>
5/8		11	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Plug	1	6006736 <sup>2)</sup>
	5/8	18	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Bottoming	1	6006745 <sup>2)</sup>
5/8		11	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Bottoming	1	6006741 <sup>2)</sup>
	3/4	16	4.1/4	2"	0.5900	0.4420	11/16	4	H3	Bottoming	1	6006708 <sup>2)</sup>
3/4		10	4.1/4	2"	0.5900	0.4420	11/16	4	H3	Bottoming	1	6006704 <sup>2)</sup>
7/8		9	4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	Plug	1	6006756 <sup>2)</sup>

## 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 semi-bottoming.

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

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



E500

M

ISO  
529

6H



HSS




M1 - M56

**Note:** ISO shank and square dimensions will necessitate metric holders

Nominal d <sub>1</sub>	Pitch M	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of Flutes	l <sub>4</sub> mm	Pack Qty	Taper	Plug	Semi - Bottoming	Sets	
1	0.25	38	4.5	2.50	2.00	4	2	0.75	4.5	1	5977027	5977031	5977035	—
1.2	0.25	38	4.5	2.50	2.00	4	2	0.95	4.5	1	5976974	5976976	5976978	—
1.4	0.30	40	6	2.50	2.00	4	2	0.95	6	1	5976982	5976983	5976985	—
1.6	0.35	41	8	2.50	2.00	4	2	1.25	8	1	5976987	5976988	5976989	5976990
1.7	0.35	41	8	2.50	2.00	4	2	1.35	8	1	5976993	5976994	5976995	5977001
1.8	0.35	41	8	2.50	2.00	4	2	1.45	8	1	5977007	5977011	5977015	—
2	0.40	41	8	2.50	2.00	4	3	1.6	8	1	5975724	5975728	5975730	5975732
2	0.45	41	8	2.50	2.00	4	3	1.55	8	1	5975593	5975597	5975603	—
2.2	0.45	44.5	9.5	2.80	2.24	5	3	1.75	9.5	1	5975398	5975404	5975410	—
2.3	0.45	44.5	9.5	2.80	2.24	5	3	1.85	9.5	1	5975432	5975437	5975442	—
2.5	0.45	44.5	9.5	2.80	2.24	5	3	2.05	9.5	1	5975452	5975456	5975461	5975466
2.6	0.45	44.5	9.5	2.80	2.24	5	3	2.15	9.5	1	5975584	5975631	5975674	—
3	0.50	48	12.5	3.15	2.50	5	3	2.5	12.5	1	5975703	5975705	5975707	5975709
3	0.60	48	12.5	3.15	2.50	5	3	2.4	12.5	1	5975715	5975717	5975720	—
3.5	0.60	50	14	3.55	2.80	5	3	2.9	14	1	5975690	5975691	5975693	5975695
4	0.70	53	14	4.00	3.15	6	3	3.3	14	1	5976765	5976770	5976774	5976783
4	0.75	53	14	4.00	3.15	6	3	3.25	14	1	5976795	5976798	5976802	—
4.5	0.75	53	9.5	4.50	3.55	6	3	3.8	18	1	5976749	5976752	5976754	5976757
5	0.80	58	11	5.00	4.00	7	3	4.2	22	1	5976871	5976878	5976886	5976890
5	0.90	58	11	5.00	4.00	7	3	4.1	22	1	5976902	5976907	5976910	—
5.5	0.90	62	12	5.60	4.50	7	3	4.6	21	1	5976854	5976858	5976862	—
6	1.00	66	13	6.30	5.00	8	3	5	26	1	5977074	5977116	5977162	5977173
7	1.00	66	13	7.10	5.60	8	3	6	26	1	5977183	5976997	5976999	5977002
8	1.25	72	16	8.00	6.30	9	3	6.8	29	1	5977012	5977016	5977020	5977024
9	1.25	72	16	9.00	7.10	10	3	7.8	29	1	5977040	5977043	5977047	5977051
10	1.50	80	18	10.00	8.00	11	3	8.5	34	1	5975273	5975320	5975367	5975419
11	1.50	85	19	8.00	6.30	9	3	9.5	—	1	5975482	5975484	5975486	5975281
12	1.75	89	22	9.00	7.10	10	3	10.3	—	1	5975288	5975293	5975296	5975302
14	2.00	95	24	11.20	9.00	12	4	12	—	1	5975313	5975317	5975324	5975328
16	2.00	102	24	12.50	10.00	13	4	14	—	1	5975340	5975344	5975349	5975355
18	2.50	112	29	14.00	11.20	14	4	15.5	—	1	5975371	5975375	5975380	5975385
20	2.50	112	29	14.00	11.20	14	4	17.5	—	1	5975607	5975610	5975614	5975619

# HAND TAPS



Nominal d <sub>1</sub>	Pitch M	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> ∅ mm	□ a mm	l <sub>3</sub> mm	# of Flutes		l <sub>4</sub> mm	Pack Qty	Taper	Plug	Semi - Bottoming	Sets
22	2.50	118	29	16.00	12.50	16	4	19.5		1	5975634	5975639	5975645	5975648
24	3.00	130	35	18.00	14.00	18	4	21		1	5975656	5975659	5975663	5975667
27	3.00	135	35	20.00	16.00	20	4	24		1	5975684	5975687	5975688	—
30	3.50	138	41	20.00	16.00	20	4	26.5		1	5975722	5975727	5976741	—
33	3.50	151	41	22.40	18.00	22	4	29.5		1	5976778	5976831	5976875	—
36	4.00	162	47	25.00	20.00	24	4	32		1	5976923	5976933	5976938	—
39	4.00	170	47	28.00	22.40	26	4	35		1	5976941	5976944	5976746	—
42	4.50	170	53	28.00	22.40	26	6	37.5		1	5976807	5976812	5976815	—
45	4.50	187	54	31.50	25.00	28	6	40.5		1	5976826	5976837	5976841	—
48	5.00	187	60	31.50	25.00	28	6	43		1	5976844	5976847	5976850	—
52	5.00	200	60	35.50	28.00	31	6	47		1	—	—	5976992	—
56	5.50	200	60	35.50	28.00	31	6	50.5		1	—	—	5977032	—

Note: ISO shank and square dimensions will necessitate metric holders

## 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 semi-bottoming.

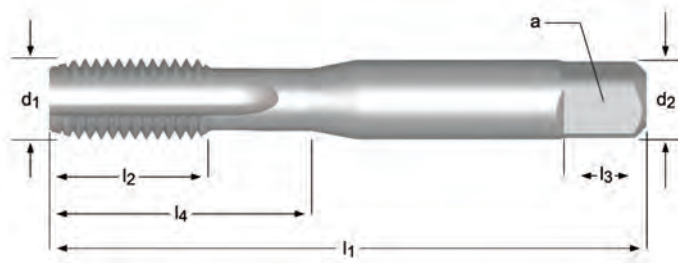
Taper - 7-10 pitch chamfer length

Plug - 3-5 pitch chamfer length

Semi-Bottoming - 1-2 pitch chamfer length

3 pc.(No.6) sets include 1 of each tap (Taper, Plug and Bottoming)

2 pc.(No.7) sets include 1 of each tap (Plug and Bottoming)



E513

MF

ISO  
529

6H



HSS




M3 - M50

**Note: ISO shank and square dimensions will necessitate metric holders**

Nominal d <sub>1</sub>	Pitch MF	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	# of Flutes	l <sub>3</sub> mm	l <sub>4</sub> mm	Pack Qty	Taper	Plug	Semi - Bottoming	2 Pc Sets	3 Pc Sets	
3	0.35	48	12.5	3.15	2.50	3	5	2.65	12.5	1	5977029	5977033	5977041	—	—
3.5	0.35	48	12.5	3.15	2.50	3	5	3.2	12.5	1	—	—	5977025	—	—
4	0.50	53	14	4.00	3.15	3	6	3.5	14	1	5977117	5977125	5977128	5977133	—
5	0.50	58	11	5.00	4.00	3	7	4.5	22	1	5977153	5977196	5977223	5977227	—
5	0.75	58	11	5.00	4.00	3	7	4.3	22	1	5977229	5977231	5977233	—	—
6	0.50	66	13	6.30	5.00	3	8	5.5	26	1	5977076	5977080	5977083	—	—
6	0.75	66	13	6.30	5.00	3	8	5.3	26	1	5977087	5977094	5977098	5977102	—
7	0.75	66	13	7.10	5.60	3	8	6.3	26	1	5977106	5977114	5977118	—	—
8	0.50	72	16	8.00	6.30	3	9	7.5	29	1	5977122	5977126	5977130	—	—
8	0.75	72	16	8.00	6.30	3	9	7.3	29	1	5977134	5977136	5977141	5977145	—
8	1.00	72	16	8.00	6.30	3	9	7	29	1	5977149	5977155	5977161	5977163	—
9	0.75	72	16	9.00	7.10	3	10	8.3	29	1	—	—	5977168	—	—
9	1.00	72	16	9.00	7.10	3	10	8	29	1	5977172	5977177	5977182	—	—
10	0.50	80	18	10.00	8.00	3	11	9.5	34	1	—	—	5977390	—	—
10	0.75	80	18	10.00	8.00	3	11	9.3	34	1	5977393	5977396	5977398	—	—
10	1.00	80	18	10.00	8.00	3	11	9	34	1	5977402	5977404	5977407	5976716	5976682
10	1.25	80	18	10.00	8.00	3	11	8.8	34	1	5976737	5976768	5976817	5976833	5976828
11	0.75	85	19	8.00	6.30	3	9	10.3	—	1	5976838	5976843	5976686	—	—
11	1.00	85	19	8.00	6.30	3	9	10	—	1	5976690	5976693	5976696	—	—
11	1.25	85	19	8.00	6.30	3	9	9.8	—	1	—	—	5976699	—	—
12	0.75	89	22	9.00	7.10	3	10	11.3	—	1	—	—	5976702	—	—
12	1.00	89	22	9.00	7.10	3	10	11	—	1	5976704	5976707	5976710	5976713	—
12	1.25	89	22	9.00	7.10	3	10	10.8	—	1	5976718	5976719	5976721	5976725	5976723
12	1.50	89	22	9.00	7.10	3	10	10.5	—	1	5976727	5976729	5976731	5976735	5976733
13	1.50	89	22	9.00	7.10	3	10	11.5	—	1	—	—	5976739	—	—
14	1.00	95	24	11.20	9.00	4	12	13	—	1	5976742	5976744	5976747	5976751	—
14	1.25	95	24	11.20	9.00	4	12	12.8	—	1	5976755	5976758	5976760	—	5976763
14	1.50	95	24	11.20	9.00	4	12	12.5	—	1	5976773	5976777	5976780	5976788	5976784
15	1.50	95	24	11.20	9.00	4	12	13.5	—	1	—	5976793	5976797	—	—
16	1.00	102	24	12.50	10.00	4	13	15	—	1	5976806	5976813	5976823	5977250	—
16	1.25	102	24	12.50	10.00	4	13	14.8	—	1	—	—	5977291	—	—
16	1.50	102	24	12.50	10.00	4	13	14.5	—	1	5977327	5977362	5977395	5977401	5977400

# HAND TAPS

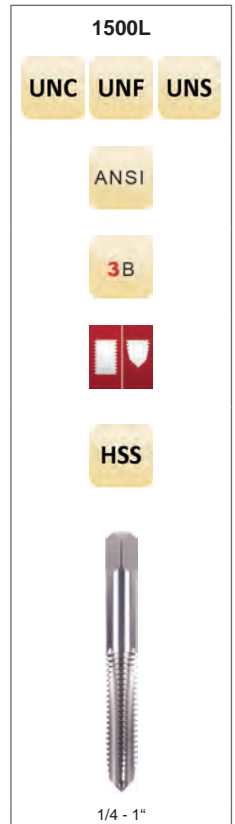
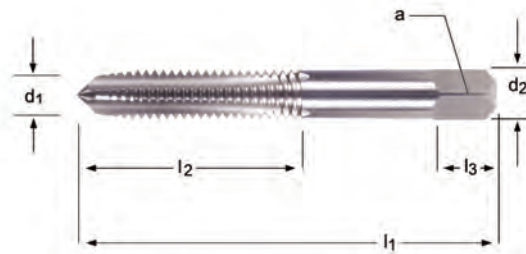


Nominal d <sub>1</sub>	Pitch MF	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	# of Flutes	l <sub>3</sub> mm		l <sub>4</sub> mm	Pack Qty	Taper	Plug	Semi - Bottoming	2 Pc Sets	3 Pc Sets
18	1.00	112	29	14.00	11.20	4	14	17		1	5977403	5977405	5977255	5977258	—
18	1.50	112	29	14.00	11.20	4	14	16.5		1	5977261	5977264	5977267	5977275	5977271
18	2.00	112	29	14.00	11.20	4	14	16		1	5977279	5977283	5977287	5977295	—
20	1.00	112	29	14.00	11.20	4	14	19		1	5977299	5977302	5977305	5977308	—
20	1.50	112	29	14.00	11.20	4	14	18.5		1	5977311	5977314	5977318	5977324	5977322
20	2.00	112	29	14.00	11.20	4	14	18		1	5977330	5977333	5977336	5977341	—
22	1.00	118	29	16.00	12.50	4	16	21		1	—	5977344	5977347	5977350	—
22	1.50	118	29	16.00	12.50	4	16	20.5		1	5977353	5977356	5977359	5977365	—
22	2.00	118	29	16.00	12.50	4	16	20		1	5977369	5977372	5977375	5977378	—
24	1.00	130	35	18.00	14.00	4	18	23		1	—	5977381	5977383	—	—
24	1.50	130	35	18.00	14.00	4	18	22.5		1	5977386	5977389	5977392	5977399	—
24	2.00	130	35	18.00	14.00	4	18	22		1	5976996	5977038	5977079	5977121	—
25	1.50	130	35	18.00	14.00	4	18	23.5		1	5977166	5977175	5977179	5977193	5977187
26	1.50	130	35	18.00	14.00	4	18	24.5		1	—	5977000	5977003	—	—
27	1.50	135	35	20.00	16.00	4	20	25.5		1	—	5977006	5977010	—	—
27	2.00	135	35	20.00	16.00	4	20	25		1	—	—	5977013	—	—
28	1.50	138	35	20.00	16.00	4	20	26.5		1	—	5977017	5977021	—	—
30	1.50	138	41	20.00	16.00	4	20	28.5		1	—	5977045	5977049	—	—
30	2.00	138	41	20.00	16.00	4	20	28		1	—	5977053	5977057	—	—
32	1.50	151	41	22.40	18.00	4	22	30.5		1	5977062	5977065	5977068	—	—
33	2.00	151	41	22.40	18.00	4	22	31		1	—	5977071	5977075	—	—
35	1.50	162	47	25.00	20.00	4	24	33.5		1	—	5977082	5977086	—	—
36	1.50	162	47	25.00	20.00	4	24	34.5		1	—	—	5977090	—	—
36	2.00	162	47	25.00	20.00	4	24	34		1	—	5977093	5977097	—	—
36	3.00	162	47	25.00	20.00	4	24	33		1	—	5977101	5977105	—	—
39	3.00	170	47	28.00	22.40	4	26	36		1	—	5977109	5977113	—	—
40	1.50	170	53	28.00	22.40	6	26	38.5		1	—	5977137	5977140	—	—
42	1.50	170	53	28.00	22.40	6	26	40.5		1	—	5977144	5977151	—	—
42	3.00	170	53	28.00	22.40	6	26	39		1	—	—	5977156	—	—
45	1.50	187	54	31.50	25.00	6	28	43.5		1	—	5977160	5977164	—	—
48	1.50	187	60	31.50	25.00	6	28	46.5		1	—	—	5977170	—	—
48	2.00	187	60	31.50	25.00	6	28	46		1	—	—	5977058	—	—
48	3.00	187	60	31.50	25.00	6	28	45		1	—	—	5977110	—	—
50	1.50	187	60	31.50	25.00	6	28	48.5		1	—	5977067	5977072	—	—

Note: ISO shank and square dimensions will necessitate metric holders

## 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.



			$l_1$	$l_2$	$d_2$	$\square$	$l_3$	# of Flutes	Limits	Chamfer	Pack Qty	1500L	
UNC	UNF	UNS	TPI	Inch	Inch	$\varnothing$	a						Inch
	1/4		28	2.1/2	1"	0.2550	0.1910	5/16	4	H3	Plug	1	6006636
1/4			20	2.1/2	1"	0.2550	0.1910	5/16	4	H3	Plug	1	6006635
	5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	6006655
5/16			18	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	6006653
	3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	6006649
3/8			16	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	6006647
	7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	6006663
7/16			14	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	Plug	1	6006661
	1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	6006634
1/2			13	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	Plug	1	6006632
	9/16		18	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	Plug	1	6006671
9/16			12	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	Plug	1	6006669
	5/8		18	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Plug	1	6006659
5/8			11	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	Plug	1	6006657
	3/4		16	4.1/4	2"	0.5900	0.4420	11/16	4	H3	Plug	1	6006645
3/4			10	4.1/4	2"	0.5900	0.4420	11/16	4	H3	Plug	1	6006643
	7/8		14	4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	Plug	1	6006665
7/8			9	4.11/16	2.7/32	0.6970	0.5230	3/4	4	H4	Plug	1	6006667
	1"		12	5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	Plug	1	6006637
1"			8	5.1/8	2.1/2	0.8000	0.6000	13/16	4	H4	Plug	1	6006641

# HAND TAPS



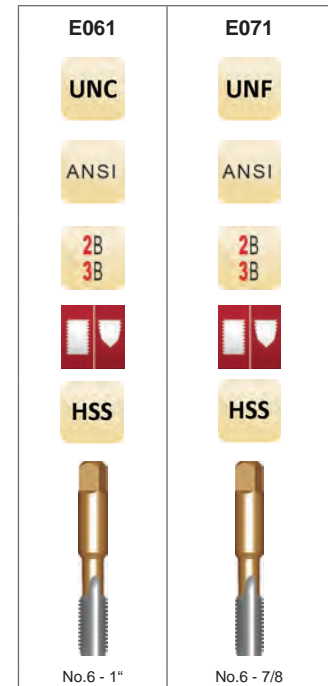
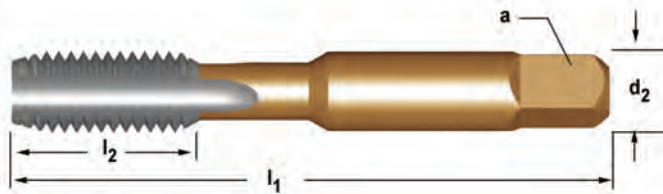
## General Purpose

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

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

Premium substrate with bronze tempered 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 <sub>1</sub>	TP	TPI	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	a	# of Flutes	Limits	l <sub>4</sub>	Pack Qty	Taper	Plug	Semi - Bottoming	Sets	
d <sub>1</sub>	UNC	UNF	Inch	Inch	Inch /	Inch			Inch						
6	32	2"	0.5800	0.1410	0.1100	3	H3	36	2.85	0.5800	1	5974286	5974288	5974290	5974295
6	40	2"	0.5800	0.1410	0.1100	3	H2	33	2.90	0.5800	1	5974142	5974147	5974152	5974162
8	32	2.1/8	0.6500	0.1680	0.1310	4	H3	29	3.50	0.6500	1	5974326	5974335	5974337	5974342
8	36	2.1/8	0.6500	0.1680	0.1310	4	H2	29	3.50	0.6500	1	5974198	5974205	5974209	5974213
10	24	2.3/8	0.7600	0.1940	0.1520	4	H3	25	3.90	0.7600	1	5974292	5974330	5974387	5974396
10	32	2.3/8	0.7600	0.1940	0.1520	4	H3	21	4.10	0.7600	1	5974157	5974201	5974239	5974244
12	24	2.3/8	0.8100	0.2200	0.1650	4	H3	16	4.50	0.8100	1	5974402	5974406	5974412	5974257
12	28	2.3/8	0.8100	0.2200	0.1650	4	H3	15	4.70	0.8100	1	5974247	5974249	5974250	5974063
1/4	20	2.1/2	0.6500	0.2550	0.1910	4	H3	7	5.10	1.0630	1	5974924	5974927	5974930	5974933
1/4	28	2.1/2	0.6500	0.2550	0.1910	4	H3	3	5.50	1.0630	1	5974681	5974685	5974689	5974694
5/16	18	2.23/32	0.7700	0.3180	0.2380	4	H3	F	6.60	1.2598	1	5974272	5974274	5974275	5974277
5/16	24	2.23/32	0.7700	0.3180	0.2380	4	H3	I	6.90	1.2598	1	5974100	5974108	5974114	5974118
3/8	16	2.15/16	0.8100	0.3810	0.2860	4	H3	5/16	8.00	1.3780	1	5974267	5974269	5974270	5974271
3/8	24	2.15/16	0.8100	0.3810	0.2860	4	H3	Q	8.50	1.3780	1	5974082	5974086	5974091	5974094
7/16	14	3.5/32	0.9055	0.3230	0.2420	4	H3	U	9.40		1	5974298	5974300	5974303	5974307
7/16	20	3.5/32	0.9055	0.3230	0.2420	4	H3	25/64	9.90		1	5974166	5974170	5974175	5974179
1/2	13	3.3/8	0.9055	0.3670	0.2750	4	H3	27/64	10.80		1	5974912	5974915	5974918	5974921
1/2	20	3.3/8	0.9055	0.3670	0.2750	4	H3	29/64	11.50		1	5974659	5974664	5974668	5974679
9/16	12	3.19/32	0.9843	0.4290	0.3220	4	H3	27/64	12.20		1	5974347	5974355	5974363	5974368
9/16	18	3.19/32	0.9843	0.4290	0.3220	4	H3	33/64	12.90		1	5974217	5974221	5974224	5974227
5/8	11	3.13/16	0.9843	0.4800	0.3600	4	H3	17/32	13.50		1	5974278	5974280	5974282	5974284
5/8	18	3.13/16	0.9843	0.4800	0.3600	4	H3	37/64	14.50		1	5974123	5974128	5974133	5974138
3/4	10	4.1/4	1.1811	0.5900	0.4420	4	H3	21/32	16.50		1	5974259	5974261	5974263	5974265
3/4	16	4.1/4	1.1811	0.5900	0.4420	4	H3	11/16	17.50		1	5974067	5974071	5974075	5974079
7/8	9	4.11/16	1.1811	0.6970	0.5230	4	H4	49/64	19.50		1	5974310	5974314	5974318	—
7/8	14	4.11/16	1.1811	0.6970	0.5230	4	H4	13/16	20.40		1	5974182	5974185	5974190	5974194
1"	8	5.1/8	1.4173	0.8000	0.6000	4	H4	7/8	22.25		1	5974936 <sup>1)</sup>	—	—	—

<sup>1)</sup> Bright Finish



## 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.



1508 (UNC)	1508 (UNF)	1595
UNC	UNF	UNF UNC
ANSI	ANSI	ANSI
3B	2B 3B	3B
HSS	HSS	HSS
1/4 - 1/2	1/4 - 5/16	1/4 - 5/16

		$l_1$	$l_2$	$d_2$	$\square$	$l_3$				Pack Qty	1508(UNC)	1508(UNF)	1595	
UNC	UNF	TPI	Inch	Inch	$\emptyset$	$a$	Inch	# of Flutes	Limits	Chamfer				
	1/4	28	2.1/2	1"	0.2550	0.1910	5/16	3	H3	Plug	1	—	6007576	—
	1/4	28	2.1/2	1"	0.2550	0.1910	5/16	2	H3	Plug	1	—	—	6007668
1/4		20	2.1/2	1"	0.2550	0.1910	5/16	3	H3	Plug	1	6007567	—	—
1/4		20	2.1/2	1"	0.2550	0.1910	5/16	2	H3	Plug	1	—	—	6007870
	1/4	28	2.1/2	1"	0.2550	0.1910	5/16	3	H3	Bottoming	1	—	—	—
	1/4	28	2.1/2	1"	0.2550	0.1910	5/16	2	H3	Bottoming	1	—	—	6007672
1/4		20	2.1/2	1"	0.2550	0.1910	5/16	3	H3	Bottoming	1	6007572	—	—
1/4		20	2.1/2	1"	0.2550	0.1910	5/16	2	H3	Bottoming	1	—	—	6007871
	5/16	24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	Plug	1	—	6006862	—
5/16		18	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	Plug	1	6006814	—	—
5/16		18	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H3	Plug	1	—	—	6007677
	5/16	24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	Bottoming	1	—	6006866	—
5/16		18	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	Bottoming	1	6006856	—	—
5/16		18	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H3	Bottoming	1	—	—	6007682
	3/8	24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	Plug	1	—	6006730	—
3/8		16	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	Plug	1	6007591	—	—
	3/8	24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	Bottoming	1	—	6006777	—
3/8		16	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	Bottoming	1	6006681	—	—
	7/16	20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	Plug	1	—	6006874	—
7/16		14	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	Plug	1	6006870	—	—
	1/2	20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	Plug	1	—	6007562	—
1/2		13	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	Plug	1	6007553	—	—
1/2		13	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	Bottoming	1	6007558	—	—

# HAND TAPS



## General Purpose

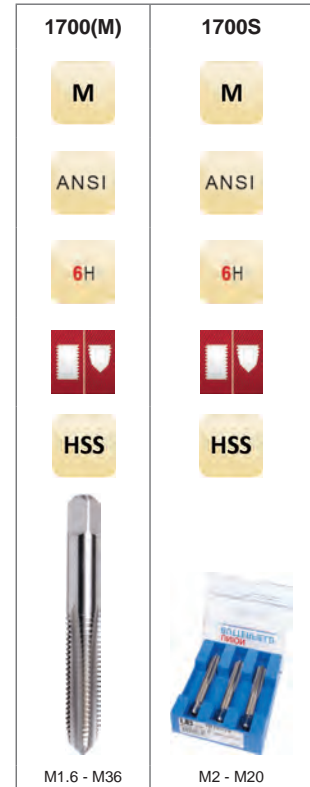
**1700(M)** The most versatile taps for hand use or machine tapping in a wide variety of materials in through or blind hole applications. Available in 3 chamfer lengths - taper, plug, and bottoming.

Taper - 7-10 pitch chamfer length

Plug - 3-5 pitch chamfer length

Bottoming - 1-2 pitch chamfer length

**1700S** Sets include 1 of each tap (Taper, Plug, and Bottoming).

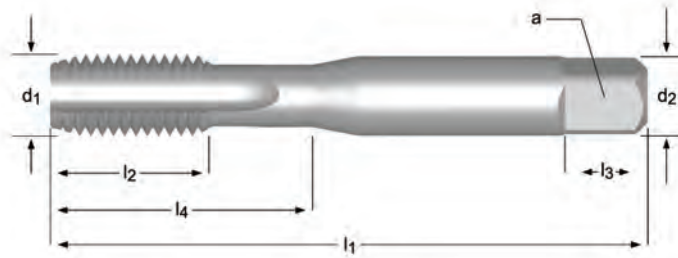


Nominal d <sub>1</sub>	Pitch M	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> Ø Inch /	l <sub>3</sub> Inch	∠ a Inch	# of Flutes	Limits	Pack Qty	Taper	Plug	Bottoming	Sets
M1.6	0.35	1.5/8	5/16	0.1410	3/16	0.1100	2	D3	1	6008954	6009005	6009064	—
M1.8	0.35	1.11/16	3/8	0.1410	3/16	0.1100	2	D3	1	6009078	6009080	—	—
M2	0.40	1.3/4	7/16	0.1410	3/16	0.1100	3	D3	1	6009056	6009071	6008657	6008649
M2.3	0.40	1.3/4	7/16	0.1410	3/16	0.1100	3	D3	1	—	6009014	6009024	—
M2.5	0.45	1.13/16	1/2	0.1410	3/16	0.1100	3	D3	1	6009028	6009033	6009038	6008642
M2.6	0.45	1.13/16	1/2	0.1410	3/16	0.1100	3	D3	1	6009042	6009047	—	—
M3	0.50	1.15/16	5/8	0.1410	3/16	0.1100	3	D3	1	6008727	6008732	6008737	6008660
M3.5	0.60	2"	11/16	0.1410	3/16	0.1100	3	D4	1	6008712	6008717	6008723	6008655
M4	0.70	2.1/8	3/4	0.1680	1/4	0.1310	4	D4	1	6008787	6008790	6008794	6008666
M4.5	0.75	2.3/8	7/8	0.1940	1/4	0.1520	4	D4	1	6008772	6008777	—	—
M5	0.80	2.3/8	7/8	0.1940	1/4	0.1520	4	D4	1	6008798	6008801	6008814	6008673
M6	1.00	2.1/2	1"	0.2550	5/16	0.1910	4	D5	1	6008818	6008822	6008828	6008687
M7	1.00	2.23/32	1.1/8	0.3180	3/8	0.2380	4	D5	1	6008833	6008837	6008842	6008696
M8	1.00	2.23/32	1.1/8	0.3180	3/8	0.2380	4	D5	1	6008847	6008851	6008854	6008700
M8	1.25	2.23/32	1.1/8	0.3180	3/8	0.2380	4	D5	1	6008861	6008630	6008678	6008708
M9	1.25	2.15/16	1.1/4	0.3810	7/16	0.2860	4	D5	1	—	6008743	6008800	—
M10	1.25	2.15/16	1.1/4	0.3810	7/16	0.2860	4	D5	1	6009088	6008877	6008879	6008855
M10	1.50	2.15/16	1.1/4	0.3810	7/16	0.2860	4	D6	1	6008880	6008882	6008884	6008860
M11	1.50	3.5/32	1.7/16	0.3230	13/32	0.2420	4	D6	1	—	6008886	6008888	—
M12	1.25	3.3/8	1.21/32	0.3670	7/16	0.2750	4	D5	1	6008891	6008895	6008899	6008864
M12	1.75	3.3/8	1.21/32	0.3670	7/16	0.2750	4	D6	1	6008907	6008911	6008919	6008867
M14	1.50	3.19/32	1.21/32	0.4290	1/2	0.3220	4	D6	1	6008922	6008926	6008930	—
M14	2.00	3.19/32	1.21/32	0.4290	1/2	0.3220	4	D7	1	6008935	6008938	6008943	6008870
M16	1.50	3.13/16	1.13/16	0.4800	9/16	0.3600	4	D6	1	6008947	6008959	6008964	—
M16	2.00	3.13/16	1.13/16	0.4800	9/16	0.3600	4	D7	1	6008967	6008971	6008976	6008633
M18	1.50	4.1/32	1.13/16	0.5420	5/8	0.4060	4	D6	1	6008981	6008985	6008990	—
M18	2.50	4.1/32	1.13/16	0.5420	5/8	0.4060	4	D7	1	6008995	6008999	6009009	6008636
M20	1.50	4.15/32	2"	0.6520	11/16	0.4890	4	D6	1	6008707	6008759	6008806	—
M20	2.50	4.15/32	2"	0.6520	11/16	0.4890	4	D7	1	6008858	6008863	6008866	6008652
M22	1.50	4.11/16	2.7/32	0.6970	3/4	0.5230	4	D6	1	6008869	6008871	6008663	—
M22	2.50	4.11/16	2.7/32	0.6970	3/4	0.5230	4	D7	1	6008668	6008672	6008676	—
M24	2.00	4.29/32	2.7/32	0.7600	3/4	0.5700	4	D7	1	6008681	6008685	6008691	—
M24	3.00	4.29/32	2.7/32	0.7600	3/4	0.5700	4	D8	1	6008695	6008698	6008703	—
M30	3.50	5.7/16	2.9/16	1.0210	1"	0.7660	4	D9	1	6008742	6008746	6008751	—
M36	4.00	6.1/16	3"	1.2330	1.1/8	0.9250	4	D9	1	—	6008763	6008768	—

## 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 semi-bottoming chamfer. For through or blind hole applications.



E501

M

ISO  
529


6H



HSS



M3 - M24

Nominal $d_1$	Pitch M	$l_1$ mm	$l_2$ mm	$d_2$ $\emptyset$ mm	$\square$ a mm	$l_3$ mm	# of Flutes		$l_4$ mm	Limits	Pack Qty	Taper	Plug	Semi - Bottoming
3	0.50	48	12.5	3.15	2.50	5	3	2.5	12.5	D3	1	5977154	5977158	5977169
4	0.70	53	14	4.00	3.15	6	3	3.3	14	D4	1	5976769	5976814	5976856
5	0.80	58	11	5.00	4.00	7	3	4.2	22	D4	1	—	5976942	5976949
6	1.00	66	13	6.30	5.00	8	3	5	26	D5	1	5976952	5976955	5976958
8	1.25	72	16	8.00	6.30	9	3	6.8	29	D5	1	5976771	5976775	5976779
10	1.50	80	18	10.00	8.00	11	3	8.5	34	D6	1	5977063	5977066	5977070
12	1.75	89	22	9.00	7.10	10	3	10.3		D6	1	5977078	5977081	5977085
14	2.00	95	24	11.20	9.00	12	4	12		D7	1	5977089	5977092	5977096
16	2.00	102	24	12.50	10.00	13	4	14		D7	1	5977100	5977104	5977108
18	2.50	112	29	14.00	11.20	14	4	15.5		D7	1	—	—	5977120
20	2.50	112	29	14.00	11.20	14	4	17.5		D7	1	5977124	5977129	5977132
22	2.50	118	29	16.00	12.50	16	4	19.5		D7	1	—	—	5977142
24	3.00	130	35	18.00	14.00	18	4	21		D8	1	—	5977147	5977150

Note: ISO shank and square dimensions will necessitate metric holders

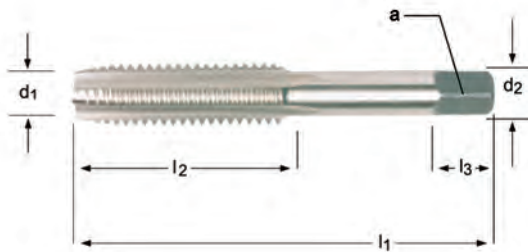
# HAND TAPS



## General Purpose, Oversize

### 1500OV(UNC)

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)

UNC

ANSI



HSS

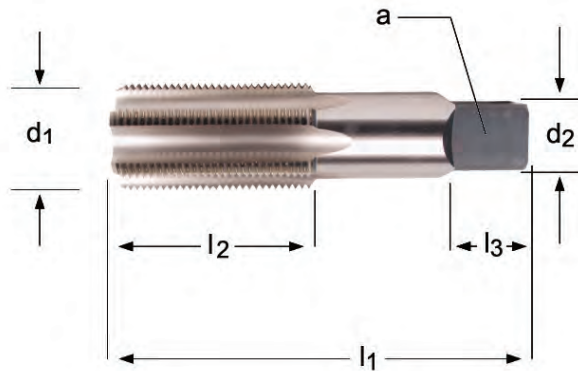


1/4 - 5/8

UNC	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Chamfer	Pack Qty	1500OV(UNC)
1/4	20	2.1/2	1.000	0.2550	0.1910	5/16	4	H11	Plug	1	6006967
5/16	18	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H11	Plug	1	6007239
3/8	16	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H11	Plug	1	6007152
1/2	13	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H11	Plug	1	6007027
5/8	11	3.13/16	1.13/16	0.4800	0.3600	9/16	4	H11	Plug	1	6007375

## 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(UNS)

UNS

ANSI

2B



HSS



1.1/8 - 2"

Nominal $d_1$	TPI UNS	$l_1$ Inch	$l_2$ Inch	$d_2$ $\varnothing$ Inch /	$\square$ a Inch	$l_3$ Inch	# 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	6007424	6007478	6007534
1.1/4	8	5.3/4	2.9/16	1.0210	0.7660	1"	4	H5	1	6007579	6007589	6007378
1.3/8	8	6.1/16	3"	1.1080	0.8310	1.1/16	4	H5	1	6007605	6007610	6007383
1.1/2	8	6.3/8	3"	1.2330	0.9250	1.1/8	6	H5	1	6007565	6007570	6007575
1.5/8	8	6.11/16	3.3/16	1.3050	0.9780	1.1/8	6	H6	1	6007387	6007391	6007396
1.3/4	8	7"	3.3/16	1.4300	1.0720	1.1/4	6	H6	1	6007586	6007596	6007601
1.7/8	8	7.5/16	3.9/16	1.5190	1.1390	1.1/4	6	H6	1	6007400	6007403	6007407
2"	8	7.5/8	3.9/16	1.6440	1.2330	1.3/8	6	H6	1	6009511	6007524	6007529

# HAND TAPS



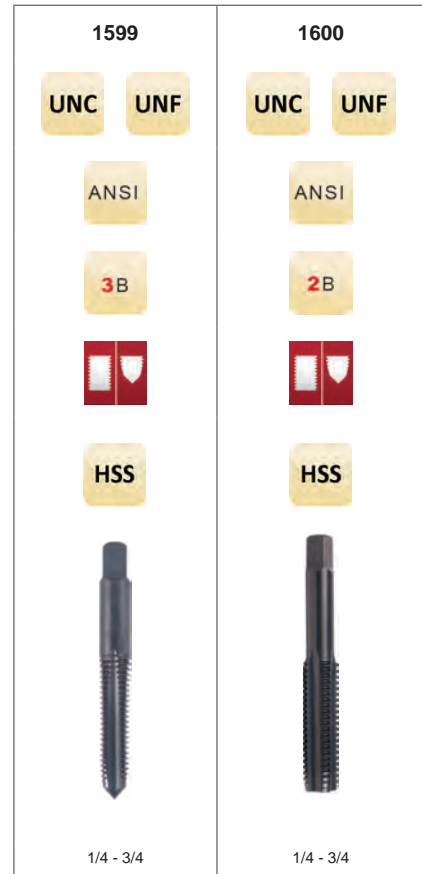
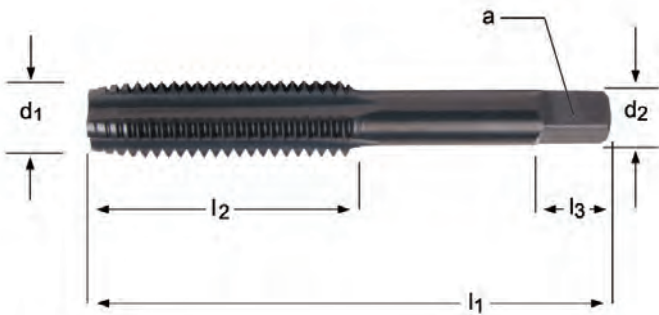
## For Cast Iron

**1599** 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 tempered coating reduces wear and chip welding in abrasive materials. For through or blind hole applications.

**1600**

1599 - H3

1600 - H5

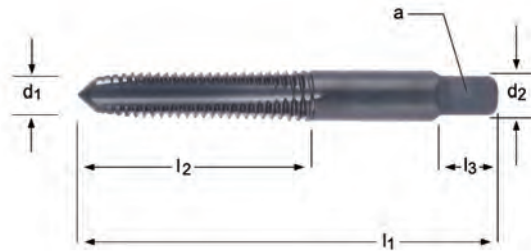


Nominal d <sub>1</sub>	TPI UNC	TPI UNF	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> Ø Inch /	□ a Inch	l <sub>3</sub> Inch	# of Flutes	Limits	Pack Qty	1599 Plug	1599 Bottoming	1600 Plug	1600 Bottoming
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	4	H3	1	6007787	6007791	—	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	4	H5	1	—	—	6008145	6008149
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	4	H5	1	—	—	6008153	6008158
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	1	6007853	6007856	—	—
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	4	H5	1	—	—	—	6008209
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H3	1	—	6007861	—	—
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	4	H5	1	—	—	6008212	6008217
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	6007835	6007840	—	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H5	1	—	—	6008182	6008187
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	6007845	6007849	—	—
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	4	H5	1	—	—	6008191	6008199
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	4	H5	1	—	—	6008245	6008254
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H3	1	—	6008330	—	—
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	4	H5	1	—	—	6008260	6008266
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	6007763	6007767	—	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H5	1	—	—	—	6008136
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	6007776	6007782	—	—
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H5	1	—	—	6008138	6008141
9/16	12		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H5	1	—	—	6008268	6008270
9/16		18	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	—	6008354	—	—
9/16		18	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H5	1	—	—	—	6008285
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	1	6007863	6007865	—	—
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H5	1	—	—	6008226	6008231
3/4	10		4.1/4	2"	0.5900	0.4420	11/16	4	H3	1	—	6007814	—	—
3/4	10		4.1/4	2"	0.5900	0.4420	11/16	4	H5	1	—	—	—	6008165
3/4		16	4.1/4	2"	0.5900	0.4420	11/16	4	H3	1	6007819	6007824	—	—
3/4		16	4.1/4	2"	0.5900	0.4420	11/16	4	H5	1	—	—	—	6008178

## For Cast Iron

**1599(M)**     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 tempered coating reduces wear and chip welding in abrasive materials. For through or blind hole applications.

**1599SB(M)**



**1599(M)**

M

ANSI

6H

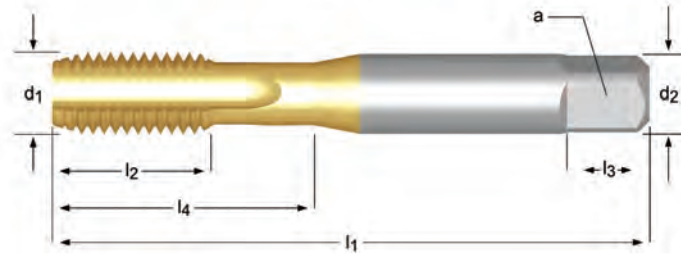
HSS

M6 - M14

Nominal $d_1$	Pitch M	$l_1$ Inch	$l_2$ Inch	$d_2$ $\emptyset$ Inch /	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Pack Qty	1599M Plug	1599M Bottoming
M6	1.00	2.1/2	1"	0.2550	0.1910	5/16	4	D5	1	6007738	6007742
M8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	4	D5	1	6007754	6007759
M10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	4	D6	1	6007695	6007699
M12	1.75	3.3/8	1.21/32	0.3670	0.2750	7/16	4	D6	1	6007708	6007712
M14	1.25	3.19/32	1.21/32	0.4290	0.3220	1/2	4	D4	1	6007722	—

## For Cast Iron, Semi-Bottoming

**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.



E504

M

ISO  
529

6H



HSS



M3 - M24

M	P mm	$l_1$ mm	$l_2$ mm	$d_2$ Ø mm	$a$ mm	$l_3$ mm	# of Flutes	$l_4$ mm	Limits	Pack Qty	E504
3	0.50	48	12.5	3.15	2.50	5	3	2.5	D3	1	5976834
4	0.70	53	14	4.00	3.15	6	3	3.3	D4	1	5976842
5	0.80	58	11	5.00	4.00	7	3	4.2	D4	1	5976848
6	1.00	66	13	6.30	5.00	8	3	5	D5	1	5976860
8	1.25	72	16	8.00	6.30	9	3	6.8	D5	1	5976868
10	1.50	80	18	10.00	8.00	11	3	8.5	D6	1	5976786

**Note: ISO shank and square dimensions will necessitate metric holders**



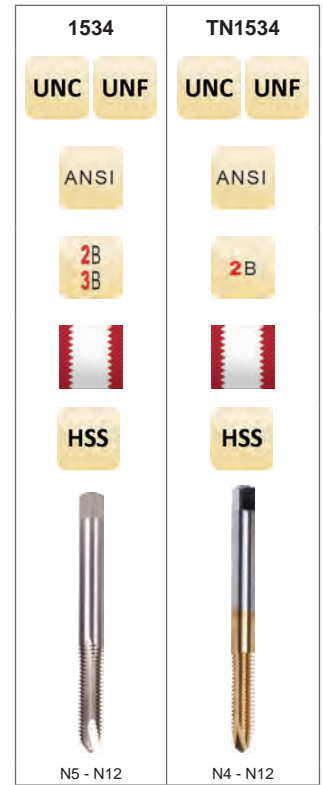
## Relieved Style, Machine Screw Sizes

**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.



UNC		UNF		$l_1$	$l_2$	$d_2$ Ø	$\square$ a	$l_3$	# of Flutes	Limits	Chamfer	Pack Qty	1534	TN1534
4		40	1.7/8	9/16	0.1410	0.1100	3/16	2	H2	Plug	1	—	6006775	
	5	44	1.15/16	5/8	0.1410	0.1100	3/16	2	H2	Plug	1	6006760	—	
5		40	1.15/16	5/8	0.1410	0.1100	3/16	2	H2	Plug	1	6006753	—	
	6	40	2"	11/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	6006757	—	
		40	2"	11/16	0.1410	0.1100	3/16	2	H2	Plug	1	6006790	—	
6		32	2"	11/16	0.1410	0.1100	3/16	2	H1	Plug	1	6006764	—	
		32	2"	11/16	0.1410	0.1100	3/16	2	H2	Plug	1	6006768	—	
		32	2"	11/16	0.1410	0.1100	3/16	2	H3	Plug	1	6006778	6007377	
	6	40	2"	11/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	6006794	—	
6		32	2"	11/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	6006772	—	
		32	2"	11/16	0.1410	0.1100	3/16	2	H3	Bottoming	1	6006786	—	
	8	36	2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Plug	1	6006812	—	
8		32	2.1/8	3/4	0.1680	0.1310	1/4	2	H1	Plug	1	6006798	—	
		32	2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Plug	1	6006801	—	
		32	2.1/8	3/4	0.1680	0.1310	1/4	2	H3	Plug	1	6006806	6007420	
8		32	2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Bottoming	1	6006803	—	
		32	2.1/8	3/4	0.1680	0.1310	1/4	2	H3	Bottoming	1	6006809	—	
	10	32	2.3/8	7/8	0.1940	0.1520	1/4	2	H1	Plug	1	6006706	—	
		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Plug	1	6006711	—	
		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	6006719	6006763	
10		24	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Plug	1	6006690	—	
		24	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	6006698	6006759	
		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Bottoming	1	6006714	—	
		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Bottoming	1	6006724	—	
10		24	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Bottoming	1	6006694	—	
		24	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Bottoming	1	6006702	—	
	12	28	2.3/8	15/16	0.2200	0.1650	9/32	2	H3	Plug	1	6006743	—	
12		24	2.3/8	15/16	0.2200	0.1650	9/32	2	H3	Plug	1	6006729	6006767	
		24	2.3/8	15/16	0.2200	0.1650	9/32	2	H3	Bottoming	1	6006739	—	

# SPIRAL POINT TAPS



## 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** The angular flutes in the cutting face propel the chips ahead of the cutting zone, thus reducing loading and clogging in the flutes.
- TN1585**

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 tempered - reduces wear and prevents chip welding in harder ferrous materials.
- TiN Coating - increases surface hardness and improves tool life.



		$l_1$	$l_2$	$d_2$	$l_3$	$\square$								
UNC	UNF	TPI	Inch	Inch	Inch	Inch	Inch	# of Flutes	Limits	Chamfer	Pack Qty	1585	1585A	TN1585
1/4	20	2.1/2	1"	0.2550	5/16	0.1910	2	H1	Plug	1	6007168	—	—	
1/4	20	2.1/2	1"	0.2550	5/16	0.1910	2	H2	Plug	1	6007226	—	—	
1/4	20	2.1/2	1"	0.2550	5/16	0.1910	2	H3	Plug	1	6007283	6007698	6007401	
1/4	20	2.1/2	1"	0.2550	5/16	0.1910	3	H3	Plug	1	6007343	—	6007405	
1/4	20	2.1/2	1"	0.2550	5/16	0.1910	3	H5	Plug	1	6007352	—	6007413	
1/4	20	2.1/2	1"	0.2550	5/16	0.1910	2	H5	Plug	1	6007348	—	6007409	
1/4	20	2.1/2	1"	0.2550	5/16	0.1910	2	H3	Bottoming	1	6007332	—	—	
1/4	28	2.1/2	1"	0.2550	5/16	0.1910	2	H2	Plug	1	6007129	—	—	
1/4	28	2.1/2	1"	0.2550	5/16	0.1910	3	H2	Plug	1	6007132	—	—	
1/4	28	2.1/2	1"	0.2550	5/16	0.1910	2	H3	Plug	1	6007135	6007702	6007416	
1/4	28	2.1/2	1"	0.2550	5/16	0.1910	2	H4	Plug	1	6007142	—	—	
1/4	28	2.1/2	1"	0.2550	5/16	0.1910	3	H4	Plug	1	6007146	—	—	
1/4	28	2.1/2	1"	0.2550	5/16	0.1910	2	H3	Bottoming	1	6007139	—	—	
5/16	18	2.23/32	1.1/8	0.3180	3/8	0.2380	2	H1	Plug	1	6007220	—	—	
5/16	18	2.23/32	1.1/8	0.3180	3/8	0.2380	2	H2	Plug	1	6007230	—	—	
5/16	18	2.23/32	1.1/8	0.3180	3/8	0.2380	2	H3	Plug	1	6007234	6007727	6007443	
5/16	18	2.23/32	1.1/8	0.3180	3/8	0.2380	3	H3	Plug	1	6007249	—	6007446	
5/16	18	2.23/32	1.1/8	0.3180	3/8	0.2380	3	H5	Plug	1	6007258	—	6007448	
5/16	18	2.23/32	1.1/8	0.3180	3/8	0.2380	2	H5	Plug	1	6007252	—	—	
5/16	18	2.23/32	1.1/8	0.3180	3/8	0.2380	2	H3	Bottoming	1	6007242	—	—	
5/16	24	2.23/32	1.1/8	0.3180	3/8	0.2380	3	H2	Plug	1	6007272	—	—	
5/16	24	2.23/32	1.1/8	0.3180	3/8	0.2380	2	H3	Plug	1	6007280	6007731	6007453	
5/16	24	2.23/32	1.1/8	0.3180	3/8	0.2380	3	H4	Plug	1	6007297	—	—	
5/16	24	2.23/32	1.1/8	0.3180	3/8	0.2380	2	H3	Bottoming	1	6007288	—	—	
3/8	16	2.15/16	1.1/4	0.3810	7/16	0.2860	3	H1	Plug	1	6007173	—	—	
3/8	16	2.15/16	1.1/4	0.3810	7/16	0.2860	3	H3	Plug	1	6007188	6007715	6007425	
3/8	16	2.15/16	1.1/4	0.3810	7/16	0.2860	3	H2	Plug	1	6007177	—	—	
3/8	16	2.15/16	1.1/4	0.3810	7/16	0.2860	3	H5	Plug	1	6007192	—	6007432	
3/8	24	2.15/16	1.1/4	0.3810	7/16	0.2860	3	H3	Plug	1	6007206	6007719	6007438	
3/8	24	2.15/16	1.1/4	0.3810	7/16	0.2860	3	H4	Plug	1	6007211	—	—	

# SPIRAL POINT TAPS

UNC		I <sub>1</sub>		I <sub>2</sub>		d <sub>2</sub> Ø		I <sub>3</sub>		□ a		# of Flutes	Limits	Chamfer	Pack Qty	1585	1585A	TN1585
UNF	TPI	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch									
7/16	14	3.5/32	1.7/16	0.3230	13/32	0.2420	3	H2	Plug	1	6007323	—	—					
7/16	14	3.5/32	1.7/16	0.3230	13/32	0.2420	3	H3	Plug	1	6007327	6007748	6007457					
7/16	14	3.5/32	1.7/16	0.3230	13/32	0.2420	3	H5	Plug	1	6007337	—	—					
	7/16	20	3.5/32	1.7/16	0.3230	13/32	0.2420	3	H2	Plug	1	6007622	—	—				
	7/16	20	3.5/32	1.7/16	0.3230	13/32	0.2420	3	H3	Plug	1	6007651	6007752	6007461				
1/2	13	3.3/8	1.21/32	0.3670	7/16	0.2750	3	H1	Plug	1	6007817	—	—					
1/2	13	3.3/8	1.21/32	0.3670	7/16	0.2750	3	H2	Plug	1	6007821	—	—					
1/2	13	3.3/8	1.21/32	0.3670	7/16	0.2750	3	H3	Plug	1	6007826	6007685	6007393					
1/2	13	3.3/8	1.21/32	0.3670	7/16	0.2750	3	H5	Plug	1	6007832	—	—					
	1/2	20	3.3/8	1.21/32	0.3670	7/16	0.2750	3	H1	Plug	1	6007837	—	—				
	1/2	20	3.3/8	1.21/32	0.3670	7/16	0.2750	3	H2	Plug	1	6007843	—	—				
	1/2	20	3.3/8	1.21/32	0.3670	7/16	0.2750	3	H3	Plug	1	6007846	6007690	6007397				
	1/2	20	3.3/8	1.21/32	0.3670	7/16	0.2750	3	H5	Plug	1	6007854	—	—				
5/8	11	3.13/16	1.13/16	0.4800	9/16	0.3600	3	H3	Plug	1	6007308	6007737	—					
5/8	11	3.13/16	1.13/16	0.4800	9/16	0.3600	3	H5	Plug	1	6007312	—	—					
	5/8	18	3.13/16	1.13/16	0.4800	9/16	0.3600	3	H3	Plug	1	6007316	—	—				
3/4	10	4.1/2	2"	0.5900	11/16	0.4420	3	H3	Plug	1	—	6007706	—					
3/4	10	4.1/4	2"	0.5900	11/16	0.4420	3	H3	Plug	1	6007150	—	—					
3/4	10	4.1/4	2"	0.5900	11/16	0.4420	3	H5	Plug	1	6007154	—	—					
	3/4	16	4.1/2	2"	0.5900	11/16	0.4420	3	H3	Plug	1	—	6007709	—				
	3/4	16	4.1/4	2"	0.5900	11/16	0.4420	3	H3	Plug	1	6007158	—	—				

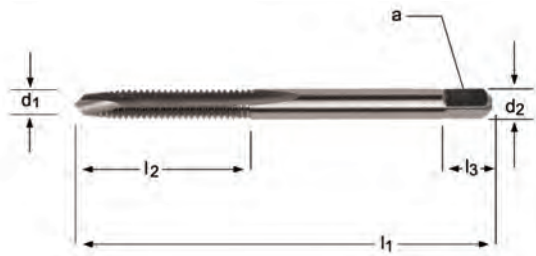
# SPIRAL POINT TAPS



## 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(UNF)**

**UNC UNF**

ANSI

**3B**

**HSS-E**

N4 - N10

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Chamfer	Pack Qty	1634
4		40	1.7/8	9/16	0.1410	0.1100	3/16	2	H2	Plug	1	6008081
6		32	2"	11/16	0.1410	0.1100	3/16	2	H2	Plug	1	6008001
8		32	2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Plug	1	6008058
	10	32	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Plug	1	6008074

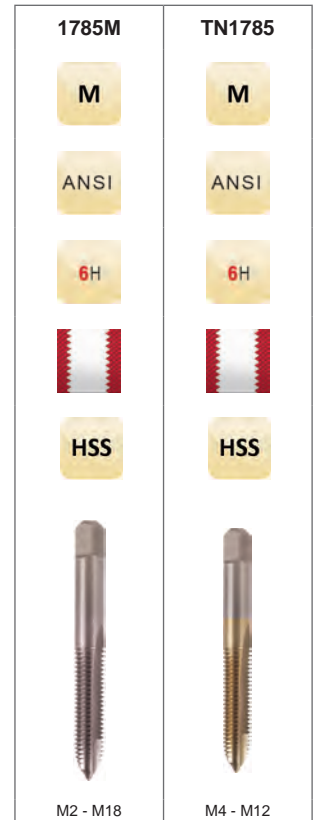
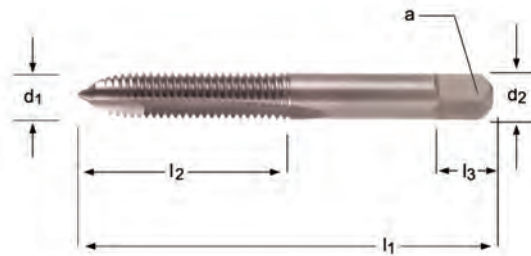
## Relieved Style, Metric

### 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.



M	P mm	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> Ø Inch	l <sub>3</sub> Inch	∠ a Inch	# of Flutes	Limits	Chamfer	Pack Qty	1785M	TN1785
M2	0.40	1.3/4	7/16	0.1410	3/16	0.1100	2	D3	Plug	1	6008747	—
M2.5	0.45	1.13/16	1/2	0.1410	3/16	0.1100	2	D3	Plug	1	6008764	—
M3	0.50	1.15/16	5/8	0.1410	3/16	0.1100	2	D3	Plug	1	6008773	—
M3.5	0.60	2"	11/16	0.1410	3/16	0.1100	2	D4	Plug	1	6008778	—
M4	0.70	2.1/8	3/4	0.1680	1/4	0.1310	2	D4	Plug	1	—	6007488
M4	0.70	2.1/8	3/4	0.1680	1/4	0.1310	2	D4	Plug	1	6008782	—
M4.5	0.75	2.3/8	7/8	0.1940	1/4	0.1520	2	D4	Plug	1	6008786	—
M5	0.80	2.3/8	7/8	0.1940	1/4	0.1520	2	D4	Plug	1	—	6007491
M5	0.80	2.3/8	7/8	0.1940	1/4	0.1520	2	D4	Plug	1	6008791	—
M6	1.00	2.1/2	1"	0.2550	5/16	0.1910	2	D5	Plug	1	—	6007496
M6	1.00	2.1/2	1"	0.2550	5/16	0.1910	2	D5	Plug	1	6008796	—
M7	1.00	2.23/32	1.1/8	0.3180	3/8	0.2380	2	D5	Plug	1	6008805	—
M8	1.25	2.23/32	1.1/8	0.3180	3/8	0.2380	2	D5	Plug	1	—	6007501
M8	1.25	2.23/32	1.1/8	0.3180	3/8	0.2380	2	D5	Plug	1	6008810	—
M9	1.25	2.15/16	1.1/4	0.3810	7/16	0.2860	3	D5	Plug	1	6008819	—
M10	1.50	2.15/16	1.1/4	0.3810	7/16	0.2860	3	D6	Plug	1	—	6007466
M10	1.50	2.15/16	1.1/4	0.3810	7/16	0.2860	3	D6	Plug	1	6008714	—
M11	1.50	3.5/32	1.7/16	0.3230	13/32	0.2420	3	D6	Plug	1	6008718	—
M12	1.75	3.3/8	1.21/32	0.3670	7/16	0.2750	3	D6	Plug	1	—	6007480
M12	1.75	3.3/8	1.21/32	0.3670	7/16	0.2750	3	D6	Plug	1	6008722	—
M14	2.00	3.19/32	1.21/32	0.4290	1/2	0.3220	3	D7	Plug	1	6008728	—
M16	2.00	3.13/16	1.13/16	0.4800	9/16	0.3600	3	D7	Plug	1	6008733	—
M18	2.50	4.1/32	1.13/16	0.5420	5/8	0.4060	3	D7	Plug	1	6008738	—

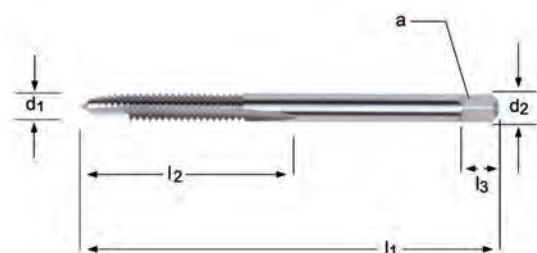
# SPIRAL POINT TAPS



## 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.



UNC	UNF	UNS	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$a$ Inch	$l_3$ Inch	# of Flutes	Limits	Chamfer	Pack Qty	1534NR
	0		80	1.5/8	5/16	0.1410	0.1100	3/16	2	H1	Plug	1	6007593
	0		80	1.5/8	5/16	0.1410	0.1100	3/16	2	H2	Plug	1	6007598
	0		80	1.5/8	5/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	6007373
	1		72	1.11/16	3/8	0.1410	0.1100	3/16	2	H1	Plug	1	6007379
	1		72	1.11/16	3/8	0.1410	0.1100	3/16	2	H2	Plug	1	6007382
1			64	1.11/16	3/8	0.1410	0.1100	3/16	2	H1	Plug	1	6007374
1			64	1.11/16	3/8	0.1410	0.1100	3/16	2	H2	Plug	1	6007376
	2		64	1.3/4	7/16	0.1410	0.1100	3/16	2	H1	Plug	1	6007472
	2		64	1.3/4	7/16	0.1410	0.1100	3/16	2	H2	Plug	1	6007477
2			56	1.3/4	7/16	0.1410	0.1100	3/16	2	H1	Plug	1	6007451
2			56	1.3/4	7/16	0.1410	0.1100	3/16	2	H2	Plug	1	6007459
2			56	1.3/4	7/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	6007467
	3		56	1.13/16	1/2	0.1410	0.1100	3/16	2	H1	Plug	1	6007490
	3		56	1.13/16	1/2	0.1410	0.1100	3/16	2	H2	Plug	1	6007495
3			48	1.13/16	1/2	0.1410	0.1100	3/16	2	H2	Plug	1	6007482
3			48	1.13/16	1/2	0.1410	0.1100	3/16	2	H2	Bottoming	1	6007486
	4		48	1.7/8	9/16	0.1410	0.1100	3/16	2	H2	Plug	1	6007526
4			40	1.7/8	9/16	0.1410	0.1100	3/16	2	H1	Plug	1	6007505
4			40	1.7/8	9/16	0.1410	0.1100	3/16	2	H2	Plug	1	6007510
	4		48	1.7/8	9/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	6007531
4			40	1.7/8	9/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	6007521
	5		44	1.15/16	5/8	0.1410	0.1100	3/16	2	H2	Plug	1	6007547
5			40	1.15/16	5/8	0.1410	0.1100	3/16	2	H2	Plug	1	6007537
5			40	1.15/16	5/8	0.1410	0.1100	3/16	2	H2	Bottoming	1	6007542
	6		40	2"	11/16	0.1410	0.1100	3/16	2	H2	Plug	1	6006685
6			32	2"	11/16	0.1410	0.1100	3/16	2	H1	Plug	1	6007554
6			32	2"	11/16	0.1410	0.1100	3/16	2	H2	Plug	1	6007559
6			32	2"	11/16	0.1410	0.1100	3/16	2	H3	Plug	1	6007569
	6		40	2"	11/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	6006734
6			32	2"	11/16	0.1410	0.1100	3/16	2	H2	Bottoming	1	6007564
6			32	2"	11/16	0.1410	0.1100	3/16	2	H3	Bottoming	1	6007578
	8		36	2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Plug	1	6006877

# SPIRAL POINT TAPS

UNC	UNF	UNS	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ $\emptyset$ Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Chamfer	Pack Qty	1534NR
8			32	2.1/8	3/4	0.1680	0.1310	1/4	2	H1	Plug	1	6006782
8			32	2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Plug	1	6006818
8			32	2.1/8	3/4	0.1680	0.1310	1/4	2	H3	Plug	1	6006867
8			32	2.1/8	3/4	0.1680	0.1310	1/4	2	H2	Bottoming	1	6006859
8			32	2.1/8	3/4	0.1680	0.1310	1/4	2	H3	Bottoming	1	6006871
	10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H1	Plug	1	6007412
	10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Plug	1	6007417
	10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	6007426
	10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Bottoming	1	6007421
	10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Bottoming	1	6007430
10			24	2.3/8	7/8	0.1940	0.1520	1/4	2	H1	Plug	1	6007386
10			24	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Plug	1	6007390
10			24	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Plug	1	6007399
10			24	2.3/8	7/8	0.1940	0.1520	1/4	2	H2	Bottoming	1	6007394
10			24	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	Bottoming	1	6007404
	12		28	2.3/8	15/16	0.2200	0.1650	9/32	2	H3	Plug	1	6007445
12			24	2.3/8	15/16	0.2200	0.1650	9/32	2	H3	Plug	1	6007435
12			24	2.3/8	15/16	0.2200	0.1650	9/32	2	H3	Bottoming	1	6007440

# 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.



1585NR

UNC UNF

ANSI

2B  
3B



HSS



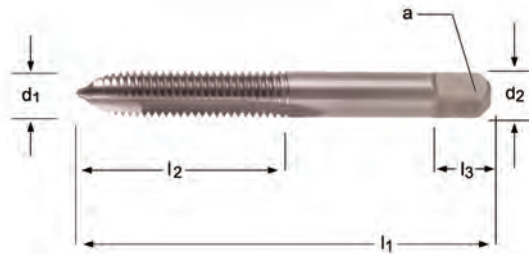
1/4 - 3/4

Nominal d <sub>1</sub>	TPI UNC	TPI UNF	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> Ø Inch /	∠ a Inch	l <sub>3</sub> Inch	# of Flutes	Limits	Pack Qty	Plug	Bottoming
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H1	1	6007801	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H2	1	6007806	—
<b>1/4</b>	<b>20</b>		<b>2.1/2</b>	<b>1"</b>	<b>0.2550</b>	<b>0.1910</b>	<b>5/16</b>	<b>2</b>	<b>H3</b>	<b>1</b>	<b>6007811</b>	<b>6007815</b>
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H5	1	6007825	—
<b>1/4</b>	<b>20</b>		<b>2.1/2</b>	<b>1"</b>	<b>0.2550</b>	<b>0.1910</b>	<b>5/16</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007820</b>	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H1	1	6007635	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H2	1	6007687	—
<b>1/4</b>		<b>28</b>	<b>2.1/2</b>	<b>1"</b>	<b>0.2550</b>	<b>0.1910</b>	<b>5/16</b>	<b>2</b>	<b>H3</b>	<b>1</b>	<b>6007799</b>	<b>6007850</b>
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H2	1	6007692	—
<b>5/16</b>	<b>18</b>		<b>2.23/32</b>	<b>1.1/8</b>	<b>0.3180</b>	<b>0.2380</b>	<b>3/8</b>	<b>2</b>	<b>H3</b>	<b>1</b>	<b>6007696</b>	<b>7197820</b>
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	2	H5	1	6007716	—
<b>5/16</b>	<b>18</b>		<b>2.23/32</b>	<b>1.1/8</b>	<b>0.3180</b>	<b>0.2380</b>	<b>3/8</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007703</b>	—
<b>5/16</b>		<b>24</b>	<b>2.23/32</b>	<b>1.1/8</b>	<b>0.3180</b>	<b>0.2380</b>	<b>3/8</b>	<b>2</b>	<b>H3</b>	<b>1</b>	<b>6007741</b>	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H2	1	6007648	—
<b>3/8</b>	<b>16</b>		<b>2.15/16</b>	<b>1.1/4</b>	<b>0.3810</b>	<b>0.2860</b>	<b>7/16</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007652</b>	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H5	1	6007659	—
<b>3/8</b>		<b>24</b>	<b>2.15/16</b>	<b>1.1/4</b>	<b>0.3810</b>	<b>0.2860</b>	<b>7/16</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007673</b>	—
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H2	1	6007777	—
<b>7/16</b>	<b>14</b>		<b>3.5/32</b>	<b>1.7/16</b>	<b>0.3230</b>	<b>0.2420</b>	<b>13/32</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007781</b>	—
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H5	1	6007786	—
<b>7/16</b>		<b>20</b>	<b>3.5/32</b>	<b>1.7/16</b>	<b>0.3230</b>	<b>0.2420</b>	<b>13/32</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007802</b>	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H2	1	6007762	—
<b>1/2</b>	<b>13</b>		<b>3.3/8</b>	<b>1.21/32</b>	<b>0.3670</b>	<b>0.2750</b>	<b>7/16</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007768</b>	—
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H5	1	6007773	—
<b>1/2</b>		<b>20</b>	<b>3.3/8</b>	<b>1.21/32</b>	<b>0.3670</b>	<b>0.2750</b>	<b>7/16</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007792</b>	—
5/8	11		3.13/16	1.13/16	0.4800	0.3600	9/16	3	H3	1	6007761	—
<b>5/8</b>	<b>11</b>		<b>3.13/16</b>	<b>1.13/16</b>	<b>0.4800</b>	<b>0.3600</b>	<b>9/16</b>	<b>3</b>	<b>H5</b>	<b>1</b>	<b>6007766</b>	—
5/8		18	3.13/16	1.13/16	0.4800	0.3600	9/16	3	H3	1	6007771	—
<b>3/4</b>	<b>10</b>		<b>4.1/2</b>	<b>2"</b>	<b>0.5900</b>	<b>0.4420</b>	<b>11/16</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007862</b>	—
3/4	10		4.1/2	2"	0.5900	0.4420	11/16	3	H5	1	6007864	—
<b>3/4</b>		<b>16</b>	<b>4.1/2</b>	<b>2"</b>	<b>0.5900</b>	<b>0.4420</b>	<b>11/16</b>	<b>3</b>	<b>H3</b>	<b>1</b>	<b>6007639</b>	—



## 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



HSS



M1.6 - M20

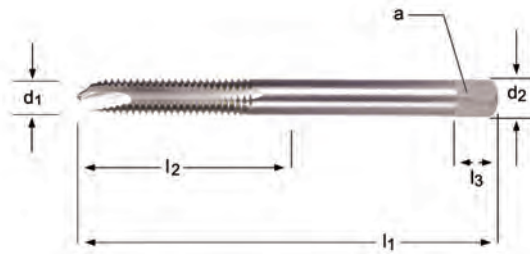
M	P mm	l <sub>1</sub> Inch	l <sub>2</sub> Inch	l <sub>3</sub> Inch	d <sub>2</sub> Ø Inch	∠ a Inch	# of Flutes	Limits	Chamfer	Pack Qty	1785NR
1.6	0.35	1.5/8	5/16	0.1410	0.1100	3/16	2	D3	Plug	1	6008823
2	0.40	1.3/4	7/16	0.1410	0.1100	3/16	2	D3	Plug	1	6008852
2.5	0.45	1.13/16	1/2	0.1410	0.1100	3/16	2	D3	Plug	1	6008622
3	0.50	1.15/16	5/8	0.1410	0.1100	3/16	2	D3	Plug	1	6008765
3.5	0.60	2"	11/16	0.1410	0.1100	3/16	2	D4	Plug	1	6008815
4	0.70	2.1/8	3/4	0.1680	0.1310	1/4	2	D4	Plug	1	6008829
4.5	0.75	2.3/8	7/8	0.1940	0.1520	1/4	2	D4	Plug	1	6008834
5	0.80	2.3/8	7/8	0.1940	0.1520	1/4	2	D4	Plug	1	6008839
6	1.00	2.1/2	1"	0.2550	0.1910	5/16	2	D5	Plug	1	6008844
7	1.00	2.23/32	1.1/8	0.3180	0.2380	3/8	2	D5	Plug	1	6008623
8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	2	D5	Plug	1	6008625
10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	3	D6	Plug	1	6008827
12	1.75	3.3/8	1.21/32	0.3670	0.2750	7/16	3	D6	Plug	1	6008832
14	2.00	3.19/32	1.21/32	0.4290	0.3220	1/2	3	D7	Plug	1	6008838
16	2.00	3.13/16	1.13/16	0.4800	0.3600	9/16	3	D7	Plug	1	6008843
20	2.50	4.15/32	2"	0.6520	0.4890	11/16	3	D7	Plug	1	6008713

# SPIRAL POINT TAPS



## 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.



1534NE(UNC)

UNC UNF

ANSI

3B



HSS



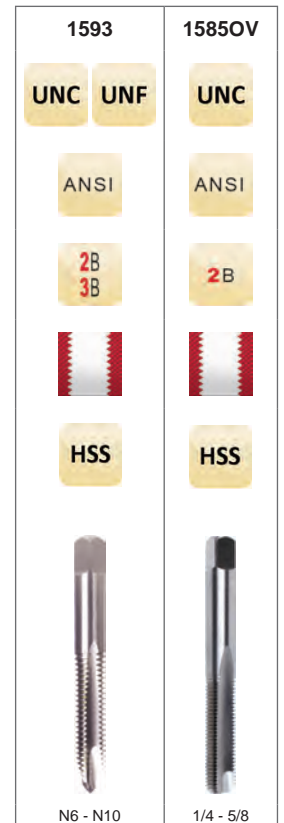
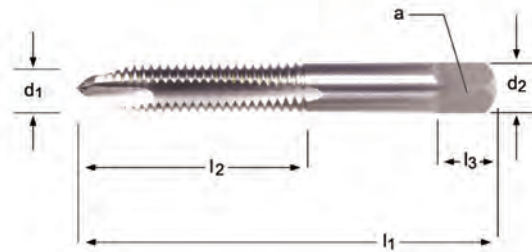
No.4 - 1/2

UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Pack Qty	Chamfer	1534NE
4		40	4"	9/16	0.1410	0.1100	3/16	2	H2	1	Plug	6007097
6		32	4"	11/16	0.1410	0.1100	3/16	2	H3	1	Plug	6007408
6		32	6"	11/16	0.1410	0.1100	3/16	2	H3	1	Plug	6007462
8		32	4"	3/4	0.1680	0.1310	1/4	2	H3	1	Plug	6007583
8		32	6"	3/4	0.1680	0.1310	1/4	2	H3	1	Plug	6007588
	10	32	4"	7/8	0.1940	0.1520	1/4	2	H3	1	Plug	6007080
	10	32	6"	7/8	0.1940	0.1520	1/4	2	H3	1	Plug	6007083
10		24	4"	7/8	0.1940	0.1520	1/4	2	H3	1	Plug	6007071
10		24	6"	7/8	0.1940	0.1520	1/4	2	H3	1	Plug	6007077
	1/4	28	4"	1"	0.2550	0.1910	5/16	2	H3	1	Plug	6007065
	1/4	28	6"	1"	0.2550	0.1910	5/16	2	H3	1	Plug	6007068
1/4		20	4"	1"	0.2550	0.1910	5/16	2	H3	1	Plug	6007059
1/4		20	6"	1"	0.2550	0.1910	5/16	2	H3	1	Plug	6007062
5/16		18	4"	1.1/8	0.3180	0.2380	3/8	2	H3	1	Plug	6007099
5/16		18	6"	1.1/8	0.3180	0.2380	3/8	2	H3	1	Plug	6007101
	3/8	24	6"	1.1/4	0.3810	0.2860	7/16	3	H3	1	Plug	6007094
3/8		16	4"	1.1/4	0.3810	0.2860	7/16	3	H3	1	Plug	6007085
3/8		16	6"	1.1/4	0.3810	0.2860	7/16	3	H3	1	Plug	6007088
	7/16	20	6"	1.7/16	0.3230	0.2420	13/32	3	H3	1	Plug	6007574
7/16		14	6"	1.7/16	0.3230	0.2420	13/32	3	H3	1	Plug	6007515
	1/2	20	6"	1.21/32	0.3670	0.2750	7/16	3	H3	1	Plug	6007056
1/2		13	6"	1.21/32	0.3670	0.2750	7/16	3	H3	1	Plug	6007053

## 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



UNC		UNF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$a$ Inch	$l_3$ Inch	# of Flutes	Limits	Chamfer	Pack Qty	1593	1585OV
6		32	2"	11/16	0.1410	0.1100	3/16	2	H7	Plug	1	6007868	—	
8		32	2.1/8	3/4	0.1680	0.1310	1/4	2	H7	Plug	1	6007869	—	
	10	32	2.3/8	7/8	0.1940	0.1520	1/4	2	H7	Plug	1	6007866	—	
10		24	2.3/8	7/8	0.1940	0.1520	1/4	2	H7	Plug	1	6007830	—	
1/4		20	2.1/2	1"	0.2550	0.1910	5/16	2	H11	Plug	1	—	6007124	
5/16		18	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H11	Plug	1	—	6007215	
3/8		16	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H11	Plug	1	—	6007163	
7/16		14	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H11	Plug	1	—	6007319	
1/2		13	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H11	Plug	1	—	6007812	
5/8		11	3.13/16	1.13/16	0.4800	0.3600	9/16	3	H11	Plug	1	—	6007304	

# SPIRAL FLUTE TAPS

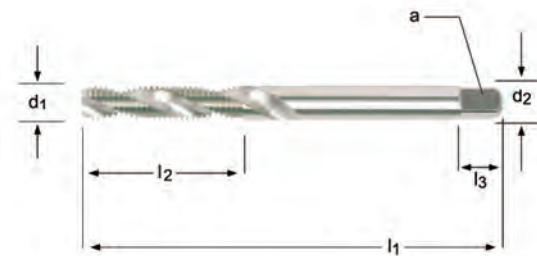


## Regular Spiral 30°

**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 or through holes in a variety of materials. Excellent choice for non-ferrous applications.



1582 / 1586

UNC

ANSI

3B



HSS



No.4 - 1/2

Nominal $d_1$	TPI UNC	TPI UNF	$l_1$ Inch	$l_2$ Inch	$d_2$ $\varnothing$ Inch /	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Pack Qty	Plug	Bottoming
4	40		1.7/8	9/16	0.1410	0.1100	3/16	2	H2	1	6007645	6007650
6	32		2"	11/16	0.1410	0.1100	3/16	2	H3	1	6007661	6007665
8	32		2.1/8	3/4	0.1680	0.1310	1/4	2	H3	1	6007675	6007680
10	24		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	6007630	6007633
10		32	2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	6007637	6007641
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	2	H3	1	6007836	6007841
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	6007623	6007624
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	2	H3	1	6007625	6007627
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	6007629	6007632
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	6007655	6007662
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	6007666	6007671
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	6007636	6007640
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	6007644	6007647
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	6007676	6007681
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	6007760	6007816
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	6007827	6007831

## 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 or through hole applications. Excellent choice for non-ferrous applications.



1587 / 1588

UNC UNF

ANSI

2B  
3B



HSS



N4 - 1/2

Nominal $d_1$	TPI UNC	TPI UNF	$l_1$ Inch	$l_2$ Inch	$d_2$ $\emptyset$ Inch /	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Pack Qty	Plug	Bottoming
4	40		1.7/8	9/16	0.1410	0.1100	3/16	2	H2	1	6007730	6007735
6	32		2"	11/16	0.1410	0.1100	3/16	2	H3	1	6007750	6007755
8	32		2.1/8	3/4	0.1680	0.1310	1/4	3	H3	1	6007765	6007770
10	24		2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	6007686	6007691
10		32	2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	6007694	6007700
1/4	20		2.1/2	1.000	0.2550	0.1910	5/16	3	H3	1	6007796	6007800
1/4		28	2.1/2	1.000	0.2550	0.1910	5/16	3	H3	1	6007805	6007810
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	6007784	6007838
5/16		24	2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	6007847	6007851
3/8	16		2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	6007822	6007628
3/8		24	2.15/16	1.1/4	0.3810	0.2860	7/16	3	H3	1	6007669	6007721
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	6007855	6007858
7/16		20	3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	6007631	6007634
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	6007775	6007780
1/2		20	3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	6007785	6007790

# SPIRAL FLUTE TAPS



## 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 or through hole tapping. Chip ejection is more efficient and problems such as chipping and breakage are largely eliminated. A steam tempered finish makes this tap ideal for use in ferrous materials and higher strength alloys.



1590 / 1591

UNC UNF

ANSI

3B



HSS

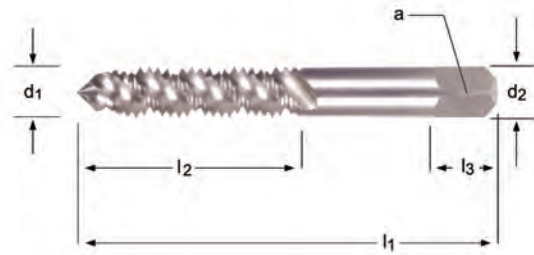


N6 - 1/2

Nominal $d_1$	TPI UNC	TPI UNF	$l_1$ Inch	$l_2$ Inch	$d_2$ $\varnothing$ Inch /	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Pack Qty	Plug	Bottoming
6	32		2"	11/16	0.1410	0.1100	3/16	2	H3	1	6007674	6007679
6		40	2"	11/16	0.1410	0.1100	3/16	2	H3	1	—	6007689
10	24		2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	6007638	6007642
10		32	2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	6007646	6007649
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	6007736	6007746
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	6007751	6007756
5/16	18		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	6007789	6007793
3/8	16		2.5/16	1.1.4	0.3810	0.2860	7/16	3	H3	1	6007764	6007769
7/16	14		3.5/32	1.7/16	0.3230	0.2420	13/32	3	H3	1	6007808	6007813
1/2	13		3.3/8	1.21/32	0.3670	0.2750	7/16	3	H3	1	6007713	6007718

## High Spiral Helicut 52°, Metric

**1788(M)** 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 or through hole applications. Excellent choice for non-ferrous applications.



1788(M)

M

ANSI

6H



HSS



M3 - M12

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	Plug	Bottoming
M3	0.50	1.15/16	5/8	0.1410	0.1100	3/16	2	D3	1	6008645	6008650
M4	0.70	2.1/8	3/4	0.1680	0.1310	1/4	3	D4	1	6008669	6008674
M5	0.80	2.3/8	7/8	0.1940	0.1520	1/4	3	D4	1	6008679	6008683
M6	1.00	2.1/2	1"	0.2550	0.1910	5/16	3	D5	1	6008688	6008692
M8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	3	D5	1	6008704	6008709
M10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	3	D6	1	6008626	6008628
M12	1.75	3.3/8	1.21/32	0.3670	0.2750	7/16	3	D6	1	6008631	6008634

# THREAD FORMING TAPS



## 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

HSS

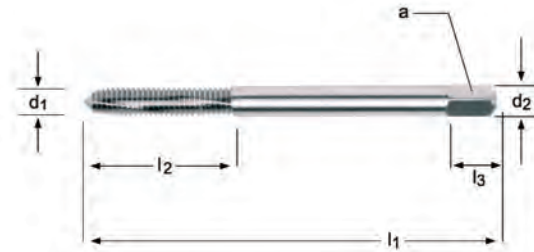
N2 - 3/8

Nominal d <sub>1</sub>	TPI UNC	TPI UNF	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> ∅ Inch /	∠ a Inch	l <sub>3</sub> Inch	Limits	Pack Qty	Plug	Bottoming
2	56		1.3/4	7/16	0.1410	0.1100	3/16	H2	1	—	6006727
2	56		1.3/4	7/16	0.1410	0.1100	3/16	H3	1	—	6006732
4	40		1.7/8	9/16	0.1410	0.1100	3/16	H3	1	6006780	6006784
4	40		1.7/8	9/16	0.1410	0.1100	3/16	H5	1	—	6006791
5	40		1.15/16	5/8	0.1410	0.1100	3/16	H3	1	—	6006807
6	32		2"	11/16	0.1410	0.1100	3/16	H3	1	6006843	6006847
6	32		2"	11/16	0.1410	0.1100	3/16	H5	1	6006849	—
8	32		2.1/8	3/4	0.1680	0.1310	1/4	H3	1	6007778	6007829
8	32		2.1/8	3/4	0.1680	0.1310	1/4	H5	1	6007839	6007844
10	24		2.3/8	7/8	0.1940	0.1520	1/4	H4	1	6007005	6007009
10		32	2.3/8	7/8	0.1940	0.1520	1/4	H4	1	—	6006800
10		32	2.3/8	7/8	0.1940	0.1520	1/4	H6	1	6006834	6006873
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	H4	1	6006982	6006985
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	H6	1	6006989	—
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	H4	1	6006998	6007001
5/16	18		2.23/32	1.1/8	0.3180	0.2380	7/16	H5	1	6006822	6006825
5/16	18		2.23/32	1.1/8	0.3180	0.2380	7/16	H7	1	—	6006828
5/16		24	2.23/32	1.1/8	0.3180	0.2380	7/16	H5	1	6006831	—
3/8	16		2.15/16	1.1/4	0.3810	0.2860	1/2	H5	1	6006765	6006769
3/8		24	2.15/16	1.1/4	0.3810	0.2860	1/2	H5	1	—	6006776



## 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



HSS



M3 - M12

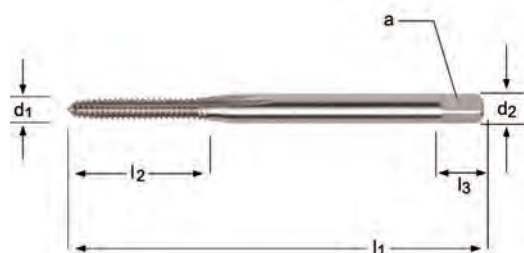
Nominal $d_1$	Pitch M	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch /	$\square$ a Inch	$l_3$ Inch	Limits	Pack Qty	Plug	Bottoming
M3	0.50	1.15/16	5/8	0.1410	0.1100	3/16	D5	1	6006922	6006924
M4	0.70	2.1/8	3/4	0.1680	0.1310	1/4	D6	1	6006926	6006928
M5	0.80	2.3/8	7/8	0.1940	0.1520	1/4	D7	1	6006930	6006933
M6	1.00	2.1/2	1"	0.2550	0.1910	5/16	D8	1	6006935	6006938
M8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	D9	1	6006939	6006943
M10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	D10	1	6006913	6006915
M12	1.75	3.3/8	1.21/32	0.3670	0.2750	7/16	D11	1	6006917	6006919

# THREAD FORMING 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.



3300

UNC UNF

ANSI

2B  
3B



HSS

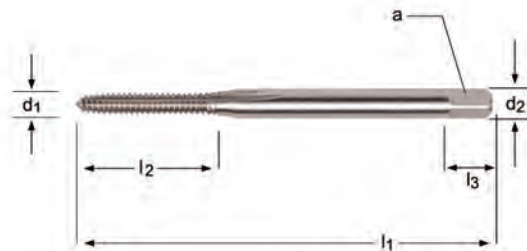


N0 - 1/2

Nominal d <sub>1</sub>	TPI UNC	TPI UNF	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> ∅ Inch /	a Inch	l <sub>3</sub> Inch	Limits	Pack Qty	Plug	Bottoming
0		80	1.5/8	5/16	0.1410	0.1100	3/16	H2	1	—	6009413
1	64		1.11/16	3/8	0.1410	0.1100	3/16	H2	1	—	6009416
1		72	1.11/16	3/8	0.1410	0.1100	3/16	H2	1	—	6009419
2	56		1.3/4	7/16	0.1410	0.1100	3/16	H2	1	—	6009492
2	56		1.3/4	7/16	0.1410	0.1100	3/16	H3	1	—	6009496
4	40		1.7/8	9/16	0.1410	0.1100	3/16	H3	1	6009383	6009386
4	40		1.7/8	9/16	0.1410	0.1100	3/16	H5	1	6009389	—
5	40		1.15/16	5/8	0.1410	0.1100	3/16	H3	1	—	6009409
5	40		1.15/16	5/8	0.1410	0.1100	3/16	H5	1	—	6009415
6	32		2"	11/16	0.1410	0.1100	3/16	H3	1	6009454	6009457
6	32		2"	11/16	0.1410	0.1100	3/16	H5	1	6009459	6009462
8	32		2.1/8	3/4	0.1680	0.1310	1/4	H3	1	6009491	6009493
8	32		2.1/8	3/4	0.1680	0.1310	1/4	H5	1	6009495	6009497
10	24		2.3/8	7/8	0.1940	0.1520	1/4	H4	1	6009453	6009455
10	24		2.3/8	7/8	0.1940	0.1520	1/4	H6	1	6009458	6009460
10		32	2.3/8	7/8	0.1940	0.1520	1/4	H4	1	6009468	6009471
10		32	2.3/8	7/8	0.1940	0.1520	1/4	H6	1	6009474	6009476
12	24		2.3/8	15/16	0.2200	0.1650	9/32	H4	1	6009480	—
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	H4	1	6009435	6009438
1/4	20		2.1/2	1"	0.2550	0.1910	5/16	H6	1	6009441	6009444
1/4		28	2.1/2	1"	0.2550	0.1910	5/16	H4	1	6009447	6009450
5/16	18		2.23/32	1.1/8	0.3180	0.2380	7/16	H5	1	6009424	6009427
5/16	18		2.23/32	1.1/8	0.3180	0.2380	7/16	H7	1	6009432	6009437
3/8	16		2.15/16	1.1/4	0.3810	0.2860	1/2	H5	1	6009502	6009506
3/8	16		2.15/16	1.1/4	0.3810	0.2860	1/2	H7	1	6009507	6009508
3/8		24	2.15/16	1.1/4	0.3810	0.2860	1/2	H7	1	6009378	6009381
1/2	13		3.3/8	1.21/32	0.3670	0.2750	23/32	H5	1	6009422	—

## Rol-Form, Lube Grooves

**3300(M)** The Rol-Form style has 1-2 lube 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



HSS



M3 - M10

Nominal $d_1$	Pitch M	$l_1$ Inch	$l_2$ Inch	$d_2$ $\emptyset$ Inch /	$\square$ a Inch	$l_3$ Inch	Limits	Grooves	Pack Qty	Plug	Bottoming
M3	0.50	1.15/16	5/8	0.1410	0.1100	3/16	D5	1	1	6009382	6009384
M4	0.70	2.1/8	3/4	0.1680	0.1310	1/4	D6	1	1	6009387	6009390
M5	0.80	2.3/8	7/8	0.1940	0.1520	1/4	D7	1	1	6009393	6009396
M6	1.00	2.1/2	1"	0.2550	0.1910	5/16	D8	2	1	6009399	6009404
M8	1.25	2.23/32	1.1/8	0.3180	0.2380	3/8	D9	2	1	6009407	6009410
M10	1.50	2.15/16	1.1/4	0.3810	0.2860	7/16	D10	2	1	6009505	6009373

# THREAD FORMING TAPS



## 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(UNF)

UNC UNF

ANSI

2B

HSS

N4 - 5/16

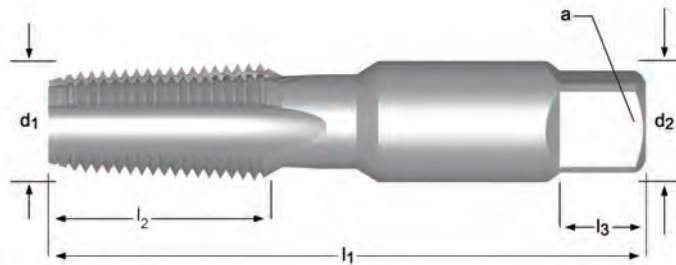
UNC	UNF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	Limits	Chamfer	Pack Qty	3306E
4		40	4"	9/16	0.1410	0.1100	3/16	H3	Bottoming	1	6009250
4		40	4"	9/16	0.1410	0.1100	3/16	H5	Bottoming	1	6009255
6		32	4"	11/16	0.1410	0.1100	3/16	H3	Bottoming	1	6009326
8		32	4"	3/4	0.1680	0.1310	1/4	H3	Bottoming	1	6009339
10		24	4"	7/8	0.1940	0.1520	1/4	H4	Bottoming	1	6009175
1/4		20	4"	1"	0.2550	0.1910	5/16	H4	Bottoming	1	6009504
5/16		18	4"	1.1/8	0.3180	0.2380	3/8	H5	Bottoming	1	6009260

## General Purpose, Medium Hook, NPT

**1541**      Straight Flute. Medium hook for multi-material tapping. Generally  
**TN1541**    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.

TiN coating increases surface hardness and improves tool life.

Made to Metal Cutting Tool Institute Standards, table 311



1541(NPT)	TN1541
1/16 - 2"	1/8 - 3/4

Nominal d <sub>1</sub>	TPI	l <sub>1</sub>		d <sub>2</sub> Ø	□ a Inch	l <sub>3</sub> Inch	# of Flutes	Pack Qty	1541	TN1541
		Inch	Inch						Inch /	Inch
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	6006824	—
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	6006837	—
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	6006833	6007587
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	6006830	6007530
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	6006855	6007602
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	6006827	6007471
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6006851	6007597
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	6006841	—
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	6006821	—
1.1/2	11.5	4.1/4	1.3/4	1.5000	1.1250	1"	7	1	6006815	—
2"	11.5	4.1/2	1.3/4	1.8750	1.4060	1.1/8	7	1	6006846	—

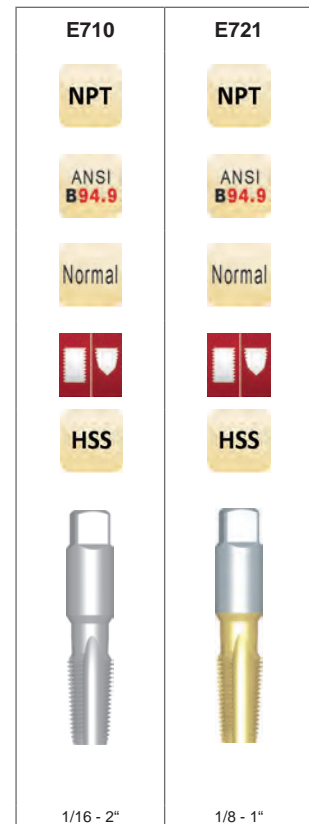
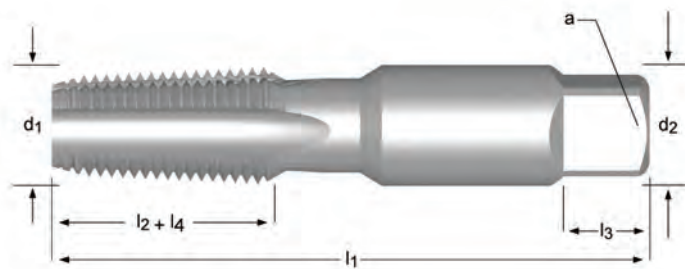
# PIPE TAPS




## General Purpose, Medium Hook, NPT

- E710** Straight Flute. Medium hook for multi-material tapping.  
**E721** 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.

TiN coating increases surface hardness and improves tool life.

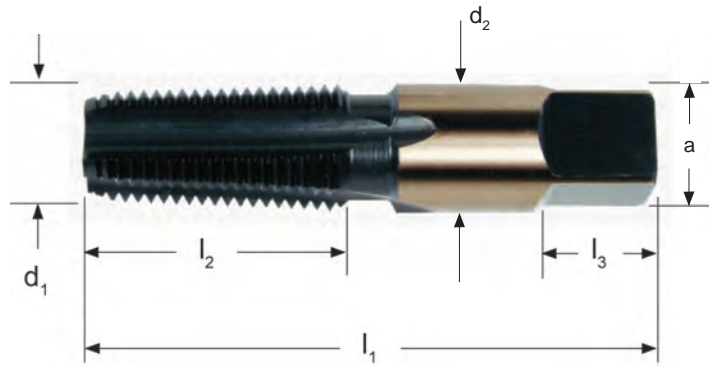


Nominal d <sub>1</sub>	TPI	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm		# of Flutes	l <sub>4</sub> mm	Pack Qty	E710	E721
1/16	27	65	17	7.9	5.9	8	6.3	4	11.7	1	5977618	—
1/8	27	70	19	11.1	8.3	10	8.5	4	11.9	1	5977634	5977601
1/8	27	70	19	11.1	8.3	10	8.5	4	11.9	Set of 2	5977637 <sup>1)</sup>	—
1/4	18	75	27	14.3	10.7	11	11	4	17.6	1	5977628	5977598
1/4	18	75	27	14.3	10.7	11	11	4	17.6	Set of 2	5977631 <sup>1)</sup>	—
3/8	18	80	27	17.8	13.5	13	14.5	4	19.5	1	5977652	5977607
3/8	18	80	27	17.8	13.5	13	14.5	4	19.5	Set of 2	5977653 <sup>1)</sup>	—
1/2	14	100	35	17.5	13.1	16	18	4	22.7	1	5977622	5977595
1/2	14	100	35	17.5	13.1	16	18	4	22.7	Set of 2	5977625 <sup>1)</sup>	—
3/4	14	105	35	23.0	17.2	17	23	5	24.4	1	5977646	5977604
3/4	14	105	35	23.0	17.2	17	23	5	24.4	Set of 2	5977649 <sup>1)</sup>	—
1"	11.5	115	43	28.6	21.4	21	29	5	29.4	1	5977609	5977592
1.1/4	11.5	125	43	33.3	25.0	24	38	5	27.7	1	5977615	—
1.1/2	11.5	135	43	38.1	28.6	25	44	7	28.9	1	5977612	—
2"	11.5	145	43	47.6	35.7	29	56	7	26.6	1	5977643	—

<sup>1)</sup> Sets (No.7) include: 1pc. semi-bottoming + 1 pc. semi-bottoming (truncated)

## 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.



6541

**NPT**

ANSI **B94.9**

Normal

1/8 - 2"

NPT	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Pack Qty	6541
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	6008958
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	6008949
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	6008970
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	6008944
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6008965
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	6008928
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	6008941
1.1/2	11.5	4.1/4	1.3/4	1.5000	1.1250	1	7	1	6008932
2"	11.5	4.1/2	1.3/4	1.8750	1.4060	1.1/8	7	1	6008963

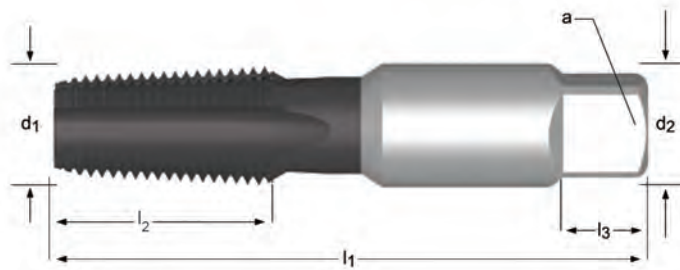
# PIPE TAPS



## 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



HSS



1/16 - 1.1/4

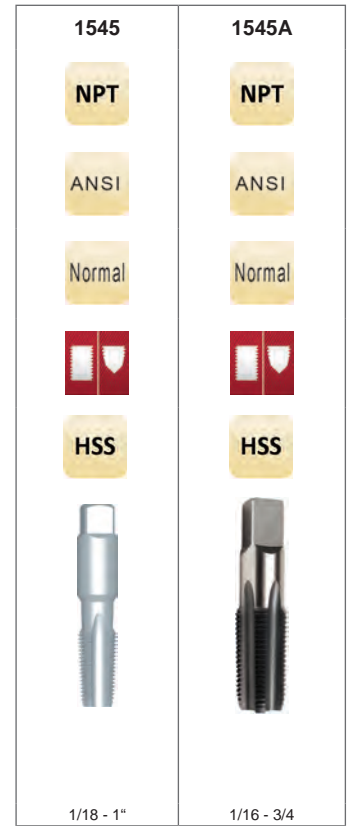
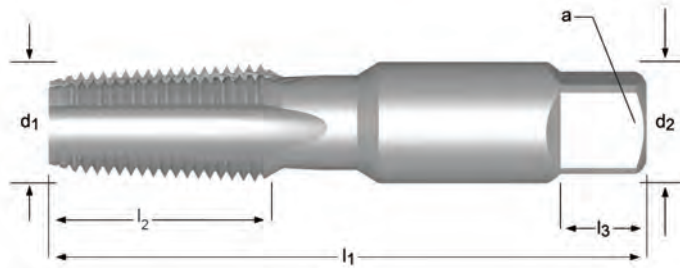
NPT	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Pack Qty	1544
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	6007157
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	6007175
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	6007170
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	6007197
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	6007165
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6007191
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	6007183
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	6007153



## High Hook, NPT

**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 tempered surface treatment to prevent galling and chipping.



		$l_1$	$l_2$	$d_2$	$\square$	$l_3$	# of Flutes	Pack Qty	1545	1545A
NPT	TPI	Inch	Inch	$\varnothing$ Inch	a Inch	Inch				
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	—	6007202
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	6007271	—
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	6007261	6007223
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	6007256	6007218
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	6007290	6007232
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	6007251	6007207
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6007286	6007228
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	6007276	—

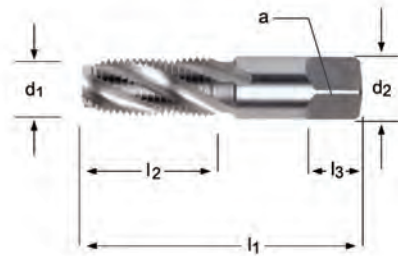
# PIPE TAPS



## 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



HSS



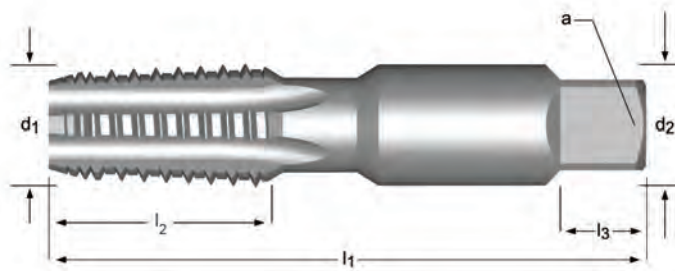
1/16 - 1"

NPT	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Pack Qty	1548
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	6006902
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	6006978
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	6006973
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	6006961
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	6006839
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	6006923
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6006986
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	6006983

## 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



HSS

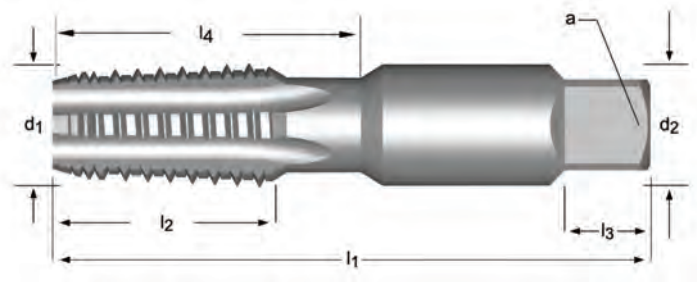


1/8 - 1.1/2

NPT	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Pack Qty	1568
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	5	1	6006908
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	5	1	6006906
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	5	1	6006904
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	5	1	6006916
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	5	1	6006900
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6006914
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	6006910
1.1/4	11.5	4"	1.3/4	1.3130	0.9840	15/16	5	1	6006898
1.1/2	11.5	4.1/4	1.3/4	1.5000	1.1250	1"	7	1	6006896

## 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



HSS



1/8 - 1.1/2

NPT	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of Flutes	↔	Pack Qty	E711
1/8	27	10.29	70	19	309	11.1	8.3	10	5	8.5	1	5977664
1/4	18	13.72	75	27	44.6	14.3	10.7	11	5	11.0	1	5977662
3/8	18	17.15	80	27	46.5	17.8	13.5	13	5	14.5	1	5977542
1/2	14	21.33	100	35	57.7	17.5	13.1	16	5	18.0	1	5977660
3/4	14	26.67	105	35	59.4	23.0	17.2	17	5	23.0	1	5977669
1"	11.5	33.40	115	43	72.4	28.6	21.4	21	5	29.0	1	5977656
1.1/2	11.5	48.26	135	43	71.9	38.1	28.6	25	7	44.0	1	5977658

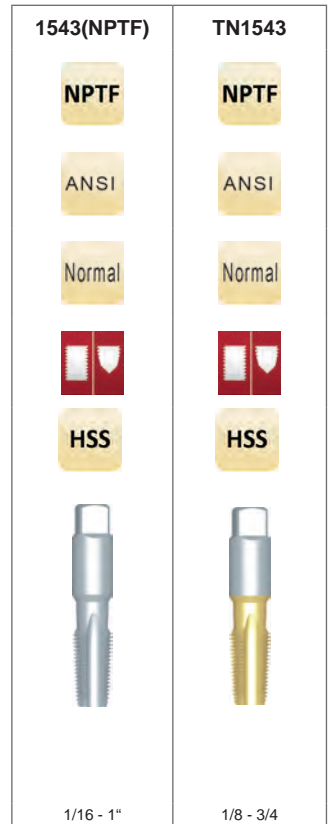
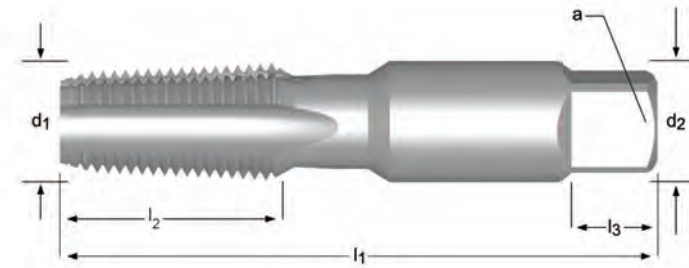
## Dryseal, NPTF, Medium Hook

### 1543

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.

### TN1543

TiN coated option increases surface hardness and improves tool life.



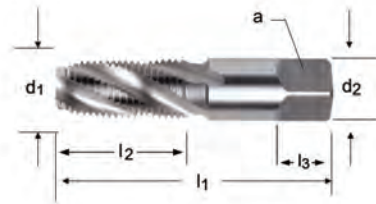
NPTF		$l_1$	$l_2$	$d_2$	$\square$	$l_3$	# of Flutes	Pack Qty	1543(NPTF)	TN1543
TPI	Inch	Inch	Inch	Ø Inch	a Inch	Inch				
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	6007345	—
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	—	6007381
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	6007134	—
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	6007131	—
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	—	6007609
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	6007128	—
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	—	6007389
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	6007144	—
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	—	6007606
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	6007126	—
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	—	6007385
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6007140	—
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	6007137	—

# PIPE TAPS



## 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.



**1549**

**NPTF**

ANSI

Normal

**HSS**

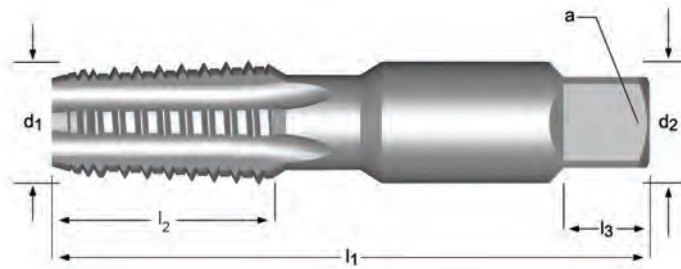
1/16 - 3/4

		$l_1$	$l_2$	$d_2$	$\square$	$l_3$	# of Flutes	Pack Qty	<b>1549</b>
NPTF	TPI	Inch	Inch	Inch	a	Inch			
1/16	27	2.1/8	11/16	0.3130	0.2340	3/8	4	1	6006842
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	6006858
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	6006854
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	6006850
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	6006872
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	6006845
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6006868

## 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



HSS



1/8 - 1"

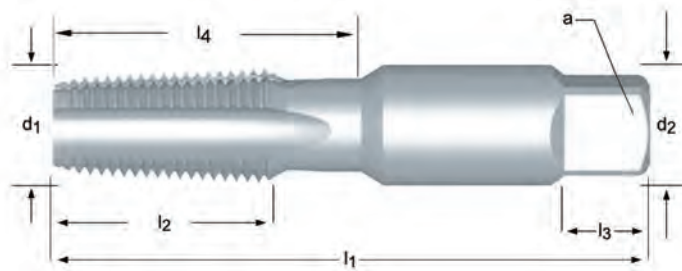
NPTF	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$a$ Inch	$l_3$ Inch	# of Flutes	Pack Qty	1567
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	5	1	6006888
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	5	1	6006885
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	5	1	6006883
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	5	1	6006894
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	5	1	6006881
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6006892
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	6006890

# PIPE TAPS



## 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



HSS



1/16 - 1.1/4

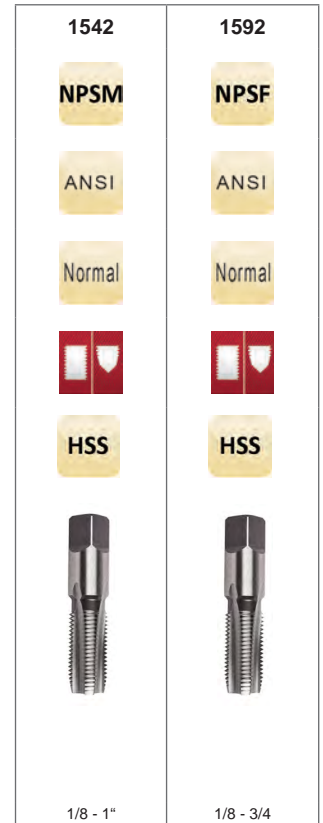
NPTF	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> ∅ mm	□ a mm	l <sub>3</sub> mm	# of Flutes		Pack Qty	E712
1/16	27	7.94	65	17	11.7	8.1	6.0	8	4	6.20	1	5977651
1/8	27	10.29	70	19	11.9	11.1	8.3	10	4	8.40	1	5977688
1/4	18	13.72	75	27	17.6	14.3	10.7	11	4	10.90	1	5977685
3/8	18	17.15	80	27	19.5	17.8	13.5	13	4	14.25	1	5977694
1/2	14	21.34	100	35	22.7	17.5	13.1	16	4	17.75	1	5977677
3/4	14	26.67	105	35	24.4	23.0	17.2	17	5	23.00	1	5977691
1"	11.5	33.40	115	43	29.4	28.6	21.4	21	5	29.00	1	5977585
1.1/4	11.5	42.16	125	43	27.7	33.4	24.9	23	5	37.75	1	5977619



## Straight Pipe Taps, NPS & NPSF

**1542** NPSM (Mechanical) - 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.

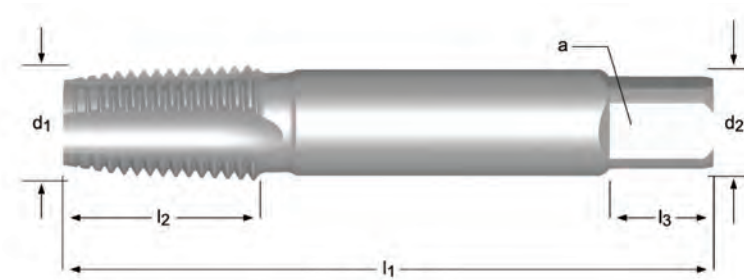
**1592** NPSF (Dryseal) - Similar in design to the 1542 series but manufactured to Dryseal American National Standard Pipe Thread NPSF specifications. Intended for low pressure work where a sealer is not used such as fuel and oil lines. When assembling with a dryseal taper-threaded part there will not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



Nominal d <sub>1</sub>	TPI	l <sub>1</sub>		d <sub>2</sub> ∅ Inch /	a Inch	l <sub>3</sub> Inch	# of Flutes	Pack Qty	1542	1592
		Inch	Inch							
1/8	27	2.1/8	3/4	0.3130	0.2340	3/8	4	1	6007213	6007658
1/8	27	2.1/8	3/4	0.4380	0.3280	3/8	4	1	6007161	6007842
1/4	18	2.7/16	1.1/16	0.5630	0.4210	7/16	4	1	6007122	6007833
3/8	18	2.9/16	1.1/16	0.7000	0.5310	1/2	4	1	6007329	6007772
1/2	14	3.1/8	1.3/8	0.6880	0.5150	5/8	4	1	6006863	6007828
3/4	14	3.1/4	1.3/8	0.9060	0.6790	11/16	5	1	6007320	6007717
1"	11.5	3.3/4	1.3/4	1.1250	0.8430	13/16	5	1	6007266	—

## 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



HSS



1/8 - 2"

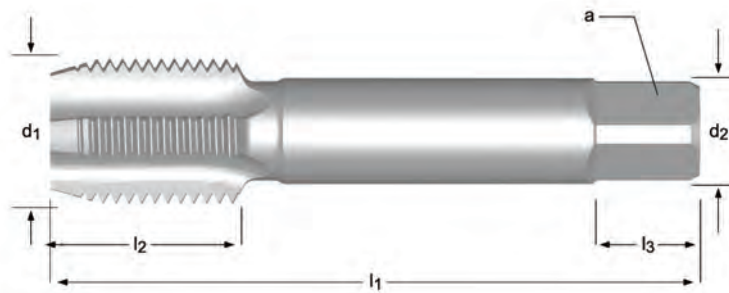
Rc	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of Flutes		Pack Qty	E550
1/8	28	9.728	59	15	8.0	6.3	9	3	8.4	1	5976468
1/8	28	9.728	59	15	8.0	6.3	9	3	8.4	Set of 2	5976472 <sup>1)</sup>
1/4	19	13.157	67	19	10.0	8.0	11	3	11.2	1	5976464
1/4	19	13.157	67	19	10.0	8.0	11	3	11.2	Set of 2	5976466 <sup>1)</sup>
3/8	19	16.662	75	21	12.5	10.0	13	3	14.75	1	5977464
3/8	19	16.662	75	21	12.5	10.0	13	3	14.75	Set of 2	5977475 <sup>1)</sup>
1/2	14	20.955	87	26	16.0	12.5	16	5	18.25	1	5976459
1/2	14	20.955	87	26	16.0	12.5	16	5	18.25	Set of 2	5976462 <sup>1)</sup>
3/4	14	26.441	96	28	20.0	16.0	20	5	23.75	1	5977442
3/4	14	26.441	96	28	20.0	16.0	20	5	23.75	Set of 2	5977453 <sup>1)</sup>
1"	11	33.249	109	33	25.0	20.0	24	5	30	1	5976452
1.1/4	11	41.910	119	36	31.5	25.0	28	5	38.5	1	5976457
1.1/2	11	47.803	125	37	35.5	28.0	31	7	44.5	1	5976455
2"	11	59.614	140	41	40.0	31.5	34	7	56	1	5977431

**Note: ISO shank and square dimensions will necessitate metric holders**

<sup>1)</sup> Sets (No.7) include: 1pc. semi-bottoming + 1 pc. semi-bottoming (truncated)

## 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

**HSS**

1/8 - 2"

Nominal d <sub>1</sub>	TPI	l <sub>1</sub> mm	l <sub>2</sub> mm	d <sub>2</sub> Ø mm	□ a mm	l <sub>3</sub> mm	# of Flutes	Flute Width	Pack Qty	Taper	Plug	Bottoming
1/8	28	59	15	8.0	8.0	9	4	8.8	1	5976343	5976346	5976349
1/4	19	67	19	10.0	8.0	11	4	11.8	1	5976327	5976330	5976335
3/8	19	75	21	12.5	10.0	13	4	15.25	1	5976408	5976412	5976416
1/2	14	87	26	16.0	12.5	16	4	19	1	5976474	5976477	5976480
5/8	14	91	26	18.0	14.0	18	4	21	1	5976423	5976427	5976430
3/4	14	96	28	20.0	16.0	20	4	24.5	1	5976389	5976392	5976397
7/8	14	102	29	22.4	18.0	22	4	28.25	1	5976438	5976445	5976448
1"	11	109	33	25.0	20.0	24	4	30.75	1	5976357	5976361	5976369
1.1/4	11	119	36	31.5	25.0	28	6	39.5	1	5976365	5976404	5976442
1.1/2	11	125	37	35.5	28.0	31	6	45	1	5976717	5976722	5976322
2"	11	140	41	40.0	31.5	34	6	57	1	5976379	5976382	5976385

**Note:** ISO shank and square dimensions will necessitate metric holders

# SPECIAL PURPOSE TAPS

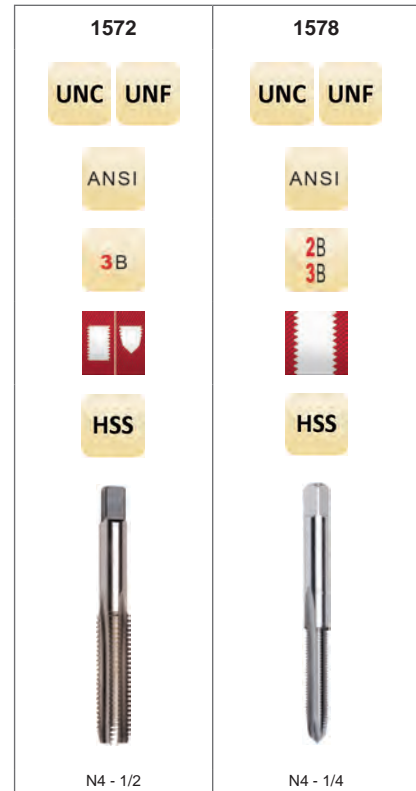


## Screw Thread Insert, STI

**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 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. For a particular size and pitch the lower H-Limit is suggested for class 2B and 3B threads, while the higher H-Limit is suggested for class 2B.



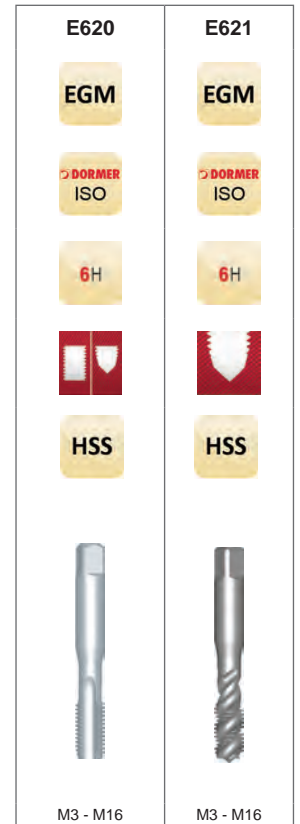
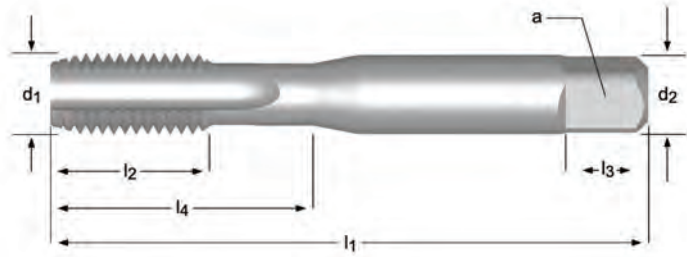
Nominal d <sub>1</sub>	TPI UNC	TPI UNF	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> Ø Inch /	a Inch	l <sub>3</sub> Inch	# of Flutes	Limits	Pack Qty	1572 - Plug	1572 Bottoming	1578 - Plug
4	40		2"	11/16	0.1410	0.1100	3/16	2	H2	1	—	—	6006901
4	40		2"	11/16	0.1410	0.1100	3/16	3	H2	1	6006887	6006909	—
6	32		2.3/8	7/8	0.1940	0.1520	1/4	2	H2	1	—	—	6006903
6	32		2.3/8	7/8	0.1940	0.1520	1/4	2	H3	1	—	—	6006905
6	32		2.3/8	7/8	0.1940	0.1520	1/4	3	H3	1	6007013	6007020	—
8	32		2.3/8	15/16	0.2200	0.1650	9/32	2	H2	1	—	—	6006907
8	32		2.3/8	15/16	0.2200	0.1650	9/32	2	H3	1	—	—	6006911
8	32		2.3/8	15/16	0.2200	0.1650	9/32	3	H3	1	6007032	6006889	—
10	24		2.1/2	1"	0.2550	0.1910	5/16	3	H2	1	6006932	6006934	—
10		32	2.1/2	1"	0.2550	0.1910	9/32	2	H2	1	—	—	6006899
10		32	2.1/2	1"	0.2550	0.1910	5/16	3	H2	1	6006936	6006940	—
10		32	2.1/2	1"	0.2550	0.1910	5/16	3	H3	1	6006945	6006950	—
1/4	20		2.23/32	1.1/8	0.3180	0.2380	5/16	2	H2	1	—	—	6006891
1/4	20		2.23/32	1.1/8	0.3180	0.2380	5/16	2	H3	1	—	—	6006893
1/4	20		2.23/32	1.1/8	0.3180	0.2380	3/8	3	H3	1	6006921	6006925	—
1/4		28	2.23/32	1.1/8	0.3180	0.2380	5/16	2	H2	1	—	—	6006895
1/4		28	2.23/32	1.1/8	0.3180	0.2380	5/16	2	H3	1	—	—	6006897
1/4		28	2.23/32	1.1/8	0.3180	0.2380	3/8	2	H2	1	—	6006929	—
5/16	18		2.15/16	1.1/4	0.3810	0.2860	7/16	4	H3	1	6006931	—	—
3/8	16		3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	6006955	6006969	—
7/16	14		3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	6007024	—	—
7/16		20	3.3/8	1.21/32	0.3670	0.2750	7/16	4	H3	1	—	—	—
1/2	13		3.13/16	1.13/16	0.4800	0.3600	9/16	4	H3	1	6006918	—	—
1/2		20	3.19/32	1.21/32	0.4290	0.3220	1/2	4	H3	1	—	—	—


## Screw Thread Insert, STI, Semi-Bottoming

**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 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.



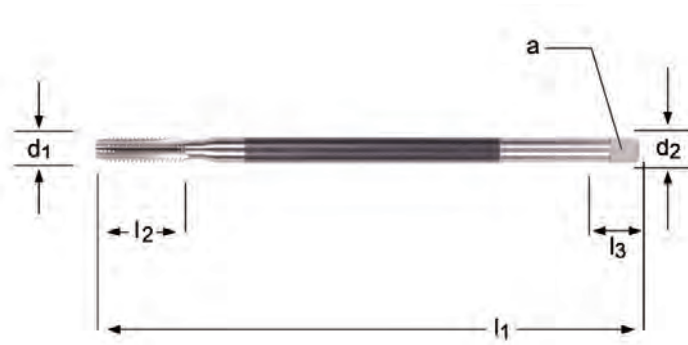
Nominal $d_1$	P mm	$l_1$ mm	$l_2$ mm	$d_2$ $\varnothing$ mm	$\square$ a mm	$l_3$ mm	# of Flutes		$l_4$ mm	Pack Qty	E620	E621
3	0.50	53	14	4.00	3.15	6	3	3.2	14	1	5978063	5978441
4	0.70	58	11	5.00	4.00	7	3	4.2	20	1	5978072	5978446
5	0.80	66	13	6.30	5.00	8	3	5.2	26	1	5978280	5978285
6	1.00	72	16	8.00	6.30	9	3	6.3	29	1	5978336	—
6	1.00	72	16	8.00	6.30	9	3	6.3	31	1	—	5978290
8	1.25	80	18	10.00	8.00	11	3	8.4	32	1	5978371	—
8	1.25	80	18	10.00	8.00	11	3	8.4	34	1	—	5978295
10	1.50	89	22	9.00	7.10	10	3	10.5	—	1	5978043	5978401
12	1.75	95	24	11.20	9.00	12	4	12.5	—	1	5978049	—
12	1.75	95	24	11.20	9.00	12	3	12.5	—	1	—	5978428
14	2.00	112	29	14.00	11.20	14	4	14.5	—	1	5978053	—
14	2.00	112	29	14.00	11.20	14	3	14.5	—	1	—	5978435
16	2.00	112	29	14.00	11.20	14	4	16.5	—	1	5978059	—
16	2.00	112	29	14.00	11.20	14	3	16.5	—	1	—	5978439

# 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



HSS



1/4 - 3/4

UNC	TPI	$l_1$ Inch	$l_2$ Inch	$d_2$ Ø Inch	$\square$ a Inch	$l_3$ Inch	# of Flutes	Limits	Chamfer	Pack Qty	1519
1/4	20	6"	1.000	0.2550	0.1910	5/16	4	H3	Plug	1	6006701
1/4	20	8"	1.000	0.2550	0.1910	5/16	4	H3	Plug	1	6006705
5/16	18	6"	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	6006740
5/16	18	8"	1.1/8	0.3180	0.2380	3/8	4	H3	Plug	1	6006744
3/8	16	6"	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	6006725
3/8	16	8"	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	6006735
3/8	16	10"	1.1/4	0.3810	0.2860	7/16	4	H3	Plug	1	6006720
1/2	13	6"	1.21/32	0.5070	0.3800	9/16	4	H3	Plug	1	6006693
1/2	13	8"	1.21/32	0.5070	0.3800	9/16	4	H3	Plug	1	6006697
1/2	13	10"	1.21/32	0.5070	0.3800	9/16	4	H3	Plug	1	6006684
5/8	11	6"	1.13/16	0.6330	0.4750	11/16	4	H3	Plug	1	6006755
5/8	11	8"	1.13/16	0.6330	0.4750	11/16	4	H3	Plug	1	6006762
5/8	11	10"	1.13/16	0.6330	0.4750	11/16	4	H3	Plug	1	6006749
3/4	10	10"	2.000	0.7590	0.5690	3/4	4	H3	Plug	1	6006710

## 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.



1994(UNF)

UNC UNF

ANSI

2B



HSS



No.4 - 1/2

UNC	UNF	TPI	d <sub>1</sub> Ø Inch	l <sub>1</sub> Inch	l <sub>2</sub> Inch	d <sub>2</sub> Ø Inch	□ a Inch	l <sub>3</sub> Inch	l <sub>4</sub> Inch	# of Flutes	Pack Qty	1994
4		40	0.0890	1.7/8	3/8	0.1410	0.1100	3/16	1/4	2	1	6008951
5		40	0.1015	1.15/16	13/32	0.1410	0.1100	3/16	9/32	2	1	6008961
6		32	0.1110	2"	7/16	0.1410	0.1100	3/16	5/16	2	1	6008987
8		32	0.1360	2.1/8	1/2	0.1680	0.1310	1/4	3/8	2	1	6009013
10		24	0.1540	2.3/8	5/8	0.1940	0.1520	1/4	13/32	2	1	6008914
	10	32	0.1610	2.3/8	5/8	0.1940	0.1520	1/4	13/32	2	1	6008918
12		24	0.1800	2.3/8	21/32	0.2200	0.1650	9/32	15/32	2	1	6008921
	12	28	0.1850	2.3/8	21/32	0.2200	0.1650	9/32	15/32	2	1	6008925
1/4		20	0.2055	2.1/2	25/32	0.2550	0.1910	5/16	17/32	2	1	6008905
	1/4	28	0.2188	2.1/2	25/32	0.2550	0.1910	5/16	17/32	2	1	6008909
5/16		18	0.2660	2.27/32	15/16	0.3180	0.2380	3/8	11/16	2	1	6008975
	5/16	24	0.2770	2.27/32	15/16	0.3180	0.2380	3/8	11/16	2	1	6008980
3/8		16	0.3230	3.3/8	1.1/16	0.3810	0.2860	7/16	13/16	2	1	6008934
	3/8	24	0.3390	3.3/8	1.1/16	0.3810	0.2860	7/16	13/16	2	1	6008946
7/16		14	0.3770	3.3/4	1.1/4	0.3230	0.2420	13/32	1"	2	1	6008996
	7/16	20	0.3937	3.3/4	1.1/4	0.3230	0.2420	13/32	1"	2	1	6009006
1/2		13	0.4331	4.1/16	1.3/8	0.3670	0.2750	7/16	1.1/8	2	1	6008897
	1/2	20	0.4531	4.1/16	1.3/8	0.3670	0.2750	7/16	1.1/8	2	1	6008901

# SPECIAL PURPOSE TAPS

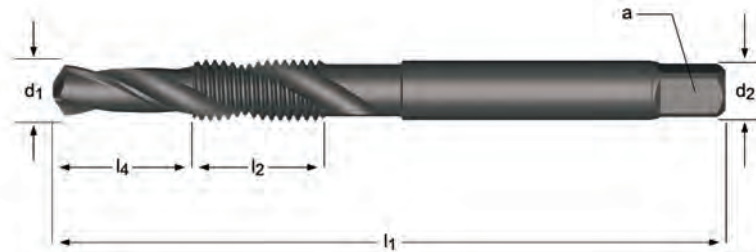


## Combination Drill & Tap

**E651**  
**E654**

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 tempered finish reduces wear and chip welding in harder ferrous materials.



E651 / E654

UNC UNF



2B



HSS



No.6 - 5/8

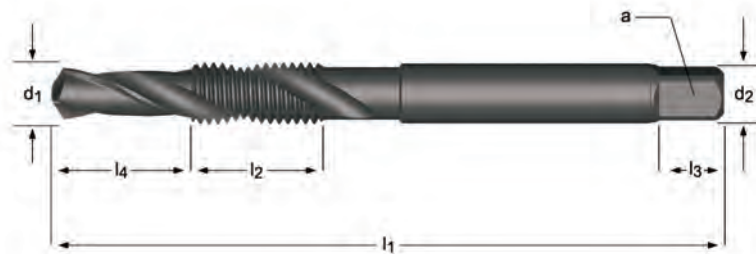
UNC	UNF	TPI	d <sub>1</sub> nom mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> Ø mm	□ a mm	# of Flutes	Pack Qty	E651 / E654
6		32	2.85	56.9	12	6.0	3.50	2.90	2	1	5978374
8		32	3.50	64.0	12	8.0	4.50	3.55	2	1	5978380
	8	36	3.50	64.0	13	8.0	4.50	3.55	2	1	5978426
10		24	3.90	72.0	15	10.0	5.00	4.00	2	1	5978357
	10	32	4.10	72.0	16	10.0	5.00	4.00	2	1	5978409
12		24	4.50	77.0	15	11.0	5.60	4.50	2	1	5978360
	12	28	4.70	77.0	17	11.0	5.60	4.50	2	1	5978411
1/4		20	5.10	83.0	17	13.0	6.30	5.00	2	1	5978353
	1/4	28	5.50	83.0	19	13.0	6.30	5.00	2	1	5978407
5/16		18	6.60	94.0	21	16.0	8.00	6.30	2	1	5978365
	5/16	24	6.90	94.0	22	16.0	8.00	6.30	2	1	5978417
3/8		16	8.00	104.0	23	19.0	10.00	8.00	2	1	5978362
	3/8	24	8.50	104.0	24	19.0	10.00	8.00	2	2	5978414
7/16		14	9.40	107.0	25	22.0	8.00	6.30	2	1	5978377
	7/16	20	9.90	107.0	25	22.0	8.00	6.30	2	1	5978423
1/2		13	10.80	114.0	29	25.0	9.00	7.10	2	1	5978350
	1/2	20	11.50	114.0	29	25.0	9.00	7.10	2	1	5978405
9/16		12	12.20	124.0	29	28.0	11.20	9.00	2	1	5978383
5/8		11	13.50	134.0	31	32.5	12.50	10.00	2	1	5978368
	5/8	18	14.50	134.0	32	32.0	12.50	10.00	2	1	5978420



## 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 tempered finish reduces wear and chip welding in harder ferrous materials.



E650

M

DORMER  
ISO

6H



HSS



M3 - M16

M	P mm	d <sub>1</sub> ∅ mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>4</sub> mm	d <sub>2</sub> ∅ mm	∠ a mm	l <sub>3</sub> mm	# of Flutes	Pack Qty	E650
3	0.50	2.5	56	10	6	3.15	2.5	5.0	2	1	5978325
4	0.70	3.3	65	12	8	4.0	3.15	6.0	2	1	5978330
5	0.80	4.2	69	15	10	5.0	4.00	7.0	2	1	5978339
6	1.00	5.0	84	18	12	6.3	5.00	8.0	2	1	5978342
8	1.25	6.8	96	21	16	8.0	6.30	9.0	2	1	5978347
10	1.50	8.5	108	22	20	10.0	8.00	11.0	2	1	5978304
12	1.75	10.2	113	29	24	9.0	7.10	10.0	2	1	5978308
14	2.00	12.0	123	30	28	11.2	9.00	12.0	2	1	5978313
16	2.00	14.0	134	32	32	12.5	10.00	13.0	2	1	5978320

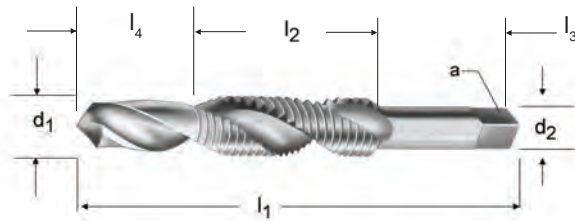
# SPECIAL PURPOSE TAPS



## 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

Normal



HSS



1/8 - 1"

NPT	TPI	d <sub>1</sub> nom Inch	l <sub>1</sub> Inch	l <sub>2</sub> Inch	l <sub>3</sub> Inch	l <sub>4</sub> Inch	d <sub>2</sub> Ø Inch	□ a Inch	# of Flutes	Pack Qty	E653
1/8	27	0.3346	2.7/8	3/4	3/8	3/4	0.4370	0.3280	2	1	5978397
1/4	18	0.4331	3.5/16	1.1/16	7/16	7/8	0.5620	0.4210	2	1	5978395
3/8	18	0.5709	3.1/2	1.1/16	1/2	15/16	0.7000	0.5310	2	1	5978403
1/2	14	0.7087	4.3/8	1.3/8	5/8	1.1/4	0.6870	0.5150	2	1	5978392
3/4	14	0.9055	4.9/16	1.3/8	11/16	1.5/16	0.9060	0.6790	2	1	5978399
1"	11.5	1.1417	5.3/8	1.3/4	13/16	1.5/8	1.1250	0.8430	2	1	5978386

## 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.



1215

T0-T2

Tap Wrench #	Hand Reamer Capacity Inch	Hand Reamer Capacity mm	Hand Tap Capacity Inch	Hand Tap Capacity mm	Pack Qty	1215
T0	1/8 - 3/16	M3 - M5	1/16 - 5/32	M1 - M4	1	6007552
T1	3/16 - 5/16	M4 - M7	3/16 - 7/16	M4 - M10	1	6007557
T2	1/4 - 15/32	M6 - M14	1/4 - 9/16	M6 - M14	1	6007563

## 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

Number	Hand Reamer Capacity Inch	Hand Reamer Capacity mm	Hand Tap Capacity Inch	Hand Tap Capacity mm	$l_1$ Length	Pack Qty	3850
8	1/8 - 5/16	M3 - M8	1/16 - 5/16	M1 - M8	7"	1	6009196
9	3/16 - 3/8	M5 - M9	3/16 - 1/2	M4 - M12	10.1/2"	1	6009254
10	1/4 - 9/16	M6 - M14	1/4 - 3/4	M3 - M8	15"	1	6009347
11	3/8 - 3/4	M9 - M19	3/8 - 1"	M10 - M25	20"	1	6009350
12	3/8 - 7/8	M9 - M22	3/8 - 1.1/8	M10 - M27	25.5/8"	1	6009353
14	5/8 - 1.1/2	M16 - M39	7/8 - 1.7/8	M22 - M42	40.1/2"	1	6009143

## Tap & Drill Combination Sets

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

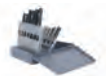


229CSET

UNC

ANSI

HSS



Set

Set	Style	Pieces per Set	UNC Tap Sizes	Tap Drill Sizes	Pack Qty	229CSET
229C	1500,1528 Taps; R10P,R15P,R18P Drills	18	6-32,8-32,10-24,10-32,1/4-20,5/16-18,3/8-16,7/16-14,1/2-13	#36,#29,#25,#21,#7,F,5/16,U,27/64	1	6009137



















# Visual Index - Dies

## How to Use This Chart:






















- 1) Determine your Workpiece Material from the Application Material Groups (AMG) below.
- 2) Use the icons to find Product Features.
- 3) Find the Surface Feet Per Minute (SFM)  
example: 361 = SFM

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		---

# Visual Index - Dies

Thread Form:	<b>NPT</b>	<b>UNC</b>	<b>UNF</b>	<b>M</b>	<b>G</b>	<b>M</b>
Standard:	ANSI	BS 1127: 1950	BS 1127: 1950	ANSI	BS 1127: 1950	ISO 2568
Tolerance:						6g
Chamfer:		1.75XP	1.75XP		1.75XP	1.75XP
Tool Material:	<b>CS</b>	<b>HSS</b>	<b>HSS</b>	<b>HSS</b>	<b>HSS</b>	<b>HSS</b>
Direction of Cut:						
Finish/Coating:						
						
Style:	<b>2010(NPT)</b>	<b>F320</b>	<b>F330</b>	<b>2710M</b>	<b>F370</b>	<b>F201</b>
Range:	1/8 - 1/2	No.4 - 1.1/4	No.4 - 1.1/2	M2 - M20	1/8 - 1.1/2	M3 - M20
Page #	<b>378</b>	<b>379</b>	<b>379</b>	<b>381</b>	<b>382</b>	<b>383</b>
1.1	26	26	26	26	26	26
1.2	23	23	23	23	23	23
1.3	20	20	20	20	20	20
1.4	16	16	16	16	16	16
1.5						
1.6						
1.7						
1.8						
2.1	13	13	13	13	13	13
2.2	7	7	7	7	7	7
2.3						
2.4						
3.1	26	26	26	26	26	26
3.2	23	23	23	23	23	23
3.3	20	20	20	20	20	20
3.4	16	16	16	16	16	16
4.1						
4.2						
4.3	7	7	7	7	7	7
5.1	30	30	30	30	30	30
5.2	7	7	7	7	7	7
5.3	7	7	7	7	7	7
6.1	30	30	30	30	30	30
6.2	26	26	26	26	26	26
6.3	23	23	23	23	23	23
6.4						
7.1	33	33	33	33	33	33
7.2	49	49	49	49	49	49
7.3	49	49	49	49	49	49
7.4	33	33	33	33	33	33
8.1	49	49	49	49	49	49
8.2	33	33	33	33	33	33
8.3	16	16	16	16	16	16
9.1						
10.1						

# Visual Index - Dies

	UNC	UNF	UNS	NPT	M	M	MF
	ANSI	ANSI	ANSI	ANSI	ANSI	BS 1127: 1950	BS 1127: 1950
						6g	6g
						1.75XP	1.75XP
	CS	CS	CS	CS	CS	HSS	HSS
							
							
							
	<b>2025(UNC)</b>	<b>2025(UNF)</b>	<b>2025(UNS)</b>	<b>2025(NPT)</b>	<b>2325M</b>	<b>F302</b>	<b>F312</b>
	1/4 - 1.1/2	1/4 - 1.1/2	11/16 - 1"	1/8 - 1"	M6 - M20	M3 - M36	M8 - M24
	<b>384</b>	<b>384</b>	<b>384</b>	<b>384</b>	<b>385</b>	<b>386</b>	<b>387</b>
1.1	26	26	26	26	26	26	26
1.2	23	23	23	23	23	23	23
1.3	20	20	20	20	20	20	20
1.4	16	16	16	16	16	16	16
1.5							
1.6							
1.7							
1.8							
2.1	13	13	13	13	13	13	13
2.2	7	7	7	7	7	7	7
2.3							
2.4							
3.1	26	26	26	26	26	26	26
3.2	23	23	23	23	23	23	23
3.3	20	20	20	20	20	20	20
3.4	16	16	16	16	16	16	16
4.1							
4.2							
4.3	7	7	7	7	7	7	7
5.1	30	30	30	30	30	30	30
5.2	7	7	7	7	7	7	7
5.3	7	7	7	7	7	7	7
6.1	30	30	30	30	30	30	30
6.2	26	26	26	26	26	26	26
6.3	23	23	23	23	23	23	23
6.4							
7.1	33	33	33	33	33	33	33
7.2	49	49	49	49	49	49	49
7.3	49	49	49	49	49	49	49
7.4	33	33	33	33	33	33	33
8.1	49	49	49	49	49	49	49
8.2	33	33	33	33	33	33	33
8.3	16	16	16	16	16	16	16
9.1							
10.1							



# List Number Index - Dies



Pgs. 377-389

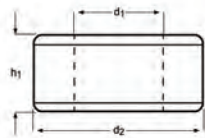
2010.....	378
2025.....	384
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F320 .....	379
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## Round Adjustable, Split Type

**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.

**Note:** Die pictured has 4 clearance holes. The number of clearance holes will increase or decrease depending on the size of the die. NPT type dies are not split.

Thread Size



2010(NPT)

NPT

CS



ANSI



1/8 - 1/2

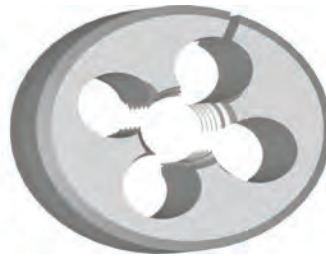
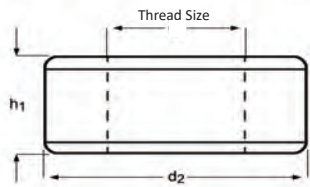
NPT	TPI	d <sub>2</sub> Ø Inch	h <sub>1</sub> Inch	Pack Qty	2010 (NPT)
1/8	27	1"	3/8	1	6008629
1/8	27	1.1/2	1/2	1	6008632
1/4	18	1.1/2	1/2	1	6009094
1/4	18	2"	5/8	1	6009098
3/8	18	1.1/2	1/2	1	6008726
3/8	18	2"	5/8	1	6008731
1/2	14	2"	5/8	1	6009086

## 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**

**Note:** Die pictured has 4 clearance holes. The number of clearance holes will increase or decrease depending on the size of the die



F320	F330
UNC	UNF
HSS	HSS
BS 1127: 1950	BS 1127: 1950
2B	2B
N4 - 1.1/4	N4 - 1.1/2

UNC	UNF	TPI	d <sub>1</sub> nom mm	d <sub>2</sub> Ø Inch	h <sub>1</sub> Inch	Pack Qty	F320	F330
	4	48	2.85	13/16	1/4	1	—	5978804
4		40	2.85	13/16	1/4	1	5978041	—
	5	44	3.18	13/16	1/4	1	—	5978807
5		40	3.18	13/16	1/4	1	5978045	—
	6	40	3.51	13/16	1/4	1	—	5978830
6		32	3.51	13/16	1/4	1	5978080	—
	8	36	4.17	13/16	1/4	1	—	5978840
8		32	4.17	1"	3/8	1	5978846	—
		32	4.17	13/16	1/4	1	5978869	—
	10	32	4.83	13/16	1/4	1	—	5978776
	10	32	4.83	1"	3/8	1	—	5978772
10		24	4.83	1"	3/8	1	5978004	—
10		24	4.83	13/16	1/4	1	5978007	—
	12	28	5.49	13/16	1/4	1	—	5978779
12		24	5.49	13/16	1/4	1	5978010	—
	1/4	28	6.35	1"	3/8	1	—	5978757
	1/4	28	6.35	1.1/2	1/2	1	—	5978761
	1/4	28	6.35	13/16	1/4	1	—	5978765
1/4		20	6.35	1"	3/8	1	5977987	—
1/4		20	6.35	1.1/2	1/2	1	5977990	—
1/4		20	6.35	1.5/16	7/16	1	5977993	—
1/4		20	6.35	13/16	1/4	1	5977996	—
	5/16	24	7.94	1"	3/8	1	—	5978810
	5/16	24	7.94	1.1/2	1/2	1	—	5978813
	5/16	24	7.94	1.5/16	7/16	1	—	5978816
5/16		18	7.94	1"	3/8	1	5978050	—
5/16		18	7.94	1.1/2	1/2	1	5978055	—
	3/8	24	9.53	1"	3/8	1	—	5978794
	3/8	24	9.53	1.1/2	1/2	1	—	5978798
	3/8	24	9.53	1.5/16	7/16	1	—	5978801
3/8		16	9.53	1"	3/8	1	5978027	—
3/8		16	9.53	1.1/2	1/2	1	5978031	—
3/8		16	9.53	1.5/16	7/16	1	5978036	—

# DIES

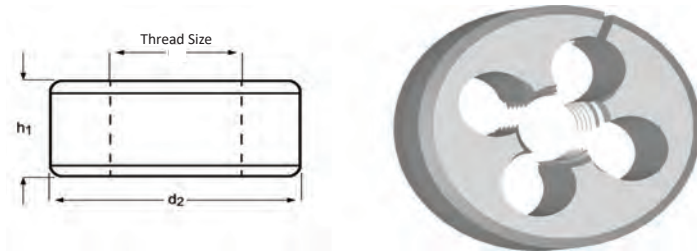


UNC	UNF	TPI	d <sub>1</sub> nom mm	d <sub>2</sub> Ø Inch	h <sub>1</sub> Inch	Pack Qty	F320	F330
	7/16	20	11.11	1"	3/8	1	—	5978832
	7/16	20	11.11	1.1/2	1/2	1	—	5978834
	7/16	20	11.11	1.5/16	7/16	1	—	5978836
7/16		14	11.11	1.1/2	1/2	1	5978746	—
7/16		14	11.11	1.5/16	7/16	1	5978787	—
	1/2	20	12.70	1.1/2	1/2	1	—	5978750
	1/2	20	12.70	1.5/16	7/16	1	—	5978753
1/2		13	12.70	1.1/2	1/2	1	5977975	—
1/2		13	12.70	1.5/16	7/16	1	5977978	—
1/2		13	12.70	2"	5/8	1	5977981	—
	9/16	18	14.29	1.1/2	1/2	1	—	5978842
	9/16	18	14.29	1.5/16	7/16	1	—	5978844
9/16		12	14.29	1.1/2	1/2	1	5978875	—
	5/8	18	15.88	1.1/2	1/2	1	—	5978825
	5/8	18	15.88	2"	5/8	1	—	5978827
5/8		11	15.88	1.1/2	1/2	1	5978065	—
5/8		11	15.88	2"	5/8	1	5978069	—
	3/4	16	19.05	1.1/2	1/2	1	—	5978783
	3/4	16	19.05	2"	5/8	1	—	5978791
3/4		10	19.05	1.1/2	1/2	1	5978013	—
3/4		10	19.05	2"	5/8	1	5978016	—
	7/8	14	22.23	2"	5/8	1	—	5978838
7/8		9	22.23	2"	5/8	1	5978821	—
	1"	12	25.40	2"	5/8	1	—	5978768
1"		8	25.40	2"	5/8	1	5978001	—
	1.1/8	12	28.58	3"	7/8	1	—	5978884
1.1/8		7	28.58	3"	7/8	1	5977972	—
	1.1/4	12	31.75	3"	7/8	1	—	5978881
1.1/4		7	31.75	3"	7/8	1	5977968	—
	1.1/2	12	38.10	3"	7/8	1	—	5978878

## 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.

**Note:** Die pictured has 4 clearance holes. The number of clearance holes will increase or decrease depending on the size of the die



2710M

M

HSS



ANSI

6H



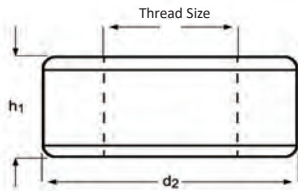
M2 - M20

M	P mm	d <sub>2</sub> Ø Inch	h <sub>1</sub> Inch	Pack Qty	2710M
2	0.40	13/16	1/4	1	6009431
2.5	0.45	13/16	1/4	1	6009426
3	0.50	13/16	1/4	1	6009442
4	0.70	13/16	1/4	1	6009448
4.5	0.75	13/16	1/4	1	6009445
5	0.80	13/16	1/4	1	6009451
6	1.00	1"	3/8	1	6009456
8	1.25	1"	3/8	1	6009463
9	1.25	1"	3/8	1	6009466
10.0	1.50	1"	3/8	1	6009401
12	1.75	1"	3/8	1	6009405
12	1.75	1.1/2	1/2	1	6009412
14	2.00	1.1/2	1/2	1	6009414
16	2.00	1.1/2	1/2	1	6009417
18	2.50	2"	5/8	1	6009420
20	2.50	2"	5/8	1	6009434

## 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.

**Note:** Die pictured has 4 clearance holes. The number of clearance holes will increase or decrease depending on the size of the die.



**F370**

**G**

**HSS**

**BS  
1127:  
1950**

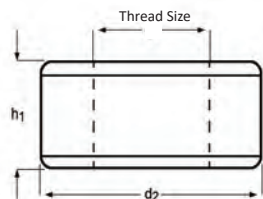
1/8 - 1.1/2

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	5978453
1/4	19	13.16	1.5/16	7/16	1	5978451
3/8	19	16.66	1.1/2	1/2	1	5978464
1/2	14	20.96	2"	5/8	1	5978449
5/8	14	22.91	2"	5/8	1	5978467
3/4	14	26.44	2"	5/8	1	5978458
7/8	14	30.20	2.1/4	11/16	1	5978470
1"	11	33.25	2.1/4	11/16	1	5978455
1.1/4	11	41.91	3"	7/8	1	5978447
1.1/2	11	47.80	4"	1"	1	5978444

## 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.

**Note:** Die pictured has 4 clearance holes.  
The number of clearance holes will increase or decrease depending on the size of the die



F201

M

HSS



ISO  
2568

6H



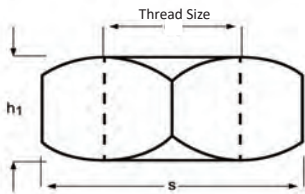
M3 - M20

M	P mm	d <sub>2</sub> Ø mm	h <sub>1</sub> mm	Pack Qty	F201
3	0.50	20	5	1	5977853
4	0.70	20	5	1	5977857
5	0.80	20	7	1	5977860
6	1.00	20	7	1	5977863
8	1.25	25	9	1	5977866
10	1.50	30	11	1	5977822
12	1.75	38	14	1	5977826
14	2.00	38	14	1	5977831
16	2.00	45	18	1	5977836
18	2.50	45	18	1	5977840
20	2.50	45	18	1	5977845

## 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.

**Note:** Die pictured has 4 clearance holes. The number of clearance holes will increase or decrease depending on the size of the die



2025(UNC)	2025(UNF)	2025(UNS)	2025(NPT)
UNC	UNF	UNS	NPT
CS	CS	CS	CS
ANSI	ANSI	ANSI	ANSI
2B	2B	2B	
1/4 - 1.1/2	1/4 - 1.1/2	11/16 - 1"	1/8 - 1"

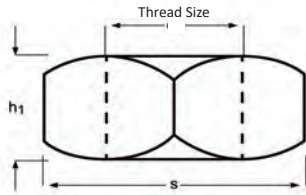
UNC	UNF	UNS	NPT	TPI	S Inch	h <sub>1</sub> Inch	Pack Qty	2025(UNC)	2025(UNF)	2025(UNS)	2025(NPT)
			1/8	27	1.1/16	3/8	1	—	—	—	6009081
	1/4			28	5/8	1/2	1	—	6009075	—	—
1/4				20	5/8	1/2	1	6009069	—	—	—
			1/4	18	1.1/4	5/8	1	—	—	—	6009060
	5/16			24	11/16	5/16	1	—	6009324	—	—
5/16				18	11/16	5/16	1	6009316	—	—	—
	3/8			24	13/16	3/8	1	—	6009261	—	—
3/8				16	13/16	3/8	1	6009155	—	—	—
			3/8	18	1.7/16	5/8	1	—	—	—	6009208
	7/16			20	7/8	7/16	1	—	6009122	—	—
7/16				14	7/8	7/16	1	6009335	—	—	—
	1/2			20	1.1/16	1/2	1	—	6009055	—	—
1/2				13	1.1/16	1/2	1	6009045	—	—	—
			1/2	14	1.5/8	3/4	1	—	—	—	6009050
	9/16			18	1.1/16	1/2	1	—	6009134	—	—
9/16				12	1.1/16	1/2	1	6009131	—	—	—
	5/8			18	1.1/4	5/8	1	—	6009331	—	—
5/8				11	1.1/4	5/8	1	6009328	—	—	—
			11/16	11	1.7/16	3/4	1	—	—	6009095	—
			11/16	16	1.7/16	3/4	1	—	—	6009097	—
	3/4			16	1.7/16	3/4	1	—	6009119	—	—
3/4				10	1.7/16	3/4	1	6009099	—	—	—
			3/4	14	2"	13/16	1	—	—	—	6009103
	7/8			14	1.5/8	7/8	1	—	6009125	—	—
7/8				9	1.5/8	7/8	1	6009128	—	—	—
			1"	14	1.13/16	1"	1	—	—	6009091	—
1"				12	1.13/16	1"	1	—	6009089	—	—
			1"	8	1.13/16	1"	1	6009093	—	—	—
			1"	11.5	2.3/8	1"	1	—	—	—	6009085
	1.1/8			12	2"	1"	1	—	6009025	—	—
1.1/8				7	2"	1"	1	6009030	—	—	—
	1.1/4			12	2.3/16	1"	1	—	6009017	—	—
1.1/4				7	2.3/16	1"	1	6009021	—	—	—
	1.3/8			12	2.3/8	1"	1	—	6009035	—	—
1.3/8				6	2.3/8	1"	1	6009040	—	—	—
	1.1/2			12	2.9/16	1"	1	—	6009003	—	—
1.1/2				6	2.5/8	1"	1	6009008	—	—	—



## 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.

**Note:** Die pictured has 4 clearance holes. The number of clearance holes will increase or decrease depending on the size of the die.



2325M

M

CS



ANSI

6H



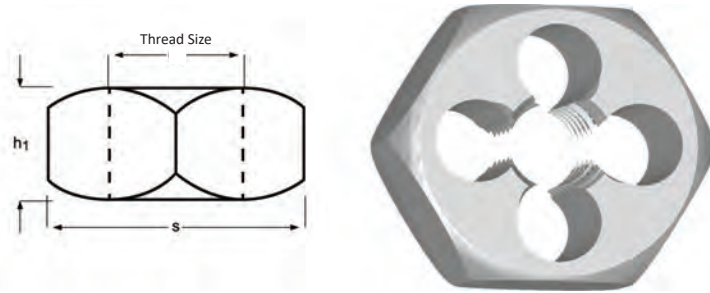
M6 - M20

M	P mm	S Inch	h <sub>1</sub> Inch	Pack Qty	2325M
6	1.00	5/8	3/8	1	6009183
8	1.25	1	3/8	1	6009193
9	1.25	1	3/8	1	6009202
10	1.50	1	3/8	1	6009144
12	1.75	1	3/8	1	6009151
14	2.00	1.7/16	1/2	1	6009164
16	2.00	1.7/16	1/2	1	6009169
18	1.50	1.7/16	1/2	1	6009174
18	2.50	1.7/16	1/2	1	6009197
20	2.50	1.13/16	3/4	1	6009179

## 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.

**Note:** Die pictured has 4 clearance holes. The number of clearance holes will increase or decrease depending on the size of the die.



F302

M

HSS



BS  
1127:  
1950

6H



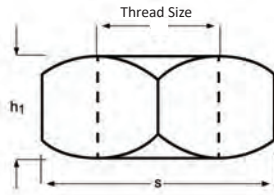
M3 - M36

M	P mm	S decimal Inch	h <sub>1</sub> Inch	Pack Qty	F302
3	0.50	0.7100	1/4	1	5978496
4	0.70	0.7100	1/4	1	5978508
5	0.80	0.7100	1/4	1	5978510
6	1.00	0.7100	1/4	1	5978513
7	1.00	0.8200	5/16	1	5978517
8	1.25	0.8200	5/16	1	5978521
10	1.50	0.9200	3/8	1	5978465
11	1.50	1.0100	7/16	1	5978468
12	1.75	1.1000	1/2	1	5978471
14	2.00	1.3000	5/8	1	5978473
16	2.00	1.3000	5/8	1	5978476
18	2.50	1.4800	11/16	1	5978479
20	2.50	1.4800	11/16	1	5978482
22	2.50	1.6700	13/16	1	5978484
24	3.00	2.0500	15/16	1	5978487
27	3.00	2.2200	1.1/16	1	5978493
30	3.50	2.2200	1.1/16	1	5978499
33	3.50	2.5800	1.1/8	1	5978502
36	4.00	2.7600	1.1/4	1	5978505

## 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.

**Note:** Die pictured has 4 clearance holes.  
The number of clearance holes will increase or decrease depending on the size of the die



**F312**

**MF**

**HSS**

**BS 1127: 1950**

**6H**

M8 - M24

MF	P mm	S decimal Inch	h <sub>1</sub> Inch	Pack Qty	F312
8	0.75	0.8200	5/16	1	5977961
8	1.00	0.8200	5/16	1	5977964
10	1.00	0.9200	3/8	1	5977930
10	1.25	0.9200	3/8	1	5977934
12	1.00	1.0100	7/16	1	5977937
12	1.25	1.0100	7/16	1	5977939
12	1.50	1.0100	7/16	1	5977941
14	1.50	1.3000	5/8	1	5977944
16	1.50	1.3000	5/8	1	5977946
18	1.50	1.4800	11/16	1	5977948
20	1.50	1.4800	11/16	1	5977950
22	1.50	1.6700	13/16	1	5977954
24	1.50	2.0500	15/16	1	5977956
24	2.00	2.0500	15/16	1	5977959

## 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"

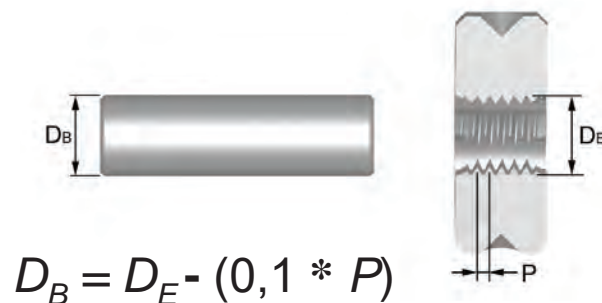
Nr.	Die Size Ø x H	Pack Qty	L110
1"	16 x 5	1	5978506
2a	20 x 5	1	5978542
2b	20 x 7	1	5978547
3	25 x 9	1	5978556
4"	30 x 11	1	5978566
5	38 x 14	1	5978576
5f	38 x 10	1	5978581
6	45 x 18	1	5978589
6f	45 x 14	1	5978749
7	55 x 22	1	5978792
7f	55 x 16	1	5978826
8	65 x 25	1	5978850
8f	65 x 18	1	5978876
9	75 x 30	1	5978882
9f	75 x 20	1	5978885
10	90 x 36	1	5978522
10f	90 x 22	1	5978526
	13/16 x 1/4	1	5978531
	1 x 3/8	1	5978518
	1.5/16 x 7/16	1	5978514
	1.1/2 x 1/2	1	5978511
	2 x 5/8	1	5978552
	2.1/4 x 11/16	1	5978539
	3 x 7/8	1	5978562
	4 x 1	1	5978571

## 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.










# Visual Index - End Mills

## HSS End Mill - Feed Rate Chart

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	
 ↓ 0,5D ↔ 0,8D	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	0.0033	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	0.0066	0.0066	0.0066	0.0066	0.0066	0.0069
	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	0.0033
 ↓ D ↔ 0,8D	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	0.0025	0.0021	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	
	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	
	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	
 ↓ 1,5D ↔ 0,25D	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	0.0015	0.0039	0.0031	0.0035	0.0033	0.0036	
	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	
	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	
 ↓ 1,5D ↔ 0,1D	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	
	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	
	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	

## Carbide End Mill - Feed Rate Chart

# 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				0.0010	0.0015	0.0015	0.0015	0.0015	0.0020	0.0020	0.0025
			B				0.0020	0.0020	0.0025	0.0030	0.0035	0.0040	0.0040	0.0045
			C				0.0030	0.0035	0.0040	0.0045	0.0050	0.0055	0.0060	0.0070
3-4		↓ 1,5 ↔ 0,1	A	0.0010	0.0015	0.0020	0.0020	0.0025	0.0025	0.0030	0.0035	0.0040	0.0045	0.0050
			B	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045	0.0050	0.0055	0.0060	0.0070
			C	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050	0.0060	0.0065	0.0070	0.0080	0.0090
3-4		↓ 1 ↔ 0,5	A	0.0005	0.0005	0.0005	0.0010	0.0010	0.0015	0.0015	0.0020	0.0020	0.0025	0.0025
			B	0.0005	0.0005	0.0010	0.0015	0.0015	0.0020	0.0020	0.0025	0.0030	0.0035	0.0040
			C	0.0005	0.0010	0.0015	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045	0.0050
2-3		↓ 0,5 ↔ 1	A	0.0005	0.0010	0.0010	0.0010	0.0015	0.0015	0.0020	0.0020	0.0025	0.0025	0.0030
			B	0.0010	0.0010	0.0010	0.0015	0.0015	0.0020	0.0025	0.0030	0.0035	0.0035	0.0040
			C	0.0015	0.0015	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045	0.0050	0.0050
3-4		↓ 0,5 ↔ 1 ↔ 0,5	B				0.0010	0.0020	0.0030	0.0030	0.0035	0.0040	0.0040	0.0040
2 & 4		↓ 0,1 - 0,5mm ↔ 0,1 - 0,5mm	A	0.0010	0.0010	0.0015	0.0015	0.0020	0.0020	0.0025	0.0030	0.0030		
			BC	0.0010	0.0010	0.0015	0.0020	0.0020	0.0025	0.0030	0.0035	0.0040		
4		↓ 0,01 - 0,1 ↔ ≤ 1	A				0.0020	0.0020	0.0025	0.0030			0.0030	
			BC				0.0020	0.0025	0.0030	0.0035			0.0040	

# Visual Index - End Mills

## How to Use This Chart:

- 1) Determine your Workpiece Material from the Application Material Groups (AMG) below.
- 2) Use the icons to find Product Features.
- 3) Find the Surface Feet Per Minute (SFM) and Alpha Code.  
 example: 361 W  
 361 = SFM  
 W = Alpha Code used to find your Feed Rate (IPR)
- 4) To find Cutting Feed Rate, find your Alpha Code on the AMG Chart  
 (example: 279 U : U is the Alpha Code)
- 5) Find the closest diameter for your cutting application on the Feed Rate chart to find your Ft
- 6) Select the type of cut and # of flutes to find your Ft Range

Application Material Groups (AMG)			Hardness HRC	ISO
1. Steel	1.1 Magnetic soft steel	12L14, 12L15	<120 HB	P 1
	1.2 Structural Steel/ case carburising steel	1005-1025, 1214, 1215, A36	<200 HB	P 1
	1.3 Plain Carbon steel	1030-1060, 1050-1060, 1144-1146	<24	P 2
	1.4 Alloy steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	<24	P 3
	1.5 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>24<38	P 4
	1.6 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>38	H 1
	1.7 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	49-55	H 3
	1.8 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	55-63	H 4
2. Stainless Steel	2.1 Free machining Stainless Steel	200, 303, 416, 420F, 430F, 440	<24	M 1
	2.2 Austenitic	301, 302, 304, 316, 321, 330, CUSTOM 455, AM-350	<24	M 3
	2.3 Ferritic + Austenitic, Martensitic	318-329, 400-446, DUPLEX	<32	M 2
	2.4 Precipitation Hardened	15-5PH, Custom 450 17-4PH	<32	S 2
3. Cast Iron	3.1 Lamellar graphite	Grey, G10, Gg40, J431C, A48 CLASS 20	<150 HB	K 1
	3.2 Lamellar graphite	Grey, GG25-Gg40, J158, A48 CLASS 40-60	>150 HB<32	K 2
	3.3 Nodular graphite/ Malleable Cast Iron	A220, A436, A439, A602, Black, GGG40-GGG70	<200 HB	K 3
	3.4 Nodular graphite/ Malleable Cast Iron	Black Gts/Gtw, J434C	>200 HB<32	K 4
4. Titanium	4.1 Titanium, unalloyed	Commercially Pure	<200 HB	S 1
	4.2 Titanium, alloyed	6Al4V, 6A14V-2Sn, Monel, Monel K	<28	S 2
	4.3 Titanium, alloyed	6Al4V-4Mo, 7A14V-4Mo, 4911-4967	>28<38	S 3
5. Nickel	5.1 Nickel, unalloyed	Commercially Pure, 17644, 200, 5553	<150 HB	S 1
	5.2 Nickel, alloyed	Monel 400, Hastelloy C, Inconel 625, Waspaloy	<28	S 2
	5.3 Nickel, alloyed	Iconel 718, Nimonic 75-95, Rene 41, Iconel 825, A286	>28<38	S 3
6. Copper	6.1 Copper	Commercially Pure	<100 HB	N 3
	6.2 β-Brass, Bronze	314-340, 350-370	<200 HB	N 4
	6.3 α-Brass	Alloyed Cu + Al + Fe, Long Chipping	<200 HB	N 3
	6.4 High Strength Bronze	Ampco 18-25	<49	N 4
7. Aluminium Magnesium	7.1 Al, Mg, unalloyed	Commercially Pure	<100 HB	N 1
	7.2 Al alloyed, Si<0.5%	6061 T6, 7075, 314-340	<150 HB	N 1
	7.3 Al alloyed, Si>0.5%<10%	6061 T6, 380-390	<120 HB	N 1
	7.4 Al alloyed, Si>10% Mg alloys	Magnesium Whisker Reinforced	<120 HB	N 2
8. Synthetic Materials	8.1 Thermoplastics	Ultrad, Polystrol	---	O
	8.2 Thermosetting plastics	Bakelit, Pertinax	---	O
	8.3 Reinforced plastic materials	CFK, GFKAFK	---	O
9. Hard Mat.	9.1 Cermets (Metal-ceramics)	Ferrotic	<54	H
10. Graphite	10.1 Standard graphite		---	O

# Visual Index - End Mills

Tool Material:	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM
Application:															
Type:	W	W	W												
Number of Flutes:	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2	Z 2
Cut Length:															
Helix:	$\lambda 45^\circ$	$\lambda 45^\circ$	$\lambda 37^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$
Shank:															
Finish/Coating:		ZrN	ZrN			TiAlN				TiAlN		AlTiN		AlTiN	
Tolerance:				Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Direction:															
Style:	S106	S206	S207	S116	S108	S208	S109	S110	S111	S211	S112	S212	S113	S213	S114
Range:	1/4 - 1"	1/4 - 1"	1/8 - 1"	1/8 - 1/2	1/16 - 5/8	1/16 - 5/8	2.00 - 25.00	1/8 - 1/2	1/8 - 1/2	1/8 - 1/2	1/16 - 1/2	1/16 - 1/2	2.00 - 20.00	2.00 - 12.00	1/8 - 5/8
Page #	397	397	398	399	400	400	401	402	403	403	404	404	405	405	406
1.1				289B	289B	400B	289B	269B	249B	361B	289B	400B	289B	400B	269B
1.2				223B	223B	298B	223B	212B	200B	269B	223B	298B	223B	298B	212B
1.3				223B	223B	298B	223B	212B	200B	269B	223B	298B	223B	298B	212B
1.4				180B	180B	259B	180B	171B	161B	239B	180B	259B	180B	259B	170B
1.5				161B	161B	230B	161B	152B	144B	200B	161B	230B	161B	230B	152B
1.6				148B	148B	200B	148B	140B	131B	180B	148B	200B	148B	200B	140B
1.7															
1.8															
2.1				200A	200A	325A	200A	190A	180A	298A	200A	325A	200A	325A	190A
2.2				141A	141A	223A	141A	125A	108A	180A	141A	223A	141A	223A	125A
2.3				108A	108A	174A	108A	103A	98A	171A	108A	174A	108A	174A	103A
2.4				89A	89A	131A	89A	78A	66A	131A	89A	131A	89A	131A	78A
3.1				374B	374B	551B	374B	336A	298B	499B	374B	551B	374B	551B	336A
3.2				318B	318B	525B	318B	284B	249B	400B	318B	525B	318B	525B	284B
3.3				318B	318B	525B	318B	284B	249B	400B	318B	525B	318B	525B	284B
3.4				249B	249B	374B	249B	225B	200B	341B	249B	374B	249B	374B	225B
4.1						230B				200B		230B		230B	
4.2						200B				180B		200B		200B	
4.3						190B				174B		190B		190B	
5.1						230B				200B		230B		230B	
5.2						161A				141A		161A		161A	
5.3						98A				85A		98A		98A	
6.1				649C	649C		649C	617C	584C		649C		649C		617C
6.2				499C	499C		499C	474C	449C		499C		499C		474C
6.3				499C	499C		499C	474C	449C		499C		499C		474C
6.4				125B	125B		125B	117B	108B		125B		125B		117B
7.1	2326C	2326C	2093C	1499C	1499C		1499C	1424C	1348C		1499C		1499C		1424C
7.2	1749C	1749C	1575C	1499C	1499C		1499C	1424C	1348C		1499C		1499C		1424C
7.3	1171C	1171C	1056C	649C	649C		649C	617C	584C		649C		649C		617C
7.4	751B	751B	676B	400B	400B		400B	380B	361B		400B		400B		380B
8.1															
8.2															
8.3															
9.1															
10.1															



# Visual Index - End Mills

	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	
	Z 2	Z 2	Z 3	Z 3	Z 4	Z 4	Z 4	Z 4	Z 4	Z 4	Z 4	Z 4	Z 4	Z 4	Z 4	Z 4	
	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	λ30°	
	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	
	S115	S215	S121	S221	S129	S134	S234	S135	S235	S136	S236	S137	S237	S138	S238	S139	S239
	1/8 - 1/2	1/8 - 1/2	1/16 - 1/2	1/16 - 1/2	1/8 - 1/2	1/16 - 1"	1/16 - 1"	2.00 - 25.00	2.00 - 20.00	1/8 - 3/4	1/8 - 3/4	1/8 - 1"	1/8 - 1"	1/16 - 3/4	1/16 - 3/4	2.00 - 12.00	2.00 - 12.00
	407	407	408	408	409	410	410	411	411	412	412	413	413	414	414	415	415
1.1	249B	361B	289B	400B	361B	361B	499B	361B	499B	343B	474B	325B	449B	361B	499B	361B	499B
1.2	200B	269B	223B	298B	325B	325B	449B	325B	449B	312B	425B	298B	400B	325B	449B	325B	449B
1.3	200B	269B	223B	298B	325B	325B	449B	325B	449B	312B	425B	298B	400B	325B	449B	325B	449B
1.4	161B	239B	180B	259B	298B	298B	423B	298B	423B	287B	406B	276B	390B	298B	423B	298B	423B
1.5	144B	200B	161B	230B	249B	249B	400B	249B	400B	238B	380B	226B	361B	249B	400B	249B	400B
1.6	131B	180B	148B	200B	230B	230B	328B	230B	328B	205B	313B	180B	298B	230B	328B	230B	328B
1.7																	
1.8																	
2.1	180A	298A	200A	325A	239A	239A	351A	239A	351A	220A	338A	200A	325A	239A	351A	239A	351A
2.2	108A	180A	141A	223A	171A	171A	276A	171A	276A	156A	251A	141A	226A	171A	276A	171A	276A
2.3	98A	171A	108A	174A	131A	131A	200A	131A	200A	123A	182A	115A	164A	131A	200A	131A	200A
2.4	82A	89A			105A	105A	164A	105A	164A	97A	140A	89A	115A	98A	148A	98A	148A
3.1	298B	499B	374B	551B	449B	449B	699B	449B	699B	405B	650B	361B	600B	449B	699B	449B	699B
3.2	249B	400B	318B	525B	377B	377B	649B	377B	649B	338B	578B	298B	508B	377B	649B	377B	649B
3.3	249B	400B	318B	525B	377B	377B	649B	377B	649B	338B	578B	298B	508B	377B	649B	377B	649B
3.4	200B	341B	249B	374B	279B	279B	430B	279B	430B	254B	415B	230B	400B	279B	430B	279B	430B
4.1		200B		230B			259B		259B		245B		230B		259B		259B
4.2		180B		200B			230B		230B		220B		210B		230B		230B
4.3		174B		190B			200B		200B		190B		180B		200B		200B
5.1	148B	200B		230B			266B		266B		251B		236B		266B		266B
5.2		141A		161A			200A		200A		190A		180A		200A		200A
5.3		85A		98A			131A		131A		123A		115A		131A		131A
6.1	584C		649C		679C	679C	679C		646C		613C		679C		679C		679C
6.2	449C		499C		574C	574C	574C		546C		518C		574C		574C		574C
6.3	449C		499C		574C	574C	574C		546C		518C		574C		574C		574C
6.4	108B		125B		144B	144B	144B		138B		131B		144B		144B		144B
7.1	1348C		1499C		1601C	1601C	1601C		1525C		1450C		1601C		1601C		1601C
7.2	1348C		1499C		1601C	1601C	1601C		1525C		1450C		1601C		1601C		1601C
7.3	584C		649C		708C	708C	708C		674C		640C		708C		708C		708C
7.4	361B		400B		479B	479B	479B		455B		430B		479B		479B		479B
8.1																	
8.2																	
8.3																	
9.1																	
10.1																	

# Visual Index - End Mills

	HM	HM	HM	HM	HM	HM	HM	HM	HSS-E PM	HSS	HSS	HSS	HSS-E	HSS-E PM	HSS	HSS
					N	N	N	N	N					N		
	Z <sub>4</sub>	Z <sub>4</sub>	Z <sub>4</sub>	Z <sub>4</sub>	Z <sub>4</sub>	Z <sub>4</sub>	Z <sub>4</sub>	Z <sub>4</sub>	Z <sub>2</sub>	Z <sub>2</sub>	Z <sub>2</sub>	Z <sub>2</sub>	Z <sub>2</sub>	Z <sub>2</sub>	Z <sub>2</sub>	Z <sub>2</sub>
	λ30°	λ30°	λ30°	λ30°	λ*	λ*	λ*	λ*	λ30° γ12°	λ30°	λ30°	λ30°	λ30°	λ30° γ12°	λ30°	λ38°
			Normal	Normal					DIN 1835B e8	+0.03 -0.000	+0.03 -0.000	+0.001 -0.0015	+0.003 -0.000	DIN 1835B e8	+0.003 -0.000	+0.003 -0.000
	<b>S146</b>	<b>S246</b>	<b>S147</b>	<b>S247</b>	<b>S223HA</b>	<b>S223HB</b>	<b>S248HA</b>	<b>S248HB</b>	<b>C110</b>	<b>C600</b>	<b>C601</b>	<b>C602</b>	<b>C603</b>	<b>C123</b>	<b>C604</b>	<b>C605</b>
	1/4 - 5/8	1/4 - 5/8	1/8 - 5/8	1/8 - 5/8	1/8 - 1"	1/8 - 1"	5/16 - 1"	5/16 - 1"	1.00 - 50.00	1/8 - 3/4	1/8 - 1.1/2	1/8 - 1"	1/8 - 1"	1/16 - 40.00	1/8 - 3/4	1/4 - 1"
	<b>416</b>	<b>416</b>	<b>417</b>	<b>417</b>	<b>418</b>	<b>418</b>	<b>419</b>	<b>419</b>	<b>420</b>	<b>422</b>	<b>423</b>	<b>424</b>	<b>425</b>	<b>426</b>	<b>428</b>	<b>429</b>
1.1	343B	450B	325B	400B	801C	801C	801C	801C	197A	98A	98A	98A	164A	180A	112S	164A
1.2	312B	412B	298B	374B	778C	778C	778C	778C	164A	89A	89A	89A	131A	148A	89S	131A
1.3	312B	412B	298B	374B	522C	522C	522C	522C	131B	75B	75B	75B	115B	131B	79T	115B
1.4	287B	387B	276B	351B	463B	463B	463B	463B	115B				98B	115B		
1.5	238B	363B	226B	325B	328B	328B	328B	328B								
1.6	205B	288B	180B	249B	285A	285A	285A	285A								
1.7					187A	187A	364A	364A								
1.8					125A	125A	240A	240A								
2.1	220A	288A	200A	226A	489B	489B	489B	489B	98F				75F	82F		75F
2.2	156A	233A	141A	190A	400B	400B	400B	400B								62F
2.3	123A	176A	115A	151A	302B	302B	302B	302B								
2.4		135A		121A	256A	256A	256A	256A								
3.1	405B	500B	361B	499B	456C	456C	771C	771C	115A	82A	82A	82A	92A	98A	89S	
3.2	338B	540N	298B	430B	381B	381B	571B	571B	98A	66A	66A	66A	75A	82A	72S	
3.3	338B	540B	298B	430B	305B	305B	538B	538B	164B	82B	82B	82B	131B	148B	89T	
3.4	255B	384B	230B	338B	256B	256B	433B	433B	98B				82B	98B		
4.1		230B		200B	522B	522B	1017B	1017B	115D	59D	59D	59D	92D	98D	62V	92D
4.2		210B		190B	463B	463B	902B	902B	82D	49D	49D	49D	75D	82D	49V	
4.3		180B			387A	387A	755B	755B								
5.1		238B		210B	358B	358B	614B	614B	197D	98D	98D	98D	157D	164D	108V	157D
5.2		176A			269A	269A	525A	525A	49C	20C	20C	20C	43C	49C	20U	
5.3					223A	223A	436A	436A								
6.1	646C		613C	699C					279C	180C	180C	180C	410C	262C	200U	410C
6.2	602C		518C	571C					279C	197C	197C	197C	410C	262C	223U	
6.3	546C		518C	571C					279C	197C	197C	197C	410C	262C	223U	
6.4	137B		131B	180B												
7.1	1526C		1450C	1650C					722E	197E	197E	197E	984E	656E	243X	984E
7.2	1526C		1450C	1650C					722E	180E	180E	180E	984E	656E	194X	984E
7.3	674C		640C	708C					279E	115E	115E	115E	295E	262E	144X	295E
7.4	455B		430B	410B												
8.1									295C	197C	197C	197C	410C	262C	200U	410C
8.2																
8.3																
9.1																
10.1																

# Visual Index - End Mills

	HSS	HSS	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS-E	HSS	HSS	HSS-E PM	HSS-E PM	HSS	HSS-E
	Z 2	Z 3	Z 3	Z 4-8	Z 4-8	Z 4-8	Z 4-8	Z 4-8	Z 4-8	Z 4	Z 4	Z 4-8	Z 4-8	Z 4-8	Z 4-8
	$\lambda 38^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$ $\gamma 12^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$ $\gamma 12^\circ$	$\lambda 30^\circ$ $\gamma 12^\circ$	$\lambda 30^\circ$	$\lambda 30^\circ$
			DIN 1835B									DIN 1835B	DIN 1835B		
					TiCN 										
	+0.003 -0.000	+0.003 -0.000	e8	+0.005 -0.000	+0.005 -0.000	+0.005 -0.000	+0.005 -0.000	+0.005 -0.000	+0.005 -0.000	Normal	+0.003 -0.000	k10	k10	+0.003 -0.000	+0.003 -0.000
	<b>C606</b>	<b>C607</b>	<b>C346</b>	<b>C608</b>	<b>C609</b>	<b>C610</b>	<b>C611</b>	<b>C612</b>	<b>C613</b>	<b>C614</b>	<b>C615</b>	<b>C247</b>	<b>C273</b>	<b>C617</b>	<b>C618</b>
	1/4 - 3/4	1/8 - 1"	3.00 - 20.00	1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 1"	1/4 - 3/4	1/8 - 3/4	1/8 - 1"	2.00 - 50.00	2.00 - 40.00	1/8 - 1"	1/8 - 1"
	<b>430</b>	<b>431</b>	<b>432</b>	<b>433</b>	<b>433</b>	<b>434</b>	<b>434</b>	<b>435</b>	<b>436</b>	<b>437</b>	<b>438</b>	<b>439</b>	<b>441</b>	<b>443</b>	<b>444</b>
1.1	148A		148A	164G	197G	164G	197G	148G	148G	115S	164S	180S	164S	115S	164S
1.2	118A	131A	115A	131G	184G	131G	184G	118G	118G	92S	131S	148S	164S	92S	131S
1.3	102B	115B	98B	115H	161H	115H	161H	102H	102H	79T	115T	131T	115T	79T	115T
1.4		98B	82B	98H	138H	98H	138H	89H	89H	69T	98T	115T	98T	69T	98T
1.5		66C													
1.6															
1.7															
1.8															
2.1	66F		66F	75L	105L	75L	105L	66L	66L	52Y	75Y	82Y	33Y	52Y	75Y
2.2	56F	62F													
2.3															
2.4															
3.1			82A	92G	128G	92G	128G	82G	82G	92S	92S	98S	82S	92S	92S
3.2		75A	66A	75G	105G	75G	105G	66G	66G	75S	75S	82S	66S	75S	75S
3.3		131B	115B	131H	184H	131H	184H	118H	118H	92T	131T	148T	131T	92T	131T
3.4		82B	66B	82H	128H	82H	128H	72H	72H	56T	82T	82T	82T	56T	82T
4.1	82D	92D	82D	92J	128J	92J	128J	82J	82J	62V	92V	98V	82V	62V	92V
4.2		75D	66D	75J	105J	75J	105J	66J	66J	52V	75V	82V	66V	52V	75V
4.3		33D													
5.1	141D		148D	157J	220J	157J	220J	141J	141J	108V	157V	164V	148V	108V	157V
5.2		43C	33C	43I	59I	43I	59I	36I	36I	20U	43U	49U	33U	20U	43U
5.3		20D													
6.1	367C		230C	410I	574I	410I	574I	367I	367I	203U	410U	262U	230U	203U	410U
6.2		410C	230C	410I	574I	410I	574I	367I	367I	223U	410U	262U	230U	223U	410U
6.3		410C	230C	410I	574I	410I	574I	367I	367I	223U	410U	262U	230U	223U	410U
6.4		49C													
7.1	886E		590E								984X	656X	590X		984X
7.2	886E		590E	984K	1378K	984K	1378K	886K	886K	197X	984X	656X	590X	197X	984X
7.3	266E	295E		295K	413K	295K	413K	266K	266K	148X	295X	262X	230X	148X	295X
7.4		197A													
8.1	367C		230C	410I	574I	410I	574I	367I	367I	203U	410U	262U	230U	203U	410U
8.2		410C													
8.3															
9.1															
10.1															

# List Number Index - End Mills



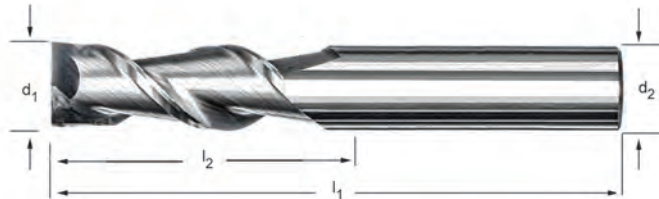
Pgs. 390-444

C110 .....	420	S111 .....	403	S235 .....	411
C123 .....	426	S112 .....	404	S236 .....	412
C247 .....	439	S113 .....	405	S237 .....	413
C273 .....	441	S114 .....	406	S238 .....	414
C346 .....	432	S115 .....	407	S239 .....	415
C600 .....	422	S116 .....	399	S246 .....	416
C601 .....	423	S121 .....	408	S247 .....	417
C602 .....	424	S129 .....	409	S248HA .....	419
C603 .....	425	S134 .....	410	S248HB .....	419
C604 .....	428	S135 .....	411		
C605 .....	429	S136 .....	412		
C606 .....	430	S137 .....	413		
C607 .....	431	S138 .....	414		
C608 .....	433	S139 .....	415		
C609 .....	433	S146 .....	416		
C610 .....	434	S147 .....	417		
C611 .....	434	S206 .....	397		
C612 .....	435	S207 .....	398		
C613 .....	436	S208 .....	400		
C614 .....	437	S211 .....	403		
C615 .....	438	S212 .....	404		
C617 .....	443	S213 .....	405		
C618 .....	444	S215 .....	407		
S106 .....	397	S221 .....	408		
S108 .....	400	S223HA .....	418		
S109 .....	401	S223HB .....	418		
S110 .....	402	S234 .....	410		

## Regular Length, Square End, 45° Helix

**S106** Double gullet flute design allows for fast, efficient evacuation of chips in soft and non-ferrous materials

**S206** Zirconium coating increases surface hardness, improves chip evacuation and tool life allowing for higher removal rates in soft and non-ferrous materials



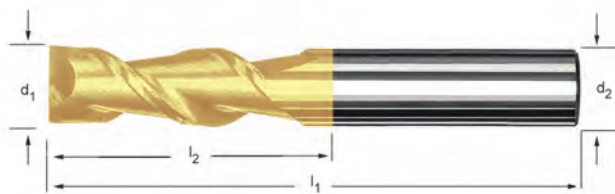
$d_1$ Ø Inch	$d_1$ decimal Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S106	S206
1/4	0.2500	1/4	1"	2-1/2	2	1	7648490	7648497
5/16	0.3125	5/16	1"	3"	2	1	7648491	7648498
3/8	0.3750	3/8	1"	2-1/2	2	1	7648492	7648499
1/2	0.5000	1/2	1-1/4	3"	2	1	7648493	7648500
5/8	0.6250	5/8	1-5/8	3-1/2	2	1	7648494	7648501
3/4	0.7500	3/4	1-3/4	4"	2	1	7648495	7648502
1"	1.0000	1"	1-1/2	4"	2	1	7648496	7648503

# Solid Carbide 2-Flute End Mill



## Regular Length, Square End, 37° Helix

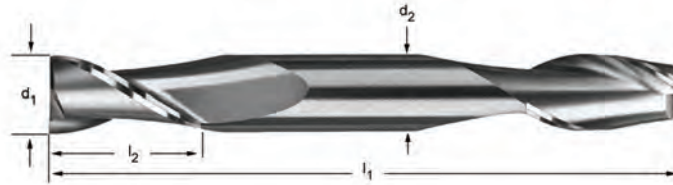
**S207** Unique flute design along with the Zirconium coating allow for faster speeds and feeds in soft and non-ferrous materials



$d_1$ Ø Inch	$d_1$ decimal Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	<b>S207</b>
1/8	0.1250	1/8	1/2	1-1/2	2	1	7648504
1/8	0.1250	1/8	3/4	2"	2	1	7648505
5/32	0.1563	5/32	9/16	2"	2	1	7648506
3/16	0.1875	3/16	3/4	2"	2	1	7648507
3/16	0.1875	3/16	1-1/8	3"	2	1	7648508
1/4	0.2500	1/4	1"	2-1/2	2	1	7648509
1/4	0.2500	1/4	1-1/2	4"	2	1	7648510
5/16	0.3125	5/16	3/4	2-1/2	2	1	7648511
5/16	0.3125	5/16	1-5/8	4"	2	1	7648512
3/8	0.3750	3/8	1"	2-1/2	2	1	7648513
3/8	0.3750	3/8	2"	4"	2	1	7648514
7/16	0.4375	7/16	1"	2-1/2	2	1	7648515
7/16	0.4375	7/16	2"	4"	2	1	7648516
1/2	0.5000	1/2	1"	3"	2	1	7648517
1/2	0.5000	1/2	3"	6"	2	1	7648518
9/16	0.5625	9/16	1-1/4	3"	2	1	7648519
5/8	0.6250	5/8	1-5/8	3-1/2	2	1	7648520
5/8	0.6250	5/8	2-1/4	5"	2	1	7648521
3/4	0.7500	3/4	1-3/4	4"	2	1	7648522
3/4	0.7500	3/4	3"	6"	2	1	7648523
1"	1.0000	1"	1-1/2	4"	2	1	7648524
1"	1.0000	1"	4"	6"	2	1	7648525

## Regular Length, Square End, Double End, 30° Helix

**S116** Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft and non-ferrous materials



**S116**

**HM**

**Z**  
**2**

1/8 - 1/2

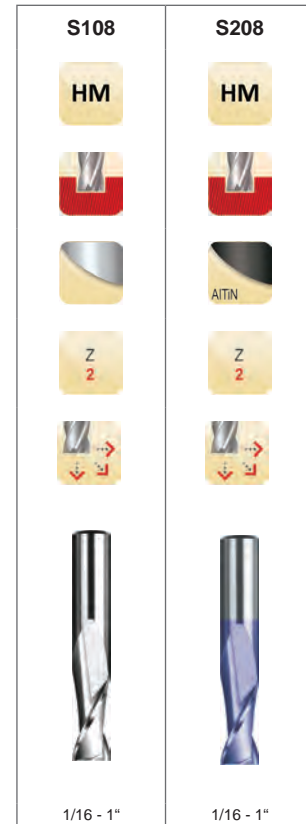
$d_1$ Ø Inch	$d_1$ decimal Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	<b>S116</b>
1/8	0.1250	3/8	3/8	3"	2	1	7648650
5/32	0.1562	3/8	7/16	3"	2	1	7648651
3/16	0.1875	3/8	1/2	3"	2	1	7648652
1/4	0.2500	3/8	5/8	3"	2	1	7648653
5/16	0.3125	3/8	3/4	3.1/2	2	1	7648654
3/8	0.3750	3/8	3/4	3.1/2	2	1	7648655
1/2	0.5000	1/2	1"	4"	2	1	7648656

# Solid Carbide 2-Flute End Mill



## Regular Length, Square End, 30° Helix

- S108** Bright finish improves chip flow in soft and non-ferrous materials.
- S208** ALTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.



d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	d <sub>2</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	# of Flutes	Pack Qty	S108	S208
1/16	0.0625	1/8	1/4	1.1/2	2	1	7648526	7648544
5/64	0.0781	1/8	1/4	1.1/2	2	1	7648527	7648545
3/32	0.0938	1/8	3/8	1.1/2	2	1	7648528	7648546
1/8	0.1250	1/8	1/2	1.1/2	2	1	7648529	7648547
9/64	0.1406	3/16	9/16	2"	2	1	7648530	—
5/32	0.1562	3/16	9/16	2"	2	1	7648531	7648548
11/64	0.1719	3/16	9/16	2"	2	1	7648532	—
3/16	0.1875	3/16	5/8	2"	2	1	7648533	7648549
7/32	0.2188	1/4	5/8	2.1/2	2	1	7648534	7648550
1/4	0.2500	1/4	3/4	2.1/2	2	1	7648535	7648551
5/16	0.3125	5/16	7/8	2.1/2	2	1	7648536	7648552
3/8	0.3750	3/8	7/8	2.1/2	2	1	7648537	7648553
7/16	0.4375	7/16	1"	2.1/2	2	1	7648538	7648554
1/2	0.5000	1/2	1"	3"	2	1	7648539	7648555
9/16	0.5625	9/16	1.1/4	3.1/2	2	1	7648540	7648556
5/8	0.6250	5/8	1.1/4	3.1/2	2	1	7648541	7648557
3/4	0.7500	3/4	1.1/2	4"	2	1	7648542	—
1"	1.0000	1"	1.1/2	4"	2	1	7648543	—



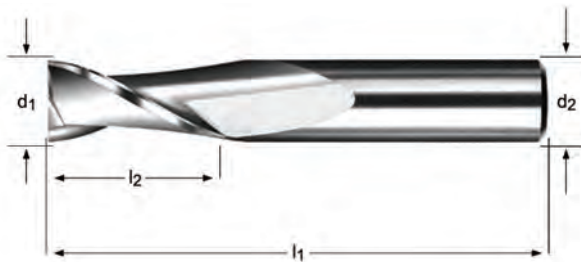


# Solid Carbide 2-Flute End Mill



## Long Length, Square End, 30° Helix

**S110** Bright finish improves chip flow in soft and non-ferrous materials.



**S110**

**HM**

**Z**  
**2**

1/8 - 1/2

<b>d<sub>1</sub></b> <b>Ø</b> <b>Inch</b>	<b>d<sub>1</sub></b> <b>decimal</b> <b>Inch</b>	<b>d<sub>2</sub></b> <b>Ø</b> <b>Inch</b>	<b>l<sub>2</sub></b> <b>Inch</b>	<b>l<sub>1</sub></b> <b>Inch</b>	<b># of</b> <b>Flutes</b>	<b>Pack</b> <b>Qty</b>	<b>S110</b>
1/8	0.1250	1/8	3/4	2"	2	1	7648575
3/16	0.1875	3/16	3/4	2.1/2	2	1	7648576
1/4	0.2500	1/4	1.1/8	3"	2	1	7648577
3/8	0.3750	3/8	1.1/8	3"	2	1	7648578
1/2	0.5000	1/2	2"	4"	2	1	7648579

## Extra Long Length, Square End, 30° Helix

- S111** Bright finish improves chip flow in soft and non-ferrous materials.
- S211** ALTiN 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	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S111	S211
1/8	0.1250	1/8	1"	3"	2	1	7648580	7648586
3/16	0.1875	3/16	1.1/8	3"	2	1	7648581	7648587
1/4	0.2500	1/4	1.1/2	4"	2	1	7648582	7648588
5/16	0.3125	5/16	1.5/8	4"	2	1	7648583	—
3/8	0.3750	3/8	1.3/4	4"	2	1	7648584	7648589
1/2	0.5000	1/2	3"	6"	2	1	7648585	7648590

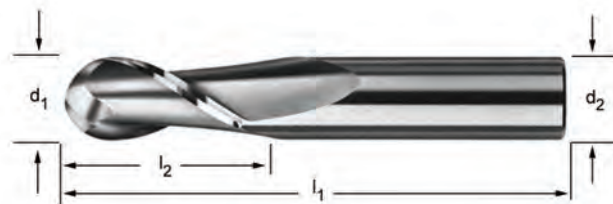
# Solid Carbide 2-Flute End Mill



## Regular Length, Ball Nose, 30° Helix

**S112** Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

**S212** Ball nose for cutting internal part radius. ALTiN coating increases surface hardness, improves chip flow and tool life, allowing higher metal removal rates.

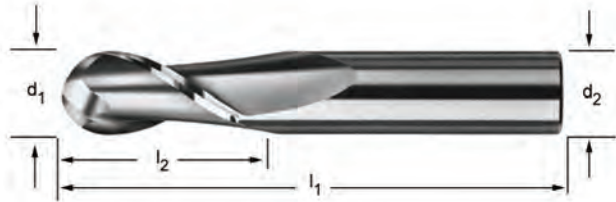


$d_1$ Ø Inch	$d_1$ decimal Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S112	S212
1/16	0.0625	1/8	1/4	1.1/2	2	1	7648591	7648601
3/32	0.0938	1/8	3/8	1.1/2	2	1	7648592	—
1/8	0.1250	1/8	1/2	1.1/2	2	1	7648593	7648602
5/32	0.1562	3/16	9/16	2"	2	1	7648594	—
3/16	0.1875	3/16	5/8	2"	2	1	7648595	7648603
7/32	0.2188	1/4	5/8	2.1/2	2	1	7648596	7648604
1/4	0.2500	1/4	3/4	2.1/2	2	1	7648597	7648605
5/16	0.3125	5/16	7/8	2.1/2	2	1	7648598	7648606
3/8	0.3750	3/8	7/8	2.1/2	2	1	7648599	7648607
1/2	0.5000	1/2	1"	3"	2	1	7648600	7648608

## Regular Length, Ball Nose, 30° Helix

**S113** Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

**S213** Ball nose for cutting internal part radius. ALTiN coating increases surface hardness, improves chip flow and tool life, allowing higher metal removal rates.



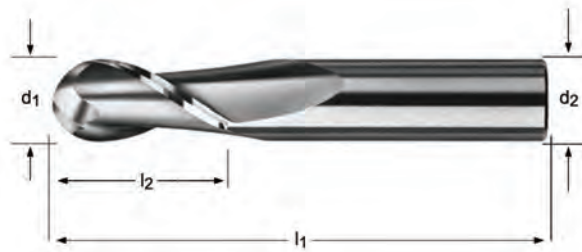
$d_1$ Ø mm	$d_1$ decimal Inch	$d_2$ Ø mm	$l_2$ mm	$l_1$ mm	# of Flutes	Pack Qty	S113	S213
2.00	0.0787	3.0	6.0	38.0	2	1	7648609	—
2.50	0.0984	3.0	6.0	38.0	2	1	7648610	—
3.00	0.1181	3.0	12.0	38.0	2	1	7648611	7648622
4.00	0.1575	4.0	14.0	50.0	2	1	7648612	7648623
5.00	0.1969	5.0	16.0	50.0	2	1	7648613	7648624
6.00	0.2362	6.0	19.0	63.0	2	1	7648614	7648625
7.00	0.2756	8.0	19.0	63.0	2	1	7648615	7648626
8.00	0.3150	8.0	19.0	63.0	2	1	7648616	7648627
9.00	0.3543	10.0	22.0	70.0	2	1	7648617	7648628
10.00	0.3937	10.0	22.0	70.0	2	1	7648618	7648629
12.00	0.4724	12.0	25.0	75.0	2	1	7648619	7648630
16.00	0.6299	16.0	32.0	88.0	2	1	7648620	—
20.00	0.7874	20.0	38.0	100.0	2	1	7648621	—

# Solid Carbide 2-Flute End Mill



## Long Length, Ball Nose, 30° Helix

**S114** Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.



S114

HM



Z  
2



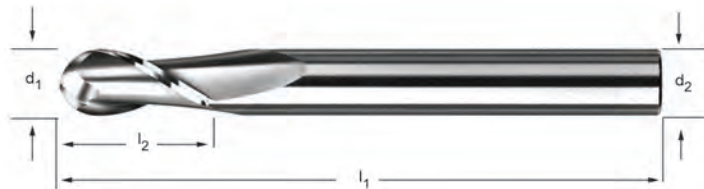
1/8 - 5/8

$d_1$ Ø Inch	$d_1$ decimal Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S114
1/8	0.1250	1/8	3/4	2"	2	1	7648631
3/16	0.1875	3/16	3/4	2.1/2	2	1	7648632
1/4	0.2500	1/4	1.1/8	3"	2	1	7648633
5/16	0.3125	5/16	1.1/8	3"	2	1	7648634
3/8	0.3750	3/8	1.1/8	3"	2	1	7648635
1/2	0.5000	1/2	2"	4"	2	1	7648636
5/8	0.6250	5/8	2.1/4	5"	2	1	7648637

## Extra Long Length, Ball Nose, 30° Helix

**S115** Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

**S215** Ball nose for cutting internal part radius. ALTiN 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	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S115	S215
1/8	0.1250	1/8	1"	3"	2	1	7648638	7648644
3/16	0.1875	3/16	1.1/8	3"	2	1	7648639	7648645
1/4	0.2500	1/4	1.1/2	4"	2	1	7648640	7648646
5/16	0.3125	5/16	1.5/8	4"	2	1	7648641	7648647
3/8	0.3750	3/8	1.3/4	4"	2	1	7648642	7648648
1/2	0.5000	1/2	3"	6"	2	1	7648643	7648649

# Solid Carbide 3-Flute End Mill



## Regular Length, Square End, 30° Helix

- S121** 3-flute design for less chatter. Bright finish improves chip flow in soft or non-ferrous materials.
- S221** 3-flute design for less chatter. ALTiN 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	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S121	S221
1/16	0.0625	1/8	1/4	1.1/2	3	1	7648657	7648666
3/32	0.0938	1/8	3/8	1.1/2	3	1	7648658	7648667
1/8	0.1250	1/8	1/2	1.1/2	3	1	7648659	7648668
5/32	0.1562	3/16	9/16	2"	3	1	7648660	7648669
3/16	0.1875	3/16	5/8	2"	3	1	7648661	7648670
1/4	0.2500	1/4	3/4	2.1/2	3	1	7648662	7648671
5/16	0.3125	5/16	7/8	2.1/2	3	1	7648663	7648672
3/8	0.3750	3/8	7/8	2.1/2	3	1	7648664	7648673
1/2	0.5000	1/2	1"	3"	3	1	7648665	7648674



## Square End, Double End , 30° Helix

**S129 Regular Length.** Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft and non-ferrous materials.



S129

HM



Z  
4



1/8 - 1/2

$d_1$ Ø Inch	$d_1$ decimal Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S129
1/8	0.1250	3/8	3/8	3"	4	1	7648719
5/32	0.1562	3/8	7/16	3"	4	1	7648720
3/16	0.1875	3/8	1/2	3"	4	1	7648721
1/4	0.2500	3/8	5/8	3"	4	1	7648722
5/16	0.3125	3/8	3/4	3.1/2	4	1	7648723
3/8	0.3750	3/8	3/4	3.1/2	4	1	7648724
1/2	0.5000	1/2	1"	4"	4	1	7648725

# Solid Carbide 4-Flute End Mill



## Regular Length, Square End , 30° Helix

- S134** Bright finish improves chip flow in soft or non-ferrous materials.
- S234** ALTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.

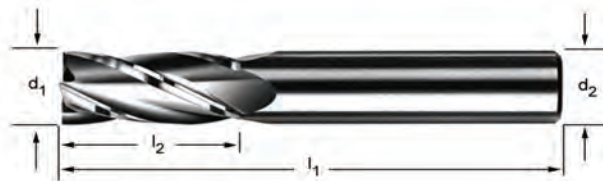


d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	d <sub>2</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	# of Flutes	Pack Qty	S124	S234
1/16	0.0625	1/8	1/4	1.1/2	4	1	7648726	7648748
5/64	0.0781	1/8	1/4	1.1/2	4	1	7648727	7648749
3/32	0.0938	1/8	3/8	1.1/2	4	1	7648728	7648750
7/64	0.1094	1/8	3/8	1.1/2	4	1	7648729	7648751
1/8	0.1250	1/8	1/2	1.1/2	4	1	7648730	7648752
9/64	0.1406	3/16	9/16	2"	4	1	7648731	7648753
5/32	0.1562	3/16	9/16	2"	4	1	7648732	7648754
11/64	0.1719	3/16	9/16	2"	4	1	7648733	7648755
3/16	0.1875	3/16	5/8	2"	4	1	7648734	7648756
13/64	0.2031	1/4	5/8	2.1/2	4	1	7648735	7648757
7/32	0.2188	1/4	5/8	2.1/2	4	1	7648736	7648758
1/4	0.2500	1/4	3/4	2.1/2	4	1	7648737	7648759
5/16	0.3125	5/16	7/8	2.1/2	4	1	7648738	7648760
3/8	0.3750	3/8	7/8	2.1/2	4	1	7648739	7648761
7/16	0.4375	7/16	1"	2.1/2	4	1	7648740	7648762
1/2	0.5000	1/2	1"	3"	4	1	7648741	7648763
9/16	0.5625	9/16	1.1/4	3.1/2	4	1	7648742	7648764
5/8	0.6250	5/8	1.1/4	3.1/2	4	1	7648743	7648765
11/16	0.6875	3/4	1.1/2	4"	4	1	7648744	7648766
3/4	0.7500	3/4	1.1/2	4"	4	1	7648745	7648767
7/8	0.8750	7/8	1.1/2	4"	4	1	7648746	7648768
1"	1.0000	1"	1.1/2	4"	4	1	7648747	7648769

## Regular Length, Square End , 30° Helix

**S135** Bright finish improves chip flow in soft or non-ferrous materials.

**S235** AlTiN 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	$l_2$ mm	$l_1$ mm	# of Flutes	Pack Qty	S135	S235
2.00	0.0787	3.0	6.0	38.0	4	1	7648770	7648789
2.50	0.0984	3.0	7.0	38.0	4	1	7648771	7648790
3.00	0.1181	3.0	12.0	38.0	4	1	7648772	7648791
3.50	0.1378	4.0	12.0	50.0	4	1	7648773	7648792
4.00	0.1575	4.0	14.0	50.0	4	1	7648774	7648793
4.50	0.1772	5.0	14.0	50.0	4	1	7648775	7648794
5.00	0.1969	5.0	16.0	50.0	4	1	7648776	7648795
6.00	0.2362	6.0	19.0	63.0	4	1	7648777	7648796
7.00	0.2756	8.0	19.0	63.0	4	1	7648778	7648797
8.00	0.3150	8.0	19.0	63.0	4	1	7648779	7648798
9.00	0.3543	10.0	22.0	70.0	4	1	7648780	7648799
10.00	0.3937	10.0	22.0	70.0	4	1	7648781	7648800
11.00	0.4331	11.0	25.0	70.0	4	1	7648782	7648801
12.00	0.4724	12.0	25.0	75.0	4	1	7648783	7648802
14.00	0.5512	14.0	30.0	88.0	4	1	7648784	7648803
16.00	0.6299	16.0	32.0	88.0	4	1	7648785	7648804
18.00	0.7087	18.0	36.0	100.0	4	1	7648786	7648805
20.00	0.7874	20.0	38.0	100.0	4	1	7648787	7648806
25.00	0.9843	25.0	38.0	100.0	4	1	7648788	—

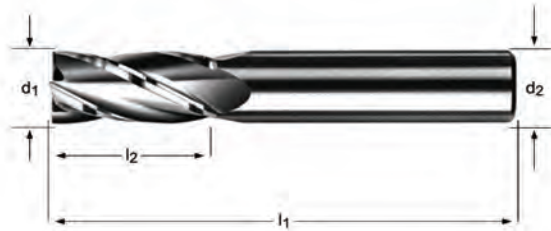
# Solid Carbide 4-Flute End Mill



## Long Length, Square End , 30° Helix

**S136** Bright finish improves chip flow in soft or non-ferrous materials.

**S236** AlTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.

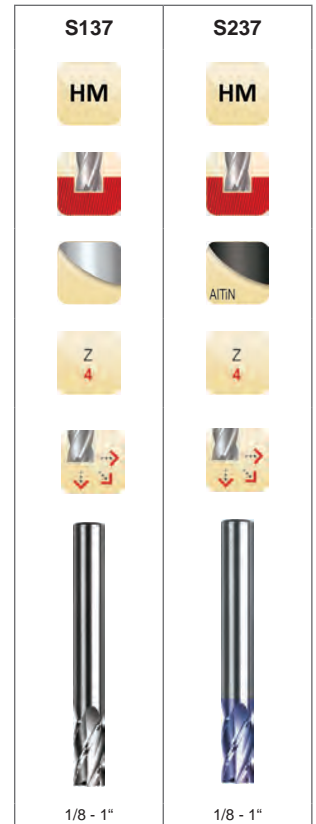


$d_1$ Ø Inch	$d_1$ decimal Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S136	S236
1/8	0.1250	1/8	3/4	2"	4	1	7648807	7648816
3/16	0.1875	3/16	3/4	2.1/2	4	1	7648808	7648817
1/4	0.2500	1/4	1.1/8	3"	4	1	7648809	7648818
5/16	0.3125	5/16	1.1/8	3"	4	1	7648810	7648819
3/8	0.3750	3/8	1.1/8	3"	4	1	7648811	7648820
7/16	0.4375	7/16	2"	4"	4	1	7648812	7648821
1/2	0.5000	1/2	2"	4"	4	1	7648813	7648822
5/8	0.6250	5/8	2.1/4	5"	4	1	7648814	7648823
3/4	0.7500	3/4	2.1/4	5"	4	1	7648815	7648824

## Extra Long Length, Square End , 30° Helix

**S137** Bright finish improves chip flow in soft or non-ferrous materials.

**S237** AlTiN 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	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S137	S237
1/8	0.1250	1/8	1"	3"	4	1	7648825	7648835
3/16	0.1875	3/16	1.1/8	3"	4	1	7648826	7648836
1/4	0.2500	1/4	1.1/2	4"	4	1	7648827	7648837
5/16	0.3125	5/16	1.5/8	4"	4	1	7648828	7648838
3/8	0.3750	3/8	1.3/4	4"	4	1	7648829	7648839
7/16	0.4375	7/16	3"	6"	4	1	7648830	7648840
1/2	0.5000	1/2	3"	6"	4	1	7648831	7648841
5/8	0.6250	5/8	3"	6"	4	1	7648832	7648842
3/4	0.7500	3/4	3"	6"	4	1	7648833	7648843
1"	1.0000	1"	3"	6"	4	1	7648834	7648844

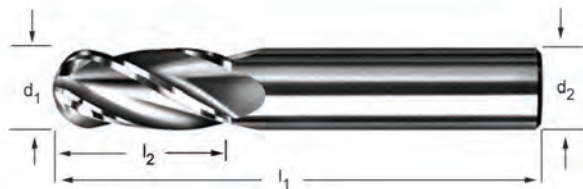
# Solid Carbide 4-Flute End Mill



## Regular Length, Ball Nose , 30° Helix

**S138** Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

**S238** Ball nose for cutting internal part radius. AlTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.

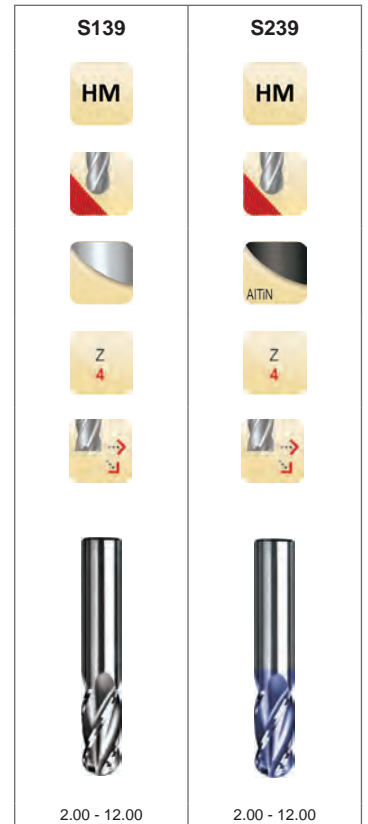
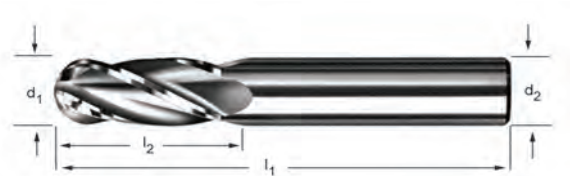


d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	d <sub>2</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	# of Flutes	Pack Qty	S138	S238
1/16	0.0625	1/8	1/4	1.1/2	4	1	7648845	7648857
3/32	0.0938	1/8	3/8	1.1/2	4	1	7648846	7648858
1/8	0.1250	1/8	1/2	1.1/2	4	1	7648847	7648859
5/32	0.1562	3/16	9/16	2"	4	1	7648848	7648860
3/16	0.1875	3/16	5/8	2"	4	1	7648849	7648861
1/4	0.2500	1/4	3/4	2.1/2	4	1	7648850	7648862
5/16	0.3125	5/16	7/8	2.1/2	4	1	7648851	7648863
3/8	0.3750	3/8	7/8	2.1/2	4	1	7648852	7648864
7/16	0.4375	7/16	1"	2.1/2	4	1	7648853	7648865
1/2	0.5000	1/2	1"	3"	4	1	7648854	7648866
5/8	0.6250	5/8	1.1/4	3.1/2	4	1	7648855	7648867
3/4	0.7500	3/4	1.1/2	4"	4	1	7648856	7648868

## Regular Length, Ball Nose, 30° Helix

**S139** Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

**S239** Ball nose for cutting internal part radius. AlTiN 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	$l_2$ mm	$l_1$ mm	# of Flutes	Pack Qty	S139	S239
2.00	0.0787	3.0	6.0	38.0	4	1	7648877	7648878
3.00	0.1181	3.0	12.0	38.0	4	1	7648876	7648879
4.00	0.1575	4.0	14.0	50.0	4	1	7648875	7648880
4.50	0.1772	5.0	14.0	50.0	4	1	7648874	—
5.00	0.1969	5.0	16.0	50.0	4	1	7648873	7648881
6.00	0.2362	6.0	19.0	63.0	4	1	7648872	7648882
8.00	0.3150	8.0	19.0	63.0	4	1	7648871	7648883
10.00	0.3937	10.0	22.0	70.0	4	1	7648870	7648884
12.00	0.4724	12.0	25.0	75.0	4	1	7648869	7648885

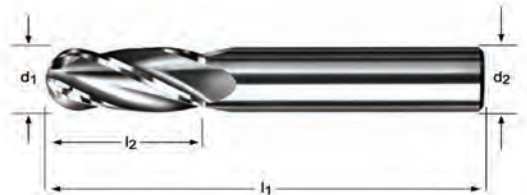
# Solid Carbide 4-Flute End Mill



## Long Length, Ball Nose, 30° Helix

**S146** Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

**S246** Ball nose for cutting internal part radius. AlTiN 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	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S146	S246
1/4	0.2500	1/4	1.1/8	3"	4	1	7648886	7648890
3/8	0.3750	3/8	1.1/8	3"	4	1	7648887	7648891
1/2	0.5000	1/2	2"	4"	4	1	7648888	7648892
5/8	0.6250	5/8	2.1/4	5"	4	1	7648889	7648893



## Extra Long Length, Ball Nose, 30° Helix

**S147** Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

**S247** Ball nose for cutting internal part radius. AlTiN 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	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	S147	S247
1/8	0.1250	1/8	1"	3"	4	1	7648894	7648901
3/16	0.1875	3/16	1.1/8	3"	4	1	7648895	7648902
1/4	0.2500	1/4	1.1/2	4"	4	1	7648896	7648903
5/16	0.3125	5/16	1.5/8	4"	4	1	7648897	7648904
3/8	0.3750	3/8	1.3/4	4"	4	1	7648898	7648905
1/2	0.5000	1/2	3"	6"	4	1	7648899	7648906
5/8	0.6250	5/8	3"	6"	4	1	7648900	7648907

# Solid Carbide 4-Flute End Mill

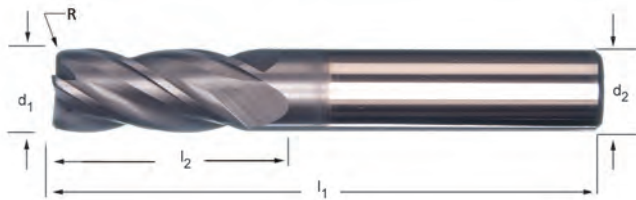


## Regular Length, Corner Radius, Unequal Helix

**S223HA** ALTiN coating increases hardness, and improves tool life allowing higher metal removal rates. These unequal helix cutters with corner radii are designed for higher speeds and deeper cuts. Provides superior workpiece finishes by eliminating vibrations and harmonics. Excellent for milling tough alloys and hardened steels.

**S223HB**

**S223HB** has a Weldon shank.



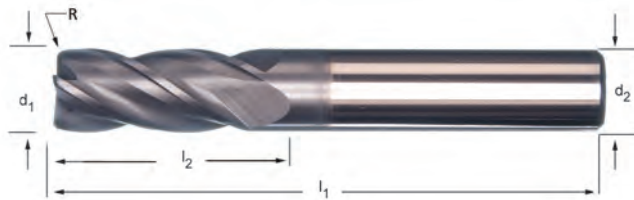
$d_1$ Ø Inch	$d_1$ decimal Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	R Radius	# of Flutes	Pack Qty	S223HA	S223HB
1/8	0.1250	1/8	3/8	1-1/2	.015	4	1	7648675	7648697
1/8	0.1250	1/8	3/8	1-1/2	.030	4	1	7648676	7648698
3/16	0.1875	3/16	7/16	2"	.015	4	1	7648677	7648699
3/16	0.1875	3/16	7/16	2"	.030	4	1	7648678	7648700
1/4	0.2500	1/4	5/8	2-1/2	.015	4	1	7648679	7648701
1/4	0.2500	1/4	5/8	2-1/2	.030	4	1	7648680	7648702
5/16	0.3125	1/4	1/2	2"	.015	4	1	7648681	7648703
5/16	0.3125	1/4	1/2	2"	.030	4	1	7648682	7648704
3/8	0.3750	3/8	7/8	2-1/2	.015	4	1	7648683	7648705
3/8	0.3750	3/8	7/8	2-1/2	.030	4	1	7648684	7648706
7/16	0.4375	7/16	5/8	2-1/2	.020	4	1	7648685	7648707
7/16	0.4375	7/16	5/8	2-1/2	.045	4	1	7648686	7648708
1/2	0.5000	1/2	1-1/4	3"	.030	4	1	7648687	7648709
1/2	0.5000	1/2	1-1/4	3"	.060	4	1	7648688	7648710
9/16	0.5625	9/16	1-1/8	3-1/2	.045	4	1	7648689	7648711
9/16	0.5625	9/16	1-1/8	3-1/2	.060	4	1	7648690	7648712
5/8	0.6250	5/8	1-1/4	3-1/2	.060	4	1	7648691	7648713
5/8	0.6250	5/8	1-1/4	5"	.090	4	1	7648692 *	7648714 *
3/4	0.7500	3/4	1-1/2	4"	.030	4	1	7648693	7648715
3/4	0.7500	3/4	1-1/2	4"	.060	4	1	7648694	7648716
1"	1.0000	1"	2-1/4	5"	.030	4	1	7648695 *	7648717 *
1"	1.0000	1"	2-1/4	5"	.090	4	1	7648696 *	7648718 *

\* Will require a reduction of 30% - 60% in cutting speed.

## Regular Length, Corner Radius, Unequal Helix

**S248HA**    ALTiN coating increases hardness, and improves tool life  
**S248HB**    allowing higher metal removal rates. These unequal helix cutters with corner radii are designed for higher speeds and deeper cuts. Provides superior workpiece finishes by eliminating vibrations and harmonics. Excellent for milling tough alloys and hardened steels.

**S248HB** has a Weldon shank.



d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	d <sub>2</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	R Radius	# of Flutes	Pack Qty	S248HA	S248HB
5/16	0.3125	5/16	13/16	2-1/2	.015	5	1	7648908	7648927
5/16	0.3125	5/16	13/16	2-1/2	.030	5	1	7648909	7648928
3/8	0.3750	3/8	7/8	2-1/2	.015	5	1	7648910	7648929
3/8	0.3750	3/8	7/8	2-1/2	.030	5	1	7648911	7648930
7/16	0.4375	7/16	5/8	2-1/2	.020	5	1	7648912	7648931
7/16	0.4375	7/16	5/8	2-1/2	.045	5	1	7648913	7648932
1/2	0.5000	1/2	1"	3"	.030	5	1	7648914	7648933
1/2	0.5000	1/2	1-1/4	3"	.030	5	1	7648915	7648934
1/2	0.5000	1/2	1-1/4	3"	.060	5	1	7648916	7648935
9/16	0.5625	9/16	1-1/8	3-1/2	.020	5	1	7648917	7648936
9/16	0.5625	9/16	1-1/8	3-1/2	.045	5	1	7648918	7648937
9/16	0.5625	9/16	1-1/8	3-1/2	.060	5	1	7648919	7648938
5/8	0.6250	5/8	1-1/4	3-1/2	.045	5	1	7648920	7648939
5/8	0.6250	5/8	1-1/4	3-1/2	.060	5	1	7648921	7648940
5/8	0.6250	5/8	1-1/4	3-1/2	.090	5	1	7648922	7648941
3/4	0.7500	3/4	1-1/2	4"	.030	5	1	7648923	7648942
3/4	0.7500	3/4	1-1/2	4"	.060	5	1	7648924	7648943
1"	1.0000	1"	2-1/4	5"	.030	5	1	7648925 *	7648944 *
1"	1.0000	1"	2-1/4	5"	.090	5	1	7648926 *	7648945 *

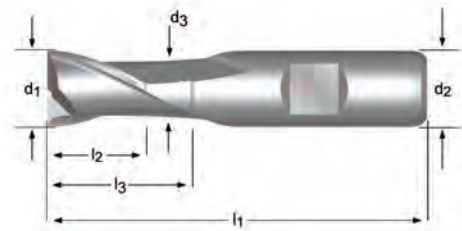
\* Will require a reduction of 30% - 60% in cutting speed.

# HSS-PM 2-Flute End Mill



## Stub Length, Square End, Weldon Shank, 30° Helix

**C110** Powdered Metal. P9 slotting tolerance.



**C110**

**HSS-E  
PM**

**P9**

**Z  
2**

1.00 - 50.00

$d_1$ Ø Inch	$d_1$ Ø mm	$d_2$ Ø <sub>h6</sub> mm	$l_2$ mm	$l_1$ mm	# of Flutes	$l_3$ mm	$d_3$ Ø mm	Pack Qty	<b>C110</b>
	1.00	6	2.5	47	2	-	-	1	5983761
	1.50	6	3	47	2	-	-	1	5983771
1/16	1.59	6	3	47	2	-	-	1	5983776
	1.80	6	4	48	2	-	-	1	5983773
	2.00	6	4	48	2	-	-	1	5983863
3/32	2.38	6	5	49	2	-	-	1	5983902
	2.50	6	5	49	2	-	-	1	5983866
	2.80	6	5	49	2	-	-	1	5983869
	3.00	6	5	49	2	-	-	1	5984089
1/8	3.18	6	6	50	2	-	-	1	5983788
	3.50	6	6	50	2	-	-	1	5984094
	3.80	6	7	51	2	-	-	1	5984099
	4.00	6	7	51	2	-	-	1	5983914
	4.50	6	7	51	2	-	-	1	5983917
3/16	4.76	6	8	52	2	-	-	1	5984103
	4.80	6	8	52	2	-	-	1	5983919 <sup>1)2)</sup>
	5.00	6	8	52	2	-	-	1	5983933
	5.50	6	8	52	2	-	-	1	5983937
	5.75	6	8	52	2	-	-	1	5983941 <sup>1)2)</sup>
	6.00	6	8	52	2	-	-	1	5983958
1/4	6.35	10	10	60	2	-	-	1	5983785
	6.50	10	10	60	2	-	-	1	5983962
	7.00	10	10	60	2	-	-	1	5983976
	7.50	10	10	60	2	-	-	1	5983981
	7.75	10	11	61	2	-	-	1	5983986 <sup>1)2)</sup>
5/16	7.94	10	11	61	2	-	-	1	5983946
	8.00	10	11	61	2	-	-	1	5984003
	8.50	10	11	61	2	-	-	1	5984007
	9.00	10	11	61	2	-	-	1	5984012

<sup>1)</sup> Diameter tolerance h10

<sup>2)</sup> Slot not in P9 tolerance

<sup>3)</sup> Available in HSCo only

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø mm	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	# of Flutes	l <sub>3</sub> mm	d <sub>3</sub> Ø mm	Pack Qty	C110
3/8	9.50	10	11	61	2	-	-	1	5984017
	9.52	10	13	63	2	22.5	9.5	1	5983905
	10.00	10	13	63	2	22.5	9.5	1	5983791
13/32	10.32	12	13	70	2	-	-	1	5983827
	10.50	12	13	70	2	-	-	1	5983794
	11.00	12	13	70	2	-	-	1	5983797
7/16	11.11	12	13	70	2	-	-	1	5983991
	11.50	12	13	70	2	-	-	1	5983800
	12.00	12	16	73	2	27.5	11.5	1	5983811
1/2	12.50	12	16	73	2	27.5	11.5	1	5983816
	12.70	12	16	73	2	27.5	11.5	1	5983782
	13.00	12	16	73	2	27.5	11.5	1	5983821
17/32	13.49	12	16	73	2	27.5	11.5	1	5983852
	14.00	12	16	73	2	27.5	11.5	1	5983831
	14.29	12	16	73	2	27.5	11.5	1	5984032
9/16	15.00	12	16	73	2	27.5	11.5	1	5983834
	15.88	16	19	79	2	30.5	15.5	1	5983949
	16.00	16	19	79	2	30.5	15.5	1	5983840
11/16	17.00	16	19	79	2	30.5	15.5	1	5983843
	17.46	16	19	79	2	30.5	15.5	1	5983808
	18.00	16	19	79	2	30.5	15.5	1	5983855
3/4	19.00	16	19	79	2	30.5	15.5	1	5983857
	19.05	20	22	88	2	37.5	18.5	1	5983903
	20.00	20	22	88	2	37.5	19.5	1	5983872
7/8	22.00	20	22	88	2	37.5	19.5	1	5983881
	22.22	20	22	88	2	37.5	19.5	1	5983996
	24.00	25	26	102	2	45.5	23.5	1	5983901
1"	25.00	25	26	102	2	45.5	24.5	1	5983967
	25.40	25	26	102	2	45.5	24.5	1	5983749
	26.00	25	26	102	2	45.5	24.5	1	5984022
	28.00	25	26	102	2	45.5	24.5	1	5984079
	30.00	25	26	102	2	45.5	24.5	1	5983906
	32.00	32	32	112	2	51.5	31.5	1	5983908
	35.00	32	32	112	2	51.5	31.5	1	5983910 <sup>1)3)</sup>
36.00	32	32	112	2	51.5	31.5	1	5983912 <sup>1)3)</sup>	
40.00	40	38	130	2	59.5	39.0	1	5983925 <sup>1)3)</sup>	

<sup>1)</sup> Diameter tolerance h10

<sup>2)</sup> Slot not in P9 tolerance

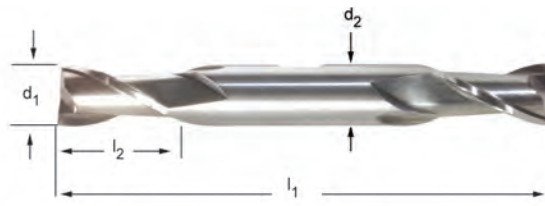
<sup>3)</sup> Available in HSCo only

# HSS 2-Flute End Mill



## Regular Length, Square End, Weldon Shank, 30° Helix

**C600** Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft or non-ferrous materials.



C600

HSS



Z  
2

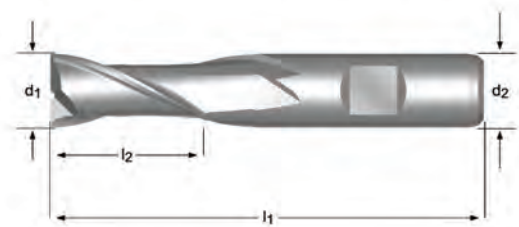


1/8 - 3/4

$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C600
1/8	0.1250	3/8	3.1/16	3/8	2	1	7647759
5/32	0.1562	7/16	3.1/8	3/8	2	1	7647820
3/16	0.1875	7/16	3.1/4	3/8	2	1	7647821
1/4	0.2500	1/2	3.3/8	3/8	2	1	7647822
9/32	0.2812	9/16	3.3/8	3/8	2	1	7647823
5/16	0.3125	9/16	3.1/2	3/8	2	1	7647824
11/32	0.3437	9/16	3.1/2	3/8	2	1	7647825
3/8	0.3750	9/16	3.1/2	3/8	2	1	7647826
13/32	0.4062	13/16	4.1/8	1/2	2	1	7647827
7/16	0.4375	13/16	4.1/8	1/2	2	1	7647828
1/2	0.5000	13/16	4.1/8	1/2	2	1	7647829
5/8	0.6250	1.1/8	5"	5/8	2	1	7647830
3/4	0.7500	1.5/16	5.5/8	3/4	2	1	7647831

## Regular Length, Square End, Weldon Shank, 30° Helix

**C601** Bright finish improves chip flow in soft or non-ferrous materials.



**C601**

**HSS**

**Z**  
**2**

1/8 - 1/2

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	# of Flutes	Pack Qty	C601
1/8	0.1250	3/8	2.5/16	3/8	2	1	7647832
3/16	0.1875	7/16	2.3/8	3/8	2	1	7647833
1/4	0.2500	1/2	2.7/16	3/8	2	1	7647834
5/16	0.3125	9/16	2.1/2	3/8	2	1	7647835
3/8	0.3750	9/16	2.1/2	3/8	2	1	7647836
7/16	0.4375	13/16	2.11/16	3/8	2	1	7647837
1/2	0.5000	13/16	2.11/16	3/8	2	1	7647838
1/2	0.5000	1"	3.1/4	1/2	2	1	7647839
9/16	0.5625	1.1/8	3.3/8	1/2	2	1	7647840
5/8	0.6250	1.1/8	3.3/8	1/2	2	1	7647841
5/8	0.6250	1.5/16	3.3/4	5/8	2	1	7647844
11/16	0.6875	1.5/16	3.5/8	1/2	2	1	7647842
11/16	0.6875	1.5/16	3.3/4	5/8	2	1	7647845
3/4	0.7500	1.5/16	3.5/8	1/2	2	1	7647843
3/4	0.7500	1.5/16	3.3/4	5/8	2	1	7647846
3/4	0.7500	1.5/16	3.7/8	3/4	2	1	7647859
13/16	0.8125	1.1/2	4"	5/8	2	1	7647847
7/8	0.8750	1.1/2	4"	5/8	2	1	7647848
7/8	0.8750	1.1/2	4.1/8	3/4	2	1	7647860
7/8	0.8750	1.1/2	4.1/8	7/8	2	1	7647851
15/16	0.9375	1.1/2	4"	5/8	2	1	7647849
1"	1.0000	1.1/2	4"	5/8	2	1	7647850
1"	1.0000	1.1/2	4.1/8	3/4	2	1	7647861
1"	1.0000	1.1/2	4.1/8	7/8	2	1	7647852
1"	1.0000	1.5/8	4.1/2	1"	2	1	7647853
1.1/8	1.1250	1.5/8	4.1/4	3/4	2	1	7647862
1.1/8	1.1250	1.5/8	4.1/2	1"	2	1	7647854
1.1/4	1.2500	1.5/8	4.1/2	1"	2	1	7647855
1.1/4	1.2500	1.5/8	4.1/2	1.1/4	2	1	7647857
1.1/2	1.5000	1.5/8	4.1/4	3/4	2	1	7647863
1.1/2	1.5000	1.5/8	4.1/2	1"	2	1	7647856
1.1/2	1.5000	1.5/8	4.1/2	1.1/4	2	1	7647858

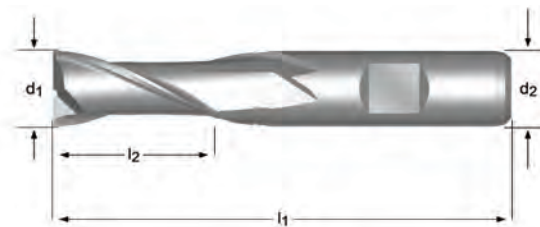
# HSS 2-Flute End Mill



## Regular Length, Square End, Keyway, Weldon Shank, 30° Helix

**C602**

Keyway cutter, close tolerance (+0.0000"/-0.0015").  
Bright finish improves chip flow in soft or non-ferrous materials.



**C602**

**HSS**




**Z  
2**



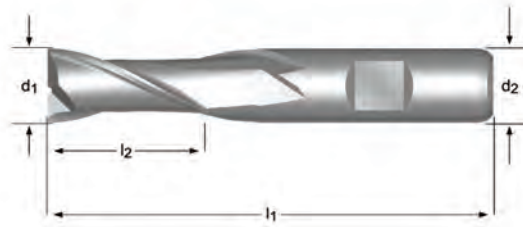

1/8 - 1"

<b>d<sub>1</sub></b> <b>Ø</b> <b>Inch</b>	<b>d<sub>1</sub></b> <b>decimal</b> <b>Inch</b>	<b>l<sub>2</sub></b> <b>Inch</b>	<b>l<sub>1</sub></b> <b>Inch</b>	<b>d<sub>2</sub></b> <b>Ø</b> <b>Inch</b>	<b># of</b> <b>Flutes</b>	<b>Pack</b> <b>Qty</b>	<b>C602</b>
1/8	0.1250	3/8	2.5/16	3/8	2	1	7647864
3/16	0.1875	7/16	2.3/8	3/8	2	1	7647865
1/4	0.2500	1/2	2.7/16	3/8	2	1	7647866
5/16	0.3125	9/16	2.1/2	3/8	2	1	7647867
3/8	0.3750	9/16	2.1/2	3/8	2	1	7647868
1/2	0.5000	1"	3.1/4	1/2	2	1	7647869
5/8	0.6250	1.5/16	3.3/4	5/8	2	1	7647870
3/4	0.7500	1.5/16	3.7/8	3/4	2	1	7647871
7/8	0.8750	1.1/2	4.1/8	7/8	2	1	7647872
1"	1.0000	1.5/8	4.1/2	1"	2	1	7647873



## Regular Length, Square End, Weldon Shank, 30° Helix

**C603** Bright finish improves chip flow in soft or non-ferrous materials.



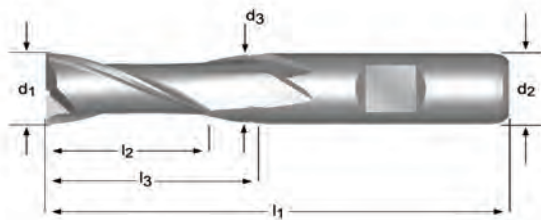
$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C603
1/8	0.1250	3/8	2.5/16	3/8	2	1	7647874
3/16	0.1875	7/16	2.3/8	3/8	2	1	7647875
1/4	0.2500	1/2	2.7/16	3/8	2	1	7647876
5/16	0.3125	9/16	2.1/2	3/8	2	1	7647877
3/8	0.3750	9/16	2.1/2	3/8	2	1	7647878
1/2	0.5000	1"	3.1/4	1/2	2	1	7647879
5/8	0.6250	1.5/16	3.3/4	5/8	2	1	7647880
3/4	0.7500	1.5/16	3.7/8	3/4	2	1	7647881
1"	1.0000	1.5/8	4.1/2	1"	2	1	7647882

# HSS-PM 2-Flute End Mill



## Regular Length, Square End, Weldon Shank, 30° Helix

**C123** Powdered Metal. P9 slotting tolerance.



C123

HSS-E  
PM

P9



Z  
2



1/16 - 40.00

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø mm	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	# of Flutes	l <sub>3</sub> mm	d <sub>3</sub> Ø mm	Pack Qty	C123
1/16	1.59	6	7	51	2	—	—	1	5984309 <sup>1)</sup>
	2.00	6	7	51	2	—	—	1	5984368
	2.50	6	8	52	2	—	—	1	5984375
	3.00	6	8	52	2	—	—	1	5984385
1/8	3.18	6	10	54	2	—	—	1	5984329 <sup>1)</sup>
	3.50	6	10	54	2	—	—	1	5984387
5/32	3.97	6	11	55	2	—	—	1	5983899 <sup>1)</sup>
	4.00	6	11	55	2	—	—	1	5983807
	4.50	6	11	55	2	—	—	1	5983844
3/16	4.76	6	13	57	2	—	—	1	5984389 <sup>1)</sup>
	5.00	6	13	57	2	—	—	1	5983895
	5.50	6	13	57	2	—	—	1	5983897
	6.00	6	13	57	2	—	—	1	5983778
1/4	6.35	10	16	66	2	—	—	1	5984319 <sup>1)</sup>
	6.50	10	16	66	2	—	—	1	5983781
	7.00	10	16	66	2	—	—	1	5983784
	7.50	10	16	66	2	—	—	1	5983787
5/16	7.94	10	19	69	2	—	—	1	5983898 <sup>1)</sup>
	8.00	10	19	69	2	—	—	1	5983790
	8.50	10	19	69	2	—	—	1	5983793
	9.00	10	19	69	2	—	—	1	5983796
	9.50	10	19	69	2	—	—	1	5983799
3/8	9.52	10	22	72	2	31.5	9.5	1	5984393 <sup>1)</sup>
	10.00	10	22	72	2	31.5	9.5	1	5984334
	11.00	12	22	79	2	—	—	1	5984339
	12.00	12	26	83	2	37.5	11.5	1	5984343
1/2	12.70	12	26	83	2	37.5	11.5	1	5984314 <sup>1)</sup>
	13.00	12	26	83	2	37.5	11.5	1	5984348
	14.00	12	26	83	2	37.5	11.5	1	5984352
	15.00	12	26	83	2	37.5	11.5	1	5984356

<sup>1)</sup> Diameter tolerance -.0005 inches / -.0013 inches

$d_1$ Ø Inch	$d_1$ Ø mm	$d_2$ Ø <sub>h<sub>6</sub></sub> mm	$l_2$ mm	$l_1$ mm	# of Flutes	$l_3$ mm	$d_3$ Ø mm	Pack Qty	C123
	16.00	16	32	92	2	43.5	15.5	1	5984360
	18.00	16	32	92	2	43.5	15.5	1	5984364
	20.00	20	38	104	2	53.5	19.5	1	5984378
	22.00	20	38	104	2	53.5	19.5	1	5984381
	25.00	25	45	121	2	64.5	24.5	1	5984384
	30.00	25	45	121	2	64.5	24.5	1	5984394

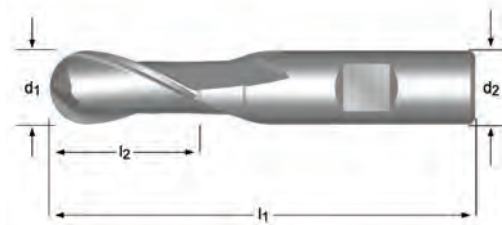
<sup>1)</sup> Diameter tolerance -.0005 inches / -.0013 inches

# HSS 2-Flute End Mill



## Regular Length, Ball Nose, Weldon Shank, 30° Helix

**C604** Ball nose for cutting internal radius. Bright finish improves chip flow in soft or non-ferrous materials.



C604

HSS



Z  
2

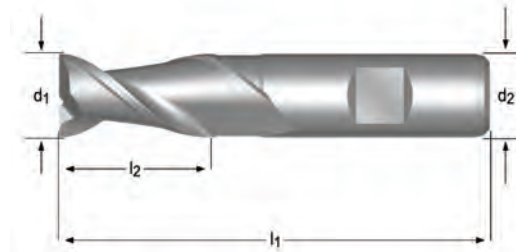


1/8 - 3/4

d <sub>1</sub> Ø Inch	d <sub>1</sub> decimal Inch	l <sub>2</sub> Inch	l <sub>1</sub> inch	d <sub>2</sub> Ø Inch	# of Flutes	Pack Qty	C604
1/8	0.1250	3/8	2.5/16	3/8	2	1	7647883
3/16	0.1875	1/2	2.3/8	3/8	2	1	7647884
1/4	0.2500	5/8	2.7/16	3/8	2	1	7647885
5/16	0.3125	3/4	2.1/2	3/8	2	1	7647886
3/8	0.3750	3/4	2.1/2	3/8	2	1	7647887
7/16	0.4375	1"	3.1/4	1/2	2	1	7647888
1/2	0.5000	1"	3.1/4	1/2	2	1	7647889
9/16	0.5625	1.1/8	3.3/8	1/2	2	1	7647890
5/8	0.6250	1.1/8	3.3/8	1/2	2	1	7647891
3/4	0.7500	1.5/16	3.5/8	1/2	2	1	7647892

## Regular Length, Square End, Weldon Shank, 37° Helix

**C605** High Helix design for aluminum and other non-ferrous materials.



**C605**

**HSS**

**Z**  
**2**

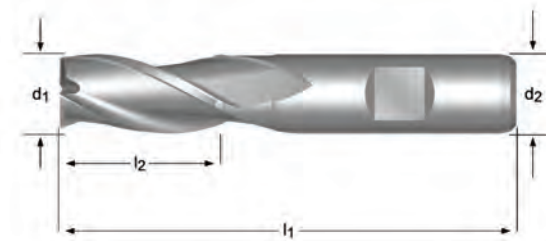
1/4 - 1"

$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	<b>C605</b>
1/4	0.2500	5/8	2.7/16	3/8	2	1	7647893
3/8	0.3750	3/4	2.1/2	3/8	2	1	7647895
1/2	0.5000	1.1/4	3.1/4	1/2	2	1	7647896
3/4	0.7500	1.5/8	3.7/8	3/4	2	1	7647897



## Regular Length, Square End, Weldon Shank, 30° Helix

**C607** 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	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C607
1/8	0.1250	3/8	2.5/16	3/8	3	1	7647904
3/16	0.1875	1/2	2.3/8	3/8	3	1	7647905
1/4	0.2500	5/8	2.7/16	3/8	3	1	7647906
5/16	0.3125	3/4	2.1/2	3/8	3	1	7647907
3/8	0.3750	3/4	2.1/2	3/8	3	1	7647908
7/16	0.4375	1"	2.11/16	3/8	3	1	7647909
1/2	0.5000	1.1/4	3.1/4	1/2	3	1	7647910
9/16	0.5625	1.3/8	3.3/8	1/2	3	1	7658817
5/8	0.6250	1.5/8	3.3/4	5/8	3	1	7647912
3/4	0.7500	1.5/8	3.3/4	5/8	3	1	7647913
3/4	0.7500	1.5/8	3.7/8	3/4	3	1	7647916
1"	1.0000	1.7/8	4"	5/8	3	1	7647914
1"	1.0000	2"	4.1/2	1"	3	1	7647915

# Cobalt 3-Flute End Mill



## Long Length, Square End, Weldon Shank, 30° Helix

**C346** P9 slotting tolerance. 3 flute design provides less chatter.

C346

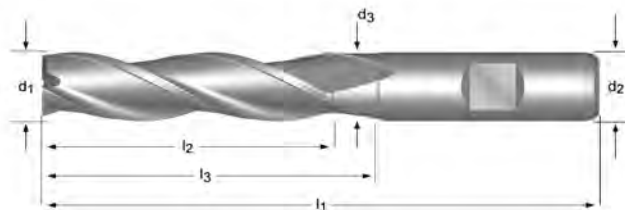
HSS-E



Z  
3



3.00 - 20.00

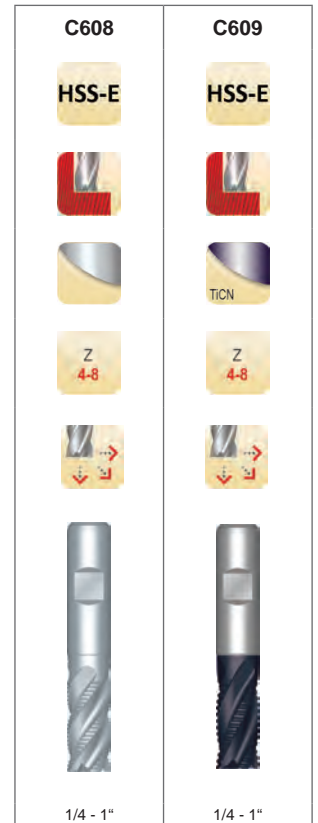
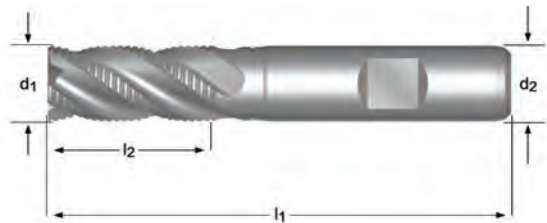


$d_1$ Ø mm	$d_2$ Ø <sub>h6</sub> mm	$l_2$ mm	$l_1$ mm	# of Flutes	$l_3$ mm	$d_3$ Ø mm	Pack Qty	C346
3.00	6	12	56	3	-	-	1	5984057
4.00	6	19	63	3	-	-	1	5984062
5.00	6	24	68	3	-	-	1	5984067
6.00	6	24	68	3	-	-	1	5984075
7.00	10	30	80	3	-	-	1	5984080
8.00	10	38	88	3	-	-	1	5984085
9.00	10	38	88	3	-	-	1	5984090
10.00	10	45	95	3	-	-	1	5984009
11.00	12	45	102	3	-	-	1	5984014
12.00	12	53	110	3	-	-	1	5984019
13.00	12	53	110	3	64.5	11.5	1	5984024
15.00	12	53	110	3	64.5	11.5	1	5984034
16.00	16	63	123	3	74.5	15.5	1	5984044
20.00	20	75	141	3	90.5	19.5	1	5984052



## Regular Length, Square End, Roughing, Weldon Shank, 30° Helix

- C608** Roughing, Fine Profile, provides a stronger edge and runs longer than conventional coarse profile roughers. Bright finish.
- C609** TiCN coating lowers the coefficient of friction and improves wear resistance on the end mill.



$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C608	C609
1/4	0.2500	5/8	2.7/16	3/8	4	1	7647917	7647927
5/16	0.3125	3/4	2.1/2	3/8	4	1	7647918	7647928
3/8	0.3750	3/4	2.1/2	3/8	4	1	7647919	7647929
7/16	0.4375	1.1/4	3.1/4	1/2	4	1	7647920	7647930
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	7647921	7647931
9/16	0.5625	1.3/8	3.3/8	1/2	4	1	7647922	—
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	7647923	7647932
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	7647924	7647933
7/8	0.8750	1.7/8	4.1/8	3/4	5	1	7647925	—
1"	1.0000	2"	4.1/2	1"	5	1	7647926	7647934

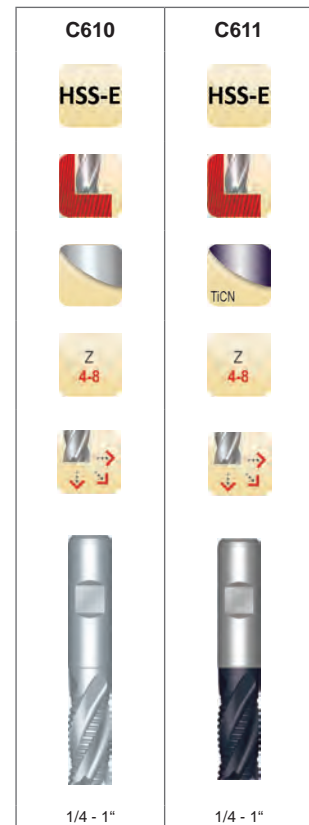
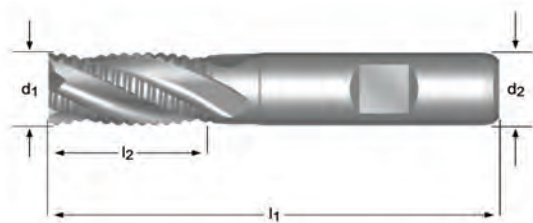
# Cobalt Multi-Flute End Mill



## Regular Length, Square End, Roughing, Weldon Shank, 30° Helix

**C610** Roughing, Coarse Profile, for maximum metal removal in one pass. Bright finish.

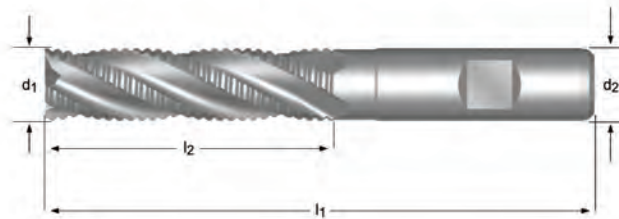
**C611** TiCN coating lowers the coefficient of friction and improves wear resistance on the end mill.



$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C610	C611
1/4	0.2500	5/8	2.7/16	3/8	4	1	7647935	7647945
5/16	0.3125	3/4	2.1/2	3/8	4	1	7647936	7647946
3/8	0.3750	3/4	2.1/2	3/8	4	1	7647937	7647947
7/16	0.4375	1.1/4	3.1/4	1/2	4	1	7647938	7647948
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	7647939	7647949
9/16	0.5625	1.3/8	3.3/8	1/2	4	1	7647940	—
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	7647941	7647950
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	7647942	7647951
7/8	0.8750	1.7/8	4.1/8	3/4	5	1	7647943	7647952
1"	1.0000	2"	4.1/2	1"	5	1	7647944	7647953

## Long Length, Square End, Roughing, Weldon Shank, 30° Helix

**C612** Roughing, Coarse Profile, for maximum metal removal in one pass. Bright finish.



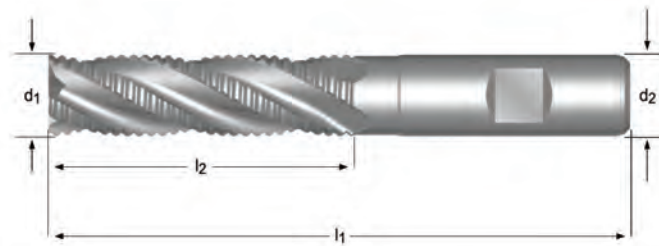
$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	<b>C612</b>
1/4	0.2500	1.1/4	3.1/8	3/8	4	1	7647954
3/8	0.3750	1.1/2	3.1/4	3/8	4	1	7647955
1/2	0.5000	2"	4"	1/2	4	1	7647956
5/8	0.6250	2.1/2	4.5/8	5/8	4	1	7647957
3/4	0.7500	3"	5.1/4	3/4	4	1	7647958
7/8	0.8750	3.1/2	5.3/4	3/4	6	1	7647959
1"	1.0000	4"	6.1/2	1"	5	1	7647960

# Cobalt 4-Flute End Mill



## Long Length, Square End, Roughing, Weldon Shank, 30° Helix

**C613** Roughing, Fine Profile, provides a stronger edge and runs longer than conventional coarse profile roughers. Bright finish.



C613

HSS-E

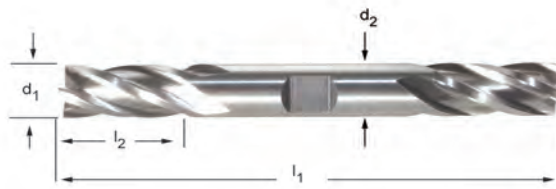


1/4 - 3/4

$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C613
1/4	0.2500	1.1/4	3.1/8	3/8	4	1	7647961
3/8	0.3750	1.1/2	3.1/4	3/8	4	1	7647962
1/2	0.5000	2"	4"	1/2	4	1	7647963
3/4	0.7500	3"	5.1/4	3/4	4	1	7647964

## Regular Length, Square End, Weldon Shank, 30° Helix

**C614** Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft or non-ferrous materials.



C614

HSS



Z  
4



1/8 - 3/4

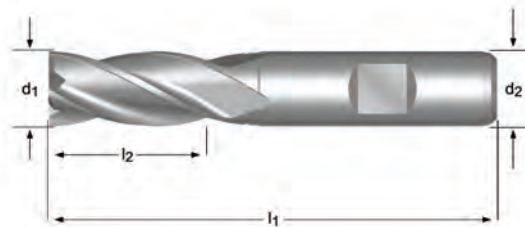
$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C614
1/8	0.1250	3/8	3.1/16	3/8	4	1	7647965
3/16	0.1875	1/2	3.1/4	3/8	4	1	7647966
1/4	0.2500	5/8	3.3/8	3/8	4	1	7647967
5/16	0.3125	3/4	3.1/2	3/8	4	1	7647968
3/8	0.3750	3/4	3.1/2	3/8	4	1	7647969
1/2	0.5000	1"	4.1/8	1/2	4	1	7647970
5/8	0.6250	1.3/8	5"	5/8	4	1	7647971
3/4	0.7500	1.5/8	5.5/8	3/4	4	1	7647972

# HSS 4-Flute End Mill



## Regular Length, Square End, Weldon Shank, 30° Helix

**C615** Bright finish improves chip flow in soft or non-ferrous materials.



C615

HSS



Z  
4

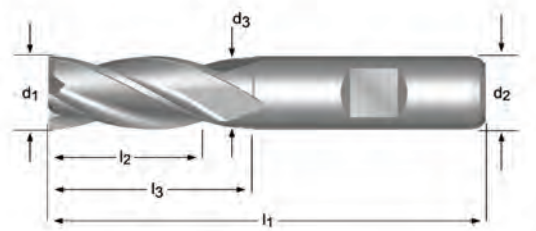


1/8 - 1"

$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C615
1/8	0.1250	3/8	2.5/16	3/8	4	1	7647973
3/16	0.1875	1/2	2.3/8	3/8	4	1	7647974
1/4	0.2500	5/8	2.7/16	3/8	4	1	7647975
5/16	0.3125	3/4	2.1/2	3/8	4	1	7647976
3/8	0.3750	3/4	2.1/2	3/8	4	1	7647977
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	7647978
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	7647979
11/16	0.6875	1.5/8	3.3/4	5/8	4	1	7647980
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	7647981
7/8	0.8750	1.7/8	4.1/8	7/8	4	1	7647982
1"	1.0000	2"	4.1/2	1"	4	1	7647983

## Regular Length, Square End, Weldon Shank, 30° Helix

**C247** Powdered Metal. Bright finish improves chip flow in soft or non-ferrous materials.



**C247**

**HSS-E PM**



**N**

**Z  
4-8**




2.00 - 50.00

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø mm	d <sub>2</sub> Ø <sub>h<sub>6</sub></sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	# of Flutes	l <sub>3</sub> mm	d <sub>3</sub> Ø mm	Pack Qty	<b>C247</b>
	2.00	6	7	51	4	—	—	1	5984300
	2.50	6	8	52	4	—	—	1	5984305
	3.00	6	8	52	4	—	—	1	5984880
1/8	3.18	6	10	54	4	—	—	1	5984242 <sup>1)</sup>
	3.50	6	10	54	4	—	—	1	5984882
	4.00	6	11	55	4	—	—	1	5984712
	4.50	6	11	55	4	—	—	1	5984716
3/16	4.76	6	13	57	4	—	—	1	5984884 <sup>1)</sup>
	5.00	6	13	57	4	—	—	1	5984724
	5.50	6	13	57	4	—	—	1	5984728
	6.00	6	13	57	4	—	—	1	5984747
1/4	6.35	10	16	66	4	—	—	1	5984237 <sup>1)</sup>
	6.50	10	16	66	4	—	—	1	5984752
	7.00	10	16	66	4	—	—	1	5984757
	7.50	10	16	66	4	—	—	1	5984762
5/16	7.94	10	19	69	4	—	—	1	5984731 <sup>1)</sup>
	8.00	10	19	69	4	—	—	1	5984775
	8.50	10	19	69	4	—	—	1	5984780
	9.00	10	19	69	4	—	—	1	5984785
	9.50	10	19	69	4	—	—	1	5984794
3/8	9.52	10	22	72	4	31.5	9.5	1	5984696 <sup>1)</sup>
	10.00	10	22	72	4	31.5	9.5	1	5984245
	11.00	12	22	79	4	—	—	1	5984250
	12.00	12	26	83	4	37.5	11.5	1	5984256
1/2	12.70	12	26	83	4	37.5	11.5	1	5984233 <sup>1)</sup>
	13.00	12	26	83	4	37.5	11.5	1	5984261
	14.00	12	26	83	4	37.5	11.5	1	5984271
9/16	14.29	12	26	83	4	37.5	11.5	1	5984799 <sup>1)</sup>
	15.00	12	26	83	4	37.5	11.5	1	5984275
5/8	15.88	16	32	92	4	43.5	15.5	1	5984738 <sup>1)</sup>

<sup>1)</sup> Diameter tolerance +.0025 inches / -.0005 inches

<sup>2)</sup> Not center Cutting

<sup>3)</sup> Available in HSCo only

# Cobalt-PM Multi-Flute End Mill



d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø mm	d <sub>2</sub> Øh <sub>6</sub> mm	l <sub>2</sub> mm	l <sub>1</sub> mm	# of Flutes	l <sub>3</sub> mm	d <sub>3</sub> Ø mm	Pack Qty	C247
	16.00	16	32	92	4	43.5	15.5	1	5984280
	17.00	16	32	92	4	43.5	15.5	1	5984285
	18.00	16	32	92	4	43.5	15.5	1	5984290
	19.00	16	32	92	4	43.5	15.5	1	5984296
3/4	19.05	20	38	104	4	53.5	18.5	1	5984886 <sup>1)</sup>
	20.00	20	38	104	4	53.5	19.5	1	5984310
	21.00	20	38	104	4	53.5	19.5	1	5984315
	22.00	20	38	104	5	53.5	19.5	1	5984325
7/8	22.22	20	38	104	5	53.5	19.5	1	5984767 <sup>1)</sup>
	23.00	20	38	104	5	53.5	19.5	1	5984690
	24.00	25	45	121	5	64.5	23.5	1	5984734
	25.00	25	45	121	5	64.5	24.5	1	5984789
1"	25.40	25	45	121	5	64.5	24.5	1	5984228 <sup>1)</sup>
	26.00	25	45	121	6	64.5	24.5	1	5984840
	28.00	25	45	121	6	64.5	24.5	1	5984876
	30.00	25	45	121	6	64.5	24.5	1	5984700
	32.00	32	53	133	6	72.5	31.5	1	5984703
	36.00	32	53	133	6	72.5	31.5	1	5984707 <sup>2)3)</sup>
	40.00	40	63	155	6	84.5	39.0	1	5984720 <sup>2)3)</sup>
	50.00	50	75	177	8	96.5	48.0	1	5984742 <sup>2)3)</sup>

<sup>1)</sup> Diameter tolerance +.0025 inches / -.0005 inches

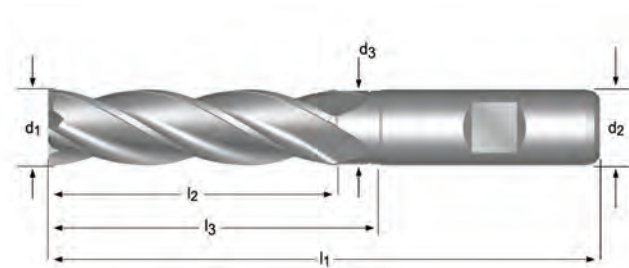
<sup>2)</sup> Not center Cutting

<sup>3)</sup> Available in HSCo only



## 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 <sub>h6</sub> mm	$l_2$ mm	$l_1$ mm	# of Flutes	$l_3$ mm	$d_3$ Ø mm	Pack Qty	C273
	2.00	6	10	54	4	—	—	1	5984621
	2.50	6	12	56	4	—	—	1	5984625
	3.00	6	12	56	4	—	—	1	5984695
1/8	3.18	6	15	59	4	—	—	1	5984576 <sup>1)</sup>
	3.50	6	15	59	4	—	—	1	5984736
	4.00	6	19	63	4	—	—	1	5984662
	4.50	6	19	63	4	—	—	1	5984665
3/16	4.76	6	24	68	4	—	—	1	5984791 <sup>1)</sup>
	5.00	6	24	68	4	—	—	1	5984670
	5.50	6	24	68	4	—	—	1	5984673
	6.00	6	24	68	4	—	—	1	5984680
1/4	6.35	10	30	80	4	—	—	1	5984571 <sup>1)</sup>
	7.00	10	30	80	4	—	—	1	5984683
	8.00	10	38	88	4	—	—	1	5984692
	9.00	10	38	88	4	—	—	1	5984699
3/8	9.52	10	45	95	4	54.5	9.5	1	5984850 <sup>1)</sup>
	10.00	10	45	95	4	54.5	9.5	1	5984584
	11.00	12	45	102	4	—	—	1	5984588
	12.00	12	53	110	4	64.5	11.5	1	5984597
1/2	12.70	12	53	110	4	64.5	11.5	1	5984566 <sup>1)</sup>
	13.00	12	53	110	4	64.5	11.5	1	5984603
	14.00	12	53	110	4	64.5	11.5	1	5984606
	15.00	12	53	110	4	64.5	11.5	1	5984610
5/8	15.88	16	63	123	4	74.5	15.5	1	5984677 <sup>1)</sup>
	16.00	16	63	123	4	74.5	15.5	1	5984614
	18.00	16	63	123	4	74.5	15.5	1	5984618
3/4	19.05	20	75	141	4	90.5	18.5	1	5984843 <sup>1)</sup>
	20.00	20	75	141	4	90.5	19.5	1	5984626
	22.00	20	75	141	5	90.5	19.5	1	5984628
	25.00	25	90	166	5	109.5	24.5	1	5984632

<sup>1)</sup> Diameter tolerance +.0025 inches / -.0005 inches

<sup>2)</sup> Available in HSCo only

<sup>3)</sup> Not Center Cutting

# Cobalt-PM Multi-Flute End Mill



$d_1$ Ø Inch	$d_1$ Ø mm	$d_2$ Ø <sub>h<sub>6</sub></sub> mm	$l_2$ mm	$l_1$ mm	# of Flutes	$l_3$ mm	$d_3$ Ø mm	Pack Qty	C273
1"	25.40	25	90	166	5	109.5	24.5	1	5984556 <sup>1)</sup>
	28.00	25	90	166	6	109.5	24.5	1	5984660
	30.00	25	90	166	6	109.5	24.5	1	5984854
	32.00	32	106	186	6	125.5	31.5	1	5984857
	40.00	40	125	217	6	146.5	39.0	1	5984667 <sup>2)3)</sup>

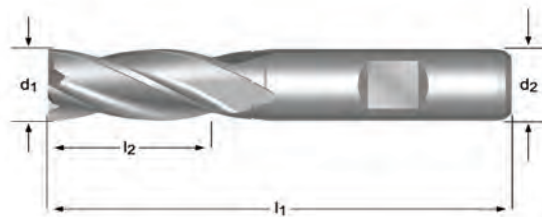
<sup>1)</sup> Diameter tolerance +.0025 inches / -.0005 inches

<sup>2)</sup> Available in HSCo only

<sup>3)</sup> Not Center Cutting

## Regular Length, Square End, Weldon Shank, 30° Helix

**C617** Multi-flute finishing. Bright finish improves chip flow in soft or non-ferrous materials.



C617

HSS



Z  
4-8



1/8 - 1"

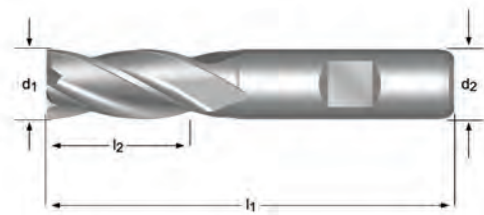
$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C617
1/8	0.1250	3/8	2.5/16	3/8	4	1	7647984
3/16	0.1875	1/2	2.3/8	3/8	4	1	7647985
1/4	0.2500	5/8	2.7/16	3/8	4	1	7647986
5/16	0.3125	3/4	2.1/2	3/8	4	1	7647987
3/8	0.3750	3/4	2.1/2	3/8	4	1	7647988
7/16	0.4375	1"	2.11/16	3/8	4	1	7647989
1/2	0.5000	1"	2.11/16	3/8	4	1	7647990
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	7647991
9/16	0.5625	1.3/8	3.3/8	1/2	4	1	7647992
5/8	0.6250	1.3/8	3.3/8	1/2	4	1	7647993
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	7647996
11/16	0.6875	1.5/8	3.5/8	1/2	4	1	7647994
11/16	0.6875	1.5/8	3.3/4	5/8	4	1	7647997
3/4	0.7500	1.5/8	3.5/8	1/2	4	1	7647995
3/4	0.7500	1.5/8	3.3/4	5/8	4	1	7647998
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	7648005
13/16	0.8125	1.7/8	4"	5/8	6	1	7647999
7/8	0.8750	1.7/8	4"	5/8	6	1	7648000
7/8	0.8750	1.7/8	4.1/8	3/4	4	1	7648006
7/8	0.8750	1.7/8	4.1/8	7/8	4	1	7648002
1"	1.0000	1.7/8	4"	5/8	6	1	7648001
1"	1.0000	1.7/8	4.1/8	3/4	4	1	7648007
1"	1.0000	1.7/8	4.1/8	7/8	4	1	7648003
1"	1.0000	2"	4.1/2	1"	4	1	7648004

# Cobalt 4-Flute End Mill



## Regular Length, Square End, Weldon Shank, 30° Helix

**C618** Multi-flute finishing for high strength heat resistant materials, stainless and alloy steel, super alloys, and titanium alloys.



C618

HSS-E

Z  
4-6

1/8 - 1"

$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	# of Flutes	Pack Qty	C618
1/8	0.1250	3/8	2.5/16	3/8	4	1	7648008
3/16	0.1875	1/2	2.3/8	3/8	4	1	7648009
1/4	0.2500	5/8	2.7/16	3/8	4	1	7648010
5/16	0.3125	3/4	2.1/2	3/8	4	1	7648011
3/8	0.3750	3/4	2.1/2	3/8	4	1	7648012
1/2	0.5000	1.1/4	3.1/4	1/2	4	1	7648013
5/8	0.6250	1.5/8	3.3/4	5/8	4	1	7648014
3/4	0.7500	1.5/8	3.7/8	3/4	4	1	7648015
1"	1.0000	2"	4.1/2	1"	4	1	7648016

# Visual Index - Reamers

## How to Use This Chart:

- 1) Determine your Workpiece Material from the Application Material Groups (AMG) below.
- 2) Use the icons to find Product Features.
- 3) Find the Surface Feet Per Minute (SFM) and Alpha Code.  
 example: 361 W  
 361 = SFM  
 W = Alpha Code used to find your Feed Rate (IPR)
- 4) To find Cutting Feed Rate, find your Alpha Code on the AMG Chart  
 (example: 279 U : U is the Alpha Code)
- 5) Find the closest diameter for your cutting application on the Feed Rate chart below to find your IPR

## 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	0.043	
F	0.006	0.007	0.010	0.014	0.017	0.020	0.022	0.025	0.028	0.031	0.037	0.047	0.059	

Application Material Groups (AMG)		Hardness HRC	ISO
1. Steel	1.1 Magnetic soft steel	12L14, 12L15	<120 HB P 1
	1.2 Structural Steel/ case carburising steel	1005-1025, 1214, 1215, A36	<200 HB P 1
	1.3 Plain Carbon steel	1030-1060, 1050-1060, 1144-1146	<24 P 2
	1.4 Alloy steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	<24 P 3
	1.5 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>24<38 P 4
	1.6 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>38 H 1
	1.7 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	49-55 H 3
	1.8 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	55-63 H 4
2. Stainless Steel	2.1 Free machining Stainless Steel	200, 303, 416, 420F, 430F, 440	<24 M 1
	2.2 Austenitic	301, 302, 304, 316, 321, 330, CUSTOM 455, AM-350	<24 M 3
	2.3 Ferritic + Austenitic, Martensitic	318-329, 400-446, DUPLEX	<32 M 2
	2.4 Precipitation Hardened	15-5PH, Custom 450 17-4PH	<32 S 2
3. Cast Iron	3.1 Lamellar graphite	Grey, G10, Gg40, J431C, A48 CLASS 20	<150 HB K 1
	3.2 Lamellar graphite	Grey, GG25-Gg40, J158, A48 CLASS 40-60	>150 HB<32 K 2
	3.3 Nodular graphite/ Malleable Cast Iron	A220, A436, A439, A602, Black, GGG40-GGG70	<200 HB K 3
	3.4 Nodular graphite/ Malleable Cast Iron	Black Gts/Gtw, J434C	>200 HB<32 K 4
4. Titanium	4.1 Titanium, unalloyed	Commercially Pure	<200 HB S 1
	4.2 Titanium, alloyed	6Al4V, 6Al4V-2Sn, Monel, Monel K	<28 S 2
	4.3 Titanium, alloyed	6Al4V-4Mo, 7Al4V-4Mo, 4911-4967	>28<38 S 3
5. Nickel	5.1 Nickel, unalloyed	Commercially Pure, 17644, 200, 5553	<150 HB S 1
	5.2 Nickel, alloyed	Monel 400, Hastelloy C, Inconel 625, Waspaloy	<28 S 2
	5.3 Nickel, alloyed	Inconel 718, Nimonic 75-95, Rene 41, Inconel 825, A286	>28<38 S 3
6. Copper	6.1 Copper	Commercially Pure	<100 HB N 3
	6.2 β-Brass, Bronze	314-340, 350-370	<200 HB N 4
	6.3 α-Brass	Alloyed Cu + Al + Fe, Long Chipping	<200 HB N 3
	6.4 High Strength Bronze	Ampcoo 18-25	<49 N 4
7. Aluminium Magnesium	7.1 Al, Mg, unalloyed	Commercially Pure	<100 HB N 1
	7.2 Al alloyed, Si<0.5%	6061 T6, 7075, 314-340	<150 HB N 1
	7.3 Al alloyed, Si>0.5%<10%	6061 T6, 380-390	<120 HB N 1
	7.4 Al alloyed, Si>10% Mg alloys	Magnesium Whisker Reinforced	<120 HB N 2
8. Synthetic Materials	8.1 Thermoplastics	Ultradid, Polystrol	--- O
	8.2 Thermosetting plastics	Bakelit, Pertinax	--- O
	8.3 Reinforced plastic materials	CFK, GFKAFK	--- O
9. Hard Mat.	9.1 Cermets (Metal-ceramics)	Ferrotic	<54 H
10. Graphite	10.1 Standard graphite		--- O

# Visual Index - Reamers

Tool Material:	HM	HM	HM	HM	HM	HSS-E	HSS	HSS	HSS-E	HSS-E	HSS	HSS
Finish/Coating:												
Standard:	DIN 8050	DIN 8093	DIN 8051	DIN 8094	DIN 8093	DIN 212	ANSI	ANSI	BS 328	DIN 212	ANSI	ANSI
Direction of Cut:												
Shank:												
Tolerance:	H7	H7	H7	H7	0.95-5.5 0,+0.004 0.95:1-12 0,+0.005	0.95-5.5 0,+0.004 0.95:1-12 0,+0.005	USCTI	USCTI	H7	H7		USCTI
Tolerance:												
Countersink Angle:												
Taper Gradient:												1:48
Style:	B441	B400	B442	B411	B481	B170	B610	B620	B901	B157	B122	B630
Range:	10.00 - 20.00	1.00 - 20.00	10.00 - 20.00	5.00 - 30.00	0.98 - 12.05	0.98 - 12.00	N60 - 1.1/2	1/16 - 1"	1.50 - 1/2	2.00 - 20.00	3/8 - 1.1/16	7/0 - 10
Page #	449	450	451	452	453	455	458	462	463	464	465	466
1.1	59B	59B	59B	59B	59B	82C	82C	82C	59C	82C	59C	59C
1.2	59B	59B	59B	59B	59B	66C	66C	66C	46C	66C	46C	46C
1.3	46B	46B	46B	46B	46B	52C	52C	52C	36C	52C	36C	36C
1.4	46B	46B	46B	46B	46B	49B	49B	49B	33B	49B	33B	33B
1.5	33C	33C	33C	33C	33C	30B	30B	30B	16B	30B	16B	16B
1.6	33C	33C	33C	33C	33C	16A	16A	16A	13A	16A	13A	13A
1.7												
1.8												
2.1						36C	36C	36C	26C	36C	26C	26C
2.2						20B	20B	20B		20B	16B	16B
2.3						26B	26B	26B		26B	20B	20B
2.4							20B	20B				
3.1	56D	56D	56D	56D	56D	52E	52E	52E	46E		46E	46E
3.2	56D	56D	56D	56D	56D	49D	49D	49D	36D		36D	36D
3.3	56D	56D	56D	56D	56D	43C	43C	43C	33C		33C	33C
3.4	46D	46D	46D	46D	46D	36C	36C	36C	30C		30C	30C
4.1	46C	46C	46C	46C	46C	49C	49C	49C	36C	49C	36C	36C
4.2	46C	46C	46C	46C	46C	30B	30B	30B	16B	30B	16B	16B
4.3	33B	33B	33B	33B	33B	16B	16B	16B	13B	16B	13B	13B
5.1	33C	33C	33C	33C	33C	26D	26D	26D	16D	26D	16D	16D
5.2	33B	33B	33B	33B	33B	16C	16C	16C	10C	16C		
5.3	33B	33B	33B	33B	33B	10C	10C	10C	7C	10C		
6.1	125E	125E	125E	125E	125E	82D	82D	82D	59D	82D	59D	59D
6.2	125E	125E	125E	125E	125E	92E	92E	92E	66E	92E	66E	66E
6.3	125E	125E	125E	125E	125E	82D	82D	82D	59D		59D	59D
6.4	125D	125D	125D	125D	125D	46D	46D	46D	36D		36D	36D
7.1	197D	197D	197D	197D	197D				75F	92F	75F	75F
7.2	197D	197D	197D	197D	197D				59F	82F	59F	59F
7.3	82D	82D	82D	82D	82D					66E	49E	49E
7.4	82D	82D	82D	82D	82D					52D	46D	46D
8.1	82C	82C	82C	82C	82C					98B		
8.2	43C	43C	43C	43C	43C					69B	69B	69B
8.3												
9.1										10A		
10.1												

# Visual Index - Reamers

	HSS-E	HSS	HSS	HSS	HSS		HSS	HSS	HSS	HSS	HSS	HSS
	ST	ST	ST							ST	ST	
	BS 328	DIN 311	ANSI	ANSI	DOORMER		ANSI	ANSI	ANSI	DIN 206	BS 328	ANSI
	H7	k11	USCTI	USCTI			USCTI	USCTI	USCTI	H7		USCTI
												60°
												↓
												100°
							1:48	1:48			1:48	
	B101	B121	B640	B650	B334	B335	B660	B670	B680	B100	B301	B690
	3.00 - 2"	10.00 - 30.00	7/16 - 1.1/16	1/8 - 1"	N000 N16	Blades Nuts	N0 - N10	N0 - N10	1/8 - 1"	1.50 - 50.00	1/16 - 1/2	1/4 - 1"
	467	469	470	471	472	473	474	475	476	477	479	480
1.1	59C	59C	59C	82C	59C		59C	59C	59C	59C	59C	98F
1.2	46C	46C	46C	66C	46C		46C	46C	46C	46C	46C	82E
1.3	36C	36C	36C	52C	36C		36C	36C	36C	36C	36C	66D
1.4	33B	33B	33B	49B	33B		33B	33B	33B	33B	33B	49D
1.5	16B	16B	16B	30B	16B		16B	16B	16B	16B	16B	33B
1.6	13A	13A	13A	16A	13A		13A	13A	13A	13A	13A	20A
1.7												
1.8												
2.1	26C		26C	36C	26F		26C	26C	26C	26F	26C	26C
2.2			16B	20B			16B	16B	16B		16B	20B
2.3			20B	26B			20B	20B	20B		20B	13A
2.4				20B					20B			
3.1	46E	46E	46E	52E	46E		46E	46E	46E	46E	46E	82F
3.2	36D	36D	36D	49D	36D		36D	36D	36D	36D	36D	49D
3.3	33C	33C	33C	43C	33C		33C	33C	33C	33C	33C	39C
3.4	30C	30C	30C	36C	30C		30C	30C	30C	30C	30C	26C
4.1	36C	36C	36C	49C	36C		36C	36C	36C	36C	36C	39C
4.2	16B		16B	30B	16B		16B	16B	16B	16B	16B	33A
4.3	13B		13B	16B	13B		13B	13B	13B	13B	13B	26A
5.1	16D		16D	26D	16D		16D	16D	16D	16D	16D	39C
5.2	10C			16C	10C					10C		20B
5.3	7C			10C	7C					7C		13A
6.1	59D		59D	82D	59D		59D	59D	59D	59D	59D	82D
6.2	66E		66E	92E	66E		66E	66E	66E	66E	66E	66F
6.3	59D		59D	82D	59D		59D	59D	59D	59D	59D	82F
6.4	36D		36D	46D	36D		36D	36D	36D	36D	36D	33D
7.1	75F		75F		75F		75F	75F	75F	75F	75F	98G
7.2	59F		59F		59F		59F	59F	59F	59F	59F	82F
7.3				49E			49E	49E	49E		49E	66F
7.4				46D			46D	46D	46D		46D	33F
8.1												98G
8.2	69B	69B	69B		69B		69B	69B	69B	69B	69B	66G
8.3												
9.1												
10.1												

## List Number Index - Reamers



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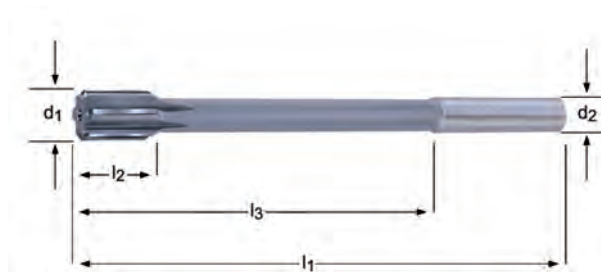
B100.....	477	B481.....	453
B101.....	467	B610.....	458
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## Machine Reamer, Straight Shank, Brazed Carbide Tipped

**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



B441

HM



DIN 8050



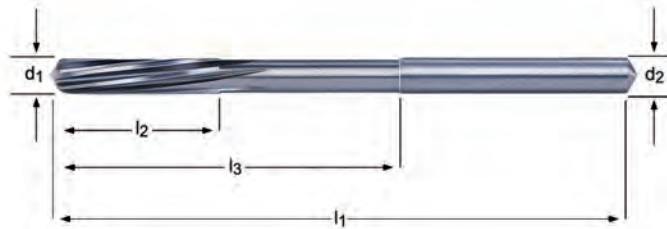
10.00 - 20.00

d <sub>1</sub> Ø mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	# of Flutes	d <sub>2</sub> Øh <sub>9</sub> mm	Pack Qty	B441
10.0	133	19	87	6	10	1	5987160
11.0	142	19	96	6	10	1	5987164
12.0	151	19	105	6	10	1	5987167
13.0	151	19	105	6	10	1	5987170
14.0	160	19	110	6	12.5	1	5987173
15.0	162	19	112	6	12.5	1	5987176
16.0	170	22	120	6	12.5	1	5987179
17.0	175	22	123	6	14	1	5987185
18.0	182	22	130	6	14	1	5987189
19.0	189	22	131	6	16	1	5987193
20.0	195	22	137	6	16	1	5987196

## 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



B400

HM



DIN  
8093



1.00 - 20.00

$d_1$ Ø mm	$l_1$ mm	$l_2$ mm	$l_3$ mm	# of Flutes	$d_2$ Ø $h_9$ mm	Pack Qty	B400
1.0	34	5.5	15	3	1.0	1	5987088 <sup>1)</sup>
1.2	38	7.5	16.5	3	1.2	1	5987126 <sup>1)</sup>
1.4	40	8	18	3	1.5	1	5987163 <sup>1)</sup>
1.5	40	8	18	3	1.5	1	5987198 <sup>1)</sup>
1.6	43	9	20	3	1.6	1	5987237 <sup>1)</sup>
1.8	46	10	22	4	1.8	1	5987244 <sup>1)</sup>
2.0	49	11	24	4	2.0	1	5987100 <sup>1)</sup>
2.2	53	12	25	4	2.2	1	5987103 <sup>1)</sup>
2.5	57	14	29	4	2.5	1	5987107 <sup>1)</sup>
2.8	61	15	33	6	3.0	1	5987111 <sup>1)</sup>
3.0	61	15	33	6	3.0	1	5987117 <sup>1)</sup>
3.2	65	16	37	6	3.2	1	5987120 <sup>1)</sup>
3.5	70	18	42	6	3.5	1	5987123 <sup>1)</sup>
4.0	75	19	47	6	4.0	1	5987129 <sup>1)</sup>
4.5	80	21	52	6	4.5	1	5987132 <sup>1)</sup>
5.0	86	23	58	6	5.0	1	5987134 <sup>1)</sup>
5.5	93	26	57	6	5.6	1	5987137 <sup>1)</sup>
6.0	93	26	57	6	5.6	1	5987141 <sup>1)</sup>
6.5	101	28	65	6	6.3	1	5987144 <sup>2)</sup>
7.0	109	31	73	6	7.1	1	5987148 <sup>2)</sup>
8.0	117	33	81	6	8.0	1	5987152 <sup>2)</sup>
9.0	125	36	85	6	9.0	1	5987155 <sup>2)</sup>
10.0	133	38	93	6	10.0	1	5987247 <sup>2)</sup>
12.0	151	44	111	6	10.0	1	5987250 <sup>2)</sup>
14.0	160	47	115	6	12.5	1	5987253 <sup>2)</sup>
16.0	170	52	125	6	12.5	1	5987094 <sup>2)</sup>
18.0	182	56	137	6	14.0	1	5987097 <sup>3)</sup>
20.0	195	60	147	6	16.0	1	5987114 <sup>3)</sup>

<sup>1)</sup> Solid Carbide

<sup>2)</sup> Carbide Head

<sup>3)</sup> Carbide Tipped

## Machine Reamer, Taper Shank, Brazed Carbide Tipped

**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



B442

HM



DIN 8051



10.00 - 20.00

$d_1$ Ø mm	$l_1$ mm	$l_2$ mm	$l_3$ mm	# of Flutes	MTS	Pack Qty	B442
10.0	168	19	102.5	6	1	1	5987200
12.0	182	19	116.5	6	1	1	5987204
14.0	189	19	123.5	6	1	1	5987208
15.0	204	19	124	6	2	1	5987212
16.0	210	22	130	6	2	1	5987216
17.0	214	22	134	6	2	1	5987220
18.0	219	22	139	6	2	1	5987228
19.0	223	22	143	6	2	1	5987230
20.0	228	22	148	6	2	1	5987233

## 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



B411

HM



DIN  
8094



5.00 - 30.00

d <sub>1</sub> Ø mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	# of Flutes	MTS	Pack Qty	B411
5.0	133	23	67.5	6	1	1	5987213 <sup>1)</sup>
6.0	138	26	72.5	6	1	1	5987217 <sup>1)</sup>
7.0	150	31	84.5	6	1	1	5987221 <sup>1)</sup>
8.0	156	33	90.5	6	1	1	5987226 <sup>1)</sup>
9.0	162	36	96.5	6	1	1	5987229 <sup>1)</sup>
10.0	168	38	102.5	6	1	1	5987159 <sup>1)</sup>
12.0	182	44	116.5	6	1	1	5987166 <sup>1)</sup>
14.0	189	47	123.5	8	1	1	5987169 <sup>1)</sup>
15.0	204	50	124	8	2	1	5987172 <sup>1)</sup>
16.0	210	52	130	8	2	1	5987175 <sup>1)</sup>
17.0	214	54	134	6	2	1	5987178 <sup>2)</sup>
18.0	219	56	139	6	2	1	5987181 <sup>2)</sup>
19.0	223	58	143	6	2	1	5987184 <sup>2)</sup>
20.0	228	60	148	6	2	1	5987187 <sup>2)</sup>
22.0	237	64	157	6	2	1	5987190 <sup>2)</sup>
24.0	268	68	169	8	3	1	5987194 <sup>2)</sup>
25.0	268	68	169	8	3	1	5987202 <sup>2)</sup>
26.0	273	70	174	8	3	1	5987206 <sup>2)</sup>
30.0	281	73	182	8	3	1	5987209 <sup>2)</sup>

<sup>1)</sup> Carbide Head

<sup>2)</sup> Carbide Tipped

## 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



B481

HM



DIN  
8093



0.98 - 12.05

d <sub>1</sub> Ø mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	# of Flutes	d <sub>2</sub> Øh <sub>6</sub> mm	Pack Qty	B481
0.98	49.5	6	21.5	3	4	1	5987462
0.99	49.5	6	21.5	3	4	1	5987467
1.00	49.5	6	21.5	3	4	1	5987475
1.01	49.5	6	21.5	3	4	1	5987478
1.02	49.5	6	21.5	3	4	1	5987482
1.03	49.5	9	21.5	3	4	1	5987485
1.48	49	9	21	3	4	1	5987488
1.49	49	9	21	3	4	1	5987491
1.50	49	9	21	3	4	1	5987494
1.51	49	9	21	3	4	1	5987497
1.52	49	9	21	3	4	1	5987499
1.53	49	9	21	3	4	1	5987501
1.98	49	12	21	4	4	1	5987506
1.99	49	12	21	4	4	1	5987509
2.00	49	12	21	4	4	1	5987602
2.01	49	12	21	4	4	1	5987603
2.02	49	12	21	4	4	1	5987604
2.03	49	12	21	4	4	1	5987507
2.48	59	16	31	4	4	1	5987510
2.49	59	16	31	4	4	1	5987513
2.50	59	16	31	4	4	1	5987516
2.51	59	16	31	4	4	1	5987519
2.52	59	16	31	4	4	1	5987522
2.53	59	16	31	4	4	1	5987524
2.97	62.5	17	35	6	4	1	5987526
2.98	62.5	17	35	6	4	1	5987529
2.99	62.5	17	35	6	4	1	5987534
3.00	62.5	17	35	6	4	1	5987540
3.01	62.5	17	35	6	4	1	5987543
3.02	62.5	17	35	6	4	1	5987546
3.03	62.5	17	35	6	4	1	5987549
3.97	75	19	47	6	4	1	5987551
3.98	75	19	47	6	4	1	5987553

# APPLICATION CARBIDE REAMER



$d_1$ Ø mm	$l_1$ mm	$l_2$ mm	$l_3$ mm	# of Flutes	$d_2$ Ø $h_6$ mm	Pack Qty	B481
3.99	75	19	47	6	4	1	5987556
4.00	75	19	47	6	4	1	5987558
4.01	75	19	47	6	4	1	5987560
4.02	75	19	47	6	4	1	5987562
4.03	75	19	47	6	4	1	5987565
4.97	86	23	50	6	6	1	5987567
4.98	86	23	50	6	6	1	5987569
4.99	86	23	50	6	6	1	5987571
5.00	86	23	50	6	6	1	5987573
5.01	86	23	50	6	6	1	5987575
5.02	86	23	50	6	6	1	5987577
5.03	86	23	50	6	6	1	5987578
5.97	93	26	57	6	6	1	5987580
5.98	93	26	57	6	6	1	5987582
5.99	93	26	57	6	6	1	5987586
6.00	93	26	57	6	6	1	5987588
6.01	93	26	57	6	6	1	5987590
6.02	93	26	57	6	6	1	5987592
6.03	93	26	57	6	6	1	5987593
7.97	117	33	81	6	8	1	5987594
7.98	117	33	81	6	8	1	5987595
7.99	117	33	81	6	8	1	5987596
8.00	117	33	81	6	8	1	5987597
8.01	117	33	81	6	8	1	5987598
8.02	117	33	81	6	8	1	5987600
8.03	117	33	81	6	8	1	5986965
8.04	117	33	81	6	8	1	5986973
9.97	133	38	93	6	10	1	5986978
9.98	133	38	93	6	10	1	5986981
9.99	133	38	93	6	10	1	5986985
10.00	133	38	93	6	10	1	5987511
10.01	133	38	93	6	10	1	5987514
10.02	133	38	93	6	10	1	5987517
10.03	133	38	93	6	10	1	5987520
10.04	133	38	93	6	10	1	5987525
10.05	133	38	93	6	10	1	5987528
11.97	151	44	106	6	12	1	5987531
11.98	151	44	106	6	12	1	5987533
11.99	151	44	106	6	12	1	5987538
12.00	151	44	106	6	12	1	5987503
12.01	151	44	106	6	12	1	5987537
12.02	151	44	106	6	12	1	5987563
12.03	151	44	106	6	12	1	5987584
12.04	151	44	106	6	12	1	5987599
12.05	151	44	106	6	12	1	5987601

## 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



B170

HSS-E



DIN 212



0.98 - 12.00

d <sub>1</sub> Ø mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	# of Flutes	d <sub>2</sub> Øh <sub>3</sub> mm	Pack Qty	B170
0.98	34	5.5	15	3	1.0	1	5986212
0.99	34	5.5	15	3	1.0	1	5986213
1.00	34	5.5	15	3	1.0	1	5986214
1.01	34	5.5	15	3	1.0	1	5986215
1.02	34	5.5	15	3	1.0	1	5986216
1.03	34	5.5	15	3	1.0	1	5986217
1.04	34	5.5	15	3	1.0	1	5986219
1.05	34	5.5	15	3	1.0	1	5986221
1.49	40	8.0	18	3	1.5	1	5986223
1.50	40	8.0	18	3	1.5	1	5986225
1.51	43	9.0	20	3	1.6	1	5986229
1.52	43	9.0	20	3	1.6	1	5986232
1.98	49	11.0	24	4	2.0	1	5986235
1.99	49	11.0	24	4	2.0	1	5986238
2.00	49	11.0	24	4	2.0	1	5986940
2.01	49	11.0	24	4	2.0	1	5986795
2.02	49	11.0	24	4	2.0	1	5986798
2.03	49	11.0	24	4	2.0	1	5986801
2.04	49	11.0	24	4	2.0	1	5986805
2.05	49	11.0	24	4	2.0	1	5986809
2.49	57	14.0	28	4	2.5	1	5986813
2.50	57	14.0	28	4	2.5	1	5986817
2.51	57	14.0	28	4	2.5	1	5986821
2.52	57	14.0	28	4	2.5	1	5986825
2.98	61	15.0	32	6	3.0	1	5986829
2.99	61	15.0	32	6	3.0	1	5986836
3.00	61	15.0	32	6	3.0	1	5986839
3.01	65	16.0	35	6	3.2	1	5986842
3.02	65	16.0	35	6	3.2	1	5986845
3.03	65	16.0	35	6	3.2	1	5986848
3.04	65	16.0	35	6	3.2	1	5986851
3.05	65	16.0	35	6	3.2	1	5986852
3.49	70	18.0	40	6	3.5	1	5986855

# APPLICATION COBALT REAMER



$d_1$ Ø mm	$l_1$ mm	$l_2$ mm	$l_3$ mm	# of Flutes	$d_2$ Ø $h_3$ mm	Pack Qty	B170
3.50	70	18.0	40	6	3.5	1	5986858
3.51	70	18.0	40	6	3.5	1	5986860
3.52	70	18.0	40	6	3.5	1	5986865
3.98	75	19.0	43	6	4.0	1	5986867
3.99	75	19.0	43	6	4.0	1	5986872
4.00	75	19.0	43	6	4.0	1	5986875
4.01	75	19.0	43	6	4.0	1	5986878
4.02	75	19.0	43	6	4.0	1	5986881
4.03	75	19.0	43	6	4.0	1	5986884
4.04	75	19.0	43	6	4.0	1	5986887
4.05	75	19.0	43	6	4.0	1	5986890
4.49	80	21.0	47	6	4.5	1	5986892
4.50	80	21.0	47	6	4.5	1	5986896
4.51	80	21.0	47	6	4.5	1	5986898
4.52	80	21.0	47	6	4.5	1	5986901
4.98	86	23.0	52	6	5.0	1	5986903
4.99	86	23.0	52	6	5.0	1	5986906
5.00	86	23.0	52	6	5.0	1	5986909
5.01	86	23.0	52	6	5.0	1	5986912
5.02	86	23.0	52	6	5.0	1	5986915
5.03	86	23.0	52	6	5.0	1	5986918
5.04	86	23.0	52	6	5.0	1	5986921
5.05	86	23.0	52	6	5.0	1	5986927
5.49	93	26.0	57	6	5.6	1	5986545
5.50	93	26.0	57	6	5.6	1	5986586
5.51	93	26.0	57	6	5.6	1	5986616
5.52	93	26.0	57	6	5.6	1	5986647
5.98	93	26.0	57	6	5.6	1	5986682
5.99	93	26.0	57	6	5.6	1	5986689
6.00	93	26.0	57	6	5.6	1	5986693
6.01	101	28.0	63	6	6.3	1	5986696
6.02	101	28.0	63	6	6.3	1	5986700
6.03	101	28.0	63	6	6.3	1	5986550
6.04	101	28.0	63	6	6.3	1	5986554
6.05	101	28.0	63	6	6.3	1	5986558
6.49	101	28.0	63	6	6.3	1	5986562
6.50	101	28.0	63	6	6.3	1	5986566
6.51	101	28.0	63	6	6.3	1	5986570
6.52	101	28.0	63	6	6.3	1	5986573
6.98	109	31.0	69	6	7.1	1	5986578
6.99	109	31.0	69	6	7.1	1	5986581
7.00	109	31.0	69	6	7.1	1	5986584
7.01	109	31.0	69	6	7.1	1	5986590
7.02	109	31.0	69	6	7.1	1	5986593
7.03	109	31.0	69	6	7.1	1	5986596
7.04	109	31.0	69	6	7.1	1	5986598
7.05	109	31.0	69	6	7.1	1	5986602
7.49	109	31.0	69	6	7.1	1	5986603
7.50	109	31.0	69	6	7.1	1	5986606
7.51	117	33.0	75	6	8.0	1	5986609
7.52	117	33.0	75	6	8.0	1	5986612
7.98	117	33.0	75	6	8.0	1	5986614
7.99	117	33.0	75	6	8.0	1	5986620
8.00	117	33.0	75	6	8.0	1	5986622
8.01	117	33.0	75	6	8.0	1	5986626
8.02	117	33.0	75	6	8.0	1	5986629
8.03	117	33.0	75	6	8.0	1	5986632
8.04	117	33.0	75	6	8.0	1	5986637
8.05	117	33.0	75	6	8.0	1	5986639
8.49	117	33.0	75	6	8.0	1	5986641
8.50	117	33.0	75	6	8.0	1	5986643
8.51	125	36.0	81	6	9.0	1	5986645
8.52	125	36.0	81	6	9.0	1	5986650
8.98	125	36.0	81	6	9.0	1	5986652
8.99	125	36.0	81	6	9.0	1	5986655
9.00	125	36.0	81	6	9.0	1	5986658



$d_1$ Ø mm	$l_1$ mm	$l_2$ mm	$l_3$ mm	# of Flutes	$d_2$ Ø $h_9$ mm	Pack Qty	B170
9.01	125	36.0	81	6	9.0	1	5986663
9.02	125	36.0	81	6	9.0	1	5986666
9.03	125	36.0	81	6	9.0	1	5986669
9.04	125	36.0	81	6	9.0	1	5986672
9.05	125	36.0	81	6	9.0	1	5986675
9.49	125	36.0	81	6	9.0	1	5986678
9.50	125	36.0	81	6	9.0	1	5986685
9.51	133	38.0	87	6	10.0	1	5986611
9.52	133	38.0	87	6	10.0	1	5986642
9.98	133	38.0	87	6	10.0	1	5986671
9.99	133	38.0	87	6	10.0	1	5986709
10.00	133	38.0	87	6	10.0	1	5986241
10.01	133	38.0	87	6	10.0	1	5986244
10.02	133	38.0	87	6	10.0	1	5986246
10.03	133	38.0	87	6	10.0	1	5986249
10.04	133	38.0	87	6	10.0	1	5986253
10.05	133	38.0	87	6	10.0	1	5986256
10.49	133	38.0	87	6	10.0	1	5986261
10.51	133	38.0	87	6	10.0	1	5986267
10.52	133	38.0	87	6	10.0	1	5986270
10.98	142	41.0	96	6	10.0	1	5986273
10.99	142	41.0	96	6	10.0	1	5986276
11.00	142	41.0	96	6	10.0	1	5986279
11.01	142	41.0	96	6	10.0	1	5986282
11.02	142	41.0	96	6	10.0	1	5986285
11.03	142	41.0	96	6	10.0	1	5986288
11.04	142	41.0	96	6	10.0	1	5986292
11.05	142	41.0	96	6	10.0	1	5986789
11.49	142	41.0	96	6	10.0	1	5986832
11.50	142	41.0	96	6	10.0	1	5986862
11.51	142	41.0	96	6	10.0	1	5986894
11.52	142	41.0	96	6	10.0	1	5986924
11.98	151	44.0	105	6	10.0	1	5986930
11.99	151	44.0	105	6	10.0	1	5986933
12.00	151	44.0	105	6	10.0	1	5986937

## Chucking Reamer, Straight Shank

**B610** 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.

Produced per ASME B94.2-1995 Standards.



4533

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N60 - 1.1/2

$d_1$ Ø "/Nr./letter	$d_1$ decimal Inch	$d_2$ decimal Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	B610
N60	0.0400	0.0390	1/2	2.1/2	4	1	8157149
N59	0.0410	0.0390	1/2	2.1/2	4	1	8157150
N58	0.0420	0.0390	1/2	2.1/2	4	1	8157151
N57	0.0430	0.0390	1/2	2.1/2	4	1	8157152
N56	0.0465	0.0455	1/2	2.1/2	4	1	8157153
3/64	0.0469	0.0455	1/2	2.1/2	4	1	8157154
N55	0.0520	0.0510	1/2	2.1/2	4	1	8157155
N54	0.0550	0.0510	1/2	2.1/2	4	1	8157156
N53	0.0595	0.0585	1/2	2.1/2	4	1	8157157
1/16	0.0625	0.0585	1/2	2.1/2	4	1	8157158
N52	0.0635	0.0585	1/2	2.1/2	4	1	8157159
N51	0.0670	0.0660	3/4	3"	4	1	8157160
N50	0.0700	0.0660	3/4	3"	4	1	8157161
N49	0.0730	0.0660	3/4	3"	4	1	8157162
N48	0.0760	0.0720	3/4	3"	4	1	8157163
5/64	0.0781	0.0720	3/4	3"	4	1	8157164
N47	0.0785	0.0720	3/4	3"	4	1	8157165
N46	0.0810	0.0771	3/4	3"	4	1	8157166
N45	0.0820	0.0771	3/4	3"	4	1	8157167
N44	0.0860	0.0810	3/4	3"	4	1	8157168
N43	0.0890	0.0810	3/4	3"	4	1	8157169
N42	0.0935	0.0880	3/4	3"	4	1	8157170
3/32	0.0938	0.0880	3/4	3"	4	1	8157171
N41	0.0960	0.0928	7/8	3.1/2	4	1	8157172
N40	0.0980	0.0928	7/8	3.1/2	4	1	8157173
N39	0.0995	0.0928	7/8	3.1/2	4	1	8157174
N38	0.1015	0.0950	7/8	3.1/2	4	1	8157175
N37	0.1040	0.0950	7/8	3.1/2	4	1	8157176
N36	0.1065	0.1030	7/8	3.1/2	4	1	8157177
7/64	0.1094	0.1030	7/8	3.1/2	4	1	8157178
N35	0.1100	0.1030	7/8	3.1/2	4	1	8157179
N34	0.1110	0.1055	7/8	3.1/2	4	1	8157180
N33	0.1130	0.1055	7/8	3.1/2	4	1	8157181

$d_1$ Ø "/Nr./letter	$d_1$ decimal Inch	$d_2$ decimal Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	B610
N32	0.1160	0.1120	7/8	3.1/2	4	1	8157182
N31	0.1200	0.1120	7/8	3.1/2	4	1	8157183
	0.1230	0.1120	7/8	3.1/2	4	1	8157184
	0.1240	0.1190	7/8	3.1/2	4	1	8157185
	0.1247	0.1190	7/8	3.1/2	4	1	8157186
1/8	0.1250	0.1190	7/8	3.1/2	4	1	8157187
	0.1260	0.1190	7/8	3.1/2	4	1	8157188
N30	0.1285	0.1190	7/8	3.1/2	4	1	8157189
N29	0.1360	0.1275	1"	4"	4	1	8157190
N28	0.1405	0.1350	1"	4"	4	1	8157191
9/64	0.1410	0.1350	1"	4"	4	1	8157192
N27	0.1440	0.1350	1"	4"	4	1	8157193
N26	0.1470	0.1430	1"	4"	4	1	8157194
N25	0.1495	0.1430	1"	4"	4	1	8157195
N24	0.1520	0.1460	1"	4"	4	1	8157196
N23	0.1540	0.1460	1"	4"	4	1	8157197
5/32	0.1562	0.1510	1"	4"	6	1	8157198
N22	0.1570	0.1510	1"	4"	6	1	8157199
N21	0.1590	0.1530	1.1/8	4.1/2	6	1	8157200
N20	0.1610	0.1530	1.1/8	4.1/2	6	1	8157201
N19	0.1660	0.1595	1.1/8	4.1/2	6	1	8157202
N18	0.1695	0.1595	1.1/8	4.1/2	6	1	8157203
11/64	0.1719	0.1645	1.1/8	4.1/2	6	1	8157204
N17	0.1730	0.1645	1.1/8	4.1/2	6	1	8157205
N16	0.1770	0.1700	1.1/8	4.1/2	6	1	8157206
N15	0.1800	0.1755	1.1/8	4.1/2	6	1	8157207
N14	0.1820	0.1755	1.1/8	4.1/2	6	1	8157208
N13	0.1850	0.1800	1.1/8	4.1/2	6	1	8157209
	0.1855	0.1800	1.1/8	4.1/2	6	1	8157210
	0.1865	0.1800	1.1/8	4.1/2	6	1	8157211
	0.1870	0.1800	1.1/8	4.1/2	6	1	8157212
3/16	0.1875	0.1800	1.1/8	4.1/2	6	1	8157213
	0.1885	0.1800	1.1/8	4.1/2	6	1	8157214
N12	0.1890	0.1800	1.1/8	4.1/2	6	1	8157215
N11	0.1910	0.1860	1.1/4	5"	6	1	8157216
N10	0.1935	0.1860	1.1/4	5"	6	1	8157217
N9	0.1960	0.1895	1.1/4	5"	6	1	8157218
N8	0.1990	0.1895	1.1/4	5"	6	1	8157219
N7	0.2010	0.1945	1.1/4	5"	6	1	8157220
13/64	0.2031	0.1945	1.1/4	5"	6	1	8157221
N6	0.2040	0.1945	1.1/4	5"	6	1	8157222
N5	0.2055	0.2016	1.1/4	5"	6	1	8157223
N4	0.2090	0.2016	1.1/4	5"	6	1	8157224
N3	0.2130	0.2075	1.1/4	5"	6	1	8157225
7/32	0.2188	0.2075	1.1/4	5"	6	1	8157226
N2	0.2210	0.2173	1.1/2	6"	6	1	8157227
N1	0.2280	0.2173	1.1/2	6"	6	1	8157228
A	0.2340	0.2265	1.1/2	6"	6	1	8157229
15/64	0.2344	0.2265	1.1/2	6"	6	1	8157230
B	0.2380	0.2329	1.1/2	6"	6	1	8157231
C	0.2420	0.2329	1.1/2	6"	6	1	8157232
D	0.2460	0.2329	1.1/2	6"	6	1	8157233
	0.2480	0.2329	1.1/2	6"	6	1	8157234
	0.2490	0.2400	1.1/2	6"	6	1	8157235
	0.2495	0.2400	1.1/2	6"	6	1	8157236
1/4	0.2500	0.2400	1.1/2	6"	6	1	8157237
	0.2510	0.2400	1.1/2	6"	6	1	8157238
F	0.2570	0.2485	1.1/2	6"	6	1	8157239
G	0.2610	0.2485	1.1/2	6"	6	1	8157240
17/64	0.2656	0.2485	1.1/2	6"	6	1	8157241
H	0.2660	0.2485	1.1/2	6"	6	1	8157242
I	0.2720	0.2485	1.1/2	6"	6	1	8157243
J	0.2770	0.2485	1.1/2	6"	6	1	8157244
K	0.2810	0.2485	1.1/2	6"	6	1	8157245
9/32	0.2812	0.2485	1.1/2	6"	6	1	8157246

# HSS REAMER



$d_1$ Ø "/Nr./letter	$d_1$ decimal Inch	$d_2$ decimal Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	B610
L	0.2900	0.2792	1.1/2	6"	6	1	8157247
M	0.2950	0.2792	1.1/2	6"	6	1	8157248
19/64	0.2969	0.2792	1.1/2	6"	6	1	8157249
N	0.3020	0.2792	1.1/2	6"	6	1	8157250
	0.3105	0.2792	1.1/2	6"	6	1	8157251
	0.3115	0.2792	1.1/2	6"	6	1	8157252
	0.3120	0.2792	1.1/2	6"	6	1	8157253
5/16	0.3125	0.2792	1.1/2	6"	6	1	8157254
	0.3135	0.2792	1.1/2	6"	6	1	8157255
	0.3160	0.2792	1.1/2	6"	6	1	8157256
O	0.3230	0.2792	1.1/2	6"	6	1	8157257
P	0.3281	0.2792	1.1/2	6"	6	1	8157258
21/64	0.3281	0.2792	1.1/2	6"	6	1	8157258
Q	0.3320	0.2792	1.1/2	6"	6	1	8157259
R	0.3390	0.2792	1.1/2	6"	6	1	8157260
11/32	0.3438	0.2792	1.1/2	6"	6	1	8157261
S	0.3480	0.3100	1.3/4	7"	6	1	8157262
T	0.3580	0.3100	1.3/4	7"	6	1	8157263
23/64	0.3594	0.3100	1.3/4	7"	6	1	8157264
U	0.3680	0.3100	1.3/4	7"	6	1	8157265
	0.3730	0.3100	1.3/4	7"	6	1	8157266
	0.3740	0.3100	1.3/4	7"	6	1	8157267
	0.3745	0.3100	1.3/4	7"	6	1	8157268
3/8	0.3750	0.3100	1.3/4	7"	6	1	8157269
	0.3760	0.3100	1.3/4	7"	6	1	8157270
V	0.3770	0.3100	1.3/4	7"	6	1	8157271
W	0.3860	0.3100	1.3/4	7"	6	1	8157272
25/64	0.3906	0.3100	1.3/4	7"	6	1	8157273
X	0.3970	0.3100	1.3/4	7"	6	1	8157274
Y	0.4040	0.3100	1.3/4	7"	6	1	8157275
13/32	0.4062	0.3100	1.3/4	7"	6	1	8157276
Z	0.4130	0.3730	1.3/4	7"	6	1	8157277
27/64	0.4219	0.3730	1.3/4	7"	6	1	8157278
	0.4355	0.3730	1.3/4	7"	6	1	8157279
	0.4365	0.3730	1.3/4	7"	6	1	8157280
	0.4370	0.3730	1.3/4	7"	6	1	8157281
7/16	0.4375	0.3730	1.3/4	7"	6	1	8157282
	0.4385	0.3730	1.3/4	7"	6	1	8157283
29/64	0.4531	0.3730	1.3/4	7"	6	1	8157284
15/32	0.4688	0.3730	1.3/4	7"	6	1	8157285
31/64	0.4844	0.4355	2"	8"	6	1	8157286
	0.4980	0.4355	2"	8"	6	1	8157287
	0.4990	0.4355	2"	8"	6	1	8157288
	0.4995	0.4355	2"	8"	6	1	8157289
1/2	0.5000	0.4355	2"	8"	6	1	8157290
	0.5010	0.4355	2"	8"	6	1	8157291
33/64	0.5156	0.4355	2"	8"	6	1	8157292
17/32	0.5312	0.4355	2"	8"	6	1	8157293
35/64	0.5469	0.4355	2"	8"	8	1	8157294
9/16	0.5625	0.4355	2"	8"	8	1	8157295
37/64	0.5781	0.4355	2"	8"	8	1	8157296
19/32	0.5938	0.4355	2"	8"	8	1	8157297
39/64	0.6094	0.5620	2.1/4	9"	8	1	8157298
5/8	0.6250	0.5620	2.1/4	9"	8	1	8157299
41/64	0.6406	0.5620	2.1/4	9"	8	1	8157300
21/32	0.6562	0.5620	2.1/4	9"	8	1	8157301
43/64	0.6719	0.5620	2.1/4	9"	8	1	8157302
11/16	0.6875	0.5620	2.1/4	9"	8	1	8157303
45/64	0.7031	0.5620	2.1/4	9"	8	1	8157304
23/32	0.7188	0.5620	2.1/4	9"	8	1	8157305
47/64	0.7344	0.6245	2.1/2	9.1/2	8	1	8157306
3/4	0.7500	0.6245	2.1/2	9.1/2	8	1	8157307
49/64	0.7656	0.6245	2.1/2	9.1/2	8	1	8157308
25/32	0.7812	0.6245	2.1/2	9.1/2	8	1	8157309
51/64	0.7969	0.6245	2.1/2	9.1/2	8	1	8157310
13/16	0.8125	0.6245	2.1/2	9.1/2	8	1	8157311

$d_1$ Ø "/Nr./letter	$d_1$ decimal Inch	$d_2$ decimal Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	B610
53/64	0.8281	0.6245	2.1/2	9.1/2	8	1	8157312
27/32	0.8438	0.6245	2.1/2	9.1/2	8	1	8157313
55/64	0.8594	0.7495	2.5/8	10"	8	1	8157314
7/8	0.8750	0.7495	2.5/8	10"	8	1	8157315
57/64	0.8906	0.7495	2.5/8	10"	8	1	8157316
29/32	0.9062	0.7495	2.5/8	10"	8	1	8157317
59/64	0.9219	0.7495	2.5/8	10"	8	1	8157318
15/16	0.9375	0.7495	2.5/8	10"	8	1	8157319
61/64	0.9531	0.7495	2.5/8	10"	8	1	8157320
31/32	0.9688	0.7495	2.5/8	10"	8	1	8157321
63/64	0.9844	0.8745	2.3/4	10.1/2	8	1	8157322
1"	1.0000	0.8745	2.3/4	10.1/2	8	1	8157323
1.1/16	1.0625	0.8745	2.3/4	10.1/2	8	1	8157324
1.1/8	1.1250	0.8745	2.7/8	11"	8	1	8157325
1.3/16	1.1875	0.9995	2.7/8	11"	8	1	8157326
1.1/4	1.2500	0.9995	3"	11.1/2	8	1	8157327
1.3/8	1.3750	0.9995	3.1/4	12"	8	1	8157328
1.1/2	1.5000	1.2495	3.1/2	12.1/2	8	1	8157329

## Chucking Reamer, Straight Shank

**B620** 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.

Produced per ASME B94.2-1995 standards.



4535

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ANSI



1/16 - 1"

$d_1$ Ø Inch	$d_1$ decimal Inch	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	B620
1/16	0.0625	0.0585	1/2	2.1/2	4	1	8157330
5/64	0.0781	0.0720	3/4	3"	4	1	8157331
3/32	0.0938	0.0880	3/4	3"	4	1	8157332
7/64	0.1094	0.1030	7/8	3.1/2	4	1	8157333
1/8	0.1250	0.1190	7/8	3.1/2	4	1	8157334
5/32	0.1562	0.1510	1"	4"	6	1	8157335
11/64	0.1719	0.1645	1.1/8	4.1/2	6	1	8157336
3/16	0.1875	0.1800	1.1/8	4.1/2	6	1	8157337
13/64	0.2031	0.1945	1.1/4	5"	6	1	8157338
7/32	0.2188	0.2075	1.1/4	5"	6	1	8157339
1/4	0.2500	0.2400	1.1/2	6"	6	1	8157340
17/64	0.2656	0.2485	1.1/2	6"	6	1	8157341
9/32	0.2812	0.2485	1.1/2	6"	6	1	8157342
5/16	0.3125	0.2792	1.1/2	6"	6	1	8157343
11/32	0.3438	0.2792	1.1/2	6"	6	1	8157344
3/8	0.3750	0.3100	1.3/4	7"	6	1	8157345
25/64	0.3906	0.3100	1.3/4	7"	6	1	8157346
13/32	0.4062	0.3100	1.3/4	7"	6	1	8157347
7/16	0.4375	0.3730	1.3/4	7"	6	1	8157348
31/64	0.4844	0.4355	2"	8"	6	1	8157349
1/2	0.5000	0.4355	2"	8"	6	1	8157350
17/32	0.5312	0.4355	2"	8"	6	1	8157351
9/16	0.5625	0.4355	2"	8"	8	1	8157352
5/8	0.6250	0.5620	2.1/4	9"	8	1	8157353
11/16	0.6875	0.5620	2.1/4	9"	8	1	8157354
3/4	0.7500	0.6245	2.1/2	9.1/2	8	1	8157355
7/8	0.8750	0.7495	2.5/8	10"	8	1	8157356
1"	1.0000	0.8745	2.3/4	10.1/2	8	1	8157357

## Machine Reamer, Straight Shank

**B901** Left Hand Slow Spiral, Right Hand Cut. Steam tempered in flutes reduces wear and chip welding in soft ferrous materials.



**B901**

**HSS-E**



**BS  
328**



1.50mm - 1/2

$d_1$ Ø Inch	$d_1$ Ø mm	$l_1$ mm	$l_2$ mm	# of Flutes	Pack Qty	<b>B901</b>
	1.50	44	21	4	1	5986427
1/16	1.59	44	21	4	1	5986431
	2.00	50	25	4	1	5986481
3/32	2.38	58	29	4	1	5986504
	2.50	58	29	4	1	5986485
	3.00	62	31	4	1	5986489
1/8	3.18	66	33	4	1	5986444
	3.50	71	35	4	1	5986493
5/32	3.97	76	38	6	1	5986528
	4.00	76	38	6	1	5986512
	4.50	81	41	6	1	5986514
3/16	4.76	87	44	6	1	5986500
	5.00	87	44	6	1	5986520
13/64	5.16	87	44	6	1	5986469
	5.50	93	47	6	1	5986523
7/32	5.56	93	47	6	1	5986540
15/64	5.95	93	47	6	1	5986477
	6.00	93	47	6	1	5986531
1/4	6.35	100	50	6	1	5986440
	7.00	107	54	6	1	5986534
9/32	7.14	107	54	6	1	5986555
5/16	7.94	115	58	6	1	5986525
	8.00	115	58	6	1	5986543
	9.00	124	62	6	1	5986547
3/8	9.52	133	66	6	1	5986508
	10.00	133	66	6	1	5986448
	11.00	142	71	6	1	5986453
7/16	11.11	142	71	6	1	5986537
	12.00	152	76	6	1	5986461
1/2	12.70	152	76	6	1	5986437

# 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



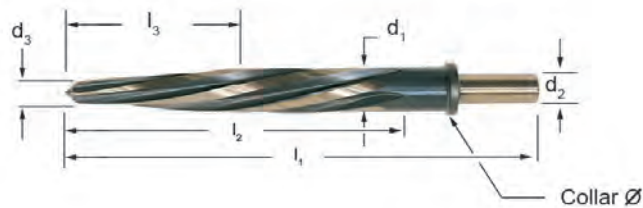
2.00 - 20.00

$d_1$ Ø mm	$l_1$ mm	$l_2$ mm	$l_3$ mm	$l_4$ mm	# of Flutes	$d_2$ Ø $h_9$ mm	Pack Qty	B157
2.0	49	11	3.5	24	3	2.0	1	5986889
3.0	61	15	4.0	32	3	3.0	1	5986732
4.0	75	19	4.0	43	3	4.0	1	5986736
5.0	86	23	4.5	52	3	5.0	1	5986739
6.0	93	26	6.0	57	3	5.6	1	5986743
7.0	109	31	7.0	69	3	7.1	1	5986747
8.0	117	33	9.0	75	3	8.0	1	5986751
9.0	125	36	9.5	81	3	9.0	1	5986755
10.0	133	38	10.0	87	3	10.0	1	5986588
11.0	142	41	10.5	96	3	10.0	1	5986594
12.0	151	44	11.0	105	3	10.0	1	5986724
13.0	151	44	11.5	105	3	10.0	1	5986765
14.0	160	47	12.0	110	3	12.5	1	5986804
15.0	162	50	12.5	112	3	12.5	1	5986841
16.0	170	52	13.0	120	3	12.5	1	5986874
17.0	175	54	13.5	123	3	14.0	1	5986880
18.0	182	56	14.0	130	3	14.0	1	5986883
19.0	189	58	14.5	131	3	16.0	1	5986886
20.0	195	60	15.0	137	3	16.0	1	5986728



## Car Reamer (Alignment Reamer), Reduced Shank

**B122** Left Hand Helical Flute, Right Hand Cut. 1/2"  
 Reduced Shank with Tri-Flats. Combination  
 Bronze and Steam tempered in flutes reduces  
 wear and chip welding in harder ferrous  
 materials. Used to align or enlarge holes.



Note: Collar diameter =  $d_1 + 1/8"$   
 Collar thickness =  $3/16"$   
 Shank Length =  $1.1/2"$

B122

HSS



ANSI



3/8 - 1.1/16

$d_1$ Ø Inch	$d_1$ decimal Inch	$l_1$ Inch	$l_2$ Inch	$l_3$ Inch	# of Flutes	$d_2$ Ø Inch	$d_3$ Ø Inch	Pack Qty	B122
3/8	0.3750	5.1/4	3.1/16	2	5	3/8	7/32	1	5986460
1/2	0.5000	5.5/16	3.3/4	2.5/8	5	1/2	1/4	1	5986446
9/16	0.5625	6.9/16	4.5/16	3.3/16	5	1/2	5/16	1	5986471
5/8	0.6250	6.9/16	4.5/16	3.3/16	5	1/2	3/8	1	5986463
11/16	0.6875	7	4.13/16	3.9/16	5	1/2	7/16	1	5986449
3/4	0.7500	7	4.13/16	3.9/16	5	1/2	1/2	1	5986457
13/16	0.8125	7.1/4	5.1/8	3.7/8	5	1/2	9/16	1	5986451
7/8	0.8750	7.1/4	5.1/8	3.7/8	5	1/2	5/8	1	5986467
15/16	0.9375	7.1/4	5.1/8	3.7/8	5	1/2	11/16	1	5986454
1"	1.0000	7.1/4	5.1/8	3.7/8	5	1/2	3/4	1	5986605
1.1/16	1.0625	7.1/4	5.1/4	3.7/8	5	1/2	13/16	1	5986608

# HSS REAMER



## Machine Reamer, Taper Pin Type, Straight Shank

### B630

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 (ASA B5.20-1958) 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 breakage.



4588

HSS



ANSI



1:48



7/0 - 10

nom Ø	d <sub>1</sub> Ø Inch	d <sub>2</sub> Ø Inch	d <sub>3</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	# of Flutes	Pack Qty	B630
7/0	0.0497	0.0666	5/64	13/16	1.13/16	2	1	8157380
6/0	0.0611	0.0810	3/32	15/16	1.15/16	2	1	8157381
5/0	0.0719	0.0966	7/64	1.3/16	2.3/16	2	1	8157382
4/0	0.0869	0.1142	1/8	1.5/16	2.5/16	2	1	8157383
3/0	0.1029	0.1300	9/64	1.5/16	2.5/16	2	1	8157384
2/0	0.1137	0.1462	5/32	1.9/16	2.9/16	3	1	8157385
1	0.1447	0.1798	3/16	1.11/16	2.15/16	3	1	8157386
2	0.1600	0.2010	13/64	1.15/16	3.3/16	3	1	8157387
3	0.1813	0.2294	15/64	2.5/16	3.11/16	3	1	8157388
4	0.2071	0.2600	17/64	2.9/16	4.1/16	3	1	8157389
5	0.2410	0.2994	5/16	2.13/16	4.5/16	3	1	8157390
6	0.2773	0.3540	23/64	3.11/16	5.7/16	3	1	8157391
7	0.3297	0.4220	13/32	4.7/16	6.5/16	3	1	8157392
8	0.3971	0.5050	7/16	5.3/16	7.3/16	3	1	8157393
9	0.4800	0.6066	9/16	6.1/16	8.5/16	4	1	8157394
10	0.5799	0.7216	5/8	6.13/16	9.5/16	4	1	8157395

Note: Nom Ø is the Taper Pin number  
Per American Standard Taper Pin Specification ( ASA B5.20-1958)

## Machine Reamer, Taper Shank

**B101** Left hand slow spiral, right hand. Steam tempered in flutes reduces wear chip welding harder ferrous materials.



B101

HSS-E



BS  
328



3.00mm - 2"

Note: All sizes have 1mm x 45 chamfer (lead).  
Cutting diameters are produced to H7 tolerance

$d_1$ 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	5986595
1/8	3.18	112	33	4	1	1	5986589
	3.50	115	35	6	1	1	5986599
	4.00	117	38	6	1	1	5986814
	4.50	120	41	6	1	1	5986818
3/16	4.76	124	44	6	1	1	5986601
	5.00	124	44	6	1	1	5986673
	5.50	127	47	6	1	1	5986676
	6.00	127	47	6	1	1	5986699
1/4	6.35	130	50	6	1	1	5986548
	6.50	130	50	6	1	1	5986703
	7.00	134	54	6	1	1	5986705
5/16	7.94	138	58	6	1	1	5986679
	8.00	138	58	6	1	1	5986727
	8.50	138	58	6	1	1	5986731
	9.00	142	62	6	1	1	5986735
	9.50	142	62	6	1	1	5986740
3/8	9.52	146	66	6	1	1	5986607
	10.00	146	66	6	1	1	5986621
	10.50	146	66	6	1	1	5986627
	11.00	151	71	6	1	1	5986630
7/16	11.11	151	71	6	1	1	5986711
	12.00	156	76	6	1	1	5986479
	12.50	156	76	6	1	1	5986483
1/2	12.70	156	76	6	1	1	5986513
	13.00	156	76	6	1	1	5986486
	13.50	161	81	6	1	1	5986490
	14.00	161	81	8	1	1	5986501
9/16	14.29	181	81	8	2	1	5986744
	14.50	181	81	8	2	1	5986505
	15.00	181	81	8	2	1	5986509
	15.50	187	87	8	2	1	5986516
5/8	15.88	187	87	8	2	1	5986688

# COBALT REAMER



$d_1$ Ø Inch	$d_1$ Ø mm	$l_1$ mm	$l_2$ mm	# of Flutes	MTS	Pack Qty	B101
	16.00	187	87	8	2	1	5986526
	16.50	187	87	8	2	1	5986529
	17.00	187	87	8	2	1	5986532
	18.00	193	93	8	2	1	5986538
	19.00	193	93	8	2	1	5986541
3/4	19.05	200	100	8	2	1	5986604
	20.00	200	100	8	2	1	5986556
13/16	20.64	200	100	8	2	1	5986494
	21.00	200	100	8	2	1	5986560
	22.00	207	107	8	2	1	5986564
7/8	22.22	207	107	8	2	1	5986719
	23.00	207	107	8	2	1	5986568
	24.00	242	115	8	3	1	5986574
	25.00	242	115	10	3	1	5986576
1"	25.40	242	115	10	3	1	5986328
	26.00	242	115	10	3	1	5986579
	27.00	251	124	10	3	1	5986582
	28.00	251	124	10	3	1	5986585
1.1/8	28.58	251	124	10	3	1	5986339
	29.00	251	124	10	3	1	5986592
	30.00	251	124	10	3	1	5986610
	31.00	260	133	10	3	1	5986613
1.1/4	31.75	260	133	10	3	1	5986336
	32.00	293	133	10	4	1	5986615
	34.00	302	142	10	4	1	5986624
1.3/8	34.93	302	142	10	4	1	5986470
	35.00	302	142	10	4	1	5986649
	36.00	302	142	10	4	1	5986681
	37.00	302	142	10	4	1	5986723
	38.00	312	152	10	4	1	5986768
1.1/2	38.10	312	152	10	4	1	5986333
	39.00	312	152	10	4	1	5986807
	40.00	312	152	10	4	1	5986823
	41.00	312	152	10	4	1	5986827
	42.00	312	152	10	4	1	5986653
	43.00	323	163	10	4	1	5986656
	44.00	323	163	10	4	1	5986659
1.3/4	44.45	323	163	10	4	1	5986348
	45.00	323	163	12	4	1	5986661
	46.00	323	163	12	4	1	5986664
	47.00	323	163	12	4	1	5986667
	48.00	334	174	12	4	1	5986670
	50.00	334	174	12	4	1	5986692
2"	50.80	334	174	12	4	1	5986552

## 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. The  $l_3$  length has a 1:10 starting taper.



B121

HSS



DIN 311



10.00 - 30.00

$d_1$ Ø	$l_1$	$l_2$	$l_3$	# of Flutes	MTS	Pack Qty	B121
10.0	171	95	30	4	1	1	5986764
11.0	176	100	33	4	1	1	5986772
12.0	199	105	39	4	2	1	5986775
13.0	199	105	39	4	2	1	5986778
14.0	209	115	42	4	2	1	5986781
15.0	219	125	45	4	2	1	5986784
16.0	229	135	48	4	2	1	5986787
17.0	251	135	51	4	3	1	5986791
18.0	261	145	58	4	3	1	5986794
19.0	261	145	58	4	3	1	5986797
20.0	271	155	62	4	3	1	5986803
21.0	271	155	62	4	3	1	5986810
22.0	281	165	66	4	3	1	5986442
23.0	281	165	66	4	3	1	5986478
24.0	296	180	72	4	3	1	5986521
25.0	296	180	72	4	3	1	5986557
26.0	296	180	72	4	3	1	5986591
30.0	311	195	78	5	3	1	5986597

# HSS REAMER



## Bridge Reamer, Taper Shank

**B640** Left hand slow spiral, right hand cut tapered bridge reamer. Used in structural iron and steel applications for badly misaligned holes.

Produced per ASME B94.2-1995 standards.



4579

HSS



ANSI



7/16 - 1.1/16

nom Ø	d <sub>1</sub> Ø (min)	d <sub>2</sub> Ø (max)	MTS	l <sub>2</sub> Inch	l <sub>1</sub> Inch	# of Flutes	Pack Qty	B640
7/16	1/4	7/16	2	4.3/8	8.1/4	4	1	8157358
1/2	9/32	1/2	2	5.1/8	9"	4	1	8157359
9/16	11/32	9/16	2	5.1/8	9"	4	1	8157360
5/8	3/8	5/8	2	6.1/8	10"	4	1	8157361
11/16	25/64	11/16	3	7.1/8	11.3/4	4	1	8157362
3/4	7/16	3/4	3	7.3/8	12"	4	1	8157363
13/16	1/2	13/16	3	7.3/8	12"	4	1	8157364
7/8	9/16	7/8	3	7.3/8	12"	4	1	8157365
15/16	5/8	15/16	3	7.3/8	12"	4	1	8157366
1"	11/16	1"	3	7.3/8	12"	4	1	8157367
1.1/16	3/4	1.1/16	3	7.3/8	12"	4	1	8157368

## Hand Reamer, Square Drive

### B650

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.



4500

HSS

ANSI

1/8 - 1"

$d_1$ Ø Inch	$d_1$ decimal Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	B650
1/8	0.1250	1.1/2	3"	4	1	8157057
3/16	0.1875	1.3/4	3.1/2	6	1	8157058
1/4	0.2500	2"	4"	6	1	8157059
5/16	0.3125	2.1/4	4.1/2	6	1	8157140
3/8	0.3750	2.1/2	5"	6	1	8157141
7/16	0.4375	2.3/4	5.1/2	6	1	8157142
1/2	0.5000	3"	6"	6	1	8157143
9/16	0.5625	3.1/4	6.1/2	8	1	8157144
5/8	0.6250	3.1/2	7"	8	1	8157145
3/4	0.7500	4.3/16	8.3/8	8	1	8157146
7/8	0.8750	4.7/8	9.3/4	8	1	8157147
1"	1.0000	5.7/16	10.7/8	8	1	8157148

# HSS REAMER



## Adjustable Hand Reamer, Replaceable Blade Type

**B334** For light duty sizing of uninterrupted holes.



B334

HSS



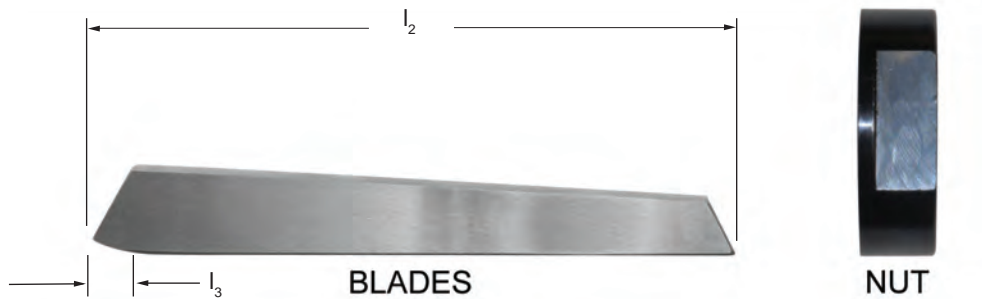
N000 - N16

Nr.	d min-max mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	# of Flutes	□ a mm	Pack Qty	B334
000	6.4 - 7.2	110	32	7	4	3.0	1	5987076
00	7.2 - 8.0	110	32	7	4	3.4	1	5987047
0	8.0 - 9.0	115	34	9	5	3.8	1	5987015
1	9.0 - 10.0	115	34	9	5	4.3	1	5987081
2	10.0 - 11.0	115	34	9	5	4.9	1	5986955
3	11.0 - 12.0	125	35	9	5	4.9	1	5986958
4	12.0 - 13.5	135	41	9	5	6.2	1	5986963
5	13.5 - 15.5	146	50	12	5	7.0	1	5986968
6	15.5 - 18.0	166	60	12	5	8.0	1	5986972
7	18.0 - 21.0	178	65	15	5	9.0	1	5986975
8	21.0 - 24.0	195	76	15	5	11.0	1	5986983
9	24.0 - 27.5	218	82	18	5	12.0	1	5986987
10	27.5 - 31.5	245	86	18	5	14.5	1	5987084
11	31.5 - 37.0	280	98	18	6	18.0	1	5987087
12	37.0 - 45.0	325	108	20	6	20.0	1	5987091
13	45.0 - 55.0	370	118	20	6	26.0	1	5986943
14	55.0 - 67.0	400	125	20	6	32.0	1	5986946
15	67.0 - 80.0	435	140	23	8	39.0	1	5986949
16	80.0 - 95.0	475	155	23	8	49.0	1	5986952



## Adjustable Hand Reamer, Replaceable Blade Type

**B335** Replace blades & nuts for use with B334



**B335**

N000 BLADES -  
N16 NUTS

Nr.	$l_2$ mm	$l_3$ mm	Nuts Pack Qty	B335 Nuts	Blades Pack Qty	B335 Blades
000	32	7	1	5987006	4	5987003
00	32	7	1	5987000	4	5986997
0	34	9	1	5986993	5	5986990
1	34	9	1	5987012	5	5987009
2	34	9	1	5987062	5	5987060
3	35	9	1	5987067	5	5987064
4	41	9	1	5987073	5	5987070
5	50	12	1	5986401	5	5987078
6	60	12	1	5986473	5	5986434
7	65	15	1	5986551	5	5986517
8	76	15	1	5986563	5	5986559
9	82	18	1	5986571	5	5986567
10	86	18	1	5987020	5	5987017
11	98	18	1	5987027	6	5987023
12	108	20	1	5987032	6	5987029
13	118	20	1	5987038	6	5987035
14	125	20	1	5987044	6	5987041
15	140	23	1	5987053	8	5987050
16	155	23	1	5987058	8	5987056

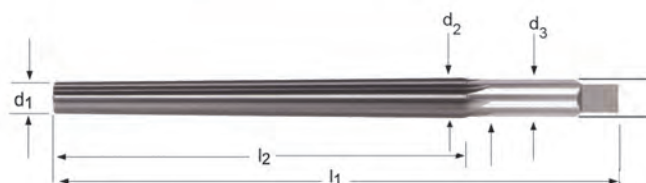
# HSS REAMER



## Hand Reamer, Taper Pin Type, Square Drive

**B660** 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 (ASA B5.20-1958) 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.

Produced per ASME B94.2-1995 standards.



4587

HSS



ANSI



1:48



N0 - N10

nom Ø	d <sub>1</sub> Ø Inch	d <sub>2</sub> Ø Inch	d <sub>3</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	# of Flutes	Pack Qty	B660
0	0.1287	0.1638	11/64	1.11/16	2.15/16	6	1	8157369
1	0.1447	0.1798	3/16	1.11/16	2.15/16	6	1	8157370
2	0.1600	0.2010	13/64	1.15/16	3.3/16	6	1	8157371
3	0.1813	0.2294	15/64	2.5/16	3.11/16	6	1	8157372
4	0.2071	0.2600	17/64	2.9/16	4.1/16	6	1	8157373
5	0.2410	0.2994	5/16	2.13/16	4.5/16	6	1	8157374
6	0.2773	0.3540	23/64	3.11/16	5.7/16	6	1	8157375
7	0.3297	0.4220	13/32	4.7/16	6.5/16	6	1	8157376
8	0.3971	0.5050	7/16	5.3/16	7.3/16	6	1	8157377
9	0.4800	0.6066	9/16	6.1/16	8.5/16	8	1	8157378
10	0.5799	0.7216	5/8	6.13/16	9.5/16	8	1	8157379

Note: Nom Ø is the Taper Pin number  
Per American Standard Taper Pin Specification ( ASA B5.20-1958)

## Hand Reamer, Taper Pin, Square Drive

### B670

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 (ASA B5.20-1958) 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.

Produced per ASME B94.2-1995 standards.



4591

HSS



ANSI



1:48



N0 - N10

nom Ø	d <sub>1</sub> Ø Inch	d <sub>2</sub> Ø Inch	d <sub>3</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	# of Flutes	Pack Qty	B670
0	0.1287	0.1638	11/64	1.11/16	2.15/16	6	1	8157396
1	0.1447	0.1798	3/16	1.11/16	2.15/16	6	1	8157397
2	0.1600	0.2010	13/64	1.15/16	3.3/16	6	1	8157398
3	0.1813	0.2294	15/64	2.5/16	3.11/16	6	1	8157399
4	0.2071	0.2600	17/64	2.9/16	4.1/16	6	1	8157400
5	0.2410	0.2994	5/16	2.13/16	4.5/16	6	1	8157401
6	0.2773	0.3540	23/64	3.11/16	5.7/16	6	1	8157402
7	0.3297	0.4220	13/32	4.7/16	6.5/16	6	1	8157403
8	0.3971	0.5050	7/16	5.3/16	7.3/16	6	1	8157404
9	0.4800	0.6066	9/16	6.1/16	8.5/16	8	1	8157405
10	0.5799	0.7216	5/8	6.13/16	9.5/16	8	1	8157406

Note: Nom Ø is the Taper Pin number  
Per American Standard Taper Pin Specification ( ASA B5.20-1958)

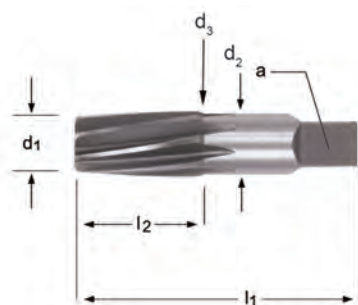
# HSS REAMER



## Hand Reamer, Taper Pipe Type, Square Drive

**B680** Left hand spiral 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.

Produced per ASME B94.2-1995 standards.



4600

HSS



ANSI



1/8 - 1"

nom Ø	d <sub>1</sub> Ø Inch	d <sub>2</sub> Ø Inch	d <sub>3</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	□ a mm	# of Flutes	Pack Qty	B680
1/8	0.3160	0.3620	0.4375	3/4	2.1/8	0.3280	6	1	8157407
1/4	0.4060	0.4720	0.5625	1.1/16	2.7/16	0.4210	6	1	8157408
3/8	0.5400	0.6060	0.7000	1.1/16	2.9/16	0.5310	8	1	8157409
1/2	0.6650	0.7510	0.6875	1.3/8	3.1/8	0.5150	8	1	8157410
3/4	0.8760	0.9620	0.9063	1.3/8	3.1/4	0.6790	10	1	8157411
1"	1.1030	1.2120	1.1250	1.3/4	3.3/4	0.8430	10	1	8157412

Note: Nom Ø (column 1) is the NPT pipe thread size. This is not the tool diameter.

## 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.



B100

HSS



DIN 206



1.50 - 50.00

Produced per DIN206 Form B.

Cutting diameters are produced to H7 tolerance.

Shank diameters (same as cutting diameters) but produced to e9 tolerance.

d <sub>1</sub> Ø Inch	d <sub>1</sub> Ø mm	l <sub>1</sub> mm	l <sub>2</sub> mm	l <sub>3</sub> mm	# of Flutes	□ a mm	Pack Qty	B100
	1.50	41	20	5	3	1.12	1	5986266
1/16	1.59	41	20	5	3	1.12	1	5986338
	1.60	44	21	5	3	1.25	1	5986300
5/64	1.98	47	23	6	4	1.40	1	5986265
	2.00	50	25	6	4	1.60	1	5986320
3/32	2.38	54	27	7	4	1.80	1	5986312
	2.50	58	29	7	4	2.10	1	5986323
7/64	2.78	62	31	8	6	2.10	1	5986296
	3.00	62	31	8	6	2.40	1	5986378
1/8	3.18	66	33	8	6	2.40	1	5986385
	3.20	66	33	8	6	2.40	1	5986218
	3.50	71	35	9	6	2.70	1	5986245
9/64	3.57	71	35	9	6	2.70	1	5986325
5/32	3.97	76	38	10	6	3.00	1	5986263
	4.00	76	38	10	6	3.00	1	5986236
11/64	4.37	81	41	10	6	3.40	1	5986247
	4.50	81	41	10	6	3.40	1	5986239
3/16	4.76	87	44	11	6	3.80	1	5986277
	5.00	87	44	11	6	3.80	1	5986254
13/64	5.16	87	44	11	6	3.80	1	5986272
	5.50	93	47	12	6	4.30	1	5986257
7/32	5.56	93	47	12	6	4.30	1	5986293
15/64	5.95	93	47	12	6	4.90	1	5986287
	6.00	93	47	12	6	4.90	1	5986274
1/4	6.35	100	50	13	6	4.90	1	5986381
	6.50	100	50	13	6	4.90	1	5986280
17/64	6.75	107	54	14	6	5.50	1	5986304
	7.00	107	54	14	6	5.50	1	5986284
9/32	7.14	107	54	14	6	6.20	1	5986321
	7.50	107	54	14	6	6.20	1	5986286
19/64	7.54	115	58	15	6	6.20	1	5986317
5/16	7.94	115	58	15	6	6.20	1	5986260
	8.00	115	58	15	6	6.20	1	5986303

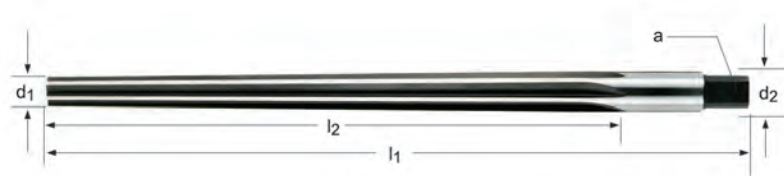
# HSS REAMER



$d_1$ 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	5986334
	8.50	115	58	15	6	7.00	1	5986307
11/32	8.73	124	62	16	6	7.00	1	5986243
	9.00	124	62	16	6	7.00	1	5986310
23/64	9.13	124	62	16	6	8.00	1	5986347
	9.50	124	62	16	6	8.00	1	5986315
3/8	9.52	124	62	17	6	8.00	1	5986351
25/64	9.92	133	66	17	6	8.00	1	5986356
	10.00	133	66	17	6	8.00	1	5986388
13/32	10.32	133	66	17	6	8.00	1	5986268
	10.50	133	66	17	6	8.00	1	5986391
7/16	11.00	142	71	18	6	9.00	1	5986234
	11.11	142	71	18	6	9.00	1	5986289
	11.50	142	71	18	6	9.00	1	5986237
	12.00	152	76	19	6	9.00	1	5986250
1/2	12.50	152	76	19	6	10.00	1	5986252
	12.70	152	76	19	6	10.00	1	5986375
	13.00	152	76	19	6	10.00	1	5986255
	13.49	163	81	20	8	11.00	1	5986297
17/32	13.50	163	81	20	8	11.00	1	5986259
	14.00	163	81	20	8	11.00	1	5986275
	14.29	163	81	20	8	11.00	1	5986318
9/16	14.50	163	81	20	8	11.00	1	5986278
	15.00	163	81	20	8	12.00	1	5986281
	15.08	163	81	22	8	12.00	1	5986314
5/8	15.88	175	87	22	8	12.00	1	5986269
	16.00	175	87	22	8	12.00	1	5986291
	17.00	175	87	22	8	13.00	1	5986294
11/16	17.46	188	93	23	8	14.50	1	5986240
	18.00	188	93	23	8	14.50	1	5986308
	19.00	188	93	23	8	14.50	1	5986311
3/4	19.05	188	93	25	8	14.50	1	5986345
	20.00	201	100	25	8	16.00	1	5986327
13/16	20.64	201	100	25	8	16.00	1	5986262
	21.00	201	100	25	8	16.00	1	5986330
	22.00	215	107	27	8	18.00	1	5986341
7/8	22.22	215	107	27	8	18.00	1	5986299
	23.00	215	107	27	8	18.00	1	5986344
	24.00	231	115	29	8	18.00	1	5986349
	25.00	231	115	29	8	20.00	1	5986353
1"	25.40	231	115	29	8	20.00	1	5986230
	26.00	231	115	29	8	20.00	1	5986360
	27.00	247	124	31	10	22.00	1	5986364
	28.00	247	124	31	10	22.00	1	5986367
	29.00	247	124	31	10	22.00	1	5986373
	30.00	247	124	31	10	24.00	1	5986355
	31.00	265	133	33	10	24.00	1	5986358
	32.00	265	133	33	10	24.00	1	5986362
	33.00	265	133	33	10	26.00	1	5986220
	34.00	284	142	36	10	26.00	1	5986222
	35.00	284	142	36	10	29.00	1	5986224
	36.00	284	142	36	10	29.00	1	5986226
	37.00	284	142	36	10	29.00	1	5986228
	38.00	305	152	38	10	29.00	1	5986231
	39.00	305	152	38	10	32.00	1	5986233
40.00	305	152	38	10	32.00	1	5986242	
45.00	326	163	41	12	35.00	1	5986251	
50.00	347	174	44	12	39.00	1	5986271	

## 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.



**B301**

**HSS**

ST

**BS 328**

1:48

1/16 - 1/2

nom Ø	d <sub>1</sub> Ø mm	l <sub>1</sub> mm	l <sub>2</sub> mm	# of Flutes	□ a mm	d <sub>2</sub> Ø mm	Pack Qty	B301
1/16	1.10	51	25	4	1.2	1.63	1	5986376 <sup>1)</sup>
5/64	1.50	51	25	4	1.6	2.03	1	5986412 <sup>1)</sup>
3/32	1.75	57	32	4	2.0	2.41	1	5986397 <sup>1)</sup>
7/64	2.03	64	38	4	2.2	2.82	1	5986424 <sup>1)</sup>
1/8	2.30	70	44	4	2.5	3.23	1	5986384 <sup>1)</sup>
9/64	2.64	73	48	4	2.8	3.63	1	5986979 <sup>1)</sup>
5/32	2.95	76	51	4	3.1	4.01	1	5986409 <sup>1)</sup>
11/64	3.23	89	57	4	3.6	4.42	1	5986390 <sup>1)</sup>
3/16	3.50	102	70	4	4.0	4.95	1	5986395 <sup>1)</sup>
7/32	4.13	102	70	6	4.5	5.59	1	5986421 <sup>1)</sup>
1/4	4.64	117	86	6	5.0	6.43	1	5986382 <sup>2)</sup>
9/32	5.23	143	105	6	5.6	7.42	1	5986936 <sup>2)</sup>
5/16	5.84	143	105	6	6.3	8.03	1	5986406 <sup>2)</sup>
11/32	6.43	152	114	6	7.1	8.81	1	5986387 <sup>2)</sup>
3/8	7.03	165	127	6	8.0	9.68	1	5986404 <sup>2)</sup>
13/32	7.42	191	146	6	8.0	10.46	1	5986393 <sup>2)</sup>
7/16	8.21	191	146	6	9.0	11.25	1	5986418 <sup>2)</sup>
1/2	9.41	210	165	6	10.0	12.85	1	5986379 <sup>2)</sup>

<sup>1)</sup> Limit of tolerance +0.0030

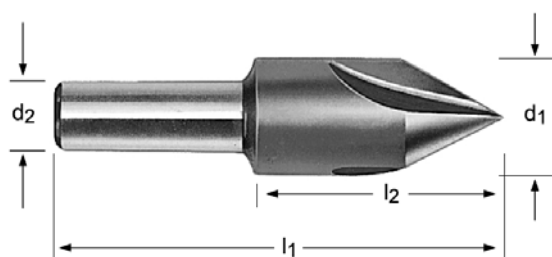
<sup>2)</sup> Limit of tolerance +0.0050

# HSS REAMER



## Straight Shank, 3-Flute

**B690** Center Reamer, Available in 60°, 82°, 90°, or 100° angles. Widely used to finish ream lathe centers in shafts, and countersink angles for screw heads and rivets. The odd number of flutes promotes smooth reamed finishes while eliminating chatter and providing better accuracy in most applications.



4608

HSS



ANSI



1/4 - 1"

$d_1$ Ø Inch	Angle	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	B690
1/4	60°	3/16	3/4	1.1/2	3	1	8157413
1/4	82°	3/16	3/4	1.1/2	3	1	8157414
1/4	90°	3/16	3/4	1.1/2	3	1	8157415
1/4	100°	3/16	3/4	1.1/2	3	1	8157416
3/8	60°	1/4	7/8	1.3/4	3	1	8157417
3/8	82°	1/4	7/8	1.3/4	3	1	8157418
3/8	90°	1/4	7/8	1.3/4	3	1	8157419
3/8	100°	1/4	7/8	1.3/4	3	1	8157420
1/2	60°	3/8	1"	2"	3	1	8157421
1/2	82°	3/8	1"	2"	3	1	8157422
1/2	90°	3/8	1"	2"	3	1	8157423
1/2	100°	3/8	1"	2"	3	1	8157424
5/8	60°	3/8	1"	2.1/4	3	1	8157425
5/8	82°	3/8	1"	2.1/4	3	1	8157426
5/8	90°	3/8	1"	2.1/4	3	1	8157427
5/8	100°	3/8	1"	2.1/4	3	1	8157428
3/4	60°	1/2	1.1/4	2.5/8	3	1	8157429
3/4	82°	1/2	1.1/4	2.5/8	3	1	8157430
3/4	90°	1/2	1.1/4	2.5/8	3	1	8157431
3/4	100°	1/2	1.1/4	2.5/8	3	1	8157432
1"	60°	1/2	1"	3"	3	1	8157433
1"	82°	1/2	1"	3"	3	1	8157434
1"	90°	1/2	1"	3"	3	1	8157435
1"	100°	1/2	1"	3"	3	1	8157436



## Visual Index - Countersinks & Counterbores



# Visual Index - Countersinks & Counterbores













## How to Use This Chart:

- 1) Determine your Workpiece Material from the Application Material Groups (AMG) below.
- 2) Use the icons to find Product Features.
- 3) Find the Surface Feet Per Minute (SFM) and Alpha Code.  
example: 361 W  
361 = SFM  
W = Alpha Code used to find your Feed Rate (IPR)
- 4) To find Cutting Feed Rate, find your Alpha Code on the AMG Chart  
(example: 279 U : U is the Alpha Code)
- 5) Find the closest diameter for your cutting application on the Feed Rate chart below to find your IPR












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	

Application Material Groups (AMG)	Hardness HRC	ISO		
1. Steel	1.1 Magnetic soft steel	12L14, 12L15	<120 HB	P 1
	1.2 Structural Steel/ case carburising steel	1005-1025, 1214, 1215, A36	<200 HB	P 1
	1.3 Plain Carbon steel	1030-1060, 1050-1060, 1144-1146	<24	P 2
	1.4 Alloy steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	<24	P 3
	1.5 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>24<38	P 4
	1.6 Alloy steel/ Hardened and tempered steel	4140,4340,52100,8620 H11-H41,A2,D2,01,P20,420	>38	H 1
	1.7 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	49-55	H 3
	1.8 Alloy steel Hardened	A2-D2, H10-H41, L1-L6, M1-M42, T1	55-63	H 4
2. Stainless Steel	2.1 Free machining Stainless Steel	200, 303, 416, 420F, 430F, 440	<24	M 1
	2.2 Austenitic	301, 302, 304, 316, 321, 330, CUSTOM 455, AM-350	<24	M 3
	2.3 Ferritic + Austenitic, Martensitic	318-329, 400-446, DUPLEX	<32	M 2
	2.4 Precipitation Hardened	15-5PH, Custom 450 17-4PH	<32	S 2
3. Cast Iron	3.1 Lamellar graphite	Grey, G10, Gg40, J431C, A48 CLASS 20	<150 HB	K 1
	3.2 Lamellar graphite	Grey, GG25-Gg40, J158, A48 CLASS 40-60	>150 HB<32	K 2
	3.3 Nodular graphite/ Malleable Cast Iron	A220, A436, A439, A602, Black, GGG40-GGG70	<200 HB	K 3
	3.4 Nodular graphite/ Malleable Cast Iron	Black Gts/Gtw, J434C	>200 HB<32	K 4
4. Titanium	4.1 Titanium, unalloyed	Commercially Pure	<200 HB	S 1
	4.2 Titanium, alloyed	6Al4V, 6A14V-2Sn, Monel, Monel K	<28	S 2
	4.3 Titanium, alloyed	6Al4V-4Mo, 7A14V-4Mo, 4911-4967	>28<38	S 3
5. Nickel	5.1 Nickel, unalloyed	Commercially Pure, 17644, 200, 5553	<150 HB	S 1
	5.2 Nickel, alloyed	Monel 400, Hastelloy C, Inconel 625, Waspaloy	<28	S 2
	5.3 Nickel, alloyed	Inconel 718, Nimonic 75-95, Rene 41, Inconel 825, A286	>28<38	S 3
6. Copper	6.1 Copper	Commercially Pure	<100 HB	N 3
	6.2 β-Brass, Bronze	314-340, 350-370	<200 HB	N 4
	6.3 α-Brass	Alloyed Cu + Al + Fe, Long Chipping	<200 HB	N 3
	6.4 High Strength Bronze	Ampco 18-25	<49	N 4
7. Aluminium Magnesium	7.1 Al, Mg, unalloyed	Commercially Pure	<100 HB	N 1
	7.2 Al alloyed, Si<0.5%	6061 T6, 7075, 314-340	<150 HB	N 1
	7.3 Al alloyed, Si>0.5%<10%	6061 T6, 380-390	<120 HB	N 1
	7.4 Al alloyed, Si>10% Mg alloys	Magnesium Whisker Reinforced	<120 HB	N 2
8. Synthetic Materials	8.1 Thermoplastics	Ultradid, Polystrol	---	O
	8.2 Thermosetting plastics	Bakelit, Pertinax	---	O
	8.3 Reinforced plastic materials	CFK, GFKAFK	---	O
9. Hard Mat.	9.1 Cermets (Metal-ceramics)	Ferrotic	<54	H
10. Graphite	10.1 Standard graphite		---	O

# Visual Index - Countersinks & Counterbores

Tool Material:												
Finish/Coating:												
Standard:												
Direction of Cut:												
Application:												
Shank:												
Countersink Angle:												
		↓	↓									
												
Style:	<b>G400</b>	<b>4603</b>	<b>4602</b>	<b>G135</b>	<b>G335</b>	<b>G154</b>	<b>G149</b>	<b>G136</b>	<b>G560</b>	<b>G142</b>	<b>G570</b>	<b>G171</b>
Range:	6.30 - 31.00	1/4 - 1.1/2	1/2 - 1"	6.30 - 25.00	6.30 - 25.00	6.30 - 25.00	5.00 - 50.00	4.30 - 31.00	6.30 - 31.00	4.80 - 31.00	6.30 - 31.00	6.30 - 25.00
Page #	<b>486</b>	<b>487</b>	<b>488</b>	<b>489</b>	<b>489</b>	<b>490</b>	<b>491</b>	<b>492</b>	<b>492</b>	<b>493</b>	<b>494</b>	<b>495</b>
1.1	98F	98F	98F	98F	164E	98F	98D	98F	164E	98F	148E	164E
1.2	82E	82E	82E	82E	131E	82E	82D	82E	131E	82E	118E	131E
1.3	66D	66D	66D	66D	98D	66D	66C	66D	98D	66D	89D	98D
1.4	49D	49D	49D	49D	66D	49D	49B	49D	66D	49D	72D	66D
1.5	33B	33B	33B	33B	49B	33B	33A	33B	49B		56B	49B
1.6	20A	20A	20A	20A	33B	20A	20A	20A	33B		39B	33B
1.7												
1.8												
2.1	26C	26C	26C	26C		26C	26B	26C		26C	56C	
2.2	20B	20B	20B	20B		20B	20A	20B		20B	39B	
2.3	13A	13A	13A	13A		13A		13A		13A	49A	
2.4											33A	
3.1	82F	82F	82F	82F	148F	82F	82D	82F	148F		131C	148F
3.2	49D	49D	49D	49D	115D	49D	49C	49D	115D		105C	115D
3.3	39C	39C	39C	39C	98C	39C	39A	39C	98C		89C	98C
3.4	26C	26C	26C	26C	98C	26C	26A	26C	98C		79C	98C
4.1	39C	39C	39C	39C	66C	39C	39B	39C	66C	39C		66C
4.2	33A	33A	33A	33A	49A	33A	33A	33A	49A	33A		49A
4.3	26A	26A	26A	26A	33A	26A	26A	26A	33A			33A
5.1	39C	39C	39C	39C	66C	39C	39B	39C	66C	39C		66C
5.2	20B	20B	20B	20B	33B	20B	20A	20B	33B	20B	20A	33B
5.3	13A	13A	13A	13A	20A	13A	13A	13A	20A		13A	20A
6.1	82D	82D	82D	82D	131D	82D	82B	82D	131D	82D	131D	131D
6.2	66F	66F	66F	66F	98F	66F	66C	66F	98F	66F	98F	98F
6.3	82F	82F	82F	82F	131F	82F	82C	82F	131F	82F	131F	131F
6.4	33D	33D	33D	33D	49D	33D	33B	33D	49D		49D	49D
7.1	98G	98G	98G	98G	164G	98G	98D	98G	164G	98G	148G	164G
7.2	82F	82F	82F	82F	131F	82F	82C	82F	131F	82F	118F	131F
7.3	66F	66F	66F	66F	98F	66F	66C	66F	98F	66F	89F	98F
7.4	33F	33F	33F	33F	49F	33F	33C	33F	49F	33F	43F	49F
8.1	98G	98G	98G	98G	164G	98G	98D	98G	164G	98G		164G
8.2	66G	66G	66G	66G	98G	66G	66D	66G	98G	66G		98G
8.3												
9.1												
10.1												

# Visual Index - Countersinks & Counterbores

											
	<b>G600</b>	<b>G132</b>	<b>G137</b>	<b>G138</b>	<b>G338</b>	<b>G236</b>	<b>G702</b>	<b>G706</b>	<b>G705</b>	<b>G703</b>	<b>G704</b>
	6.30 - 25.00	8.00 - 20.00	16.00 - 80.00	25.00 - 80.00	25.00 - 63.00	Set	1/4 - 2"	1/4 - 1"	1/4 - 1"	1/4 - 2.1/2	3/32 - 2"
	<b>496</b>	<b>497</b>	<b>498</b>	<b>499</b>	<b>499</b>	<b>500</b>	<b>501</b>	<b>502</b>	<b>502</b>	<b>504</b>	<b>505</b>
1.1	72F		98F	98F	164F		82C	82C	82C	82C	
1.2	56E		82E	82E	131E		66C	66C	66C	66C	
1.3	49D	66E	66D	66D	98D		52C	52C	52C	52C	
1.4	39D	49D	49D	49D	66D		49B	49B	49B	49B	
1.5	26B	33D	33B	33B	49B		30B	30B	30B	30B	
1.6	20A	20B	20A	20A	33A		16A	16A	16A	16A	
1.7											
1.8											
2.1	26C		26C	26C			36C	36C	36C	36C	
2.2	20B		20B	20B			20B	20B	20B	20B	
2.3	13A	13B	13A	13A			26B	26B	26B	26B	
2.4											
3.1	82F		82F	82F	148F		52E	52E	52E	52E	
3.2	49D		49D	49D	115D		49D	49D	49D	49D	
3.3	39C		39C	39C	98C		43C	43C	43C	43C	
3.4		26D	26C	26C	98C		36C	36C	36C	36C	
4.1			39C	39C	66C		49C	49C	49C	49C	
4.2		26A	33A	33A	49A		30B	30B	30B	30B	
4.3		26A	26A	26A	33A		16B	16B	16B	16B	
5.1			39C	39C	66C		26D	26D	26D	26D	
5.2		20C	20B	20B	33B		16C	16C	16C	16C	
5.3		13B	13A	13A	20A		10C	10C	10C	10C	
6.1	82D		82D	82D	131D		82D	82D	82D	82D	
6.2	66F		66F	66F	98F		92E	92E	92E	92E	
6.3	82F		82F	82F	131F		82D	82D	82D	82D	
6.4	33D	33F	33D	33D	49D		46D	46D	46D	46D	
7.1	98G		98G	98G	164G						
7.2	82F		82F	82F	131F						
7.3	66F		66F	66F	98F						
7.4	33F		33F	33F	49F						
8.1			98G	98G	164G						
8.2			66G	66G	98G						
8.3		16G									
9.1											
10.1											

# List Number Index - Countersinks/Counterbores



Pgs. 483-506

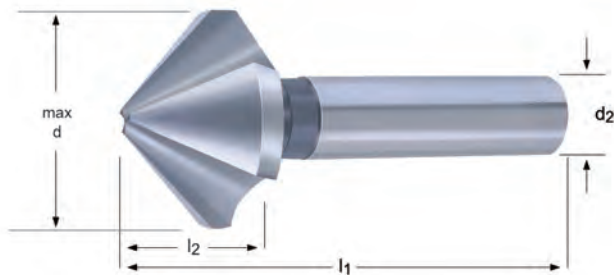
G132.....	497
G135.....	489
G136.....	492
G137.....	498
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G154.....	490
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G702.....	501
G703.....	504
G704.....	505
G705.....	502
G706.....	502

# MULTI-APPLICATION 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



G400

HM



DIN  
335C



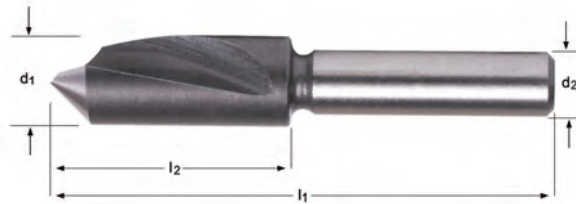
6.30 - 31.00

max d mm	min d mm	$l_2$ mm	$l_1$ mm	$d_2$ $\varnothing h_6$ mm	# of Flutes	Pack Qty	G400
6.3 (1/4)	1.5	5.0	45	5	3	1	5979252
8.3 (5/16)	2.0	6.0	50	6	3	1	5979084
10.4 (3/8)	2.5	7.1	50	6	3	1	5979159
12.4 (1/2)	2.8	8.0	56	8	3	1	5979199
16.5 (5/8)	3.2	10.0	60	10	3	1	5979234
20.5 (3/4)	3.5	12.5	63	10	3	1	5979242
25.0 (1")	3.8	15.0	67	10	3	1	5979245
31.0 (1.1/4)	4.2	18.0	71	12	3	1	5979248

## 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.



4603

HSS



ANSI



1/4 - 1.1/2

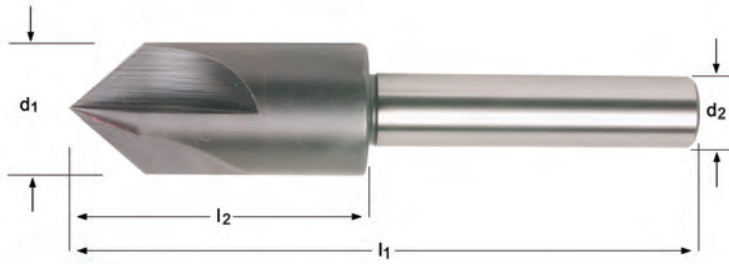
$d_1$ Ø Inch	angle	$d_2$ Ø Inch	$l_2$ Inch	$l_1$ Inch	# of Flutes	Pack Qty	4603
1/4	82°	3/16	11/16	1.7/16	1	1	6005665
1/4	90°	3/16	11/16	1.7/16	1	1	6005669
3/8	60°	1/4	7/8	1.3/4	1	1	6005698
3/8	82°	1/4	25/32	1.21/32	1	1	6005702
3/8	90°	1/4	3/4	1.5/8	1	1	6005705
1/2	60°	1/4	1"	2"	1	1	6005655
1/2	82°	1/4	27/32	1.27/32	1	1	6005659
1/2	90°	1/4	13/32	1.13/16	1	1	6005662
5/8	82°	3/8	1.3/32	2.3/32	1	1	6005708
5/8	90°	3/8	1"	2"	1	1	6005711
3/4	60°	3/8	1.13/32	2.21/32	1	1	6005682
3/4	82°	3/8	1.5/32	2.13/32	1	1	6005685
3/4	90°	3/8	1.1/16	2.5/16	1	1	6005694
1"	60°	1/2	1.9/16	3.1/8	1	1	6005673
1"	82°	1/2	1.1/4	2.13/16	1	1	6005677
1"	90°	1/2	1.1/4	2.13/16	1	1	6005679
1.1/4	60°	1/2	1.3/4	3.3/4	1	1	6005639
1.1/4	82°	1/2	1.1/2	3.1/2	1	1	6005644
1.1/4	90°	1/2	1.9/16	3.9/16	1	1	6005648
1.1/2	60°	1/2	2.5/16	4.1/4	1	1	6005624
1.1/2	82°	1/2	1.15/16	3.7/8	1	1	6005629
1.1/2	90°	1/2	1.13/16	3.3/4	1	1	6005634

# HSS COUNTERSINK



## 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.



4602

HSS



ANSI



1/2 - 1"

$d_1$ 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	6005567
1/2	82°	1/2	1.5/8	3.7/8	4	1	6005571
5/8	60°	1/2	1.3/4	4"	4	1	6005600
5/8	82°	1/2	1.3/4	4"	4	1	6005605
3/4	60°	1/2	1.7/8	4.1/8	4	1	6005586
3/4	82°	1/2	1.7/8	4.1/8	4	1	6005591
7/8	60°	1/2	2"	4.1/4	4	1	6005614
7/8	82°	1/2	2"	4.1/4	4	1	6005619
1"	60°	1/2	2.1/8	4.3/8	4	1	6005576
1"	82°	1/2	2.1/8	4.3/8	4	1	6005581

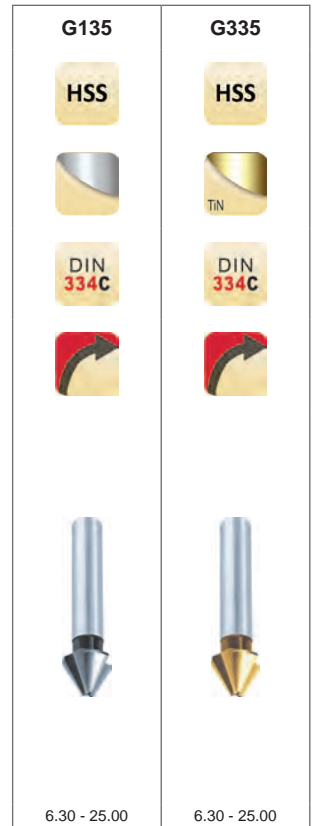
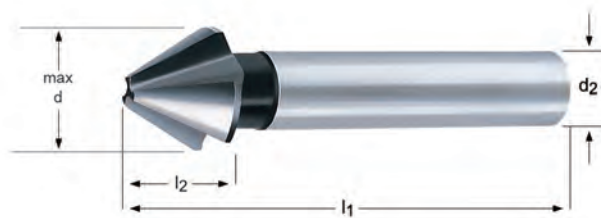


## Straight Shank, 3-Flute

60° countersink with straight shank for multiple materials.

**G135** Bright finish improves chip flow in soft ferrous or non-ferrous materials.

**G335** TiN coated for improved wear resistance.



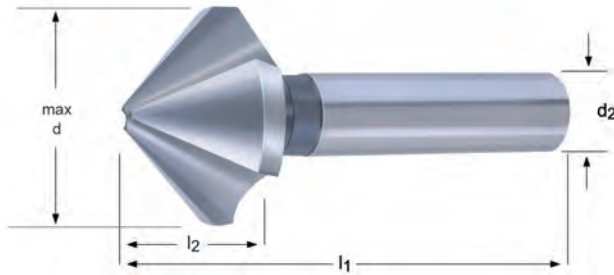
max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> Øh <sub>9</sub> mm	# of Flutes	Pack Qty	G135	G335
6.3 (1/4)	1.6	6.8	45	5	3	1	5973354	5972779
8.0 (5/16)	2.0	8.5	50	6	3	1	5973356	5972782
10.0 (3/8)	2.5	7.6	50	6	3	1	5973342	5972759
12.5 (1/2)	3.2	11.7	56	8	3	1	5973344	5972763
16.0 (5/8)	4.0	14.5	63	10	3	1	5973346	5972767
20.0 (3/4)	5.0	17.5	67	10	3	1	5973350	5972771
25.0 (1")	6.3	20.5	71	10	3	1	5973352	5972775

# HSS COUNTERSINK



## Straight Shank, 3-Flute

**G154** 82° countersink for multiple materials. Bright finish improves chip flow in soft ferrous or non-ferrous materials.



G154

HSS



DIN 335C

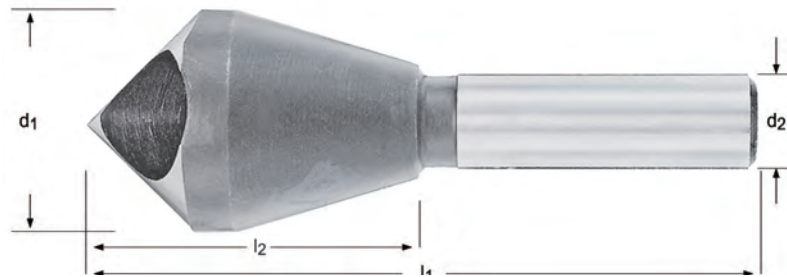


6.30 - 25.00

max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> Øh <sub>9</sub> mm	# of Flutes	Pack Qty	G154
6.3 (1/4)	1.5	5.5	45	5	3	1	5972617
8.3 (5/16)	2.0	6.5	50	6	3	1	5972621
10.4 (3/8)	2.5	7.6	50	6	3	1	5972788
12.4 (1/2)	2.8	8.5	56	8	3	1	5972795
16.5 (5/8)	3.2	10.5	60	10	3	1	5972798
20.5 (3/4)	3.5	13.0	63	10	3	1	5972801
25.0 (1")	3.8	15.5	67	10	3	1	5972804

## Straight Shank, Single Flute

**G149** 90° Countersink, single flute, for multiple materials. Bright finish improves chip flow in soft ferrous or non-ferrous materials.



**G149**

**HSS-E**

5.00 - 50.00

max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> Ø mm	d <sub>1</sub> Ø mm	# of Flutes	Pack Qty	<b>G149</b>
5	2	19.0	45	6	10	1	1	5972702
10	5	23.0	48	8	14	1	1	5973182
15	10	34.0	65	10	21	1	1	5973188
20	15	43.0	84	12	28	1	1	5973198
25	20	48.0	102	15	35	1	1	5973203
30	25	61.0	115	15	44	1	1	5973211
35	30	65.0	127	15	48	1	1	5972612
40	35	66.0	136	15	53	1	1	5972656
50	40	85.0	166	20	60	1	1	5972744

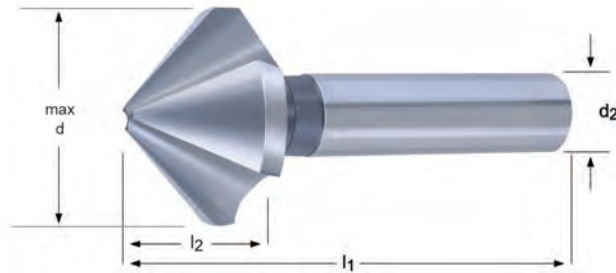
# HSS COUNTERSINK



## 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. TiAlN coating increases surface hardness, improves chip flow, and increases tool life.

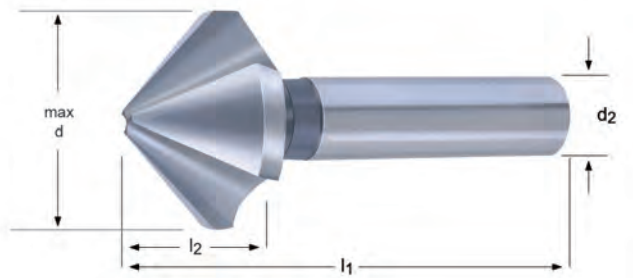


G136	G560
4.30 - 31.00	6.30 - 31.00

max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> Ø <sub>h9</sub> mm	# of Flutes	Pack Qty	G136	G560
4.3	1.3	4.0	40	4	3	1	5973389	—
5.0	1.5	4.5	40	4	3	1	5973393	—
5.3	1.5	4.5	40	4	3	1	5973395	—
5.8	1.5	5.0	45	5	3	1	5973398	—
6.0	1.5	5.0	45	5	3	1	5973399	—
6.3	1.5	5.5	45	5	3	1	5973400	5973351
7.0	1.8	5.5	50	6	3	1	5973401	—
7.3	1.8	6.1	50	6	3	1	5973402	—
8.0	2.0	6.1	50	6	3	1	5973403	5973353
8.3	2.0	6.5	50	6	3	1	5973404	5973355
9.4	2.2	7.2	50	6	3	1	5973405	—
10.0	2.5	7.6	50	6	3	1	5973358	5973336
10.4	2.5	7.6	50	6	3	1	5973360	5973337
11.5	2.8	8.0	56	8	3	1	5973362	—
12.4	2.8	8.5	56	8	3	1	5973364	5973339
13.4	2.9	9.0	56	8	3	1	5973366	—
15.0	3.2	9.5	60	10	3	1	5973368	—
16.5	3.2	10.5	60	10	3	1	5973371	5973341
19.0	3.5	11.7	63	10	3	1	5973373	—
20.5	3.5	13.0	63	10	3	1	5973375	5973345
23.0	3.8	13.7	67	10	3	1	5973377	—
25.0	3.8	15.5	67	10	3	1	5973379	5973347
26.0	3.8	15.5	67	10	3	1	5973381	—
28.0	4.0	16.5	71	12	3	1	5973383	—
30.0	4.2	18.5	71	12	3	1	5973386	—
31.0	4.2	18.5	71	12	3	1	5973387	5973349

## Straight Shank, 3-Flute

**G142** 90° Countersink with extra radial relief for soft or gummy materials. Bright finish improves chip flow in these materials.



G142

HSS



DIN 335C



4.80 - 31.00

max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> Øh <sub>9</sub> mm	# of Flutes	Pack Qty	G142
4.8	1.3	4.5	40	4	3	1	5973137
5.0	1.5	4.5	40	4	3	1	5973143
6.0	1.5	5.0	45	5	3	1	5973152
6.3	1.5	5.5	45	5	3	1	5973157
7.0	1.8	5.5	50	6	3	1	5973162
7.3	1.8	6.1	50	6	3	1	5973166
8.0	2.0	6.1	50	6	3	1	5973173
8.3	2.0	6.5	50	6	3	1	5973178
10.0	2.5	7.6	50	6	3	1	5973088
10.4	2.5	7.6	50	6	3	1	5973091
11.5	2.8	8.0	56	8	3	1	5973094
12.4	2.8	8.5	56	8	3	1	5973100
15.0	3.2	9.5	60	10	3	1	5973105
16.5	3.2	10.5	60	10	3	1	5973108
19.0	3.5	11.7	63	10	3	1	5973112
20.5	3.5	13.0	63	10	3	1	5973117
23.0	3.8	13.7	67	10	3	1	5973121
25.0	3.8	15.5	67	10	3	1	5973126
31.0	4.2	18.5	71	12	3	1	5973131

# COBALT COUNTERSINK



## Straight Shank, 3-Flute

**G570** 90° Countersink with AlTiCN coating designed primarily for Alloy Steels and Stainless Steels. Special PVD coating increases surface hardness and temperature resistance while maintaining a high level of toughness even in dry cutting conditions.

G570

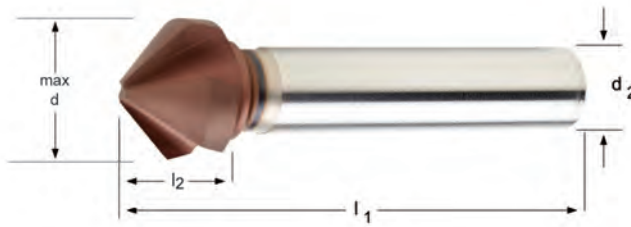
HSS-E



DIN 335C



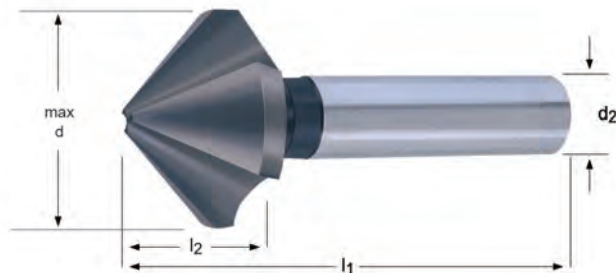
6.30 - 31.00



max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> Øh <sub>9</sub> mm	# of Flutes	Pack Qty	G570
6.3	1.5	6.5	45	5	3	1	6381760
8.3	2.0	8.2	50	6	3	1	6381761
10.4	2.5	9.7	50	6	3	1	6381762
12.4	2.8	10.6	56	8	3	1	6381763
16.5	3.2	13.9	60	10	3	1	6381764
20.5	3.5	17.1	63	10	3	1	6381765
25.0	3.8	21.4	67	10	3	1	6381766
31.0	4.2	24.4	71	12	3	1	6381767

## Straight Shank, 3-Flute

**G171** 100° Countersink with straight shank design for cast iron, soft steels & aluminum. TiAlN coating increases surface hardness and improves tool life at higher speeds.



G171

HSS



DIN 335C



6.30 - 25.00

max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> Øh <sub>9</sub> mm	# of Flutes	Pack Qty	G171
6.3	1.5	4.5	44.0	5.0	3	1	5972697
8.3	2.0	5.5	49.0	6.0	3	1	5972706
10.4	2.5	6.6	49.0	6.0	3	1	5972677
12.4	2.8	7.0	53.0	6.0	3	1	5972680
16.5	3.2	9.0	56.0	6.0	3	1	5972684
20.5	3.5	11.0	61.0	10.0	3	1	5972689
25.0	3.8	13.5	65.0	10.0	3	1	5972693

## Straight Shank, 3-Flute

**G600** 90° Countersink with straight shank for long reach applications. Multi-material type excellent for soft to medium steels. Bright finish improves chip flow in softer materials.



G600

HSS



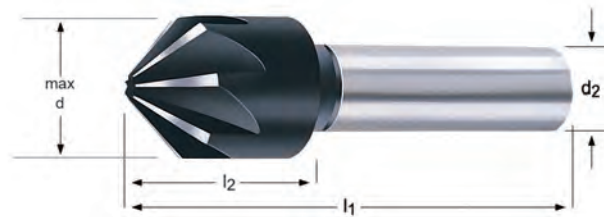
6.30 - 25.00

max d mm	min d mm	$l_2$ mm	$l_1$ mm	$d_2$ $\varnothing h_9$ mm	# of Flutes	Pack Qty	G600
6.3	1.3	6.4	154	5	3	1	6381768
8.3	1.8	8.3	155	6	3	1	6381769
10.4	2.2	9.7	157	6	3	1	6381770
12.4	2.5	10.6	158	8	3	1	6381771
15.0	2.8	12.6	159	10	3	1	6381772
16.5	2.8	13.9	161	10	3	1	6381773
20.5	3.0	17.1	164	10	3	1	6381774
25.0	3.2	21.4	168	10	3	1	6381775



## Straight Shank, Multi-Flute

**G132** 90° Multi-flute countersink for better stability in harder materials.  
More flutes to share the load when cutting at slower speeds.



G132

HSS



DIN 335A



8.00 - 20.00

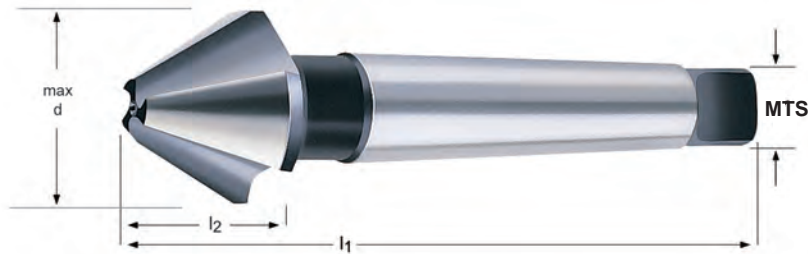
max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	d <sub>2</sub> Øh <sub>9</sub> mm	# of Flutes	Pack Qty	G132
8.0	-	0.0	48	8	5	1	5973340
12.5	2.0	15.5	48	8	5	1	5973334
16.0	3.2	19.5	56	10	7	1	5973335
20.0	5.0	23.0	60	10	7	1	5973338

# HSS COUNTERSINK



## Taper Shank, 3-Flute

**G137** 60° Countersink with Morse Taper Shank for multiple materials. Bright finish improves chip flow in soft ferrous and non-ferrous materials.



G137

HSS



DIN 334D



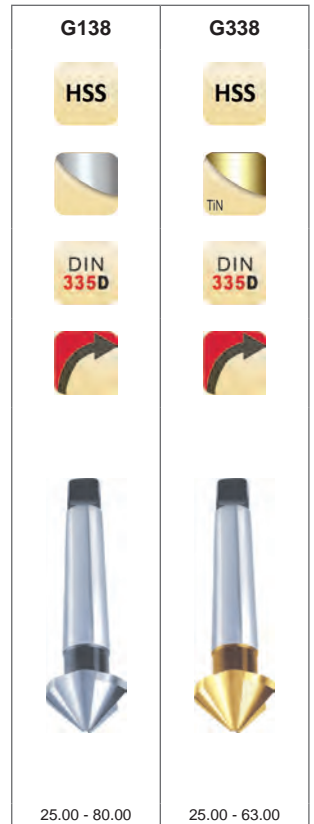
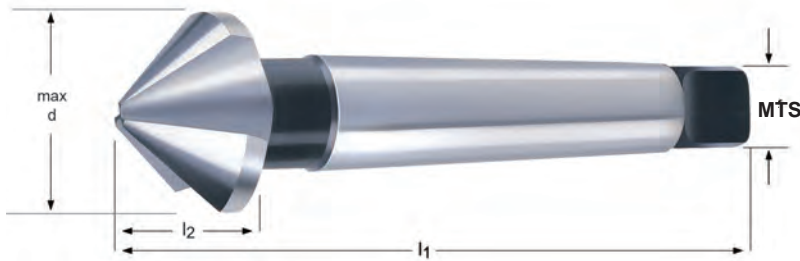
16.00 - 80.00

max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	MTS	# of Flutes	Pack Qty	G137
16.0 (5/8)	4.0	14.5	90	1	3	1	5973407
20.0 (3/4)	5.0	17.5	106	2	3	1	5973061
25.0 (1")	6.3	20.0	112	2	3	1	5973073
31.5 (1.1/4)	10.0	23.0	118	2	3	1	5973099
40.0 (1.1/2)	12.5	28.5	150	3	3	1	5973147
50.0 (2")	16.0	36.0	160	3	3	1	5973208
63.0 (2.1/2)	20.0	43.0	190	4	3	1	5973217
80.0 (3")	25.0	54.0	200	4	3	1	5973222

## Taper Shank, 3-Flute

**G138** 90° Countersink with Morse Taper Shank for multiple materials. Excellent for steel, titanium & nickle alloys. Bright finish improves chip flow in soft ferrous and non-ferrous materials.

**G338** 90° Countersink with Morse Taper Shank for multiple materials. TiN coating increases surface hardness and improves chip flow in steel, cast iron and aluminum alloys.



max d mm	min d mm	l <sub>2</sub> mm	l <sub>1</sub> mm	MTS	# of Flutes	Pack Qty	G138	G338
25.0	3.8	15.5	106	2	3	1	5973066	5973321
30.0	4.2	18.5	112	2	3	1	5973069	—
31.0	4.2	20.0	112	2	3	1	5973070	5973322
34.0	4.5	19.5	118	2	3	1	5973071	—
37.0	4.8	21.7	118	2	3	1	5973072	5973324
40.0	10.0	20.5	140	3	3	1	5973074	5973326
50.0	14.0	24.1	150	3	3	1	5973075	5973327
63.0	16.0	28.5	180	4	3	1	5973076	5973329
80.0	22.0	36.0	190	4	3	1	5973078	—

# HSS COUNTERSINK



## Straight Shank, 3-Flute

**G236** 90° Countersink sets in 4 or 6 pcs. Sets 1&2 in bright finish improves chip flow in soft ferrous & non-ferrous materials. Set 3 in TiAlN coating increases surface hardness and improves tool life.

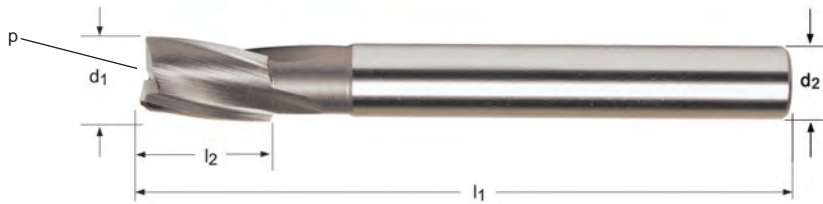


Set	Styles in set	Pieces per Set	Diameters in set	Pack Qty	G236
1	G136	6	6.30 mm, 8.30 mm, 10.40 mm, 12.40 mm, 16.50 mm, 20.50 mm	1	5972710
2	G136	4	6.30 mm, 10.40 mm, 16.50 mm, 20.50 mm	1	5972714
3	G560	6	6.30 mm, 8.30 mm, 10.40 mm, 12.40 mm, 16.50 mm, 20.50 mm	1	6521338

## Counterbore Body - Interchangeable Pilot Type

**G702** Short Length

Used to enlarge the end of a preformed hole when a flat bottom is required. The counterbore is an end cutting tool which utilizes an interchangeable pilot to align the enlarged hole being machined with the preformed hole. The 3 and 5 flute counterbore reduces chatter and improves finish.



4702

HSS



ANSI



1/4 - 2"

d <sub>1</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	# of Flutes	Pilot (p) Mounting Ø Inch	Pilot Ø min	Pilot Ø max	Pack Qty	G702
1/4	3/4	3.13/16	15/64	3	3/32	1/8	3/16	1	8203127
9/32	3/4	3.13/16	17/64	3	3/32	1/8	7/32	1	8203128
5/16	3/4	3.13/16	19/64	3	3/32	1/8	1/4	1	8203129
11/32	3/4	3.13/16	5/16	3	3/32	1/8	9/32	1	8203180
3/8	1"	4.1/16	5/16	3	5/32	3/16	5/16	1	8203181
13/32	1"	4.1/16	3/8	3	5/32	3/16	11/32	1	8203182
7/16	1"	4.1/16	3/8	3	5/32	3/16	3/8	1	8203183
15/32	1.1/4	4.5/16	7/16	3	3/16	3/16	13/32	1	8203184
1/2	1.1/4	4.5/16	7/16	3	3/16	3/16	7/16	1	8203185
9/16	1.1/4	4.5/16	1/2	3	3/16	3/16	1/2	1	8203186
19/32	1.1/4	5.1/8	1/2	3	3/16	3/16	17/32	1	8203187
5/8	1.1/4	5.1/8	1/2	3	3/16	3/16	9/16	1	8203188
11/16	1.1/4	5.1/8	1/2	3	3/16	3/16	5/8	1	8203189
3/4	1.1/2	5.3/8	1/2	3	1/4	5/16	11/16	1	8203190
25/32	1.1/2	5.3/8	5/8	3	1/4	5/16	23/32	1	8203191
13/16	1.1/2	5.3/8	5/8	3	1/4	5/16	3/4	1	8203192
27/32	1.1/2	5.3/8	3/4	3	1/4	5/16	25/32	1	8203193
7/8	1.1/2	5.3/8	3/4	3	1/4	5/16	13/16	1	8203194
1"	1.3/4	6.3/8	3/4	3	5/16	3/8	15/16	1	8203195
2"	2.1/2	8.3/8	1.1/2	5	1/2	9/16	1.15/16	1	8203196

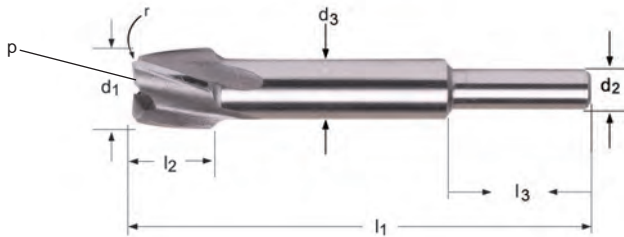
# HSS COUNTERBORE



## Counterbore Body, Aircraft Series - Interchangeable Pilot Type

- G705** Long Series, 4-flute
- G706** Short Series (Aircraft) 4-flute with corner radius

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 Inch	$l_2$ Inch	$l_1$ Inch	$d_2$ Ø Inch	$l_3$ Inch	$d_3$ Ø Inch	# of Flutes	Pilot (p) Moun- ting Ø Inch	Pilot Ø min	Pilot Ø max	Pack Qty	G705	G706
1/4	1/2	2.3/8	1/4	1.1/8	15/64	4	3/32	1/8	3/16	1	—	8203307 <sup>1)</sup>
1/4	3/4	3.13/16	15/64	3.1/16	15/64	3	3/32	1/8	3/16	1	8203291	—
5/16	1/2	2.3/8	1/4	7/8	17/64	4	3/32	1/8	1/4	1	—	8203308 <sup>1)</sup>
5/16	3/4	3.13/16	19/64	3.1/16	19/64	3	3/32	1/8	1/4	1	8203292	—
11/32	1/2	2.3/8	1/4	7/8	19/64	4	3/32	1/8	9/32	1	—	8203309 <sup>1)</sup>
3/8	1/2	2.3/8	1/4	7/8	5/16	4	3/32	3/16	5/16	1	—	8203310 <sup>2)</sup>
3/8	3/4	3.13/16	5/16	3.1/16	5/16	3	3/32	3/16	5/16	1	8203293	—
13/32	1/2	2.13/16	1/4	7/8	5/16	4	1/8	3/16	11/32	1	—	8203311 <sup>2)</sup>
7/16	1/2	2.13/16	1/4	7/8	5/16	4	1/8	3/16	3/8	1	—	8203312 <sup>2)</sup>
7/16	3/4	3.13/16	3/8	3.1/16	3/8	3	1/8	3/16	3/8	1	8203294	—
15/32	1/2	2.13/16	1/4	7/8	5/16	4	1/8	1/4	13/32	1	—	8203313 <sup>2)</sup>
1/2	1/2	2.13/16	1/4	7/8	3/8	4	1/8	1/4	7/16	1	—	8203314 <sup>2)</sup>
1/2	3/4	3.13/16	7/16	3.1/16	7/16	3	1/8	1/4	7/16	1	8203295	—
17/32	1/2	2.13/16	1/4	7/8	3/8	4	1/8	1/4	15/32	1	—	8203315 <sup>2)</sup>
17/32	3/4	5.3/8	1/2	4.5/8	1/2	3	1/8	1/4	15/32	1	8203296	—
9/16	1/2	2.13/16	1/4	7/8	3/8	4	1/8	1/4	1/2	1	—	8203316 <sup>2)</sup>
9/16	3/4	5.3/8	1/2	4.5/8	1/2	3	1/8	1/4	1/2	1	8203297	—
19/32	3/4	5.3/8	1/2	4.3/16	9/16	3	1/8	1/4	17/32	1	8203298	—
5/8	3/4	5.3/8	1/2	4.3/16	9/16	3	1/8	1/4	9/16	1	8203299	—
11/16	1/2	2.13/16	1/4	7/8	1/2	4	1/8	1/4	5/8	1	—	8203317 <sup>3)</sup>
21/32	1.1/4	5.3/8	1/2	3.5/8	9/16	3	3/16	1/4	19/32	1	8203300	—
11/16	1.1/4	5.3/8	1/2	3.5/8	5/8	3	3/16	1/4	5/8	1	8203301	—
3/4	1.1/4	5.3/8	1/2	3.5/8	11/16	3	3/16	5/16	11/16	1	8203302	—

<sup>1)</sup> 1/32 Corner Radius

<sup>2)</sup> 3/64 Corner Radius

<sup>3)</sup> 0.0550" Corner Radius

d <sub>1</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	d <sub>2</sub> Ø Inch	l <sub>3</sub> Inch	d <sub>3</sub> Ø Inch	# of Flutes	Pilot Moun- ting Ø Inch	Pilot Ø min	Pilot Ø max	Pack Qty	G705	G706
3/4	1/2	2.13/16	1/4	7/8	1/2	4	3/16	5/16	11/16	1	—	8203318 <sup>3)</sup>
25/32	1.1/4	5.3/8	1/2	3.5/8	11/16	3	3/16	5/16	23/32	1	8203303	—
13/16	1.1/4	5.3/8	1/2	3.5/8	3/4	3	3/16	5/16	3/4	1	8203304	—
13/16	1/2	2.13/16	1/4	7/8	1/2	4	3/16	5/16	3/4	1	—	8203319 <sup>3)</sup>
7/8	1.1/4	5.3/8	1/2	3.5/8	3/4	3	3/16	5/16	13/16	1	8203305	—
7/8	1/2	2.13/16	1/4	7/8	1/2	4	3/16	5/16	13/16	1	—	8203320 <sup>3)</sup>
15/16	1.1/4	5.3/8	1/2	3.5/8	3/4	3	3/16	5/16	7/8	1	8203306	—
1"	1/2	2.13/16	1/4	7/8	1/2	4	3/16	3/8	15/16	1	—	8203321 <sup>3)</sup>

<sup>1)</sup> 1/32 Corner Radius

<sup>2)</sup> 3/64 Corner Radius

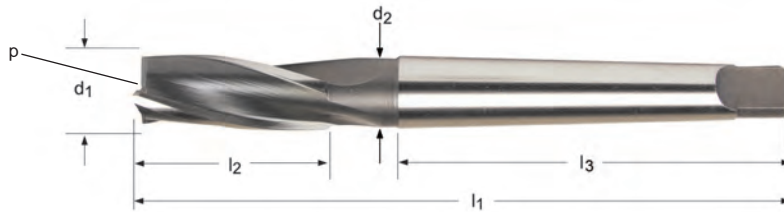
<sup>3)</sup> 0.0550" Corner Radius

# HSS COUNTERBORE



## Counterbore Body, Taper Shank, Short Series - Interchangeable Pilot Type

**G703** 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



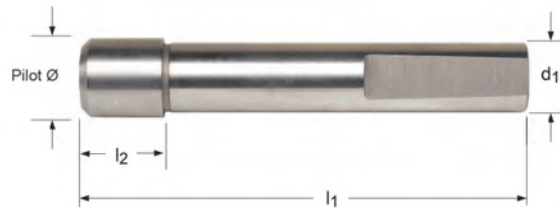
1/4 - 2.1/2

$d_1$ Ø Inch	$l_2$ Inch	$l_1$ Inch	MTS	$d_2$ Neck Dia. Inch	$l_3$ Shank Length Inch	# of Flutes	pilot (p) mounting Ø Inch	pilot Ø min	pilot Ø max	Pack Qty	G703
1/2	1.1/4	4.5/16	1	29/64	2.9/16	3	3/16	1/4	7/16	1	8203197
11/16	1.1/4	5.1/8	2	5/8	3.1/8	3	3/16	1/4	5/8	1	8203198
3/4	1.1/2	5.3/8	2	21/32	3.1/8	3	1/4	5/16	11/16	1	8203199
13/16	1.1/2	5.3/8	2	21/32	3.1/8	3	1/4	5/16	3/4	1	8203200
7/8	1.1/2	5.3/8	2	21/32	3.1/8	3	1/4	5/16	13/16	1	8203201
15/16	1.1/2	6.1/8	2	7/8	3.7/8	3	1/4	5/16	7/8	1	8203202
1"	1.3/4	6.3/8	3	7/8	3.7/8	3	5/16	3/8	15/16	1	8203203
1.1/16	1.3/4	6.3/8	3	7/8	3.7/8	3	5/16	3/8	1"	1	8203204
1.1/8	1.3/4	6.3/8	3	7/8	3.7/8	3	5/16	3/8	1.1/16	1	8203205
1.3/16	1.3/4	6.3/8	3	7/8	3.7/8	3	5/16	3/8	1.1/8	1	8203206
1.1/4	2"	6.5/8	3	7/8	3.7/8	5	3/8	7/16	1.3/16	1	8203207
1.3/8	2"	6.5/8	3	7/8	3.7/8	5	3/8	7/16	1.5/16	1	8203208
1.1/2	2"	7.7/8	4	1.3/16	4.7/8	5	3/8	7/16	1.7/16	1	8203209
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	8203210
2"	2.1/2	8.3/8	4	1.1/2	4.7/8	5	1/2	9/16	1.5/16	1	8203211
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	8203212



## Counterbore Pilot, Detachable

**G704** 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 <sub>1</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	G704
1/8	3/32	1/8	1.1/4	1	8203213
5/32	3/32	3/16	1.5/16	1	8203214
3/16	3/32	3/16	1.5/16	1	8203215
7/32	3/32	1/4	1.3/8	1	8203216
1/4	3/32	1/4	1.3/8	1	8203217
1/8	1/8	1/8	1.7/16	1	8203218
5/32	1/8	3/16	1.1/2	1	8203219
3/16	1/8	3/16	1.1/2	1	8203220
7/32	1/8	1/4	1.9/16	1	8203221
1/4	1/8	1/4	1.9/16	1	8203222
9/32	1/8	5/16	1.5/8	1	8203223
5/16	1/8	5/16	1.5/8	1	8203224
3/8	1/8	3/8	1.11/16	1	8203225
7/16	1/8	7/16	1.3/4	1	8203226
1/2	1/8	1/2	1.13/16	1	8203227
3/16	5/32	3/16	1.9/16	1	8203228
7/32	5/32	1/4	1.5/8	1	8203229
1/4	5/32	1/4	1.5/8	1	8203230
9/32	5/32	5/16	1.11/16	1	8203231
5/16	5/32	5/16	1.11/16	1	8203232
3/8	5/32	3/8	1.3/4	1	8203233
3/16	3/16	1/4	1.7/8	1	8203234
7/32	3/16	1/4	1.7/8	1	8203235
1/4	3/16	1/4	1.7/8	1	8203236
9/32	3/16	5/16	1.15/16	1	8203237
5/16	3/16	5/16	1.15/16	1	8203238
11/32	3/16	3/8	2"	1	8203239
3/8	3/16	3/8	2"	1	8203240
13/32	3/16	7/16	2.1/16	1	8203241
7/16	3/16	7/16	2.1/16	1	8203242
15/32	3/16	1/2	2.1/8	1	8203243
1/2	3/16	1/2	2.1/8	1	8203244
9/16	3/16	9/16	2.3/16	1	8203245
5/8	3/16	9/16	2.3/16	1	8203246
13/16	3/16	13/16	2.7/16	1	8203247

# HSS COUNTERBORE



pilot Ø Inch	d <sub>1</sub> Ø Inch	l <sub>2</sub> Inch	l <sub>1</sub> Inch	Pack Qty	G704
7/8	3/16	7/8	2.1/2	1	8203248
1/4	1/4	1/4	1.11/16	1	8203249
9/32	1/4	5/16	1.3/4	1	8203250
5/16	1/4	5/16	1.3/4	1	8203251
3/8	1/4	3/8	1.13/16	1	8203252
7/16	1/4	7/16	1.7/8	1	8203253
1/2	1/4	1/2	1.15/16	1	8203254
17/32	1/4	9/16	2"	1	8203255
9/16	1/4	9/16	2"	1	8203256
5/8	1/4	5/8	2.1/16	1	8203257
11/16	1/4	11/16	2.1/8	1	8203258
3/4	1/4	3/4	2.3/16	1	8203259
13/16	1/4	7/8	2.5/16	1	8203260
1"	1/4	1"	2.7/16	1	8203261
3/8	5/16	3/8	2"	1	8203262
7/16	5/16	7/16	2.1/16	1	8203263
1/2	5/16	1/2	2.1/8	1	8203264
9/16	5/16	9/16	2.3/16	1	8203265
5/8	5/16	5/8	2.1/4	1	8203266
11/16	5/16	11/16	2.5/16	1	8203267
3/4	5/16	3/4	2.3/8	1	8203268
13/16	5/16	7/8	2.1/2	1	8203269
15/16	5/16	1"	2.5/8	1	8203270
1"	5/16	1"	2.5/8	1	8203271
7/16	3/8	7/16	2.5/16	1	8203272
1/2	3/8	1/2	2.3/8	1	8203273
9/16	3/8	9/16	2.7/16	1	8203274
5/8	3/8	5/8	2.1/2	1	8203275
11/16	3/8	11/16	2.9/16	1	8203276
3/4	3/8	3/4	2.5/8	1	8203277
13/16	3/8	7/8	2.3/4	1	8203278
7/8	3/8	7/8	2.3/4	1	8203279
15/16	3/8	1"	2.5/8	1	8203280
9/16	7/16	5/8	2.7/8	1	8203281
11/16	7/16	3/4	3"	1	8203282
3/4	7/16	3/4	3"	1	8203283
13/16	7/16	7/8	3.1/8	1	8203284
7/8	7/16	7/8	3.1/8	1	8203285
15/16	7/16	1"	3.1/4	1	8203286
1"	7/16	1"	3.1/4	1	8203287
9/16	1/2	5/8	3.1/8	1	8203288
1"	1/2	1"	3.1/2	1	8203289
1.1/2	1/2	1.1/2	4"	1	8203290

# Miscellaneous



## Pgs. 508-510

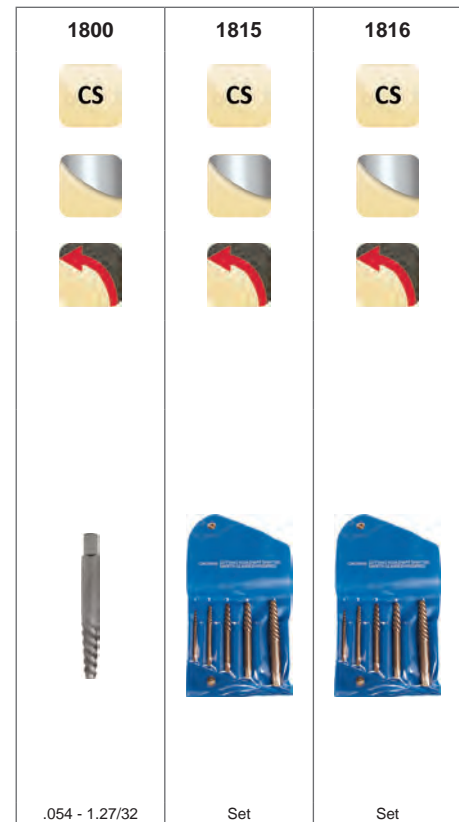
1800.....	508
1815.....	508
1816.....	508
411.....	509
430.....	509
K520.....	510
K521.....	510
K522.....	510

# MISCELLANEOUS



## SCREW EXTRACTOR

- 1800** Screw Extractor
- 1815** Screw Extractor Set, 5 piece
- 1816** Screw Extractor Set, 6 piece

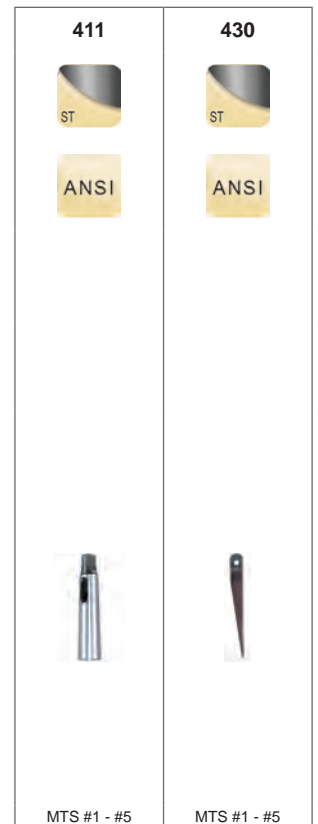


Nr.	d <sub>1</sub> Ø Inch	Sizes in Set	d <sub>2</sub> Ø Inch	Pieces per Set	l <sub>1</sub> Inch	Capacity For		Pack Qty	1800	1815set	1816set
						Screws & Bolts	Pipe Sizes				
801	0.0540		5/32		2"	3/16 - 1/4		12	6005042	—	—
802	0.0860		3/16		2.3/8	1/4 - 5/16		12	6005058	—	—
803	1/8		1/4		2.3/4	5/16 - 7/16		12	6005062	—	—
804	11/64		5/16		3"	7/16 - 9/16		6	6005066	—	—
805	1/4		7/16		3.3/8	9/16 - 3/4	1/8 - 1/4	6	6005068	—	—
806	3/8		5/8		3.3/4	3/4 - 1"	3/8	1	6005072	—	—
807	31/64		3/4		4.1/8	1 - 1.3/8	1/2	1	6005084	—	—
808	47/64		1"		4.3/8	1.3/8 - 1.3/4	3/4	1	6005089	—	—
809	31/32		1.1/4		4.5/8	1.3/4 - 2.1/8	1	1	6005093	—	—
1815		801 - 805		5		3/16 - 3/4	1/8 - 1/4	1	—	6005098	—
1816		801 - 806		6		3/16 - 1	1/8 - 3/8	1	—	—	6005103

## SLEEVES & KEYS

**411** Taper shank (internal and external) adapters. Heat treated and externally ground. Steam tempered surface finish prevents corrosion.

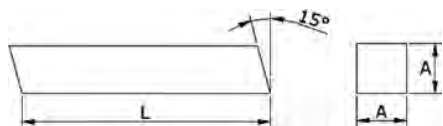
**430** Drill Drift. Dropped forged steel keys used for removing taper shank tools from adapting sleeves and machine spindles.



430	411	411		Pack	411	430
MTS #	Inside Taper	Outside Taper	Length	Qty		
1			4.1/2	1	—	6005736
2			5.1/2	1	—	6005552
3			7	1	—	6005555
4			8	1	—	6005558
5			9.7/8	1	—	6005562
	1	2	3.1/2	1	6004701	—
	1	3	3.15/16	1	6005545	—
	1	4	4.13/16	1	6005595	—
	2	3	4.3/8	1	6005651	—
	2	4	4.13/16	1	6005690	—
	3	4	5.5/16	1	6005724	—
	3	5	6.1/16	1	6005728	—
	4	5	6.1/2	1	6005731	—
	5	6	8.1/2	1	6005733	—

## TOOL BIT BLANKS

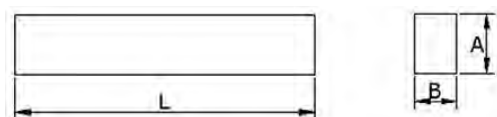
**K520** Cobalt ground blank with 15° beveled ends



**K521** Cobalt round blank



**K522** Cobalt rectangular blank



Sizes	Overall Length	K520
4	100	5982467
5	160	5982472
6	100	5982327
6	160	5982332
6	200	5982336
8	100	5982358
8	160	5982361
8	200	5982365
10	100	5982322
10	160	5982330
10	200	5982333
12	100	5982344
12	160	5982348
12	200	5982355
14	160	5982363
14	200	5982367
16	100	5982371
16	160	5982374
16	200	5982378
20	160	5982387
20	200	5982392
25	200	5982403
3/16	2.1/2	5982304
1/4	2.1/2	5982311
1/4	4"	5982314
5/16	2.1/2	5982309
5/16	3"	5982313
5/16	4"	5982316
3/8	3"	5982427
3/8	4"	5982458
3/8	6"	5982464
7/16	3.1/2	5982354
1/2	4"	5982303
1/2	6"	5982305
5/8	4.1/2	5982319
5/8	6"	5982323

Sizes	Overall Length	K521
3	100	5982442
4	100	5982451
5	160	5982461
6	100	5982357
6	160	5982400
8	100	5982474
8	160	5982478
8	200	5982480
10	100	5982386
10	200	5982397
12	100	5982401
12	200	5982408
14	200	5982416
16	200	5982430
20	200	5982439

A Height	B Width	Overall Length	K522
10	3	200	5982321
12	3	200	5982342
10	4	200	5982331
16	4	200	5982398
20	4	200	5982438
18	5	200	5982417
20	5	200	5982444
10	6	200	5982335
12	6	200	5982366
16	6	200	5982404
20	6	200	5982447
25	6	200	5982460
12	8	200	5982373
16	8	200	5982413
20	8	200	5982450
12	10	200	5982338
16	10	200	5982385
20	10	200	5982426
25	12	200	5982455
25	16	200	5982457

# Technical Section - Icon Descriptions

Material



Carbide



High Speed Steel



High Speed Cobalt



High Speed Powder Metallurgy Steel



High Speed Cobalt Powder Metallurgy Steel



High Speed Steel and Carbide



Chromium Steel

Coating



Bright



Steam Tempered



Nitride



Nitride/ Steam Tempered



Bronze



Titanium Aluminium Nitride



Titanium Carbo-Nitride



Titanium Nitride



Bright/ Steam Tempered



Bright/ Titanium Nitride



Steam Tempered/ Bronze



Titanium Aluminium Nitride - Top



Titanium Nitride - Top



Ti-phon  
(TiAlCrSiN)



Purple / Bronze  
(Dual oxide surface treatment)



Alcrona Top  
(AlCrN - Top)



Aluminium Titanium Carbo-Nitride



Aluminium Titanium Nitride



Zirconium Coating

# Technical Section - Icon Descriptions

## Common Icons

Direction



Right hand rotation



Left hand rotation

Depth



## Drilling icons

Point Angle



Countersink °



60° Countersink



82° Countersink



90° Countersink

Form



Normal Helix



Quick Helix



Continuously Thinned Web

Coolant



Internal Coolant



# Technical Section - Icon Descriptions

## Drilling icons

### Shank



Straight Shank



Morse taper shank



DIN 6535 HA  
(cylindrical)



DIN 6535 HE



Reduced shank



Threaded Hex Shank



DIN 6535 HB / HE



DIN 6535 HB  
(Weldon Shank)

### Manufacturing Standards

NAS  
907

DIN  
338

DIN  
340

DIN  
341

DIN  
345

DIN  
1869/1

DIN  
1869/2

DIN  
1869/3

DIN  
1870/1

DIN  
1870/2

DIN  
1897

DIN  
1899

DIN  
6537  
K

DIN  
6537  
L

DIN  
6539

DIN  
ANSI

ANSI

BS  
328

DORMER

# Technical Section - Icon Descriptions

## Reaming - Countersink Icons

### Taper Gradient



Imperial  
Standard  
Taper



Metric  
Standard  
Taper

### Tolerance



Industry standard  
hole tolerance



Specific  
Reamer  
Tolerance



ISO Tolerance  
for shafts

### Application



Countersink



Counterbore

### Countersink<sup>o</sup>



60°



82°



90°



100°

### Shank



Straight



Morse taper

### Manufacturing Standards



**DORMER**



**DIN 206**



**DIN 212**



**DIN 311**



**BS 328**



**DIN 334C**



**DIN 334D**



**DIN 335A**



**DIN 335C**



**DIN 373**



**DIN 8050**



**DIN 8051**



**DIN 8093**



**DIN 8094**



**ANSI**

# Technical Section - Icon Descriptions

## Threading icons

### Thread form



Metric coarse



Metric fine



Unified Coarse



Unified Fine



Unified Special



British standard pipe fastening - G series



National taper pipe



National taper pipe dryseal



National straight pipe dryseal



National straight pipe mechanical



ISO Metric Coarse to DIN8140-2



British standard pipe taper - Rc Series

### Flute Geometry



Straight Flute



Spiral Point



Fluteless - thread forming



15° Helix



17° Helix



27° Helix



30° Helix



40° Helix



45° Helix



50° Helix



52° Helix



Straight Flute (hand tap)

### Hole Type



Through hole



Blind hole



Through or blind hole

# Technical Section - Icon Descriptions

## Threading icons

### Chamfer



Plug chamfer



Semi-bottoming



Full-bottoming



Semi-bottoming



Plug



Taper

### Tolerance



Common Class of fit



Multiple Classes of fit



Closer class of fit for accuracy



Common metric class of fit



Class of fit outside Std. for high strength or abrasive materials



Normal

### Standards



# Technical Section - Icon Descriptions

## Milling icons

Type



For steels with low to high resistance



For soft and malleable materials

Application



Slotting P9 tolerance



Slotting



Finishing (side cutting)



Roughing



Ball nose



Corner radius inside



Corner rounding outside

Direction



Slotting, ramping, plunging



Slotting, ramping



Finishing (side cutting)

Cut Length



Extra short



Short



Medium



Long

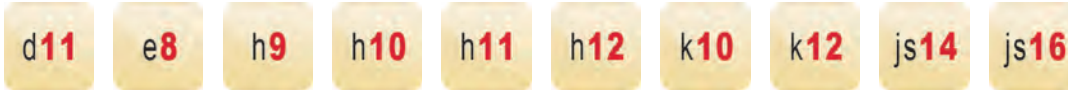


Extra long

# Technical Section - Icon Descriptions

## Milling icons

Diameter tolerance



Industry standard shaft tolerances

Helix Angle



Unequal Helix

# of teeth or flutes



Shank



Straight Shank



Weldon Shank



DIN  
1835B

# Technical Section - General

## 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

**HSS-E**

This high speed steel contains cobalt for increased hot hardness. The composition of HSCo 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 PM**

Has a finer and more consistent grain structure than HSCo resulting in a tougher product. Tool life and wear resistance is normally higher than HSCo and this grade has superior edge strength and rigidity. Mainly used for milling cutters and taps.

### Sintered Cobalt High Speed Steel

**HSS-E PM**

HSCo-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 %	Tool Material
<b>HSS</b>	M2	810-850	0.9	6.4	5.0	4.2	1.8	-	HSS
<b>HSS-E</b>	M35	830-870	0.93	6.4	5.0	4.2	1.8	4.8	HSCO
	M42	870-960	1.08	1.5	9.4	3.9	1.2	8.0	
<b>HSS PM</b>	-	830-870	0.9	6.25	5.0	4.2	1.9	-	HSS Powder Metal
<b>HSS-E PM</b>	ASP 2017	860-900	0.8	3.0	3.0	4.0	1.0	8.0	HSCO Powder Metal
	ASP 2030	870-910	1.28	6.4	5.0	4.2	3.1	8.5	
	ASP 2052	870-910	1.6	10.5	2.0	4.8	5.0	8.0	
	-	775-825	1.03	-	-	1.5	-	-	Chromium Steel

# Technical Section - General

## 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 <sup>3</sup> )	8.0-9.0	7.2-15	14.45
Compressive strength (N/mm <sup>2</sup> )	3000-4000	3000-8000	6250
Flexural strength, (bending) (N/mm <sup>2</sup> )	2500-4000	1000-4700	4300
Heat resistance (°C)	550	1000	900
E-module (KN/mm <sup>2</sup> )	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.

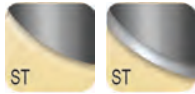
Characteristic	Higher WC content give	Higher Co content give
Hardness	Higher hardness	Lower hardness
Compressive strength (CS)	Higher CS	Lower CS
Bending strength (BS)	Lower BS	Higher BS

Grain size also influences the material properties. Small grain sizes means higher hardness and coarse grains give more toughness.



# Technical Section - General

## 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



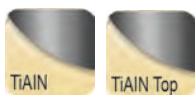
### Titanium Nitride Coating (TiN)

Titanium Nitride is a gold colored 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 Aluminum 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.

# Technical Section - General



## Chromium Nitride Coating (CrN)

CrN is an excellent coating for aluminum 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 Top (AlCrN Top)

Alcrona Top is an aluminum 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)	Thick-ness (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
Alcrona Top	Blue grey	AlCrN Top	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	<b>1/16</b>	<b>.0625</b>	3.4 mm	.1339	3	.2130	8.2 mm	.3228	<b>9/16</b>	<b>.5625</b>
0.35 mm	.0138	1.6 mm	.0630	29	.1360	5.5 mm	.2165	P	.3230	14.50 mm	.5709
79	.0145	52	.0635	3.5 mm	.1378	<b>7/32</b>	<b>.2188</b>	8.25 mm	.3248	<b>37/64</b>	<b>.5781</b>
<b>1/64</b>	<b>.0156</b>	1.65 mm	.0650	28	.1405	5.6 mm	.2205	8.3 mm	.3268	15.00 mm	.5906
.4 mm	.0157	1.7 mm	.0669	<b>9/64</b>	<b>.1406</b>	2	.2210	<b>21/64</b>	<b>.3281</b>	<b>19/32</b>	<b>.5938</b>
78	.0160	51	.0670	3.6 mm	.1417	5.7 mm	.2244	8.4 mm	.3307	<b>39/64</b>	<b>.6094</b>
.45 mm	.0177	1.75 mm	.0689	27	.1440	5.75 mm	.2264	Q	.3320	15.50 mm	.6102
77	.0180	50	.0700	3.7 mm	.1457	1	.2280	8.5 mm	.3346	<b>5/8</b>	<b>.6250</b>
.5 mm	.0197	1.8 mm	.0709	26	.1470	5.8 mm	.2283	8.6 mm	.3386	16.00 mm	.6299
76	.0200	1.85 mm	.0728	3.75 mm	.1476	5.9 mm	.2323	R	.3390	<b>41/64</b>	<b>.6406</b>
75	.0210	49	.0730	25	.1495	A	.2340	8.7 mm	.3425	16.50 mm	.6496
.55 mm	.0217	1.9 mm	.0748	3.8 mm	.1496	<b>15/64</b>	<b>.2344</b>	<b>11/32</b>	<b>.3438</b>	<b>21/32</b>	<b>.6562</b>
74	.0225	48	.0760	24	.1520	6 mm	.2362	8.75 mm	.3445	17.00 mm	.6693
.6 mm	.0236	1.95 mm	.0768	3.9 mm	.1535	B	.2380	8.8 mm	.3465	<b>43/64</b>	<b>.6719</b>
73	.0240	<b>5/64</b>	<b>.0781</b>	23	.1540	6.1 mm	.2402	S	.3480	<b>11/16</b>	<b>.6875</b>
72	.0250	47	.0785	<b>5/32</b>	<b>.1562</b>	C	.2420	8.90 mm	.3504	17.50 mm	.6890
.65 mm	.0256	2 mm	.0787	22	.1570	6.2 mm	.2441	9.00 mm	.3543	<b>45/64</b>	<b>.7031</b>
71	.0260	2.05 mm	.0807	4 mm	.1575	D	.2460	T	.3580	18.00 mm	.7087
.7 mm	.0276	46	.0810	21	.1590	6.25 mm	.2461	9.10 mm	.3583	<b>23/32</b>	<b>.7188</b>
70	.0280	45	.0820	20	.1610	6.3 mm	.2480	<b>23/64</b>	<b>.3594</b>	18.50 mm	.7283
69	.0292	2.1 mm	.0827	4.1 mm	.1614	E	.2500	9.20 mm	.3622	<b>47/64</b>	<b>.7344</b>
.75 mm	.0295	2.15 mm	.0846	4.2 mm	.1654	<b>1/4</b>	<b>.2500</b>	9.25 mm	.3642	19.00 mm	.7480
68	.0310	44	.0860	19	.1660	6.4 mm	.2520	9.30 mm	.3661	<b>3/4</b>	<b>.7500</b>
<b>1/32</b>	<b>.0312</b>	2.2 mm	.0866	4.25 mm	.1673	6.5 mm	.2559	U	.3680	<b>49/64</b>	<b>.7656</b>
.8 mm	.0315	2.25 mm	.0886	4.3 mm	.1693	F	.2570	9.40 mm	.3701	19.50 mm	.7677
67	.0320	43	.0890	18	.1695	6.6 mm	.2598	9.50 mm	.3740	<b>25/32</b>	<b>.7812</b>
66	.0330	2.3 mm	.0906	<b>11/64</b>	<b>.1719</b>	G	.2610	<b>3/8</b>	<b>.3750</b>	20.00 mm	.7874
.85 mm	.0335	2.35 mm	.0925	17	.1730	6.7 mm	.2638	V	.3770	<b>51/64</b>	<b>.7969</b>
65	.0350	42	.0935	4.4 mm	.1732	<b>17/64</b>	<b>.2656</b>	9.60 mm	.3780	20.50 mm	.8071
.9 mm	.0354	<b>3/32</b>	<b>.0938</b>	16	.1770	6.75 mm	.2657	9.70 mm	.3819	<b>13/16</b>	<b>.8125</b>
64	.0360	2.4 mm	.0945	4.5 mm	.1772	H	.2660	9.75 mm	.3839	21.00 mm	.8268
63	.0370	41	.0960	15	.1800	6.8 mm	.2677	9.80 mm	.3858	<b>53/64</b>	<b>.8281</b>
.95 mm	.0374	2.45 mm	.0965	4.6 mm	.1811	6.9 mm	.2717	W	.3860	<b>27/32</b>	<b>.8438</b>
62	.0380	40	.0980	14	.1820	I	.2720	9.90 mm	.3898	21.50 mm	.8465
61	.0390	2.5 mm	.0984	13	.1850	7 mm	.2756	<b>25/64</b>	<b>.3906</b>	<b>55/64</b>	<b>.8594</b>
1 mm	.0394	39	.0995	4.7 mm	.1850	J	.2770	10.00 mm	.3937	22.00 mm	.8661
60	.0400	38	.1015	4.75 mm	.1870	7.1 mm	.2795	X	.3970	<b>7/8</b>	<b>.8750</b>
59	.0410	2.60 mm	.1024	<b>3/16</b>	<b>.1875</b>	K	.2810	Y	.4040	22.50 mm	.8858
1.05 mm	.0413	37	.1040	4.8 mm	.1890	<b>9/32</b>	<b>.2812</b>	<b>13/32</b>	<b>.4062</b>	<b>57/64</b>	<b>.8906</b>
58	.0420	2.7 mm	.1063	12	.1890	7.2 mm	.2835	Z	.4130	23.00 mm	.9055
57	.0430	36	.1065	11	.1910	7.25 mm	.2854	10.50 mm	.4134	<b>29/32</b>	<b>.9062</b>
1.1 mm	.0433	2.75 mm	.1083	4.9 mm	.1929	7.3 mm	.2874	<b>27/64</b>	<b>.4219</b>	<b>59/64</b>	<b>.9219</b>
1.15 mm	.0453	<b>7/64</b>	<b>.1094</b>	10	.1935	L	.2900	11.00 mm	.4331	23.50 mm	.9252
56	.0465	35	.1100	9	.1960	7.4 mm	.2913	<b>7/16</b>	<b>.4375</b>	<b>15/16</b>	<b>.9375</b>
<b>3/64</b>	<b>.0469</b>	2.8 mm	.1102	5 mm	.1969	M	.2950	11.50 mm	.4528	24.00 mm	.9449
1.2 mm	.0472	34	.1110	8	.1990	7.5 mm	.2953	<b>29/64</b>	<b>.4531</b>	<b>61/64</b>	<b>.9531</b>
1.25 mm	.0492	33	.1130	5.1 mm	.2008	<b>19/64</b>	<b>.2969</b>	<b>15/32</b>	<b>.4688</b>	24.50 mm	.9646
1.3 mm	.0512	2.9 mm	.1142	7	.2010	7.6 mm	.2992	12.00 mm	.4724	<b>31/32</b>	<b>.9688</b>
55	.0520	32	.1160	<b>13/64</b>	<b>.2031</b>	N	.3020	<b>31/64</b>	<b>.4844</b>	25.00 mm	.9843
1.35 mm	.0531	3 mm	.1181	6	.2040	7.7 mm	.3031	12.50 mm	.4921	<b>63/64</b>	<b>.9844</b>
54	.0550	31	.1200	5.2 mm	.2047	7.75 mm	.3051	<b>1/2</b>	<b>.5000</b>	1.0000	1.0000
1.4 mm	.0551	3.1 mm	.1220	5	.2055	7.8 mm	.3071	13.00 mm	.5118		
1.45 mm	.0571	<b>1/8</b>	<b>.1250</b>	5.25 mm	.2067	7.9 mm	.3110	<b>33/64</b>	<b>.5156</b>		
1.5 mm	.0591	3.2 mm	.1260	5.3 mm	.2087	<b>5/16</b>	<b>.3125</b>	<b>17/32</b>	<b>.5312</b>		
53	.0595	3.25 mm	.1280	4	.2090	8 mm	.3150	13.50 mm	.5315		
1.55 mm	.0610	30	.1285	5.4 mm	.2126	O	.3160	<b>35/64</b>	<b>.5469</b>		
		3.3 mm	.1299			8.1 mm	.3189	14.00 mm	.5512		

# Technical Section - General

## 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
38	110	69.5	363	171,000

Rockwell Hardness			Brinell	Tensile Strength
C	B	A	Hardness	(Lbs./Sq.In.)
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.

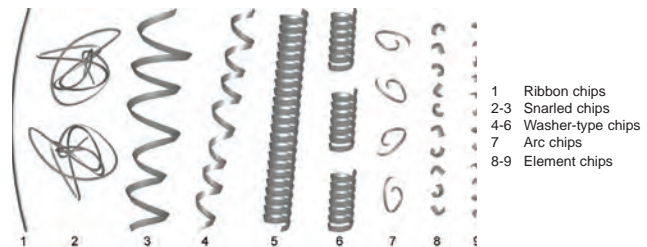


## TYPES OF CHIPS

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 minimum.

# Technical Section - General

## INDUSTRY STANDARD TOLERANCES FOR SHAFTS & HOLES

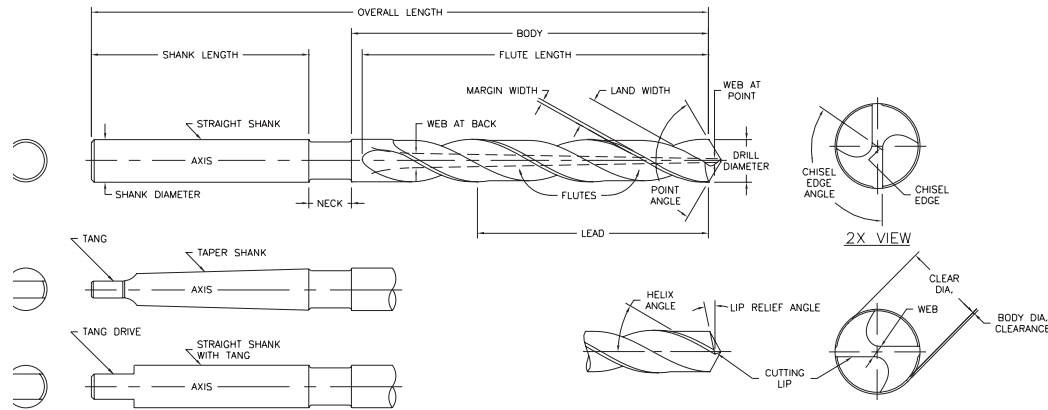
Tolerance values are shown in Microns ( $\mu\text{m}$ )

Formula for Microns ...1  $\mu\text{m}$  = 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 ( $\mu\text{m}$ )							
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

# Technical Section - Drilling

## 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 the hole for improved accuracy.



spot

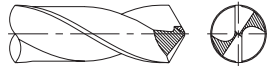


# Technical Section - Drilling

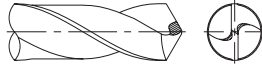
(CONTINUED FROM PRIOR PAGE)

## 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
<b>IPM</b> = Inches Per Minute	$IPR \times RPM = \mathbf{IPM}$
<b>IPR</b> = Inches Per Revolution	$\frac{IPM}{RPM} = \mathbf{IPR}$
<b>RPM</b> = Revolutions Per Minute	$\frac{SFM \times 3.82}{D} = \mathbf{RPM}$
<b>SFM</b> = Surface Feet Per Minute	$D \times RPM \times .26 = \mathbf{SFM}$
<b>D</b> = Drill Diameter	

**Note:** For element and tolerance information, see specific technical sections on Solid Carbide or High Speed Steel.

# Technical Section - Drilling

## 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

<b>Problem</b>	<b>Solution</b>
<b>Wear on Outer Corners</b>	<ul style="list-style-type: none"> <li>• Reduce cutting speed</li> <li>• Increase feed (IPR)</li> <li>• Improve direction of coolant flow</li> <li>• Increase coolant pressure</li> <li>• Add corner break</li> </ul>
<b>Chipping of Chisel Edge</b>	<ul style="list-style-type: none"> <li>• Check accuracy of drill runout</li> <li>• Check workpiece clamping accuracy and movement</li> <li>• Check point centrality and lip height</li> <li>• Increase feed rate</li> </ul>
<b>Chipping of Cutting Lips</b>	<ul style="list-style-type: none"> <li>• Check accuracy of drill runout</li> <li>• Check workpiece clamping accuracy and movement</li> <li>• Reduce speed</li> <li>• Reduce point clearance</li> <li>• Increase hone</li> </ul>
<b>Cracking of Lands</b>	<ul style="list-style-type: none"> <li>• Check movement of workpiece</li> <li>• Increase back taper</li> <li>• Check accuracy of drill runout</li> <li>• Chip packing; increase flute form opening or peck drill (HSS or HSCO only)</li> <li>• Slow down helix, horizontal drilling</li> <li>• Increase feed</li> <li>• When spot drilling, reduce feed</li> <li>• Improve direction of coolant flow</li> <li>• Increase coolant pressure</li> </ul>
<b>Oversize Hole</b>	<ul style="list-style-type: none"> <li>• Increase speed, reduce feed</li> <li>• Check workpiece clamping accuracy and movement</li> <li>• Check accuracy of drill runout</li> <li>• Chip packing, increase flute form opening or peck drill (HSS or HSCO only)</li> <li>• Check point centrality and lip height</li> </ul>
<b>Undersize Hole</b>	<ul style="list-style-type: none"> <li>• Improve direction of coolant flow</li> <li>• Reduce cutting speed, increase feed</li> <li>• Check drill diameter</li> </ul>
<b>Hole Not Round</b>	<ul style="list-style-type: none"> <li>• Check accuracy of drill runout</li> <li>• Check workpiece clamping accuracy and movement</li> <li>• Check point centrality and lip height</li> <li>• Chip packing, increase flute form opening or peck drill (HSS or HSCO only)</li> </ul>
<b>Drill Breakage</b>	<ul style="list-style-type: none"> <li>• Chip packing, increase flute form opening or peck drill (HSS or HSCO only)</li> <li>• Check workpiece clamping accuracy and movement</li> <li>• Check accuracy of drill runout</li> <li>• Reduce feed rate, increase feed rate</li> <li>• Improve direction of coolant flow</li> <li>• Increase coolant pressure</li> </ul>



# Technical Section - Drilling

## 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 favorable 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

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### 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

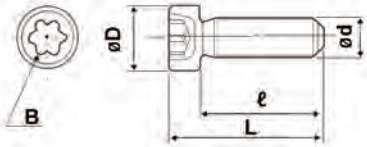
In view of the ability of some drills to produce a much tighter hole tolerance, due consideration should be given to drilled holes which are subject to secondary operations, eg. tapping, reaming. The diameter of the drill will need to be increased from what is recommended to account for the fact that the hole size produced will be smaller.

# Technical Section - Drilling - Hydra

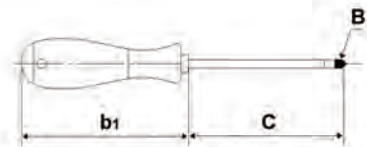
## Torque Table

					TORQUE VALUES Nm (metric System)	TORQUE VALUES in/lbs (inch System)
H860	H861	H853 3xD	H855 5xD	H858 8xD		
H860N1	H861N1	12.0mm-15.0mm 31/64"-39/64"	12.0mm-15.0mm 31/64"-39/64"	14.0mm-15.0mm	0.75-0.99	6.6-8.8
H860N2	H861N2	16.0mm-18.0mm 41/64"-23/32"	16.0mm-18.0mm 41/64"-23/32"	16.0mm-18.0mm	0.93-1.24	8.2-11.0
H860N3	H861N3	19.0mm-21.0mm 49/64"-27/32"	19.0mm-21.0mm 49/64"-27/32"	19.0mm-21.0mm	1.84-2.44	16.3-21.6
H860N4	H861N3	22.0mm-24.0mm 57/64"-31/32"	22.0mm-24.0mm 57/64"-31/32"	22.0mm-24.0mm	2.73-3.72	24.2-32.9
H860N5	H861N4	25.0mm-27.0mm 1.1/64"-1.3/32"	25.0mm-27.0mm 1.1/64"-1.3/32"	25.0mm-27.0mm	4.14-5.52	36.6-48.8
H860N6	H861N5	28.0mm-33.5mm 1.1/8"-1.3/16"	28.0mm-33.5mm 1.1/8"-1.3/16"	28.0mm-33.5mm	4.97-6.63	44.0-58.7
H860N7	H861N6	35.0mm-42.5mm	35.0mm-42.5mm	35.0mm-42.5mm	7.20	63.7

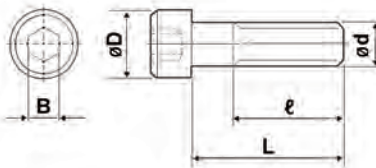
## Screws and screw-drivers data



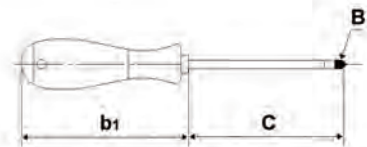
e-code	d	Pitch	L (mm)	l (mm)	D (mm)	B
H860N1	M2.2	0.45	7.5	5.7	3.5	8IP
H860N2	M2.5	0.45	9.0	7.0	4.1	10IP
H860N3	M3.0	0.50	10.5	8.0	4.9	15IP
H860N4	M3.5	0.60	11.5	8.8	5.5	15IP
H860N5	M4.0	0.70	12.5	9.5	6.0	20IP
H860N6	M4.5	0.75	14.3	10.8	6.8	25IP



code	B	C	b1
H861N1	8IP	60	104
H861N2	10IP	80	111
H861N3	15IP	80	111
H861N4	20IP	100	118
H861N5	25IP	100	118



e-code	d	Pitch	L (mm)	l (mm)	D (mm)	B
H860N7	M5.0	0.8	15	FULL	8.5	4



e-code	B	C	b1
H861N6	4	75	111

# Technical Section - Drilling - Hydra

## Drilling Hints & Tips with the Hydra Drill

### COOLANTS

For maximum chip evacuation and tool performance, coolant use is recommended.

Emulsion coolant concentration of 6 – 8% is recommended for most applications, at a coolant pressure of 20 bar or higher. For high strength steel, stainless steels and tougher drilling applications, use a higher concentration of 10-12%. In these applications, particularly in stainless steels, it is recommended to use the maximum coolant pressure on the machine.

The Hydra-drill coolant holes provide improved web strength and reduce heat at the cutting edges for increased productivity and longer tool life.

### HOLDERS

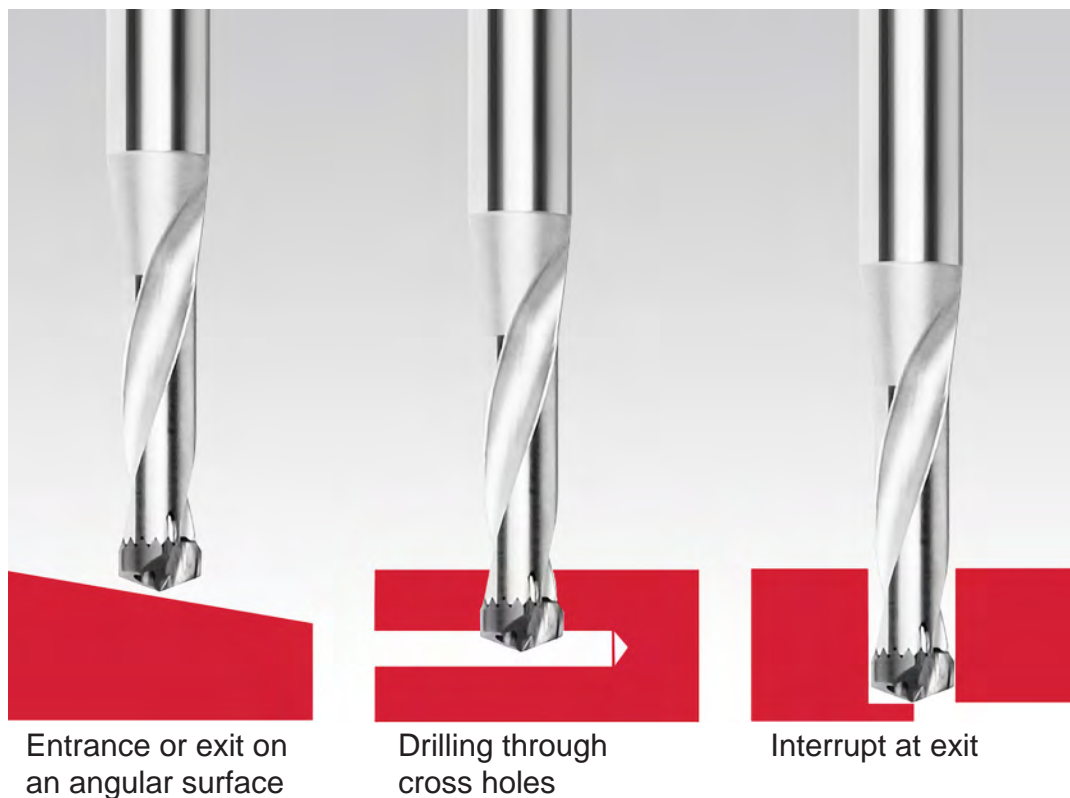
Always use tool holders and collets that provide good concentricity between the drill and the machine spindle. Use a positive stop to prevent the tool from backing up into the holder. Radial runout in the tool assembly must be accurately checked and maintained.

### WORKPIECE

A secure and rigid workpiece will minimise deflection, and allow for better accuracy and true position of the hole.

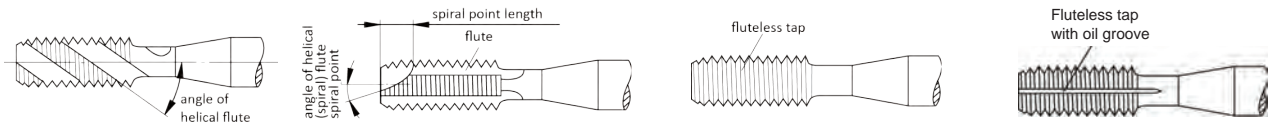
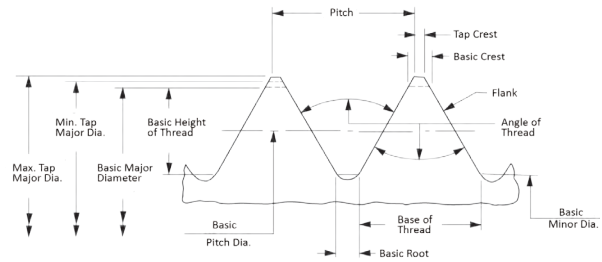
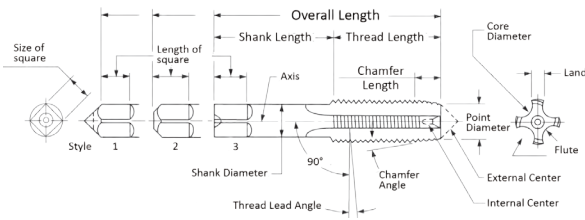
### FEEDS

It is important not to underfeed the drill which will cause it to dwell and dull. This is particularly true in work hardening materials. Feed rates should be high enough for proper chip formation.



In these drilling scenarios, reducing feed rate to 1/3 (33%) is generally recommended. Drilling into an entry angle of more than 10° is NOT recommended – surface should be milled flat first.

# Technical Section - Threading



**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:**

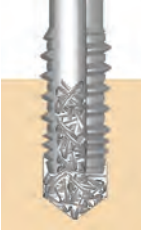





**SINGLE:** A thread in which lead is equal to pitch.

**DOUBLE:** A thread in which lead is equal to twice the pitch.

**TRIPLE:** A thread in which lead is equal to triple the pitch.

# Technical Section - Threading

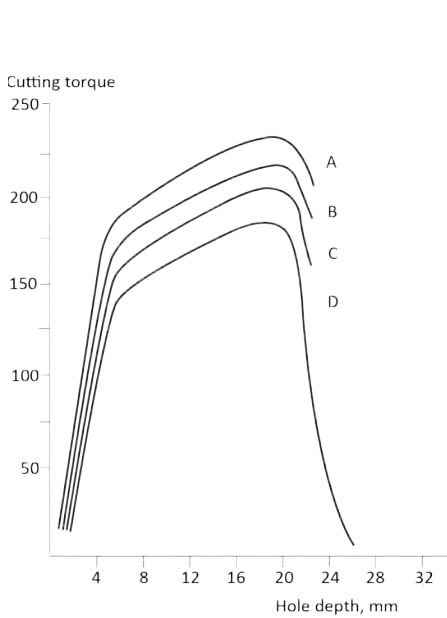
## TAP GEOMETRIES & APPLICATIONS

Description	Chips	Description	Chips
<p><b>Taps with straight flutes</b></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><b>Taps with flutes only on the chamfer lead</b></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 <math>1.5 \times \varnothing</math>.</p>	
<p><b>Taps with interrupted thread</b></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 minimize the torque generated</p>		<p><b>Taps with spiral flutes</b></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><b>Spiral point taps</b></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><b>Cold forming taps</b></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 (<math>R_m</math>) should not exceed <math>1200 \text{ N/mm}^2</math> and the elongation factor (<math>A_5</math>) 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><b>Nut taps</b></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><b>Through coolant taps</b></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>	

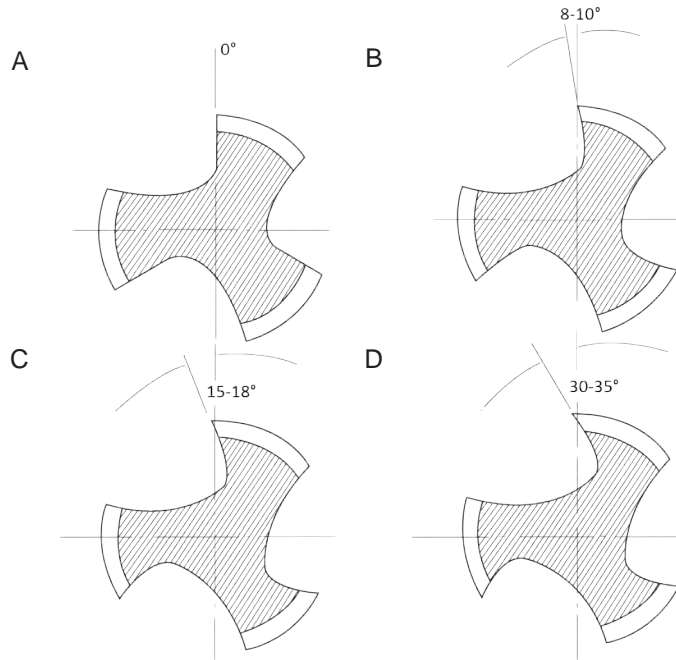
# Technical Section - Threading

## TAPPING TECHNICAL DATA

### Rake Angles

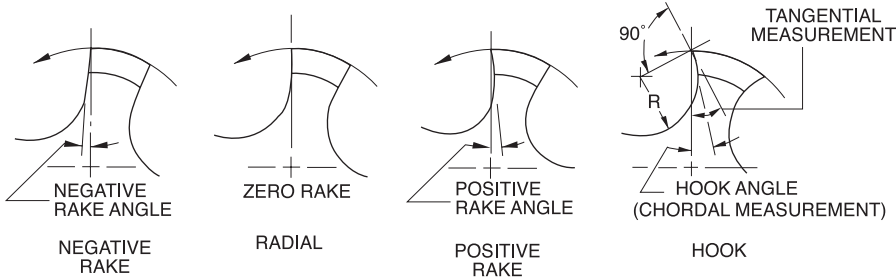


Threading tap M10 used with various rake angles in steel (low carbon steel)

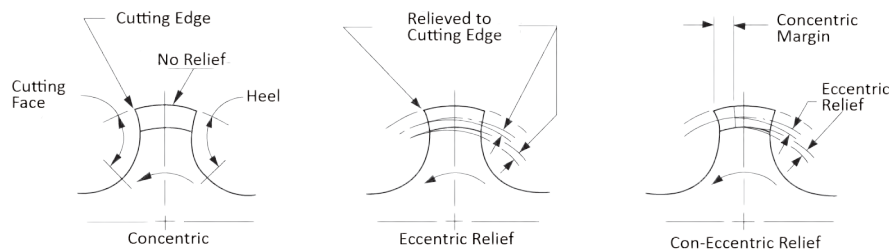


The rake angle has a primary influence on cutting forces and consequently the cutting torque and surface finish of the thread. Test results made with different rake angles are shown in the above diagram, illustrating how cutting torque decreases

with a larger rake angle. There is, however, a limit. A large rake angle means lower strength of the cutting edge.



### Relief Angles



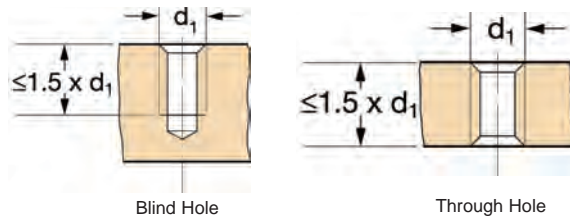


# Technical Section - Threading

## 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.

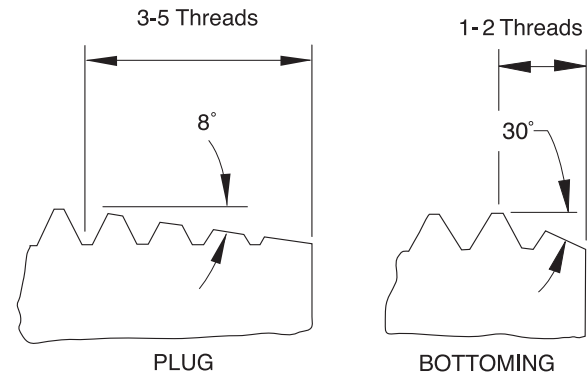
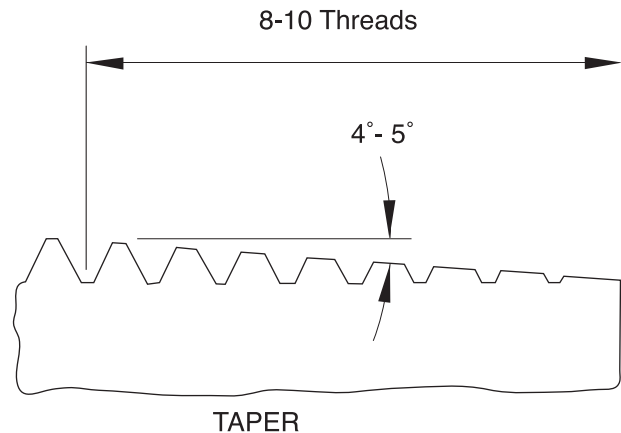
Generally, the form and length of chamfer depend on the type of hole to be tapped. Though holes do not normally cause difficulties whereas the tapping of blind holes can create certain problems associated with chip evacuation.



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.


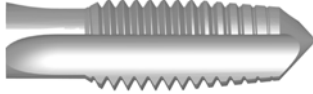

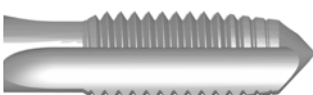

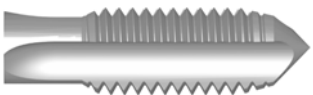


Proper tapping speeds are determined best by experiment. In the table below the speeds shown should be used as a guide only, and the suggested surface feet per minute adjusted upward or downward until the best results are obtained.

$$\text{RPM} = \frac{3.82 \times \text{SFM}}{D} \quad \text{SFM} = .26 \times \text{RPM} \times D$$

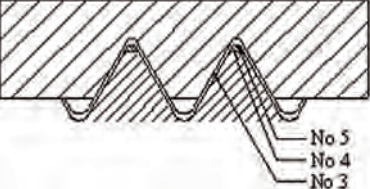
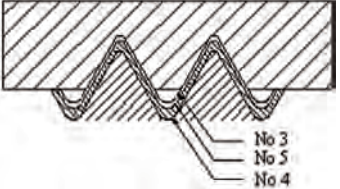
# Technical Section - Threading

## 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	

 <p style="text-align: center;"><math>\varnothing \leq M10</math></p>	 <p style="text-align: center;"><math>\varnothing \geq M12</math></p>
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<b>ISO</b>	<b>Set code number</b>	<b>Including tap number</b>
	No. 6	No. 1 + No. 2 + No. 3
	No. 7	No. 2 + No. 3
	No. 8	No. 4 + No. 5 + No. 3
	No. 9	No. 5 + No. 3
<b>DIN</b>	<b>Set code number</b>	<b>Including tap number</b>
	No. 8	No.3 (form C) + No.4 (form A) + No.5 (form B)
	No. 9	No.3 (form C) + No.5 (form B)
<b>ANSI</b>	<b>Set code number</b>	<b>Including tap number</b>
	Hand Tap (No. 6)	Taper(No.1) + Plug(No.2) + Bottoming(No.3)



# Technical Section - Threading

## TAPPING TECHNICAL DATA

### The Relationship Between H-Limit and Class of Fit

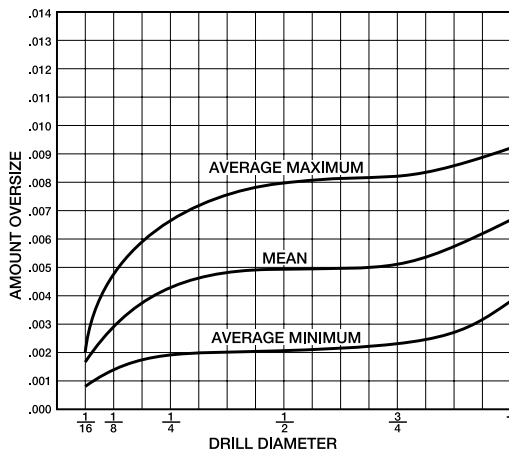
H-limits are used to properly size a tap for the threaded hole to be produced. They are selected based upon the tolerance required for the part. These tolerances are defined by the symbols class 1B, 2B, or 3B. Class 1B has the broadest tolerance and is generally applied to DIY (Do It Yourself) type nuts 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		
	Average Max	Mean	Average Min.
1/16	.002	.0015	.001
1/8	.0045	.003	.001
1/4	.0065	.004	.002

Drill Dia., Inch	Amount Oversize, Inch		
	Average Max	Mean	Average Min.
1/2	.008	.005	.002
3/4	.008	.005	.003
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

Pitch Diameter limits for Taps over 1" diameter to 1-1/2" diameter inclusive:

H4 = 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.

### 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 Limit No. =  $\frac{\text{Amt. Tap PD High Limit Is Over Basic PD}}{.00052}$ "

DU 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"

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.

### 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.

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."

## Technical Section - Threading

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.

## Technical Section - Threading

**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.

# Technical Section - Threading

## SELF-LOCKING THREAD FORM

### Concept

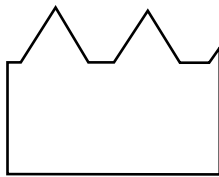
**Designed to produce threads for self-locking operations and put a lock on fastener costs.**

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.

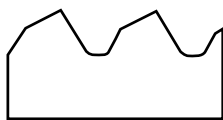
Although this is a made-to-order program, quantities of up to 48 pieces of any style would be delivered in no greater than 10 working days.

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

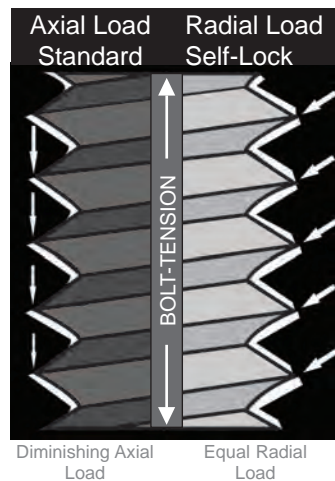
There is no loss of locking power in those applications requiring frequent loosening and tightening of the male fastener. This eliminates time intensive disassembly and assembly procedures. Conventional locking fasteners would be either destroyed or their locking power severely diminished.

#### Threading Solution for Soft Materials

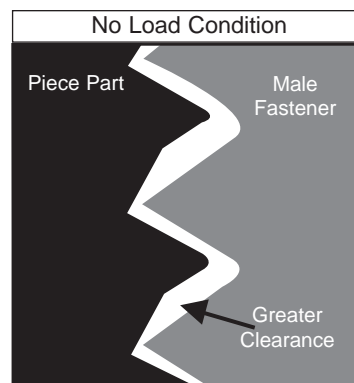
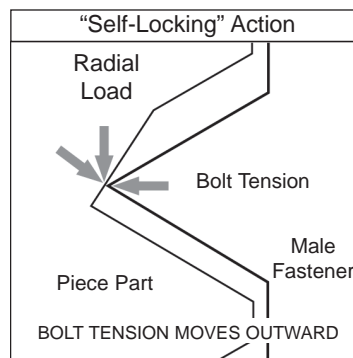
The optimum load distribution provided by this thread form eliminates thread stripping that is typical with thread forms that concentrate clamping load on fewer threads. Ideal for aluminum and other lightweight, soft materials in applications where stripping is frequent.

#### 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.



Diminishing Axial Load Equal Radial Load



# Technical Section - Threading

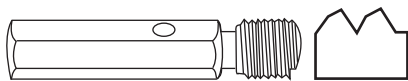
## SELF-LOCKING THREAD FORM

### Gaging for Self-Locking Threads

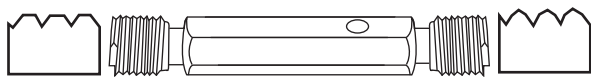
An essential element in high quality thread production is an accurate gaging capability. To facilitate the latter Precision offers a complete gaging system for self-locking threads, which consists of the following:

#### LARGER DIAMETERS

Go-Pitch Diameter and Ramp Gage

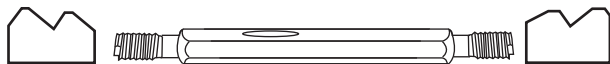


Hi-Pitch Diameter and Ramp Gage



#### SMALLER DIAMETERS

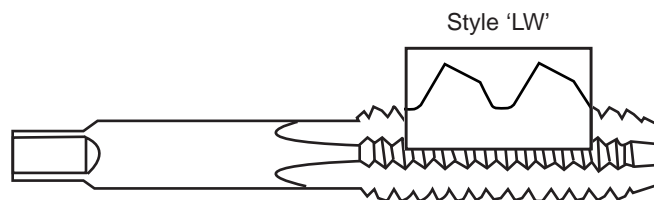
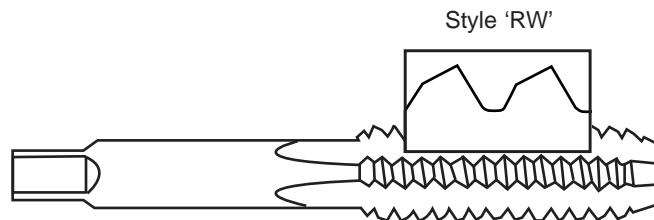
Go-Pitch Diameter and Ramp Gage      Hi-Limit Gage



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.

### How to Order



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	9	.1960	83	.0038	.1998	77
—	5/64	.0781	77	.0019	.0800	70	—	8	.1990	79	.0038	.2028	73
—	47	.0785	76	.0019	.0804	69	—	7	.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	—	3	.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	—	6.80mm	.2677	83	.0041	.2718	75
—	2.20mm	.0866	78	.0020	.0886	72	—	I	.2720	75	.0041	.2761	67
—	43	.0890	71	.0020	.0910	65	3/8-16	7.80mm	.3071	84	.0044	.3115	78
—	2.30mm	.0906	66	.0020	.0926	60	—	7.90mm	.3110	79	.0044	.3154	73
4-48	2.35mm	.0925	72	.0020	.0926	72	—	5/16	.3125	77	.0044	.3169	72
—	42	.0935	68	.0020	.0955	61	—	O	.3160	73	.0044	.3204	68
—	3/32	.0938	68	.0020	.0958	60	3/8-24	21/64	.3281	87	.0044	.3325	79
—	2.40mm	.0945	65	.0020	.0965	57	—	8.40mm	.3307	82	.0044	.3351	74
5-40	40	.0980	83	.0023	.1003	76	—	Q	.3320	79	.0044	.3364	71
—	39	.0995	79	.0023	.1018	71	—	8.50mm	.3346	75	.0044	.3390	67
—	38	.1015	72	.0023	.1038	65	7/16-14	T	.3580	86	.0046	.3626	81
—	2.60mm	.1024	70	.0023	.1047	63	—	23/64	.3594	84	.0046	.3640	79
5-44	38	.1015	79	.0023	.1038	72	—	9.20mm	.3622	81	.0046	.3668	76
—	2.60mm	.1024	77	.0023	.1047	69	—	9.30mm	.3661	77	.0046	.3707	72
—	37	.1040	71	.0023	.1063	63	—	U	.3680	75	.0046	.3726	70
6-32	37	.1040	84	.0023	.1063	78	—	9.40mm	.3701	73	.0046	.3747	68
—	36	.1065	78	.0023	.1088	72	7/16-20	W	.3860	79	.0046	.3906	72
—	7/64	.1094	70	.0026	.1120	64	—	25/64	.3906	72	.0046	.3952	65
—	35	.1100	69	.0026	.1126	63	1/2-13	10.50mm	.4134	87	.0047	.4181	82
—	34	.1100	67	.0026	.1136	60	—	27/64	.4219	78	.0047	.4266	73
6-40	34	.1110	83	.0026	.1136	75	1/2-20	29/64	.4531	72	.0047	.4578	65
—	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

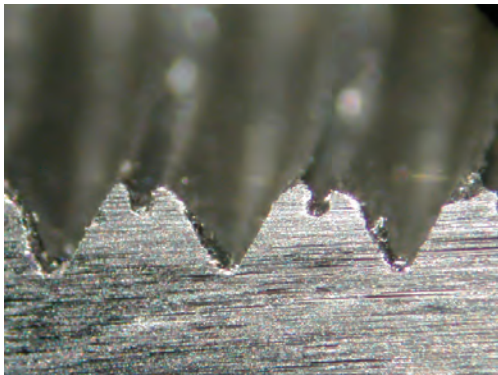
Metric of Tap	Tap Drill	Decimal Equiv. of Tap Drill	Theoretical Percent of Thread	Probable Mean Oversize	Probable Hole Size	Probable Percent Thread	Metric of Tap	Tap Drill	Decimal Equiv. of Tap Drill	Theoretical Percent of Thread	Probable Mean Oversize	Probable Hole Size	Probable Percent Thread
M1.6 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	—	6.8mm	.2677	74	.0041	.2718	68
—	32	.1160	71	.0026	.1186	63	M10 x 1.5	8.4mm	.3307	82	.0044	.3344	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	.4063	.4063
—	25	.1495	72	.0032	.1527	64	—	Y	.4040	76	.0047	.4087	71
							—	13/32	.4062	74	.0047	.4109	69

**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.

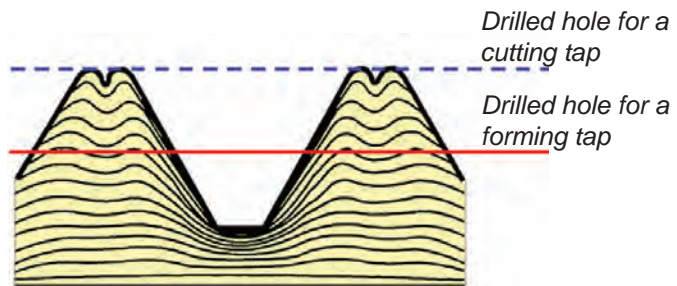
# Technical Section - Threading

## FLOW OF MATERIAL WHEN FORMING A THREAD

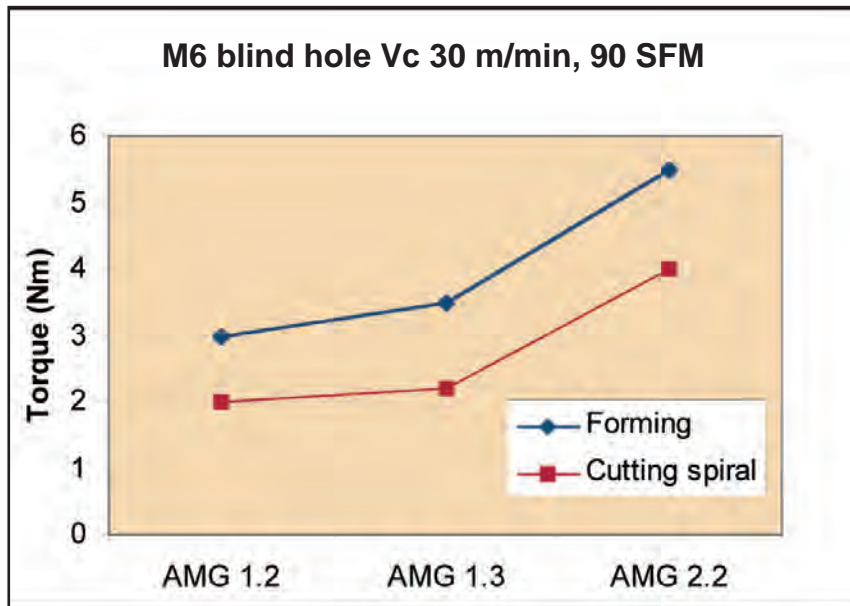
The tapping hole size depends upon the material being drilled, the cutting conditions selected and the condition of the equipment being used. If material is pushed up at the thread entry by the tap and/or the life of the tap is too short, select a slightly larger drill diameter. If on the other hand 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.



# Technical Section - Threading

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.

# Technical Section - Threading

## Tap Projection and Hole Size for Pipe Taps

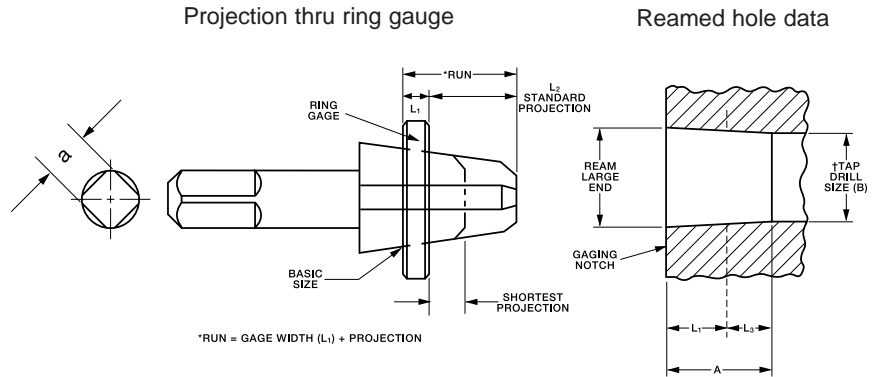
Nominal Size	Tap Thread Limits		Taper Per Ft. Limits		Projection				Ream Dia. Large End	Gage Width L <sub>1</sub>	L <sub>3</sub>	A	Tap Drill Size B	Tap Drill Size BB
	L <sub>2</sub>	L <sub>2</sub> Tolerance	Min.	Max.	NPT & NPTF		SAE - Short							
1/16 - 27	0.3120	±1/16	23/32	25/32	.250	0.3750	.222	.259	.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	37/64
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<sub>1</sub> Taper Thread Ring Gage.  
 \*\*Recommended sizes given permit direct tapping without reaming the hole, but only give a full thread for approx. L<sub>1</sub> 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	17/32	.5312
1/2	—	20	.5130	.5220	33/64	.5156	.5150	.5240	17/32	.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/Min.		Pitch Diameter Limits For Class of Thread		
	NC	NF	Class 2B	Class 3B	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

\* Note: In cast iron applications we recommend style 1600 (H5 limit) for class 2B fit.

### 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	.4277	.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	—	—	12-2 8	.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	Surface Feet Per Minute																		
	5'	10'	15'	20'	25'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'	
UNC/ UNF	Pipe	Revolutions Per Minute																	
0	—	318	637	955	1273	1592	1910	2546	3183	3820	4456	5093	5729	6366	7003	7639	8276	8913	9549
1	—	273	546	819	1046	1308	1570	2093	2617	3140	3663	4186	4710	5233	5756	6279	6805	7326	7849
2	—	212	424	637	888	1110	1333	1777	2221	2665	3109	3554	3999	4442	4886	5330	5774	6218	6662
3	—	191	382	573	772	964	1157	1543	1929	2315	2701	3086	3472	3858	4244	4629	5015	5401	5787
4	—	174	347	521	682	853	1023	1364	1705	2046	2387	2728	3069	3411	3751	4092	4434	4775	5116
5	—	147	294	441	611	764	917	1222	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	4584
6	—	136	273	409	553	691	829	1106	1382	1659	1935	2212	2488	2766	3042	3318	3595	3871	4148
8	—	119	239	358	466	583	699	932	1165	1398	1631	1864	2097	2330	2563	2796	3029	3262	3495
10	—	101	201	302	402	502	603	804	1005	1205	1406	1607	1808	2009	2210	2411	2612	2813	3014
12	—	87	174	260	354	442	531	707	884	1061	1238	1415	1592	1769	1945	2122	2300	2476	2653
1/4	—	76	153	229	306	382	458	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292
5/16	—	62	123	185	245	306	367	489	611	733	856	978	1100	1222	1345	1467	1589	1711	1833
3/8	—	50	101	151	204	255	305	407	509	611	713	815	917	1019	1120	1222	1324	1426	1528
7/16	1/8	43	87	130	175	219	262	349	437	524	611	698	786	873	960	1048	1135	1222	1310
1/2	—	38	76	115	153	191	229	305	382	458	535	611	688	764	840	917	993	1070	1146
9/16	1/4	34	68	102	137	172	206	274	342	410	478	547	616	683	752	820	888	952	1020
5/8	—	32	64	96	122	153	183	244	306	367	428	489	550	611	672	733	794	856	917
11/16	3/8	28	55	83	111	138	167	222	278	333	389	444	500	556	611	667	722	778	833
3/4	—	25	51	76	102	128	153	203	255	305	357	407	458	509	560	611	662	713	764
7/8	1/2	22	43	65	87	109	131	175	218	262	306	350	392	437	480	524	568	611	655
1	—	19	38	57	76	96	115	153	191	230	268	305	344	382	420	458	497	535	573
1-1/8	3/4	17	34	51	68	84	102	136	170	204	238	272	306	340	373	407	441	475	509
1-1/4	—	15	31	46	61	76	92	122	153	183	214	244	275	305	336	367	397	428	458
1-3/8	1	14	28	42	56	69	83	111	139	167	194	222	250	278	306	333	361	389	417
1-1/2	—	13	25	38	51	63	76	102	127	153	178	204	229	255	280	305	331	356	382
1-5/8	—	12	23	35	47	59	71	94	118	141	165	188	212	235	259	282	306	329	353
1-3/4	—	11	22	33	44	55	65	87	109	131	153	175	196	218	240	262	284	306	327
1-7/8	—	10	20	30	41	51	61	81	102	122	143	163	183	204	224	244	265	285	306
2	—	9	19	29	38	48	57	76	96	115	134	153	172	191	210	229	248	267	287

## Metric Sizes

Tap Sizes	Surface Feet Per Minute																	
	5'	10'	15'	20'	25'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
Metric	Revolutions Per Minute																	
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

# Technical Section - Threading

## TYPICAL TAPPING PROBLEMS

<i>Problem</i>	<i>Cause</i>	<i>Solution</i>
<b>DIMENSIONAL ACCURACY</b>		
<b>Oversize Pitch Diameter</b>		
	Incorrect Tap	<ol style="list-style-type: none"> <li>Use correct H limit</li> <li>Use longer chamfered taps</li> <li>Consider less free cutting NR style</li> </ol>
	Chip packing	<ol style="list-style-type: none"> <li>Use spiral pointed or spiral fluted taps</li> <li>Reduce number of flutes to create extra chip space</li> <li>Use larger drill size</li> <li>In blind hole applications, allow deeper holes where applicable or shorten the thread length of the parts</li> <li>Use recommended lubricant</li> </ol>
	Galling	<ol style="list-style-type: none"> <li>Apply surface treatment such as steam tempered, TiN, TiCN or CrN</li> <li>Use recommended lubricant</li> <li>Reduce tapping speed</li> <li>Use correct tap for the material being tapped</li> </ol>
	Operating Conditions	<ol style="list-style-type: none"> <li>Ensure correct tapping speeds to avoid torn threads</li> <li>Check alignment of tap and drilled hole</li> <li>Use lead screw tapper</li> <li>Use tapping machine with adequate horsepower</li> <li>Check misalignment of tap and drilled hole due to loose spindle or worn holder</li> </ol>
	Tool Condition	<ol style="list-style-type: none"> <li>Check accuracy of chamfer lead grinding</li> <li>Ensure correct cutting angles</li> <li>Land widths too narrow</li> <li>Check burrs from regrinding not present</li> </ol>
<b>Oversize Internal Diameter</b>		
	Hole Size	<ol style="list-style-type: none"> <li>Use smaller drill size</li> <li>Avoid tapered hole</li> <li>Use taps with correct chamfer</li> </ol>
	Galling	See solutions prescribed under Oversize Pitch Diameter
<b>Undersized Pitch Diameter</b>		
	Incorrect Tap	<ol style="list-style-type: none"> <li>Use oversize taps                             <ul style="list-style-type: none"> <li>» For cutting materials such as copper alloy, aluminum alloy and cast iron</li> <li>» For cutting tubing which will have "spring back" action after tapping</li> </ul> </li> <li>Use taps with correct chamfer angle</li> <li>Use taps with higher cutting angle</li> </ol>
	Damaged Thread	Use proper reversing speed to avoid damaging tapped thread on the existing hole
	Leftover Chips	<ol style="list-style-type: none"> <li>Improve operating conditions to eliminate leftover chips in the hole</li> <li>Remove left over chips prior to gage checking</li> </ol>
<b>Undersized Internal Diameter</b>		
	Hole Size	Use larger drill size
<b>SURFACE FINISH</b>		
<b>Torn or Rough Threads</b>		
	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"> <li>Use thread relieved taps</li> <li>Reduce land width</li> <li>Apply surface treatment such as steam tempered, TiN, or chrome</li> <li>Use recommended lubricant</li> <li>Reduce tapping speed</li> <li>Use larger drill size</li> <li>Check alignment between tap and hole</li> </ol>

# Technical Section - Threading

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
	Chip Packing	<ol style="list-style-type: none"> <li>1. Use spiral pointed or spiral fluted taps</li> <li>2. Use larger drill size</li> </ol>
<b>Chattering on Tapped Thread</b>		
	Too Positive	<ol style="list-style-type: none"> <li>1. Use lower rake angle</li> <li>2. Reduce amount of thread relief - consider NR style</li> <li>3. Use taps with wider land</li> </ol>
	Tool Condition	Use taps with wider land
<b>TOOL LIFE</b>		
<b>Breakage</b>		
	Incorrect Tap Selection	<ol style="list-style-type: none"> <li>1. Tapping too deep. Avoid chip packing in the flutes or bottom of the hole. Use spiral pointed, spiral fluted or cold forming tap.</li> <li>2. Use correct surface treatment such as steam tempered, TiN, TiCN or CrN</li> </ol>
	Excessive Tapping Torque	<ol style="list-style-type: none"> <li>1. Hole too small - use correct size drill</li> <li>2. Shorten thread length</li> <li>3. Increase rake angle</li> <li>4. Use a tap with more thread relief and reduced land width</li> <li>5. Use spiral pointed or spiral fluted taps</li> </ol>
	Operating Conditions	<ol style="list-style-type: none"> <li>1. Reduce tapping speed</li> <li>2. Avoid misalignment between tap and the hole and tapered hole</li> <li>3. Use floating type of tapping holder</li> <li>4. Use tapping holder with torque adjustment</li> <li>5. Avoid hitting bottom of the hole</li> </ol>
	Tool Condition	<ol style="list-style-type: none"> <li>1. Use taps with wider land width</li> <li>2. Remove all worn sections when regrinding the flutes</li> <li>3. Regrind tool more frequently</li> </ol>
<b>Chipping</b>		
	Incorrect Tap Selection	<ol style="list-style-type: none"> <li>1. Use tap with lower rake angle</li> <li>2. Consider different tool steel</li> <li>3. Reduce hardness of the tap</li> <li>4. Increase chamfer length</li> <li>5. Avoid chip packing in the flutes or in the bottom of the hole by using spiral fluted or spiral pointed taps</li> </ol>
	Operating Conditions	<ol style="list-style-type: none"> <li>1. Reduce tapping speed</li> <li>2. Avoid misalignment between tap and hole</li> <li>3. Avoid sudden reverse in blind hole tapping</li> <li>4. Avoid galling</li> <li>5. Use larger drill size</li> <li>6. Ensure adequate lubricant</li> <li>7. Check for hard spots in the workpiece</li> </ol>
<b>Excessive Wear</b>		
	Incorrect Tap Selection	<ol style="list-style-type: none"> <li>1. Consider specially designed taps</li> <li>2. Change to an Applix style of tap made from PM material</li> <li>3. Apply special surface treatment such as steam tempered, TiN, TiCN or CrN</li> <li>4. Increase chamfer length</li> </ol>
	Operating Conditions	<ol style="list-style-type: none"> <li>1. Reduce tapping speed</li> <li>2. Apply adequate lubrication</li> <li>3. Avoid work hardening the material being tapped</li> <li>4. Use larger drill size</li> </ol>
	Tool Condition	<ol style="list-style-type: none"> <li>1. Ensure correct rake angle</li> <li>2. Minimize heat in grinding process to avoid de-tempering</li> </ol>



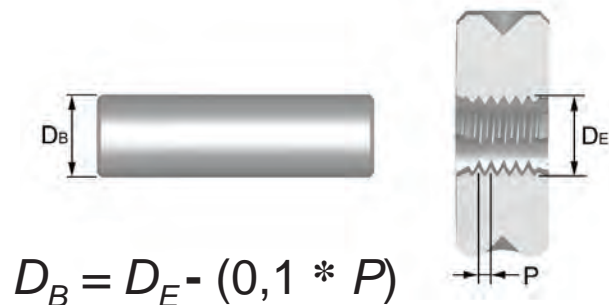
# Technical Section - Threading

## 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

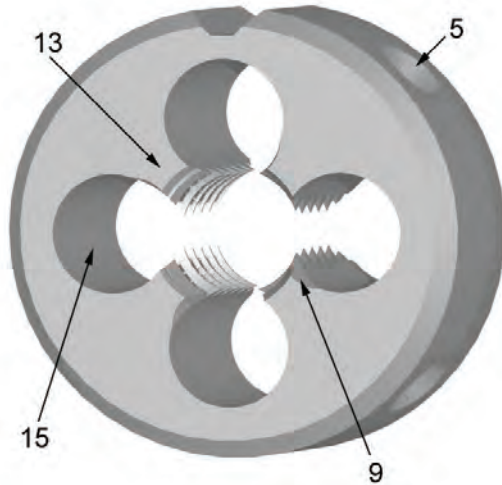
The diameter of the bolt blank must be smaller than the max. external diameter of the screw thread.



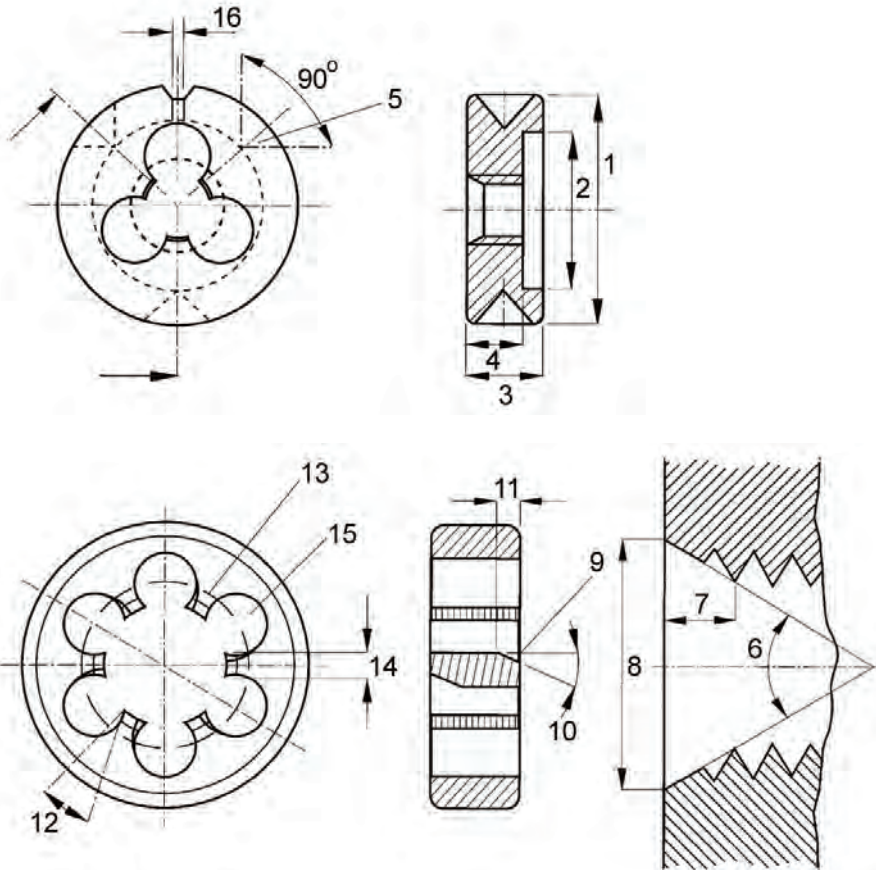


# Technical Section - Threading

## 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



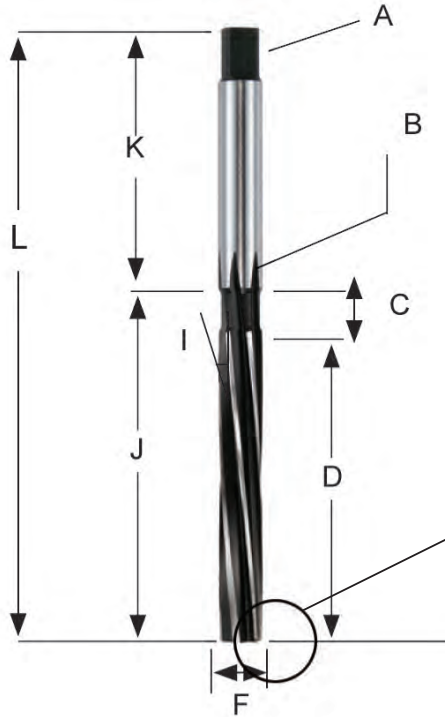
# Technical Section - Threading

## TROUBLE SHOOTING WHEN THREADING WITH DIES

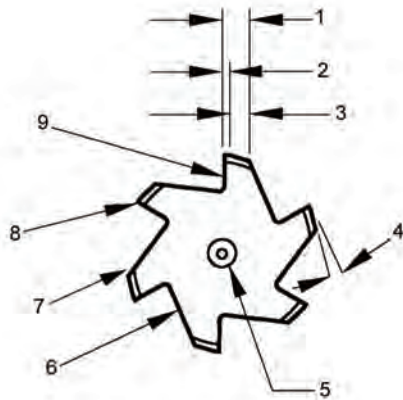
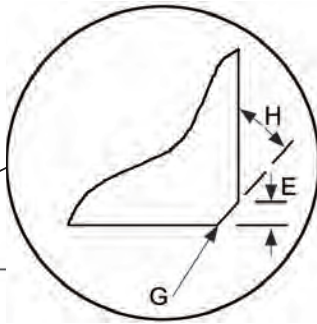
<i>Problem</i>	<i>Cause</i>	<i>Solution</i>
<b>Oversize / Undersize</b>		
	Misalignment	Correct alignment, ensure cleanliness
	Incorrect axial feed rate	Ensure axial feed rate is controlled accurately
<b>Poor finish</b>		
	Incorrect rake angle for the material	Try alternative dies or special die
	Incorrect/lack of lubricant	See lubricants section
	Incorrect speed	Follow recommendations in Catalog
	Bar diameter too large	Reduce to appropriate size
	Bar end not chamfered	Ensure bar end is chamfered
<b>Chipping / Breakage</b>		
	Wrong type of die	Follow recommendations in Catalog
	Speed too high	Follow recommendations in Catalog
	Bar diameter too large	Reduce to appropriate size
	Bar end not chamfered	Ensure bar end is chamfered
	Misalignment	Correct alignment, ensure cleanliness
<b>Rapid wear</b>		
	Incorrect/lack of lubricant	See lubricants section
	Speed too high	Follow recommendations in Catalog
<b>Built up edge</b>		
	Incorrect/lack of lubricant	See section lubricants
	Bar diameter too large	Reduce to appropriate size
	Speed too low	Follow recommendations in Catalog

# Technical Section - Reaming

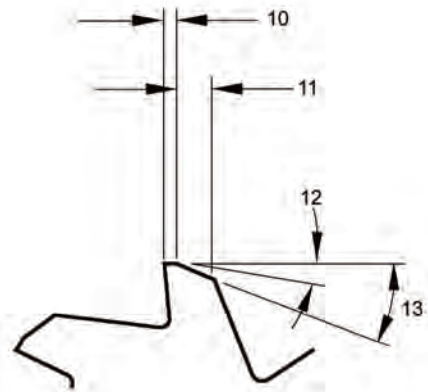
## REAMER DEFINITIONS / NOMENCLATURE



- 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 Section - Reaming

## 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 centers. 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.

# Technical Section - Reaming

## 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 $\geq$	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*						
Hard cast-iron	.004	.004 – .008	.006 – .010	.008 – .014	.010 – .018	.016 – .025
Soft cast-iron						
Light alloys*	.005	.005 – .012	.008 – .016	.010 – .020	.016 – .024	.024 – .031
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	
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)
$\geq 1/16"$	.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"

# Technical Section - Reaming

## 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 centers 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 recognized 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.

# Technical Section - Reaming

## Applications - Reamer Selection

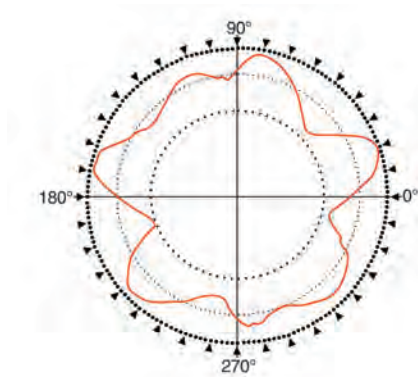
The most common types of reamers have a left-hand spiral because the main applications involve through holes requiring chips to be pushed forward. For blind holes, reamers with straight flutes or right hand spirals are recommended.

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  $\mu\text{m}$ . This compared with a variance of up to 10 $\mu\text{m}$  with unequal spacing.

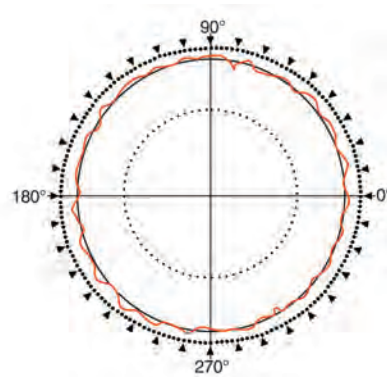
## CARBIDE REAMERS - COMPARISON SPACING / EU SPACING

unequal spacing  
roundness error up to 10  $\mu\text{m}$



Results of roundness

extremely unequal spacing  
roundness error up to 1 - 2  $\mu\text{m}$



Results of roundness



# Technical Section - Reaming

## TROUBLE SHOOTING WHEN REAMING

<i>Problem</i>	<i>Cause</i>	<i>Solution</i>
<b>Broken or twisted tangs</b>		
	Incorrect fit between shank and socket	Ensure the shank and the socket are clean and free from damage
<b>Rapid Tool Wear</b>		
	Insufficient stock to remove	Increase the amount of stock to be removed
<b>Oversize Hole</b>		
	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 Catalog or Product Selector
<b>Undersize hole</b>		
	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.
<b>Oval and conical holes</b>		
	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
<b>Bad Hole finish</b>		
	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 Catalog/ Product Selector
	Cutting speed too high	Adjust cutting conditions in accordance with Catalog/ Product Selector
<b>The tool clamps and breaks</b>		
	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



# Technical Section - Counterboring and Countersinking

## 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



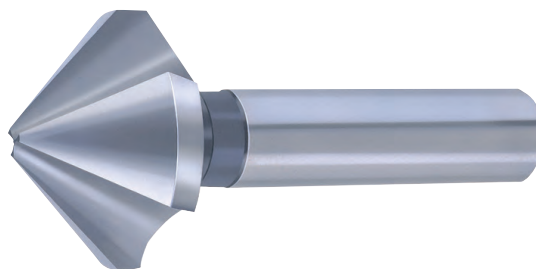
Fig.2



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.



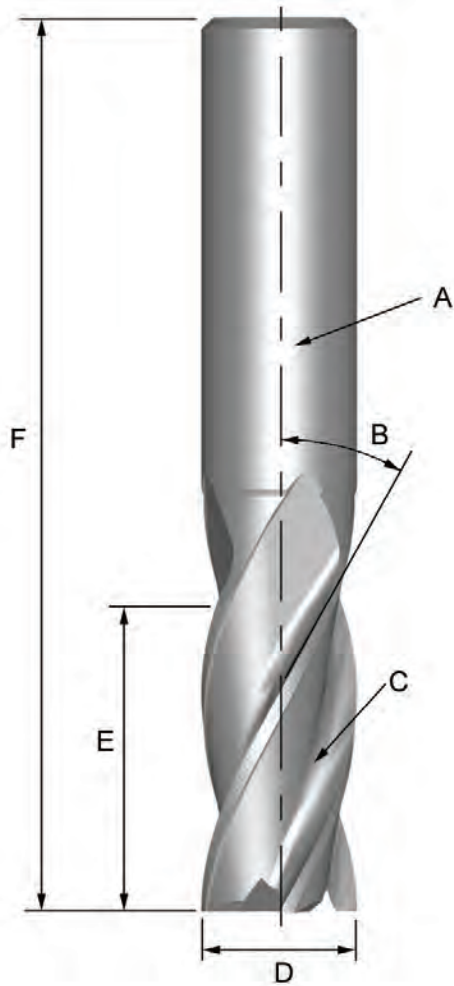
# Technical Section - Counterboring and Countersinking

## TROUBLE SHOOTING WHEN COUNTERBORING

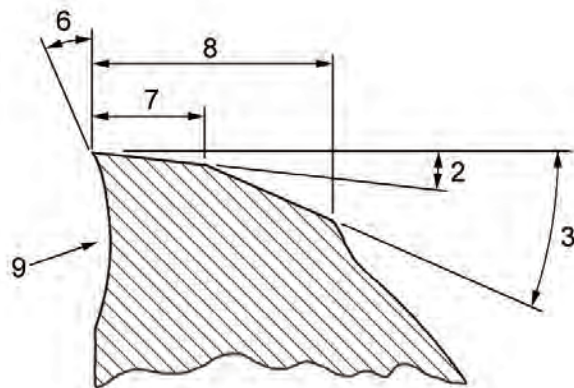
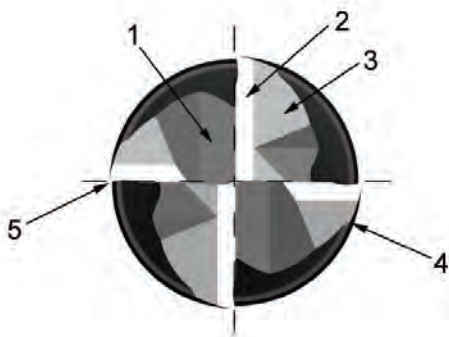
<i>Problem</i>	<i>Cause</i>	<i>Solution</i>
<b>Excessive Cutting Edge Wear</b>		
	Incorrect feeds & speeds	Increase feed - especially when machining ductile or free machining materials. Also try reducing speed
	Rough cutting edge	Lightly hone cutting edge with fine grit diamond hone
	Insufficient coolant	Increase coolant flow - review type of coolant
<b>Chipping</b>		
	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
<b>Short Tool Life</b>		
	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
<b>Glazed Finish</b>		
	Feed too light	Increase feed
	Dull cutting edge	Resharpen tool to original geometry
	Insufficient clearance	Resharpen tool with more clearance
<b>Rough Finish</b>		
	Dull cutting edge	Resharpen to original tool geometry
	Wrong feeds & speeds	Increase speed - also try reducing feed
<b>Chattering</b>		
	Insufficient machine horsepower	Use tool with fewer flutes as correct feeds & speeds must be maintained
	Vibration	Resharpen tool with more clearance

# Technical Section - Milling

## 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

# Technical Section - Milling

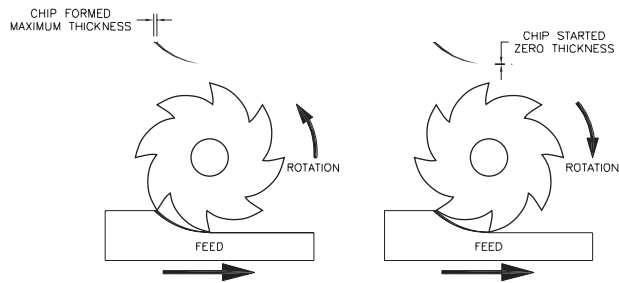
## MILLING EFFECTIVELY

### Types Of Cuts

#### Climb Milling Versus Conventional Milling

##### CLIMB MILLING

##### CONVENTIONAL MILLING



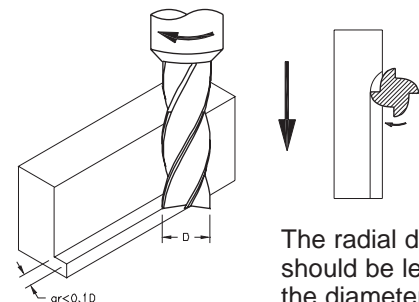
In conventional milling, the cutter revolves opposite to the direction of table feed. Therefore the width of the chip starts at zero and increases to a maximum at the end of the cut. This can lead to accelerated tool wear under some conditions. Conventional milling may be advantageous when milling hot 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.

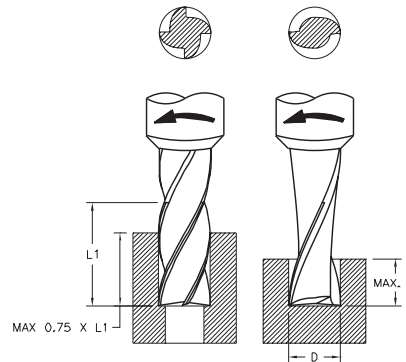
**Peripheral Milling** The milling of a surface which is parallel to the end mill axis.

#### Peripheral (Cylindrical, Slab) Milling



The radial depth of cut should be less than 0.1 of the diameter of the mill:  
 $a_r < 0.1 D$ .

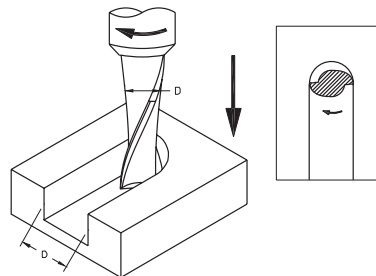
**Plunge Milling** The direct movement between the workpiece and the center line of the end mill when the end mill sinks directly into the workpiece.



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:  $a_r = D$ .

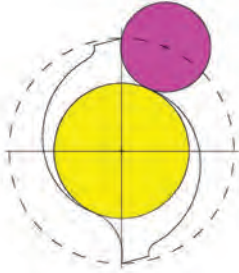
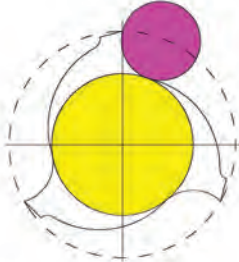
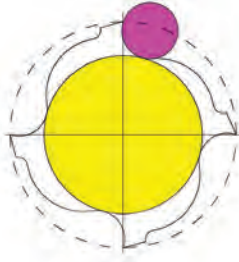
All slotting applications are a combination of conventional and climb milling. Refer to adjacent section.

# Technical Section - Milling

## 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"> <li>• Large chip space.</li> <li>• Easy chip ejection.</li> <li>• Good for slot milling.</li> <li>• Good for heavy duty milling.</li> <li>• Less rigidity due to small section area.</li> <li>• Lower quality surface finish</li> </ul>	<ul style="list-style-type: none"> <li>• Chip space almost as large as for 2 flutes.</li> <li>• Larger section area - higher rigidity than 2 flutes</li> <li>• Improved surface finish</li> </ul>	<ul style="list-style-type: none"> <li>• Highest rigidity.</li> <li>• Largest section area – small chip space.</li> <li>• Gives best surface finish.</li> <li>• Recommended for profiling, side milling and shallow slotting.</li> </ul>	

## 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.



# Technical Section - 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 center 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.




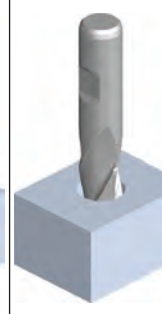
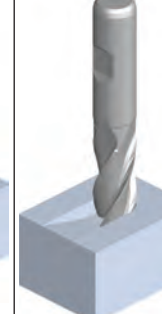
$$Q = \frac{a_p * a_e * v_f}{1000}$$

$Q$  = MRR (cm<sup>3</sup>/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.

# Technical Section - 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
<b>SFM</b> = Surface Feet Per Minute	$D \times \text{RPM} \times .26 = \text{SFM}$
<b>RPM</b> = Revolutions Per Minute	$\frac{\text{SFM} \times 3.82}{D} = \text{RPM}$
<b>F</b> = Feed in Inches Per Minute	$\text{Ft} \times T \times \text{RPM} = F$
<b>Ft</b> = Feed Per Tooth	$\frac{F}{T \times \text{RPM}} = \text{Ft}$
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'	



# Technical Section - Milling

## CUTTING DATA

### S400HA SLOTTING

Materials:	AMG 7.1 - 7.4 Aluminum & Non-Ferrous Metals			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/16	15,600	29.44	255	0.0019
3/32	15,600	35.98	383	0.0039
1/8	15,600	42.52	511	0.0027
3/16	15,600	61.42	766	0.0039
1/4	15,600	70.87	1022	0.0045
5/16	12,000	85.05	983	0.0071
3/8	12,000	103.93	1179	0.0087
1/2	12,000	127.56	1572	0.0106
5/8	9,600	118.12	1572	0.0123
3/4	6,000	89.76	1179	0.0150
Axial DOC (maximum) = 0.5 x D				
Using Table Above...				
For AMG 6.1 & 6.4 — Use RPM & SFM x 0.3				
For AMG 8.1 - 8.3 — Use RPM & SFM x 0.3				

### S401HA SLOTTING

Materials:	AMG 7.1 - 7.4 Aluminum & Non-Ferrous Metals			
"D" Tool Dia.	RPM	IPM	SFM	IPR
5/32	12,400	36.4	508	0.0029
1/4	12,400	45.4	812	0.0037
5/16	9,920	54.5	812	0.0055
3/8	9,920	66.6	975	0.0067
1/2	9,920	81.8	1300	0.0082
5/8	7,440	75.7	1218	0.0102
3/4	4,960	60.6	975	0.0122
Axial DOC (maximum) = 0.5 x D				
Using Table Above...				
For AMG 8.1 - 8.3 — Use RPM & SFM x 0.3				

Materials:	AMG 6.1 - 6.4 Copper Alloys			
"D" Tool Dia.	RPM	IPM	SFM	IPR
5/32	3,720	9.1	152	0.0024
1/4	3,720	11.5	244	0.0031
5/16	2,852	13.6	234	0.0048
3/8	2,852	16.6	280	0.0058
1/2	2,852	20.5	374	0.0072
5/8	2,232	19.1	365	0.0086
3/4	1,426	15.2	280	0.0107
Axial DOC (maximum) = 0.5 x D				

RPM = Revolutions per Minute  
 IPM = Inches per Minute  
 SFM = Surface Feet per Minute  
 IPR = Inches per Revolution  
 DOC = Depth of Cut  
 FT (Feet per Tooth) = IPR / # of Teeth

### S400HA SIDE CUTTING

Materials	AMG 7.1 - 7.4 Aluminum & Non-Ferrous Metals			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/16	12,000	40.01	197	0.0033
3/32	12,000	48.35	295	0.0040
1/8	12,000	56.69	393	0.0047
3/16	12,000	80.32	590	0.0067
1/4	12,000	94.49	786	0.0079
5/16	9,600	108.66	786	0.0113
3/8	9,600	127.56	943	0.0133
1/2	9,600	160.56	1258	0.0167
5/8	7,200	146.52	1179	0.0204
3/4	4,800	113.39	943	0.0236
Axial DOC (maximum) = 1.0 x D				
Radial DOC (maximum) = 0.25 x D (up to ø 3/8)				
Radial DOC (maximum) = 0.5 x D (ø 1/2 - ø 3/4)				

### S401HA SIDE CUTTING

Materials	AMG 7.1 - 7.4 Aluminum & Non-Ferrous Metals			
"D" Tool Dia.	RPM	IPM	SFM	IPR
5/32	12,400	42.4	508	0.0034
1/4	12,400	60.6	812	0.0049
5/16	9,920	69.6	812	0.0070
3/8	9,920	81.8	975	0.0082
1/2	9,920	103	1300	0.0104
5/8	7,440	93.9	1218	0.0126
3/4	4,960	75.7	975	0.0153
Axial DOC (maximum) = 1.0 x D				
Radial DOC (maximum) = 0.25 x D (up to ø 3/8)				
Radial DOC (maximum) = 0.5 x D (ø 1/2 - ø 3/4)				

Materials	AMG 6.1 - 6.4 Copper Alloys			
"D" Tool Dia.	RPM	IPM	SFM	IPR
5/32	3,720	10.6	152	0.0028
1/4	3,720	15.2	244	0.0041
5/16	2,852	17.6	234	0.0062
3/8	2,852	20.6	280	0.0072
1/2	2,852	25.8	374	0.0090
5/8	2,232	23.6	365	0.0106
3/4	1,426	19.1	280	0.0134
Axial DOC (maximum) = 1.0 x D				
Radial DOC (maximum) = 0.25 x D (up to ø 3/8)				
Radial DOC (maximum) = 0.5 x D (ø 1/2 - ø 3/4)				

# Technical Section - Milling

## CUTTING DATA

### S402HA PROFILING

Materials:	AMG 7.1 - 7.4 Aluminum & Non-Ferrous Metals			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/4	14,500	71.65	950	0.0049
5/16	11,200	81.9	917	0.0073
3/8	11,200	96.2	1100	0.0086
1/2	11,200	122.85	1467	0.0110
5/8	8,800	110.5	1441	0.0126
3/4	5,600	104	1100	0.0186
<b>Using Table Above...</b>				
For AMG 6.1 & 6.4 — Use RPM & SFM x 0.3				
For AMG 8.1 - 8.3 — Use RPM & SFM x 0.3				

Axial Depth of Cut (DOC) recommendation = 0.2 x D  
 Radial Depth of Cut (DOC) recommendation = 0.5 x D  
 Note: Reduce the Feed in "Long Length" options by 50%

### S403HA & S404HA SLOTING

Materials:	AMG 7.1 - 7.4 Aluminum & Non-Ferrous Metals			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/8	15,600	43	511	0.0028
3/16	15,600	61.4	766	0.0039
1/4	15,600	73.7	1022	0.0047
5/16	12,000	86	983	0.0072
3/8	12,000	104.4	1179	0.0087
7/16	12,000	116.65	1376	0.0097
1/2	12,000	128.9	1572	0.0107
5/8	9,600	116.65	1572	0.0122
3/4	6,000	92.15	1179	0.0154
1"	6,000	98.3	1572	0.0164
Axial DOC (maximum) = 0.5 x D				
<b>Using Table Above...</b>				
For AMG 6.1 & 6.4 — Use RPM & SFM x 0.3				
For AMG 8.1 - 8.3 — Use RPM & SFM x 0.3				

### S403HA & S404HA SIDE CUTTING

Materials:	AMG 7.1 - 7.4 Aluminum & Non-Ferrous Metals			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/8	12,000	55.25	393	0.0046
3/16	12,000	79.8	590	0.0067
1/4	12,000	92.2	786	0.0077
5/16	9,600	110.55	786	0.0115
3/8	9,600	129	943	0.0134
7/16	9,600	144.4	1100	0.0150
1/2	9,600	159.8	1258	0.0166
5/8	7,200	147.4	1179	0.0205
3/4	4,800	113.6	943	0.0237
1"	4,800	116.65	1258	0.0243
Axial DOC (maximum) = 1.0 x D Radial DOC (maximum) = 0.25 x D (up to ø 3/8) Radial DOC (maximum) = 0.5 x D (ø 1/2 - ø 1")				

### S405HA

#### HIGH SPEED CUTTING (FINISHING)

Materials:	AMG 1.3-1.6 Carbon Steels, Alloy Steels			
	AMG 3.4 Cast Iron (up to 50 HRC)			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/4	16,800	240	1100	0.0143
5/16	12,600	240	1032	0.0190
3/8	10,000	235	983	0.0235
1/2	8,400	200	1100	0.0238
5/8	6,300	150	1032	0.0238
3/4	5,000	120	983	0.0240
Axial DOC (maximum) = 1.5 x D Radial DOC (maximum) = 0.05 x D				

Materials:	AMG 1.7 - 1.8 Alloy Steels & Tool Steels (from 50 HRC up to 60 HRC)			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/4	8,400	120	550	0.0143
5/16	6,300	120	516	0.0190
3/8	5,000	120	491	0.0240
1/2	4,200	100	550	0.0238
5/8	3,150	75	516	0.0238
3/4	2,500	58	491	0.0232
Axial DOC (maximum) = 1.5 x D Radial DOC (maximum) = 0.05 x D				

Materials:	AMG 1.8 Hardened Steels (from 60 HRC up to 65 HRC)			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/4	4,200	58	275	0.0138
5/16	3,200	58	262	0.0181
3/8	2,500	58	246	0.0232
1/2	2,100	50	275	0.0238
5/8	1,600	37	262	0.0231
3/4	1,260	30	248	0.0238
Axial DOC (maximum) = 1.5 x D Radial DOC (maximum) = 0.05 x D				

RPM = Revolutions per Minute  
 IPM = Inches per Minute  
 SFM = Surface Feet per Minute  
 IPR = Inches per Revolution  
 DOC = Depth of Cut  
 FT (Feet per Tooth) = IPR / # of Teeth

# Technical Section - Milling

## S406HA & S406HB

### SLOTTING & SIDE CUTTING

Materials:		AMG 1.1-1.5 Carbon Steels, Alloy Steels, and Cast Iron (under 40 HRC)			
"D" Tool Dia.	RPM	IPM	SFM	IPR	
1/8	12,735	10.2	417	0.0008	
3/16	8,490	10.9	417	0.0013	
1/4	6,370	11.5	417	0.0018	
5/16	5,100	13	418	0.0025	
3/8	4,245	18.4	417	0.0043	
7/16	4,010	24.5	460	0.0061	
1/2	3,500	25.9	459	0.0074	
9/16	3,110	26	458	0.0084	
5/8	2,800	26.1	459	0.0093	
3/4	2,340	24	460	0.0103	
1"	1,755	17.4	460	0.0099	

Axial DOC (maximum) = 1 x D (Slotting)  
 Axial DOC (maximum) = 1.5 x D (Side Cutting)  
 Radial DOC (maximum) = 0.5 x D (Side Cutting)

### SLOTTING & SIDE CUTTING

Materials:		AMG 2.2-2.4 Stainless Steels (300 Series)			
"D" Tool Dia.	RPM	IPM	SFM	IPR	
1/8	9,625	7.3	315	0.0008	
3/16	6,385	8.3	314	0.0013	
1/4	4,810	9.6	315	0.0020	
5/16	3,850	10.7	315	0.0028	
3/8	3,210	15.4	315	0.0048	
7/16	2,750	20.9	315	0.0076	
1/2	2,400	21	314	0.0088	
9/16	2,140	21.2	315	0.0099	
5/8	1,925	21.2	315	0.0110	
3/4	1,600	19.4	314	0.0121	
1"	1,200	14.7	314	0.0123	

Axial DOC (maximum) = 1 x D (Slotting)  
 Axial DOC (maximum) = 1.5 x D (Side Cutting)  
 Radial DOC (maximum) = 0.5 x D (Side Cutting)

### SLOTTING & SIDE CUTTING

Materials:		AMG 2.1-2.3 Stainless Steels (400 Series)			
"D" Tool Dia.	RPM	IPM	SFM	IPR	
1/8	13,475	7.6	441	0.0006	
3/16	12,000	8.4	590	0.0007	
1/4	6,815	9.6	446	0.0014	
5/16	5,390	10.7	441	0.0020	
3/8	4,490	15.4	441	0.0034	
7/16	3,850	20.9	441	0.0054	
1/2	3,370	21	441	0.0062	
9/16	2,990	21.2	441	0.0071	
5/8	2,700	21.2	442	0.0079	
3/4	2,250	19.4	442	0.0086	
1"	1,685	15.1	441	0.0090	

Axial DOC (maximum) = 1 x D (Slotting)  
 Axial DOC (maximum) = 1.5 x D (Side Cutting)  
 Radial DOC (maximum) = 0.5 x D (Side Cutting)

### SLOTTING & SIDE CUTTING

Materials:		AMG 4.1-4.3 Titanium			
"D" Tool Dia.	RPM	IPM	SFM	IPR	
1/8	8,320	7.6	272	0.0009	
3/16	5,550	8.4	273	0.0015	
1/4	4,160	9.6	272	0.0023	
5/16	3,330	10.7	273	0.0032	
3/8	2,770	15.4	272	0.0056	
7/16	2,380	20.7	273	0.0087	
1/2	2,080	21	272	0.0101	
9/16	1,850	21.2	273	0.0115	
5/8	1,660	21.2	272	0.0128	
3/4	1,390	19.4	273	0.0140	
1"	1,040	15.1	272	0.0145	

Axial DOC (maximum) = 1 x D (Slotting)  
 Axial DOC (maximum) = 1.5 x D (Side Cutting)  
 Radial DOC (maximum) = 0.5 x D (Side Cutting)

### SLOTTING & SIDE CUTTING

Materials:		AMG 5.1-5.3 Nickel Alloys, Inconel, Hastelloy			
"D" Tool Dia.	RPM	IPM	SFM	IPR	
1/8	2,565	2.1	84	0.0008	
3/16	1,685	1.8	83	0.0011	
1/4	1,285	2.5	84	0.0019	
5/16	1,025	2.8	84	0.0027	
3/8	855	4.1	84	0.0048	
7/16	735	5.5	84	0.0075	
1/2	640	5.6	84	0.0088	
9/16	570	5.7	84	0.0100	
5/8	510	5.6	84	0.0110	
3/4	425	5.2	84	0.0122	
1"	315	4.3	83	0.0137	

Axial DOC (maximum) = 0.5 x D (Slotting)  
 Axial DOC (maximum) = 1.0 x D (Side Cutting)  
 Radial DOC (maximum) = 0.35 x D (Side Cutting)

RPM = Revolutions per Minute  
 IPM = Inches per Minute  
 SFM = Surface Feet per Minute  
 IPR = Inches per Revolution  
 DOC = Depth of Cut  
 FT (Feet per Tooth) = IPR / # of Teeth

# Technical Section - Milling

## CUTTING DATA

### S407HA

#### SLOTTING & SIDE CUTTING

Materials:	AMG 1.1-1.4 Alloy Steels			
	AMG 3.1-3.3 Cast Iron (up to 30 HRC)			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/8	12,735	10.2	417	0.0008
3/16	8,490	10.9	417	0.0013
1/4	6,370	11.5	417	0.0018
5/16	5,100	13	418	0.0025
3/8	4,245	18.4	417	0.0043
7/16	4,010	24.5	460	0.0061
1/2	3,500	25.9	459	0.0074
9/16	3,110	26	458	0.0084
5/8	2,800	26.1	459	0.0093
3/4	2,340	24	460	0.0103
1"	1,755	17.4	460	0.0099

Axial DOC (maximum) = 1 x D (Slotting)  
 Axial DOC (maximum) = 1.5 x D (Side Cutting)  
 Radial DOC (maximum) = 0.5 x D (Side Cutting)

#### SLOTTING & SIDE CUTTING

Materials:	AMG 1.4-1.6 Alloy Steels			
	AMG 3.2-3.4 Cast Iron (from 30 HRC to 40 HRC)			
"D" Tool Dia.	RPM	IPM	SFM	IPR
1/8	8,910	7.1	292	0.0008
3/16	5,940	7.6	292	0.0013
1/4	4,460	8.1	292	0.0018
5/16	3,560	9.1	291	0.0026
3/8	2,970	12.7	292	0.0043
7/16	2,800	17	321	0.0061
1/2	2,460	18	322	0.0073
9/16	2,180	18.1	321	0.0083
5/8	1,960	18.3	321	0.0093
3/4	1,640	16.7	322	0.0102
1"	1,230	12.2	322	0.0099

Axial DOC (maximum) = 1 x D (Slotting)  
 Axial DOC (maximum) = 1.5 x D (Side Cutting)  
 Radial DOC (maximum) = 0.5 x D (Side Cutting)

# Technical Section - Milling

## MILLING TROUBLESHOOTING GUIDE

<i>Problem</i>	<i>Solution</i>	
<b>Chipping of the Cutting Edge</b>	<ul style="list-style-type: none"> <li>• Apply hone .0005" to .001"</li> <li>• Try air blow or coolant</li> <li>• Reduce depth of cut</li> <li>• Check amount of wear on collet</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce feed per tooth</li> <li>• If wet cutting, change to dry cutting</li> <li>• Check tool runout</li> <li>• Improve the stability of the work-holding</li> </ul>
<b>Extreme Flank Wear</b>	<ul style="list-style-type: none"> <li>• Use coated end mill</li> <li>• If conventional milling, change to climb</li> <li>• If using water soluble cutting fluid, change to non-water soluble cutting fluid</li> </ul>	<ul style="list-style-type: none"> <li>• Increase helix angle</li> <li>• If conventional milling, change to climb</li> </ul>
<b>Vibration / Chattering</b>	<ul style="list-style-type: none"> <li>• Use larger diameter end mill</li> <li>• Increase feed per tooth</li> <li>• Increase helix angle</li> <li>• Reduce length of flutes or overhang</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce cutting speed</li> <li>• Check or change the holder</li> <li>• Increase number of flutes</li> <li>• Tighten chuck or use stronger chuck</li> </ul>
<b>Deflection</b>	<ul style="list-style-type: none"> <li>• Reduce depth of cut</li> <li>• Increase feed per tooth</li> <li>• Increase helix angle</li> <li>• If using water soluble cutting fluid, change to non-water soluble cutting fluid</li> </ul>	<ul style="list-style-type: none"> <li>• Use larger diameter end mill</li> <li>• Reduce length of flutes or overhang</li> <li>• If using 2-flute type, change to 4-flute type</li> <li>• If climb milling, change to conventional milling</li> </ul>
<b>Poor Surface Finish</b>	<ul style="list-style-type: none"> <li>• Reduce end mill runout</li> <li>• Increase cutting speed</li> <li>• Reduce feed per tooth</li> <li>• Use small hone .0003" to .0006"</li> <li>• Increase helix angle</li> </ul>	<ul style="list-style-type: none"> <li>• Increase number of flutes</li> <li>• Increase volume of air or cutting fluid</li> <li>• Reduce depth of cut</li> <li>• If dry cutting, change to wet cutting</li> </ul>
<b>Waviness</b>	<ul style="list-style-type: none"> <li>• Reduce helix angle</li> <li>• Check end mill runout</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce depth of cut</li> <li>• Check or change the holder</li> </ul>
<b>End Mill Fracturing</b>	<ul style="list-style-type: none"> <li>• Reduce depth of cut</li> <li>• Reduce feed per tooth</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce length of flutes or overhang</li> <li>• If chip jamming occurs, reduce the number of flutes</li> </ul>
<b>Poor Chip Disposal</b>	<ul style="list-style-type: none"> <li>• Use air blow</li> <li>• Reduce depth of cut</li> <li>• Reduce feed per tooth</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce the number of flutes</li> <li>• Increase volume of air or cutting fluid</li> <li>• Increase cutting speed</li> </ul>
<b>Burring Workpiece Chipping</b>	<ul style="list-style-type: none"> <li>• Reduce helix angle</li> <li>• Reduce feed per tooth</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce depth of cut</li> </ul>
<b>Chip Welding</b>	<ul style="list-style-type: none"> <li>• Use coolant</li> <li>• Use coated end mill</li> </ul>	<ul style="list-style-type: none"> <li>• Increase volume of cutting fluid</li> <li>• Increase helix angle</li> </ul>

## Technical Section - General



# Technical Section - General

## 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 $\beta$ -Brass, Bronze	314-340, 350-370	<200 HB
	6.3 $\alpha$ -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	Ulramid, 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 - 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%																Ø Diameter			
	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								

**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



# APPLICATION MATERIAL GROUPS - DRILLS

## SURFACE FEET PER MINUTE (SFM)

\*Feed rate chart - see page 573. For material examples, see page 567.

	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
0860	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
502-6			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
A101	35H	30H	25F	20F	13E	9D			15E	8G	9C		30H	24F	20E	14E	23E
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
A160	197E	197E	180D	164D	131C	121A			131B	115C	115A		164C	131A	115A	98A	115A
A170	115H	98H	82F	66E	43D	30C			49D	23F	23B		89H	72E	62D	39D	56E
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
A243			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
A244			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
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
A720	115A	98A	89A	75A	56A	33A			72A	33A	49A		98A	79A	66A	46A	75A
A730	115J	98H	89G	75F	56E	33D			79E	36G	56C		115J	92G	72E	56E	92G
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
ATR41			82F	66F	43E	30D			49E	26G	30C		98I	79F	66E	46E	75F
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	197E	197E	180D	164D	131C	121A			131B	115C	115A		164C	131A	115A	98A	115A
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
DS-120	279S	246S	246S	230S	148S	148S	98S	98S	174S	148S			246T	246T	180T	180T	148T

# APPLICATION MATERIAL GROUPS - DRILLS

## SURFACE FEET PER MINUTE (SFM)

\*Feed rate chart - see page 573. For material examples, see page 567.

	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	
0860	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
502-6	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	
A101	12D	6B	10G	6E	3A	33G	35I	27H	16G	33J	30I	27H	24F	30J	28H	14F	3B	
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	
A160	115A	82A	98A	82A	66A	180D	230G	197C	164C	164I	148H	131G	115F		197E		30C	
A170	30C	16A	26F	13D	10A	115F	108H	89G	52F	108I	98H	89G	72G	98I	92G	46E	10A	
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	
A243	39D	20B	33G	20E	10A			89H	52G				79F					10B
A244	39D	20B	33G	20E	10A			89H	52G				79F					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				
A720	56A	26A	33A	23A	13A	115A	131A	115A	89A	115A	98A	89A	89A	157A	82A			
A730	66D	36C	49G	23E	20B	125L	131J	89H	69F	108J	98I	98H	89F	115K	92J	66H	16C	
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					
ATR41	39D	20B	33G	20E	10A			89H	52G				79F					10B
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	115A	82A	98A	82A	66A	180D	230G	197C	164C	164I	148H	131G	115F		197E		30C	
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			
DS-120	115T	82S	148T	98S	66S	902V	820V	820V	230T	656V	656V	367V	197V	197X	328V			

# APPLICATION MATERIAL GROUPS - DRILLS

## SURFACE FEET PER MINUTE (SFM)

\*Feed rate chart - see page 573. For material examples, see page 567.

	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
DS-142	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
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	443V	394V	361V	328V	262V	213U	98U	82U	246V	115V	98U		394W	394W	262V	262V	180V
R454	410V	361V	295V	262V	197V	164U	98U	82U	148U	131T	115T	115T	295W	295W	230V	230V	164U
R457	443W	394W	361W	328W	262W	213U	98U	82U	246V	115V	98U		394W	394W	262V	262V	180V
R458	410W	361W	295W	262V	197V	164U	98U	82U	148U	131T	115T	115T	295W	295W	230V	230V	164U
R459	443V	394V	361U	328U	262U	180T			246V	115V	98U		394W	394W	262V	262V	
R463									279G	246G	197F						180V
R467									279G	246G	197F						180V
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 1.5x			361W	307W	307W	217T						127T			318U	318U	
R950 3x			328W	279W	279W	230U						115T			289V	289V	
R950 5x			328V	279V	279V	213U						115S			279V	279V	
R950 8x			295U	246U	246U	197T						98S			262U	262U	

# APPLICATION MATERIAL GROUPS - DRILLS

## SURFACE FEET PER MINUTE (SFM)

\*Feed rate chart - see page 573. For material examples, see page 567.

	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
DS-142	115T	82S	148T	98S	66S	902V	820V	820V	230T	656V	656V	367V	197V	197X	328V			
HX10	75H		59H															
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					
R459						410V	722V	722V	328U	935W	935W	623V	312V					
R463	148V	131U	180U	148U	131U													
R467	148V	131U	180U	148U	131U													
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 1.5x																		
R950 3x																		
R950 5x																		
R950 8x																		

# APPLICATION MATERIAL GROUPS - DRILLS

## SURFACE FEET PER MINUTE (SFM)

\*Feed rate chart - see page 573. For material examples, see page 567.

	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
<b>R950 12x</b>			262U	223U	223U	158S						92S				231U	231U
<b>R960 1.5x</b>	397W	361W							217V	180T	144T		433V	418V			163T
<b>R960 3x</b>	361W	328W							197V	164T	131T		394V	380V			148T
<b>R960 5x</b>	361V	328V							164V	164S	131S		374V	354V			148T
<b>R960 8x</b>	328U	295U							148U	131S	115S		348U	328U			115S
<b>R960 12x</b>	289U	262U							157U	131S	92S		315U	304U			118S
<b>R970 1.5x</b>	397W	361W											433V	418V	318U	318U	
<b>R970 3x</b>	361W	328W											394V	380V	289U	289U	
<b>R970 5x</b>	361V	328V											374V	354V	279V	279V	
<b>R970 8x</b>	328U	295U											346U	328U	262U	262U	
<b>R970 12x</b>	289U	262U											315U	314U	231U	231U	
<b>S209</b>	115I	98I	82F	66F	39E	30D			49E	30G	33C		98I	79E	66E	46E	75F
<b>SPL-120</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPL-90</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPLG-120</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPLG-90</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPR-120</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPR-90</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPRG-120</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPRG-90</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPS-120</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPS-90</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPSG-120</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>SPSG-90</b>	115E	98E	89C	69C	46C	33B			52C	30D	33B		105E	89C	66C	52B	89C
<b>T400</b>	75F	46F	49F	49D	36D				66F	39D	39D		108E	59H	59F		69F
<b>TS10CO</b>	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
<b>TS15CO</b>	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
<b>TS18CO</b>	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
<b>TS40CO</b>	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
<b>TS41CO</b>	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
<b>TS42CO</b>	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
<b>TS51CO</b>	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
<b>TS52CO</b>	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
<b>TS55CO</b>	125K	108H	98G	89G	59F	36E			72F	36H	49D		112K	98F	72F	56F	98G
<b>TS10HS</b>	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
<b>TS15HS</b>	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
<b>TS18HS</b>	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
<b>TS40HS</b>	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
<b>TS41HS</b>	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
<b>TS42HS</b>	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
<b>TS51HS</b>	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
<b>TS52HS</b>	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G
<b>TS55HS</b>	115J	98J	89G	69G	46F	33E			52F	30H	33D		105J	89G	66F	52F	89G



# APPLICATION MATERIAL GROUPS - DRILLS

## SURFACE FEET PER MINUTE (SFM)

\*Feed rate chart - see page 573. For material examples, see page 567.

	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
R950 12x																		
R960 1.5x	127T	108S	127T	108S	90S													
R960 3x	115T	98S	115T	98S	82S													
R960 5x	115T	98S	115T	98S	82S													
R960 8x	98S	82S	98S	82S	66S													
R960 12x	92S	78S	92S	78S	66S													
R970 1.5x																		
R970 3x																		
R970 5x																		
R970 8x																		
R970 12x																		
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	
T400	36D		49D															
TS10CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
TS15CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
TS18CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
TS40CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
TS41CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
TS42CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
TS51CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
TS52CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
TS55CO	59F	33C	49H	30F	20C	125I	131K	89J	52I	115K	108J	102I	98G	115M	92K	56I	20C	
TS10HS	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
TS15HS	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
TS18HS	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
TS40HS	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
TS41HS	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
TS42HS	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
TS51HS	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
TS52HS	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	
TS55HS	52E	26C	43H	26F	13B	118H	125J	89I	52H	108K	98J	98I	82I	98K	115I	56G	13C	

# APPLICATION MATERIAL GROUPS - TAPS

## SURFACE FEET PER MINUTE (SFM)

For material examples, see page 567.

1500	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1500A	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1500L	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1500OV	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1505	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1508	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1519	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1528	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1534	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1534NE	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1534NR	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1541	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1542	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1543	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1544										65	40	40	25	
1545	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1545A	60	45	30	30	20	10	25	15	15					20
1548	60	50	35	35			25	20	20					20
1549	60	50	35	35			25	20	20					20
1567	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1568	45	35	25	15	10		25	15	15					20
1572	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1578	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1580	120	100	60	60	40		50	30	40					40
1582	60	50	35	35			25	20	20					20
1585	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1585A	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1585NR	65	60	40	40	25	15	20	13	10	50	30	30	20	20
1585OV	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1586	60	50	35	35			26	20	20					20
1587														
1588														
1590	70	60	40	40	30		30	26	20					20
1591	70	60	40	40	30		30	26	20					20
1592	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1593	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1595	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1599										65	40	40	25	
1599SB										65	40	40	25	
1600										65	40	40	25	
1634	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1641	150	125	90	90			70	60	50					60
1671	150	125	90	90			70	60	50					60
1672AP	110	90	55	55	45		50	40	40					35
1673AP	110	90	55	55	45		50	40	40					35
1674	120	100	65	65	50		60	40	45					40
1675	120	100	65	65	50		60	40	45					40
1676AP	100	80	50	50	40		45	30	35					30
1677AP	100	80	50	50	40		45	30	35					30
1678	110	90	55	55	45		50	40	40					35
1679	110	90	55	55	45		50	40	40					35
1681AP	150	125	90	90			70	50	60					60
1687AP	150	125	90	90			70	50	60					60
1691AP	165	135	100	100			80	70	60					70
1697AP	165	135	100	100			80	70	60					70
1700M	60	45	30	30	20	10	25	15	15	50	30	30	15	20
1785M	65	60	40	40	25	15	30	20	20	50	30	30	20	20
1785NR	66	59	46	33	16	10	20	13	10	46	26	26	16	
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

# APPLICATION MATERIAL GROUPS - TAPS

## SURFACE FEET PER MINUTE (SFM)

For material examples, see page 567.

1500	15	20	10	25	80	60	10	50	100	75	20	25	15	
1500A	15	20	10	25	80	60	10	50	100	75	20	25	15	
1500L	15	20	10	25	80	60	10	50	100	75	20	25	15	
1500OV	15	20	10	25	80	60	10	50	100	75	20	25	15	
1505	15	20	10	25	80	60	10	50	100	75	20	25	15	
1508	15	20	10	25	80	60	10	50	100	75	20	25	15	
1519	15	20	10	25	80	60	10	50	100	75	20	25	15	
1528	15	20	10	25	80	60	10	50	100	75	20	25	15	
1534	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1534NE	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1534NR	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1541	15	20	10	25	80	60	10	50	100	75	20	25	15	
1542	15	20	10	25	80	60	10	50	100	75	20	25	15	
1543	15	20	10	25	80	60	10	50	100	75	20	25	15	
1544							15							
1545	15	20	10	25	80	60	10	50	100	75	20	25	15	
1545A	15	20	10	25	80	60	10	50	100	75	20	25	15	
1548	15	5	20	15										
1549	15	5	20	15										
1567	15	20	10	25	80	60	10	50	100	75	20	25	15	
1568	10	20	10	30	50	50		50	75	50		25	15	
1572	15	20	10	25	80	60	10	50	100	75	20	25	15	
1578	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1580	30	40		50	150	120		100	200	125				
1582	15	5	20	15										
1585	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1585A	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1585NR	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1585OV	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1586	15	5	20	15										
1587				30	80	60		50	60	60				
1588				30	80	60		50	60	60				
1590	15	5		10										
1591	15	5		10										
1592	15	20	10	25	80	60	10	50	100	75	20	25	15	
1593	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1595	15	20	10	25	80	60	10	50	100	75	20	25	15	
1599							15							
1599SB							15							
1600							15							
1634	16	7	26	10	30	89	69	10	49	98	66	20	98	26
1641			45		55	180	130		180	200	230			
1671			45		55	180	130		180	200	230			
1672AP	25	35	20	45	120	100		85	100	85	30			
1673AP	25	35	20	45	120	100		85	100	85	30			
1674	30	40	25	50	125	110		95	120	95	40			
1675	30	40	25	50	125	110		95	120	95	40			
1676AP	20	30	15	40	100	90		80	95	80	30			
1677AP	20	30	15	40	100	90		80	95	80	30			
1678	25	35	20	45	120	100		85	100	85	30			
1679	25	35	20	45	120	100		85	100	85	30			
1681AP			45		55	180	130		180	200	230			
1687AP			45		55	180	130		180	200	230			
1691AP			55		70	200	160		200	240	260			
1697AP			55		70	200	160		200	240	260			
1700M	15	20	10	25	80	60	10	50	100	75	20	25	15	
1785M	15	5	25	10	30	90	70	10	70	100	75	20	90	25
1785NR		10	33	13	33		49		33	82	43	33	66	
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			



# APPLICATION MATERIAL GROUPS - TAPS

## SURFACE FEET PER MINUTE (SFM)

For material examples, see page 567.

3306E	98	79	49	49	30		39	30					30	
6541	16	16	23	20	13					23	16	23	16	
E000	82	72	59	52	33	16				49	26	49	26	33
E000TIN	131	131	105	89	43	36	26	23	16	72	23	16		49
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					
E011	82	72	59	52	33	16	23	20	13	49	26	49	26	
E013	82	72	59	52	33		23	20	13					
E016	82	72	59	52	33	16	26	23	16	49	26	49	26	
E018	82	72	59	52	33		23	20	13					
E021	82	72	59	52	33	16	23	20	13	49	26	49	26	
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					
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					
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					
E624	108	95	75	69	43									
E625	108	95	75	69	43									
E626				98	66	36								
E627				98	66	36								
E628		72	59	52	33		46	33	20					
E629		72	59	52	33		46	33	20					
E630										98	82	115	82	
E631										98	82	115	82	
E650	82	72	59	49						26				
E651	82	72	59	49						26				
E653	82	72	59	49						26				
E654	82	72	59	49						26				
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	
E764	108	95	75	69	43									
E765	108	95	75	69	43									
E766				98	66	36								
E767				98	66	36								
E768		72	59	52	33		46	33	20					
E769		72	59	52	33		46	33	20					
E770										98	82	115	82	
E771										98	82	115	82	
E805				55	42	22								

# APPLICATION MATERIAL GROUPS - TAPS

## SURFACE FEET PER MINUTE (SFM)

For material examples, see page 567.

3306E	26	30	39	121	98	79	161	98				
6541				39				39	26	16		
E000	16	39	16	39	98	66	52	115	66	49	98	
E000TIN	23	59	26	59	148	115		98	72		148	
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												
E011												
E013												
E016												
E018												
E021												
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												
E033												
E035	16	39	16	39	98	66	52	115	66	49	98	
E036												
E037	16	39	16				52	115	66	49	98	
E038												
E061				39	98	66			66	49	39	23
E071				39	98	66			66	49	39	23
E201					66					49	33	
E252					66					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	
E624				39	98	66						
E625				39	98	66						
E626	33		33									
E627	33		33									
E628												
E629												
E630					98		16			66		49
E631					98		16			66		49
E650					98	66		59	115			98
E651					98	66		59	115			98
E653					98	66		59	115			98
E654					98	66		59	115			98
E710					36					36	23	13
E711					36					36	23	13
E712					36					36	23	13
E721					36					36	23	13
E764				39	98	66						
E765				39	98	66						
E766	33		33									
E767	33		33									
E768												
E769												
E770					98		16			66		49
E771					98		16			66		49
E805	42	26		16	10							

# APPLICATION MATERIAL GROUPS - TAPS

## SURFACE FEET PER MINUTE (SFM)

For material examples, see page 567.

E806					55	42	22												
E808	108	95	75	69	43														
E809	108	95	75	69	43														
E810					98	66	36												
E811					98	66	36												
E812		72	59	52	33			46	33	20									
E813		72	59	52	33			46	33	20									
E814													98	82	115	82			
E815													98	82	115	82			
E816					55	42	22												
E817					55	42	22												
E905					55	42	22												
E906					55	42	22												
E908	108	95	75	69	43														
E909	108	95	75	69	43														
E910					98	66	36												
E911					98	66	36												
E912		72	59	52	33			46	33	20									
E913		72	59	52	33			46	33	20									
E914													98	82	115	82			
E915													98	82	115	82			
E916					55	42	22												
E917					55	42	22												
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				
EX006H	82	72	59	52	33														33
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				

# APPLICATION MATERIAL GROUPS - TAPS

## SURFACE FEET PER MINUTE (SFM)

For material examples, see page 567.

E806	42	26	16	10										
E808					39	98	66							
E809					39	98	66							
E810	33		33											
E811	33		33											
E812														
E813														
E814					98	16		66	49					
E815					98	16		66	49					
E816	42	26	16	10										
E817	42	26	16	10										
E905	42	26	16	10										
E906	42	26	16	10										
E908					39	98	66							
E909					39	98	66							
E910	33		33											
E911	33		33											
E912														
E913														
E914					98	16		66	49					
E915					98	16		66	49					
E916	42	26	16	10										
E917	42	26	16	10										
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														
EX006H	16		39	16				52	115	66	49			
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

## APPLICATION MATERIAL GROUPS - DIES SURFACE FEET PER MINUTE (SFM)

*For material examples, see page 567.*

	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
<b>2010</b>	26	23	20	16					13	7			26	23	20	16	
<b>2025</b>	26	23	20	16					13	7			26	23	20	16	
<b>2325M</b>	26	23	20	16					13	7			26	23	20	16	
<b>2510</b>	26	23	20	16					13	7			26	23	20	16	
<b>2710M</b>	26	23	20	16					13	7			26	23	20	16	
<b>F201</b>	26	23	20	16					13	7			26	23	20	16	
<b>F302</b>	26	23	20	16					13	7			26	23	20	16	
<b>F312</b>	26	23	20	16					13	7			26	23	20	16	
<b>F320</b>	26	23	20	16					13	7			26	23	20	16	
<b>F330</b>	26	23	20	16					13	7			26	23	20	16	
<b>F370</b>	26	23	20	16					13	7			26	23	20	16	

# APPLICATION MATERIAL GROUPS - DIES

## SURFACE FEET PER MINUTE (SFM)

For material examples, see page 567.

	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 582 & 583. For material examples, see page 567.

	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
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
C600	98A	89A	75B										82A	66A	82B		59D
C601	98A	89A	75B										82A	66A	82B		59D
C602	98A	89A	75B										82A	66A	82B		59D
C603	164A	131A	115B	98B					75F				92A	75A	131B	82B	92D
C604	112S	89S	79T										89S	72S	89T		62V
C605	164A	131A	115B						75F	62F							92D
C606	148A	118A	102B						66F	56F							82D
C607		131A	115B	98B	66C					62F				75A	131B	82B	92D
C608	164G	131G	115H	98H					75L				92G	75G	131H	82H	92J
C609	197G	184G	161H	138H					105L				128G	105G	184H	128H	128J
C610	164G	131G	115H	98H					75L				92G	75G	131H	82H	92J
C611	197G	184G	161H	138H					105L				128G	105G	184H	128H	128J
C612	148G	118G	102H	89H					66L				82G	66G	118H	72H	82J
C613	148G	118G	102H	89H					66L				82G	66G	118H	72H	82J
C614	115S	92S	79T	69T					52Y				92S	75S	92T	56T	62V
C615	164S	131S	115T	98T					75Y				92S	75S	131T	82T	92V
C617	115S	92S	79T	69T					52Y				92S	75S	92T	56T	62V
C618	164S	131S	115T	98T					75Y				92S	75S	131T	82T	92V
S106																	
S108	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
S109	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
S110	269B	212B	212B	171B	152B	140B			190A	125A	103A	78A	336B	284B	284B	225B	
S111	249B	200B	200B	161B	144B	131B			180A	108A	98A	66A	298B	249B	249B	200B	
S112	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
S113	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
S114	269B	212B	212B	171B	152B	140B			190A	125A	103A	78A	336B	284B	284B	225B	
S115	249B	200B	200B	161B	144B	131B			180A	108A	98A	82A	298B	249B	249B	200B	
S116	289B	223B	223B	180B	161B	148B			200A	141A	108A	89A	374B	318B	318B	249B	
S121	289B	223B	223B	180B	161B	148B			200A	141A	108A		374B	318B	318B	249B	
S129	361B	325B	325B	298B	249B	230B			239A	171A	131A	105A	449B	377B	377B	279B	
S134	361B	325B	325B	298B	249B	230B			239A	171A	131A	105A	449B	377B	377B	279B	
S135	361B	325B	325B	298B	249B	230B			239A	171A	131A	105A	449B	377B	377B	279B	
S136	343B	312B	312B	287B	238B	205B			220A	156A	123A	97A	405B	338B	338B	254B	
S137	325B	298B	298B	276B	226B	180B			200A	141A	115A	89A	361B	298B	298B	230B	
S138	361B	325B	325B	298B	249B	230B			239A	171A	131A	98A	449B	377B	377B	279B	
S139	361B	325B	325B	298B	249B	230B			239A	171A	131A	98A	449B	377B	377B	279B	
S146	343B	312B	312B	287B	238B	205B			220A	156A	123A	97A	405B	338B	338B	254B	
S147	325B	298B	298B	276B	226B	180B			200A	141A	115A		361B	298B	298B	230B	
S206																	
S207																	
S208	400B	298B	298B	259B	230B	200B			325A	223A	174A	131A	551B	525B	525B	374B	230B
S211	361B	269B	269B	239B	200B	180B			298A	180A	171A	131A	499B	400B	400B	341B	200B
S212	400B	298B	298B	259B	230B	200B			325A	223A	174A	131A	551B	525B	525B	374B	230B
S213	400B	298B	298B	259B	230B	200B			325A	223A	174A	131A	551B	525B	525B	374B	230B
S215	361B	269B	269B	239B	200B	180B			298A	180A	171A	89A	499B	400B	400B	341B	200B
S221	400B	298B	298B	259B	230B	200B			325A	223A	174A		551B	525B	525B	374B	230B
S223HA	801C	778C	522C	463B	328B	285A	187A	125A	489B	400B	302B	256B	456C	381B	305B	256B	255B
S223HB	801C	778C	522C	463B	328B	285A	187A	125A	489B	400B	302B	256B	456C	381B	305B	256B	255B
S234	499B	449B	449B	423B	400B	328B			351A	276A	200A	164A	699B	649B	649B	430B	259B
S235	499B	449B	449B	423B	400B	328B			351A	276A	200A	164A	699B	649B	649B	430B	259B
S236	474B	425B	425B	406B	380B	313B			338A	251A	182A	140A	650B	578B	578B	415B	245B

# APPLICATION MATERIAL GROUPS - END MILLS

## SURFACE FEET PER MINUTE (SFM)

\*Feed rate chart - see pages 582 & 583. For material examples, see page 567.

	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
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				
C600	49D		98D	20C		180C	197C	197C		197E	180E	115E		197C				
C601	49D		98D	20C		180C	197C	197C		197E	180E	115E		197C				
C602	49D		98D	20C		180C	197C	197C		197E	180E	115E		197C				
C603	75D		157D	43C		410C	410C	410C		984E	984E	295E		410C				
C604	49V		108V	20U		200U	223U	223U		243X	194X	144X		200U				
C605			157D			410C				984E	984E	295E		410C				
C606			141D			367C				886E	886E	266E		367C				
C607	75D	33D		43C	20D		410C	410C	49C			295E	197A		410C			
C608	75J		157J	43I		410I	410I	410I			984K	295K		410I				
C609	105J		220J	59I		574I	574I	574I			1378K	413K		574I				
C610	75J		157J	43I		410I	410I	410I			984K	295K		410I				
C611	105J		220J	59I		574I	574I	574I			1378K	413K		574I				
C612	66J		141J	36I		367I	367I	367I			886K	266K		367I				
C613	66J		141J	36I		367I	367I	367I			886K	266K		367I				
C614	52V		108V	20U		203U	223U	223U			197X	148X		203U				
C615	75V		157V	43U		410U	410U	410U		984X	984X	295X		410U				
C617	52V		108V	20U		203U	223U	223U			197X	148X		203U				
C618	75V		157V	43U		410U	410U	410U		984X	984X	295X		410U				
S106										2326C	1749C	1171C	751B					
S108						649C	499C	499C	125B	1499C	1499C	649C	400B					
S109						649C	499C	499C	125B	1499C	1499C	649C	400B					
S110						617C	474C	474C	117B	1424C	1424C	617C	380B					
S111						584C	449C	449C	108B	1348C	1348C	584C	361B					
S112						649C	499C	499C	125B	1499C	1499C	649C	400B					
S113						649C	499C	499C	125B	1499C	1499C	649C	400B					
S114						617C	474C	474C	117B	1424C	1424C	617C	380B					
S115			148B			584C	449C	449C	108B	1348C	1348C	584C	361B					
S116						649C	499C	499C	125B	1499C	1499C	649C	400B					
S121						649C	499C	499C	125B	1499C	1499C	649C	400B					
S129						679C	574C	574C	144B	1601C	1601C	708C	479B					
S134						679C	574C	574C	144B	1601C	1601C	708C	479B					
S135						679C	574C	574C	144B	1601C	1601C	708C	479B					
S136						646C	546C	546C	138B	1525C	1525C	674C	455B					
S137						613C	518C	518C	131B	1450C	1450C	640C	430B					
S138						679C	574C	574C	144B	1601C	1601C	708C	479B					
S139						679C	574C	574C	144B	1601C	1601C	708C	479B					
S146						646C	546C	546C	138B	1525C	1525C	674C	455B					
S147						613C	518C	518C	131B	1450C	1450C	640C	430B					
S206										2326C	1749C	1171C	751B					
S207										2093C	1575C	1056C	676B					
S208	200B	190B	230B	161A	98A													
S211	180B	174B	200B	141A	85A													
S212	200B	190B	230B	161A	98A													
S213	200B	190B	230B	161A	98A													
S215	180B	174B	200B	141A	85A													
S221	200B	190B	230B	161A	98A													
S223HA	463B	387A	358B	269A	223A													
S223HB	463B	387A	358B	269A	223A													
S234	230B	200B	266B	200A	131A													
S235	230B	200B	266B	200A	131A													
S236	220B	190B	251B	190A	123A													
S237	210B	180B	236B	180A	115A													



# APPLICATION MATERIAL GROUPS - END MILLS

## SURFACE FEET PER MINUTE (SFM)

\*Feed rate chart - see pages 582 & 583. For material examples, see page 567.

	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
S237	449B	400B	400B	390B	361B	298B			325A	226A	164A	115A	600B	508B	508B	400B	230B
S238	499B	449B	449B	423B	400B	328B			351A	276A	200A	148A	699B	649B	649B	430B	259B
S239	499B	449B	449B	423B	400B	328B			351A	276A	200A	148A	699B	649B	649B	430B	259B
S246	450B	412B	412B	387B	363B	288B			288A	233A	176A	135A	500B	540B	540B	384B	230B
S247	400B	374B	374B	351B	325B	249B			226A	190A	151A	121A	499B	430B	430B	338B	200B
S248HA	801C	778C	522C	463B	328B	285A	364A	240A	489B	400B	302B	256A	771C	571B	538B	433B	1017B
S248HB	801C	778C	522C	463B	328B	285A	364A	240A	489B	400B	302B	256A	771C	571B	538B	433B	1017B

### 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				0.0010	0.0015	0.0015	0.0015	0.0015	0.0020	0.0020	0.0025	
			B				0.0020	0.0020	0.0025	0.0030	0.0035	0.0040	0.0040	0.0045	
			C				0.0030	0.0035	0.0040	0.0045	0.0050	0.0055	0.0060	0.0070	
3-4		↓ 1,5 ↔ 0,1	A	0.0010	0.0015	0.0020	0.0020	0.0025	0.0025	0.0030	0.0035	0.0040	0.0045	0.0050	
			B	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045	0.0050	0.0055	0.0060	0.0070	
			C	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050	0.0060	0.0065	0.0070	0.0080	0.0090	
3-4		↓ 1 ↔ 0,5	A	0.0005	0.0005	0.0005	0.0010	0.0010	0.0015	0.0015	0.0020	0.0020	0.0025	0.0025	
			B	0.0005	0.0005	0.0010	0.0015	0.0015	0.0020	0.0020	0.0025	0.0030	0.0035	0.0040	
			C	0.0005	0.0010	0.0015	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045	0.0050	
2-3		↓ 0,5 ↔ 1	A	0.0005	0.0010	0.0010	0.0010	0.0015	0.0015	0.0020	0.0020	0.0025	0.0025	0.0030	
			B	0.0010	0.0010	0.0010	0.0015	0.0015	0.0020	0.0025	0.0030	0.0035	0.0035	0.0040	
			C	0.0015	0.0015	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045	0.0050	0.0050	
3-4		↓ 0,5 ↔ 1 ↓ 1 ↔ 0,5	B				0.0010	0.0020	0.0030	0.0030	0.0035	0.0040	0.0040	0.0040	
2 & 4		↓ 0,1 - 0,5mm ↔ 0,1 - 0,5mm	A	0.0010	0.0010	0.0015	0.0015	0.0020	0.0020	0.0025	0.0030	0.0030			
			BC	0.0010	0.0010	0.0015	0.0020	0.0020	0.0025	0.0030	0.0035	0.0040			
4		↓ 0,01 - 0,1 ↔ ≤ 1	A				0.0020	0.0020	0.0025	0.0030		0.0030			
			BC				0.0020	0.0025	0.0030	0.0035		0.0040			

# APPLICATION MATERIAL GROUPS - END MILLS

## SURFACE FEET PER MINUTE (SFM)





\*Feed rate chart - see pages 582 & 583. For material examples, see page 567.

	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
S238	230B	200B	266B	200A	131A													
S239	230B	200B	266B	200A	131A													
S246	210B	180B	238B	176A														
S247	190B		210B			699C	571C	571C	180B	1650C	1650C	708C	410B					
S248HA	902B	755B	614B	525A	436A													
S248HB	902B	755B	614B	525A	436A													

### 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	
 ↓ 0,5D ↔ D	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	0.0066	0.0066	0.0066	0.0066	0.0066	
	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	
 ↓ D ↔ 0,8D	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	
	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	
	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	
 ↓ 1,5D ↔ 0,25D	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	0.0015	0.0039	0.0031	0.0035	0.0033	0.0036	
	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	
	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	
 ↓ 1,5D ↔ 0,1D	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	
	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	
	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)  
 $RPM = SFM/D \times 3.82$      $F = Ft \times T \times RPM$   
 $RPM = [(m/min.) \times 1000] \div (3.14 \times D)$

**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 567.

	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
4608	82C	66C	52C	49B	30B	16A			36C	20B	26B		52E	49D	43C	36C	49C
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
B334	59C	46C	36C	33B	16B	13A			26F				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

Feed rate chart see page 584. **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
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
G171	164E	131E	98D	66D	49B	33B							148F	115D	98C	98C	66C
G132			66E	49D	33D	20B					13B						26D
G135	98F	82E	66D	49D	33B	20A			26C	20B	13A		82F	49D	39C	26C	39C
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
G138	98F	82E	66D	49D	33B	20A			26C	20B	13A		82F	49D	39C	26C	39C
G142	98F	82E	66D	49D					26C	20B	13A						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
G338	164F	131E	98D	66D	49B	33A							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
G570	148E	118E	89D	72D	56B	39B			56C	39B	49A	33A	131C	105C	89C	79C	
G600	72F	56E	49D	39D	26B	20A			26C	20B	13A		82F	49D	39C		

## 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	0.043		
F	0.006	0.007	0.010	0.014	0.017	0.020	0.022	0.025	0.028	0.031	0.037	0.047	0.059		

# APPLICATION MATERIAL GROUPS - REAMERS

## SURFACE FEET PER MINUTE (SFM)

\*Feed rate chart - see pages 584. For material examples, see page 567

	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		
4608	30B	16B	26D	16C	10C	82D	92E	82D	46D									
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		
B334	16B	13B	16D	10C	7C	59D	66E	59D	36D	75F	59F					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)

Material examples page 585.

	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			
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									
G171	49A	33A	66C	33B	20A	131D	98F	131F	49D	164G	131F	98F	49F	164G	98G			
G132	26A	26A		20C	13B				33F							16G		
G135	33A	26A	39C	20B	13A	82D	66F	82F	33D	98G	82F	66F	33F	98G	66G			
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			
G138	33A	26A	39C	20B	13A	82D	66F	82F	33D	98G	82F	66F	33F	98G	66G			
G142	33A		39C	20B		82D	66F	82F		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			
G338	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			
G570				20A	13A	131D	98F	131F	49D	148G	118F	89F	43F					
G600						82D	66F	82F	33D	98G	82F	66F	33F					

## 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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0000021	A1002	5967598	95	0000830	A100122	5967436	100	0001646	A100325	5967015	97
0000038	A10025	5967601	95	0000847	A1001225	5967441	100	0001653	A10033	5967018	97
0000045	A1003	5967603	95	0000854	A100123	5967445	100	0001660	A10034	5967020	97
0000052	A10032	5967605	95	0000861	A100124	5967306	100	0001677	A10035	5967022	98
0000069	A10035	5967609	95	0000878	A100125	5967310	101	0001684	A10036	5967025	98
0000076	A10038	5967611	95	0000885	A100126	5967314	101	0001691	A10037	5967028	98
0000083	A1004	5967613	95	0000892	A100127	5967318	101	0001707	A100375	5967033	98
0000090	A10042	5967614	95	0000908	A1001275	5967322	101	0001714	A10038	5967036	98
0000106	A10045	5967616	95	0000915	A100128	5967326	101	0001721	A10039	5967039	98
0000113	A10048	5967618	96	0000922	A100129	5967330	101	0001738	A1003/16	5967042	98
0000120	A1005	5967619	96	0000939	A100130	5967334	101	0001745	A10031/64	5967054	100
0000137	A10052	5967621	96	0000946	A100131	5967338	101	0001752	A1003/32	5967046	97
0000144	A10055	5967623	96	0000953	A100132	5967341	101	0001769	A10033/64	5967058	101
0000151	A10058	5967625	96	0000960	A1001325	5967347	101	0001776	A10035/64	5967062	101
0000168	A1006	5967628	96	0000977	A100133	5967349	101	0001783	A1003/64	5967048	96
0000175	A10062	5967631	96	0000984	A100134	5967351	101	0001790	A10037/64	5967072	101
0000182	A10065	5967633	96	0000991	A100135	5967353	101	0001806	A1003/8	5967051	100
0000199	A10068	5967635	96	0001004	A100136	5967355	101	0001813	A10039/64	5966663	101
0000205	A1007	5967637	96	0001011	A100137	5967357	101	0001820	A10040	5966715	98
0000212	A10072	5967639	96	0001028	A1001375	5967359	101	0001837	A10041	5966760	98
0000229	A10075	5967641	96	0001035	A100138	5967361	101	0001844	A10042	5966791	98
0000236	A10078	5967643	96	0001042	A100139	5967363	101	0001851	A100425	5966827	98
0000243	A1008	5967645	96	0001059	A1001/32	5966600	96	0001868	A10043	5966832	98
0000250	A10082	5967647	96	0001066	A10013/32	5967365	100	0001875	A10044	5966834	98
0000267	A10085	5967651	96	0001073	A10013/64	5967369	98	0001882	A10045	5966836	98
0000274	A10088	5967654	96	0001080	A1001/4	5966602	99	0001899	A10046	5966838	98
0000281	A1009	5967655	96	0001097	A100140	5967371	101	0001905	A10047	5966671	98
0000298	A10092	5967659	96	0001103	A1001425	5967373	101	0001912	A100475	5966675	98
0000304	A10095	5967662	96	0001110	A100145	5967375	101	0001929	A10048	5966679	98
0000311	A10098	5967667	96	0001127	A1001475	5967377	101	0001936	A10049	5966685	98
0000328	A10010	5966592	96	0001134	A100150	5967379	101	0001943	A10041/64	5966690	101
0000335	A100105	5966612	96	0001141	A1001525	5967381	101	0001950	A10043/64	5966695	101
0000342	A10011	5966634	96	0001158	A100155	5967383	101	0001967	A10050	5966700	98
0000359	A100115	5966674	96	0001165	A1001575	5967385	101	0001974	A10051	5966705	98
0000366	A10012	5966686	96	0001172	A10015/32	5967387	100	0001981	A10052	5966709	98
0000373	A100125	5966691	96	0001189	A10015/64	5967391	99	0001998	A100525	5966712	98
0000380	A10013	5966696	96	0001196	A100160	5967393	101	0002001	A10053	5966718	98
0000397	A100135	5966701	96	0001202	A100165	5967395	101	0002018	A10054	5966721	98
0000403	A10014	5966572	96	0001219	A1001/64	5966604	95	0002025	A10055	5966725	98
0000410	A100145	5966573	96	0001226	A100170	5967397	101	0002032	A10056	5966729	98
0000427	A10015	5966574	96	0001233	A100175	5967399	101	0002049	A10057	5966733	98
0000434	A100155	5966575	96	0001240	A10017/32	5967402	101	0002056	A100575	5966737	98
0000441	A10016	5966576	96	0001257	A10017/64	5967404	99	0002063	A10058	5966744	99
0000458	A100165	5966577	97	0001264	A1001/8	5966606	97	0002070	A10059	5966748	99
0000465	A10017	5966578	97	0001271	A100180	5967408	101	0002087	A1005/16	5966752	99
0000472	A100175	5966579	97	0001288	A100185	5967412	101	0002094	A1005/32	5966756	98
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0000496	A100185	5966591	97	0001301	A100195	5967426	101	0002117	A1005/8	5966766	97
0000502	A10019	5966593	97	0001318	A10019/32	5966897	101	0002124	A10060	5966769	99
0000519	A100195	5966595	97	0001325	A10019/64	5966955	101	0002131	A10061	5966772	99
0000526	A100100	5966608	100	0001332	A10020	5967000	97	0002148	A10062	5966775	99
0000533	A100101	5966611	100	0001349	A100205	5967030	97	0002155	A100625	5966777	99
0000540	A100102	5966614	100	0001356	A10021	5967066	97	0002162	A10063	5966780	99
0000557	A1001025	5966616	100	0001363	A100215	5967075	97	0002179	A10064	5966783	99
0000564	A100103	5966618	100	0001370	A10022	5967078	97	0002186	A10065	5966786	99
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0000649	A100110	5966636	100	0001455	A10026	5966929	97	0002261	A10072	5966815	99
0000656	A100111	5966638	100	0001462	A100265	5966935	97	0002278	A100725	5966818	99
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0000670	A1001125	5966644	100	0001486	A100275	5966946	97	0002292	A10074	5966824	99
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0000694	A100114	5966652	100	0001509	A100285	5966961	97	0002315	A10076	5967921	99
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0000717	A100116	5966659	100	0001523	A100295	5966968	97	0002339	A100775	5967999	99
0000724	A100117	5966665	100	0001530	A100200	5966974	101	0002346	A10078	5968028	99
0000731	A1001175	5966670	100	0001547	A10021/32	5966978	101	0002353	A10079	5968081	99
0000748	A100118	5966681	100	0001554	A10021/64	5966982	99	0002360	A1007/16	5968091	100
0000755	A100119	5967300	100	0001561	A10023/64	5966986	100	0002377	A1007/32	5968097	98
0000762	A10011/16	5967344	101	0001578	A10025/64	5966990	100	0002384	A1007/64	5968101	97
0000779	A10011/32	5967367	99	0001585	A10027/64	5966994	100	0002391	A10080	5968105	99
0000786	A1001/16	5966596	96	0001592	A10029/64	5966997	100	0002407	A10081	5967926	99
0000793	A10011/64	5967389	98	0001608	A10030	5967003	97	0002414	A10082	5967932	99
0000809	A1001/2	5966597	101	0001615	A10031	5967006	97	0002421	A100825	5967935	99
0000816	A100120	5967421	100	0001622	A100315	5967009	97	0002438	A10083	5967940	99
0000823	A100121	5967431	100	0001639	A10032	5967012	97				



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0002452	A10085	5967950	99	003475	D33M205	6002364	206	003561	D33WN17	6002454	204
0002469	A10086	5967954	99	003476	D33M25	6002368	206	003562	D33WN16	6002451	204
0002476	A10087	5967956	99	003477	D33M30	6002373	206	003563	D33WN15	6002448	204
0002483	A100875	5967959	100	003478	D33M35	6002382	206	003564	D33WN14	6002444	204
0002490	A10088	5967962	100	003479	D33M45	6002390	206	003565	D33WN13	6002441	204
0002506	A10089	5967967	100	003480	D33M55	6002397	206	003566	D33F3/16	6002729	204
0002513	A10090	5967970	100	003481	D33M60	6002400	206	003567	D33WN12	6002438	204
0002520	A10091	5967973	100	003482	D33M65	6002406	206	003568	D33WN11	6002432	204
0002537	A10092	5967976	100	003483	D33M70	6002409	206	003569	D33WN10	6002429	204
0002544	A100925	5967979	100	003484	D33M75	6002412	206	003570	D33WN9	6001936	204
0002551	A10093	5967982	100	003485	D33M80	6002415	206	003571	D33WN8	6001909	204
0002568	A10094	5967985	100	003486	D33M85	6002418	206	003572	D33WN7	6001872	204
0002575	A10095	5967988	100	003487	D33M90	6002420	206	003573	D33F13/64	6002704	204
0002582	A10096	5967993	100	003488	D33M95	6002423	206	003574	D33WN6	6002190	204
0002599	A10097	5967996	100	003489	D33M105	6002328	206	003575	D33WN5	6002160	204
0002605	A100975	5968001	100	003490	D33M1075	6002333	206	003576	D33WN4	6002117	204
0002612	A10098	5968004	100	003491	D33M110	6002338	206	003577	D33WN3	6002227	204
0002629	A10099	5968007	100	003492	D33M115	6002342	206	003578	D33F7/32	6002739	204
0002636	A1009/16	5968009	101	003493	D33M120	6002347	206	003579	D33WN2	6002463	204
0002643	A1009/32	5968012	99	003500	D33WN68	6001815	203	003580	D33WN1	6002426	204
0002650	A1009/64	5968015	98	003501	D33F1/32	6002760	203	003581	D33LA	6002743	204
0002667	A10110	5968016	103	003502	D33WN67	6002214	203	003582	D33F15/64	6002711	204
0002674	A10111	5968019	103	003503	D33WN66	6002208	203	003583	D33LB	6002744	204
0002681	A10112	5968022	103	003504	D33WN65	6002205	203	003584	D33LC	6002745	204
0002698	A101125	5968025	103	003505	D33WN64	6002202	203	003585	D33LD	6002746	204
0002704	A10113	5968032	103	003506	D33WN63	6002199	203	003586	D33F1/4	6002762	204
0002711	A10114	5968037	103	003507	D33WN62	6002197	203	003587	D33LF	6002747	204
0002728	A10115	5968042	103	003508	D33WN61	6002194	203	003588	D33LG	6002748	204
0002735	A10116	5968047	103	003509	D33WN60	6002192	203	003589	D33F17/64	6002714	204
0002742	A10117	5968052	103	003510	D33WN59	6002188	203	003590	D33LH	6002750	204
0002766	A10118	5968062	103	003511	D33WN58	6002186	203	003591	D33LI	6002751	204
0002773	A10119	5968067	103	003512	D33WN57	6002182	203	003592	D33LJ	6002752	204
0002780	A101100	5968072	104	003513	D33WN56	6002180	203	003593	D33LK	6002753	204
0002797	A101120	5968086	104	003514	D33F3/64	6002731	203	003594	D33F9/32	6002741	204
0002803	A10120	5967908	103	003515	D33WN55	6002178	203	003595	D33LL	6002754	204
0002810	A10121	5967955	103	003516	D33WN54	6002175	203	003596	D33LM	6002755	204
0002827	A10122	5967987	103	003517	D33WN53	6002172	203	003597	D33F19/64	6002718	204
0002834	A10123	5968021	103	003518	D33F1/16	6002738	203	003598	D33LN	6002756	204
0002841	A10124	5968069	103	003519	D33WN52	6002169	203	003599	D33F5/16	6002734	205
0002858	A10125	5968082	103	003520	D33WN51	6002166	203	003600	D33LO	6002757	205
0002865	A10126	5968087	103	003521	D33WN50	6002163	203	003601	D33LP	6002758	205
0002872	A10127	5968093	103	003522	D33WN49	6002157	203	003602	D33F21/64	6002723	205
0002889	A10128	5968098	103	003523	D33WN48	6002151	203	003603	D33LQ	6002759	205
0002896	A10129	5967912	103	003524	D33F5/64	6002736	203	003604	D33LR	6002761	205
0002902	A10130	5967917	103	003525	D33WN47	6002147	203	003605	D33F11/32	6002764	205
0002919	A10132	5967920	103	003526	D33WN46	6002145	203	003606	D33LS	6002301	205
0002926	A10133	5967924	103	003527	D33WN45	6002140	203	003607	D33LT	6002360	205
0002933	A10135	5967928	103	003528	D33WN44	6002136	203	003608	D33F23/64	6002724	205
0002940	A10138	5967933	103	003529	D33WN43	6002132	203	003609	D33LU	6002403	205
0002957	A10140	5967939	103	003530	D33WN42	6002128	203	003610	D33F3/8	6002732	205
0002964	A10142	5967943	103	003531	D33F3/32	6002730	203	003611	D33LV	6002435	205
0002971	A10145	5967948	103	003532	D33WN41	6002124	203	003612	D33LW	6002470	205
0002988	A10148	5967952	103	003533	D33WN40	6002120	204	003613	D33F25/64	6002725	205
0002995	A10150	5967958	103	003534	D33WN39	6002106	204	003614	D33LX	6002477	205
0003008	A10151	5967961	103	003535	D33WN38	6002103	204	003615	D33LY	6002480	205
0003015	A10152	5967964	103	003536	D33WN37	6002098	204	003616	D33F13/32	6002702	205
0003022	A10155	5967966	104	003537	D33WN36	6002091	204	003617	D33LZ	6002483	205
0003039	A10160	5967969	104	003538	D33F7/64	6002740	204	003618	D33F27/64	6002726	205
0003046	A10165	5967972	104	003539	D33WN35	6002086	204	003619	D33F7/16	6002737	205
0003053	A10170	5967975	104	003540	D33WN34	6002082	204	003620	D33F29/64	6002728	205
0003060	A10175	5967978	104	003541	D33WN33	6002077	204	003621	D33F15/32	6002707	205
0003077	A10180	5967981	104	003542	D33WN32	6002073	204	003622	D33F31/64	6002733	205
0003084	A10185	5967984	104	003543	D33WN31	6002069	204	003623	D33F1/2	6002749	205
0003091	A10190	5967990	104	003544	D33F1/8	6002763	204	003624	D33M33	6002378	206
003251	DCN0	6002219	211	003545	D33WN30	6002064	204	003626	D33M40	6002386	206
003252	DCN1	6002246	211	003546	D33WN29	6002224	204	003630	D33M50	6002394	206
003253	DCN2	6002278	211	003547	D33WN28	6002221	204	003631	D33M100	6002324	206
003254	DCN3	6002325	211	003548	D33F9/64	6002742	204	0007549	A10810	5968323	114
003255	DCN4	6002372	211	003549	D33WN27	6002217	204	0007556	A10811	5968333	114
003256	DCN5	6002380	211	003550	D33WN26	6002211	204	0007563	A10812	5968338	114
003257	DCN6	6002384	211	003551	D33WN25	6002184	204	0007570	A10813	5968343	114
003332	DS901/8	6002225	207	003552	D33WN24	6002154	204	0007587	A10814	5968351	115
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015007	R15G	5999102	89	015313	R15COM	5999040	126	016003	2A3	6000335	95
015008	R15H	5999105	89	015314	R15CON	5999044	126	016004	2A4	6000354	95
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015012	R15L	5998822	89	015318	R15COR	5999063	126	016008	2A8	6000408	96
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024620	T40015/16	5999952	191	0028636	A100H	5966991	99	029053	2AB53	6000580	98
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024632	T40011/2	6000033	191	0028667	A100K	5967065	99	029056	2AB56	6000593	98
024636	T40019/16	5999975	191	0028674	A100L	5967069	99	029057	2AB57	6000596	98
024640	T40015/8	5999961	191	0028681	A100M	5967071	99	029058	2AB58	6000602	99
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026090	5ATS90	6001307	180	0028780	A100N17	5966937	98	029068	2AB68	6000645	99
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058307	QC41P7/64	5997602	141	058722	R88CO11/32	6000167	129	059017	500-1217/64	6001347	174
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080537	QC21GN37	5996273	119	087922	SPRG-903/4	6000057	209	091304	R5813/4	6000096	198
080538	QC21GN38	5996277	119	087923	SPRG-901	6000219	209	091306	R58113/16	6000074	198
080539	QC21GN39	5996281	119	087924	SPL-901/4	6000025	210	091308	R5817/8	6000131	198
080540	QC21GN40	5996291	119	087925	SPL-903/8	6000031	210	091310	R58115/16	6000083	198
080541	QC21GN41	5996294	119	087926	SPL-901/2	6000022	210	091312	R582	6000147	198
080542	QC21GN42	5996301	119	087927	SPL-905/8	6000034	210	091433	R5633/64	5999983	194
080543	QC21GN43	5996233	119	087928	SPL-903/4	6000028	210	091434	R5617/32	5999953	194
080544	QC21GN44	5996272	119	087929	SPL-901	6000019	210	091435	R5635/64	5999986	194
080545	QC21GN45	5996311	119	087930	SPLG-901/4	6000062	210	091436	R569/16	5999536	194
080546	QC21GN46	5996344	119	087931	SPLG-903/8	6000068	210	091437	R5637/64	5999989	194
080547	QC21GN47	5996384	119	087932	SPLG-901/2	6000059	210	091438	R5619/32	5999956	194
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080549	QC21GN49	5996396	119	087935	SPLG-901	6000056	210	091440	R565/8	5999628	194
080550	QC21GN50	5996405	119	087950	SPS-1201/4	6000072	208	091441	R5641/64	5999959	194
080551	QC21GN51	5996237	119	087951	SPS-1203/8	6000078	208	091442	R5621/32	5999959	194
080552	QC21GN52	5996240	119	087952	SPS-1201/2	6000069	208	091443	R5643/64	6000001	194
081704	QC21G1/16	5996259	119	087953	SPS-1205/8	6000081	208	091444	R5611/16	5999944	194
081705	QC21G5/64	5996341	119	087954	SPS-1203/4	6000075	208	091445	R5645/64	5999527	194
081706	QC21G3/32	5996327	119	087955	SPS-1201	6000066	208	091446	R5623/32	5999962	194
081707	QC21G7/64	5996353	119	087956	SPSG-1201/4	6000113	208	091447	R5647/64	5999550	194
081708	QC21G1/8	5996269	119	087957	SPSG-1203/8	6000127	208	091448	R563/4	5999976	194
081709	QC21G9/64	5996360	119	087958	SPSG-1201/2	6000110	208	091449	R5649/64	5999584	194
081710	QC21G5/32	5996338	120	087959	SPSG-1205/8	6000133	208	091450	R5625/32	5999968	194
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081712	QC21G3/16	5996325	120	087961	SPSG-1201	6000108	208	091452	R5613/16	5999947	194
081713	QC21G13/64	5996287	120	087962	SPR-1201/4	6000082	209	091453	R5653/64	5999967	194
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081721	QC21G21/64	5996304	120	087970	SPRG-1201/2	6000122	209	091461	R5661/64	5999530	194
081722	QC21G11/32	5996276	120	087974	SPL-1201/4	6000005	210	091462	R5631/32	5999980	194
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081728	QC21G7/16	5996347	121	087982	SPLG-1201/2	6000040	210	091469	R5615/64	5999919	195
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081730	QC21G15/32	5996289	121	090114	C114COMBPSET	5995643	226	091471	R5617/64	5999935	195
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0805202	E201M5	5975694	290	090162	C29R10PSET	5995624	224	091476	R5613/16	5999895	195
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0805226	E201M8	5975698	290	090170	C29R40SET	5995635	236	091479	R5619/32	5999938	195
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0157220	E5473/8NO1	5976408	363	0164914	K521140X2000	5982416	511	0169094	A5105/16	5970446	74
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0241141	A243N40X6	5968835	169	0297278	E6531/4	5978395	370	0347317	A977140	5973303	86
0241844	A221N0	5969065	214	0297285	E6531/8	5978397	370	0347324	A97830	5973199	84
0241851	A221N00	5969071	214	0297292	E6533/4	5978399	370	0347331	A9781/4	5973191	85
0241868	A221N1	5969075	214	0297308	E6533/8	5978403	370	0347362	A97615	5972589	84
0241875	A221N2	5969079	214	0308523	A28718	5969853	232	0347379	A9767/16	5973225	86
0241882	A221N3	5969085	214	0335635	A9213/16	5972701	70	0347386	A97715	5973247	84
0241899	A221N4	5969089	214	0338971	E65410-32	5978409	368	0347393	A9771/16	5973251	84
0241905	A221N5	5969094	214	0338988	E6541/2	5978405	368	0347409	A97720	5973305	84
0241912	A221N6	5969104	214	0338995	E65412-28	5978411	368	0347416	A9773/32	5973122	84
0241929	A221N7	5969109	214	0339008	E6541/4	5978407	368	0347935	A9763/16	5973264	85
0241936	A221N8	5969115	214	0339015	E6543/8	5978414	368	0348284	E0618-32NO1	5974326	320
0252345	B11221	5986605	465	0339022	E6545/16	5978417	368	0348291	E0616-32NO1	5974286	320
0252352	B12211/16	5986608	465	0339039	E6545/8	5978420	368	0348307	E0616-32NO2	5974288	320
0252369	B12211/16	5986649	465	0339046	E6547/16	5978423	368	0348314	E0616-32NO3	5974290	320
0252376	B1221/2	5986446	465	0339053	E6548-36	5978426	368	0348321	E0616-32NO6	5974295	320
0252383	B12213/16	5986451	465	0340684	E5475/8NO7	5976434	363	0348328	E0618-32NO2	5974335	320
0252390	B12215/16	5986454	465	0340691	K5207/16X31/2	5982354	511	0348335	E0618-32NO3	5974337	320
0252406	B1223/4	5986457	465	0343111	E513M35X35NO3	5977025	317	0348352	E0618-32NO6	5974342	320
0252413	B1225/8	5986463	465	0343128	E513M9X75NO3	5977168	317	0348369	E06110-24NO1	5974292	320
0252420	B1227/8	5986467	465	0343135	E513M10X5NO3	5977390	317	0348376	E06110-24NO2	5974330	320
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0259696	E06111/2NO6	5974855	320	0343357	E513M48X30NO3	5977110	318	0348468	E0611/4NO3	5974930	320
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0273265	E6517/16	5978377	368	0346419	R52067	5981073	46	0348567	E0617/16NO1	5974298	320
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0279731	A97624X140	5972633	84	0346464	R52079	5981117	46	0348611	E0611/2NO2	5974915	320
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0279915	A97649X195	5973097	85	0347119	A97611/32	5972606	85	0348796	E0611NO1	5974936	320
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0279939	A97652X195	5973107	85	0347133	A976105	5972599	86	0348819	E0611NO3	5974255	320
0279946	A97653X195	5973115	85	0347140	A976110	5972601	86	0348826	E0611NO6	5974273	320
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0567791	E001M12	5973809	288	0569177	E0213/8	5974327	283	0571415	A012N2	5966964	93
0567807	E001M14	5973812	288	0569184	E0217/16	5974359	283	0571422	A012N20	5966969	92
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0567838	E001M20	5973833	288	0569214	E0213/4	5974323	283	0571453	A012N23	5966979	92
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1062672	TN1785M5	6007491	333	1310178	33001/4X20H6NO2	6009441	346	1410258	20257/8X14	6009125	384
1062674	TN1785M6	6007496	333	1310180	33001/4X20H4NO3	6009438	346	1410259	20251X8	6009093	384
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1310141	33006-32H5NO3	6009462	346	1410243	20253/8X16	6009155	384	1713052	1671M4X7	6008389	302
1310147	33008-32H3NO2	6009491	346	1410244	20253/8X24	6009261	384	1713053	1671M5X8	6008393	302
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1310150	33008-32H3NO3	6009493	346	1410246	20257/16X20	6009122	384	1713055	1671M8X10	6008401	302
1310151	33008-32H5NO3	6009497	346	1410247	20251/2X13	6009045	384	1713056	1671M8X125	6008405	302
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3210006	1800N6	6005072	508	3210265	47041/2X1/8	6004897	505	5010177	4533N58	6009687	458
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3210008	1800N8	6005089	508	3210284	47047/32X3/16	6005518	505	5010186	4533N56	6009596	458
3210009	1800N9	6005093	508	3210287	47049/32X3/16	6005599	505	5010187	45333/64	6009652	458
3210013	1815SET	6005098	508	3210296	470413/16X3/16	6005498	505	5010198	4533N55	6009565	458
3210014	1816SET	6005103	508	3210297	47047/8X3/16	6005537	505	5010204	4533N54	6009966	458
3210046	4111-2	6004701	518	3210300	47041/4X1/4	6004914	505	5010213	4533N53	6009960	458
3210047	4111-3	6005545	518	3210302	47049/32X1/4	6005589	505	5010219	45331/16	6009644	458
3210048	4111-4	6005595	518	3210314	47041X1/4	6005502	505	5010221	4533N52	6009958	458
3210050	4112-3	6005651	518	3210338	430N1	6005736	518	5010228	4533N51	6009955	458
3210051	4112-4	6005690	518	3210339	430N2	6005552	518	5010234	4533N50	6009952	458
3210053	4113-4	6005724	518	3210340	430N3	6005555	518	5010240	4533N49	6009947	458
3210054	4113-5	6005728	518	3210341	430N4	6005558	518	5010246	4533N48	6009944	458
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3210115	47045/32X3/32	6005503	505	3210446	470415/32X3/16	6005519	505	5010259	4533N45	6009935	458
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3210120	47047/32X5/32	6005524	505	4710590	46023/4X60	6005586	488	5010288	4533N41	6009918	458
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3210122	47049/32X5/32	6005604	505	4710592	46021X60	6005576	488	5010295	4533N39	6009910	458
3210123	47045/16X5/32	6005610	505	4710593	46021/2X82	6005571	488	5010299	4533N38	6009906	458
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3210126	47045/16X3/16	6005606	505	4710596	46027/8X82	6005619	488	5010316	45337/64	6009765	458
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5010443	4533N18	6009820	458	5010678	453329/64	6009807	458	5011105	46081/2X90	6005722	480
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6210050	470227/32	6004988	501	7333005	R97019/32	7333005	27	7333086	R97013/64	7333086	29
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6210084	470313/16	6004869	504	7333012	R970157	7333012	28	7333093	R97017/64	7333093	29
6210085	47037/8	6004918	504	7333013	R9705/8	7333013	28	7333094	R970285	7333094	29
6210086	470315/16	6004873	504	7333014	R970160	7333014	28	7333095	R97011/8	7333095	29
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6210088	470311/16	6004815	504	7333016	R970161	7333016	28	7333097	R970290	7333097	29
6210089	470311/8	6004825	504	7333017	R970162	7333017	28	7333098	R97015/32	7333098	29
6210090	470313/16	6004829	504	7333018	R97041/64	7333018	28	7333099	R970295	7333099	29
6210091	470311/4	6004822	504	7333019	R970163	7333019	28	7333100	R970111/64	7333100	29
6210093	470313/8	6004837	504	7333020	R970165	7333020	28	7333101	R970300	7333101	29
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6210098	47032	6004877	504	7333023	R970167	7333023	28	7333104	R97017/32	7333104	29
6210099	470321/8	6004896	504	7333024	R970170	7333024	28	7333105	R970310	7333105	29
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7625217	R467120	7625217	53	7647836	C6013/8X3/8	7647836	423	7647919	C6083/8	7647919	433
7625217	R467120	7625217	53	7647837	C6017/16X3/8	7647837	423	7647920	C6087/16	7647920	433
7625218	R4671205	7625218	53	7647838	C6011/2X3/8	7647838	423	7647921	C6081/2	7647921	433
7625218	R4671205	7625218	53	7647839	C6011/2X1/2	7647839	423	7647922	C6089/16	7647922	433
7625219	R467121	7625219	53	7647840	C6019/16X1/2	7647840	423	7647923	C6085/8	7647923	433
7625219	R467121	7625219	53	7647841	C6015/8X1/2	7647841	423	7647924	C6083/4	7647924	433
7625220	R467122	7625220	53	7647842	C60111/16X1/2	7647842	423	7647925	C6087/8	7647925	433
7625220	R467122	7625220	53	7647843	C6013/4X1/2	7647843	423	7647926	C6081	7647926	433
7625221	R46731/64	7625221	53	7647844	C6015/8X5/8	7647844	423	7647927	C6091/4	7647927	433
7625221	R46731/64	7625221	53	7647845	C60111/16X5/8	7647845	423	7647928	C6095/16	7647928	433
7625222	R467125	7625222	53	7647846	C6013/4X5/8	7647846	423	7647929	C6093/8	7647929	433
7625222	R467125	7625222	53	7647847	C60113/16X5/8	7647847	423	7647930	C6097/16	7647930	433
7625223	R4671/2	7625223	53	7647848	C6017/8X5/8	7647848	423	7647931	C6091/2	7647931	433
7625223	R4671/2	7625223	53	7647849	C60115/16X5/8	7647849	423	7647932	C6095/8	7647932	433
7625223	R4671/2	7625223	53	7647850	C6011X5/8	7647850	423	7647933	C6093/4	7647933	433
7625224	R467127	7625224	53	7647851	C6017/8X7/8	7647851	423				

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7647935	C6101/4	7647935	434	7648016	C6181	7648016	444	7648570	S109120	7648570	401
7647936	C6105/16	7647936	434	7648490	S1061/4	7648490	397	7648571	S109140	7648571	401
7647937	C6103/8	7647937	434	7648491	S1065/16	7648491	397	7648572	S109160	7648572	401
7647938	C6107/16	7647938	434	7648492	S1063/8	7648492	397	7648573	S109200	7648573	401
7647939	C6101/2	7647939	434	7648493	S1061/2	7648493	397	7648574	S109250	7648574	401
7647940	C6109/16	7647940	434	7648494	S1065/8	7648494	397	7648575	S1101/8	7648575	402
7647941	C6105/8	7647941	434	7648495	S1063/4	7648495	397	7648576	S1103/16	7648576	402
7647942	C6103/4	7647942	434	7648496	S1061	7648496	397	7648577	S1101/4	7648577	402
7647943	C6107/8	7647943	434	7648497	S2061/4	7648497	397	7648578	S1103/8	7648578	402
7647944	C6101	7647944	434	7648498	S2065/16	7648498	397	7648579	S1101/2	7648579	402
7647945	C6111/4	7647945	434	7648499	S2063/8	7648499	397	7648580	S1111/8	7648580	403
7647946	C6115/16	7647946	434	7648500	S2061/2	7648500	397	7648581	S1113/16	7648581	403
7647947	C6113/8	7647947	434	7648501	S2065/8	7648501	397	7648582	S1111/4	7648582	403
7647948	C6117/16	7647948	434	7648502	S2063/4	7648502	397	7648583	S1115/16	7648583	403
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7647950	C6115/8	7647950	434	7648504	S2071/8X1/2	7648504	398	7648585	S1111/2	7648585	403
7647951	C6113/4	7647951	434	7648505	S2071/8X3/4	7648505	398	7648586	S2111/8	7648586	403
7647952	C6117/8	7647952	434	7648506	S2075/32X9/16	7648506	398	7648587	S2113/16	7648587	403
7647953	C6111	7647953	434	7648507	S2073/16X3/4	7648507	398	7648588	S2111/4	7648588	403
7647954	C6121/4	7647954	435	7648508	S2073/16X11/8	7648508	398	7648589	S2113/8	7648589	403
7647955	C6123/8	7647955	435	7648509	S2071/4X1	7648509	398	7648590	S2111/2	7648590	403
7647956	C6121/2	7647956	435	7648510	S2071/4X11/2	7648510	398	7648591	S1121/16	7648591	404
7647957	C6125/8	7647957	435	7648511	S2075/16X3/4	7648511	398	7648592	S1123/32	7648592	404
7647958	C6123/4	7647958	435	7648512	S2075/16X15/8	7648512	398	7648593	S1121/8	7648593	404
7647959	C6127/8	7647959	435	7648513	S2073/8X1	7648513	398	7648594	S1125/32	7648594	404
7647960	C6121	7647960	435	7648514	S2073/8X2	7648514	398	7648595	S1123/16	7648595	404
7647961	C6131/4	7647961	436	7648515	S2077/16X1	7648515	398	7648596	S1127/32	7648596	404
7647962	C6133/8	7647962	436	7648516	S2077/16X2	7648516	398	7648597	S1121/4	7648597	404
7647963	C6131/2	7647963	436	7648517	S2071/2X1	7648517	398	7648598	S1125/16	7648598	404
7647964	C6133/4	7647964	436	7648518	S2071/2X3	7648518	398	7648599	S1123/8	7648599	404
7647965	C6141/8	7647965	437	7648519	S2079/16X11/4	7648519	398	7648600	S1121/2	7648600	404
7647966	C6143/16	7647966	437	7648520	S2075/8X15/8	7648520	398	7648601	S2121/16	7648601	404
7647967	C6141/4	7647967	437	7648521	S2075/8X21/4	7648521	398	7648602	S2111/8	7648602	404
7647968	C6145/16	7647968	437	7648522	S2073/4X13/4	7648522	398	7648603	S2123/16	7648603	404
7647969	C6143/8	7647969	437	7648523	S2073/4X3	7648523	398	7648604	S2127/32	7648604	404
7647970	C6141/2	7647970	437	7648524	S2071X11/2	7648524	398	7648605	S2121/4	7648605	404
7647971	C6145/8	7647971	437	7648525	S2071X4	7648525	398	7648606	S2125/16	7648606	404
7647972	C6143/4	7647972	437	7648526	S1081/16	7648526	400	7648607	S2123/8	7648607	404
7647973	C6151/8	7647973	438	7648527	S1085/64	7648527	400	7648608	S2121/2	7648608	404
7647974	C6153/16	7647974	438	7648528	S1083/32	7648528	400	7648609	S11320	7648609	405
7647975	C6151/4	7647975	438	7648529	S1081/8	7648529	400	7648610	S11325	7648610	405
7647976	C6155/16	7647976	438	7648530	S1089/64	7648530	400	7648611	S11330	7648611	405
7647977	C6153/8	7647977	438	7648531	S1085/32	7648531	400	7648612	S11340	7648612	405
7647978	C6151/2	7647978	438	7648532	S10811/64	7648532	400	7648613	S11350	7648613	405
7647979	C6155/8	7647979	438	7648533	S1083/16	7648533	400	7648614	S11360	7648614	405
7647980	C61511/16	7647980	438	7648534	S1087/32	7648534	400	7648615	S11370	7648615	405
7647981	C6153/4	7647981	438	7648535	S1081/4	7648535	400	7648616	S11380	7648616	405
7647982	C6157/8	7647982	438	7648536	S1085/16	7648536	400	7648617	S11390	7648617	405
7647983	C6151	7647983	438	7648537	S1083/8	7648537	400	7648618	S113100	7648618	405
7647984	C6171/8X3/8	7647984	443	7648538	S1087/16	7648538	400	7648619	S113120	7648619	405
7647985	C6173/16X3/8	7647985	443	7648539	S1081/2	7648539	400	7648620	S113160	7648620	405
7647986	C6171/4X3/8	7647986	443	7648540	S1089/16	7648540	400	7648621	S113200	7648621	405
7647987	C6175/16X3/8	7647987	443	7648541	S1085/8	7648541	400	7648622	S2133/0	7648622	405
7647988	C6173/8X3/8	7647988	443	7648542	S1083/4	7648542	400	7648623	S2134/0	7648623	405
7647989	C6177/16X3/8	7647989	443	7648543	S1081	7648543	400	7648624	S2135/0	7648624	405
7647990	C6171/2X3/8	7647990	443	7648544	S2081/16	7648544	400	7648625	S21360	7648625	405
7647991	C6171/2X1/2	7647991	443	7648545	S2085/64	7648545	400	7648626	S21370	7648626	405
7647992	C6179/16X1/2	7647992	443	7648546	S2083/32	7648546	400	7648627	S21380	7648627	405
7647993	C6175/8X1/2	7647993	443	7648547	S2081/8	7648547	400	7648628	S21390	7648628	405
7647994	C61711/16X1/2	7647994	443	7648548	S2085/32	7648548	400	7648629	S213100	7648629	405
7647995	C6173/4X1/2	7647995	443	7648549	S2083/16	7648549	400	7648630	S213120	7648630	405
7647996	C6175/8X5/8	7647996	443	7648550	S2087/32	7648550	400	7648631	S1141/8	7648631	406
7647997	C61711/16X5/8	7647997	443	7648551	S2081/4	7648551	400	7648632	S1143/16	7648632	406
7647998	C6173/4X5/8	7647998	443	7648552	S2085/16	7648552	400	7648633	S1141/4	7648633	406
7647999	C61713/16X5/8	7647999	443	7648553	S2083/8	7648553	400	7648634	S1145/16	7648634	406
7648000	C6177/8X5/8	7648000	443	7648554	S2087/16	7648554	400	7648635	S1143/8	7648635	406
7648001	C6171X5/8	7648001	443	7648555	S2081/2	7648555	400	7648636	S1141/2	7648636	406
7648002	C6177/8X7/8	7648002	443	7648556	S2089/16	7648556	400	7648637	S1145/8	7648637	406
7648003	C6171X7/8	7648003	443	7648557	S2085/8	7648557	400	7648638	S1151/8	7648638	407
7648004	C6171X1	7648004	443	7648558	S10920	7648558	401	7648639	S1153/16	7648639	407
7648005	C6173/4X3/4	7648005	443	7648559	S10925	7648559	401	7648640	S1151/4	7648640	407
7648006	C6177/8X3/4	7648006	443	7648560	S10930	7648560	401	7648641	S1155/16	7648641	407
7648007	C6171X3/4	7648007	443	7648561	S10940	7648561	401	7648642	S1153/8	7648642	407
7648008	C6181/8	7648008	444	7648562	S10945	7648562	401	7648643	S1151/2	7648643	407
7648009	C6183/16	7648009	444	7648563	S10950	7648563	401	7648644	S2151/8	7648644	407
7648010	C6181/4	7648010	444	7648564	S10960	7648564	401	7648645	S2153/16	7648645	407
7648011	C6185/16	7648011	444	7648565	S10970	7648565	401	7648646	S2151/4	7648646	407
7648012	C6183/8	7648012	444	7648566	S10980	7648566	401	7648647	S2155/16	7648647	407
7648013	C6181/2	7648013	444	7648567	S10990	7648567	401	7648648	S2153/8	7648648	407
7648014	C6185/8	7648014	444	7648568	S109100	7648568	401				

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7648651	S1165/32	7648651	399	7648730	S1341/8	7648730	410	7648811	S1363/8	7648811	412
7648652	S1163/16	7648652	399	7648731	S1349/64	7648731	410	7648812	S1367/16	7648812	412
7648653	S1161/4	7648653	399	7648732	S1345/32	7648732	410	7648813	S1361/2	7648813	412
7648654	S1165/16	7648654	399	7648733	S13411/64	7648733	410	7648814	S1365/8	7648814	412
7648655	S1163/8	7648655	399	7648734	S1343/16	7648734	410	7648815	S1363/4	7648815	412
7648656	S1161/2	7648656	399	7648735	S13413/64	7648735	410	7648816	S2361/8	7648816	412
7648657	S1211/16	7648657	408	7648736	S1347/32	7648736	410	7648817	S2363/16	7648817	412
7648658	S1213/32	7648658	408	7648737	S1341/4	7648737	410	7648818	S2361/4	7648818	412
7648659	S1211/8	7648659	408	7648738	S1345/16	7648738	410	7648819	S2365/16	7648819	412
7648660	S1215/32	7648660	408	7648739	S1343/8	7648739	410	7648820	S2363/8	7648820	412
7648661	S1213/16	7648661	408	7648740	S1347/16	7648740	410	7648821	S2367/16	7648821	412
7648662	S1211/4	7648662	408	7648741	S1341/2	7648741	410	7648822	S2361/2	7648822	412
7648663	S1215/16	7648663	408	7648742	S1349/16	7648742	410	7648823	S2365/8	7648823	412
7648664	S1213/8	7648664	408	7648743	S1345/8	7648743	410	7648824	S2363/4	7648824	412
7648665	S1211/2	7648665	408	7648744	S13411/16	7648744	410	7648825	S1371/8	7648825	413
7648666	S2211/16	7648666	408	7648745	S1343/4	7648745	410	7648826	S1373/16	7648826	413
7648667	S2213/32	7648667	408	7648746	S1347/8	7648746	410	7648827	S1371/4	7648827	413
7648668	S2211/8	7648668	408	7648747	S1341	7648747	410	7648828	S1375/16	7648828	413
7648669	S2215/32	7648669	408	7648748	S2341/16	7648748	410	7648829	S1373/8	7648829	413
7648670	S2213/16	7648670	408	7648749	S2345/64	7648749	410	7648830	S1377/16	7648830	413
7648671	S2211/4	7648671	408	7648750	S2343/32	7648750	410	7648831	S1371/2	7648831	413
7648672	S2215/16	7648672	408	7648751	S2347/64	7648751	410	7648832	S1375/8	7648832	413
7648673	S2213/8	7648673	408	7648752	S2341/8	7648752	410	7648833	S1373/4	7648833	413
7648674	S2211/2	7648674	408	7648753	S2349/64	7648753	410	7648834	S1371	7648834	413
7648675	S223HA1/8XR015	7648675	418	7648754	S2345/32	7648754	410	7648835	S2371/8	7648835	413
7648676	S223HA1/8XR030	7648676	418	7648755	S23411/64	7648755	410	7648836	S2373/16	7648836	413
7648677	S223HA3/16XR015	7648677	418	7648756	S2343/16	7648756	410	7648837	S2371/4	7648837	413
7648678	S223HA3/16XR030	7648678	418	7648757	S23413/64	7648757	410	7648838	S2375/16	7648838	413
7648679	S223HA1/4XR015	7648679	418	7648758	S2347/32	7648758	410	7648839	S2373/8	7648839	413
7648680	S223HA1/4XR030	7648680	418	7648759	S2341/4	7648759	410	7648840	S2377/16	7648840	413
7648681	S223HA5/16XR015	7648681	418	7648760	S2345/16	7648760	410	7648841	S2371/2	7648841	413
7648682	S223HA5/16XR030	7648682	418	7648761	S2343/8	7648761	410	7648842	S2375/8	7648842	413
7648683	S223HA3/8XR015	7648683	418	7648762	S2347/16	7648762	410	7648843	S2373/4	7648843	413
7648684	S223HA3/8XR030	7648684	418	7648763	S2341/2	7648763	410	7648844	S2371	7648844	413
7648685	S223HA7/16XR020	7648685	418	7648764	S2349/16	7648764	410	7648845	S1381/16	7648845	414
7648686	S223HA7/16XR045	7648686	418	7648765	S2345/8	7648765	410	7648846	S1383/32	7648846	414
7648687	S223HA1/2XR030	7648687	418	7648766	S23411/16	7648766	410	7648847	S1381/8	7648847	414
7648688	S223HA1/2XR060	7648688	418	7648767	S2343/4	7648767	410	7648848	S1385/32	7648848	414
7648689	S223HA9/16XR045	7648689	418	7648768	S2347/8	7648768	410	7648849	S1383/16	7648849	414
7648690	S223HA9/16XR060	7648690	418	7648769	S2341	7648769	410	7648850	S1381/4	7648850	414
7648691	S223HA5/8XR060	7648691	418	7648770	S13520	7648770	411	7648851	S1385/16	7648851	414
7648692	S223HA5/8XR090	7648692	418	7648771	S13525	7648771	411	7648852	S1383/8	7648852	414
7648693	S223HA3/4XR030	7648693	418	7648772	S13530	7648772	411	7648853	S1387/16	7648853	414
7648694	S223HA3/4XR060	7648694	418	7648773	S13535	7648773	411	7648854	S1381/2	7648854	414
7648695	S223HA1XR030	7648695	418	7648774	S13540	7648774	411	7648855	S1385/8	7648855	414
7648696	S223HA1XR090	7648696	418	7648775	S13545	7648775	411	7648856	S1383/4	7648856	414
7648697	S223HB1/8XR015	7648697	418	7648776	S13550	7648776	411	7648857	S2381/16	7648857	414
7648698	S223HB1/8XR030	7648698	418	7648777	S13560	7648777	411	7648858	S2383/32	7648858	414
7648699	S223HB3/16XR015	7648699	418	7648778	S13570	7648778	411	7648859	S2381/8	7648859	414
7648700	S223HB3/16XR030	7648700	418	7648779	S13580	7648779	411	7648860	S2385/32	7648860	414
7648701	S223HB1/4XR015	7648701	418	7648780	S13590	7648780	411	7648861	S2383/16	7648861	414
7648702	S223HB1/4XR030	7648702	418	7648781	S135100	7648781	411	7648862	S2381/4	7648862	414
7648703	S223HB5/16XR015	7648703	418	7648782	S135110	7648782	411	7648863	S2385/16	7648863	414
7648704	S223HB5/16XR030	7648704	418	7648783	S135120	7648783	411	7648864	S2383/8	7648864	414
7648705	S223HB3/8XR015	7648705	418	7648784	S135140	7648784	411	7648865	S2387/16	7648865	414
7648706	S223HB3/8XR030	7648706	418	7648785	S135160	7648785	411	7648866	S2381/2	7648866	414
7648707	S223HB7/16XR020	7648707	418	7648786	S135180	7648786	411	7648867	S2385/8	7648867	414
7648708	S223HB7/16XR045	7648708	418	7648787	S135200	7648787	411	7648868	S2383/4	7648868	414
7648709	S223HB1/2XR030	7648709	418	7648788	S135250	7648788	411	7648869	S139120	7648869	415
7648710	S223HB1/2XR060	7648710	418	7648789	S23520	7648789	411	7648870	S139100	7648870	415
7648711	S223HB9/16XR045	7648711	418	7648790	S23525	7648790	411	7648871	S13980	7648871	415
7648712	S223HB9/16XR060	7648712	418	7648791	S23530	7648791	411	7648872	S13960	7648872	415
7648713	S223HB5/8XR060	7648713	418	7648792	S23535	7648792	411	7648873	S13950	7648873	415
7648714	S223HB5/8XR090	7648714	418	7648793	S23540	7648793	411	7648874	S13945	7648874	415
7648715	S223HB3/4XR030	7648715	418	7648794	S23545	7648794	411	7648875	S13940	7648875	415
7648716	S223HB3/4XR060	7648716	418	7648795	S23550	7648795	411	7648876	S13930	7648876	415
7648717	S223HB1XR030	7648717	418	7648796	S23560	7648796	411	7648877	S13920	7648877	415
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7648941	S248HB5/8XR090	7648941	419	7833306	H851150	7833306	30	7877948	TS41HSN7	7877948	217
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7878019	TS10HS15/64	7878019	217	7878120	TS41CON33	7878120	219	7878201	TS18CON17	7878201	220
7878020	TS15HSB	7878020	218	7878121	TS41CON32	7878121	220	7878202	TS18CON16	7878202	221
7878021	TS15HSC	7878021	218	7878122	TS41CON31	7878122	220	7878203	TS18CON15	7878203	221
7878022	TS15HSD	7878022	218	7878123	TS40CO1/8	7878123	220	7878204	TS18CON14	7878204	221
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7878025	TS15HSG	7878025	218	7878126	TS41CON28	7878126	220	7878207	TS18CON12	7878207	221
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7878030	TS51HS3/32	7878030	215	7878131	TS41CON24	7878131	220	7878212	TS18CON7	7878212	221
7878031	TS52HSN40	7878031	215	7878132	TS41CON23	7878132	220	7878213	TS10CO13/64	7878213	221
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7878035	TS52HSN36	7878035	215	7878136	TS41CON20	7878136	220	7878217	TS18CON3	7878217	221
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7878040	TS52HSN32	7878040	216	7878141	TS41CON16	7878141	221	7878222	TS10CO15/64	7878222	221
7878041	TS52HSN31	7878041	216	7878142	TS41CON15	7878142	221	7878223	TS15COB	7878223	222
7878042	TS51HS1/8	7878042	216	7878143	TS41CON14	7878143	221	7878224	TS15COC	7878224	222
7878043	TS52HSN30	7878043	216	7878144	TS41CON13	7878144	221	7878225	TS15COD	7878225	222
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7878045	TS52HSN28	7878045	216	7878146	TS41CON12	7878146	221	7878227	TS15COF	7878227	222
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7878047	TS52HSN27	7878047	216	7878148	TS41CON10	7878148	221	7878229	TS10CO9/32	7878229	222
7878048	TS52HSN26	7878048	216	7878149	TS41CON9	7878149	221	7878230	TS10CO5/16	7878230	222
7878049	TS52HSN25	7878049	216	7878150	TS41CON8	7878150	221	7878231	TS10CO3/8	7878231	222
7878050	TS52HSN24	7878050	216	7878151	TS41CON7	7878151	221	7878232	TS52CON50	7878232	219
7878051	TS52HSN23	7878051	216	7878152	TS40CO13/64	7878152	221	7878233	TS51CO3/32	7878233	219
7878052	TS51HS5/32	7878052	216	7878153	TS41CON6	7878153	221	7878234	TS52CON40	7878234	219
7878053	TS52HSN22	7878053	216	7878154	TS41CON5	7878154	221	7878235	TS52CON39	7878235	219
7878054	TS52HSN21	7878054	216	7878155	TS41CON4	7878155	221	7878236	TS52CON38	7878236	219
7878055	TS52HSN20	7878055	216	7878156	TS41CON3	7878156	221	7878237	TS52CON37	7878237	219
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7878242	TS52CON33	7878242	220	46073789	A9011/2	6073789	79	46719052	R45985	6719052	64
7878243	TS52CON32	7878243	220	46104481	R95017/32	6104481	23	46719053	R45986	6719053	64
7878244	TS52CON31	7878244	220	46104482	R950310	6104482	23	46719054	R45987	6719054	64
7878245	TS51CO1/8	7878245	220	46104483	R95011/4	6104483	23	46719055	R45911/32	6719055	64
7878246	TS52CON30	7878246	220	46104484	R950320	6104484	23	46719056	R45988	6719056	64
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7878248	TS52CON28	7878248	220	46104486	R950119/64	6104486	23	46719058	R45990	6719058	64
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7878256	TS52CON22	7878256	220	46104534	R950360	6104534	23	46719066	R45996	6719066	64
7878257	TS52CON21	7878257	220	46104535	R950127/64	6104535	23	46719067	R45997	6719067	64
7878258	TS52CON20	7878258	220	46104536	R950365	6104536	23	46719068	R45998	6719068	64
7878259	TS52CON19	7878259	220	46104537	R950370	6104537	23	46719069	R45999	6719069	64
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7878263	TS52CON16	7878263	221	46104541	R95011/2	6104541	23	46719073	R45910364	6719073	64
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7878279	TS51CO7/32	7878279	221	46111411	H853410	6111411	35	46719089	R45931/64	6719089	65
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7878287	TS51CO1/4	7878287	222	46111419	H855410	6111419	38	46719097	R45935/64	6719097	65
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7878289	TS55COG	7878289	222	46111421	H858320	6111421	41	46719099	R4591425	6719099	65
7878290	TS51CO9/32	7878290	222	46111422	H858335	6111422	41	46719100	R4599/16	6719100	65
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# SIMPLY RELIABLE

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