



High-Performance
Round Cutting Tools

PILDT

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Custom Solutions Are Standard



Magafor

Magafor is the recognized world leader in the production of precision tools. Pilot is proud to be the exclusive American distributor of such fine products.

Specialization

With more than 250 product groups and over 8,000 standard products, Magafor offers the solution adapted to each of your machining applications. For example, the 0.40mm diameter micro end-mill is available in 26 different lengths and styles. You'd be hard-pressed to find a manufacturer offering more options. Styles, materials and lengths vary within each specific range of tooling to offer you the widest selection.

Innovation

Magafor meets the needs of even the most demanding customers by: detecting customer needs to create new technologies; analyzing and comparing the totality of the special tools; and comparing market trends to create custom solutions.

Trial & Test Standard Tools

Magafor is so confident in the performance and reliability of its products—as are we!—that we'll extend the most liberal trial program in the industry. At your request, we'll provide standard test tools FREE of charge. Contact customer service with any questions and to facilitate this request.

Blanket Orders

Please know that we accept and encourage blanket orders on standard stock items, standard non-stock items and custom items. We will always ensure continuous delivery with large safety stock levels.

Specials

Magafor excels in manufacturing custom tooling and delivering solutions that show cost savings in most applications.

Coatings

In addition to Futura and TiN coatings, three new "X" coatings, sprung from multi-layer nano technology are available:

Red'X:

Cobalt tool coating has a higher hardness of (3700 HV) and is similar to TiAlN in a multi-layer coating. Choose this coating for dry machining. Using coolant will add lubricity.

Hard'X:

Carbide tool coating has a high hardness (3500 HV) and shows a high thermic stability. It offers excellent protection against heat and wear and is ideal for dry-machining high-speed cut-in treated steels and dies up to 67 Rc.

Graph'X:

Diamond coating (8000 HV) is particularly effective when machining graphite, composite materials, plastics with glass-fibers or carbon-fibers.

Note: Vickers Hardness Test

HV = a unit of hardness given by the test known as the Vickers Pyramid Number



Magafor is the only cutting tool manufacturer member of the European Commission that has been chosen to research micro-machining.

This research targets performance improvements of all **Magafor** tools, ensuring customers the greatest profit margins.

Materials Used in the Manufacture of Our Tools and Coatings Designation

Designation			
Magafor	European	American	Japanese
HSS	HSS	M2	SKH-51
HSS-E COBALT	HSS-E	M35	SKH-55
HSS-E 8% COBALT	HSS-E8	M42	SKH-59
TiN	TiN	TiN	TiN
Futura	TiAlN	TiAlN	TiAlN
Red'X	TiAlN with higher hardness (3700 HV)		
Hard'X	AlTiN	Latuma	
Graph'X	Diamond coating		
K15 CARBIDE — 6.5 – 7% Cobalt (0.006 – 0.008mm grain size)			

Engaged right from the start in the process aspiring to excellence, in addition to our Futura and TiN coatings, Magafor offers three “X” coatings, sprung from multi-layer nano technology.

Red'X Cobalt tool coating has a higher hardness of (3700 HV) and is similar to TiAlN in a multi-layer coating. Choose this coating for dry machining. Using coolant will add lubricity.

Hard'X [For hard milling] carbide tool coating has a high hardness (3500 HV) and shows a high thermic stability. It offers excellent protection against heat and wear and is ideal for dry machining-high speed cut-in treated steels and dies up to 67 HRC.

Graph'X [For composite milling] diamond coating (8000 HV) is particularly effective when machining graphite, composite materials, plastics with glass-fibers or carbon-fibers.



Hardness and Use for Materials

Material	HSS	HSS-Co	HSS-Co + TiN	HSS 8% Co	HSS 8% Co + Red'X	CARBIDE	CARBIDE + Hard'X
Hardness	63 HRC	65 HRC	65 HRC + 2300 HV	67 HRC	67 HRC + 3500 HV	1800HV	1800HV + 3500
Use	Small Series	Production intensive		Hard and abrasive alloys		Treated steel	

Note: Vickers Hardness Test HV = a unit of hardness given by the test known as the Vickers Pyramid Number

EDP Numbering System

EDP # 88860001810 - 1.81 mm
Solid Carbide High Precision
Micro Reamer

88860001810
Prefix A B

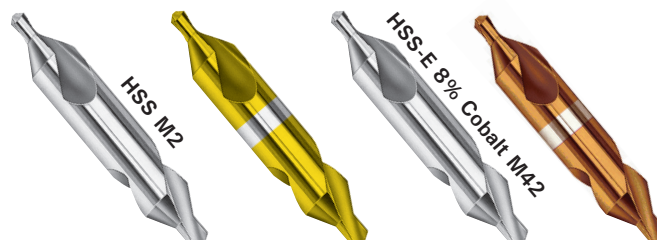
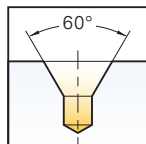
A = Series # - 8600
Series # 8600 refers to Solid Carbide
High Precision Micro Reamers
B = Size - 1.81 mm
Size 01810 refers to 1.81 mm

Series Index

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0290	84	2901	105	4839	95	8201	105	8550	94
0811	83	2903	105	4933	98	8203-H	105	8550-H	94
08115	79	43-A	99	4936	98	8431	98	8600	109
0890	84	411	102	8008-A	86	8431-H	98	8610	106
0895	87	421	100	8008-B	86	8431-L	98	8670	107
0896	87	422	101	8008-C	86	8432	97		
0910	83	423	100	8008-D	86	8434	97		
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145	82	4811	102	8105-H	80	8507-D	120		
154	80	4821	100	8119-A	86	8507-DG	120		
155	80	4822	101	8119-B	86	8507-DH	120		
185	80	4823	100	8119-C	86	8509	119		
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199	87	4833	96	8196	88	8510-H	120		
201	105	4834	95	8196-H	88	8522-H	116		

Center Drills

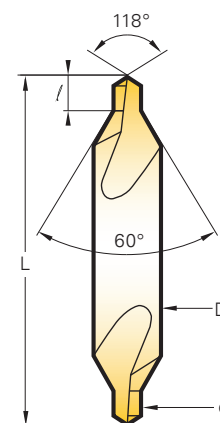
Plain Type 60°

 Applications: **Centering, Spotting and Combined Machining**


Plain Center Drills - Angle 60°

Size	D	d	L	/	115	M2/TiN 08115	Cobalt + 1055	M42/Red'X 0915
00000	1/8	0.010	1-1/4	0.008 - 0.018	8111500A000*	800811500A0	81105500A00*	80091500A00*
0000		0.015		0.014 - 0.025	8111500B000*	800811500B0	81105500B00*	80091500B00*
000		0.020		0.020 - 0.032	8111500C000	800811500C0	81105500C00*	80091500C00*
00		0.025		0.028 - 0.040	8111500D000	800811500D0	81105500D00*	80091500D00*
0		1/32		0.035 - 0.047	8111500E000	800811500E0	81105500E00*	80091500E00*
1	1/8	3/64	1-1/4	0.055 - 0.067	81115010000	80081150100	81105501000	80091501000
2	3/16	5/64	1-7/8	0.095 - 0.106	81115020000	80081150200	81105502000	80091502000
3	1/4	7/64	2	0.130 - 0.154	81115030000	80081150300	81105503000	80091503000
4	5/16	1/8	2-1/8	0.150 - 0.175	81115040000	80081150400	81105504000	80091504000
4-1/2	3/8	9/64	2-1/2	0.170 - 0.193	81115045000	80081150450	-	-
5	7/16	3/16	2-3/4	0.230 - 0.256	81115050000	80081150500	81105505000	80091505000
6	1/2	7/32	3	0.270 - 0.295	81115060000	80081150600	81105506000	80091506000
7	5/8	1/4	3-1/4	0.315 - 0.340	81115070000	80081150700	81105507000	80091507000
8	3/4	5/16	3-1/2	0.390 - 0.420	81115080000	80081150800	81105508000	80091508000
9	7/8	11/32	3-5/8	0.430 - 0.460	81115090000	80081150900	-	-
10	1	3/8	3-3/4	0.475 - 0.500	81115100000	80081151000	-	-

*Single end tool



Tolerances

Tool Diameters	D	d	Angle	
			60°	118°
.010 - 7/64	n/a	+ .0039	-	-
1/8 - 7/32	-0.0007	+ .0047	-	-
1/4 - 3/8	-0.0009	+ .0059	-	-
7/16 - 5/8	-0.0011	+ .0059	-30'	± 2°
3/4 - 1	-0.0013	+ .0059	-	-

Concentricity of Drill Diameter to Body is: +/- .0005 runoff



American Standard Value Sets

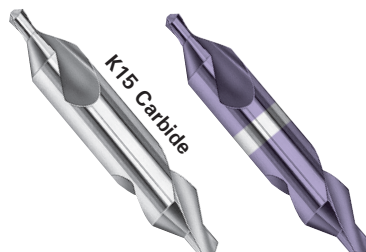
Composition Quantity	15 Pieces HSS 81115000015	Composition Quantity	HSS 81115000000	Composition Quantity	5 Pieces Cobalt 81105500000
3 pieces each	# 1	1 piece each	# 1	1 piece each	# 1
	# 2		# 2		# 2
	# 3		# 3		# 3
	# 4		# 4		# 4
2 pieces	# 4-1/2		# 5		# 5
1 piece	# 5				

Sets also available TiN coated

Center Drills

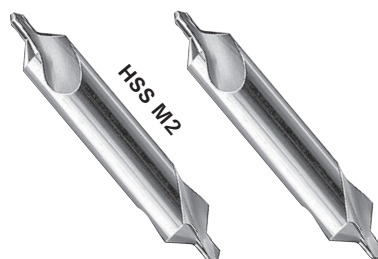
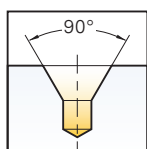
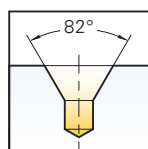
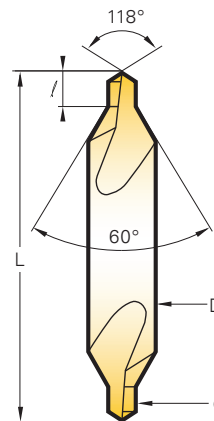
Plain Type 60°, 82° and 90° and Longs

Applications: **Centering**



ASA Solid Carbide Plain Center Drills - Angle 60°

Size	D	d	L	/	K15 Carbide 8105	Hard'X 8105-H
00	1/8	0.025	1-1/4	0.020 - 0.040	88810500D00	888105H00D0
0	1/8	1/32	1-1/4	0.035 - 0.047	88810500E00	888105H00E0
1	1/8	3/64	1-1/4	0.055 - 0.067	88810501000	888105H0100
2	3/16	5/64	1-7/8	0.095 - 0.106	88810502000	888105H0200
3	1/4	7/64	2	0.130 - 0.154	88810503000	888105H0300
4	5/16	1/8	2-1/8	0.150 - 0.175	88810504000	888105H0400
5	7/16	3/16	2-3/4	0.230 - 0.256	88810505000	888105H0500
6	1/2	7/32	3	0.270 - 0.295	88810506000	888105H0600



Plain Center Drill - Angles 82° and 90°

Size	D	d	L	/	Angle 82° 154	Angle 90° 155
1	1/8	3/64	1-1/4	0.055 - 0.067	81154010000	81155010000
2	3/16	5/64	1-7/8	0.095 - 0.106	81154020000	81155020000
3	1/4	7/64	2	0.130 - 0.154	81154030000	81155030000
4	5/16	1/8	2-1/8	0.150 - 0.175	81154040000	81155040000
5	7/16	3/16	2-3/4	0.230 - 0.256	81154050000	81155050000
6	1/2	7/32	3	0.270 - 0.295	81154060000	81155060000
7	5/8	1/4	3-1/4	0.135 - 0.340	81154070000	81155070000
8	3/4	5/16	3-1/2	0.390 - 0.420	81154080000	81155080000

Longs - Angle 60°

Size (inch)	D	d	L	HSS M2 185
1 x 3	1/8	3/64	3	81185010300
1 x 4			4	81185010400
1 x 5			5	81185010500
1 x 6			6	81185010600
2 x 3	3/16	5/64	3	81185020300
2 x 4			4	81185020400
2 x 5			5	81185020500
2 x 6			6	81185020600
3 x 3	1/4	7/64	3	81185030300
3 x 4			4	81185030400
3 x 5			5	81185030500
3 x 6			6	81185030600
4 x 3	5/16	1/8	3	81185040300
4 x 4			4	81185040400
4 x 5			5	81185040500
4 x 6			6	81185040600
4-1/2 x 4	3/8	9/64	4	81185045400
4-1/2 x 5			5	81185045500
4-1/2 x 6			6	81185045600
5 x 4	7/16	3/16	4	81185050400
5 x 5			5	81185050500
5 x 6			6	81185050600
6 x 4	1/2	7/32	4	81185060400
6 x 5			5	81185060500
6 x 6			6	81185060600
7 x 5	5/8	1/4	5	81185070500
7 x 6			6	81185070600
8 x 6	3/4	5/16	6	81185080600

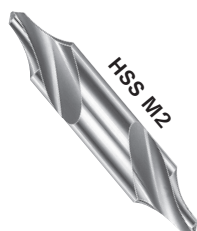


American Standard Value Sets - Angle 60°

5 Pieces / 4" OAL Long 81185000000	
Composition	
1 piece each	# 1 Long # 2 Long # 3 Long # 4 Long # 5 Long

Center Drills

Radius Type, Form R

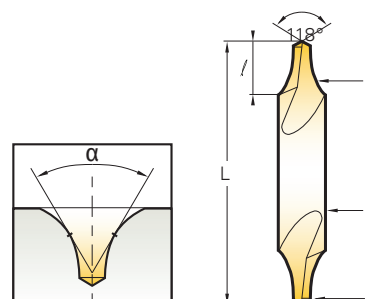
Applications: **Centering**

Magafor center drills with radius have a special profile and offer the following benefits over a 60° center drill:

- The radii eliminates the risk of breakage
- They provide an exact bearing
- They serve as a protective chamfer

Center Drills Radius Type Form R

ASA #	D	d	L	R	/	HSS M2 125
1 - R	1/8	3/64	1-1/4	0.150	0.125 – 0.150	81125010000
2 - R	3/16	5/64	1-7/8	0.230	0.200 – 0.225	81125020000
3 - R	1/4	7/64	2	0.315	0.270 – 0.300	81125030000
4 - R	5/16	1/8	2-1/8	0.400	0.340 – 0.370	81125040000
5 - R	7/16	3/16	2-3/4	0.500	0.480 – 0.510	81125050000
6 - R	1/2	7/32	3	0.530	0.540 – 0.575	81125060000
7 - R	5/8	1/4	3-1/4	0.700	0.660 – 0.700	81125070000
8 - R	3/4	5/16	3-1/2	0.790	0.810 – 0.850	81125080000



Tolerances

Tool Diameters	D	d	R max
.010 – 7/64	-0.0007	+ 0.0039	-
1/8 – 7/32	-0.0007	+ 0.0047	-
1/4 – 3/8	-0.0009	+ 0.0059	1.25 R
7/16 – 5/8	-0.0011	n/a	-
3/4 – 1	-0.0013	n/a	-

American Form R Standard Sets

Composition Quantity	5 Pieces 81125000000
1 piece each Radius Type	# 1 - R # 2 - R # 3 - R # 4 - R # 5 - R



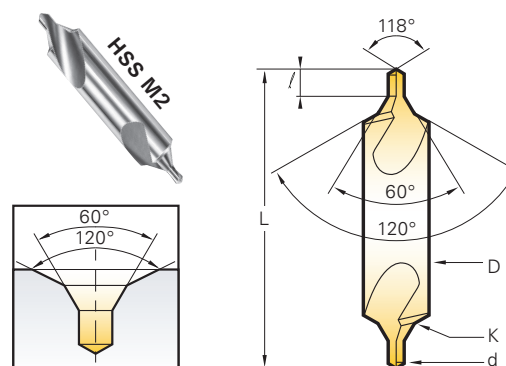
Center Drills

Bell Type, Form B

Center drills with protective chamfer guarantee the center obtained from any risk of blows and deformation. The splay resulting from the protective chamfer makes it easier to load parts between points on machines with automatic feed.

Bell Type w/Saved Angle Form B

Size	D	d	K	L	/	HSS M2 135
11	1/8	3/64	0.100	1-1/4	0.055 – 0.070	81135110000
12	3/16	1/16	0.150	1-7/8	0.707 – 0.090	81135120000
13	1/4	3/32	0.200	2	0.110 – 0.135	81135130000
14	5/16	7/64	0.250	2-1/8	0.125 – 0.155	81135140000
15	7/16	5/32	0.350	2-3/4	0.185 – 0.215	81135150000
16	1/2	3/16	0.400	3	0.230 – 0.260	81135160000
17	5/8	7/32	0.500	3-1/4	0.270 – 0.300	81135170000
18	3/4	1/4	0.600	3-1/2	0.310 – 0.340	81135180000
19	7/8	5/16	0.700	3-5/8	0.390 – 0.420	81135190000
20	1	3/8	0.800	3-3/4	0.470 – 0.500	81135200000



Tolerances

Tool Diameters	D	d	60°	Angle 118°	120°
.010 – 7/64	-0.0007	+ 0.0039	-	-	-
1/8 – 7/32	-0.0007	+ 0.0047	-	-	-
1/4 – 3/8	-0.0009	+ 0.0059	-30'	± 2°	-4°
7/16 – 5/8	-0.0011	-	-	-	-
3/4 – 1	-0.0013	-	-	-	-

American Standard Form B Sets

Composition Quantity	81135000000
1 piece each Bell Type	# 11 # 12 # 13 # 14 # 15



Unique Center Drills

With Reinforcing Bulge, Form W



Magafor center drill form W is stronger than the common center drill:

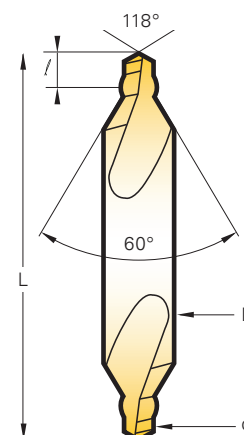
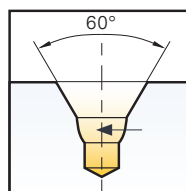
- The bulge reinforces the point
- It increases the chips removal
- It makes the lubrication of the drill easier
- It runs at faster speeds and feeds

Plain Center Drills w/Bulge Form W

ASA #	D	d	L	/	HSS M2 145
1 - W	1/8	6/64	1-1/4	0.055 - 0.067	81145010000
2 - W	3/16	5/64	1-7/8	0.094 - 0.106	81145020000
3 - W	1/4	7/64	2	0.130 - 0.154	81145030000
4 - W	5/16	1/8	2-1/8	0.150 - 0.175	81145040000
5 - W	7/16	3/16	2-3/4	0.230 - 0.256	81145050000
6 - W	1/2	7/32	3	0.270 - 0.295	81145060000
7 - W	5/8	1/4	3-1/4	0.315 - 0.340	81145070000
8 - W	3/4	5/16	3-1/2	0.390 - 0.420	81145080000

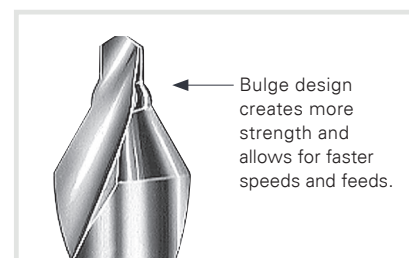
Tolerances

Tool Diameters	D	d	Angle	
			60°	118°
.010 - 7/64	-0.0007	+ 0.0039	-	-
1/8 - 7/32	-0.0007	+ 0.0047	-	-
1/4 - 3/8	-0.0009	+ 0.0059	-30'	± 2°
7/16 - 5/8	-0.0011	n/a	-	-
3/4 - 1	-0.0013	n/a	-	-



American Standard Form W Sets

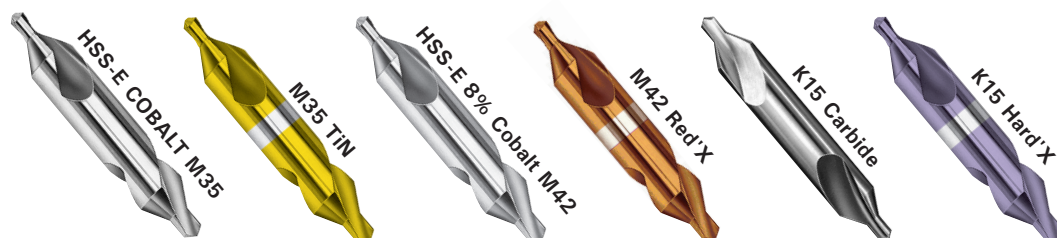
Composition Quantity	81145000000
1 piece each Bulge	# 1 - W # 2 - W # 3 - W # 4 - W # 5 - W



To place an order or to learn more about Pilot Precision Products, contact customer service at 413-350-5200.

Metric Center Drills

Angle 60°

Applications: **Centering**

Plain Center Drills - Angle 60°

ISO - NFE 66051-A - DIN 333-A - JIS-1

D x d	L	/	Cobalt M35 10	HSS-E M35 TiN 0811	HSS-E 8% Cobalt M42 105	M42/Red'X 0910	Carbide 8100	K15/Hard'X 8100-H
3.15 x 0.5*	25	0.6 – 0.9	-	80081103105	-	-	88810003105	888100H031505
3.15 x 0.8*		1.0 – 1.3	-	80081103108	-	-	88810003108	888100H031508
3.15 x 1.0	31	1.3 – 1.7	81100315100	80081103151	81105031510	80091003151	88810003151	888100H03151
3.15 x 1.25		1.6 – 2.0	81100315125	80081103125	81105031512	80091003125	88 810003125	888100H0315125
3.5 x 0.75	35	1.0 – 1.3	81100350750	800811035075	-	-	-	-
4.0 x 1.0		1.3 – 1.7	81100410000	80081104100	-	-	88810004100	888100H0410
4.0 x 1.6		2.0 – 2.6	81100416000	80081104160	81105041600	80091004160	88810004160	888100H0416
5.0 x 1.5	40	2.0 – 2.6	81100515000	80081105150	-	-	88810005150	888100H0515
5.0 x 2.0		2.5 – 3.1	81100520000	80081105200	81105052000	80091005200	88810005200	888100H0520
6.0 x 2.0	45	2.5 – 3.1	81100620000	80081106200	-	-	88810006200	888100H0620
6.3 x 2.5		3.1 – 3.8	81100632500	80081106325	81105063250	80091006325	88810006325	888100H06325
8.0 x 2.5	50	3.1 – 3.8	81100825000	80081108250	-	-	88810008250	888100H0825
8.0 x 3.0		3.9 – 4.6	81100830000	80081108300	-	-	88810008300	888100H0830
8.0 x 3.15		3.9 – 4.6	81100831500	80081108315	81105083150	80091008315	88810008315	888100H08315
10.0 x 3.0	55	3.9 – 4.6	81101030000	80081110300	-	-	88810010300	888100H1030
10.0 x 4.0		5.0 – 5.9	81101040000	80081110400	81105104000	80091010400	88810010400	888100H1040
12.0 x 4.0	63	5.0 – 5.9	81101240000	80081112400	-	-	-	-
12.0 x 5.0		6.3 – 7.2	81101250000	80081112500	-	-	88810012500	888100H1250
12.5 x 5.0		6.3 – 7.2	81101255000	80081112550	81105125500	80091012550	88810012550	888100H1255
14.0 x 5.0	69	6.3 – 7.2	81101450000	80081150450	-	-	-	-
16.0 x 6.3	71	8.0 – 8.9	-	80081116630	-	-	88810016630	888100H1663
20.0 x 8.0	80	10.1 – 11.1	-	80081120800	-	-	-	-

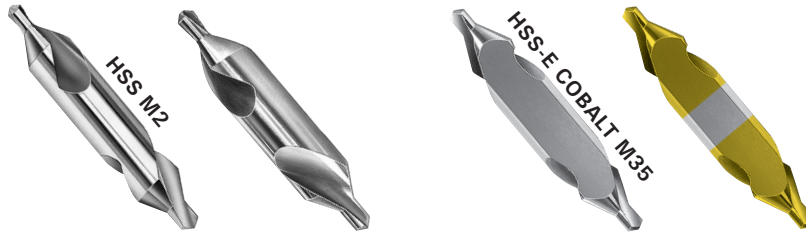
*Single end K15 Carbide — 6.5 – 7% Cobalt (0.006 – 0.008mm grain size)

Metric Center Drills

Angle 60°, Form A

Applications: **Centering**

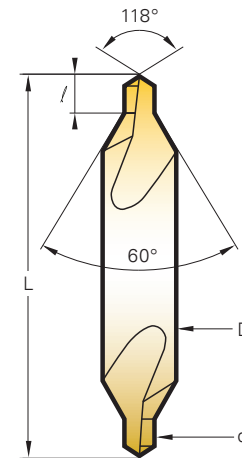
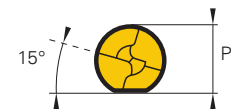
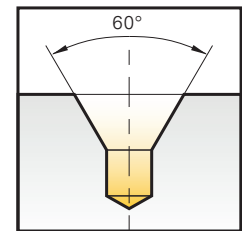
Magafor center drills are particularly effective thanks to their unique ground spiral flutes. Special attention to the concentricity of the drill diameter to body makes them superior to other offerings on the market.



Metric Center Drills Form A - Angle 60°

D x d	L	/	Right Hand HSS M2 11	Left Hand HSS M2 16	P -0.1	With flat, right hand HSS-E M35 Cobalt 0290	HSS-E M35 TiN 0890
3.0 x 0.5	31	0.6 – 0.9	81110305000	-	-	-	-
3.15 x 0.5*	25	0.6 – 0.9	81110315050	81160315050	-	-	-
3.15 x 0.63*		0.7 – 0.9	81110315063	81160315063	-	-	-
3.15 x 0.8*		1.0 – 1.3	81110315080	81160315080	-	-	-
3.15 x 1.0	31	1.3 – 1.7	81110315100	81160315100	-	-	-
3.15 x 1.25		1.6 – 2.0	81113151250	81160315125	-	-	-
3.5 x 0.75	35	1.0 – 1.3	81110350750	81160350750	-	-	-
4.0 x 1.0		1.3 – 1.7	81110410000	81160410000	-	-	-
4.0 x 1.25		1.6 – 2.0	81110412500	81160412500	-	-	-
4.0 x 1.6		2.0 – 2.6	81110416000	81160416000	3.25	80029004160	80089004160
5.0 x 1.5	40	2.0 – 2.6	81110515000	81160515000	-	-	-
5.0 x 1.6		2.0 – 2.6	81110516000	81160516000	-	-	-
5.0 x 2.0		2.5 – 3.1	81110520000	81160520000	4.20	80029005200	80089005200
6.0 x 2.0	45	2.5 – 3.1	81110620000	81160620000	-	-	-
6.3 x 2.0		2.5 – 3.1	81110632000	81160632000	-	-	-
6.3 x 2.5		3.1 – 3.8	81110632500	81160632500	5.35	80029006325	80089006325
8.0 x 2.5	50	3.1 – 3.8	81110825000	81160825000	-	-	-
8.0 x 3.0		3.9 – 4.6	81110830000	81160830000	-	-	-
8.0 x 3.15		3.9 – 4.6	81110831500	81160831500	6.96	80029008315	80089008315
10.0 x 3.0	55	3.9 – 4.6	81111030000	81161030000	-	-	-
10.0 x 3.15		3.9 – 4.6	81111031500	81161031500	-	-	-
10.0 x 4.0		5.0 – 5.9	81111040000	81161040000	8.40	80029010400	80089010400
12.0 x 4.0	63	5.0 – 5.9	81111240000	81161240000	-	-	-
12.0 x 5.0		6.3 – 7.2	81111250000	81161250000	-	-	-
12.5 x 4.0		5.0 – 5.9	81111254000	81161254000	-	-	-
12.5 x 5.0	69	6.3 – 7.2	81111255000	81161255000	10.95	80029012550	80089012550
14.0 x 5.0		6.3 – 7.2	81111450000	81161450000	-	-	-
16.0 x 5.0		6.3 – 7.2	81111650000	81161650000	-	-	-
16.0 x 6.3	71	8.0 – 8.9	81111663000	81161663000	14.00	80029016630	80089016630
18.0 x 6.0	77	8.0 – 8.9	81111860000	-	-	-	-
20.0 x 6.3	80	8.0 – 8.9	81112063000	-	-	-	-
20.0 x 8.0		10.1 – 11.1	81112080000	81162080000	17.90	80029020800	-
25.0 x 8.0	100	10.1 – 11.1	81112580000	-	-	-	-
25.0 x 10.0		12.8 – 13.8	81112510000	-	22.50	80029025100	-
31.5 x 10.0	125	12.8 – 13.8	81113151000	-	-	-	-
31.5 x 12.5		16.5 – 17.5	81113151250	-	-	-	-

*Single end

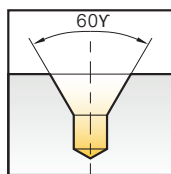


Tolerances

D	d	L	60°	118°
h8	K12	± 1	-30°	± 2°

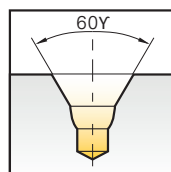
Performance

Recommendations for the use of Center Drills and NC Spot Drills



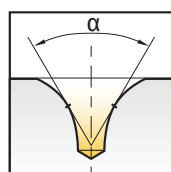
Form A

- The most universal center drill
- 60° angle
- Standard center
- 118° point



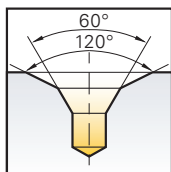
Form W

- The bulge reinforces the point
- Increases chip removal
- Makes the lubrication of the drill easier
- 118° point



Form R

- The radius eliminates the risk of breakage, and is more robust than the 60° drill
- Provides an exact bearing surface
- Serves as a protective chamfer
- 118° point



Form B

- Center drill with protective chamfer guarantees the center from any risk of blows and deformation
- 118° point

SFM: Surface Feet per Minute

RPM: Revolutions per Minute

IP: Inches per Tooth (chip load)

IPM: Inches per Minute

IPR: Inches per Revolution

Speed Formula:

$$\text{RPM} = 3.82 \times (\text{SFM} \div \text{Diameter})$$

Feed:

$$\text{IPM} = \text{IPT} \times \# \text{ of Flutes} \times \text{RPM}$$

$$\text{IPR} = \text{IPM} \div \text{RPM}$$

$$\text{SFM} = \text{RPM} \times \text{Diameter} \div 3.82$$

Formula for Speed (RPM)

Example:

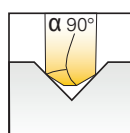
#1 center drill (.078) cutting soft material <81 HRB

SFM = 148 for 5/64Ø HSS

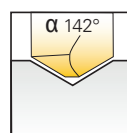
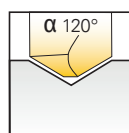
RPM = $3.82 \times (148 \div 0.078) = 14.36$

IPM = $0.001 \times 2 \times 7180 = 14.36$

IPR = $14.36 \div 7180 = .002$



90° NC Spot Drill Centering and chamfering are obtained in a single operation.



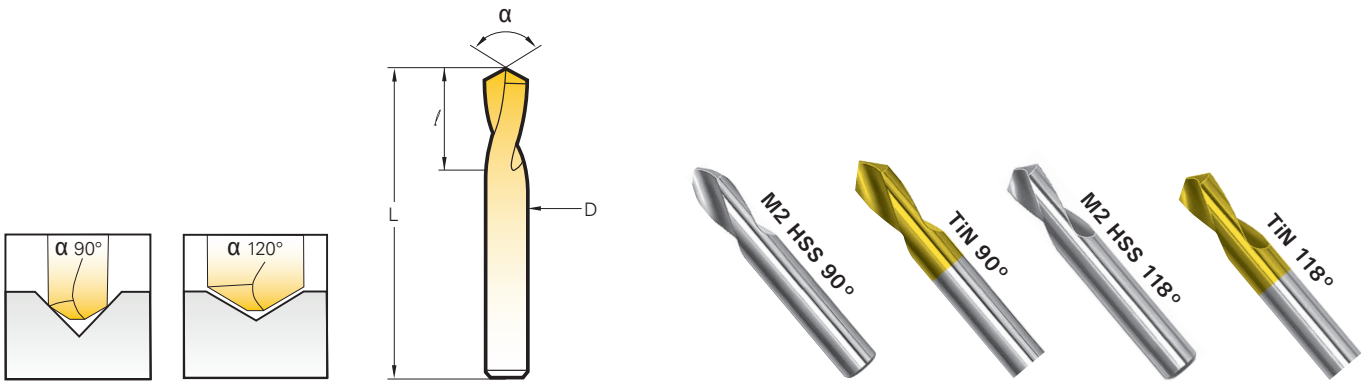
120° & 142° NC Spot Drill The preliminary hole corresponds to the angle at the end of the tool used in drilling and prevents it from deviating.

		HSS						TiN					
Material		SFM	Feed Inch/Rev					SFM	Feed Inch/Rev				
			2 mm 5/64	3 mm 1/8	6 mm 1/4	10 mm 3/8	16mm 5/8		2 mm 5/64	3 mm 1/8	6 mm 1/4	10 mm 3/8	16mm 5/8
Steel:	< 81 HRB (B)	99 – 148						197 – 296					
	< 24 Rc (C)	82 – 99	0.0020	0.0024	0.0031	0.0059	0.0079	165 – 230	0.0031	0.0035	0.0047	0.0098	0.0118
	24 – 32 Rc	49 – 82						115 – 148					
	32 – 41 Rc	33 – 49	0.0012	0.0016	0.0024	0.0039	0.0059	82 – 99	0.0020	0.0024	0.0035	0.0055	0.0087
Stainless Steel/Titanium		20 – 33						39 – 53					
Inconel/Nimonic/Waspaloy		16 – 20	0.0008	0.0012	0.0020	0.0028	0.0039	33 – 43	0.0016	0.0020	0.0028	0.0039	0.0059
Brass/Copper		132 – 197						362 – 428					
Copper Alloys Bronze		99 – 132	0.0020	0.0028	0.0035	0.0059	0.0079	263 – 362	0.0028	0.0035	0.0055	0.0106	0.0142
Aluminum		494 – 658	0.0031	0.0039	0.0079	0.0157	0.0197	1,152 – 1,481	0.0047	0.0055	0.0118	0.0217	0.0256
Hardened Aluminum < 6% Si		197 – 329						395 – 592					
Cast Aluminum > 6% Si		132 – 197	0.0024	0.0031	0.0039	0.0059	0.0098	262 – 395	0.0031	0.0039	0.0059	0.0118	0.0157
Thermoplastics		329 – 428	0.0031	0.0035	0.0079	0.0138	0.0157	658 – 855	0.0047	0.0055	0.0118	0.0217	0.0256

		Futura/Red'X						Carbide					
Material		SFM	Feed Inch/Rev					SFM	Feed Inch/Rev				
			2 mm 5/64	3 mm 1/8	6 mm 1/4	10 mm 3/8	16mm 5/8		2 mm 5/64	3 mm 1/8	6 mm 1/4	10 mm 3/8	16mm 5/8
Steel:	< 81 HRB (B)	296 – 395						362 – 461					
	< 24 Rc (C)	247 – 329	0.0039	0.0047	0.0063	0.0118	0.0177	296 – 362	0.0047	0.0055	0.0079	0.0138	0.0217
	24 – 32 Rc	165 – 214						197 – 263					
	32 – 41 Rc	99 – 214	0.0028	0.0031	0.0047	0.0071	0.0110	115 – 165	0.0035	0.0039	0.0055	0.0087	0.0094
Stainless Steel/Titanium		59 – 79						72 – 99					
Inconel/Nimonic/Waspaloy		49 – 66	0.0020	0.0024	0.0039	0.0055	0.0079	63 – 82	0.0031	0.0028	0.0047	0.0067	0.0094
Brass/Copper		4,218 – 494						494 – 592					
Copper Alloys Bronze		362 – 428	0.0039	0.0047	0.0071	0.0142	0.0197	428 – 949	0.0047	0.0055	0.0087	0.0173	0.0240
Aluminum		1,645 – 2,300	0.0063	0.0071	0.0157	0.0295	0.0354	1,974 – 2,632	0.0039	0.0087	0.0193	0.0354	0.0374
Hardened Aluminum < 6% Si		592 – 823						658 – 987					
Cast Aluminum > 6% Si		395 – 559	0.0039	0.0047	0.0071	0.0142	0.0197	461 – 658	0.0047	0.0055	0.0087	0.0173	0.0240
Thermoplastics		987 – 1316	0.0063	0.0071	0.0157	0.0295	0.0354	1,217 – 1,579	0.0079	0.0087	0.0193	0.0354	0.0374

Short & Long NC Spotting Drills

Angle 90°, 118°, 120°



90-degree angle

Centering and chamfering are obtained in a single operation.

118- and 120-degree angle

The preliminary hole obtained corresponds to the angle at the end of the tool used in drilling and prevents it from drifting and allowing the drill point to cut first.

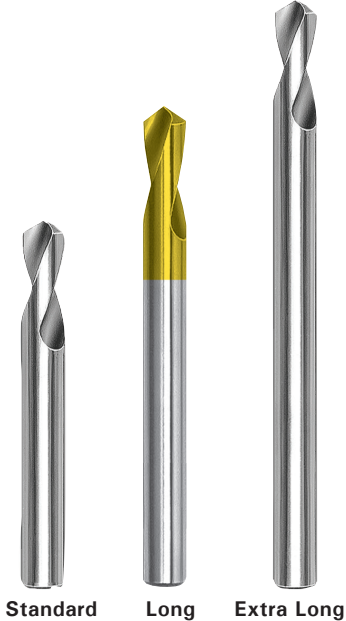
M2 HSS & TiN - Short Series

D (inch)	L (inch)	/	T	Angle 90°		Angle 118°	
				M2 HSS 8119A	TiN 8008A	M2 HSS 8119B	TiN 8008B
1/8	1-1/4	0.0380	0.012	8119A031700	8008A031700	8119B031700	8008B031700
3/16	1-3/8	0.5000	0.020	8119A047600	8008A047600	8119B047600	8008B047600
1/4	1-1/2	0.6400	0.025	8119A063500	8008A063500	8119B063500	8008B063500
5/16			0.031	8119A079300	8008A079300	8119B079300	-
3/8			0.039	8119A095200	8008A095200	8119B095200	8008B095200
7/16	2	1	0.043	8119A111100	8008A111100	8119B111100	8008B111100
1/2			0.051	8119A127000	8008A127000	8119B127000	8008B127000
5/8	2-1/4	1-1/8	0.063	8119A158700	8008A158700	8119B158700	8008B158700
3/4			0.075	8119A190500	8008A190500	8119B190500	8008B190500
7/8	2-1/2	1-1/4	0.088	8119A222200	8008A222200	8119B222200	8008B222200
1			0.100	8119A254000	8008A254000	8119B254000	8008B254000

M2 HSS & TiN - Long Series

3 different lengths

D (inch)	L (inch)	/	T	Angle 90°		Angle 120°	
				M2 HSS 8119C	TiN 8008C	M2 HSS 8119D	TiN 8008D
1/4	2-5/8	0.900	0.025	8119C063500	8008C063500	8119D063500	8008D063500
	4	0.900		8119C063504	8008C063504	8119D063504	8008D063504
	5-1/2	0.87		8119C0635055	8008C0635055	8119D0635055	8008D0635055
3/8	3-1/8	1	0.039	8119C095200	8008C095200	8119D095200	8008D095200
	5			8119C095205	8008C095205	8119D095205	8008D095205
	7			8119C095207	8008C095207	8119D095207	8008D095207
1/2	3-3/4	1-3/8	0.051	8119C127000	8008C127000	8119D127000	8008D127000
	6			8119C127006	8008C127006	8119D127006	8008D127006
	8			8119C127008	8008C127008	8119D127008	8008D127008
5/8	4-1/2	1-3/8	0.063	8119C158700	8008C158700	8119D158700	8008D158700
	8			8119C158708	8008C158708	8119D158708	8008D158708
	9			8119C158709	8008C158709	8119D158709	8008D158709
3/4	5	1-5/8	0.075	8119C190505	8008C190505	8119D190505	8008D190505
	8			8119C190508	8008C190508	8119D190508	8008D190508
	10			8119C190510	8008C190510	8119D190510	8008D190510
1	5-3/8	1-3/4	0.100	8119C254000	8008C254000	8119D254000	8008D254000
	8			8119C254008	8008C254008	8119D254008	8008D254008
	10			8119C254010	8008C254010	8119D254010	8008D254010



Tolerances			
Tool Diameters	D (inch)	Angle	L
1/8" - 3/16"	0 - 0.0005	±1°	±0.0395
1/4" - 3/8"	0 - 0.0006		
7/16" - 5/8"	0 - 0.0007		
3/4" - 1"	0 - 0.0008		
1-1/4" - 1-3/4"	0 - 0.0010		

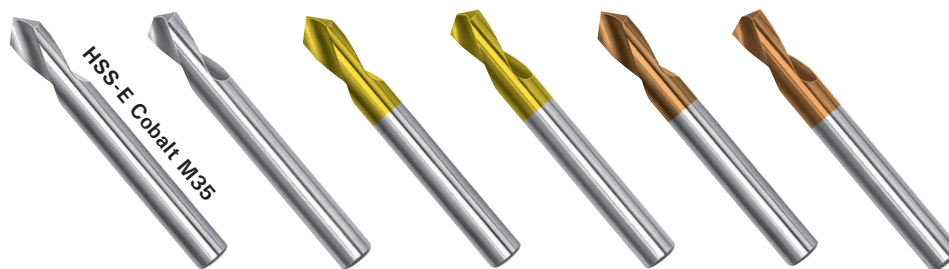
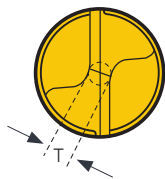


M2 HSS American Standard Spot Drill Value Sets (4 pieces)

Composition Quantity	Angle 90° 8119C000004	Angle 120° 8119D000004
1 piece each	1/4 x 2-5/8	1/4 x 2-5/8
	3/8 x 3-1/8	3/8 x 3-1/8
	1/2 x 3-3/4	1/2 x 3-3/4
	5/8 x 4-1/2	5/8 x 4-1/2

NC Spotting Drills

Angle 60°, 90°, 120°



NC Spotting Drills

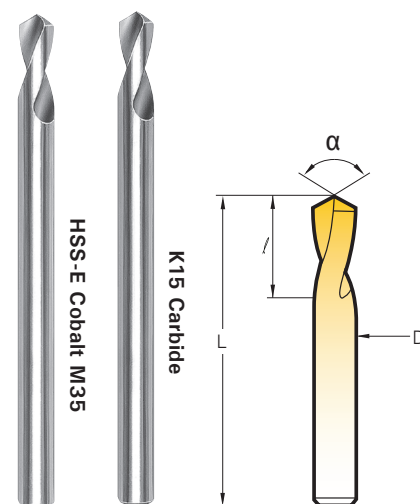
Diameter		L	/	T	Angle 60°	Angle 90°	Angle 120°	Angle 90°	Angle 120°	Angle 90°	Angle 120°	
(inch)	(mm)				Cobalt 191	Cobalt 195	Cobalt 196	M35/TiN 0895	M35/TiN 0896	M35/Red'X 0995*	M35/Red'X 0996*	
0.078	2	2	0.315	0.008	-	81195020000	81196020000	80089502000	80089602000	80099502000	80099602000	
0.118	3		0.400	0.012	-	81195030000	81196030000	80089503000	80089603000	80099503000	80099603000	
1/8			0.400	0.012	-	81195031700	81196031700	80089503170	80089603170	80099503170	80099603170	
0.157	4	2-1/16	0.475	0.016	81191040000	81195040000	81196040000	80089504000	80089604000	80099504000	80099604000	
3/16		2-3/8	0.600	0.020	-	81195047600	81196047600	80089504760	80089604760	80099504760	80099604760	
0.197	5				81191050000	81195050000	80089505000	80089605000	80099505000	80099605000		
0.236	6	2-5/8	0.800	0.023	81191060000	81195060000	81196060000	80089506000	80089606000	80099506000	80099606000	
1/4			0.900	0.025	-	81195063500	81196063500	80089506350	80089606350	80099506350	80099606350	
5/16			-	-	81195079300	-	80089507930	-	-	-		
0.315	8	3-1/8	1	0.031	81191080000	81195080000	81196080000	80089508000	80089608000	80099508000	80099608000	
3/8		3-1/2	1	0.039	-	81195095200	81196095200	80089509520	80089609520	80099509520	80099609520	
0.394	10				81191100000	81195100000	81196100000	80089510000	80089610000	80099510000	80099610000	
0.472	12	4	1-1/4	0.047	81191120000	81195120000	81196120000	80089512000	80089612000	80099512000	80099612000	
1/2			1-3/8	0.051	-	81195127000	81196127000	80089512700	80089612700	80099512700	80099612700	
0.551	14		-	0.055	-	81195140000	81196140000	80089514000	80089614000	80099514000	80099614000	
5/8		4-1/2	1-3/8	0.063	-	81195158700	81196158700	80089515870	80089615870	80099515870	80099615870	
0.630	16				0.063	81191160000	81195160000	81196160000	80089516000	80089616000	80099516000	80099616000
0.709	18	5-1/8	1-5/8	0.075	0.071	-	81195180000	81196180000	80089518000	80089618000	80099518000	
3/4					0.075	-	81195190500	81196190500	80089519050	80089619050	80099519050	80099619050
0.787	20				0.079	81191200000	81195200000	81196200000	80089520000	80089620000	80099520000	80099620000
0.984	25	5-3/8	1-3/4	0.098	-	81195250000	81196250000	80089525000	80089625000	80099525000	80099625000	
1					0.100	-	81195254000	81196254000	80089525400	80089625400	80099525400	80099625400

*The Spotting Drills (0995 & 0996) with Red'X coating are designed for machining abrasive hard alloys.

NC Spotting Drills - Long

Diameter (inch) (mm)	L	/	T	Angle 90° Cobalt 197	Angle 120° Cobalt 199	Angle 90° Carbide 8197	Angle 120° Carbide 8199
0.118	3	3-1/8	0.400	0.012	81197030000	81199030000	88819703000
0.157	4	4	0.475	0.016	81197040000	81199040000	88819704000
0.197	5	4-3/4	0.600	0.020	81197050000	81199050000	88819705000
0.236	6		0.800	0.023	81197060000	81199060000	88819706000
1/4			0.870	0.025	81197063500	81199063500	88819706350
0.315	8	5-1/2	1	0.031	81197080000	81199080000	88819708000
3/8			-	-	81197095200	81199095200	88819709520
0.394	10	6-3/4	1	0.039	81197100000	81199100000	88819710000
0.472	12		1-3/16	0.047	81197120000	81199120000	88819712000
1/2			1-3/8	0.051	81197127000	81199127000	88819712700
5/8			1-3/8	0.063	81197158700	81199158700	88819715870
0.630	16		1-3/8	-	81197160000	81199160000	88819716000
3/4			1-5/8	0.075	81197190500	81199190500	88819719050
0.787	20		1-5/8	0.079	81197200000	81199200000	88819720000
1			1-3/4	0.100	81197254000	81199254000	-

Hard'X coatings available with K15 CARBIDE — 6.5 – 7% Cobalt (0,006 – 0,008mm grain size)



Cobalt Spot Drill Value Sets (4 pieces)

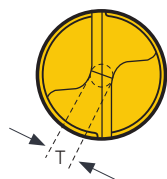
Composition Quantity	Angle 90° 81195000004	Angle 120° 81196000004
1 piece each	1/4	1/4
	3/8	3/8
	1/2	1/2
	5/8	5/8
	Ø	Ø

Sets also available TiN and Futura coated



NC Spotting Drills

Angle 90°, 120°, 142°



Hard'X
AlTiN Latuma

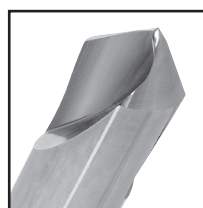
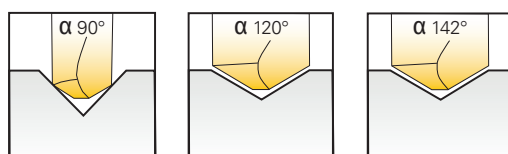
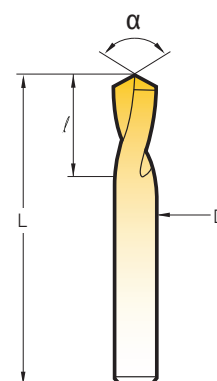
NC Spotting Drills

Diameter (inch)	(mm)	L	/	T*	Angle 90°		Angle 120°		Angle 142°
					Carbide 8195	K15/Hard'X 8195-H	Carbide 8196	K15/Hard'X 8196-H	K15/Hard'X 8190-H
0.078	2.0	1-9/16	0.315	0.008	88819502000	888195H0200	88819602000	888196H0200	-
0.118	3.0	1-3/4	0.400	0.012	88819503000	888195H0300	88819603000	888196H0300	-
0.157	4.0	2	0.475	0.016	88819504000	888195H0400	88819604000	888196H0400	-
0.197	5.0		0.600	0.020	88819505000	888195H0500	88819605000	888196H0500	-
0.236	6.0	2	0.700	0.023	88819506000	888195H0600	88819606000	888196H0600	888190H0600
1/4			0.700	0.023	88819506350	888195H0635	88819606350	888196H0635	888190H0635
5/16		2-3/8	0.900	0.031	88819507930	888195H0793	-	-	-
0.315	8.0				88819508000	888195H0800	88819608000	888196H0800	888190H0800
3/8				0.039	88819509520	888195H0952	88819609520	888196H0952	888190H0952
0.394	10.0	2-3/4	0.950	0.039	88819510000	888195H1000	88819610000	888196H1000	888190H1000
0.472	12.0			0.047	88819512000	888195H1200	88819612000	888196H1200	888190H1200
1/2				0.051	88819512700	888195H1270	88819612700	888196H1270	888190H1270
0.551	14.0	3	0.950	0.055	88819514000	888195H1400	88819614000	888196H1400	-
5/8		3-1/8	1	0.063	88819515870	888195H15870	88819615870	888196H1587	888190H1587
0.630	16.0				88819516000	888195H1600	88819616000	888196H1600	888190H1600
0.787	20.0	4	1-3/8	0.079	88819520000	888195H2000	88819620000	888196H2000	-

*T = web thickness of split point

†142° angle : for hard alloys and high performance drilling

K15 CARBIDE — 6.5 – 7% Cobalt (0.006 – 0.008mm grain size)



Standard Web Thinning
"Split-Point" Feature for
High-Speed Cutting

90° NC Spot Drill Centering and chamfering are obtained in a single operation.

120° & 142° NC Spot Drill

The preliminary hole corresponds to the angle at the end of the tool used in drilling and prevents it from deviating

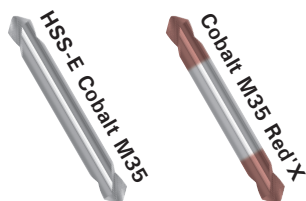


To place an order or to learn more about Pilot Precision Products, contact customer service at 413-350-5200.



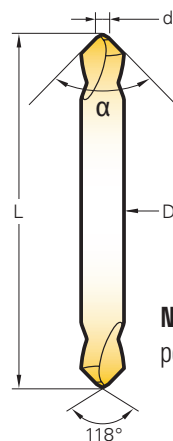
Double Ended NC Spotting Drills

1 DUO-MAG = 2 Single End NC Spot Drills



Double End NC Spot Drills - Angle 90°

D	d	L	DUO-MAG 019	Red'X 0919
3/16	1/16	2	80019010000	80091901000
1/4	3/32	2	80019020000	80091902000
3/8	9/64	3	80019030000	80091903000
1/2	3/16	4	80019040000	80091904000



Note: The 118° sharpening angle makes tool penetration easier, while reinforcing the point. (d)

Metric Double End NC Spot Drills - Angle 90°

D x d	L	DUO-MAG 019	Red'X 0919
3.0 x 0.5	40	80019030500	80091903050
4.0 x 1.0	45	80019041000	80091904100
6.0 x 2.0	55	80019062000	80091906200
8.0 x 2.5	65	80019082500	80091908250
10.0 x 3.0	75	80019103000	80091910300
12.0 x 3.5	85	80019123500	80091912350
16.0 x 4.0	90	80019164000	80091916400
20.0 x 5.0	100	80019205000	80091920500



Metric Double End Long NC Spot Drills - Angle 90°

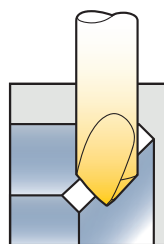
D x d	L	DUO-MAG 019L	Red'X 0919L
3.0 x 0.5	100	80019L03050	800919L0305
4.0 x 1.0	100	80019L04100	800919L0410
6.0 x 2.0	100	80019L06200	800919L0620
8.0 x 2.5	100	80019L08250	800919L0825
10.0 x 3.0	100	80019L10300	800919L1030
12.0 x 3.5	100	80019L12350	800919L1235
16.0 x 4.0	150	80019XL1640	800919XL164
20.0 x 5.0	150	80019XL2050	800919XL205

Duo Mag Sets American Standard

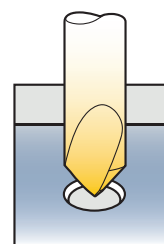
Composition Quantity	4 Pieces Cobalt 8001900004	4 Pieces Red'X 80091900004
1 piece each	3/16" 1/4" 3/8" 1/2"	3/16" 1/4" 3/8" 1/2"

Tolerances

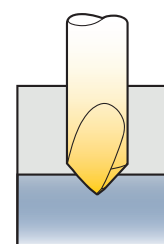
Tool Diameters	D (inch)	Angle	L
0.078 - 0.118	0 + 0.0002"	±1°	±0.0395
1/8 - 0.236	0 + 0.0003"		
1/4 - 0.394	0 + 0.0004"		
0.472 - 1	0 + 0.0005"		



Longitudinal Chamfering



Chamfering

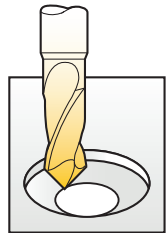


Centering Spotting

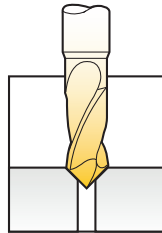
1 Multi-V = 10 Operations



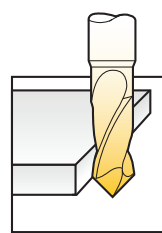
MULTI-V®



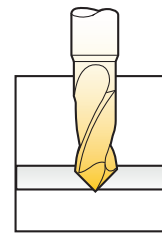
**90°-120°
Interpolation Milling**



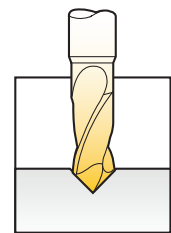
**90°-120°
Chamfering**



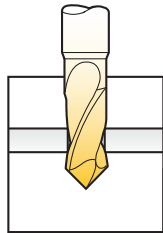
**60°-90°-120°
Contouring Side Milling**



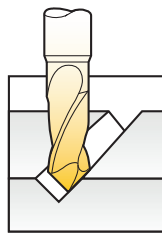
**60°-90°-120°
Direct Chamfering**



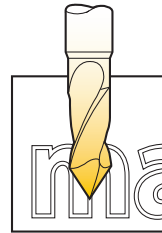
**90°-120°
Centering - Spotting**



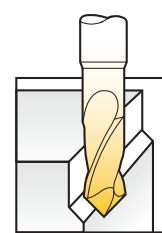
**90°-120°
Drilling**



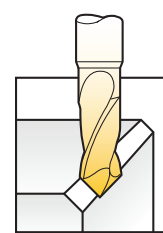
**90°-120°
V - Grooving**



**40°-60°-90°
Engraving**



**60°-90°-120°
Longitudinal Chamfers**



This is the ideal tool for machine centers and NC processing machines.

- The Multi-V combines multiple machining process to:
 - reduce machine set-up time
 - reduce operating time
 - reduce overall tool changes.
- Easy storage:
 - fewer tools required.
 - less tool spaces required in magazine
- Improved performances:
 - fine cutting edge with improved depth and surface finish
 - micro grain solid carbide for better wear resistance and greater rigidity
 - 30° spiral helix facilitates better chip removal

Metric Multi-V - Angles 40°, 60°
K15 Carbide — 6.5 – 7% Cobalt (0.006 – 0.008mm grain size)

Diameter						Angle 40°		Angle 60°	
(inch)	(mm)	L	/	d2	T*	Multi-V 8040†	Multi-V 8088†	Hard'X 8088-H†	
0.020	0.5	1-1/2	0.040	0.118	0.002	88804000500	88808800500	888088H0050	
0.031	0.8	1-1/2	0.063	0.118	0.003	-	88808800800	888088H0080	
0.039	1.0	1-1/2	0.080	0.118	0.004	88804001000	88808801000	888088H0100	
0.047	1.2	1-1/2	0.095	0.118	0.005	-	88808801200	888088H0120	
0.059	1.5	1-1/2	0.120	0.118	0.006	88804001500	88808801500	888088H0150	
0.070	1.8	1-1/2	0.142	0.118	0.007	-	88808801800	888088H0180	
0.078	2.0	1-1/2	0.160	0.118	0.008	88804002000	88808802000	888088H0200	
0.098	2.5	1-1/2	0.195	0.118	0.010	-	88808802500	888088H0250	
0.118	3	2	0.240	0.157	0.012	88804003000	88808803000	888088H0300	
0.157	4	2	0.315	0.197	0.016	-	88808804000	888088H0400	
0.197	5	2	0.395	0.236	0.020	88804005000	88808805000	888088H0500	
0.236	6	2-3/8	0.475	0.315	0.023	-	88808806000	888088H0600	
0.315	8	2-3/4	0.630	0.394	0.031	-	88808808000	888088H0800	
0.394	10	2-3/4	0.710	0.472	0.039	-	88808810000	888088H1000	
0.472	12	2-3/4	0.790	0.472	0.047	-	88808812000	888088H1200	
0.630	16	3-1/8	1.025	0.630	0.063	-	88808816000	888088H1600	
0.787	20	4	1.260	0.787	0.079	-	88808820000	888088H2000	

*T = web thickness of split point

†Angle 40° – 60° : ideal for engraving



K15 Carbide

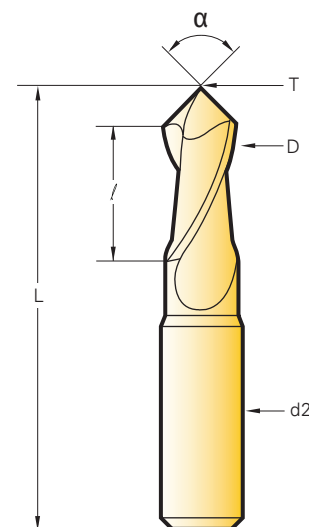
MULTI-V**Multi-Function Tools****1 Multi-V = 10 Operations****Hard'X**

AlTiN Latuma

Standard Multi-V - Angle 90°
 K15 Carbide — 6.5 – 7% Cobalt (0.006 – 0.008mm grain size)

Diameter		L	/	d2	T*	Multi-V 8090	Hard'X 8090-H
(inch)	(mm)						
0.003	0.1	1-1/2	0.008	0.118	0.001	88809000100	888090H0010
0.007	0.2	1-1/2	0.016	0.118	0.001	88809000200	888090H0020
0.011	0.3	1-1/2	0.024	0.118	0.001	88809000300	888090H0030
0.015	0.4	1-1/2	0.032	0.118	0.002	88809000400	888090H0040
0.020	0.5	1-1/2	0.040	0.118	0.002	88809000500	888090H0050
0.024	0.6	1-1/2	0.047	0.118	0.002	88809000600	888090H0060
0.028	0.7	1-1/2	0.055	0.118	0.003	88809000700	888090H0070
0.031	0.8	1-1/2	0.063	0.118	0.003	88809000800	888090H0080
0.035	0.9	1-1/2	0.071	0.118	0.003	88809000900	888090H0090
0.039	1.0	1-1/2	0.080	0.118	0.004	88809001000	888090H0100
0.043	1.1	1-1/2	0.087	0.118	0.004	88809001100	888090H0110
0.047	1.2	1-1/2	0.095	0.118	0.005	88809001200	888090H0120
0.051	1.3	1-1/2	0.102	0.118	0.005	88809001300	888090H0130
0.055	1.4	1-1/2	0.110	0.118	0.006	88809001400	888090H0140
0.059	1.5	1-1/2	0.120	0.118	0.006	88809001500	888090H0150
0.0625	1.58	1-3/4	0.126	0.125	0.007	88809015870	888090H1587
0.063	1.6	1-1/2	0.125	0.118	0.006	88809001600	888090H0160
0.066	1.7	1-1/2	0.134	0.118	0.007	88809001700	888090H0170
0.071	1.8	1-1/2	0.140	0.118	0.007	88809001800	888090H0180
0.074	1.9	1-1/2	0.145	0.118	0.008	88809001900	888090H0190
0.078	2.0	1-1/2	0.160	0.118	0.008	88809002000	888090H0200
0.082	2.1	1-1/2	0.165	0.118	0.008	88809002100	888090H0210
0.086	2.2	1-1/2	0.173	0.118	0.009	88809002200	888090H0220
0.090	2.3	1-1/2	0.181	0.118	0.009	88809002300	888090H0230
0.094	2.4	1-1/2	0.190	0.118	0.009	88809002400	888090H0240
0.098	2.5	1-1/2	0.195	0.118	0.010	88809002500	888090H0250
0.102	2.6	1-1/2	0.205	0.118	0.010	88809002600	888090H0260
0.118	3.0	2	0.240	0.157	0.012	88809003000	888090H0300
0.125	3.17	2	0.248	0.188	0.013	88809003170	888090H0317
0.157	4.0	2	0.315	0.197	0.016	88809004000	888090H0400
3/16	-	2	0.375	1/4	0.020	88809004760	888090H0476
0.197	5.0	2	0.395	0.236	0.020	88809005000	888090H0500
0.236	6.0	2-3/4	0.475	0.315	0.023	88809006000	888090H0600
1/4	-	2-3/4	0.475	5/16	0.025	88809006350	888090H0635
5/16	-	2-3/4	0.630	3/8	0.031	88809007930	888090H0793
0.315	8.0	2-3/4	0.630	0.394	0.031	88809008000	888090H0800
3/8	-	2-3/4	0.710	1/2	0.039	88809009520	888090H0952
0.394	10.0	2-3/4	0.710	0.472	0.039	88809010000	888090H1000
0.472	12.0	2-3/4	0.790	0.47	0.047	88809012000	888090H1200
1/2	-	2-3/4	0.790	1/2	0.051	88809012700	888090H1270
5/8	-	3-1/8	1.000	5/8	0.063	88809015870	888090H1587
0.630	16.0	3-1/8	1.025	0.630	0.063	88809016000	888090H1600
0.787	20.0	4	1.260	0.787	0.079	88809020000	888090H2000

*T = web thickness of split point

**Tolerances**

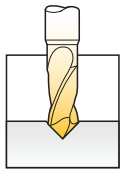
L	D	α	d2
0.003 – 0.118	-0 – 0.0010		0 – 0.00020
0.157 – 0.236	-0 – 0.0012	± 1°	0.157 – 0.197 1 – 0.00030
0.250 – 0.394	-0 – 0.0014		0.197 – 0.500 1 – 0.00035
0.472 – 0.630	-0.0018 – 0.0036		0.500 – 0.630 1 – 0.00045
0.787	-0.0025 – 0.0045		0.787 1 – 0.00050

Metric Multi-V - Angle 100°, 120°
 K15 Carbide — 6.5 – 7% Cobalt (0.006 – 0.008mm grain size)

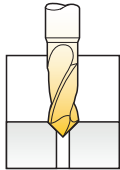
Diameter		L	/	d2	T*	Angle 120°		Angle 100°	
(inch)	(mm)					Multi-V 8092	Hard'X 8092-H	Multi-V 8095	Hard'X 8095-H
0.039	1.0	1-1/2	0.080	0.118	0.004	88809201000	888092H0100		
0.059	1.5	1-1/2	0.120	0.118	0.006	88809201500	888092H0150		
0.078	2.0	1-1/2	0.160	0.118	0.008	88809202000	888092H0200		
0.098	2.5	1-1/2	0.195	0.118	0.010	88809202500	888092H0250		
0.118	3.0	2	0.240	0.157	0.012	88809203000	888092H0300		
0.157	4.0	2	0.315	0.197	0.016	88809204000	888092H0400		
0.197	5.0	2	0.395	0.236	0.020	88809205000	888092H0500		
0.236	6.0	2-3/8	0.475	0.315	0.023	88809206000	888092H0600	88809506000	888095H0600
0.315	8.0	2-3/4	0.630	0.394	0.031	88809208000	888092H0800	88809508000	888095H0800
0.394	10.0	2-3/4	0.710	0.472	0.039	88809210000	888092H1000	88809510000	888095H1000
0.472	12.0	2-3/4	0.790	0.472	0.047	88809212000	888092H1200	88809512000	888095H1200
0.630	16.0	2-1/8	1.025	0.630	0.063	88809216000	888092H1600	88809516000	888095H1600
0.787	20.0	4	1.260	0.787	0.079	88809220000	888092H2000	-	-

*T = web thickness of split point

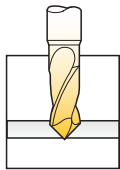




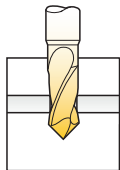
**90°-120°
Centering - Spotting**



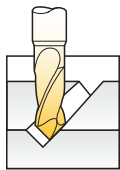
**90°-120°
Chamfering**



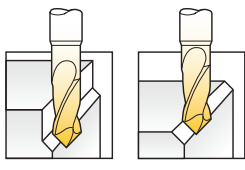
**60°-90°-120°
Direct Chamfering**



**90°-120°
Drilling**

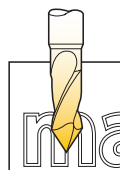


**90°-120°
V - Grooving**

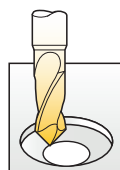


60°-90°-120°

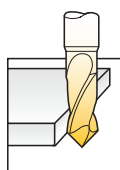
Longitudinal Chamfers



**40°-60°
Engraving**



**90°-120°
Interpolation
Milling**



**60°-90°-120°
Contouring
Side Milling**

Performance Recommendations for Use

Material	SFM		Diameter			Feed inches/rev.		
			3mm - 3/16"	5mm - 1/4"	10mm - 5/16"	12mm - 1/2"	16mm - 5/8"	20mm
Steel < 81 HRB (B)	230 - 247	RPM	6400	4000	2500	1900	1500	1300
		IPM	12.6	12.6	13.8	14.2	14.2	14.3
		inch/tooth	0.002	0.0031	0.0055	0.0075	0.0094	0.0110
Steel < 24 Rc (C)	132 - 197	RPM	4000	2600	1600	1200	900	850
		IPM	7.9	8.2	8.8	9.4	8.9	9.4
		inch/tooth	0.002	0.0031	0.0055	0.0075	0.0094	0.0110
Steels 24 - 32 RC Cast Iron < 180 HB (Grey Cast Iron)	115 - 132	RPM	3200	2200	1400	1000	850	680
		IPM	5.7	6.1	6.6	7.1	7.4	7.5
		inch/tooth	0.0018	0.0028	0.0047	0.0071	0.0087	0.0110
Steels 32 - 41 RC Cst Iron > 180 HB Stainless Steels	99 - 115	RPM	2800	1800	1100	800	650	550
		IPM	5.0	5.0	5.2	5.4	5.6	5.6
		inch/tooth	0.0018	0.0028	0.0047	0.0067	0.0087	0.0102
Titanium Alloys	82 - 99	RPM	2200	1600	900	660	500	480
		IPM	3.5	3.8	3.9	4.1	4.3	4.7
		inch/tooth	0.0016	0.0024	0.0043	0.0063	0.0087	0.0098
Ni Co Alloys Inconel - Nimonic - Waspaloy	66	RPM	1800	1100	700	500	400	320
		IPM	2.8	2.6	3.0	3.1	3.1	3.1
		inch/tooth	0.0016	0.0024	0.0043	0.0063	0.0079	0.0098
Copper Alloys Bronze	165 - 395	RPM	5000	3500	2200	1900	1700	1400
		IPM	19.7	20.7	21.7	22.4	23.4	24.8
		inch/tooth	0.0039	0.0059	0.0098	0.0118	0.0138	0.0177
Aluminum	494	RPM	10000	6300	4000	3200	2500	2000
		IPM	19.7	22.3	23.6	25.2	26.6	27.6
		inch/tooth	0.0020	0.0035	0.0059	0.0079	0.0106	0.0138
Thermoplastics	494	RPM	7300	4600	2800	2900	2300	1900
		IPM	14.4	16.3	20.9	22.8	24.4	26.2
		inch/tooth	0.002	0.0035	0.0075	0.0079	0.0106	0.0138

Material	SFM		Diameter			Feed inches/rev.		
			3mm - 3/16"	5mm - 1/4"	10mm - 5/16"	12mm - 1/2"	16mm - 5/8"	20mm
Steel < 81 HRB (B)	230 - 247	RPM	6800	4300	2650	2000	1500	1200
		IPM	2.6	2.6	2.8	3.0	3.0	3.0
		inch/tooth	0.0002	0.0003	0.0006	0.0007	0.0010	0.0012
Steel < 24 Rc (C)	132 - 197	RPM	5400	3500	2100	1600	1200	1000
		IPM	2.2	2.2	2.3	2.4	2.4	2.4
		inch/tooth	0.0002	0.0003	0.0006	0.0007	0.0010	0.0012
Steels 24 - 32 RC Cast Iron < 180 HB (Grey Cast Iron)	115 - 132	RPM	3600	2300	1400	1000	800	630
		IPM	1.1	1.1	1.3	1.4	1.4	1.4
		inch/tooth	0.0002	0.0002	0.0005	0.0007	0.0008	0.0011
Steels 32 - 41 RC Cst Iron > 180 HB Stainless Steels	99 - 115	RPM	3000	2000	1200	900	700	550
		IPM	1.0	1.0	1.2	1.2	1.2	1.2
		inch/tooth	0.0002	0.0002	0.0005	0.0006	0.0008	0.0011
Titanium Alloys	82 - 99	RPM	2200	1600	1000	760	600	400
		IPM	0.7	0.8	0.8	0.8	0.9	0.9
		inch/tooth	0.0002	0.0002	0.0004	0.0005	0.0007	0.0011
Ni Co Alloys Inconel - Nimonic - Waspaloy	66	RPM	1800	1100	700	500	400	320
		IPM	0.4	0.5	0.6	0.6	0.6	0.6
		inch/tooth	0.0001	0.0002	0.0004	0.0005	0.0007	0.0010
Copper Alloys Bronze	165 - 395	RPM	7000	6000	3500	3200	2500	1750
		IPM	4.4	4.7	4.7	5.0	5.2	5.5
		inch/tooth	0.0003	0.0004	0.0007	0.0008	0.0012	0.0016
Aluminum	494	RPM	13000	8600	5300	4000	3000	2400
		IPM	7.9	8.7	9.4	9.4	9.8	9.8
		inch/tooth	0.0003	0.0005	0.0009	0.0012	0.0017	0.0020
Thermoplastics	494	RPM	13000	8600	5300	4000	3000	2400
		IPM	10.2	10.2	10.4	10.6	10.6	10.6
		inch/tooth	0.0004	0.0006	0.0010	0.0013	0.0018	0.0022

Material	SFM		Diameter			Feed inches/rev.		
			3mm - 3/16"	5mm - 1/4"	10mm - 5/16"	12mm - 1/2"	16mm - 5/8"	20mm
Steel < 81 HRB (B)	230 - 247	RPM	6800	4300	2650	2000	1500	1200
		IPM	4.3	4.7	5.1	5.9	6.1	6.1
		inch/tooth	0.003	0.0006	0.0010	0.0016	0.0020	0.0026
Steel < 24 Rc (C)	132 - 197	RPM	5400	3500	2100	1600	1200	1000
		IPM	3.3	3.5	4.1	4.7	4.9	4.9
		inch/tooth	0.0003	0.0005	0.0010	0.0016	0.0020	0.0024
Steels 24 - 32 RC Cast Iron < 180 HB (Grey Cast Iron)	115 - 132	RPM	3600	2300	1400	1000	800	630
		IPM	2.3	2.4	2.8	3.1	3.1	3.1
		inch/tooth	0.0003	0.0005	0.0010	0.0016	0.0020	0.0024
Steels 32 - 41 RC Cst Iron > 180 HB Stainless Steels	99 - 115	RPM	3000	2000	1200	900	700	550
		IPM	1.8	2.0	2.4	2.6	2.6	2.6
		inch/tooth	0.0003	0.0005	0.0010	0.0014	0.0020	0.0024
Titanium Alloys	82 - 99	RPM	2200	1600	1000	760	600	400
		IPM	1.4	1.6	2.0	2.2	2.2	2.2
		inch/tooth	0.0003	0.0005	0.0010	0.0014	0.0018	0.0028
Ni Co Alloys Inconel - Nimonic - Waspaloy	66	RPM	1800	1100	700	500	400	320
		IPM	1.0	1.0	1.4	1.4	1.6	1.6
		inch/tooth	0.0003	0.0004	0.0010	0.0014	0.0020	0.0024
Copper Alloys Bronze	165 - 395	RPM	10000	7000	3600	2500	2300	1800
		IPM	7.9	8.3	8.5	8.9	9.1	9.2
		inch/tooth	0.0004	0.0006	0.0012	0.0018	0.0020	0.0026
Aluminum	494	RPM	13000	8600	5300	4000	3000	2400
		IPM	8.3	8.9	12.6	14.2	11.8	12.2
		inch/tooth	0.0003	0.0005	0.0012	0.0018	0.0020	0.0026
Thermoplastics	494	RPM	13000	8600	5300	4000	3000	2400
		IPM	12.2	10.2	14.6	15.7	12.6	13.0
		inch/tooth	0.0005	0.0006	0.0014	0.0020	0.0020	0.0028



Biconical Cutters

Applications: **Front and Back Chamfering**

Hard'X
AlTiN Latuma

Bi-Face Advantages

Special design = positive cut + relieving profile

- Unequalled surface finish
- Impressive performance
- Extended tool profile life

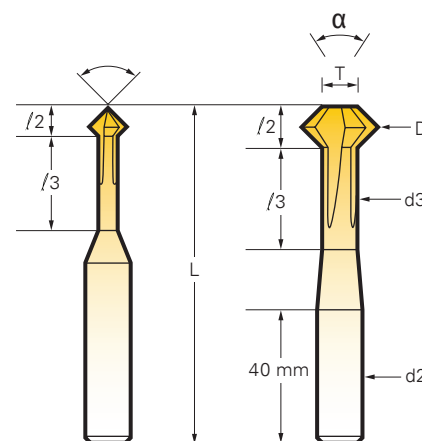
*For super finish operations, **Bi-face** has a constant relieved profile. Longitudinal or interpolated work for front and back chamfering of edges and holes.*

Tolerances

D	Tolerance	L	α
$\varnothing .040 \sim 0.197$	0 - 0.002	± 0.040	$\pm 1^\circ$
$\varnothing .236 \sim 0.630$	0 - 0.004	± 0.040	$\pm 1^\circ$



K15 Carbide



Mini

Standard

Mini - Angle 90° 3 Flutes

Diameter (inch)	(mm)	d2	d3 max	T max	L min	/ 2	/ 3	Bi-face 8480	Hard'X 8480-H
0.040	1.0	0.118	0.028	0.012	2-3/8	0.020	0.197	88848001000	888480H0100
0.059	1.5		0.043	0.018		0.029	0.236	88848001500	888480H0150
0.079	2.0		0.059	0.024		0.037	0.315	88848002000	888480H0200
0.118	3.0		0.087	0.035		0.059	0.394	88848003000	888480H0300

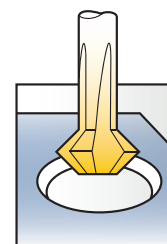
Standard - Angle 90° 4 Flutes

Diameter (inch)	(mm)	d2	d3 max	T max	L min	/ 2	/ 3	Bi-face 8490	Hard'X 8490-H
0.118	3.0	0.236	0.087	0.047	4	0.051	0.394	88849003000	888490H0300
0.157	4.0		0.114	0.063		0.069	0.472	88849004000	888490H0400
0.197	5.0		0.134	0.079		0.091	0.591	88849005000	888490H0500
0.236	6.0		0.154	0.094		0.114	0.709	88849006000	888490H0600
0.315	8.0		0.193	0.193		0.118	1.339	88849008000	888490H0800
0.394	10.0		0.232	0.232		0.157		88849010000	888490H1000
0.472	12.0		0.232	0.232		0.236		88849012000	888490H1200
0.630	16.0	0.394	0.311	0.311		0.315		88849016000	888490H1600

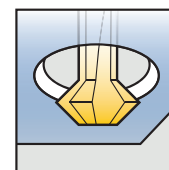
Standard - Angle 60° 4 Flutes

Diameter (inch)	mm	d2	d3 max	T max	L min	2	3	Bi-face 8460	Hard'X 8460-H
0.197	5.0	0.236	0.134	0.134	4	0.110	1.339	88846005000	888460H0500
0.315	8.0	0.236	0.193	0.232		0.213		88846008000	888460H0800
0.472	12.0	0.394	0.232	0.232		0.413		88846012000	888460H1200

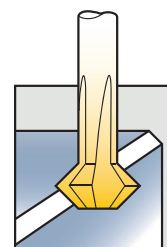
See contouring section on page 85 for Bi-Face performance parameters.



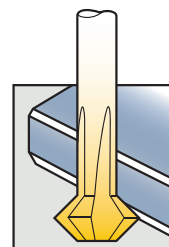
Front
Chamfering



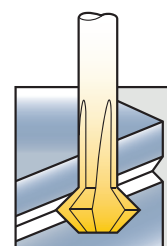
Back
Chamfering



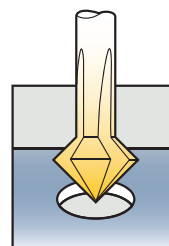
Top
Chamfering



Bottom
Chamfering



V-Grooving



Deburring

Single Flute/Point Interpolated Thread Milling Cutters

Angle 60°

Thread Milling Cutters - Angle 60° 3 Flutes						
Screw Diameter	D (mm)	d2	d1	L	/	Hard'X 845-H
M0.8	0.57	3	0.27	39	2.4	88845MH0080
M0.9	0.64		0.31		2.7	88845MH0090
M1.0	0.71		0.35		3.0	88845MH0100
M1.2	0.91		0.55		3.6	88845MH0120
M1.4	1.06		0.62		4.2	88845MH0140
M1.6	1.2		0.69		4.8	88845MH0160
M1.8	1.35		0.84		5.5	88845MH0180
M2.0	1.5		0.92		6	88845MH0200
M2.5	1.9		1.27		7	88845MH0250
M3	2.3		1.57		9	88845MH0300
M4	3.1	6	2.09	66	12	88845MH0400
M5	4.0		2.90		15	88845MH0500
M6	4.8		3.47		18	88845MH0600
M8	6.5	8	4.85	80	22	88845MH0800
M10	7.9		5.95		26	88845MH1000



K15 Carbide

The same tool will achieve different pitches (right or left hand), in blind or thru holes.

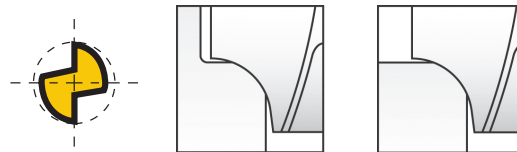
Multi-Function Carbide Miniature Tools

Applications: **Corner Rounding End-Mills**



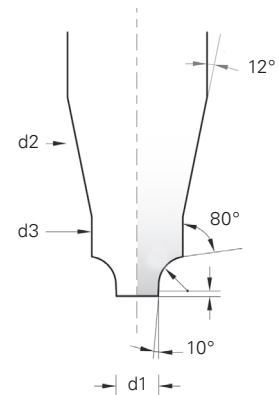
K15 Carbide

These cutters are designed for CNC machines and allow machining of even very thin materials and easy regrinds.



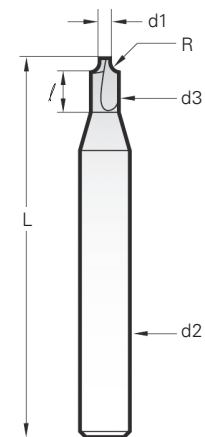
The radius is positioned in relation to the small Ø d1-, making it possible to machine compound forms, small slots and holes from 0.5mm.

Hard'X
AlTiN Latuma



Miniature									
Radius		d1	d2	d3	Δx	/	L	Carbide 8550	Hard'X 8550-H
(inch)	(mm)								
0.0039	0.10	0.020	0.118	0.031	0.35	0.098	2	88855000100	888550H0010
0.0059	0.15			0.035	0.40	0.098		88855000150	888550H0015
0.0079	0.20			0.040	0.45	0.098		88855000200	888550H0020
0.0098	0.25			0.040	0.50	0.098		88855000250	888550H0025
0.0118	0.30			0.047	0.55	0.098		88855000300	888550H0030
0.0157	0.40			0.055	0.65	0.098		88855000400	888550H0040
0.0197	0.50			0.063	0.75	0.098		88855000500	888550H0050
0.0236	0.60			0.071	0.85	0.118		88855000600	888550H0060
0.0276	0.70			0.083	0.95	0.118		88855000700	888550H0070
0.0295	0.75			0.083	1.00	0.118		88855000750	888550H0075
0.0315	0.80	0.031	0.157	0.098	1.20	0.157	2-3/16	88855000800	888550H0080
0.0354	0.90			0.114	1.30	0.157		88855000900	888550H0090
0.0394	1.00			0.114	1.40	0.157		88855001000	888550H0100
0.0492	1.25			0.157	1.65	0.157		88855001250	888550H0125
0.0591	1.50	0.059	0.236	0.197	0.180	2.25		88855001500	888550H0150
0.0689	1.75			0.236	0.220	2.50		88855001750	888550H0175
0.0787	2.00			0.236	0.220	2.75		88855002000	888550H0200
0.0886	2.25			0.315	0.260	3.00		88855002250	888550H0225
0.0984	2.50			0.315	0.260	3.25		88855002500	888550H0250
0.1181	3.00			0.315	0.299	3.75		88855003000	888550H0300
0.1575	4.00	0.075	0.394	0.394	4.95	-		88855004000	888550H0400
0.1969	5.00	0.075	0.472	0.472	5.95	-		88855005000	888550H0500

Coating is available

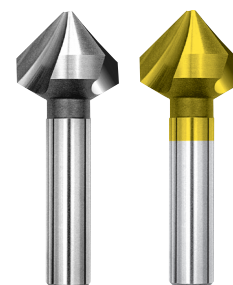
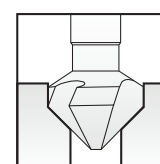
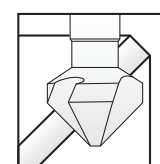
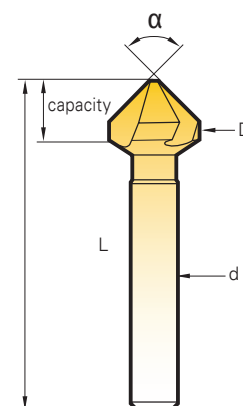


Tolerances

R	d1	d2	L
± .0008	± .00039	h6	± .0040

TRI-DENT Imperial**3 Flute Countersinks****Three Flute Countersinks**

Angle	Diameter		Capacity	d	L	Cobalt	Angle	M35/TiN
	(inch)	(mm)	min/max					
30° 439	0.248	6.30	0.079 – 0.248	0.197	2	84439063000	30° 4839	84483906300
	0.488	12.40	0.012 – 0.488	0.315	2-1/2	84439124000		84483912400
	0.650	16.50	0.157 – 0.650	0.394	3	84439165000		84483916500
	0.984	25.00	0.236 – 0.984	0.394	3-1/2	84439250000		84483925000
60° 432	0.248	6.30	0.051 – 0.248	0.197	1-7/8	84432063000	60° 4832	84483206300
	0.327	8.30	0.071 – 0.327	0.236	2	84432083000		84483208300
	0.410	10.40	0.091 – 0.410	0.236	2	84432104000		84483210400
	0.488	12.40	0.098 – 0.488	0.315	2-3/8	84432124000		84483212400
	0.650	16.50	0.110 – 0.650	0.394	2-1/2	84432165000		84483216500
	0.807	20.50	0.118 – 0.807	0.940	2-3/4	84432205000		84483220500
	0.984	25.00	0.126 – 0.984	0.394	3	84432250000		84483225000
	1.220	31.00	0.138 – 1.22	0.472	3-1/8	84432310000		84483231000
82° 434	0.248	6.30	0.051 – 0.248	0.197	1-3/4	84434063000	82° 4834	84483406300
	1/4	6.35	0.051 – 0.250	1/4	1-3/4	84434063500		84483406350
	5/16	7.94	0.070 – 0.312	1/4	1-3/4	84434079300		84483407930
	0.327	8.30	0.070 – 0.327	0.236	2	84434083000		84483408300
	3/8	9.52	0.085 – 0.375	1/4	2	84434095200		84483409520
	0.410	10.40	0.087 – 0.410	0.236	2	84434104000		84483410400
	0.488	12.40	0.098 – 0.488	0.315	2-1/4	84434124000		84483412400
	1/2	12.70	0.100 – 0.500	1/4	2	84434127000		84483412700
	5/8	15.87	0.110 – 0.625	3/8	2-3/8	84434158700		84483415870
	0.650	16.50	0.110 – 0.650	0.394	2-3/8	84434165000		84483416500
	3/4	19.05	0.120 – 0.750	3/8	2-3/8	84434190500		84483419050
	0.807	20.50	0.118 – 0.807	0.394	2-1/2	84434205000		84483420500
	0.984	25.00	0.126 – 0.984	0.394	2-11/16	84434250000		84483425000
	1.000	25.40	0.125 – 1.000	3/8	2-3/4	84434254000		84483425400
	1.220	31.00	0.138 – 1.220	0.472	2-7/8	84434310000		84483431000
90°	0.158	4.00	0.051 – 0.158	0.158	1-5/8	84431040000	90°	84483104000
	0.170	4.30	0.051 – 0.170	0.158	1-5/8	84431043000		84483104300
	0.197	5.00	0.051 – 0.197	0.158	1-5/8	84431050000		84483105000
	0.209	5.30	0.051 – 0.209	0.197	1-3/4	84431053000		84483105300
	0.229	5.80	0.051 – 0.229	0.197	1-3/4	84431058000		84483105800
	0.236	6.00	0.051 – 0.236	0.197	1-3/4	84431060000		84483106000
	0.248	6.30	0.051 – 0.248	0.197	1-3/4	84431063000		84483106300
	1/4	6.35	0.050 – 0.250	1/4	1-3/4	84431063500		84483106350
	0.276	7.00	0.063 – 0.279	0.236	2	84431070000		84483107000
	0.288	7.30	0.063 – 0.288	0.236	2	84431073000		84483107300
	5/16	7.94	0.070 – 0.312	1/4	1-3/4	84431079300		84483107930
	0.315	8.00	0.071 – 0.315	0.236	2	84431080000		84483108000
	0.327	8.30	0.071 – 0.327	0.236	2	84431083000		84483108300
	0.354	9.00	0.079 – 0.354	0.236	2	84431090000		84483109000
	0.370	9.40	0.079 – 0.370	0.236	2	84431094000		84483109400
	3/8	9.52	0.085 – 0.375	1/4	3	84431095200		84483109520
	0.394	10.00	0.087 – 0.394	0.236	4	84431100000		84483110000
	0.410	10.40	0.087 – 0.410	0.236	5	84431104000		84483110400
	0.453	11.50	0.098 – 0.453	0.315	2-1/4	84431115000		84483111500
	0.472	12.00	0.098 – 0.472	0.315	2-1/4	84431120000		84483112000
	0.488	12.40	0.098 – 0.488	0.315	2-1/4	84431124000		84483112400
	1/2	12.70	0.100 – 0.500	1/4	2	84431127000		84483112700
	0.528	13.40	0.098 – 0.528	0.315	2-1/4	84431134000		84483113400
	0.567	14.40	0.098 – 0.567	0.315	2-1/4	84431144000		84483114400
	0.590	15.00	0.110 – 0.590	0.394	2-3/8	84431150000		84483115000
	5/8	15.87	0.110 – 0.625	3/8	2-3/8	84431158700		84483115870
	0.650	16.50	0.110 – 0.650	0.394	2-3/8	84431165000		84483116500
	0.748	19.00	0.118 – 0.748	0.394	2-1/2	84431190000		84483119000
	3/4	19.05	0.120 – 0.750	3/8	2-3/8	84431190500		84483119050
	0.807	20.50	0.118 – 0.807	0.394	2-1/2	84431205000		84483120500
	0.906	23.00	0.126 – 0.906	0.394	2-5/8	84431230000		84483123000
	0.984	25.00	0.126 – 0.984	0.394	2-5/8	84431250000		84483125000
	1.000	25.40	0.125 – 1.00	3/8	2-3/4	84431254000		84483125400
	1.024	26.00	0.126 – 1.024	0.394	2-5/8	84431260000		84483126000
	1.102	28.00	0.138 – 1.102	0.472	2-3/4	84431280000		84483128000
	1.181	30.00	0.138 – 1.181	0.472	2-3/4	84431300000		84483130000
	1.220	31.00	0.138 – 1.220	0.472	2-3/4	84431310000		84483131000

**HSS-E Cobalt M35****Countersink****Chamfer**

TRI-DENT Imperial

3 Flute Countersinks & Sets

Three Flute Countersinks								
Angle	Diameter		Capacity	d	L	Cobalt	Angle	M35/TiN
(inch)	(mm)	min/max						
100° 435	0.248	6.30	0.051 – 0.248	0.197	1-3/4	84435063000	100° 4835	84483506300
	0.327	8.30	0.070 – 0.327	0.236	2	84435083000		84483508300
	0.410	10.40	0.087 – 0.410	0.236	2	84435104000		84483510400
	0.488	12.40	0.098 – 0.488	0.315	2-3/16	84435124000		84483512400
	0.650	16.50	0.110 – 0.650	0.394	2-5/16	84435165000		84483516500
	0.807	20.50	0.118 – 0.807	0.394	2-7/16	84435205000		84483520500
	0.984	25.00	0.126 – 0.984	0.394	2-1/2	84435250000		84483525000
	1.220	31.00	0.138 – 1.220	0.472	2-11/16	84435310000		84483531000
120° 433	0.248	6.30	0.051 – 0.248	0.197	1-3/4	84433063000	120° 4833	84483306300
	0.327	8.30	0.070 – 0.327	0.236	2	84433083000		84483308300
	0.410	10.40	0.087 – 0.410	0.236	2	84433104000		84483310400
	0.488	12.40	0.098 – 0.488	0.315	2-1/8	84433124000		84483312400
	0.650	16.50	0.110 – 0.650	0.394	2-1/4	84433165000		84483316500
	0.807	20.50	0.118 – 0.807	0.394	2-5/16	84433205000		84483320500
	0.984	25.00	0.126 – 0.984	0.394	2-1/2	84433250000		84483325000
	1.220	31.00	0.138 – 1.220	0.472	2-1/2	84433310000		84483331000



84431000000-M

84431000000 / 84436000000

3 Flute Countersink Sets		
Angle	Cobalt	Composition (mm)
60°	84432000000	10.4
	84483200000 TiN	
82°	84434000000	20.5
	84483400000 TiN	
100°	84435000000	25
120°	84433000000	31

Trident Countersink Sets		
Angle	EDP No.	Composition (mm)
60°	84432000000	Ø 10.4 - 16.5 20.5 - 25 - 31
	84483200000 TiN	
82°	84434000000	
	84483400000 TiN	
100°	84435000000	
120°	84433000000	

Countersink Sets - Angle 90°	
EDP No.	Composition
84431000000	10.4 - 16.5 - 20.5 - 25.0 - 31.0mm
84483100000 TiN	
84436000000	
84431000002	6.3 - 8.3 - 10.4 - 12.4 - 16.5 - 20.5mm
84483100002 TiN	
84436000002	
88843100002	

TRI-DENT Metric | 60° and 82° Three Flute Countersinks

Applications: **Countersinking and Chamfering**



Three Flute Countersinks - Angle 60° DIN 334-C				
D (mm)	d1 max	d2	L	Magaforce 8432
6.3	1.5	5	47	88843206300
8.3	2.0	6	52	88843208300
10.4	2.5	6	53	88843210400
12.4	2.8	8*	60	88843212400
16.5	3.2	10*	65	88843216500
20.5	3.5	10*	69	88843220500
25.0	3.8	10*	75	88843225000
31.0	4.2	12*	81	88843231000

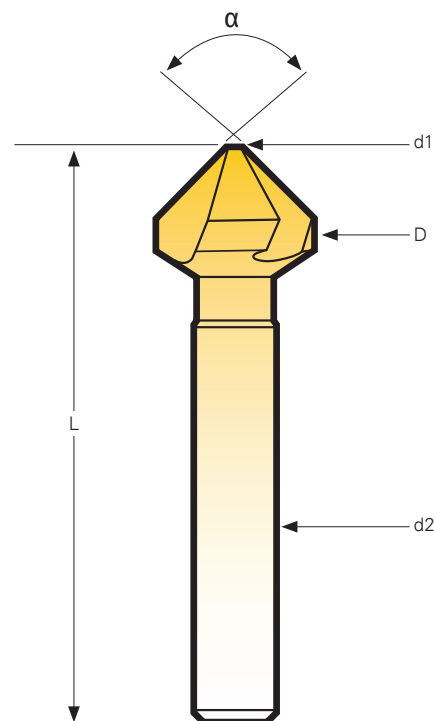
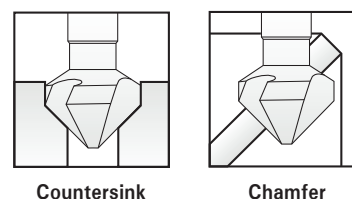
*3 flattened shanks = effective holding

Three Flute Countersinks - Angle 82° DIN 334-C				
D (mm)	d1 max	d2	L	Magaforce 8434
10.4	2.5	6	50	88843410400
12.4	2.8	8*	56	88843412400
16.5	3.2	10*	61	88843416500
20.5	3.5	10*	64	88843420500
25.0	3.8	10*	68	88843425000

*3 flattened shanks = effective holding

Tolerances			
D	Angle	d	L
z 9	- 1°	h9	± 1mm

Carbide = hardness 1800 HV to machine steels over 1300 N/mm², treated steels up to 60 HRC, abrasive tough steels, stainless steels, titanium alloys, hard bronze, inconel, nimonic, waspaloy, hard cast irons and all other metals, thermoplastics, nylon, PVC, laminated, graphite, reinforced polymer with glass or carbon fibers and ceramic glass.



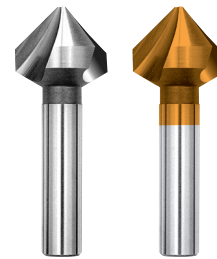
TRI-DENT Metric

90° Three Flute Countersinks

Three Flute Countersinks - Angle 90° Special for abrasion-resistant hard alloys

Diameter (inch) (mm)		Capacity min/max	D	L	Cobalt + 436	M42/RedX 4936
0.248	6.3	0.051 – 0.248	0.197	1-3/4	84436063000	84493606300
0.327	8.3	0.071 – 0.327	0.236	1-3/4	84436083000	84493608300
0.410	10.4	0.087 – 0.410	0.236	1-3/4	84436104000	84493610400
0.488	12.4	0.098 – 0.488	0.315	2-1/4	84436124000	84493612400
0.650	16.5	0.110 – 0.650	0.394	2-3/8	84436165000	84493616500
0.807	20.5	0.118 – 0.807	0.394	2-1/2	84436205000	84493620500
0.984	25.0	0.126 – 0.984	0.394	2-5/8	84436250000	84493625000
1.220	31.0	0.138 – 1.220	0.472	2-3/4	84436310000	84493631000
1.969	50.0*	0.197 – 1.969	0.630	5	84436500000	84493650000

*3 flatted shanks



HSS-E 8% COBALT M42

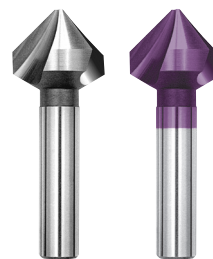
NOTE:

All metric sizes are available. Call customer service for information or to place an order.

Countersinks - Angle 90° 3 Flutes

Diameter (inch) (mm)		Capacity min/max	D	L	Carbide 8431	K15/Hard-H 8431-H
0.170	4.3	0.051 – .0170	0.157	1-9/16	88843104300	888431H0430†
0.209	5.3	0.051 – 0.209	0.157	1-9/16	88843105300	888431H0530†
0.248	6.3	0.051 – 0.248	0.197	1-3/4	88843106300	888431H0630†
0.327	8.3	0.071 – 0.327	0.236	1-3/4	88843108300	888431H0830†
0.410	10.4	0.087 – 0.410	0.236	1-3/4	88843110400	888431H1040
0.488	12.4*	0.098 – 0.488	0.315	2-1/4	88843112400	888431H1240
0.650	16.5*	0.110 – 0.650	0.394	2-3/8	88843116500	888431H1650
0.807	20.5*	0.118 – 0.807	0.394	2-1/2	88843120500	888431H2050
0.984	25.0*	0.126 – 0.984	0.394	2-5/8	88843125000	888431H2500
1.200	31.0*	0.138 – 1.220	0.472	2-3/4	88843131000	888431H3100

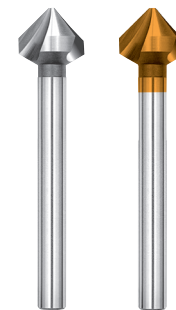
*Ø 12,4 – 31,0 = 3 flatted shanks



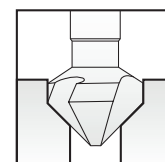
K15 SOLID CARBIDE

Long Series - Angle 90°

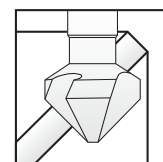
Diameter (inch) (mm)		Capacity min/max	D	L	Cobalt 4303	M35/RedX 4933	Carbide 8431-L
0.248	6.3	0.051 – 0.248	0.236	3-5/16	84430316500	84493306300	888431L0630
0.327	8.3	0.071 – 0.327	0.315	3-3/8	84430308300	84493308300	888431L0830
0.410	10.4	0.087 – 0.410	0.394	3-1/2	84430310400	84493310400	888431L1040
0.488	12.4	0.098 – 0.488	0.394	4-1/4	84430312400	84493312400	888431L1240
0.650	16.5	0.110 – 0.650	0.630	4 - 7/16	84430316500	84493316500	888431L1650
0.807	20.5	0.118 – 0.807	0.360	4-1/2	84430320500	84493320500	888431L2050
0.984	25.0	0.126 – 0.984	0.788	4 -11/16	84430325000	84493325000	-



HSS-E COBALT M35

TRI-DENT**90° Three Flute Countersinks Anti-Vibration****Metric**Applications: **Countersinking and Chamfering**

Countersink



Chamfer

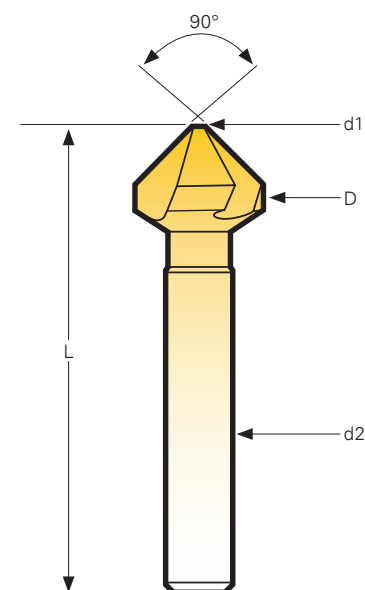
The equal division 3 x 120° of the flutes offers good results in most materials.

For iron alloys, vibrations may happen and generate chatter.

These new **anti-vibration** countersinks with variable pitch flutes avoid this phenomenon.

HSS-E Cobalt = hardness 65 HRC, to machine steels up to 1000N/mm², cast iron up to 180 HB, copper, brass, bronze and aluminum.

Three Flute Countersinks Anti-Vibration - Angle 90°					DIN 334-C
D (mm)	d1 max	d2	L	HSS-E 43-A	TiN 483-A
4.3	1.3	4	40	8443A043000	84483A04300
5.3	1.5	4	40	8443A053000	84483A05300
6.0	1.5	5	45	8443A060000	84483A06000
6.3	1.5	5	45	8443A063000	84483A06300
8.0	2.0	6	50	8443A080000	84483A08000
8.3	2.0	6	50	8443A083000	84483A08300
9.4	2.2	6	50	8443A094000	84483A09400
10.0	2.5	6	50	8443A100000	84483A10000
10.4	2.5	6	50	8443A104000	84483A10400
11.5	2.8	8	56	8443A115000	84483A11500
12.0	2.8	8	56	8443A120000	84483A12000
12.4	2.8	8	56	8443A124000	84483A12400
15.0	3.2	10	60	8443A150000	84483A15000
16.5	3.2	10	60	8443A165000	84483A16500
20.5	3.5	10	63	8443A205000	84483A20500
25.0	3.8	10	67	8443A250000	84483A25000
28.0	4	12	71	8443A280000	84483A28000
30.0	4.2	12	71	8443A300000	84483A30000
31.0	4.2	12	71	8443A310000	84483A31000

**Value Sets**

Composition	Quality	Code	EDP No.
5 cutters 10.4, 16.5 20.5, 25, 31	HSS-E TiN	43-A 483-A	8443A000000 84483A000000
6 cutters 6.3, 8.3, 10., 12.4, 16.5, 20.5	HSS-E TiN	43-A 483-A	8443A000002 84483A000002



To place an order or to learn more about Pilot Precision Products, contact customer service at 413-350-5200.

Single Flute Chamfering Cutters

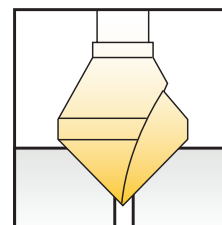
Single Flute Chamfering Cutters¹ - Angle 90°

Diameter		Capacity min/max	d	L	Cobalt 421	M35/TiN 4821
(inch)	(mm)					
1/8	-	1/32 - 1/8	1/8	1-1/4	84421031700	84482103170
0.157	4	3/64 - 0.157	0.157	1-1/2	84421040000	84482104000
3/16	-	3/64 - 3.160	3/16	1-3/8	84421047600	84482104760
0.197	5	3/64 - 0.197	0.197	1-1/2	84421050000	84482105000
0.236	6	3/64 - 0.236	0.236	1-1/2	84421060000	84482106000
1/4	-	3/64 - 1/4	1/4	1-1/2	84421063500	84482106350
5/16	-	3/64 - 5/16	1/4	1-5/8	84421079300	84482107930
0.315	8	3/64 - 0.315	0.236	1-1/2	84421080000	84482108000
3/8	-	3/64 - 3/8	1/4	1-3/4	84421095200	84482109520
0.394	10	3/64 - 0.394	0.236	1-3/4	84421100000	84482110000
0.472	12	5/64 - 0.472	0.315	2	84421120000	84482112000
1/2	-	5/64 - 1/2	1/4	2	84421127000	84482112700
0.590	15	5/64 - 0.590	0.315	2-1/8	84421150000	84482115000
5/8	-	5/64 - 5/8	3/8	2-1/4	84421158700	84482115870
3/4	-	5/64 - 3/4	1/2	2-5/8	84421190500	84482119050
0.787	20	5/64 - 0.787	0.394	2-5/8	84421200000	84482120000
7/8	-	7/64 - 7/8	1/2	2-3/4	84421222200	84482122220
0.984	25	1/8 - 0.984	0.472	3	84421250000	84482125000
1	-	1/8 - 1.000	1/2	2-3/4	84421254000	84482125400
1.181	30	1/8 - 1.181	0.472	3-1/2	84421300000	84482130000
1-1/4	-	1/8 - 1-1/4	1/2	2-3/4	84421317500	84482131750
1.378	35	5/32 - 1.378	0.630 ¹	4	84421350000	84482135000
1.575	40	7/32 - 1.575	0.630 ¹	4-5/8	84421400000	84482140000
2.000	50	15/32 - 2.000	0.630 ¹	5	84421500000	84482150000

¹ Shank with 3 flats for better holding



HSS-E Cobalt M35



Single Flute Chamfering Cutters - Angle 100°

Diameter		Capacity min/max	d	L	Cobalt 425	M35/TiN 4825
(inch)	(mm)					
0.394	10	3/64 - 0.394	0.236	1-3/4	84425100000	84482510000
0.472	12	5/64 - 0.472	0.315	1-7/8	84425120000	84482512000
0.590	15	5/64 - 0.590	0.315	2-1/8	84425150000	84482515000
0.787	20	5/64 - 0.787	0.394	2-1/2	84425200000	84482520000
0.984	25	1/8 - 0.984	0.472	3	84425250000	84482525000
1.181	30	1/8 - 1.181	0.472	3-3/8	84425300000	84482530000



Single Flute Chamfering Cutters - Angle 120°

Diameter		Capacity min/max	d	L	Cobalt 423	M35/TiN 4823
(inch)	(mm)					
0.394	10	3/64 - 0.394	0.236	1-3/4	84423100000	84482310000
0.472	12	5/64 - 0.472	0.315	1-7/8	84423120000	84482312000
0.590	15	5/64 - 0.590	0.315	2	84423150000	84482315000
0.787	20	5/64 - 0.787	0.394	2-3/8	84423200000	84482320000
0.984	25	1/8 - 0.984	0.472	2-7/8	84423250000	84482325000
1.181	30	1/8 - 1.181	0.472	3-1/4	84423300000	84482330000

Metric Single Flute Countersink - Sets of 5 Pieces

Angle	Cobalt	M35/TiN	Composition
60°	84422000000	84482200000	10-15-20 25-30
82°	84424000000	84482400000	
90°	84421000000	84482100000	
100°	84425000000	84482500000	
120°	84423000000	84482300000	

Single Flute Countersink - Sets of 6 Pieces

Angle	Cobalt	M35/TiN	Composition
60°	84422000006	84482200006	1/4 - 5/16
82°	84424000006	84482400006	3/8 - 1/2
90°	84421000006	84482100006	5/8 - 3/4

90°, 100°, 120° Single Flute Chamfering Cutters

The characteristics of the single flute chamfering cutters are similar to those of the deburring tools "with hole." They do vary on the following points:

- Greater countersinking capacity from the point to the outside diameter (up to Ø 30mm)
- Simultaneous drilling and countersinking on thin elements (laminates, aluminum, wood)

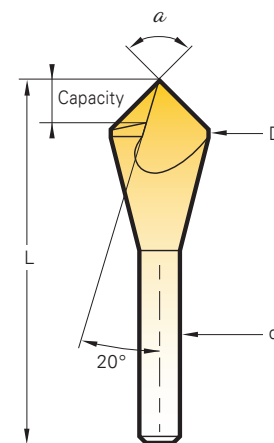
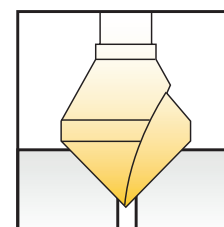
Constant finish-grind profile makes it possible to obtain many easy regrinds:

a mere touch of the grinder to the tooth is sufficient

We recommend lubricating.



HSS-E Cobalt M35

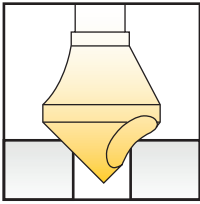


Single Flute Chamfering Cutters - Angles 60° and 82°							
Angle	Diameter		Capacity min/max	d	L	Cobalt 422	M35/TiN 4822
	(inch)	(mm)					
60°	1/8	-	1/32 - 1/8	1/8	1-1/4	84422031700	84482203170
	3/16	-	3/64 - 3/16	3/16	1-3/8	84422047600	84482204760
	0.236	6	3/64 - 0.236	0.236	1-5/8	84422060000	84482206000
	1/4	-	3/64 - 1/4	1/4	1-1/2	84422063500	84482206350
	5/16	-	3/64 - 5/16	1/4	1-5/8	84422079300	84482207930
	3/8	-	3/64 - 3/8	1/4	1-3/4	84422095200	84482209520
	0.394	10	3/64 - 0.394	0.236	1-7/8	84422100000	84482210000
	0.472	12	5/64 - 0.472	0.315	2-1/8	84422120000	84482212000
	1/2	-	5/64 - 1/2	1/4	2	84422127000	84482212700
	0.590	15	5/64 - 0.590	0.315	2-3/8	84422150000	84482215000
	5/8	-	5/64 - 5/8	3/8	2-1/4	84422158700	84482215870
	3/4	-	5/64 - 3/4	1/2	2-5/8	84422190500	84482219050
	0.787	20	5/64 - 0.787	0.394	2-7/8	84422200000	84482220000
	7/8	-	7/64 - 7/8	1/2	2-3/4	84422222000	84482222200
	0.984	25	1/8 - 0.984	0.472	3-3/8	84422250000	84482225000
	1	-	1/8 - 1	1/2	2-3/4	84422254000	84482225400
	1.181	30	1/8 - 1.181	0.472	3-5/8	84422300000	84482230000
	1-1/4	-	1/8 - 1-1/4	1/2	3	84422317500	84482231750
82°	1/8	-	1/32 - 1/8	1/8	1-1/4	84424031700	84482403170
	3/16	-	3/64 - 3/16	3/16	1-3/8	84424047600	84482404760
	0.236	6	3/64 - 0.236	0.236	1-5/8	84424060000	84482406000
	1/4	-	3/64 - 1/4	1/4	1-1/2	84424063500	84482406350
	5/16	-	3/64 - 5/16	1/4	1-5/8	84424079300	84482407930
	3/8	-	3/64 - 3/8	1/4	1-3/4	84424095200	84482409520
	0.394	10	3/64 - 0.394	0.236	1-3/4	84424100000	84482410000
	0.472	12	5/64 - 0.472	0.315	2	84424120000	84482412000
	1/2	-	5/64 - 1/2	1/4	2	84424127000	84482412700
	0.590	15	5/64 - 0.590	0.315	2-1/4	84424150000	84482415000
	5/8	-	5/64 - 5/8	3/8	2-1/4	84424158700	84482415870
	3/4	-	5/64 - 3/4	1/2	2-5/8	84424190500	84482419050
	0.787	20	5/64 - 0.787	0.394	2-5/8	84424200000	84482420000
	7/8	-	7/64 - 7/8	1/2	2-3/4	84424222000	84482422200
	0.984	25	1/8 - 0.984	0.472	3	84424250000	84482425000
	1	-	1/8 - 1	1/2	2-3/4	84424254000	84482425400
	1.181	30	1/8 - 1.181	0.472	3-1/2	84424300000	84482430000
	1-1/4	-	1/8 - 1-1/4	1/2	2-3/4	84424317500	84482431750

Note: 30° and 45° angles are metric standard. Call 413-350-5200 for information.

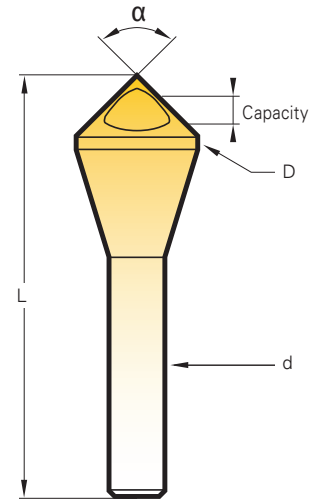
Tolerances			
D	Angle	d	L
± .03	- 1°	h9	± 1mm

60° & 82° Zero Flute Deburring Tool with Hole



The deburring tool "with hole" is specially designed for countersinking and chamfering light metals and plastics.

The surface obtained is smooth and without burrs. We recommend lubricating.



Metric Zero Flute Deburring Tool with Hole - Angle 90°

#	Diameter (inch)	Diameter (mm)	Capacity min/max	d	L	Cobalt 411	M352/TiN 4811
0	1/4 ¹	-	5/64 - 3/16	1/4	1-3/4	84411063500	84481106350
-	0.394	10	5/32 - 11/32	0.236	1-3/4	84411100000	84481110000
1	7/16	-	7/32 - 13/32	1/4	1-3/4	84411112000	84481111200
2	9/16	-	1/4 - 1/2	1/4	2	84411140000	84481114000
-	0.590	15	1/4 - 9/16	0.315	2-1/4	84411150000	84481115000
-	0.787	20	5/16 - 11/16	0.394	2-1/2	84411200000	84481120000
3	13/16	-	5/16 - 11/16	1/2	2-5/8	84411204000	84481120400
-	0.984	25	3/8 - 7/8	0.472	3	84411250000	84481125000
-	1.102	28	7/16 - 1	0.472	3-3/8	84411280000	84481128000
-	1.181	30	1/2 - 1-1/8	0.472	3-1/2	84411300000	84481130000
4	1-3/16	-	1/2 - 1-1/8	1/2	3-1/2	84411301000	84481130100
-	1.378	35	9/16 - 1-5/16	0.630 ²	4	84411350000	84481135000
-	1.575	40	5/8 - 1-1/2	0.630 ²	4-5/8	84411400000	84481140000
-	1.969	50	3/4 - 1-7/8	0.630 ²	5	84411500000	84481150000

¹ Double end cutter

² Shanks with 3 flats for better holding

Metric Zero Flute Deburring Tool with Hole - Angles 60°, 82°, 100° and 120°

Angle	#	Diameter (inch)	Diameter (mm)	Capacity min/max	d	L	Cobalt
60° 412	0	1/4 ¹	-	7/64 - 3/16	1/4	1-3/4	84412063500
	-	0.394	10	3/16 - 11/32	0.236	2	84412100000
	1	7/16	-	3/16 - 3/8	1/4	1-3/4	84412112000
	2	9/16	-	9/32 - 1/2	1/4	2	84412140000
	-	0.590	15	5/16 - 9/16	0.315	2-3/8	84412150000
	-	0.787	20	3/8 - 11/16	0.394	2-7/8	84412200000
	3	13/16	-	3/8 - 11/16	1/2	2-5/8	84412204000
	-	0.984	25	1/2 - 7/8	0.472	3-3/8	84412250000
	-	1.181	30	9/16 - 1 - 1/8	0.472	3-5/8	84412300000
	4	1-3/16	-	9/16 - 1 - 1/8	1/2	3-1/2	84412301000
	-	1.378	35	11/16 - 1 - 5/16	0.630	4-1/2	84412350000
	-	1.575	40	5/8 - 1-1/2	0.630	4-5/8	84412400000
82° 414	0	1/4 ¹	-	5/64 - 3/16	1/4	1-3/4	84414063500
	-	0.394	10	5/32 - 11/32	0.236	1-3/4	84414100000
	1	7/16	-	7/32 - 13/32	1/4	1-3/4	84414112000
	2	9/16	-	1/4 - 1/2	1/4	2	84414140000
	-	0.590	15	1/4 - 9/16	0.315	2-1/4	84414150000
	-	0.787	20	5/16 - 11/16	0.394	2-1/2	84414200000
	3	13/16	-	5/16 - 11/16	1/2	2-5/8	84414204000
	-	0.984	25	3/8 - 7/8	0.472	3	84414250000
	-	1.181	30	1/2 - 1-1/8	0.472	3-1/2	84414300000
	4	1-3/16	-	1/2 - 1-1/8	1/2	3-1/2	84414301000
	-	1.378	35	9/16 - 1-5/16	0.630	4	84414350000
	-	1.575	40	5/8 - 1-1/2	0.630	4-5/8	84414400000
100° 415	-	0.394	10	5/32 - 11/32	0.236	1-3/4	84415100000
	-	0.590	15	1/4 - 9/16	0.315	2-1/8	84415150000
	-	0.787	20	9/32 - 11/16	0.394	2-1/2	84415200000
	-	0.984	25	11/32 - 7/8	0.472	3	84415250000
	-	1.181	30	7/16 - 1-1/16	0.472	3-3/8	84415300000
	-	1.387	35	1/2 - 1-5/16	0.630	4	84415350000
120° 413	-	0.394	10	5/32 - 11/32	0.236	1-3/4	84413100000
	-	0.590	15	1/4 - 9/16	0.315	2	84413150000
	-	0.787	20	9/32 - 11/16	0.394	2-3/8	84413200000
	-	0.984	25	11/32 - 7/8	0.472	2-7/8	84413250000
	-	1.181	30	7/16 - 1-1/16	0.472	3-1/4	84413300000
	-	1.378	35	1/2 - 1-5/16	0.630	3-3/4	84413350000

¹ Double end cutter

² Shanks with 3 flats for better holding

Tolerances

D	Angle	d	L
± .03	- 1°	h9	± 1mm



Metric Single Flute Countersink Sets - 5 pieces

Angle	EDP No.	Composition
60°	84412000000	Ø 10-15-20-25-30 mm
	84412000005	# 0-1-2-3-4
82°	84414000000	Ø 10-15-20-25-30 mm
	84414000005	# 0-1-2-3-4
90°	84411000000	Ø 10-15-20-25-30 mm
	84481100000-TiN	Ø 10-15-20-25-30 mm
	84411000002	Ø 10-15-20-28-35 mm
	84411000005	# 0-1-2-3-4
	84481100005-TiN	# 0-1-2-3-4
100°	84415000000	Ø 10-15-20-25-30 mm
120°	84413000000	Ø 10-15-20-25-30 mm

Deburring Countersinking - Performance

Performance

Use Recommendations

Example:

3/4" - .750 Diameter 3 Flute to Countersink 304 SS

SFM = Speed : Surface Feet Per Minute

IPM = Feed : Inches Per Minute

RPM = $\frac{\text{SFM} \times 12}{3.14 \times \text{Diameter}}$

$$\text{RPM} = \frac{45 \times 12}{3.14 \times .75} = \frac{540}{2.35} = 230 \text{ RPM}$$

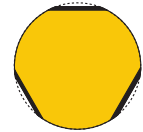
Deburring Countersinking												Contouring							
		Recommendation N°1		Recommendation N°2															
Material		HSS. Co =+TiN		HSS. Co =+TiN		HSS. Co =+TiN		HSS. .8% Co +Red'X		Carbure/Carbide +Hard'X		HSS. Co =+TiN		HSS. .8% Co +Red'X		Carbure/Carbide +Hard'X			
		SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM		
Steel < 81 HRB (B)	Ø10	IPM	6.5	6.5	6.5	6.5	3.4	3.4	6.5	6.5	10.0	3.4	3.4	6.5	6.5	10.0	10.0		
	Ø20	IPM	3.4	3.4	3.4	3.4	1.8	1.8	3.4	3.4	5.0	1.8	1.8	3.4	3.4	5.0	5.0		
	Ø30	IPM	2.0	2.0	2.0	2.0	1.2	1.2	2.0	2.0	3.4	1.2	1.2	2.0	2.0	3.4	3.4		
	SFM		65-95	65-95	65-95	65-95	32-48	32-48	65-95	65-95	95-160	32-48	32-48	65-95	65-95	95-160	95-160		
Steel < 24 Rc	Ø10	IPM	4.3	4.3	4.3	4.3	2.4	2.4	4.3	4.3	6.6	2.4	2.4	4.3	4.3	6.6	6.6		
	Ø20	IPM	2.0	2.0	2.0	2.0	1.2	1.2	2.0	2.0	3.4	1.2	1.2	2.0	2.0	3.4	3.4		
	Ø30	IPM	1.4	1.4	1.4	1.4	0.8	0.8	1.4	1.4	2.4	0.8	0.8	1.4	1.4	2.4	2.4		
	SFM		48-64	48-64	48-64	48-64	25-38	25-38	48-64	48-64	64-128	25-38	25-38	48-64	48-64	64-128	64-128		
Steel 24 - 32 Rc	Ø10	IPM	2.0	2.0	2.0	2.0	1.4	1.4	2.0	2.0	4.0	1.4	1.4	2.0	2.0	4.0	4.0		
	Ø20	IPM	1.4	1.4	1.4	1.4	1.0	1.0	1.4	1.4	2.4	1.0	1.0	1.4	1.4	2.4	2.4		
	Ø30	IPM	1.0	1.0	1.0	1.0	0.6	0.6	1.0	1.0	1.8	0.6	0.6	1.0	1.0	1.8	1.8		
	SFM		38-48	38-48	38-48	38-48	20-32	20-32	38-48	38-48	64-128	20-32	20-32	38-48	38-48	64-128	64-128		
Stainless Steel 32 - 41 Rc	Ø10	IPM	1.8	1.8	1.8	1.8	1.2	1.2	1.8	1.8	4.0	1.2	1.2	1.8	1.8	4.0	4.0		
	Ø20	IPM	1.0	1.0	1.0	1.0	0.6	0.6	1.0	1.0	2.4	0.6	0.6	1.0	1.0	2.4	2.4		
	Ø30	IPM	0.8	0.8	0.8	0.8	0.3	0.3	0.8	0.8	1.6	0.3	0.3	0.8	0.8	1.6	1.6		
	SFM										38-48					48-64	48-64		
Abrasion Resistant Steel	Ø10	IPM									1.6					1.6	2.0		
	Ø20	IPM									1.2					1.2	1.4		
	Ø30	IPM									0.8					0.8	1.0		
	SFM										13-20					13-20	32-38		
Inconel	Ø10	IPM									0.6					0.6	0.6		
	Ø20	IPM									0.3					0.3	0.3		
	Ø30	IPM									0.3					0.3	0.4		
	SFM										13-20					13-20	32-38		
Cast Iron	Ø10	IPM	5.0	5.0	5.0	5.0	2.8	2.8	5.0	5.0	0.3	2.8	2.8	5.0	5.0	0.3	0.3		
	Ø20	IPM	3.0	3.0	3.0	3.0	1.6	1.6	3.0	3.0	6.0	1.6	1.6	3.0	3.0	6.0	6.0		
	Ø30	IPM	2.0	2.0	2.0	2.0	1.2	1.2	2.0	2.0	4.0	1.2	1.2	2.0	2.0	4.0	4.0		
	SFM		160-190	160-190	160-190	160-190	112-145	112-145	160-190	160-190	128-320	112-145	112-145	160-190	160-190	128-320	128-320		
Aluminium	Ø10	IPM	10.0	10.0	10.0	10.0	7.8	7.8	10.0	10.0	13.8	7.8	7.8	10.0	10.0	13.8	13.8		
	Ø20	IPM	7.0	7.0	7.0	7.0	5.2	5.2	7.0	7.0	9.0	5.2	5.2	7.0	7.0	9.0	9.0		
	Ø30	IPM	6.0	6.0	6.0	6.0	4.3	4.3	6.0	6.0	7.8	4.3	4.3	6.0	6.0	7.8	7.8		
	SFM		96-128	96-128	96-128	96-128	65-95	65-95	96-128	96-128		65-95	65-95	96-128	96-128				
Bronze Brass	Ø10	IPM	6.0	6.0	6.0	6.0	4.7	4.7	6.0	6.0		4.7	4.7	6.0	6.0				
	Ø20	IPM	4.3	4.3	4.3	4.3	3.4	3.4	4.3	4.3		3.4	3.4	4.3	4.3				
	Ø30	IPM	3.5	3.5	3.5	3.5	2.8	2.8	3.5	3.5		2.8	2.8	3.5	3.5				
	SFM		65-95	65-95	65-95	65-95	48-80	48-80	65-95	65-95	160-256	48-80	48-80	65-95	65-95	160-256	160-256		
Copper	Ø10	IPM	4.7	4.7	4.7	4.7	3.75	3.75	4.7	4.7	12.0	3.75	3.75	4.7	4.7	12.0	12.0		
	Ø20	IPM	3.0	3.0	3.0	3.0	2.4	2.4	3.0	3.0	7.8	2.4	2.4	3.0	3.0	7.8	7.8		
	Ø30	IPM	2.6	2.6	2.6	2.6	1.8	1.8	2.6	2.6	7.0	1.8	1.8	2.6	2.6	7.0	7.0		
	SFM		160-320	160-320	160-320	160-320	112-224	112-224	112-224	112-224		112-224	112-224	112-224	112-224				
Laminated	Ø10	IPM	16.0	16.0	16.0	16.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0				
	Ø20	IPM	12.0	12.0	12.0	12.0	7.8	7.8	7.8	7.8		7.8	7.8	7.8	7.8				
	Ø30	IPM	10.0	10.0	10.0	10.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0				
	SFM		160-320	160-320	160-320	160-320	112-224	112-224	112-224	112-224		112-224	112-224	112-224	112-224				
Nylon, PVC Plastics	Ø10	IPM	18.0	18.0	18.0	18.0	16.0	16.0	16.0	16.0		16.0	16.0	16.0	16.0				
	Ø20	IPM	13.8	13.8	13.8	13.8	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0				
	Ø30	IPM	12.0	12.0	12.0	12.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0	10.0				
	SFM																		

Countersinks with 3 Flatted Shanks* - Angle 90°

Diameter (inch)	Diameter (mm)	Capacity min/max	d	L	Cobalt 437	M35/TiN 4837
0.488	12.4	0.098 – 0.488	0.315	2 - 1/4	84437124000	84483712400
0.597	14.4	0.098 – 0.597	0.315	2 - 1/4	84437144000	84483714400
0.650	16.5	0.110 – 0.650	0.394	2 - 3/8	84437165000	84483716500
0.807	20.5	0.118 – 0.807	0.394	2 - 1/2	84437205000	84483720500
0.984	25.0	0.126 – 0.984	0.394	2 - 5/8	84437250000	84483725000
1.220	31.0	0.138 – 1.220	0.472	2 - 3/4	84437310000	84483731000
1.339	34.0	0.177 – 1.339	0.630	4	84437340000	84483734000
1.378	35.0	0.177 – 1.378	0.630	4	84437350000	84483735000
1.457	37.0	0.177 – 1.457	0.630	4 - 5/8	84437370000	84483737000
1.575	40.0	0.177 – 1.575	0.630	4 - 5/8	84437400000	84483740000
1.969	50.0	0.197 – 1.969	0.630	5	84437500000	84483750000
2.480	63.0	0.394 – 2.480	0.630	5 - 1/2	84437630000	84483763000
3.150	80.0	0.551 – 3.150	0.630	6 - 1/2	84437800000	84483780000

This highly productive countersinking cutter is a much-improved version of the traditional multiflute milling cutter. It offers the following benefits:

- Grooves opened wide to allow for greater chip removal
- High positive cut
- Constant profile relief (for many regrinds)
- Self-centering countersink
- Work without vibration



Tool dimensions are adapted to countersink the 82° and 90° caps crews. Lubrication is recommended.



Hand Countersinks - HSS-E Cobalt M35

Diameter (inch)	Diameter (mm)	Capacity min/max	Angle 82° Cobalt 438	Angle 90° Cobalt 430
0.488	12.4	0.118 – 0.488	84438124000	84430124000
0.650	16.5	0.157 – 0.650	84438165000	84430165000
0.807	20.5	0.157 – 0.807	84438205000	84430205000
0.984	25.0	0.197 – 0.984	84438250000	84430250000
1.220	31.0	0.197 – 1.220	84438310000	84430310000

Universal Auto-Lock Chuck

Handle	Capacity min/max	EDP No.
Ergonomic	3/64 – 8mm	84400200000
Large	3/64 – 1/2"	84400100000

To hold any straight shank tool, for use by hand.



Hand Countersink Sets - HSS-E Cobalt M35

84431000003 ¹	6.3 - 8.3 - 10.4 - 12.4 - 16.5 - 20.5 - 25mm
84431000004 ¹	4.3 - 5.3 - 6.3 - 8.3 - 10.4 - 12.4 - 16.5 - 20.5 - 25 - 31mm
88843100000	10.4 - 16.5 - 20.5 - 25.0 - 31 mm carbide
84431000006 ²	6.3 - 12.4 - 16.5 - 20.5mm

¹ Set supplied with 1 auto-lock chuck handle Code 4001

² Set supplied with 8mm auto-lock chuck handle Code 4002

Auto Body Drill Bits to Disconnect Spot Welds

Hard'X
AlTiN Latuma

The machining of hard sheets has to be done with coated tools.

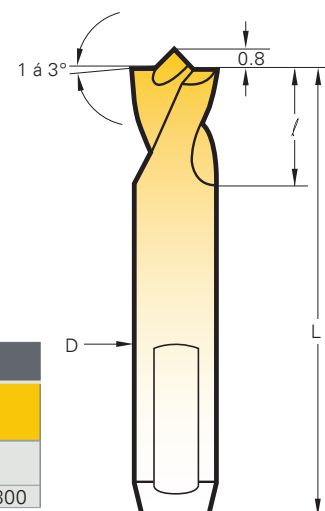
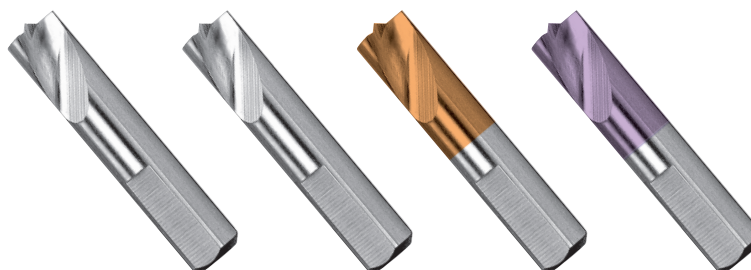
The high-performance series **8203-H** is made from **Hard'X** coated carbide.

- Easy to start
- Long lasting
- Will spot and drill one panel only, without walking

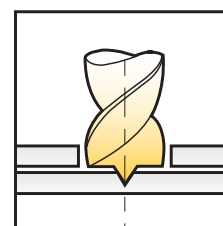
These short drills are specially designed to be used with these two types of hand type pneumatic disconnecter tools:

- With swan-neck = Magafor 202
- With revolver-handle = Magafor 203

Flatted shanks with 60° taper for a good location in the disconnecter.



Short Series							
Diameter (inch) (mm)		L	/	Cobalt 202	Cobalt 203	M35/Red'X 2903	K15/Hard'X 8203-H
0.236	6	1-3/4	0.590	-	82203060000	-	-
5/16	8	1-1/2	0.590	8220208000	-	-	-
5/16	8	1-3/4	0.590	-	82203080000	82290308000	888203H0800



Long Series						
Diameter (inch) (mm)		d	L	Cobalt 201	M35/Red'X 2901	Brazed Carbide 8201
0.236	6	2-5/8	1.100	82201060000	82290106000	-
0.275	7	2-7/8	1.340	82201070000	82290107000	-
0.314	8	-	-	-	-	88820108000
5/16	-	3-1/8	1.450	82201080000	82290108000	-
0.394	10	3-1/2	1.690	82201100000	82290110000	-

Tolerances		
D	L	/
h8	± 1	+1

The centering point grants perfect drilling without any drifting or walking. Thanks to the special sharpening, the first sheet will be bored without damage to the second one. This design allows for excellent penetration, a high resistance to wear and a great many regrinds. The carbide spot-weld drills are designed to machine the new, very-high elastic limit sheet metal (VHEL).

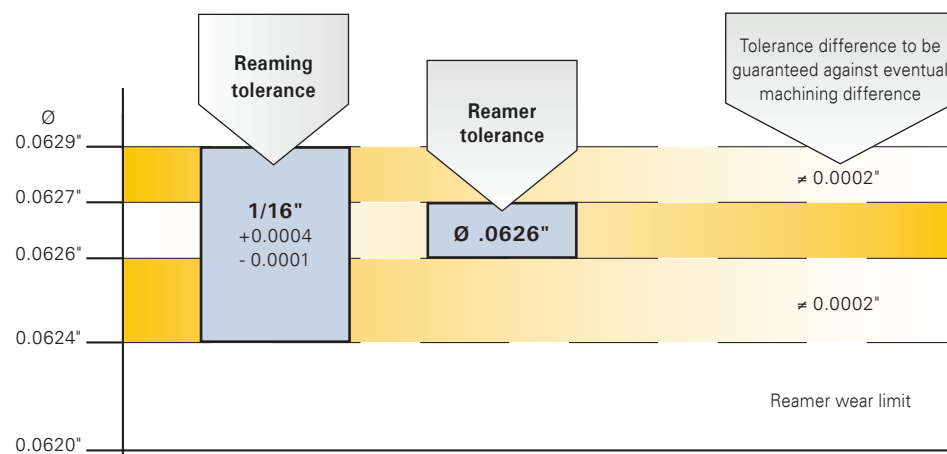
High Precision Reamers

How to Choose Standard Inch Reamers

Examples	Reaming (Hole)		Tolerance (inch)	Reamer (Tool)	
	Ø			Ø	Tolerance-inch
1	1/64"	+0.00006 - 0.00012	0.01568 0.01550	EDP No. 861000395 0.01551"	0.01559 0.01551
2	1/32"	+0.0001 - 0.0002	0.03135 0.03105	EDP No. 86000079 0.03110"	0.03122 0.03110
3	1/16"	+0.0004 - 0.0001	0.0629 0.0624	EDP No. 86000159 0.0626"	0.06272 0.06260

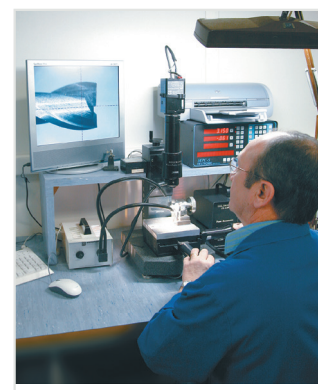


Example 3 Explanation



How to Choose Metric Reamers Code 8610 – 8600 : page 85–91

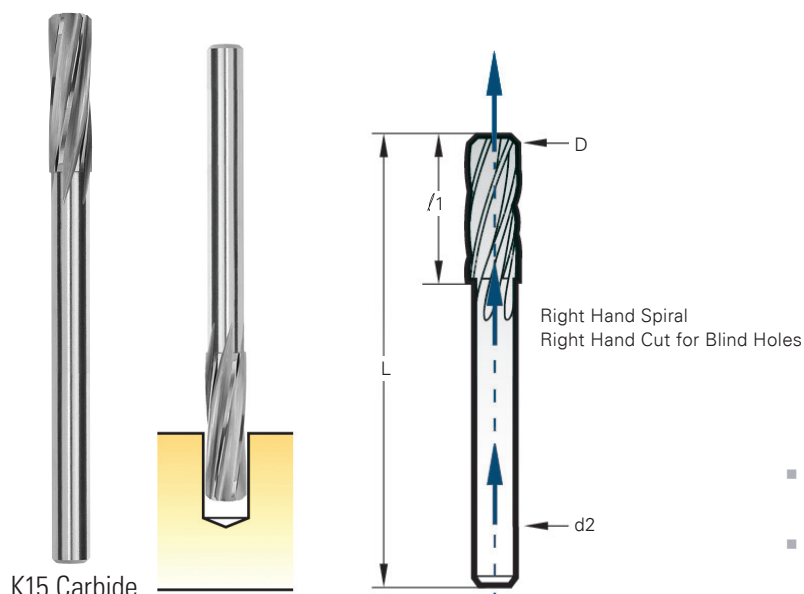
Tolerance	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14
D 10	2.04	3.04	4.05	5.06	6.06	8.07	10.08	12.10	14.10
E 8	2.02	3.02	4.03	5.03	6.03	8.03	10.03	12.04	14.04
E 9	2.03	3.03	4.04	5.04	6.04	8.05	10.05	12.06	14.06
F 7	2.01	3.01	4.01	5.01	6.01	8.02	10.02	12.02	14.02
F 8	2.01	3.01	4.02	5.02	5.02	8.02	10.02	12.03	14.03
G 7	2.00	3.00	4.01	5.02	5.02	8.01	10.01	12.01	14.01
H 6	2.00	3.01	4.00	5.00	6.00	8.00	10.00	12.00	14.00
H 8	2.01	3.01	4.01	5.01	6.01	8.01	10.01	12.01	14.01
H 9	2.01	2.99	4.02	5.02	6.02	8.02	10.02	12.03	14.03
M 7	1.99	2.99	3.99	4.99	5.99	7.99	9.99	11.99	13.99
N 7	1.99	2.99	3.99	4.99	5.99	7.98	9.98	11.98	13.98
P 7	1.99	2.99	3.98	4.98	5.98	7.98	9.98	11.97	13.97
R 7	1.98	2.98	3.98	4.98	5.98	7.98	9.98	11.97	13.97



Reamers with Coolant Thru for Blind Holes

8670 Series

*Floating Holders available on pg. 73



K15 Carbide

- Central oil feeding: the lubricant is fed directly into the hole to ream
- Right hand spiral - improved removal of swarf and coolant flow

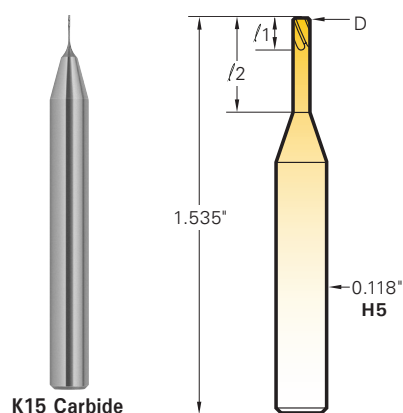
8670 Series

EDP No.	Diameter		L	/1	d2	Wire/Frac
	(inch)	(mm)				
88867003900	0.1535	3.90	2.05	0.787	0.1575	
88867004000	0.1575	4.00	2.05	0.787	0.1575	
88867004100	0.1614	4.10	2.05	0.787	0.1575	
88867004200	0.1654	4.20	2.05	0.787	0.1575	
88867004300	0.1693	4.30	2.05	0.787	0.1575	
88867004400	0.1732	4.40	2.05	0.787	0.1575	
88867004500	0.1772	4.50	2.05	0.787	0.1575	
88867004600	0.1811	4.60	2.05	0.787	0.1575	
88867004700	0.1850	4.70	2.05	0.787	0.1575	
88867004762	0.1875	4.762	2.05	0.787	0.1575	3/16"
88867004800	0.1890	4.80	2.48	0.866	0.1575	
88867004900	0.1929	4.90	2.48	0.866	0.1575	
88867005000	0.1969	5.00	2.48	0.866	0.1575	
88867005100	0.2008	5.10	2.48	0.866	0.1575	
88867005200	0.2047	5.20	2.48	0.866	0.1575	
88867005300	0.2087	5.30	2.48	0.866	0.1575	
88867005400	0.2126	5.40	2.48	0.866	0.1575	
88867005500	0.2165	5.50	2.48	0.866	0.1575	
88867005600	0.2205	5.60	2.48	0.866	0.1575	
88867005700	0.224	5.70	2.48	0.866	0.1575	
88867005800	0.2284	5.80	2.48	0.866	0.1575	
88867005900	0.2323	5.90	2.48	0.866	0.1969	
88867006000	0.2362	6.00	2.48	0.866	0.1969	
88867006100	0.2402	6.10	2.48	0.866	0.1969	
88867006200	0.2241	6.20	2.48	0.866	0.1969	
88867006300	0.2480	6.30	2.48	0.866	0.1969	
88867006350	0.2500	6.35	2.48	0.866	0.1969	E / 1/4"
88867006400	0.2520	6.40	2.48	0.866	0.1969	
88867006500	0.2259	6.50	2.48	0.866	0.1969	
88867006600	0.2598	6.60	2.48	0.866	0.1969	
88867006700	0.2638	6.70	2.80	0.984	0.248	
88867006800	0.2677	6.80	2.80	0.984	0.248	
88867006900	0.2717	6.90	2.80	0.984	0.248	
88867007000	0.2756	7.00	2.80	0.984	0.248	
88867007100	0.2795	7.10	2.80	0.984	0.248	
88867007200	0.2835	7.20	2.80	0.984	0.248	
88867007300	0.2874	7.30	2.80	0.984	0.248	
88867007400	0.2913	7.40	2.80	0.984	0.248	
88867007500	0.2756	7.50	2.80	0.984	0.248	
88867007600	0.2992	7.60	2.80	0.984	0.248	
88867007700	0.3031	7.70	2.80	0.984	0.248	
88867007800	0.3071	7.80	2.80	0.984	0.248	
88867007900	0.3110	7.90	2.80	0.984	0.248	
88867007937	0.3125	7.937	2.80	0.984	0.248	5/16"

8670 Series

EDP No.	Diameter		L	/1	d2	Wire/Frac
	(inch)	(mm)				
88867008000	0.3150	8.00	2.80	0.984	0.248	
88867008100	0.3189	8.10	2.80	0.984	0.248	
88867008200	0.3328	8.20	2.80	0.984	0.248	
88867008300	0.3268	8.30	2.80	0.984	0.248	
88867008400	0.3307	8.40	2.80	0.984	0.248	
88867008500	0.3346	8.50	2.80	0.984	0.248	
88867008600	0.3386	8.60	2.80	0.984	0.315	
88867008700	0.3425	8.70	2.80	0.984	0.315	
88867008800	0.3465	8.80	2.80	0.984	0.315	
88867008900	0.3504	8.90	2.80	0.984	0.315	
88867009000	0.3543	9.00	2.80	0.984	0.315	
88867009100	0.3583	9.10	2.80	0.984	0.315	
88867009200	0.3543	9.20	2.80	0.984	0.315	
88867009300	0.3661	9.30	2.80	0.984	0.315	
88867009400	0.3701	9.40	2.80	0.984	0.315	
88867009500	0.3740	9.50	2.80	0.984	0.315	
88867009525	0.3750	9.525	2.80	0.984	0.315	3/8"
88867009600	0.3780	9.60	2.80	0.984	0.315	
88867009700	0.3819	9.70	2.80	0.984	0.315	
88867009800	0.3858	9.80	2.80	0.984	0.315	
88867009900	0.3897	9.90	2.80	0.984	0.315	
88867010000	0.3937	10.00	2.80	0.984	0.315	
88867010100	0.3976	10.10	2.80	0.984	0.315	
88867010200	0.4016	10.20	2.80	0.984	0.315	
88867010300	0.4055	10.30	2.80	0.984	0.315	
88867010400	0.4094	10.40	2.80	0.984	0.315	
88867010500	0.4134	10.50	2.80	0.984	0.315	
88867010600	0.4173	10.60	2.80	0.984	0.315	
88867010700	0.4213	10.70	3.15	1.102	0.394	
88867010800	0.4252	10.80	3.15	1.102	0.394	
88867010900	0.4291	10.90	3.15	1.102	0.394	
88867011000	0.4331	11.00	3.15	1.102	0.394	
88867011100	0.4370	11.10	3.15	1.102	0.394	
88867011112	0.4375	11.112	3.15	1.102	0.394	7/16"
88867011200	0.4409	11.20	3.15	1.102	0.394	
88867011300	0.449	11.30	3.15	1.102	0.394	
88867011400	0.4488	11.40	3.15	1.102	0.394	
88867011500	0.4528	11.50	3.15	1.102	0.394	
88867011600	0.4567	11.60	3.15	1.102	0.394	
88867011700	0.4606	11.70	3.15	1.102	0.394	
88867011800	0.4646	11.80	3.15	1.102	0.394	
88867011900	0.4685	11.90	3.15	1.102	0.394	15/32"
88867012000	0.4724	12.00	3.15	1.102	0.394	-
88867012700	0.5000	12.70	3.15	1.102	0.394	1/2"

High Precision Carbide Micro-Reamers



Micro-reamers are manufactured and stocked in all diameters at every 0.0002" increment. Their reinforced shank offers a greater stability necessary for these high precision tools.

Magaforce 8610 Micro-Precision		
D 0.0002" increment	/1	/2
0.0079 to 0.0096	0.036	0.079
0.0098 to 0.0116	0.043	0.098
0.0118 to 0.0136	0.055	0.118
0.0138 to 0.0156	0.067	0.138
0.0157 to 0.0195	0.079	0.157
0.0197 to 0.0234	0.091	0.197

For Magaforce 8610 EDP numbers, see below

Tolerances - inch	
H4	± 0.00004

K15 Carbide — 6.5 – 7% Cobalt (0.600 – 0.008mm grain size)

8610 Series			
EDP No.	(mm)	Decimal	Wire
88861000200	0.200	0.0079	92
88861000205	0.205	0.0081	
88861000210	0.210	0.0083	91
88861000215	0.215	0.0085	
88861000220	0.220	0.0087	90
88861000225	0.225	0.0089	
88861000230	0.230	0.0091	89
88861000235	0.235	0.0093	
88861000240	0.240	0.0094	88
88861000245	0.245	0.0096	
88861000250	0.250	0.0098	
88861000255	0.255	0.0100	87
88861000260	0.260	0.0102	
88861000265	0.265	0.0104	86
88861000270	0.270	0.0106	
88861000275	0.275	0.0108	
88861000280	0.280	0.0110	85
88861000285	0.285	0.0112	
88861000290	0.290	0.0114	84
88861000295	0.295	0.0116	
88861000300	0.300	0.0118	
88861000305	0.305	0.0120	83
88861000310	0.310	0.0122	
88861000315	0.315	0.0124	82
88861000320	0.320	0.0126	
88861000325	0.325	0.0128	
88861000330	0.330	0.0130	81

8610 Series			
EDP No.	(mm)	Decimal	Wire
88861000335	0.335	0.0132	
88861000340	0.340	0.0134	80
88861000345	0.345	0.0136	
88861000350	0.350	0.0138	
88861000355	0.355	0.0140	
88861000360	0.360	0.0142	
88861000365	0.365	0.0144	79
88861000370	0.370	0.0146	
88861000375	0.375	0.0148	
88861000380	0.380	0.0150	
88861000385	0.385	0.0152	
88861000390	0.390	0.0154	
88861000395	0.395	0.0156	
88861000400	0.400	0.0157	
88861000405	0.405	0.0159	78
88861000410	0.410	0.0161	
88861000415	0.415	0.0163	
88861000420	0.420	0.0165	
88861000425	0.425	0.0167	
88861000430	0.430	0.0169	
88861000435	0.435	0.0171	
88861000440	0.440	0.0173	
88861000445	0.445	0.0175	
88861000450	0.450	0.0177	
88861000455	0.455	0.0179	77
88861000460	0.460	0.0181	
88861000465	0.465	0.0183	-

4 flutes, 20° left spiral, right hand cut

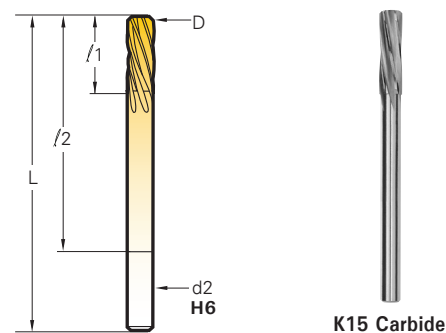
8610 Series			
EDP No.	(mm)	Decimal	Wire
88861000470	0.470	0.0185	
88861000475	0.475	0.0187	
88861000480	0.480	0.0189	
88861000485	0.485	0.0191	
88861000490	0.490	0.0193	
88861000495	0.495	0.0195	
88861000500	0.500	0.0197	
88861000505	0.505	0.0199	76
88861000510	0.510	0.0201	
88861000515	0.515	0.0203	
88861000520	0.520	0.0205	
88861000525	0.525	0.0207	
88861000530	0.530	0.0209	75
88861000535	0.535	0.0211	
88861000540	0.540	0.0213	
88861000545	0.545	0.0215	
88861000550	0.550	0.0217	
88861000555	0.555	0.0219	
88861000560	0.560	0.0220	
88861000565	0.565	0.0222	
88861000570	0.570	0.0224	74
88861000575	0.575	0.0226	
88861000580	0.580	0.0228	
88861000585	0.585	0.0230	
88861000590	0.590	0.0232	
88861000595	0.595	0.0234	

All reamers come with 10° left hand spiral/right cut flute, designed for thru holes to optimally flush out chips for improved tool life and surface finish.

High Precision 8600 Miniature Reamers

*Floating Holders available on pg. 73

Magaforce 8600 Micro-Precision				
D 0.0002" increment	/1	/2	L	d2 H6
0.0236 to 0.0413	0.275	0.393	1.300	D
0.0417 to 0.0610	0.393	0.944	1.580	D
0.0614 to 0.0929	0.433	1.220	1.970	D
0.0933 to 0.1476	0.590	1.500	2.250	D
0.1480 to 0.1673	0.748	1.930	2.950	0.158
0.1677 to 0.1870	0.827	2"	3.150	0.177
0.1874 to 0.2087	0.906	2.320	3.390	0.197
0.2091 to 0.2284	1.024	2.559	3.660	0.217
0.2288 to 0.2638	1.102	2.795	3.980	0.236
0.2642 to 0.2972	1.220	3.071	4.290	0.276
0.2976 to 0.3366	1.299	3.307	4.610	0.315
0.3370 to 0.3760	1.417	3.465	4.920	0.354
0.3763 to 0.3957	1.496	3.819	5.236	0.394
0.3961 to 0.4350	1.496	3.819	5.236	0.394
0.4354 to 0.4744	1.732	4.331	5.945	0.472
0.4748 to 0.5138	1.732	4.331	5.945	0.472
0.5135 to 0.5890	1.969	44.09	6.378	0.551
0.5929 to 0.7500	2.047	4.606	6.693	0.630
0.7468 to 0.7500	2.283	5.354	7.441	0.630



All reamers have a 45° chamfer lead
 Ø 0.0236" to 0.0929" = 4 flutes, Ø 0.0933" to .5138" = 6 flutes,
10° left spiral/right hand cut for thru holes.

For Magaforce 8600 EDP numbers see below

Tolerances		
	(mm)	(inch)
H7	0.60 – 3.00	0 + .00012
H8	3.00 – 6.00	0 + .00016
H9	6.00 – 19.05	0 + .00020

8600 Series			8600 Series			Wire
EDP No.	(mm)	Decimal	EDP No.	(mm)	Decimal	
88860000600	0.60	0.0236	88860000980	0.98	0.0386	61
88860000610	0.61	0.0240	88860000990	0.99	0.0390	
88860000620	0.62	0.0244	88860001000	1.00	0.0394	
88860000630	0.63	0.0248	88860001010	1.01	0.0398	60
88860000640	0.64	0.0252	88860001020	1.02	0.0402	
88860000650	0.65	0.0256	88860001030	1.03	0.0406	
88860000660	0.66	0.0260	88860001040	1.04	0.0409	59
88860000670	0.67	0.0264	88860001050	1.05	0.0413	
88860000680	0.68	0.0268	88860001060	1.06	0.0417	
88860000690	0.69	0.0272	88860001070	1.07	0.0421	58
88860000700	0.70	0.0276	88860001080	1.08	0.0425	
88860000710	0.71	0.0280	88860001090	1.09	0.0429	
88860000720	0.72	0.0283	88860001100	1.10	0.0433	57
88860000730	0.73	0.0287	88860001110	1.11	0.0437	
88860000740	0.74	0.0291	88860001120	1.12	0.0441	
88860000750	0.75	0.0295	88860001130	1.13	0.0445	
88860000760	0.76	0.0299	88860001140	1.14	0.0449	
88860000770	0.77	0.0303	88860001150	1.15	0.0453	
88860000780	0.78	0.0307	88860001160	1.16	0.0457	
88860000790	0.79	0.0311	88860001170	1.17	0.0461	
88860000800	0.80	0.0315	88860001180	1.18	0.0465	
88860000810	0.81	0.0319	88860001190	1.19	0.0469	
88860000820	0.82	0.0323	88860001200	1.20	0.0472	
88860000830	0.83	0.0327	88860001210	1.21	0.0476	
88860000840	0.84	0.0331	88860001220	1.22	0.0480	
88860000850	0.85	0.0335	88860001230	1.23	0.0484	
88860000860	0.86	0.0339	88860001240	1.24	0.0488	
88860000870	0.87	0.0343	88860001250	1.25	0.0492	
88860000880	0.88	0.0346	88860001260	1.26	0.0496	
88860000890	0.89	0.0350	88860001270	1.27	0.0500	
88860000900	0.90	0.0354	88860001280	1.28	0.0504	
88860000910	0.91	0.0358	88860001290	1.29	0.0508	
88860000920	0.92	0.0362	88860001300	1.30	0.0512	
88860000930	0.93	0.0366	88860001310	1.31	0.0516	55
88860000940	0.94	0.0370	88860001320	1.32	0.0520	
88860000950	0.95	0.0374	88860001330	1.33	0.0524	
88860000960	0.96	0.0378	88860001340	1.34	0.0528	
88860000970	0.97	0.0382	88860001350	1.35	0.0531	

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860001360	1.36	0.0535	
88860001370	1.37	0.0539	
88860001380	1.38	0.0543	
88860001390	1.39	0.0547	54
88860001400	1.40	0.0551	
88860001410	1.41	0.0555	
88860001420	1.42	0.0559	
88860001430	1.43	0.0563	
88860001440	1.44	0.0567	
88860001450	1.45	0.0571	
88860001460	1.46	0.0575	
88860001470	1.47	0.0579	
88860001480	1.48	0.0583	53
88860001490	1.49	0.0587	
88860001500	1.50	0.0590	
88860001510	1.51	0.0594	
88860001520	1.52	0.0598	
88860001530	1.53	0.0602	
88860001540	1.54	0.0606	
88860001550	1.55	0.0610	
88860001560	1.56	0.0614	
88860001570	1.57	0.0618	
88860001580	1.58	0.0622	
88860001590	1.59	0.0626	
88860001600	1.60	0.0630	52
88860001610	1.61	0.0634	
88860001620	1.62	0.0638	
88860001630	1.63	0.0642	
88860001640	1.64	0.0646	
88860001650	1.65	0.0650	
88860001660	1.66	0.0654	
88860001670	1.67	0.0657	
88860001680	1.68	0.0661	
88860001690	1.69	0.0665	51
88860001700	1.70	0.0669	
88860001710	1.71	0.0673	
88860001720	1.72	0.0677	
88860001730	1.73	0.0681	

10° left spiral/right hand cut for thru holes.

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860001740	1.74	0.0685	
88860001750	1.75	0.0689	
88860001760	1.76	0.0693	
88860001770	1.77	0.0697	
88860001780	1.78	0.0701	50
88860001790	1.79	0.0705	
88860001800	1.80	0.0709	
88860001810	1.81	0.0713	
88860001820	1.82	0.0717	
88860001830	1.83	0.0720	
88860001840	1.84	0.0724	
88860001850	1.85	0.0728	49
88860001860	1.86	0.0732	
88860001870	1.87	0.0736	
88860001880	1.88	0.0740	
88860001890	1.89	0.0744	
88860001900	1.90	0.0748	
88860001910	1.91	0.0752	
88860001920	1.92	0.0756	
88860001930	1.93	0.0760	48
88860001940	1.94	0.0764	
88860001950	1.95	0.0768	
88860001960	1.96	0.0772	
88860001970	1.97	0.0776	
88860001980	1.98	0.0780	
88860001990	1.99	0.0783	47
88860002000	2.00	0.0787	
88860002010	2.01	0.0791	
88860002020	2.02	0.0795	
88860002030	2.03	0.0799	
88860002040	2.04	0.0803	
88860002050	2.05	0.0807	
88860002060	2.06	0.0811	46
88860002070	2.07	0.0815	
88860002080	2.08	0.0819	45
88860002090	2.09	0.0823	
88860002100	2.10	0.0827	
88860002110	2.11	0.0831	
88860002120	2.12	0.0835	
88860002130	2.13	0.0839	
88860002140	2.14	0.0843	
88860002150	2.15	0.0846	
88860002160	2.16	0.0850	
88860002170	2.17	0.0854	
88860002180	2.18	0.0858	44
88860002190	2.19	0.0862	
88860002200	2.20	0.0866	
88860002210	2.21	0.0870	
88860002220	2.22	0.0874	
88860002230	2.23	0.0878	
88860002240	2.24	0.0882	
88860002250	2.25	0.0886	
88860002260	2.26	0.0890	43
88860002270	2.27	0.0894	
88860002280	2.28	0.0898	
88860002290	2.29	0.0902	
88860002300	2.30	0.0906	
88860002310	2.31	0.0909	
88860002320	2.32	0.0913	
88860002330	2.33	0.0917	
88860002340	2.34	0.0921	
88860002350	2.35	0.0925	
88860002360	2.36	0.0929	
88860002370	2.37	0.0933	42
88860002380	2.38	0.0937	
88860002390	2.39	0.0941	

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860002400	2.40	0.0945	
88860002410	2.41	0.0949	
88860002420	2.42	0.0953	
88860002430	2.43	0.0957	
88860002440	2.44	0.0961	41
88860002450	2.45	0.0965	
88860002460	2.46	0.0969	
88860002470	2.47	0.0972	
88860002480	2.48	0.0976	
88860002490	2.49	0.0980	40
88860002500	2.50	0.0984	
88860002510	2.51	0.0988	
88860002520	2.52	0.0992	
88860002530	2.53	0.0996	39
88860002540	2.54	0.1000	
88860002550	2.55	0.1004	
88860002560	2.56	0.1008	
88860002570	2.57	0.1012	
88860002580	2.58	0.1016	38
88860002590	2.59	0.1020	
88860002600	2.60	0.1024	
88860002610	2.61	0.1028	
88860002620	2.62	0.1031	
88860002630	2.63	0.1035	
88860002640	2.64	0.1039	37
88860002650	2.65	0.1043	
88860002660	2.66	0.1047	
88860002670	2.67	0.1051	
88860002680	2.68	0.1055	
88860002690	2.69	0.1059	
88860002700	2.70	0.1063	36
88860002710	2.71	0.1067	
88860002720	2.72	0.1071	
88860002730	2.73	0.1075	
88860002740	2.74	0.1079	
88860002750	2.75	0.1083	
88860002760	2.76	0.1087	
88860002770	2.77	0.1091	
88860002780	2.78	0.1094	
88860002790	2.79	0.1098	35
88860002800	2.80	0.1102	
88860002810	2.81	0.1106	
88860002820	2.82	0.1110	34
88860002830	2.83	0.1114	
88860002840	2.84	0.1118	
88860002850	2.85	0.1122	
88860002860	2.86	0.1126	
88860002870	2.87	0.1130	33
88860002880	2.88	0.1134	
88860002890	2.89	0.1138	
88860002900	2.90	0.1142	
88860002910	2.91	0.1146	
88860002920	2.92	0.1150	
88860002930	2.93	0.1154	
88860002940	2.94	0.1157	
88860002950	2.95	0.1161	32
88860002960	2.96	0.1164	
88860002970	2.97	0.1169	
88860002980	2.98	0.1173	
88860002990	2.99	0.1177	
88860003000	3.00	0.1181	
88860003010	3.01	0.1185	
88860003020	3.02	0.1189	
88860003030	3.03	0.1193	
88860003040	3.04	0.1197	
88860003050	3.05	0.1201	31

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860003060	3.06	0.1205	
88860003070	3.07	0.1209	
88860003080	3.08	0.1213	
88860003090	3.09	0.1217	
88860003100	3.10	0.1220	
88860003110	3.11	0.1224	
88860003120	3.12	0.1228	
88860003130	3.13	0.1232	
88860003140	3.14	0.1236	
88860003150	3.15	0.1240	
88860003160	3.16	0.1244	
88860003170	3.17	0.1248	
88860003180	3.18	0.1252	
88860003190	3.19	0.1256	
88860003200	3.20	0.1260	
88860003210	3.21	0.1264	
88860003220	3.22	0.1268	
88860003230	3.23	0.1272	
88860003240	3.24	0.1276	
88860003250	3.25	0.1280	
88860003260	3.26	0.1283	30
88860003270	3.27	0.1287	
88860003280	3.28	0.1291	
88860003290	3.29	0.1295	
88860003300	3.30	0.1299	
88860003310	3.31	0.1303	
88860003320	3.32	0.1308	
88860003330	3.33	0.1311	
88860003340	3.34	0.1315	
88860003350	3.35	0.1319	
88860003360	3.36	0.1323	
88860003370	3.37	0.1327	
88860003380	3.38	0.1331	
88860003390	3.39	0.1335	
88860003400	3.40	0.1339	
88860003410	3.41	0.1343	
88860003420	3.42	0.1346	
88860003430	3.43	0.1350	
88860003440	3.44	0.1354	
88860003450	3.45	0.1358	29
88860003460	3.46	0.1362	
88860003470	3.47	0.1366	
88860003480	3.48	0.1370	
88860003490	3.49	0.1374	
88860003500	3.50	0.1378	
88860003510	3.51	0.1382	
88860003520	3.52	0.1386	
88860003530	3.53	0.1390	
88860003540	3.54	0.1394	
88860003550	3.55	0.1398	
88860003560	3.56	0.1402	
88860003570	3.57	0.1406	28
88860003580	3.58	0.1409	
88860003590	3.59	0.1413	
88860003600	3.60	0.1417	
88860003610	3.61	0.1421	
88860003620	3.62	0.1425	
88860003630	3.63	0.1429	
88860003640	3.64	0.1433	
88860003650	3.65	0.1437	
88860003660	3.66	0.1440	27
88860003670	3.67	0.1445	
88860003680	3.68	0.1449	
88860003690	3.69	0.1453	
88860003700	3.70	0.1457	

Note: Highlighted items are an increment of 0.0003

10° left spiral/right hand cut for thru holes.

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860003710	3.71	0.1461	
88860003720	3.72	0.1465	
88860003730	3.73	0.1469	26
88860003740	3.74	0.1472	
88860003750	3.75	0.1476	
88860003760	3.76	0.1480	
88860003770	3.77	0.1484	
88860003780	3.78	0.1488	
88860003790	3.79	0.1492	
88860003800	3.80	0.1496	25
88860003810	3.81	0.1500	
88860003820	3.82	0.1504	
88860003830	3.83	0.1508	
88860003840	3.84	0.1512	
88860003850	3.85	0.1516	
88860003860	3.86	0.1520	24
88860003870	3.87	0.1524	
88860003880	3.88	0.1528	
88860003890	3.89	0.1531	
88860003900	3.90	0.1535	
88860003910	3.91	0.1539	23
88860003920	3.92	0.1543	
88860003930	3.93	0.1547	
88860003940	3.94	0.1551	
88860003950	3.95	0.1555	
88860003960	3.96	0.1559	
88860003970	3.97	0.1563	
88860003980	3.98	0.1567	
88860003990	3.99	0.1571	22
88860004000	4.00	0.1575	
88860004010	4.01	0.1579	
88860004020	4.02	0.1583	
88860004030	4.03	0.1587	
88860004040	4.04	0.1591	21
88860004050	4.05	0.1594	
88860004060	4.06	0.1598	
88860004070	4.07	0.1602	
88860004080	4.08	0.1606	
88860004090	4.09	0.1610	20
88860004100	4.10	0.1614	
88860004110	4.11	0.1618	
88860004120	4.12	0.1622	
88860004130	4.13	0.1626	
88860004140	4.14	0.1630	
88860004150	4.15	0.1634	
88860004160	4.16	0.1638	
88860004170	4.17	0.1642	
88860004180	4.18	0.1646	
88860004190	4.19	0.1650	
88860004200	4.20	0.1654	
88860004210	4.21	0.1657	
88860004220	4.22	0.1661	19
88860004230	4.23	0.1665	
88860004240	4.24	0.1669	
88860004250	4.25	0.1673	
88860004260	4.26	0.1677	
88860004270	4.27	0.1681	
88860004280	4.28	0.1685	
88860004290	4.29	0.1689	
88860004300	4.30	0.1693	18
88860004310	4.31	0.1697	
88860004320	4.32	0.1701	
88860004330	4.33	0.1705	
88860004340	4.34	0.1709	
88860004350	4.35	0.1713	
88860004360	4.36	0.1717	

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860004370	4.37	0.1720	
88860004380	4.38	0.1724	
88860004390	4.39	0.1728	17
88860004400	4.40	0.1732	
88860004410	4.41	0.1736	
88860004420	4.42	0.1740	
88860004430	4.43	0.1744	
88860004440	4.44	0.1748	
88860004450	4.45	0.1752	
88860004460	4.46	0.1756	
88860004470	4.47	0.1760	
88860004480	4.48	0.1764	
88860004490	4.49	0.1768	16
88860004500	4.50	0.1772	
88860004510	4.51	0.1776	
88860004520	4.52	0.1780	
88860004530	4.53	0.1783	
88860004540	4.54	0.1787	
88860004550	4.55	0.1791	
88860004560	4.56	0.1795	
88860004570	4.57	0.1799	15
88860004580	4.58	0.1803	
88860004590	4.59	0.1807	
88860004600	4.60	0.1811	
88860004610	4.61	0.1815	
88860004620	4.62	0.1819	14
88860004630	4.63	0.1823	
88860004640	4.64	0.1827	
88860004650	4.65	0.1831	
88860004660	4.66	0.1835	
88860004670	4.67	0.1839	
88860004680	4.68	0.1843	
88860004690	4.69	0.1846	
88860004700	4.70	0.1850	13
88860004710	4.71	0.1854	
88860004720	4.72	0.1858	
88860004730	4.73	0.1862	
88860004740	4.74	0.1866	
88860004750	4.75	0.1870	
88860004760	4.76	0.1874	
88865004762	4.763	0.1875	
88860004770	4.77	0.1878	
88860004780	4.78	0.1882	
88860004790	4.79	0.1886	
88860004800	4.80	0.1890	12
88860004810	4.81	0.1894	
88860004820	4.82	0.1898	
88860004830	4.83	0.1902	
88860004840	4.84	0.1906	
88860004850	4.85	0.1909	11
88860004860	4.86	0.1913	
88860004870	4.87	0.1917	
88860004880	4.88	0.1921	
88860004890	4.89	0.1925	
88860004900	4.90	0.1929	
88860004910	4.91	0.1933	10
88860004920	4.92	0.1937	
88860004930	4.93	0.1941	
88860004940	4.94	0.1945	
88860004950	4.95	0.1949	
88860004960	4.96	0.1953	
88860004970	4.97	0.1957	
88860004980	4.98	0.1961	9
88860004990	4.99	0.1965	
88860005000	5.00	0.1969	
88860005010	5.01	0.1972	

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860005020	5.02	0.1976	
88860005030	5.03	0.1980	
88860005040	5.04	0.1984	
88860005050	5.05	0.1988	8
88860005060	5.06	0.1992	
88860005070	5.07	0.1996	
88860005080	5.08	0.2000	
88860005090	5.09	0.2004	
88860005100	5.10	0.2008	7
88860005110	5.11	0.2012	
88860005120	5.12	0.2016	
88860005130	5.13	0.2020	
88860005140	5.14	0.2024	
88860005150	5.15	0.2028	
88860005160	5.16	0.2031	
88860005170	5.17	0.2035	
88860005180	5.18	0.2039	6
88860005190	5.19	0.2043	
88860005200	5.20	0.2047	
88860005210	5.21	0.2051	
88860005220	5.22	0.2055	5
88860005230	5.23	0.2059	
88860005240	5.24	0.2063	
88860005250	5.25	0.2067	
88860005260	5.26	0.2071	
88860005270	5.27	0.2075	
88860005280	5.28	0.2079	
88860005290	5.29	0.2083	
88860005300	5.30	0.2087	
88860005310	5.31	0.2091	4
88860005320	5.32	0.2094	
88860005330	5.33	0.2098	
88860005340	5.34	0.2102	
88860005350	5.35	0.2106	
88860005360	5.36	0.2110	
88860005370	5.37	0.2114	
88860005380	5.38	0.2118	
88860005390	5.39	0.2122	
88860005400	5.40	0.2126	
88860005410	5.41	0.2130	3
88860005420	5.42	0.2134	
88860005430	5.43	0.2138	
88860005440	5.44	0.2142	
88860005450	5.45	0.2146	
88860005460	5.46	0.2150	
88860005470	5.47	0.2154	
88860005480	5.48	0.2158	
88860005490	5.49	0.2161	
88860005500	5.50	0.2165	
88860005510	5.51	0.2169	
88860005520	5.52	0.2173	
88860005530	5.53	0.2177	
88860005540	5.54	0.2181	
88860005550	5.55	0.2185	
88860005560	5.56	0.2189	
88860005570	5.57	0.2193	
88860005580	5.58	0.2197	
88860005590	5.59	0.2201	
88860005600	5.60	0.2205	
88860005610	5.61	0.2209	2
88860005620	5.62	0.2213	
88860005630	5.63	0.2217	
88860005640	5.64	0.2220	
88860005650	5.65	0.2224	
88860005660	5.66	0.2228	
88860005670	5.67	0.2232	

Note: Highlighted items are an increment of 0.0003

10° left spiral/right hand cut for thru holes.

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860005680	5.68	0.2236	
88860005690	5.69	0.2240	
88860005700	5.70	0.2244	
88860005710	5.71	0.2248	
88860005720	5.72	0.2252	
88860005730	5.73	0.2256	
88860005740	5.74	0.2260	
88860005750	5.75	0.2264	
88860005760	5.76	0.2268	
88860005770	5.77	0.2272	
88860005780	5.78	0.2276	
88860005790	5.79	0.2280	1
88860005800	5.80	0.2284	
88860005810	5.81	0.2288	
88860005820	5.82	0.2291	
88860005830	5.83	0.2295	
88860005840	5.84	0.2299	
88860005850	5.85	0.2303	
88860005860	5.86	0.2307	
88860005870	5.87	0.2311	
88860005880	5.88	0.2315	
88860005890	5.89	0.2319	
88860005900	5.90	0.2323	
88860005910	5.91	0.2327	
88860005920	5.92	0.2331	
88860005930	5.93	0.2335	
88860005940	5.94	0.2339	A
88860005950	5.95	0.2343	
88860005960	5.96	0.2347	
88860005970	5.97	0.2350	
88860005980	5.98	0.2354	
88860005990	5.99	0.2358	
88860006000	6.00	0.2362	
88860006010	6.01	0.2366	
88860006020	6.02	0.2370	
88860006030	6.03	0.2374	
88860006040	6.04	0.2378	
88860006050	6.05	0.2382	B
88860006060	6.06	0.2386	
88860006070	6.07	0.2390	
88860006080	6.08	0.2394	
88860006090	6.09	0.2398	
88860006100	6.10	0.2402	
88860006110	6.11	0.2406	
88860006120	6.12	0.2410	
88860006130	6.13	0.2413	
88860006140	6.14	0.2417	
88860006150	6.15	0.2421	C
88860006160	6.16	0.2425	
88860006170	6.17	0.2429	
88860006180	6.18	0.2433	
88860006190	6.19	0.2437	
88860006200	6.20	0.2441	
88860006210	6.21	0.2445	
88860006220	6.22	0.2449	
88860006230	6.23	0.2453	
88860006240	6.24	0.2457	
88860006250	6.25	0.2461	D
88860006260	6.26	0.2465	
88860006270	6.27	0.2468	
88860006280	6.28	0.2472	
88860006290	6.29	0.2476	
88860006300	6.30	0.2480	
88860006310	6.31	0.2484	
88860006320	6.32	0.2488	
88860006330	6.33	0.2492	

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860006340	6.34	0.2496	
88860006350	6.35	0.2500	E
88860006360	6.36	0.2504	
88860006370	6.37	0.2508	
88860006380	6.38	0.2512	
88860006390	6.39	0.2517	
88860006400	6.40	0.2520	
88860006410	6.41	0.2524	
88860006420	6.42	0.2528	
88860006430	6.43	0.2531	
88860006440	6.44	0.2535	
88860006450	6.45	0.2539	
88860006460	6.46	0.2543	
88860006470	6.47	0.2547	
88860006480	6.48	0.2551	
88860006490	6.49	0.2555	
88860006500	6.50	0.2559	
88860006510	6.51	0.2563	
88860006520	6.52	0.2567	
88860006530	6.53	0.2571	F
88860006540	6.54	0.2575	
88860006550	6.55	0.2579	
88860006560	6.56	0.2583	
88860006570	6.57	0.2587	
88860006580	6.58	0.2591	
88860006590	6.59	0.2594	
88860006600	6.60	0.2598	
88860006610	6.61	0.2602	
88860006620	6.62	0.2606	
88860006630	6.63	0.2610	G
88860006640	6.64	0.2614	
88860006650	6.65	0.2618	
88860006660	6.66	0.2622	
88860006670	6.67	0.2626	
88860006680	6.68	0.2630	
88860006690	6.69	0.2634	
88860006700	6.70	0.2638	
88860006710	6.71	0.2642	
88860006720	6.72	0.2646	
88860006730	6.73	0.2650	
88860006740	6.74	0.2654	
88860006750	6.75	0.2657	
88860006760	6.76	0.2661	H
88860006770	6.77	0.2665	
88860006780	6.78	0.2669	
88860006790	6.79	0.2673	
88860006800	6.80	0.2677	
88860006810	6.81	0.2681	
88860006820	6.82	0.2685	
88860006830	6.83	0.2689	
88860006840	6.84	0.2693	
88860006850	6.85	0.2697	
88860006860	6.86	0.2701	
88860006870	6.87	0.2705	
88860006880	6.88	0.2709	
88860006890	6.89	0.2713	
88860006900	6.90	0.2717	
88860006910	6.91	0.2720	I
88860006920	6.92	0.2724	
88860006930	6.93	0.2728	
88860006940	6.94	0.2732	
88860006950	6.95	0.2736	
88860006960	6.96	0.2740	
88860006970	6.97	0.2744	
88860006980	6.98	0.2748	
88860006990	6.99	0.2752	

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860007000	7.00	0.2756	
88860007010	7.01	0.2760	
88860007020	7.02	0.2764	
88860007030	7.03	0.2768	J
88860007040	7.04	0.2772	
88860007050	7.05	0.2776	
88860007060	7.06	0.2780	
88860007070	7.07	0.2783	
88860007080	7.08	0.2787	
88860007090	7.09	0.2791	
88860007100	7.10	0.2795	
88860007110	7.11	0.2799	
88860007120	7.12	0.2803	
88860007130	7.13	0.2807	
88860007140	7.14	0.2811	K
88860007150	7.15	0.2815	
88860007160	7.16	0.2819	
88860007170	7.17	0.8223	
88860007180	7.18	0.2827	
88860007190	7.19	0.2831	
88860007200	7.20	0.2835	
88860007210	7.21	0.2839	
88860007220	7.22	0.2843	
88860007230	7.23	0.2846	
88860007240	7.24	0.2850	
88860007250	7.25	0.2854	
88860007260	7.26	0.2858	
88860007270	7.27	0.2862	
88860007280	7.28	0.2866	
88860007290	7.29	0.2870	
88860007300	7.30	0.2874	
88860007310	7.31	0.2878	
88860007320	7.32	0.2882	
88860007330	7.33	0.2886	
88860007340	7.34	0.2890	
88860007350	7.35	0.2894	
88860007360	7.36	0.2898	L
88860007370	7.37	0.2902	
88860007380	7.38	0.2906	
88860007390	7.39	0.2909	
88860007400	7.40	0.2913	
88860007410	7.41	0.2917	
88860007420	7.42	0.2921	
88860007430	7.43	0.2925	
88860007440	7.44	0.2929	
88860007450	7.45	0.2933	
88860007460	7.46	0.2937	
88860007470	7.47	0.2941	
88860007480	7.48	0.2945	
88860007490	7.49	0.2949	M
88860007500	7.50	0.2953	
88860007510	7.51	0.2957	
88860007520	7.52	0.2961	
88860007530	7.53	0.2965	
88860007540	7.54	0.2969	
88860007550	7.55	0.2972	
88860007560	7.56	0.2976	
88860007570	7.57	0.2980	
88860007580	7.58	0.2984	
88860007590	7.59	0.2988	
88860007600	7.60	0.2992	
88860007610	7.61	0.2996	
88860007620	7.62	0.3000	
88860007630	7.63	0.3004	
88860007640	7.64	0.3008	
88860007650	7.65	0.3012	

Note: Highlighted items are an increment of 0.0003

10° left spiral/right hand cut for thru holes.

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860007660	7.66	0.3016	N
88860007670	7.67	0.3020	
88860007680	7.68	0.3024	
88860007690	7.69	0.3028	
88860007700	7.70	0.3031	
88860007710	7.71	0.3035	
88860007720	7.72	0.3039	
88860007730	7.73	0.3043	
88860007740	7.74	0.3047	
88860007750	7.75	0.3051	
88860007760	7.76	0.3055	
88860007770	7.77	0.3059	
88860007780	7.78	0.3063	
88860007790	7.79	0.3067	
88860007800	7.80	0.3071	
88860007810	7.81	0.3075	
88860007820	7.82	0.3079	
88860007830	7.83	0.3083	
88860007840	7.84	0.3087	
88860007850	7.85	0.3091	
88860007860	7.86	0.3094	
88860007870	7.87	0.3098	
88860007880	7.88	0.3102	
88860007890	7.89	0.3106	
88860007900	7.90	0.3110	
88860007910	7.91	0.3114	
88860007920	7.92	0.3118	
88860007930	7.93	0.3122	
88865007937	7.938	0.3125	
88860007940	7.94	0.3126	
88860007950	7.95	0.3130	
88860007960	7.96	0.3134	
88860007970	7.97	0.3138	
88860007980	7.98	0.3142	
88860007990	7.99	0.3146	
88860008000	8.00	0.3150	
88860008010	8.01	0.3154	
88860008020	8.02	0.3157	O
88860008030	8.03	0.3161	
88860008040	8.04	0.3165	
88860008050	8.05	0.3169	
88860008060	8.06	0.3173	
88860008070	8.07	0.3177	
88860008080	8.08	0.3181	
88860008090	8.09	0.3185	
88860008100	8.10	0.3189	
88860008110	8.11	0.3193	
88860008120	8.12	0.3197	
88860008130	8.13	0.3201	
88860008140	8.14	0.3205	
88860008150	8.15	0.3209	
88860008160	8.16	0.3213	
88860008170	8.17	0.3217	
88860008180	8.18	0.3220	
88860008190	8.19	0.3224	
88860008200	8.20	0.3228	P
88860008210	8.21	0.3232	
88860008220	8.22	0.3236	
88860008230	8.23	0.3240	
88860008240	8.24	0.3244	
88860008250	8.25	0.3248	
88860008260	8.26	0.3252	
88860008270	8.27	0.3256	
88860008280	8.28	0.3260	
88860008290	8.29	0.3264	

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860008300	8.30	0.3268	
88860008310	8.31	0.3272	
88860008320	8.32	0.3276	
88860008330	8.33	0.3280	
88860008340	8.34	0.3283	
88860008350	8.35	0.3287	
88860008360	8.36	0.3291	
88860008370	8.37	0.3295	
88860008380	8.38	0.3299	
88860008390	8.39	0.3303	
88860008400	8.40	0.3307	Q
88860008410	8.41	0.3311	
88860008420	8.42	0.3315	
88860008430	8.43	0.3319	
88860008440	8.44	0.3323	
88860008450	8.45	0.3327	
88860008460	8.46	0.3331	
88860008470	8.47	0.3335	
88860008480	8.48	0.3339	
88860008490	8.49	0.3343	
88860008500	8.50	0.3346	
88860008510	8.51	0.3350	
88860008520	8.52	0.3354	
88860008530	8.53	0.3358	
88860008540	8.54	0.3362	
88860008550	8.55	0.3366	
88860008560	8.56	0.3370	
88860008570	8.57	0.3374	
88860008580	8.58	0.3378	
88860008590	8.59	0.3382	
88860008600	8.60	0.3386	
88860008610	8.61	0.3390	
88860008620	8.62	0.3394	
88860008630	8.63	0.3398	
88860008640	8.64	0.3402	
88860008650	8.65	0.3406	
88860008660	8.66	0.3409	
88860008670	8.67	0.3413	R
88860008680	8.68	0.3417	
88860008690	8.69	0.3421	
88860008700	8.70	0.3425	
88860008710	8.71	0.3429	
88860008720	8.72	0.3433	
88860008730	8.73	0.3437	
88860008740	8.74	0.3441	
88860008750	8.75	0.3445	
88860008760	8.76	0.3449	
88860008770	8.77	0.3453	
88860008780	8.78	0.3457	
88860008790	8.79	0.3461	
88860008800	8.80	0.3465	
88860008810	8.81	0.3469	
88860008820	8.82	0.3472	
88860008830	8.83	0.3476	
88860008840	8.84	0.3480	
88860008850	8.85	0.3484	S
88860008860	8.86	0.3488	
88860008870	8.87	0.3492	
88860008880	8.88	0.3496	
88860008890	8.89	0.3500	
88860008900	8.90	0.3504	
88860008910	8.91	0.3508	
88860008920	8.92	0.3512	
88860008930	8.93	0.3516	
88860008940	8.94	0.3520	

8600 Series			
EDP No.	(mm)	Decimal	Wire
88860008950	8.95	0.3524	
88860008960	8.96	0.3528	
88860008970	8.97	0.3531	
88860008980	8.98	0.3535	
88860008990	8.99	0.3539	
88860009000	9.00	0.3543	
88860009010	9.01	0.3547	
88860009020	9.02	0.3551	
88860009030	9.03	0.3555	
88860009040	9.04	0.3559	
88860009050	9.05	0.3563	
88860009060	9.06	0.3567	
88860009070	9.07	0.3571	
88860009080	9.08	0.3575	
88860009090	9.09	0.3579	
88860009100	9.10	0.3583	
88860009110	9.11	0.3587	T
88860009120	9.12	0.3591	
88860009130	9.13	0.3594	
88860009140	9.14	0.3598	
88860009150	9.15	0.3602	
88860009170	9.17	0.3610	
88860009180	9.18	0.3614	
88860009190	9.19	0.3618	
88860009200	9.20	0.3622	
88860009210	9.21	0.3626	
88860009220	9.22	0.3630	
88860009230	9.23	0.3634	
88860009240	9.24	0.3638	
88860009250	9.25	0.3642	
88860009260	9.26	0.3646	
88860009270	9.27	0.3650	
88860009280	9.28	0.3654	
88860009290	9.29	0.3657	
88860009300	9.30	0.3661	
88860009310	9.31	0.3665	
88860009320	9.32	0.3669	
88860009330	9.33	0.3673	
88860009340	9.34	0.3677	
88860009350	9.35	0.3681	
88860009360	9.36	0.3685	
88860009370	9.37	0.3689	U
88860009380	9.38	0.3693	
88860009390	9.39	0.3697	
88860009400	9.40	0.3701	
88860009410	9.41	0.3705	
88860009420	9.42	0.3709	
88860009430	9.43	0.3713	
88860009440	9.44	0.3717	
88860009450	9.45	0.3720	
88860009460	9.46	0.3724	
88860009470	9.47	0.3728	
88860009480	9.48	0.3732	
88860009490	9.49	0.3736	
88860009500	9.50	0.3740	
88860009510	9.51	0.3744	
88860009520	9.52	0.3748	
88865009525	9.525	0.3750	
88860009530	9.53	0.3752	
88860009540	9.54	0.3756	
88860009550	9.55	0.3760	
88860009560	9.56	0.3763	
88860009570	9.57	0.3767	
88860009650	9.65	-	
88860009730	9.73	-	

Note: Highlighted items are an increment of 0.0003

10° left spiral/right hand cut for thru holes.

8600 Series		
25/64" Range		
EDP No.	(mm)	Decimal
88860009870	9.87	0.3886
88860009880	9.88	0.3889
88860009890	9.89	0.3893
88860009900	9.90	0.3897
88860009910	9.91	0.3901
88860009920	9.92	0.3905
88860009930	9.93	0.3909
88860009940	9.94	0.3913
88860009950	9.95	0.3917
88860009960	9.96	0.3921
10mm Range		
EDP No.	(mm)	Decimal
88860009970	9.97	0.3925
88860009980	9.98	0.3929
88860009990	9.99	0.3933
88860010000	10.00	0.3937
88860010010	10.01	0.3941
88860010020	10.02	0.3945
88860010030	10.03	0.3949
88860010040	10.04	0.3953
88860010050	10.05	0.3957
27/64" Range		
EDP No.	(mm)	Decimal
88860010660	10.66	0.4197
88860010670	10.67	0.4201
88860010680	10.68	0.4205
88860010690	10.69	0.4209
88860010700	10.70	0.4213
88860010710	10.71	0.4217
88860010720	10.72	0.4220
88860010730	10.73	0.4224
88860010740	10.74	0.4228
88860010750	10.75	0.4232
88860010760	10.76	0.4236
11mm Range		
EDP No.	(mm)	Decimal
88860010950	10.95	0.4311
88860010960	10.96	0.4315
88860010970	10.97	0.4319
88860010980	10.98	0.4323
88860010990	10.99	0.4327
88860011000	11.00	0.4331
88860011010	11.01	0.4335
88860011020	11.02	0.4339
88860011030	11.03	0.4343
88860011040	11.04	0.4346
88860011050	11.05	0.4350
7/16" Range		
EDP No.	(mm)	Decimal
88860011060	11.06	0.4354
88860011070	11.07	0.4358
88860011080	11.08	0.4362
88860011090	11.09	0.4366
88860011100	11.10	0.4370
88860011110	11.11	0.4374
88865011112	11.113	0.4375
88860011120	11.12	0.4378
88860011130	11.13	0.4382
88860011140	11.14	0.4386
88860011150	11.15	0.4390
88860011160	11.16	0.4394
88860011170	11.17	-

8600 Series		
29/64" & 11.5mm Range		
EDP No.	(mm)	Decimal
88860011450	11.45	0.4508
88860011460	11.46	0.4512
88860011470	11.47	0.4516
88860011480	11.48	0.4520
88860011490	11.49	0.4524
88860011500	11.50	0.4528
88860011510	11.51	0.4531
88860011520	11.52	0.4535
88860011530	11.53	0.4539
88860011540	11.54	0.4543
88860011550	11.55	0.4547
5/32" Range		
EDP No.	(mm)	Decimal
88860011850	11.85	0.4665
88860011860	11.86	0.4669
88860011870	11.87	0.4673
88860011880	11.88	0.4677
88860011890	11.89	0.4681
88860011900	11.90	0.4685
88860011910	11.91	0.4689
88860011920	11.92	0.4693
88860011930	11.93	0.4697
12mm Range		
EDP No.	(mm)	Decimal
88860011940	11.94	0.4701
88860011950	11.95	0.4705
88860011960	11.96	0.4709
88860011970	11.97	0.4713
88860011980	11.98	0.4717
88860011990	11.99	0.4720
88860012000	12.00	0.4724
88860012010	12.01	0.4728
88860012020	12.02	0.4732
88860012030	12.03	0.4736
88860012040	12.04	0.4740
88860012050	12.05	0.4744
31/64" Range		
EDP No.	(mm)	Decimal
88860012250	12.25	0.4823
88860012260	12.26	0.4827
88860012270	12.27	0.4831
88860012280	12.28	0.4835
88860012290	12.29	0.4839
88860012300	12.30	0.4843
88860012310	12.31	0.4846
88860012320	12.32	0.4850
88860012330	12.33	0.4854
88860012340	12.34	0.4858
88860012350	12.35	0.4862

8600 Series		
1/2" Range		
EDP No.	(mm)	Decimal
88860012650	12.65	0.4980
88860012660	12.66	0.4984
88860012670	12.67	0.4988
88860012680	12.68	0.4992
88860012690	12.69	0.4996
88860012700	12.70	0.5000
88860012710	12.71	0.5004
88860012720	12.72	0.5008
88860012730	12.73	0.5012
88860012740	12.74	0.5016
88860012750	12.75	0.5020
88860012940	12.94	0.5094
88860012950	12.95	0.5098
88860012960	12.96	0.5102
88860012970	12.97	0.5106
88860012980	12.98	0.5110
88860012990	12.99	0.5114
13mm Range		
EDP No.	(mm)	Decimal
88860013000	13.00	0.5118
88860013010	13.01	0.5122
88860013020	13.02	0.5126
88860013030	13.03	0.5130
88860013040	13.04	0.5134
88860013050	13.05	0.5138
88865014287	14.287	0.5625
88865015875	15.875	0.6250
88865019050	19.050	0.7500

Note: Highlighted items are an increment of 0.0003

Reamer Formulas for Speeds & Feeds

The parameters below are based on using a carbide reamer at the highest SFM

SFM: Surface Feet per Minute

RPM: Revolutions per Minute

IPT: Inches per Tooth (chip load)

IPM: Inches per Minute

IPR: Inches per Revolution

Speed Formula:

RPM = $3.82 \times (\text{SFM} \div \text{Diameter})$

Feed:

IPM = $\text{IPT} \times \# \text{ of Flutes} \times \text{RPM}$

IPR = $\text{IPM} \div \text{RPM}$

SFM = $\text{RPM} \times \text{Diameter} \div 3.82$

Example:

using a Carbide 2mm Reamer
in Steel < 81 HRB

RPM = $3.82 \times (132 \div .0787) = 6407 \text{ RPM}$

IPM = $.0015 \times 4 \times 6407 = 38.4 \text{ IPM}$

IPR = $38.4 \div 6407 = .0059 \text{ IPR}$

This chart lists general reference parameters for a starting point. Below are a couple of tips for fine-tuning the desired size.

To increase the hole diameter: Slow down the feed rate and/or decrease RPM

To decrease the hole diameter: Increase the feed rate and/or increase the RPM

General reference parameters for a starting point									
Material	Speed / SFM			Diameter mm					
	Carbide	Cobalt		2	4	6	10	15	20
Steel < 81 HRB	82 – 132	49 – 72	IPR	0.006	0.006	0.006	0.0098	0.0098	0.0118
			IPM	38.4	19.2	12.8	12.3	8.2	7.7
			RPM	6400	3200	2130	1300	850	640
Steel < 24 Rc.	66 – 82	39 – 56	IPR	0.0039	0.0039	0.0047	0.0071	0.0071	0.0098
			IPM	14.3	8.4	6.4	5.7	3.8	3.8
			RPM	4000	2000	1300	800	500	400
Steel 24-32 Rc.	39 – 59	25 – 33	IPR	0.0031	0.0031	0.0039	0.0071	0.0059	0.0087
			IPM	8.6	4.3	3.4	4.1	2.3	2.4
			RPM	2800	1430	1000	600	400	280
Steel 32-41 Rc.	33 – 49	16 – 23	IPR	0.0031	0.0031	0.0035	0.0059	0.0079	0.0098
			IPM	7.1	3.6	2.9	2.9	2.5	2.3
			RPM	2400	1200	800	500	300	240
Stainless Steel	23 – 39	10 – 16	IPR	0.0028	0.0028	0.0039	0.0047	0.0059	0.0079
			IPM	5.7	2.8	2.3	1.8	1.5	1.5
			RPM	1900	950	630	400	250	240
Inconel/Waspaloy	20 – 33	7 – 10	IPR	0.0028	0.0028	0.0039	0.0047	0.0059	0.0079
			IPM	4.8	2.4	1.9	1.5	1.3	1.2
			RPM	1600	800	540	320	200	200
Cast Iron ≤ 180 HB (Grey)	99 – 132	20 – 49	IPR	0.0039	0.0039	0.0047	0.0079	0.0098	0.0098
			IPM	231.1	11.5	10.2	10	8.2	6.1
			RPM	6400	3200	2130	1300	850	640
Cast Iron > 180 HB	26 – 49	13 – 16	IPR	0.0028	0.0028	0.0039	0.0059	0.0071	0.0079
			IPM	7.1	3.6	2.9	2.9	2.3	1.9
			RPM	2400	1200	800	480	300	240
Copper	82 – 99	39 – 66	IPR	0.0047	0.0047	0.0071	0.0079	0.0098	0.0118
			IPM	23.1	11.5	11.5	7.5	6.1	5.8
			RPM	4800	2400	1600	960	640	480
Brass	115 – 132	66 – 99	IPR	0.0079	0.0079	0.0087	0.0118	0.0138	0.0157
			IPM	50	25	17.9	15.4	11.8	10
			RPM	6400	3200	2130	1300	850	640
Bronze	66 – 82	39 – 56	IPR	0.0059	0.0059	0.0071	0.0087	0.138	0.0146
			IPM	21.5	11.9	9.5	7.2	7.3	5.7
			RPM	4000	2000	1320	800	530	400
Aluminum	132 – 197	82 – 115	IPR	0.0059	0.0059	0.0071	0.0098	0.0118	0.0138
			IPM	57.3	28.7	22.9	18.3	15.3	13.2
			RPM	9500	4800	3200	1900	1300	950
Recommended drill hole diameter:				1.90	3.90	5.85	9.80	14.70	19.70

Note: Reference pg. 118 for Drill Hole Diameter Chart

Reamer Hole Size Chart

Correct Hole Sizes for Best Reamer Results

All Magafor Micro and Miniature Solid Carbide Reamers are left-hand spiral/right-hand cut with a 45° Lead. Designed for thru holes or holes with enough room to accommodate a small amount of waste material.

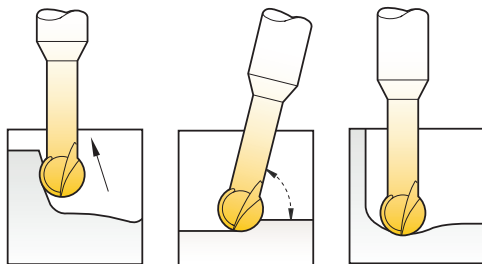
The left-hand spiral acts like an Archimedean Screw. Coolant is directly led to the cutting edges for better lubrication and cooling. Chips are pushed forward with no scratches and leave outstanding surface finishes.

Over 1,125 Standard Sizes
Starting at .0079 in .0002" increments to 0.0236"
In 0.0004" increments to 0.5020"

Final Hole Size to Drilled Hole Size

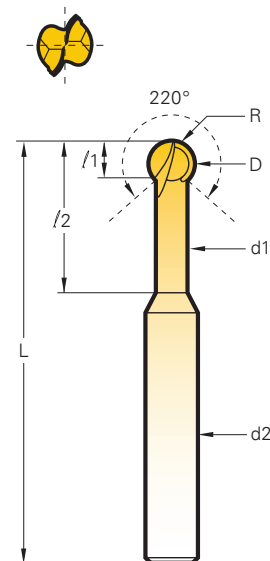
Final Hole Reamer Size (mm/inch)	Reduce Drill Hole Size (inch) min/max	Reduce Drill Hole Size (mm) min/max
0.20 / 0.00787	-0.00157 / -0.00236	-0.04 / -0.06
0.30 / 0.01181	-0.00197 / -0.00315	-0.05 / -0.08
0.40 / 0.01575	-0.00197 / -0.00394	-0.05 / -0.10
0.50 / 0.01969	-0.00197 / -0.0047	-0.05 / -0.12
0.60 / 0.02362	-0.0019 / -0.00472	-0.05 / -0.12
2.00 / 0.07874	-0.00197 / -0.00472	-0.05 / -0.12
6.00 / 0.23622	-0.00591 / -0.00787	-0.15 / -0.20
10.00 / 0.39370	-0.0059 / -0.00787	-0.15 / -0.20
15.00 / 0.59055	-0.01181 / -0.01575	-0.30 / -0.40
20.00 / 0.78740	-0.01181 / -0.01575	-0.30 / -0.40
25.00 / 0.98425	-0.01181 / -0.01969	-0.30 / -0.50
15.00 / 0.59055	-0.01181 / -0.01575	-0.30 / -0.40
20.00 / 0.78740	-0.01181 / -0.01575	-0.30 / -0.40
25.00 / 0.98425	-0.01181 / -0.01969	-0.30 / -0.50

220° Ball-End Miniature End-Mills with Back Clearance



Metric Long Neck Series
= 5 x D

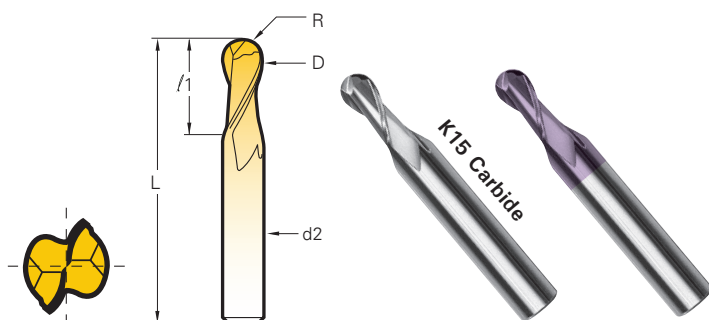
Diameter		d1	d2	L	/1	/2	R	Hard'X 8522-H
(inch)	(mm)							
0.0315	0.8	0.70	3	60	0.55	4.0	0.4	888522H0080
0.0394	1.0	0.85	3	60	0.70	5.0	0.5	888522H0100
0.0472	1.2	1.00	3	60	0.80	6.0	0.6	888522H0120
0.0590	1.5	1.30	3	60	1.00	7.5	0.75	888522H0150
0.0787	2.0	1.70	3	60	1.35	10.0	1.0	888522H0200
0.1180	3.0	2.60	6	75	2.00	15.0	1.5	888522H0300
0.1575	4.0	3.45	6	75	2.70	20.0	2.0	888522H0400
0.1969	5.0	4.30	6	75	3.40	25.0	2.5	888522H0500



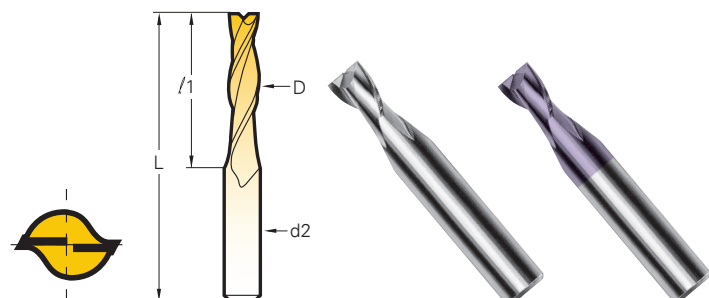
High Performance Micro-Milling



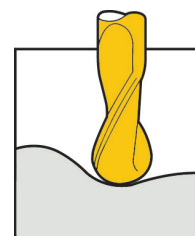
Applications: **Machining hard materials, abrasives composites, titanium and Hi-temp Alloys.**



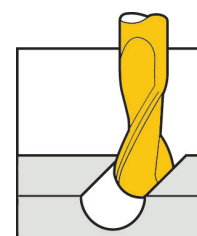
Ball End Series		L = 39mm d2 = 0.188 / 3mm $\angle = 1.5 \times D$			
Diameter (inch)	(mm)	$\angle 1$	r	magafor 8527	Hard'X 8527-H
0.0039	0.10	0.0039	0.0020	88852700100	-
0.0059	0.15	0.0079	0.0030	88852700150	-
0.0079	0.20	0.0118	0.0039	88852700200	-
0.0098	0.25	0.0138	0.0049	88852700250	-
0.0118	0.30	0.0177	0.0059	88852700300	888527H0030
0.0157	0.40	0.0236	0.0079	88852700400	888527H0040
0.0197	0.50	0.0295	0.0098	88852700500	888527H0050
0.0236	0.60	0.0354	0.0118	88852700600	888527H0060
0.0276	0.70	0.0413	0.0138	88852700700	888527H0070
0.0315	0.80	0.0472	0.0157	88852700800	888527H0080
0.0354	0.90	0.0531	0.0177	88852700900	888527H0090
0.0394	1.00	0.0591	0.0197	88852701000	888527H0100
0.0472	1.20	0.0709	0.0236	88852701200	888527H0120
0.0591	1.50	0.0886	0.0295	88852701500	888527H0150
0.0787	2.00	0.1181	0.0394	88852702000	888527H0200



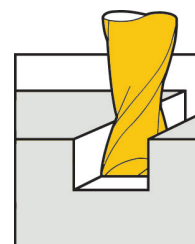
Square End Series		L = 39mm d2 = 3mm $\angle = 1.5 \times D$			
Diameter (inch)	(mm)	$\angle 1$		magafor 8507	Hard'X 8507-H
0.0039	0.10	0.0039		88850700100	-
0.0059	0.15	0.0079		88850700150	-
0.0079	0.20	0.0118		88850700200	-
0.0098	0.25	0.0138		88850700250	-
0.0118	0.30	0.0177		88850700300	888507H0030
0.0157	0.40	0.0236		88850700400	888507H0040
0.0197	0.50	0.0295		88850700500	888507H0050
0.0236	0.60	0.0354		88850700600	888507H0060
0.0276	0.70	0.0413		88850700700	888507H0070
0.0315	0.80	0.0472		88850700800	888507H0080
0.0354	0.90	0.0531		88850700900	888507H0090
0.0394	1.00	0.0591		88850701000	888507H0100
0.0433	1.10	0.0650		88850701100	888507H0110
0.0472	1.20	0.0709		88850701200	888507H0120
0.0512	1.30	0.0768		88850701300	888507H0130
0.0551	1.40	0.0827		88850701400	888507H0140
0.0591	1.50	0.0886		88850701500	888507H0150
0.0630	1.60	0.0945		88850701600	888507H0160
0.0669	1.70	0.1004		88850701700	888507H0170
0.0709	1.80	0.1063		88850701800	888507H0180
0.0748	1.90	0.1122		88850701900	888507H0190
0.0787	2.00	0.1181		88850702000	888507H0200



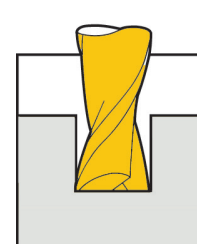
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Precise
Grooving
0 - 0.01mm



Precise
Grooving
R +/- 0.01mm



Flat Bottom
Boring

Engaged right from the start in the process aspiring to excellence, in addition to our Futura and TiN coatings, Magafor offers three "X" coatings, sprung from multi-layer nano technology.

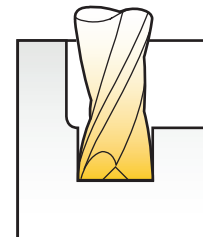
Hard'X [For hard milling] carbide tool coating has a high hardness (3500 HV) and shows a high thermic stability. It offers excellent protection against heat and wear and is ideal for dry machining-high speed cut-in treated steels and dies up to 67 Rc.

Graph'X [For composite milling] diamond coating (8000 HV) is particularly effective when machining graphite, composite materials, plastics with glass-fibers or carbon-fibers.

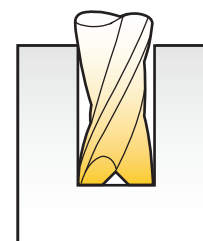
Standard Length Miniature End-mills

Standard Length Miniature End-Mills							
2-3 x D							
Diameter		/1	L	d2	magaforce 8500	Graph'X 8500-G	Hard'X 8500-H
(inch)	(mm)						
0.0020	0.05	0.004	1-1/2	0.118 3mm	88850000050		
0.0024	0.06	0.005			88850000060		
0.0031	0.08	0.006			88850000080		
0.0039	0.10	0.008			88850000100		
0.0047	0.12	0.009			88850000120		
0.0059	0.15	0.012			88850000150		
0.0079	0.20	0.020			88850000200		
0.0098	0.25	0.020			88850000250		
0.0118	0.30	0.039			88850000300	888500G0030	888500H0030
0.0138	0.35	0.039			88850000350		
0.0157	0.40	0.039			88850000400		
0.0177	0.45	0.039			88850000450		
0.0197	0.50	0.059			88850000500		
0.0216	0.55	0.059			88850000550		
0.0236	0.60	0.059			88850000600		
0.0256	0.65	0.059			88850000650		
0.0276	0.70	0.079			88850000700		
0.0295	0.75	0.079			88850000750		
0.0315	0.80	0.079			88850000800		
0.0335	0.85	0.079			88850000850		
0.0354	0.90	0.098			88850000900		
0.0374	0.95	0.098			88850000950		
0.0394	1.00	0.12			88850001000		
0.0413	1.05	0.12			88850001050		
0.0433	1.10	0.12			88850001100		
0.0452	1.15	0.12			88850001150		
0.0472	1.20	0.16			88850001200		
0.0492	1.25	0.16			88850001250		
0.0512	1.30	0.16			88850001300		
0.0551	1.40	0.16			88850001400		
0.0591	1.50	0.16			88850001500		
0.0630	1.60	0.20			88850001600		
0.0669	1.70	0.20			88850001700		
0.0709	1.80	0.20			88850001800		
0.0748	1.90	0.20			88850001900		
0.0787	2.00	0.20			88850002000		
0.0827	2.10	0.24			88850002100		
0.0866	2.20	0.24			88850002200		
0.0906	2.30	0.24			88850002300		
0.0945	2.40	0.24			88850002400		
0.0984	2.50	0.28			88850002500		
0.1024	2.60	0.28			88850002600		
0.1063	2.70	0.28			88850002700		
0.1102	2.80	0.28			88850002800		
0.1142	2.90	0.28			88850002900		
0.1181	3.00	0.39	1-3/4	0.157 4mm	88850003000	888500G0300	888500H0300
0.1220	3.10	0.39			88850003100		

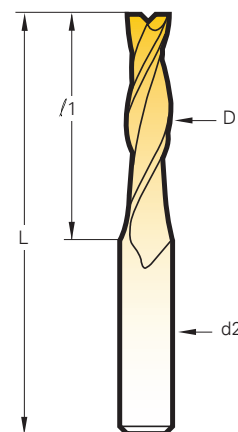
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Slotting
Engraving



Flat Bottom
Boring



K15 Carbide — 6.5 – 7% Cobalt
(0.006 – 0.008mm grain size)

Tolerances - inch

0 – 0.0004

Standard Length Miniature End-Mills



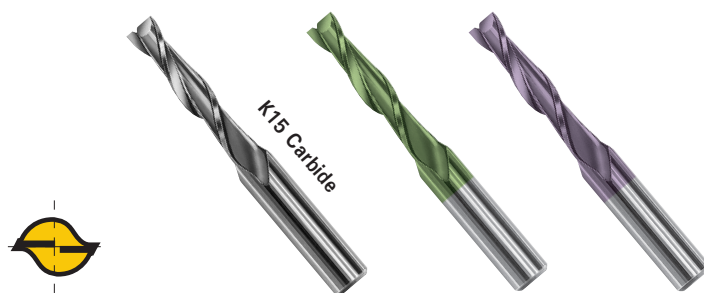
Continued from page 101

Standard Length Miniature End-Mills 2-3 x D							
Diameter (inch) (mm)		/1	L	d2	magaforce 8500	Graph'X 8500-G	Hard'X 8500-H
0.1260	3.20	0.39	1-3/4	0.157 4mm	88850003200	888500G0320	888500H0320
0.1299	3.30	0.39			88850003300	888500G0330	888500H0330
0.1339	3.40	0.39			88850003400	888500G0340	888500H0340
0.1378	3.50	0.39			88850003500	888500G0350	888500H0350
0.1417	3.60	0.39			88850003600	888500G0360	888500H0360
0.1457	3.70	0.39			88850003700	888500G0370	888500H0370
0.1496	3.80	0.39			88850003800	888500G0380	888500H0380
0.1535	3.90	0.39			88850003900	888500G0390	888500H0390
0.1575	4.00	0.47	1-1/2	0.118 3mm	88850004000	888500G0400	888500H0400
0.1614	4.10	0.47			88850004100	888500G0410	888500H0410
0.1654	4.20	0.47			88850004200	888500G0420	888500H0420
0.1693	4.30	0.47			88850004300	888500G0430	888500H0430
0.1732	4.40	0.47			88850004400	888500G0440	888500H0440
1.7720	4.50	0.47			88850004500	888500G0450	888500H0450
0.1811	4.60	0.47			88850004600	888500G0460	888500H0460
0.1850	4.70	0.47			88850004700	888500G0470	888500H0470
0.1890	4.80	0.47	2-3/16	0.236 6mm	88850004800	888500G0480	888500H0480
0.1929	4.90	0.47			88850004900	888500G0490	888500H0490
0.1969	5.00	0.55			88850005000	888500G0500	888500H0500
0.2008	5.10	0.55			88850005100	888500G0510	888500H0510
0.2047	5.20	0.55			88850005200	888500G0520	888500H0520
0.2087	5.30	0.55			88850005300	888500G0530	888500H0530
0.2126	5.40	0.55			88850005400	888500G0540	888500H0540
0.2165	5.50	0.55			88850005500	888500G0550	888500H0550
0.2205	5.60	0.55			88850005600	888500G0560	888500H0560
0.2244	5.70	0.55			88850005700	888500G0570	888500H0570
0.2283	5.80	0.55			88850005800	888500G0580	888500H0580
0.2323	5.90	0.55			88850005900	888500G0590	888500H0590

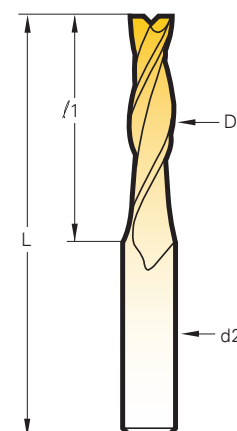


K15 Carbide

Long Miniature End-mills



Long Series K15 Carbide					
			d2 = 0.118 L = 39mm / = 5 x D		
Diameter (inch) (mm)		/1	magaforce 8509	Graph'X 8509-G	Hard'X 8509-H
0.0157	0.4	0.078	88850900400	888509G0040	888509H0040
0.0197	0.5	0.098	88850900500	888509G0050	888509H0050
0.0236	0.6	0.118	88850900600	888509G0060	888509H0060
0.0276	0.7	0.137	88850900700	888509G0070	888509H0070
0.0315	0.8	0.157	88850900800	888509G0080	888509H0080
0.0354	0.9	0.177	88850900900	888509G0090	888509H0090
0.0394	1.0	0.197	88850901000	888509G0100	888509H0100
0.0472	1.2	0.236	88850901200	888509G0120	888509H0120
0.0591	1.5	0.295	88850901500	888509G0150	888509H0150
0.0787	2.0	0.394	88850902000	888509G0200	888509H0200



Tolerances - inch

0 - 0.0004



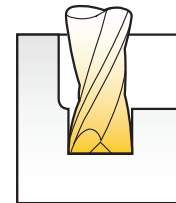
Extra-Long Miniature End-mills



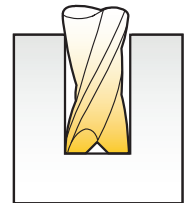
Extra-Long Series K15 Carbide

$l = 8 \times D$

Diameter		/1	L	d2	magaforce 8510	Graph'X 8510-G	Hard'X 8510-H
(inch)	(mm)						
0.0197	0.5	0.157	1-1/2	0.118 3 mm	88851000500	888510G0050	888510H0050
0.0236	0.6	0.197			88851000600	888510G0060	888510H0060
0.0315	0.8	0.236			88851000800	888510G0080	888510H0080
0.0394	1.0	0.315			88851001000	888510G0100	888510H0100
0.0472	1.2	0.354	1-3/4	0.157 4 mm	88851001200	888510G0120	888510H0120
0.0591	1.5	0.472			88851001500	888510G0150	888510H0150
0.0787	2.0	0.630			88851002000	888510G0200	888510H0200
0.0984	2.5	0.788	2-3/8	0.197 5 mm	88851002500	888510G0250	888510H0250
0.1181	3.0	0.945			88851003000	888510G0300	888510H0300



Slotting
Engraving

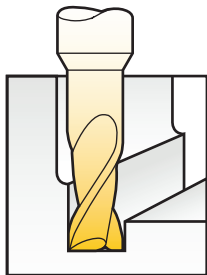


Flat Bottom
Boring

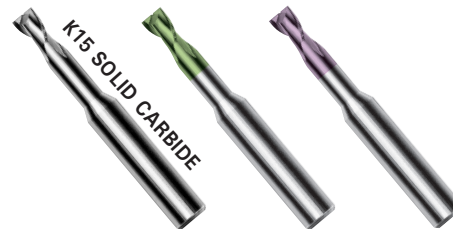
Tolerances - inch

0 - 0.0004

Miniature End-mills with Back Clearance



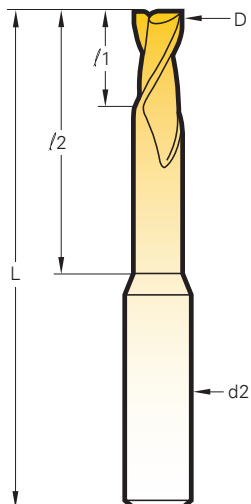
Hard to Reach
Machining



Long Neck Series $d2 = 0.188 / 3\text{mm}$

$d2 = 0.188 / 3\text{mm}$ /

Diameter x /2		/1	L	magaforce 8507-D	K15/Graph'X 8507-DG	K15/Hard'X 8507-DH
(inch)	(mm)					
0.0157 x 0.078	0.4 x 2	0.024	1-1/2	888507D0042	888507DG0042	888507DH0042
0.0197 x 0.078	0.5 x 2	0.027	1-1/2	888507D0052	888507DG0052	888507DH0052
0.0197 x 0.157	0.5 x 4	0.027	1-1/2	888507D0054	888507DG0054	888507DH0054
0.0197 x 0.236	0.5 x 6	0.027	2-3/8	888507D0056	888507DG0056	888507DH0056
0.0236 x 0.157	0.6 x 4	0.029	1-1/2	888507D0064	888507DG0064	888507DH0064
0.0276 x 0.157	0.7 x 4	0.035	1-1/2	888507D0074	888507DG0074	888507DH0074
0.0315 x 0.157	0.8 x 4	0.041	1-1/2	888507D0084	888507DG0084	888507DH0084
0.0315 x 0.236	0.8 x 6	0.041	1-1/2	888507D0086	888507DG0086	888507DH0086
0.0315 x 0.354	0.8 x 9	0.041	2-3/8	888507D0089	888507DG0089	888507DH0089
0.0354 x 0.236	0.9 x 6	0.053	1-1/2	888507D0096	888507DG0096	888507DH0096
0.0394 x 0.157	1.0 x 4	0.059	1-1/2	888507D0140	888507DG0140	888507DH0140
0.0394 x 0.236	1.0 x 6	0.059	1-1/2	888507D0160	888507DG0160	888507DH0160
0.0394 x 0.354	1.0 x 9	0.059	1-1/2	888507D0190	888507DG0190	888507DH0190
0.0394 x 0.472	1.0 x 12	0.059	2-3/8	888507D0112	888507DG0112	888507DH0112
0.0472 x 0.236	1.2 x 6	0.071	1-1/2	888507D0126	888507DG0126	888507DH0126
0.0472 x 0.354	1.2 x 9	0.071	1-1/2	888507D0129	888507DG0129	888507DH0129
0.0551 x 0.236	1.4 x 6	0.083	1-1/2	888507D0146	888507DG0146	888507DH0146
0.0551 x 0.354	1.4 x 9	0.083	1-1/2	888507D0149	888507DG0149	888507DH0149
0.0591 x 0.236	1.5 x 6	0.089	1-1/2	888507D0156	888507DG0156	888507DH0156
0.0591 x 0.354	1.5 x 9	0.089	1-1/2	888507D0159	888507DG0159	888507DH0159
0.0591 x 0.472	1.5 x 12	0.089	2-3/8	888507D01512	888507DG01512	888507DH01512
0.0709 x 0.354	1.8 x 9	0.106	1-1/2	888507D0189	888507DG0189	888507DH0189
0.0709 x 0.472	1.8 x 12	0.106	1-1/2	888507D01812	888507DG01812	888507DH01812
0.0787 x 0.354	2.0 x 9	0.118	1-1/2	888507D0290	888507DG0290	888507DH0290
0.0787 x 0.472	2.0 x 12	0.118	1-1/2	888507D0212	888507DG0212	888507DH0212
0.0787 x 0.590	2.0 x 15	0.118	2-3/8	888507D0215	888507DG0215	888507DH0215
0.0984 x 0.590	2.5 x 15	0.148	2-3/8	888507D02515	888507DG02515	888507DH02515





Performance Recommendations

- Endmills with long neck, extra-long neck, and deep machining: Reduce the speed, while maintaining the suggested feed.
- Superficial work: Increase the speed, while maintaining the suggested feed.

This chart lists general reference parameters for a starting point.

SFM: Surface Feet per Minute

RPM: Revolutions per Minute

IPT: Inches per Tooth (chip load)

IPM: Inches per Minute

IPR: Inches per Revolution

Speed Formula:

$$\text{RPM} = 3.82 \times (\text{SFM} \div \text{Diameter})$$

Feed:

$$\text{IPM} = \text{IPT} \times \# \text{ of Flutes} \times \text{RPM}$$

$$\text{IPR} = \text{IPM} \div \text{RPM}$$

$$\text{SFM} = \text{RPM} \times \text{Diameter} \div 3.82$$

Hard'X

Graph'X

Material	Diameter (inch - mm)	Speed SFM	RPM	IPT 2 Flute	IPM	Speed SFM	RPM	IPT 2 flute	IPM
Chromium / Cobalt	0.0197 - 0.5	82	15,900 - 28,504	0.0004	13 - 23	164	31,000 - 38,200	0.0004	25 - 30
	0.0394 - 1.0	~	7,950 - 14,252	0.0006	9.5 - 17	~	15,900 - 19,100	0.0006	19 - 23
	0.0787 - 2.0	147	3,980 - 7,135	0.0012	9.5 - 17	197	7,960 - 9,562	0.0012	19 - 23
	0.1575 - 4.0		1,989 - 3,565	0.0023	9 - 16		3,978 - 4,778	0.0023	18 - 22
Graphite, Plastic w/glass or carbon fibers	0.0197 - 0.5	197	38,200 - 57,203	0.0004	30 - 46	656	127,204 - 159,005	0.0004	102 - 127
	0.0394 - 1.0	~	19,100 - 28,602	0.0006	23 - 34	~	63,602 - 79,502	0.0006	76 - 95
	0.0787 - 2.0	295	9,562 - 14,189	0.0012	23 - 34	820	31,841 - 39,802	0.0012	76 - 95
	0.1575 - 4.0		4,778 - 7,155	0.0023	22 - 33		15,911 - 19,888	0.0023	73 - 91
Steel 24 ~ 44 Hrc	0.0394 - 1.0	~	12,700 - 15,900	0.0003	7.5 - 9.5				
	0.0787 - 2.0	164	6,359 - 7,960	0.0007	9-11				
	0.1575 - 4.0		3,177 - 3,978	0.0014	9-11				
Treated Steel 45 ~ 55 Hrc	0.0197 - 0.5	98	19,003 - 22,300	0.0001	3.8 - 4.5				
	0.0394 - 1.0	~	9,502 - 11,150	0.0002	3.8 - 4.5				
	0.0787 - 2.0	115	4,757 - 5,582	0.0004	3.8 - 4.5				
	0.1575 - 4.0		2,377 - 2,789	0.0008	3.8 - 4.5				
Treated Steel > 55 Hrc	0.0197 - 0.5	49	9,502 - 11,798	0.00006	1.1 - 1.4				
	0.0394 - 1.0	~	4,750 - 6,399	0.00015	1.4 - 1.9				
	0.0787 - 2.0	66	2,378 - 3,204	0.00024	1.1 - 1.5				
	0.1575 - 4.0		1,188 - 1,600	0.00055	1.3 - 1.8				
Stainless Steel	0.0197 - 0.5	131	25,400 - 31,000	0.0002	10 - 12				
	0.0394 - 1.0	~	12,700 - 15,900	0.0004	10 - 13				
	0.0787 - 2.0	164	6,359 - 7,960	0.0008	10 - 13				
	0.1575 - 4.0		3,177 - 3,978	0.0019	12 - 15				
Super alloys Inconel / Waspaloy	0.0197 - 0.5	59	11,440 - 15,900	0.00004	1 - 1.3				
	0.0394 - 1.0	~	5,720 - 7,950	0.00012	1.4 - 1.9				
	0.0787 - 2.0	82	2,864 - 3,980	0.00016	1 - 1.3				
	0.1575 - 4.0		1,431 - 1,989	0.00032	1 - 1.3				
Titanium / Ti-alloy	0.0197 - 0.5	65	12,604 - 19,003	0.00008	2 - 3				
	0.0394 - 1.0	~	6,302 - 9,502	0.00024	3 - 4.5				
	0.0787 - 2.0	98	3,155 - 4,757	0.00032	2 - 3				
	0.1575 - 4.0		1,577 - 2,377	0.00059	1.9 - 2.8				
Ceramics	0.0197 - 0.5	229	44,405 - 57,203	0.0004	35 - 46				
	0.0394 - 1.0	~	22,203 - 28,602	0.0008	35 - 46				
	0.0787 - 2.0	295	11,115 - 14,189	0.0016	35 - 45				
	0.1575 - 4.0		5,554 - 7,155	0.0031	34 - 44				
Aluminum other plastics	0.0197 - 0.5	328	63,602 - 95,403	0.0004	51 - 76				
	0.0394 - 1.0	~	31,801 - 47,702	0.0006	38 - 57				
	0.0787 - 2.0	492	15,920 - 23,881	0.0012	38 - 57				
	0.1575 - 4.0		7,955 - 11,933	0.0023	36 - 55				
Copper / Brass / Bronze	0.0197 - 0.5	164	31,000 - 50,804	0.0004	25 - 41				
	0.0394 - 1.0	~	15,900 - 25,402	0.0006	19 - 30				
	0.0787 - 2.0	262	7,960 - 12,717	0.0012	19 - 30				
	0.1575 - 4.0		3,978 - 6,355	0.0023	18 - 29				

Notes

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