

SPECIAL ? STANDARD MAGAFOR !

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 0.40 diameter micro end-mill is available in 26 different lengths and styles! **Who offers more ?** Styles, materials and lengths vary within each specific range of tooling to offer you the widest selection.

To detect the needs created by new technologies - To analyze and compare the totality of the special tools which are required of us - To compare with the heavy tendencies of the market - Such are the studies undertaken by **magafor** to **offer a standard answer, available with specific expectations of the most demanding customers.**

MINIATURE TOOLING



MICRO-NC SPOT DRILLS :
Pages 15-17

MICRO END-MILLS
Pages 30-34

MICRO-REAMERS
Pages 36-41

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 for the greatest profit margins for our customers.

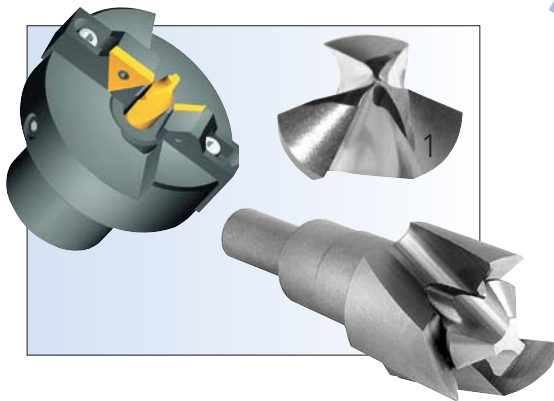


PRODUCTIVITY

COMBINED MACHINING :
Pages 13-14

MULTI-FUNCTION TOOLS
Page 28-29

These new concepts reduce the machining time, number of tools and the number of set-ups.



PERFORMANCE

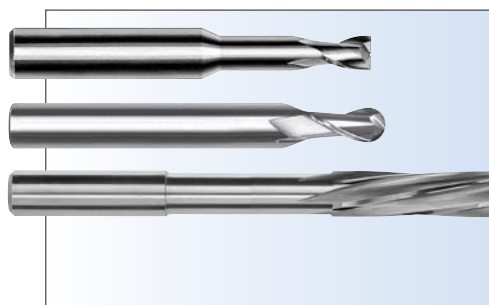
In our constant quest for excellence, **magafor** offers a new **X-coating** for solid carbide high production tooling.

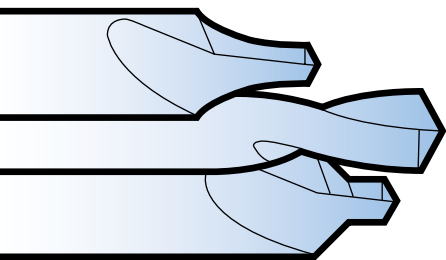
Hard'X : AlTiN with a high hardness (3,700 Hv), this coating shows a high thermic stability and an excellent protection against heat and wear. Ideal for dry machining - high speed cutting - in treated steels and dies. The higher concentration of aluminum in the coating creates for a lower friction coefficient providing greater tool life than traditional TiAlN offerings.

PRECISION

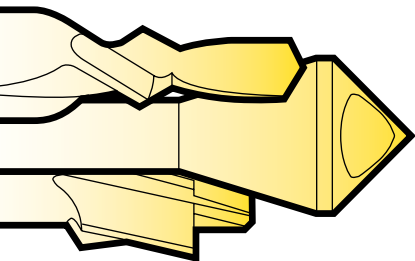
MICRO END-MILLS available at every .0020" increment from Ø .0020" to Ø .2323" :
Pages 30-31

HIGH PRECISION MICRO REAMERS available at every .0002" increment from Ø .0078" to Ø .0236" and every .0004 increment from .0240" to .7882" :
Pages 36-41.

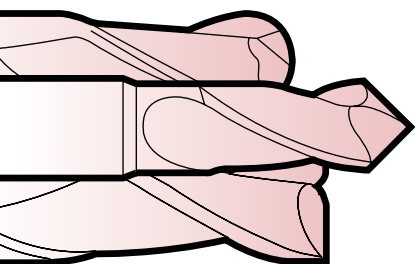




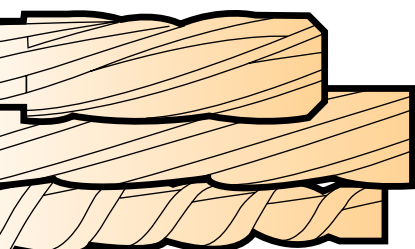
CENTERING-SPOTTING
COMBINED MACHINING
Page 4



COUNTERSINKING
COUNTERBORING
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MULTI-FUNCTION TOOLS
MICRO-MILLING
Page 28



REAMING
Page 36



EDP NUMBERING SYSTEM

EDP # 86000181 - 1.81 mm

Solid Carbide High Precision Micro Reamer

86000181
A B

A = Series # - 8600 *Series # 8600 refers to Solid Carbide High Precision Micro Reamers*

B = Size - 1.81 mm *Size 0181 refers to 1.81 mm*

SERIES INDEX

Code	Page	Code	Page	Code	Page	Code	Page
0280	12	16	7	436	25	8203-H	27
0285	12	185	6	437	24	8431	25
0287	12	191	17	438	26	8431-H	25
0288	12	195	16	439	26	8500	30-31
0290	7, 13	196	16	4811	20	8500-G	30-31
0291	13	197	17	4821	23	8500-H	30-31
0292	13	199	17	4822	22	8507-D	32
0811	8	201	27	4824	22	8507-DG	32
08115	5	202	27	4831	24	8507-DH	32
0890	7, 13	203	27	4832	26	8510	32
0891	13	2901	27	4834	26	8510-G	32
0895	16	2903	27	4837	24	8510-H	32
0896	16	411	20	4933	25	8522-H	35
0910	8	412	21	4936	25	8527-D	34
09105	5	413	21	8040	28	8527-DG	34
0995	16	414	21	8088	28	8527-DH	34
0996	16	415	21	8088-H	28	8527-L	34
10	8	416	20	8090	28	8529	33
105	8	421	23	8090-H	28	8529-G	33
1055	5	422	22	8092	28	8529-H	33
11	7	423	23	8092-H	28	8555	35
114	6	424	22	8100	8	8600	38-41
115	5	425	23	8100-H	8	8610	37
124	11	430	26	8190-H	15	R-04	14
125	11	4303	25	8195	15	R-10	14
134	10	431	24	8195-H	15	R-11	14
135	10	432	26	8196	15	R-15	14
145	9	433	26	8196-H	15	R-16	14
154	6	434	26	8197	17	R-20	14
155	6	435	26	8199	17		

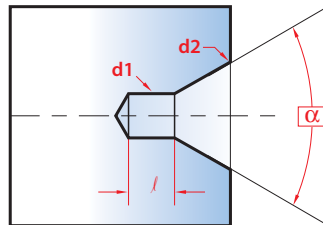
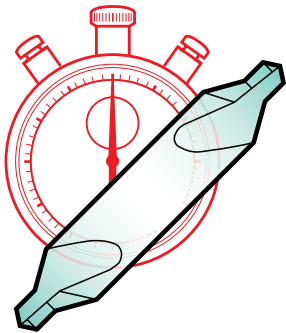
MATERIALS USED IN THE MANUFACTURE OF OUR TOOLS

DESIGNATION

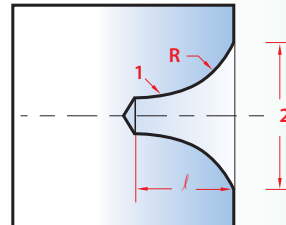
magafor	europaen	american	japanese
HSS	HSS	M2	SKH-51
HSS-E COBALT	HSS-E	M35	SKH-55
HSS-E 8% COBALT	HSS-E8	M42	SKH-59
TiN	TiN	TiN	TiN
Futura	TiAlN	TiAlN	TiAlN
Hard'X	AlTiN	(Exceed)	
Graph'X	Diamond coating		
K15 CARBIDE			

"Special"

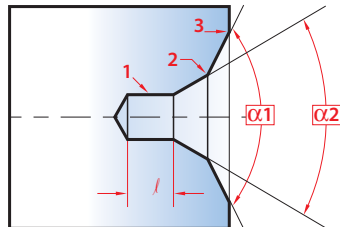
Our stock of semi-finished tools offers the advantage to manufacture many specials. With your inquiries, please fill out the appropriate sketch to your centering operation.



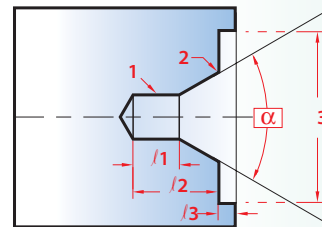
d1 = $\backslash$ =
d2 = α =



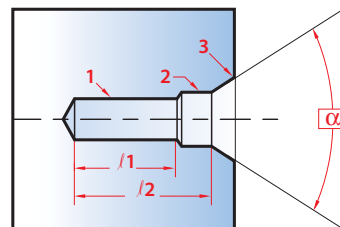
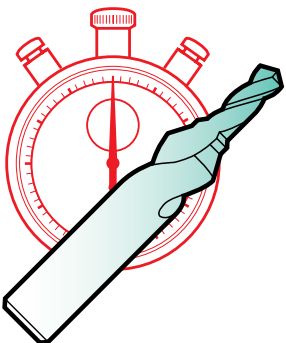
d1 = R =
d2 = $\backslash$ =



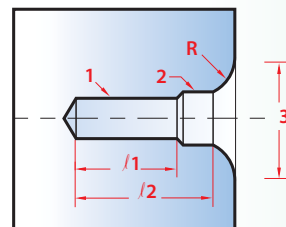
d1 = $\backslash$ =
d2 = $\alpha 1$ =
d3 = $\alpha 2$ =



d1 = $\backslash 1$ =
d2 = $\backslash 2$ =
d3 = $\backslash 3$ =
 α =



d1 = $\backslash 1$ =
d2 = $\backslash 2$ =
d3 = α =



d1 = R =
d2 = $\backslash 1$ =
d3 = $\backslash 2$ =

1 Material to bore _____

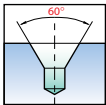
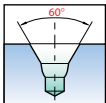
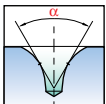
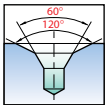
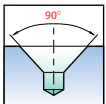
2 Number of tools _____

3 Special tolerance _____

Name and address

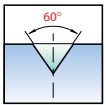
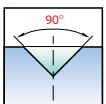
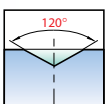


CENTERING

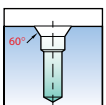
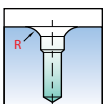
FORMS		RIGHT HAND CUT			LEFT HAND CUT
		SHORT	WITH FLAT	LONG	
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	W	Page 9			
	R	Page 11	Page 13	Page *	Page *
	B	Page 10	Page 13	Page *	Page *
	82° 90°	Page 6		Page *	Page *

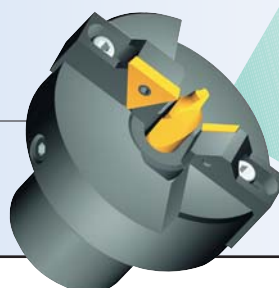
USING
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SPOTTING

	60°	Page 16		
	90°	Pages 15-16	Page 17	Page *
	120° 140°	Pages 15-16	Page 17	Page *

COMBINED MACHINING

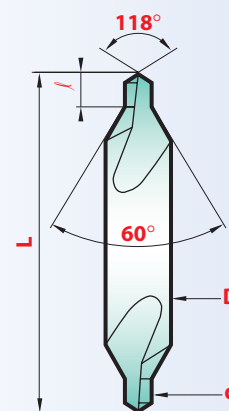
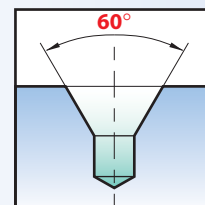
	A	Pages 13-14
	R	Pages 13-14



modul-R
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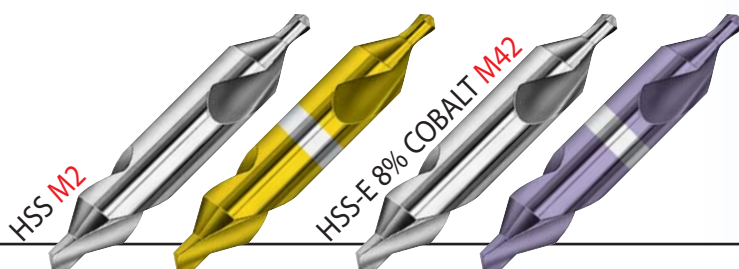
* Call for information

PLAIN TYPE 60° CENTER DRILLS Sizes in inches



Tool Diameters	D	d	Angle	
			60°	118°
.010 - 7/64	n/a	+ .0039		
1/8 - 7/32	-.0007	+ .0047		
1/4 - 3/8	-.0009	+ .0059	- 30'	± 2°
7/16 - 5/8	-.0011	n/a		
3/4 - 1	-.0013	n/a		

Tolerances



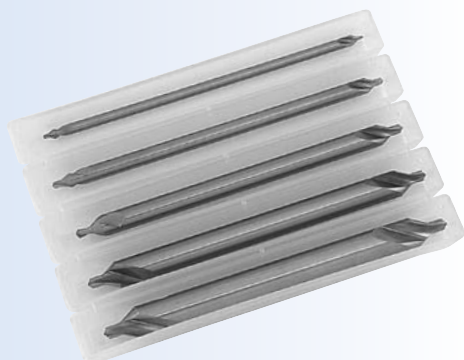
SIZE	D	d	L	I	115	TIN 08115	Cobalt + 1055	futura 091055
00000	1/8	.010	1-1/4	.008 - .018			1055005*	091055005*
0000	1/8	.015	1-1/4	.014 - .025			1055004*	091055004*
000	1/8	.020	1-1/4	.020 - .032	1150001	08115001	1055001*	091055001*
00	1/8	.025	1-1/4	.028 - .040	1150002	08115002	1055002*	091055002*
0	1/8	1/32	1-1/4	.035 - .047	1150003	08115003	1055003*	091055003*
1	1/8	3/64	1-1/4	.055 - .067	1150100	08115010	1055010	091055010
2	3/16	5/64	1-7/8	.095 - .106	1150200	08115020	1055020	091055020
3	1/4	7/64	2	.130 - .154	1150300	08115030	1055030	091055030
4	5/16	1/8	2-1/8	.150 - .175	1150400	08115040	1055040	091055040
4-1/2	3/8	9/64	2-1/2	.170 - .193	1150450	08115045		
5	7/16	3/16	2-3/4	.230 - .256	1150500	08115050	1055050	091055050
6	1/2	7/32	3	.270 - .295	1150600	08115060	1055060	091055060
7	5/8	1/4	3-1/4	.315 - .340	1150700	08115070	1055070	091055070
8	3/4	5/16	3-1/2	.390 - .420	1150800	08115080	1055080	091055080
9	7/8	11/32	3-5/8	.430 - .460	1150900	08115090		
10	1	3/8	3-3/4	.475 - .500	1151000	08115100		

* Single end tool

Longs



SIZE	D	d	L	185
1 x 3"	1/8	3/64	3	1850103
1 x 4"			4	1850104
1 x 5"			5	1850105
1 x 6"			6	1850106
2 x 3"	3/16	5/64	3	1850203
2 x 4"			4	1850204
2 x 5"			5	1850205
2 x 6"			6	1850206
3 x 3"	1/4	7/64	3	1850303
3 x 4"			4	1850304
3 x 5"			5	1850305
3 x 6"			6	1850306
4 x 3"	5/16	1/8	3	1850403
4 x 4"			4	1850404
4 x 5"			5	1850405
4 x 6"			6	1850406
4-1/2 x 4"	3/8	9/64	4	1850454
4-1/2 x 5"			5	1850455
4-1/2 x 6"			6	1850456
5 x 4"	7/16	3/16	4	1850504
5 x 5"			5	1850505
5 x 6"			6	1850506
6 x 4"	1/2	7/32	4	1850604
6 x 5"			5	1850605
6 x 6"			6	1850606
7 x 5"	5/8	1/4	5	1850705
7 x 6"			6	1850706
8 x 6"	3/4	5/16	6	1850806



SET OF 5 DRILLS / L = 4"

COMPOSITION magafor 185

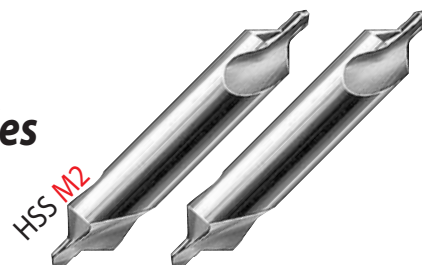
1 - 2 - 3 - 4 - 5 1 piece of each



British Standard

BS #	D	d	L	\	magafor 114
1	1/8	3/64	1-1/2	.060 - .070	1140100
2	3/16	1/16	1-3/4	.078 - .095	1140200
3	1/4	3/32	2	.114 - .135	1140300
4	5/16	1/8	2-1/8	.150 - .175	1140400
5	7/16	3/16	2-1/2	.245 - .275	1140500
6	5/8	1/4	3	.320 - .350	1140600
7	3/4	5/16	3-1/2	.390 - .425	1140700

82° - 90° Angles



SIZE	D	d	L	\	Angle 82°	90°
					154	155
1	1/8	3/64	1-1/4	.055 - .067	1540100	1550100
2	3/16	5/64	1-7/8	.095 - .106	1540200	1550200
3	1/4	7/64	2	.130 - .154	1540300	1550300
4	5/16	1/8	2-1/8	.150 - .175	1540400	1550400
5	7/16	3/16	2-3/4	.230 - .256	1540500	1550500
6	1/2	7/32	3	.270 - .295	1540600	1550600
7	5/8	1/4	3-1/4	.315 - .340	1540700	1550700
8	3/4	5/16	3-1/2	.390 - .420	1540800	1550800



METRIC CENTER DRILLS 60° Angle Form A

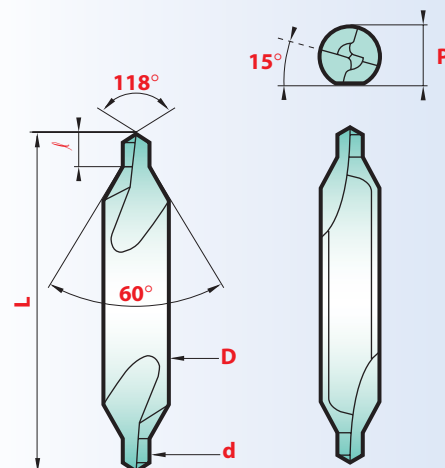
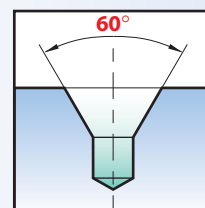
CENTERING

ISO • NFE 66051-A • DIN 333-A • JIS-1

TYPE			Right hand	Left hand	With flat, right hand		
D x d	L	\	11	16	P -0,1	Cobalt 0290	TIN 0890
3,0 x 0,5	31	0,6 - 0,9	1103000050				
3,15 x 0,5 *	25	0,6 - 0,9	1103150050	1603150050			
3,15 x 0,63 *	25	0,7 - 1,0	1103150063	1603150063			
3,15 x 0,8 *	25	1,0 - 1,3	1103150080	1603150080			
3,15 x 1,0	31	1,3 - 1,7	1103150100	1603150100			
3,15 x 1,25	31	1,6 - 2,0	1103150125	1603150125			
3,5 x 0,75	35	1,0 - 1,3	1103500075	1603500075			
4,0 x 1,0	35	1,3 - 1,7	1104000100	1604000100			
4,0 x 1,25	35	1,6 - 2,0	1104000125	1604000125			
4,0 x 1,6	35	2,0 - 2,6	1104000160	1604000160	3,25	02900400160	08900400160
5,0 x 1,5	40	2,0 - 2,6	1105000150	1605000150			
5,0 x 1,6	40	2,0 - 2,6	1105000160	1605000160			
5,0 x 2,0	40	2,5 - 3,1	1105000200	1605000200	4,20	02900500200	08900500200
6,0 x 2,0	45	2,5 - 3,1	1106000200	1606000200			
6,3 x 2,0	45	2,5 - 3,1	1106300200	1606300200			
6,3 x 2,5	45	3,1 - 3,8	1106300250	1606300250	5,35	02900630250	08900630250
8,0 x 2,5	50	3,1 - 3,8	1108000250	1608000250			
8,0 x 3,0	50	3,9 - 4,6	1108000300	1608000300			
8,0 x 3,15	50	3,9 - 4,6	1108000315	1608000315	6,95	02900800315	08900800315
10,0 x 3,0	55	3,9 - 4,6	1110000300	1610000300			
10,0 x 3,15	55	3,9 - 4,6	1110000315	1610000315			
10,0 x 4,0	55	5,0 - 5,9	1110000400	1610000400	8,40	02901000400	08901000400
12,0 x 4,0	63	5,0 - 5,9	1112000400	1612000400			
12,0 x 5,0	63	6,3 - 7,2	1112000500	1612000500			
12,5 x 4,0	63	5,0 - 5,9	1112500400	1612500400			
12,5 x 5,0	63	6,3 - 7,2	1112500500	1612500500	10,95	02901250500	08901250500
14,0 x 5,0	69	6,3 - 7,2	1114000500	1614000500			
16,0 x 5,0	71	6,3 - 7,2	1116000500	1616000500			
16,0 x 6,3	71	8,0 - 8,9	1116000630	1616000630	14,00	02901600630	08901600630
18,0 x 6,0	77	8,0 - 8,9	1118000600				
20,0 x 6,3	80	8,0 - 8,9	1120000630				
20,0 x 8,0	80	10,1 - 11,1	1120000800	1620000800	17,90	02902000800	08902000800
25,0 x 8,0	100	10,1 - 11,1	1125000800				
25,0 x 10,0	100	12,8 - 13,8	1125001000		22,50	02902501000	08902501000
31,5 x 10,0	125	12,8 - 13,8	1131501000				
31,5 x 12,5	125	16,5 - 17,5	1131501250				

* Single end

NOTE :
all metric center drills are
available within 2 weeks.
Call for information.



D	d	L	Angles	
			60°	118°
h8	k12	±1	-30'	±2°

Tolerances

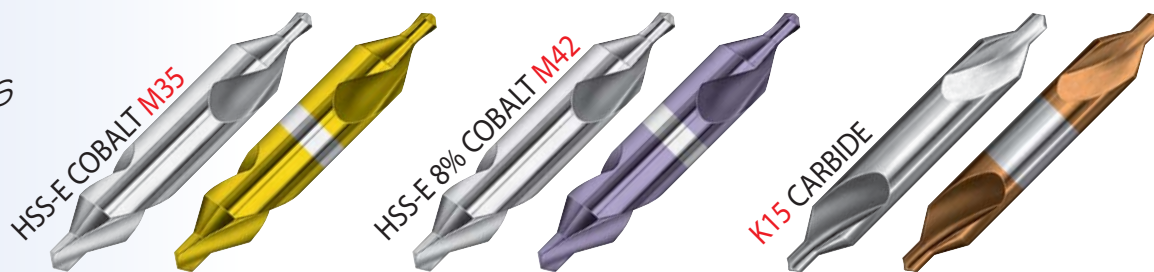
The **magafor** center drills
are particularly effective thanks
to their unique ground spiral flutes.



MODUL-R

Center drills with flat
for the combination
of centering-facing.
Pages 13-14

Performances



ISO • NFE 66051-A • DIN 333-A • JIS-1

D x d	L	\	magafor 10	TIN 0811	cobalt 105	futura 0910	carbide 8100	Hard'X 8100-H
3,15 x 0,5 *	25	0,6 - 0,9		08110315050			81000315050	81000315050-H
3,15 x 0,8 *	25	1,0 - 1,3		08110315080			81000315080	81000315080-H
3,15 x 1,0	31	1,3 - 1,7	100315100	08110315100	1050315100	0910315100	81000315100	81000315100-H
3,15 x 1,25	31	1,6 - 2,0	100315125	08110315125	1050315125	0910315125	81000315125	81000315125-H
3,5 x 0,75	35	1,0 - 1,3	100350075	08110350075				
4,0 x 1,0	35	1,3 - 1,7	100400100	08110400100			81000400100	81000400100-H
4,0 x 1,6	35	2,0 - 2,6	100400160	08110400160	1050400160	0910400160	81000400160	81000400160-H
5,0 x 1,5	40	2,0 - 2,6	100500150	08110500150			81000500150	81000500150-H
5,0 x 2,0	40	2,5 - 3,1	100500200	08110500200	1050500200	0910500200	81000500200	81000500200-H
6,0 x 2,0	45	2,5 - 3,1	100600200	08110600200			81000600200	81000600200-H
6,3 x 2,5	45	3,1 - 3,8	100630250	08110630250	1050630250	0910630250	81000630250	81000630250-H
8,0 x 2,5	50	3,1 - 3,8	100800250	08110800250			81000800250	81000800250-H
8,0 x 3,0	50	3,9 - 4,6	100800300	08110800300			81000800300	81000800300-H
8,0 x 3,15	50	3,9 - 4,6	100800315	08110800315	1050800315	0910800315	81000800315	81000800315-H
10,0 x 3,0	55	3,9 - 4,6	101000300	08111000300			81001000300	81001000300-H
10,0 x 4,0	55	5,0 - 5,9	101000400	08111000400	1051000400	0910000400	81001000400	81001000400-H
12,0 x 4,0	63	5,0 - 5,9	101200400	08111200400				
12,0 x 5,0	63	6,3 - 7,2	101200500	08111200500			81001200500	81001200500-H
12,5 x 5,0	63	6,3 - 7,2	101250500	08111250500	1051250500	0910250500	81001250500	81001250500-H
14,0 x 5,0	69	6,3 - 7,2	101400500	08111400500				
16,0 x 6,3	71	8,0 - 8,9		08111600630			81001600630	81001600630-H
20,0 x 8,0	80	10,1 - 11,1		08112000800				

* Single end

NOTE :
all metric center drills are available
within 2 weeks.
Call for information.

All in one !



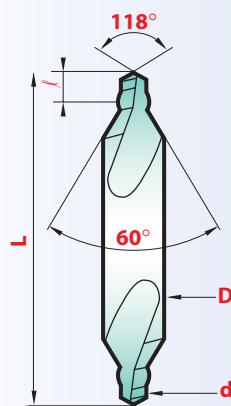
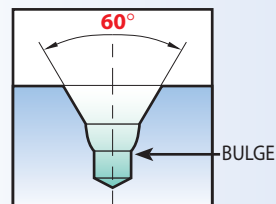
15 PIECES		SETS 5 PIECES	
COMPOSITION Quantity	115/15	COMPOSITION Quantity	115
3 pieces each	# 1	1 piece each	# 1
	# 2		# 2
	# 3		# 3
	# 4		# 4
2 pieces	# 4-1/2		# 5
1 piece	# 5		



magafor "UNIQUE" CENTER DRILLS With reinforcing bulge Form W

PLAIN TYPE WITH BULGE

SIZE	D	d	L	\	145
1 - W	1/8	3/64	1-1/4	.055 - .067	1450100
2 - W	3/16	5/64	1-7/8	.095 - .106	1450200
3 - W	1/4	7/64	2	.130 - .154	1450300
4 - W	5/16	1/8	2-1/8	.150 - .175	1450400
5 - W	7/16	3/16	2-3/4	.230 - .256	1450500
6 - W	1/2	7/32	3	.270 - .295	1450600
7 - W	5/8	1/4	3-1/4	.315 - .340	1450700
8 - W	3/4	5/16	3-1/2	.390 - .420	1450800



The **magafor** center drill form W is stronger than common center drill :

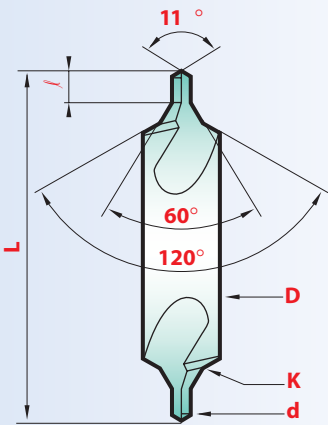
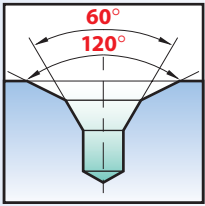
- the bulge reinforces the point,
- it increases the chips removal,
- it makes the lubrication of the drill easier.

Tool Diameters	D	d	Angle
			60° 118°
.010 - 7/64	n/a	+ .0039	
1/8 - 7/32	- .0007	+ .0047	
1/4 - 3/8	- .0009	+ .0059	- 30' ± 2°
7/16 - 5/8	- .0011	n/a	
3/4 - 1	- .0013	n/a	

SETS American Standard 5 PIECES

COMPOSITION	Quantity
	145
1 piece each	# 1
	# 2
	# 3
	# 4
	# 5

BELL TYPE CENTER DRILLS With saved angle Form B



SETS American Standard 5 PIECES

COMPOSITION Quantity	135
1 piece each	# 1
	# 2
	# 3
	# 4
	# 5

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.

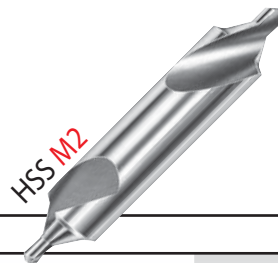


SIZE	D	d	K	L	\	135
11	1/8	3/64	.100	1-1/4	.055 - .070	1351100
12	3/16	1/16	.150	1-7/8	.070 - .090	1351200
13	1/4	3/32	.200	2	.110 - .135	1351300
14	5/16	7/64	.250	2-1/8	.125 - .155	1351400
15	7/16	5/32	.350	2-3/4	.185 - .215	1351500
16	1/2	3/16	.400	3	.230 - .260	1351600
17	5/8	7/32	.500	3-1/4	.270 - .300	1351700
18	3/4	1/4	.600	3-1/2	.310 - .340	1351800
19	7/8	5/16	.700	3-5/8	.390 - .420	1351900
20	1	3/8	.800	3-3/4	.470 - .500	1352000

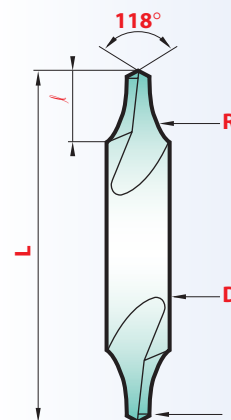
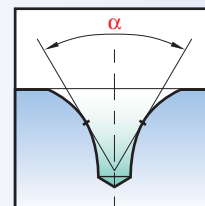
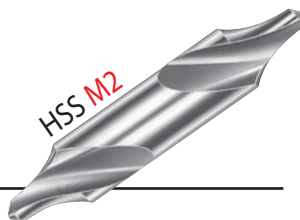


British Standard

BS #	D	d	K	L	\	magafor 134
1 - B	1/8	3/64	.075	1-1/2	.060 - .080	1340100
2 - B	3/16	1/16	.110	1-3/4	.075 - .095	1340200
3 - B	1/4	3/32	.150	2	.130 - .155	1340300
4 - B	5/16	7/64	.190	2-1/4	.160 - .185	1340400
5 - B	7/16	5/32	.260	2-1/2	.220 - .250	1340500
6 - B	5/8	7/32	.375	3	.300 - .330	1340600
7 - B	3/4	1/4	.450	3-1/2	.360 - .400	1340700



RADIUS TYPE CENTER DRILLS Form R



ASA #	D	d	L	R	\	magafor 125
1 - R	1/8	3/64	1-1/4	.150	.125 - .150	1250100
2 - R	3/16	5/64	1-7/8	.230	.200 - .225	1250200
3 - R	1/4	7/64	2	.315	.270 - .300	1250300
4 - R	5/16	1/8	2-1/8	.400	.340 - .370	1250400
5 - R	7/16	3/16	2-3/4	.500	.480 - .510	1250500
6 - R	1/2	7/32	3	.530	.540 - .575	1250600
7 - R	5/8	1/4	3-1/4	.700	.660 - .700	1250700
8 - R	3/4	5/16	3-1/2	.790	.810 - .850	1250800



British Standard

BS #	D	d	L	R	\	magafor 124
1 - R	1/8	3/64	1-1/2	.125	.125 - .145	1240100
2 - R	3/16	1/16	1-3/4	.200	.185 - .205	1240200
3 - R	1/4	3/32	2	.250	.245 - .270	1240300
4 - R	5/16	1/8	2-1/8	.315	.310 - .335	1240400
5 - R	7/16	3/16	2-3/4	.400	.430 - .470	1240500

Tool Diameters	D	d	R max
.010 - 7/64	n/a	+ .0039	
1/8 - 7/32	- 0.0007	+ .0047	
1/4 - 3/8	- 0.0009	+ .0059	1.25 R
7/16 - 5/8	- 0.0011	n/a	
3/4 - 1	- 0.0013"	n/a	

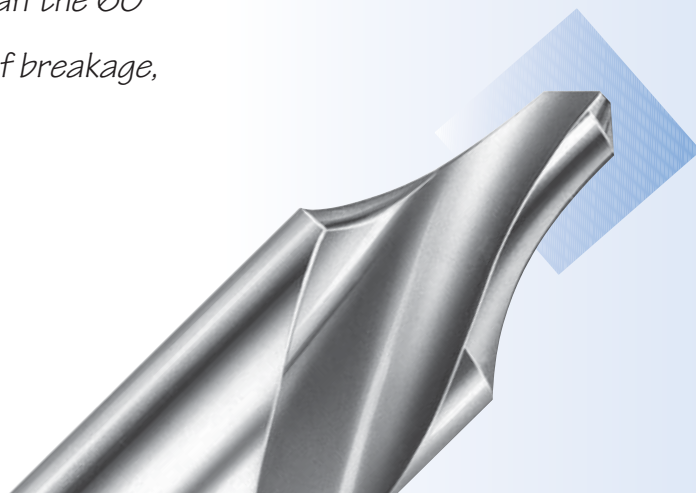
Tolerances

SETS American Standard 5 PIECES

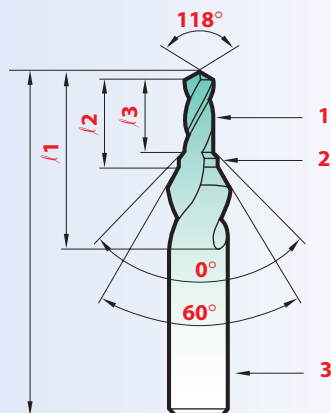
COMPOSITION Quantity	125
1 piece each	# 1
	# 2
	# 3
	# 4
	# 5

magafor center drill with radius, thanks to its special profile, is more robust than the 60° center drill :

- the radius eliminates the risk of breakage,
- it provides an exact bearing,

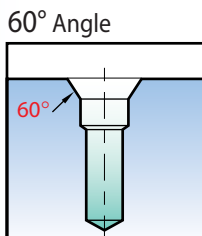


METRIC CENTER DRILLS for threaded holes



d1	d2	d3	L	Angles	
				60°	90°
h8	+0,1	h7	±1	-30'	±1°

Tolerances



DIN 332/2 • FORM D

Ø SCREW	d1	d2	d3	L	\1	\2	\3	Without flat	With flat	
								Cobalt 0285	P -0,1	Cobalt 0280
M3	2,5	3,2	6,0	55	18	9,0	8	0285030		
M4	3,3	4,3	8,0	63	23	12,6	11	0285040	6,75	0280040
M5	4,2	5,3	10,0	67	27	15,1	13	0285050	8,45	0280050
M6	5,0	6,4	12,5	71	33	18,9	16	0285060	10,45	0280060
M8	6,8	8,4	14,0	88	41	23,0	19	0285080	12,50	0280080
M10	8,5	10,5	16,0	90	47	27,7	23	0285100	14,85	0280100
M12	10,2	13,0	20,0	105	59	34,5	28	0285120	18,45	0280120
M16	14,0	17,0	25,0	132	67	41,3	33		23,40	0280160
M20	17,5	21,0	31,5	145	77	48,3	38		29,35	0280200
M24	21,0	25,0	40,0	160	90	57,0	45		36,50	0280240



Center drills for threaded spindles are designed to do the following in a single operation :

- make the preliminary tap hole,
- make the tap entrance,
- do the centering.

Main use : to center or to bore the shafts of electric motors, pumps, speed-reducing gear.

The drills **0280** and **0288** have also the following :

- a flat area for carbide insert,
- two grooves for oil.

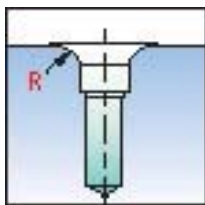
Can be used with **modul-R**



MODUL-R

Center drills with flat for the combination of centering-facing.
Pages 13-14

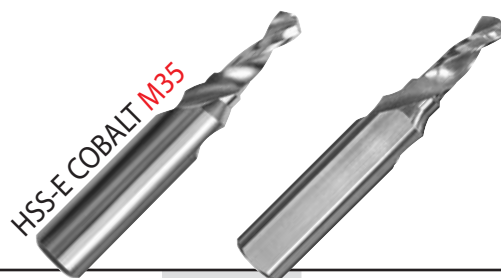
WITH RADIUS



DIN 332/2 • FORM DR

Ø SCREW	d1	d2	d3	L	\1	\2	\3	R*	Cobalt 0287	P - 0,1	Cobalt 0288
M4	3,3	4,3	8,0	63	23	12,6	11	4	0287040	6,75	0288040
M5	4,2	5,3	10,0	67	27	15,1	13	6	0287050	8,45	0288050
M6	5,0	6,4	12,5	71	33	18,9	16	8	0287060	10,45	0288060
M8	6,8	8,4	14,0	88	41	23,0	19	10	0287080	12,50	0288080
M10	8,5	10,5	16,0	90	47	27,7	23	14	0287100	14,85	0288100
M12	10,2	13,0	20,0	105	59	34,5	28	16	0287120	18,45	0288120

* R max = 1,25 R



NOTE:

all metric center drills are available within 2 weeks.
Call for information.

modul-R

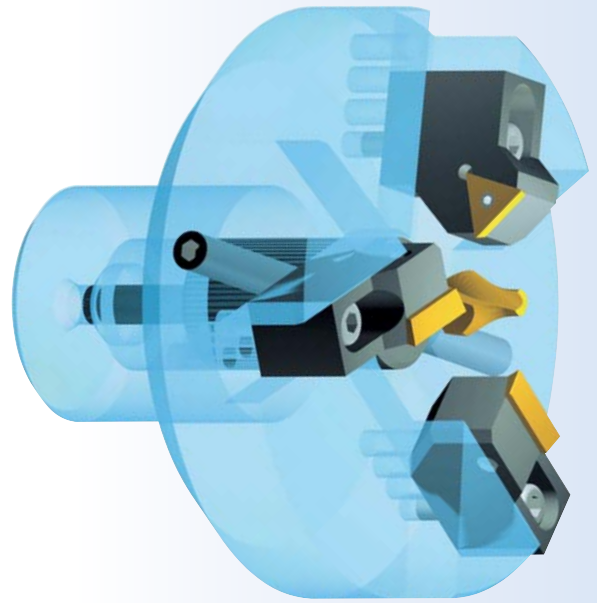
CENTERING HEADS

The new **modul-R** center head allows to center, to face and to chamfer the surface at the same time :

- constant depth of the centers,
- reduced machining times,
- less tools and change of tools,
- simple, rigid concept designed for middle and large series,
- inexpensive even for small series.

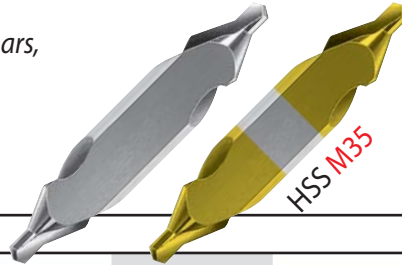
Application : for machining the ends of bars, axles, shafts and tubes.

Capacity : flexible modular system for centers into bars from 1/4" to 2".



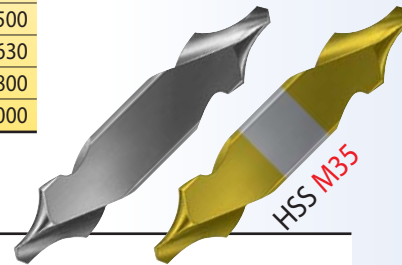
METRIC PLAIN TYPE CENTER DRILLS

D x d	L	\	FLAT	Cobalt 0290	TIN 0890
4,0 x 1,6	35	1,0 - 2,4	3,25	02900400160	08900400160
5,0 x 2,0	40	2,5 - 2,9	4,20	02900500200	08900500200
6,3 x 2,5	45	3,1 - 3,6	5,35	02900630250	08900630250
8,0 x 3,15	50	3,9 - 4,4	6,95	02900800315	08900800315
10,0 x 4,0	55	5,0 - 5,6	8,40	02901000400	08901000400
12,5 x 5,0	63	6,3 - 6,9	10,95	02901250500	08901250500
16,0 x 6,3	71	8,0 - 8,6	14,00	02901600630	08901600630
20,0 x 8,0	80	10,1 - 10,8	17,90	02902000800	08902000800
25,0 x 10,0	100	12,8 - 13,5	22,50	02902501000	08902501000



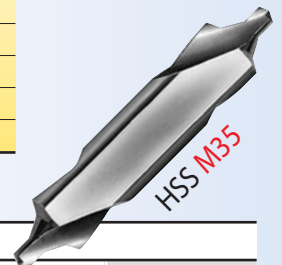
METRIC RADIUS TYPE CENTER DRILLS

D x d	L	R	\	FLAT	Cobalt 0291	TIN 0891
4,0 x 1,6	35	4,0	4,2 - 4,7	3,25	0291040160	0891040160
5,0 x 2,0	40	5,0	5,0 - 5,4	4,20	0291050200	0891050200
6,3 x 2,5	45	6,3	6,3 - 6,8	5,35	0291063250	0891063250
8,0 x 3,15	50	8,0	8,0 - 8,5	6,95	0291080315	0891080315
10,0 x 4,0	55	10,0	10,0 - 10,6	8,40	0291100400	0891100400
12,5 x 5,0	63	12,5	12,5 - 13,1	10,95	0291125500	0891125500
16,0 x 6,3	71	16,0	16,0 - 16,6	14,00	0291160630	0891160630
20,0 x 8,0	80	20,0	20,0 - 20,7	17,90	0291200800	0891200800



METRIC BELL TYPE CENTER DRILLS

D x d	L	K	\	FLAT	Cobalt 0292
6,3 x 1,6	45	3,3	2,0 - 2,4	5,35	02920630160
8,0 x 2,0	50	4,2	2,5 - 2,9	6,95	02920800200
10,0 x 2,5	55	5,3	3,1 - 3,6	8,40	02921000250
11,2 x 3,15	63	6,7	3,9 - 4,4	10,00	02921120315
14,0 x 4,0	69	8,5	5,0 - 5,6	12,65	02921400400
18,0 x 5,0	77	10,6	6,3 - 6,9	16,40	02921800500
20,0 x 6,3	80	13,2	8,0 - 8,6	17,90	02922000630
25,0 x 8,0	100	17,0	10,1 - 10,8	22,50	02922500800
31,5 x 10,0	125	21,2	12,8 - 13,5	28,40	02923151000



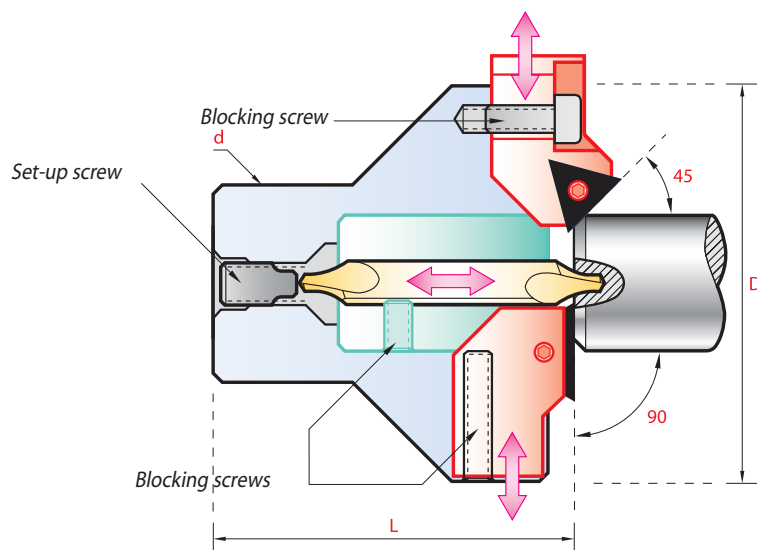
NOTE :
all metric center drills are available
within 2 weeks.
Call for information.

NOTE :
call for further
information on
the **modul-R**.

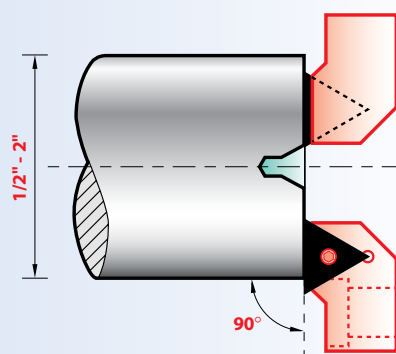
R-04 CENTERING HEAD

CAPACITY: 1/4" to 2"

modul-R Code R-04	D	d	L
	3.540	1-1/4	2.715

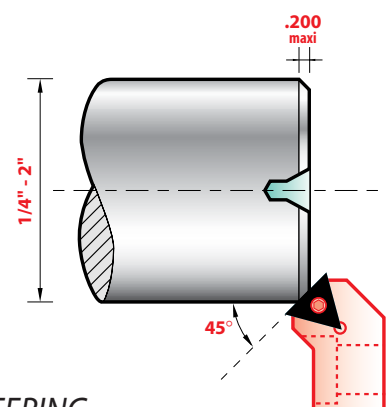
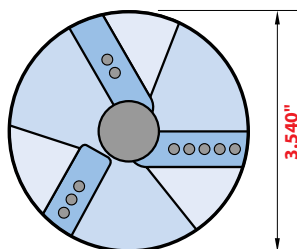


Insert-holders and inserts



FACING

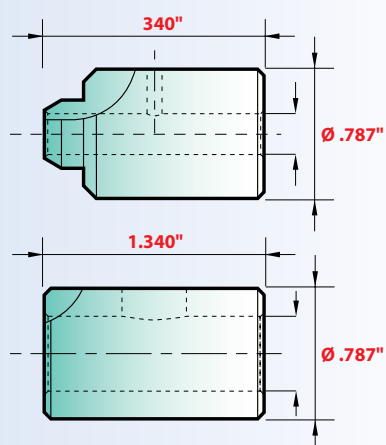
INSERT-HOLDER	R-10
CARBIDE INSERT	R-15



CHAMFERING

INSERT-HOLDER	R-11
CARBIDE INSERT	R-16

Tool-holders and tools



Ø	R-20	Pages 7 - 13	Page 13	Page 13	Page 12	Pages 24-25 *
4,0	R20040	4,0 x 1,6	4,0 x 1,6			4,3
5,0	R20050	5,0 x 2,0	5,0 x 2,0			6,3
6,0	R20060				M3	10,4
6,3	R20063	6,3 x 2,5	6,3 x 2,5	6,3 x 1,6		
8,0	R20080	8,0 x 3,15	8,0 x 3,15	8,0 x 2,0	M4	14,4
10,0	R20100	10,0 x 4,0	10,0 x 4,0	10,0 x 2,5	M5	19,0 & 25,0
11,2	R20112			11,2 x 3,15		
12,0	R20120					31,0
12,5	R20125	12,5 x 5,0	12,5 x 5,0		M6	
14,0	R20140			14,0 x 4,0	M8	
16,0	R20160	16,0 x 6,3	16,0 x 6,3		M10	

* Call for information

NC SPOTTING DRILLS

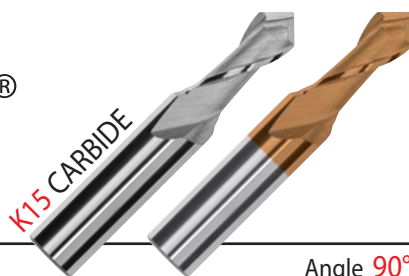


Angle				90°		120°		140° *
Diameter inch mm	L	\		Carbide 8195	Hard'X 8195-H	Carbide 8196	Hard'X 8196-H	Hard'X 8190-H
.078 2	1-9/16	.315		81950200	81950200-H	81960200	81960200-H	
.118 3	1-3/4	.400		81950300	81950300-H	81960300	81960300-H	
.157 4	2	.475		81950400	81950400-H	81960400	81960400-H	
.197 5	2	.600		81950500	81950500-H	81960500	81960500-H	
.236 6	2	.700		81950600	81950600-H	81960600	81960600-H	81900600-H
1/4	2	.700		81950635	81950635-H	81960635	81960635-H	81900635-H
5/16	2-3/8	.900		81950793	81950793-H	81960793	81960793-H	
.315 8	2-3/8	.900		81950800	81950800-H	81960800	81960800-H	81900800-H
3/8	2-3/4	.950		81950952	81950952-H	81960952	81960952-H	81900952-H
.394 10	2-3/4	.950		81951000	81951000-H	81961000	81961000-H	81901000-H
.472 12	2-3/4	.950		81951200	81951200-H	81961200	81961200-H	81901200-H
1/2	2-3/4	.950		81951270	81951270-H	81961270	81961270-H	81901270-H
.551 14	3	.950		81951400	81951400-H	81961400	81961400-H	
5/8	3-1/8	1		81951587	81951587-H	81961587	81961587-H	81901587-H
.630 16	3-1/8	1		81951600	81951600-H	81961600	81961600-H	81901600-H
.787 20	4	1-3/8		81952000	81952000-H	81962000	81962000-H	

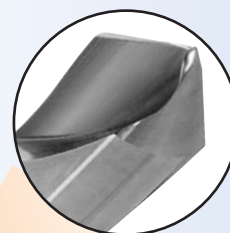
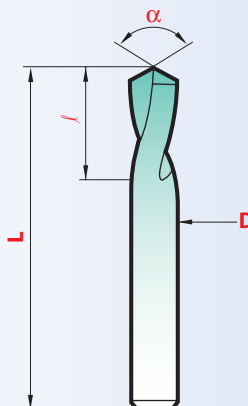
* 140 degree angle : for hard alloys

MINIATURE NC SPOTTING DRILLS MULTI-V®

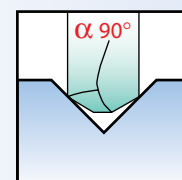
Shown in more detail on page 28



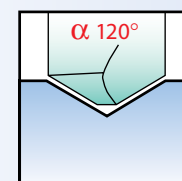
STANDARD magafor						Angle 90°	
Diameter inch mm	L	\	d2	MULTI-V 8090	Hard'X 8090-H		
.020 0,5	1-1/2	.040	.118	80900050	80900050-H		
.024 0,6	1-1/2	.047	.118	80900060	80900060-H		
.028 0,7	1-1/2	.055	.118	80900070	80900070-H		
.031 0,8	1-1/2	.063	.118	80900080	80900080-H		
.035 0,9	1-1/2	.071	.118	80900090	80900090-H		
.039 1,0	1-1/2	.080	.118	80900100	80900100-H		
.047 1,2	1-1/2	.095	.118	80900120	80900120-H		
.055 1,4	1-1/2	.110	.118	80900140	80900140-H		
.059 1,5	1-1/2	.120	.118	80900150	80900150-H		
.063 1,6	1-1/2	.125	.118	80900160	80900160-H		
.071 1,8	1-1/2	.140	.118	80900180	80900180-H		
.078 2,0	1-1/2	.160	.118	80900200	80900200-H		
.098 2,5	1-1/2	.195	.118	80900250	80900250-H		
.118 3,0	2	.240	.157	80900300	80900300-H		
.157 4,0	2	.315	.197	80900400	80900400-H		
3/16	2	.375	1/4	80900476	80900476-H		



NEW WEB THINNING
FEATURE FOR
HIGH SPEED
CUTTING



90 degree angle :
By using the **magafor NC**
drill of diameter over the
drilling tool, centering and
chamfering are obtained
in a single operation.



120 and 140 degree angles :
The preliminary hole obtained
with the **magafor NC** drill
corresponds to the angle at
the end of the tool used in
drilling and prevents it from
deviating.



Angle		60°		90°	120°	90°	120°	90°	120°
Diameter		L	\	Cobalt	Cobalt	TIN	TIN	Futura	Futura
inch	mm			191	195	0895	0896	0995	0996
.078	2	2	.315		1950200	1960200	08950200	08960200	09950200
.118	3	2	.400		1950300	1960300	08950300	08960300	09950300
1/8		2	.400		1950317	1960317	08950317	08960317	09950317
.157	4	2-1/16	.475	1910400	1950400	1960400	08950400	08960400	09950400
3/16		2-3/8	.600		1950476	1960476	08950476	08960476	09950476
.197	5	2-3/8	.600	1910500	1950500	1960500	08950500	08960500	09950500
.236	6	2-5/8	.800	1910600	1950600	1960600	08950600	08960600	09950600
1/4		2-5/8	.900		1950635	1960635	08950635	08960635	09950635
.315	8	3-1/8	1	1910800	1950800	1960800	08950800	08960800	09950800
3/8		3-1/2	1		1950952	1960952	08950952	08960952	09950952
.394	10	3-1/2	1	1911000	1951000	1961000	08951000	08961000	09951000
.472	12	4	1-1/4	1911200	1951200	1961200	08951200	08961200	09951200
1/2		4	1-3/8		1951270	1961270	08951270	08961270	09951270
.551	14	4-1/2	1-3/8		1951400	1961400	08951400	08961400	09951400
5/8		4-1/2	1-3/8		1951587	1961587	08951587	08961587	09951587
.630	16	4-1/2	1-3/8	1911600	1951600	1961600	08951600	08961600	09951600
.709	18	5-1/8	1-5/8		1951800	1961800	08951800	08961800	09951800
3/4		5-1/8	1-5/8		1951905	1961905	08951905	08961905	09951905
.787	20	5-1/8	1-5/8	1912000	1952000	1962000	08952000	08962000	09952000
.984	25	5-3/8	1-3/4		1952500	1962500	08952500	08962500	09952500
1		5-3/8	1-3/4		1952540	1962540	08952540	08962540	09952540

Diameters	Tolerance D	Angle	L
.078 - .118	0 + .0002"	± 1°	± .0395
1/8 - .236	0 + .0003"		
1/4 - .394	0 + .0004"		
.472 - 1	0 + .0005"		

Tolerances



SET OF 6 NC-DRILLS

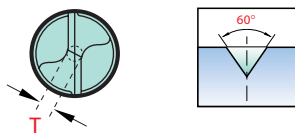
1 piece of each Ø

COMPOSITION

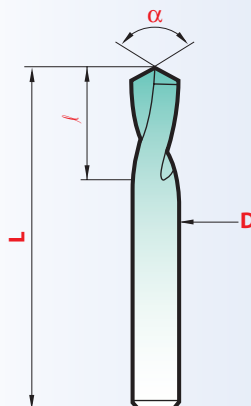
1/8 - 3/16 - 1/4 - .315 - 3/8 - 1/2

TYPE		Cobalt	TIN	Futura
90°	Code	195/6	0895/6	0995/6
120°	Code	196/6	0896/6	0996/6

NC SPOTTING DRILLS

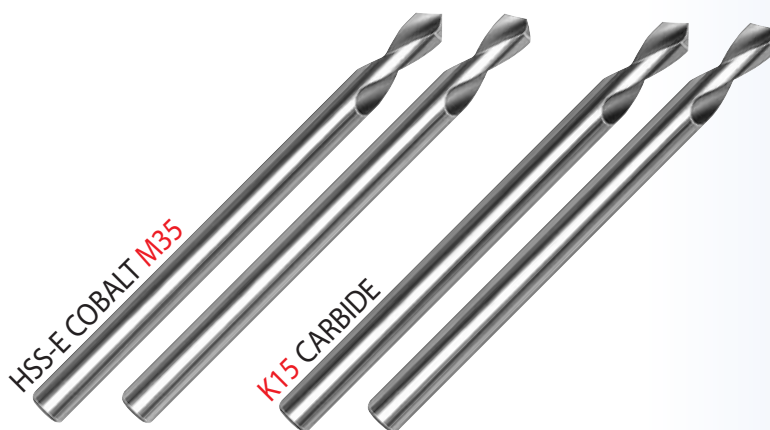


Angle 60°

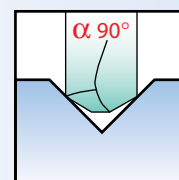


Angle 60°				
D h6	L	\	T	Cobalt 191
4,0	52	12	0,8	1910400
5,0	60	15	0,9	1910500
6,0	66	20	1,0	1910600
8,0	79	25	1,3	1910800
10,0	89	25	1,6	1911000
12,0	102	30	2,0	1911200
16,0	115	35	3,0	1911600
20,0	131	40	3,5	1912000

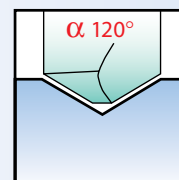
Long series



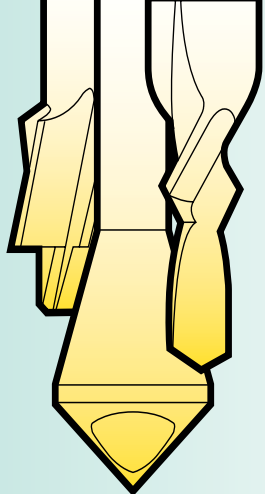
Angle				90°	120°	90°	120°
Diameter inch mm	L	\		Cobalt 197	Cobalt 199	Carbide 8197	Carbide 8199
.118 3	3-1/8	.400		1970300	1990300		
.157 4	4	.475		1970400	1990400	81970400	81990400
.197 5	4-3/4	.600		1970500	1990500	81970500	81990500
.236 6	5-1/2	.800		1970600	1990600	81970600	81990600
1/4	5-1/2	.870		1970635	1990635	81970635	81990635
.315 8	5-1/2	1		1970800	1990800	81970800	81990800
3/8	6-3/4	1		1970952	1990952	81970952	81990952
.394 10	6-3/4	1		1971000	1991000	81971000	81991000
.472 12	6-3/4	1-3/16		1971200	1991200	81971200	81991200
1/2	6-3/4	1-3/8		1971270	1991270	81971270	81991270
5/8	8	1-3/8		1971587	1991587	81971587	81991587
.630 16	8	1-3/8		1971600	1991600	81971600	81991600
3/4	8	1-5/8		1971905	1991905	81971905	81991950
.787 20	8	1-5/8		1972000	1992000	81972000	81992000
1	8	1-3/4		1972540	1992540		



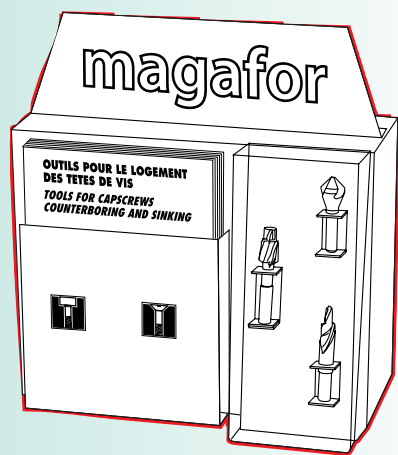
90 degree angle :
By using the **magafor NC** drill of diameter over the drilling tool, centering and chamfering are obtained in a single operation.



120 and 140 degree angles :
The preliminary hole obtained with the **magafor NC** drill corresponds to the angle at the end of the tool used in drilling and prevents it from deviating.

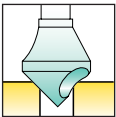
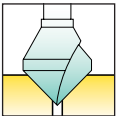
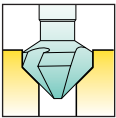
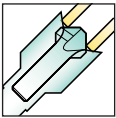
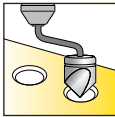
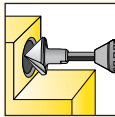
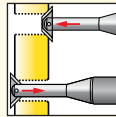


COUNTERSINKING COUNTERBORING

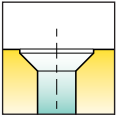
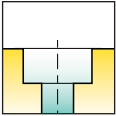


Storage display case

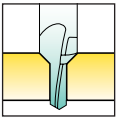
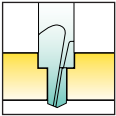
COUNTERSINKS

Angle						
30°	45°	60°	82°	90°	100°	120°
		Page 21	Page 21	Page 20	Page 21	Page 21
	Page *	Page *	Page 22	Page 23	Page 23	Page 23
	Page 26	Page 26	Page 26	Pages 24-25	Page 26	Page 26
	Pipe deburrers inter. / exter.			Page *		
				Pages 26 *		Hand countersinks

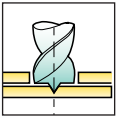
METRIC COUNTERBORES

	90° Page *
	180° Page *

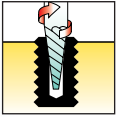
METRIC STEP DRILLS

	90° Page *
	180° Page *

SPOTWELD DRILLS

	Page 27
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METRIC SCREW EXTRACTORS

	Page *
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* Call for information

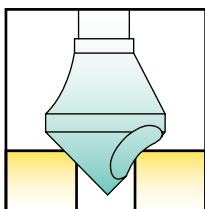
DEBURRING COUNTERSINKING

TYPE

CAPACITY

ADVANTAGES

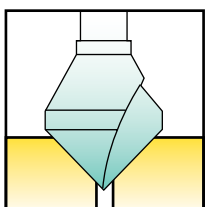
ZERO FLUTE WITH HOLE



Ex. Ø 15 = 6 - 14 mm
Ex. Ø 25 = 10 - 23 mm

- For light metals and plastics.
- For deburring and small chamfers.
- Best surface finish.
- Works without vibrations.

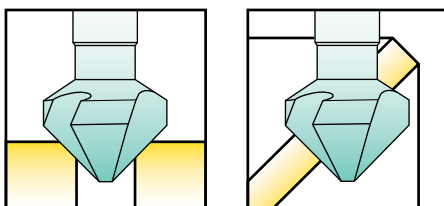
SINGLE FLUTE



Ex. Ø 15 = 2 - 15 mm
Ex. Ø 25 = 3 - 25 mm

- For wood and hard plastics.
- Can drill in sheet materials.
- Easy to sharpen.
- Works without vibrations.

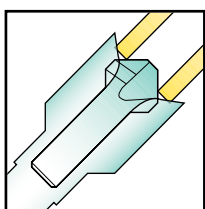
TRIDENT THREE FLUTES



Ex. Ø 15 = 5 - 15 mm
Ex. Ø 25 = 6 - 25 mm

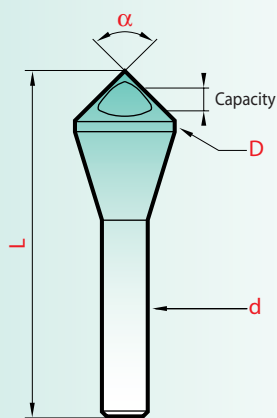
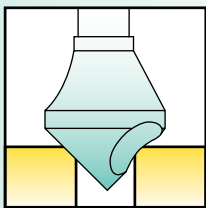
- Self-centering (3 flutes).
- Designed for 90° capscrews countersinking.
- Hand using.
- Longitudinal chamfers and contouring.
- Works without vibrations.

PIPE DEBURRERS



- Simultaneous internal / external deburring.

ZERO FLUTE DEBURRING TOOL With Hole



D	Angle	d	L
+0.3	-1°	h9	±1

Tolerances

The deburring tool "with hole" is more particularly designed for countersinking and chamfering light metals and plastics. The surface obtained is smooth and without burrs. We recommend lubricating.



Angle 90°

TYPE						Right hand		Left hand
#	Diameter		Capacity	d	L	Cobalt 411	TIN 4811	Cobalt 416
	inch	mm	min/max					
0	1/4 ⁽¹⁾		5/64 - 3/16	1/4	1-3/4	4110635	48110635	
	.394	10	5/32 - 11/32	.236	1-3/4	4111000	48111000	4161000
1	7/16		7/32 - 13/32	1/4	1-3/4	4111120	48111120	
2	9/16		1/4 - 1/2	1/4	2	4111400	48111400	
	.590	15	1/4 - 9/16	.315	2-1/4	4111500	48111500	4161500
	.787	20	5/16 - 11/16	.394	2-1/2	4112000	48112000	4162000
3	13/16		5/16 - 11/16	1/2	2-5/8	4112040	48112040	
	.984	25	3/8 - 7/8	.472	3	4112500	48112500	4162500
	1.102	28	7/16 - 1	.472	3-3/8	4112800	48112800	4162800
	1.181	30	1/2 - 1-1/8	.472	3-1/2	4113000	48113000	4163000
4	1-3/16		1/2 - 1-1/8	1/2	3-1/2	4113010	48113010	
	1.378	35	9/16 - 1-5/16	.630 ⁽²⁾	4	4113500	48113500	4163500
	1.575	40	5/8 - 1-1/2	.630 ⁽²⁾	4-5/8	4114000	48114000	4164000
	1.969	50	3/4 - 1-7/8	.630 ⁽²⁾	5	4115000	48115000	4165000

⁽¹⁾ Double end cutter⁽²⁾ Shanks with 3 flats for better holding

USING
RECOMMENDATIONS
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Angle	#	Diameter inch mm	Capacity min/max	d	L	Cobalt
60° 412	0	1/4 ⁽¹⁾	7/64 - 3/16	1/4	1-3/4	4120635
		.394 10	3/16 - 11/32	.236	2	4121000
	1	7/16	3/16 - 3/8	1/4	1-3/4	4121120
	2	9/16	9/32 - 1/2	1/4	2	4121400
		.590 15	5/16 - 9/16	.315	2-3/8	4121500
		.787 20	3/8 - 11/16	.394	2-7/8	4122000
	3	13/16	3/8 - 11/16	1/2	2-5/8	4122040
		.984 25	1/2 - 7/8	.472	3-3/8	4122500
		1.181 30	9/16 - 1-1/8	.472	3-5/8	4123000
	4	1-3/16	9/16 - 1-1/8	1/2	3-1/2	4123010
		1.378 35	11/16 - 1-5/16	.630 ⁽²⁾	4-1/2	4123500
82° 414	0	1/4 ⁽¹⁾	5/64 - 3/16	1/4	1-3/4	4140635
		.394 10	5/32 - 11/32	.236	1-3/4	4141000
	1	7/16	7/32 - 13/32	1/4	1-3/4	4141120
	2	9/16	1/4 - 1/2	1/4	2	4141400
		.590 15	1/4 - 9/16	.315	2-1/4	4141500
		.787 20	5/16 - 11/16	.394	2-1/2	4142000
	3	13/16	5/16 - 11/16	1/2	2-5/8	4142040
		.984 25	3/8 - 7/8	.472	3	4142500
		1.181 30	1/2 - 1-1/8	.472	3-1/2	4143000
	4	1-3/16	1/2 - 1-1/8	1/2	3-1/2	4143010
		1.378 35	9/16 - 1-5/16	.630 ⁽²⁾	4	4143500
100° 415		.394 10	5/32 - 11/32	.236	1-3/4	4151000
		.590 15	1/4 - 9/16	.315	2-1/8	4151500
		.787 20	9/32 - 11/16	.394	2-1/2	4152000
		.984 25	11/32 - 7/8	.472	3	4152500
		1.181 30	7/16 - 1-1/16	.472	3-3/8	4153000
		1.378 35	1/2 - 1-5/16	.630 ⁽²⁾	4	4153500
120° 413		.394 10	5/32 - 11/32	.236	1-3/4	4131000
		.590 15	1/4 - 9/16	.315	2	4131500
		.787 20	9/32 - 11/16	.394	2-3/8	4132000
		.984 25	11/32 - 7/8	.472	2-7/8	4132500
		1.181 30	7/16 - 1-1/16	.472	3-1/4	4133000
		1.378 35	1/2 - 1-5/16	.630 ⁽²⁾	3-3/4	4133500

⁽¹⁾ Double end cutter

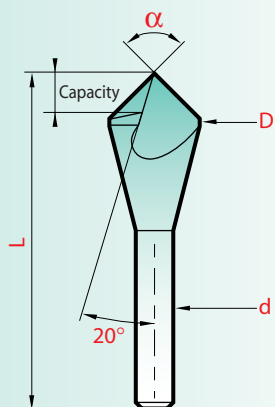
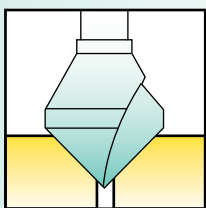
⁽²⁾ 3 flatted shanks



SETS OF 5 CUTTERS

Angle	magafor #	COMPOSITION
60°	412	Ø 10-15-20-25-30 mm
	412/5	# 0-1-2-3-4
82°	414	Ø 10-15-20-25-30 mm
	414/5	# 0-1-2-3-4
90°	411	Ø 10-15-20-25-30 mm
	4811-TIN	Ø 10-15-20-25-30 mm
	411/2	Ø 10-15-20-28-35 mm
	411/5	# 0-1-2-3-4
100°	415	Ø 10-15-20-25-30 mm
	4811/5-TIN	# 0-1-2-3-4
120°	413	Ø 10-15-20-25-30 mm

Single flute CHAMFERING CUTTERS



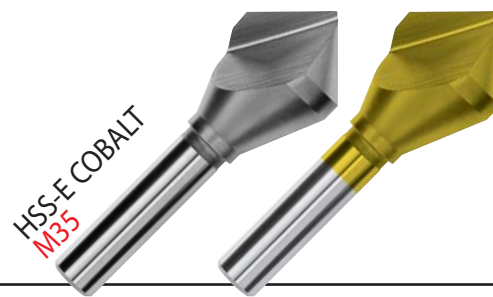
D	Angle	d	L
+0.3	-1°	h9	±1

Tolerances

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 30 mm),
 - simultaneous drilling and countersinking on thin elements (laminates, aluminium, 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.

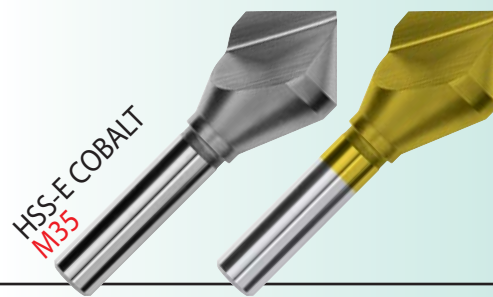
USING
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Angle	Diameter inch mm	Capacity min/max	d	L	Cobalt 422	TIN 4822
60°	1/8	1/32 - 1/8	1/8	1-1/4	4220317	48220317
	3/16	3/64 - 3/16	3/16	1-3/8	4220476	48220476
	.236	6	.236	1-5/8	4220600	48220600
	1/4	3/64 - 1/4	1/4	1-1/2	4220635	48220635
	5/16	3/64 - 5/16	1/4	1-5/8	4220793	48220793
	3/8	3/64 - 3/8	1/4	1-3/4	4220952	48220952
	.394	10	.236	1-7/8	4221000	48221000
	.472	12	.315	2-1/8	4221200	48221200
	1/2	5/64 - 1/2	1/4	2	4221270	48221270
	.590	15	.315	2-3/8	4221500	48221500
	5/8	5/64 - 5/8	3/8	2-1/4	4221587	48221587
	3/4	5/64 - 3/4	1/2	2-5/8	4221905	48221905
	.787	20	.394	2-7/8	4222000	48222000
	7/8	7/64 - 7/8	1/2	2-3/4	4222222	48222222
	.984	25	.472	3-3/8	4222500	48222500
	1	1/8 - 1	1/2	2-3/4	4222540	48222540
	1.181	30	.472	3-5/8	4223000	48223000
	1-1/4	1/8 - 1-1/4	1/2	3	4223175	48223175

Angle	Diameter inch mm	Capacity min/max	d	L	Cobalt 424	TIN 4824
82°	1/8	1/32 - 1/8	1/8	1-1/4	4240317	48240317
	3/16	3/64 - 3/16	3/16	1-3/8	4240476	48240476
	.236	6	.236	1-5/8	4240600	48240600
	1/4	3/64 - 1/4	1/4	1-1/2	4240635	48240635
	5/16	3/64 - 5/16	1/4	1-5/8	4240793	48240793
	3/8	3/64 - 3/8	1/4	1-3/4	4240952	48240952
	.394	10	.236	1-3/4	4241000	48241000
	.472	12	.315	2	4241200	48241200
	1/2	5/64 - 1/2	1/4	2	4241270	48241270
	.590	15	.315	2-1/4	4241500	48241500
	5/8	5/64 - 5/8	3/8	2-1/4	4241587	48241587
	3/4	5/64 - 3/4	1/2	2-5/8	4241905	48241905
	.787	20	.394	2-5/8	4242000	48242000
	7/8	7/64 - 7/8	1/2	2-3/4	4242222	48242222
	.984	25	.472	3	4242500	48242500
	1	1/8 - 1	1/2	2-3/4	4242540	48242540
	1.181	30	.472	3-1/2	4243000	48243000
	1-1/4	1/8 - 1-1/4	1/2	2-3/4	4243175	48243175

NOTE : 30 and 45 degree angles are metric standard. Call for information.



SETS OF 6 PIECES

1/4 - 5/16 - 3/8 - 1/2 - 5/8 - 3/4

Angle	magafor	TIN
60°	422/6	4822/6
82°	424/6	4824/6
90°	421/6	4821/6

SETS OF 5 PIECES

10 - 15 - 20 - 25 - 30

Angle	magafor	TIN
60°	422	4822
82°	424	4824
90°	421	4821
100°	425	4825
120°	423	4823

METRIC

Angle	Diameter		Capacity	d	L	Cobalt	TIN
	inch	mm	min/max			421	4821
90°	1/8		1/32 - 1/8	1/8	1-1/4	4210317	48210317
	.157	4	3/64 - .157	.157	1-1/2	4210400	48210400
	3/16		3/64 - 3/16	3/16	1-3/8	4210476	48210476
	.197	5	3/64 - .197	.197	1-1/2	4210500	48210500
	.236	6	3/64 - .236	.236	1-1/2	4210600	48210600
	1/4		3/64 - 1/4	1/4	1-1/2	4210635	48210635
	5/16		3/64 - 5/16	1/4	1-5/8	4210793	48210793
	.315	8	3/64 - .315	.236	1-1/2	4210800	48210800
	3/8		3/64 - 3/8	1/4	1-3/4	4210952	48210952
	.394	10	3/64 - .394	.236	1-3/4	4211000	48211000
	.472	12	5/64 - .472	.315	2	4211200	48211200
	1/2		5/64 - 1/2	1/4	2	4211270	48211270
	.590	15	5/64 - .590	.315	2-1/8	4211500	48211500
	5/8		5/64 - 5/8	3/8	2-1/4	4211587	48211587
	3/4		5/64 - 3/4	1/2	2-5/8	4211905	48211905
	.787	20	5/64 - .787	.394	2-5/8	4212000	48212000
	7/8		7/64 - 7/8	1/2	2-3/4	4212222	48212222
	.984	25	1/8 - .984	.472	3	4212500	48212500
	1		1/8 - 1	1/2	2-3/4	4212540	48212540
	1.181	30	1/8 - 1.181	.472	3-1/2	4213000	48213000
	1-1/4		1/8 - 1-1/4	1/2	2-3/4	4213175	48213175
	1.378	35	5/32 - 1.378	.630 (1)	4	4213500	48213500
	1.575	40	7/32 - 1.575	.630 (1)	4-5/8	4214000	48214000
	2	50	15/32 - 2	.630 (1)	5	4215000	48215000

Angle	Diameter		Capacity	d	L	Cobalt	TIN
	inch	mm	min/max			425	4825
100°	.394	10	3/64 - .394	.236	1-3/4	4251000	48251000
	.472	12	5/64 - .472	.315	1-7/8	4251200	48251200
	.590	15	5/64 - .590	.315	2-1/8	4251500	48251500
	.787	20	5/64 - .787	.394	2-1/2	4252000	48252000
	.984	25	1/8 - .984	.472	3	4252500	48252500
	1.181	30	1/8 - 1.181	.472	3-3/8	4253000	48253000

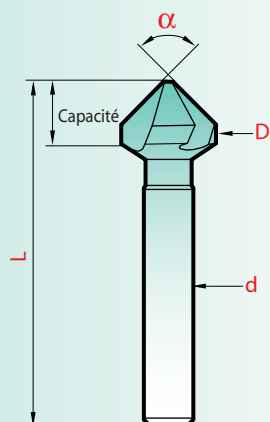
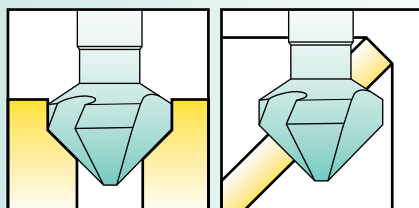
Angle	Diameter		Capacity	d	L	Cobalt	TIN
	inch	mm	min/max			423	4823
120°	.394	10	3/64 - .394	.236	1-3/4	4231000	48231000
	.472	12	5/64 - .472	.315	1-7/8	4231200	48231200
	.590	15	5/64 - .590	.315	2	4231500	48231500
	.787	20	5/64 - .787	.394	2-3/8	4232000	48232000
	.984	25	1/8 - .984	.472	2-7/8	4232500	48232500
	1.181	30	1/8 - 1.181	.472	3-1/4	4233000	48233000

⁽¹⁾ Shank with 3 flats for better holding

TRIDENT

Three flute

COUNTERSINKS



D	Angle	d	L
± 0.05	- 1°	h9	± 1

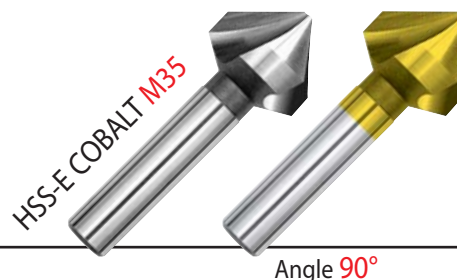
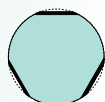
Tolerances

This highly productive countersinking cutter is a much improved version of the traditional multiflute milling cutter

- grooves opened wide to allow for greater chip removal,
- high positive cut,
- constant profile relief (a great many regrinds),
- self centering countersink,
- work without vibration.

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

USING
RECOMMENDATIONS
Page 43



Diameter inch mm	Capacity min/max	d	L	Cobalt 431	TIN 4831
.158 4,0	.051 - .158	.158	1-5/8	4310400	48310400
.170 4,3	.051 - .170	.158	1-5/8	4310430	48310430
.197 5,0	.051 - .197	.158	1-5/8	4310500	48310500
.209 5,3	.051 - .209	.197	1-3/4	4310530	48310530
.229 5,8	.051 - .229	.197	1-3/4	4310580	48310580
.236 6,0	.051 - .236	.197	1-3/4	4310600	48310600
.248 6,3	.051 - .248	.197	1-3/4	4310630	48310630
.276 7,0	.063 - .276	.236	2	4310700	48310700
.288 7,3	.063 - .288	.236	2	4310730	48310730
.315 8,0	.071 - .315	.236	2	4310800	48310800
.327 8,3	.071 - .327	.236	2	4310830	48310830
.354 9,0	.079 - .354	.236	2	4310900	48310900
.370 9,4	.079 - .370	.236	2	4310940	48310940
.394 10,0	.087 - .394	.236	2	4311000	48311000
.410 10,4	.087 - .410	.236	2	4311040	48311040
.453 11,5	.098 - .453	.315	2-1/4	4311150	48311150
.472 12,0	.098 - .472	.315	2-1/4	4311200	48311200
.488 12,4	.098 - .488	.315	2-1/4	4311240	48311240
.528 13,4	.098 - .528	.315	2-1/4	4311340	48311340
.567 14,4	.098 - .567	.315	2-1/4	4311440	48311440
.590 15,0	.110 - .590	.394	2-3/8	4311500	48311500
.650 16,5	.110 - .650	.394	2-3/8	4311650	48311650
.748 19,0	.118 - .748	.394	2-1/2	4311900	48311900
.807 20,5	.118 - .807	.394	2-1/2	4312050	48312050
.906 23,0	.126 - .906	.394	2-5/8	4312300	48312300
.984 25,0	.126 - .984	.394	2-5/8	4312500	48312500
1.024 26,0	.126 - 1.024	.394	2-5/8	4312600	48312600
1.102 28,0	.138 - 1.102	.472	2-3/4	4312800	48312800
1.181 30,0	.138 - 1.181	.472	2-3/4	4313000	48313000
1.220 31,0	.138 - 1.220	.472	2-3/4	4313100	48313100

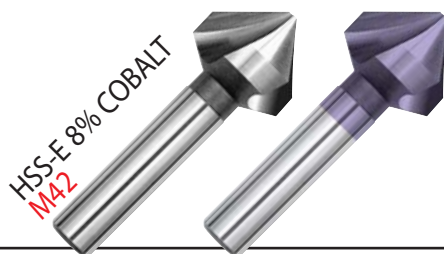
WITH 3 FLATTED SHANKS*

					Cobalt 437	TIN 4837
.488 12,4	.098 - .488	.315	2-1/4		437124	4837124
.567 14,4	.098 - .567	.315	2-1/4		437144	4837144
.650 16,5	.110 - .650	.394	2-3/8		437165	4837165
.807 20,5	.118 - .807	.394	2-1/2		437205	4837205
.984 25,0	.126 - .984	.394	2-5/8		437250	4837250
1.220 31,0	.138 - 1.220	.472	2-3/4		437310	4837310
1.339 34,0	.177 - 1.339	.630	4		437340	4837340
1.378 35,0	.177 - 1.378	.630	4		437350	4837350
1.457 37,0	.177 - 1.457	.630	4-5/8		437370	4837370
1.575 40,0	.177 - 1.575	.630	4-5/8		437400	4837400
1.969 50,0	.197 - 1.969	.630	5		437500	4837500
2.480 63,0	.394 - 2.480	.630	5-1/2		437630	4837630
3.150 80,0	.551 - 3.150	.630	6-1/2		437800	4837800

* Effective holding thanks to the three flats

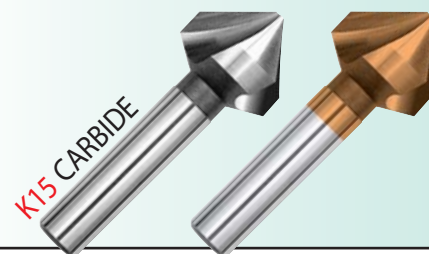
Performances-

RECOMMENDATIONS:
Page 43



METRIC					
Angle 90°					
D	Capacity min/max	d	L	Cobalt + 436	Futura 4936
6,3	1,3/6,3	5	45	436063	4936063
8,3	1,8/8,3	6	50	436083	4936083
10,4	2,2/10,4	6	50	436104	4936104
12,4	2,5/12,4	8	56	436124	4936124
16,5	2,8/16,5	10	60	436165	4936165
20,5	3,0/20,5	10	63	436205	4936205
25,0	3,2/25,0	10	67	436250	4936250
31,0	3,5/31,0	12	71	436310	4936310
50,0	5,0/50,0	16*	126	436500	4936500

* 3 flatted shanks



METRIC					
Angle 90°					
D	Capacity min/max	d*	L	Carbide 8431	Hard'X 8431-H
4,3	1,3/4,3	4	40	8431043	8431043-H
5,3	1,3/5,3	4	40	8431053	8431053-H
6,3	1,3/6,3	5	45	8431063	8431063-H
8,3	1,8/8,3	6	50	8431083	8431083-H
10,4	2,2/10,4	6	50	8431104	8431104-H
12,4	2,5/12,4	8	56	8431124	8431124-H
16,5	2,8/16,5	10	60	8431165	8431165-H
20,5	3,0/20,5	10	63	8431205	8431205-H
25,0	3,2/25,0	10	67	8431250	8431250-H
31,0	3,5/31,0	12	71	8431310	8431310-H

* Ø 12,4 - 31,0 = 3 flatted shanks

Ø 4,3 - 8,3 = Full solid carbide

Ø 10,4 - 31,0 = Brazed carbide head



SETS

magafor	COMPOSITION	Angle 90°	
431	Ø 10,4-16,5-20,5-25-31 mm		
4831 TIN			
436			
4936 Futura			
431/2	Ø 6,3-8,3-10,4-12,4-16,5-20,5 mm		
4831/2 TIN			
436/2			
4936/2 Futura			
8431/2	Ø 6,3-8,3-10,4-12,4-16,5-20,5-25 mm		
431/3 (1)			
431/4 (1)			
8431			
8431-H Hard'X	Ø 10,4-16,5-20,5-25-31 mm		

(1) Set supplied with 1 auto-lock chuck Code 4001.

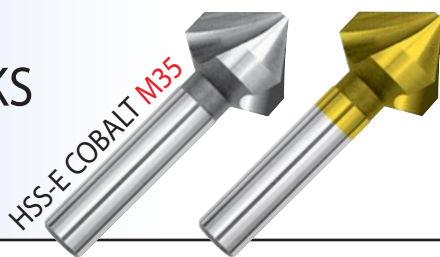


METRIC					
Angle 90°					
D	Capacity min/max	d	L	Cobalt 4303	Futura 4933
6,3	1,3/6,3	6	84	4303063	4933063
8,3	1,8/8,3	8	85	4303083	4933083
10,4	2,2/10,4	10	87	4303104	4933104
12,4	2,5/12,4	10	108	4303124	4933124
16,5	2,8/16,5	16	112	4303165	4933165
20,5	3,0/20,5	16	115	4303205	4933205
25,0	3,2/25,0	20	118	4303250	4933250

NOTE:

all these metric sizes
are available within 2 weeks.
Call for information.

TRIDENT Three flute COUNTERSINKS



METRIC							
Angle	D	Capacity min/max	d	L	Cobalt	Angle	TIN
30° 439	6,3	2/6,3	5	50	439063		4839063
	12,4	3/12,4	8	65	439124		4839124
	16,5	4/16,5	10	76	439165		4839165
	25,0	6/25	10	90	439250		4839250
60° 432	6,3	1,3/6,3	5	47	4320630	60° 4832	48320630
	8,3	1,8/8,3	6	52	4320830		48320830
	10,4	2,3/10,4	6	53	4321040		48321040
	12,4	2,5/12,4	8	60	4321240		48321240
	16,5	2,8/16,5	10	65	4321650		48321650
	20,5	3,0/20,5	10	69	4322050		48322050
	25,0	3,2/25,0	10	75	4322500		48322500
82° 434	31,0	3,5/31,0	12	81	4323100	82° 4834	48323100
	6,3	1,3/6,3	5	45	4340630		48340630
	8,3	1,8/8,3	6	50	4340830		48340830
	10,4	2,2/10,4	6	50	4341040		48341040
	12,4	2,5/12,4	8	56	4341240		48341240
	16,5	2,8/16,5	10	61	4341650		48341650
	20,5	3,0/20,5	10	64	4342050		48342050
100° 435	25,0	3,2/25,0	10	68	4342500	100° 4835	48342500
	31,0	3,5/31,0	12	73	4343100		48343100
	6,3	1,3/6,3	5	44	4350630		48350630
	8,3	1,8/8,3	6	49	4350830		48350830
	10,4	2,2/10,4	6	49	4351040		48351040
	12,4	2,5/12,4	8	55	4351240		48351240
	16,5	2,8/16,5	10	59	4351650		48351650
120° 433	20,5	3,0/20,5	10	62	4352050	120° 4833	48352050
	25,0	3,2/25,0	10	65	4352500		48352500
	31,0	3,5/31,0	12	68	4353100		48353100
	6,3	1,3/6,3	5	43	4330630		48330630
	8,3	1,8/8,3	6	48	4330830		48330830
	10,4	2,2/10,4	6	48	4331040		48331040
	12,4	2,5/12,4	8	54	4331240		48331240
	16,5	2,8/16,5	10	57	4331650		48331650
	20,5	3,0/20,5	10	59	4332050		48332050
	25,0	3,2/25,0	10	62	4332500		48332500
	31,0	3,5/31,0	12	65	4333100		48333100

TRIDENT HAND COUNTERSINKS



METRIC		Angle	82°	90°
D	Capacité min/max	Cobalt 438	Cobalt 430	
12,4	3 - 12,4	4381240	4301240	
16,5	4 - 16,5	4381650	4301650	
20,5	4 - 20,5	4382050	4302050	
25,0	5 - 25,0	4382500	4302500	
31,0	5 - 31,0	4383100	4303100	

UNIVERSAL AUTO-LOCK CHUCK



Capacity 3/64 - 1,2

magafor
4001

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



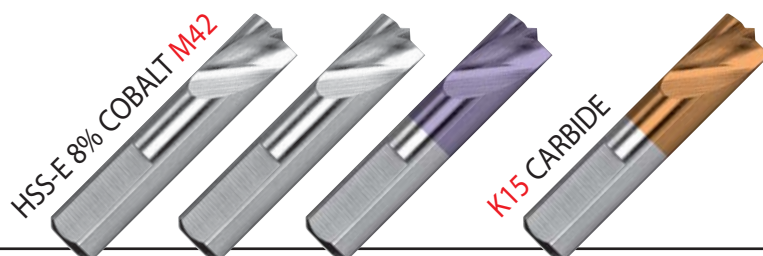
SETS

Angle	cobalt	COMPOSITION / mm
60°	432	Ø 10,4-16,5-20,5-25-31
	4832 TIN	
82°	434	
	4834-TIN	
100°	435	
120°	433	

DRILLS TO DISCONNECT SPOTWELDS

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.



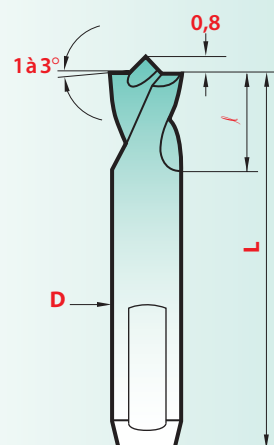
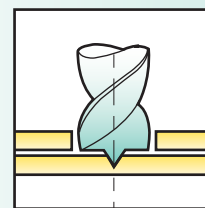
Short series

D	L	\	cobalt 202	cobalt 203	Futura 2903	Hard'X 8203-H
.236	1-3/4	.590		2030600	29030600	
5/16	1-1/2	.590	2020800			
5/16	1-3/4	.590		2030800	29030800	8203H0800

These short drills are specially designed to be used with the two types of pneumatic disconnectors :

- with swan-neck = magafor 202
- with revolver-handle = magafor 203

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



D	L	\
h8	± 1	+1

Tolerances

The centering point grants perfect drilling without any deviating.
Thanks to the special sharpening the first sheet will be bored without damage for the second one.
This design allows for excellent penetration, a high resistance to wear and a great many regrinds.

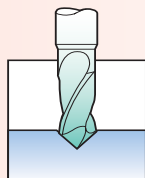


Long series

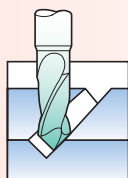
D	L	\	cobalt 201	Futura 2901
.236	2-5/8	1.100	2010600	29010600
.275	2-7/8	1.340	2010700	29010700
5/16	3-1/8	1.450	2010800	29010800
.394	3-1/2	1.690	2011000	29011000

To be used with standard drilling machines.

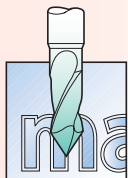
MICRO AND MULTI-FUNCTION TOOLS

MULTI-V®**8 OPERATIONS**

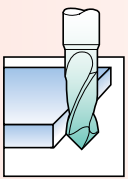
90° - 120°
CENTERING -
SPOTTING



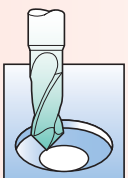
90° - 120°
V - GROOVING



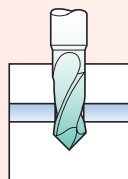
40° - 60°
ENGRAVING



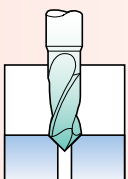
60° - 90° - 120°
COUNTERING



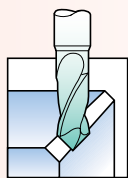
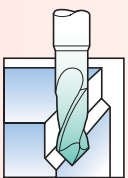
90° - 120°
INTERPOLATION
DRILLING



90° - 120°
DRILLING



60° - 90° - 120°
CHAMFERING

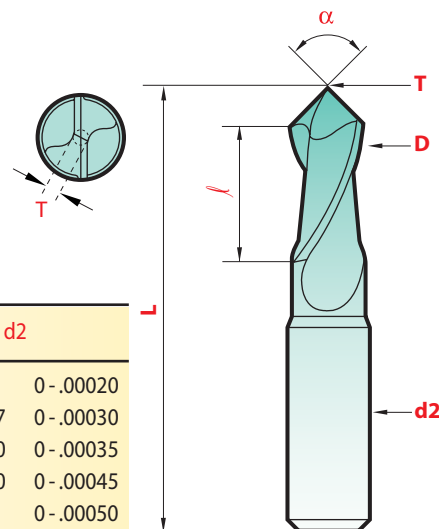


60° - 90° - 120°
LONGITUDINAL
CHAMFERS

T = 0.1 D : Web thickness

Diameters		α		d2
.020 - .118	- 0 - .0010	$\pm 1^\circ$	.118	0 - .00020
.157 - .236	- 0 - .0012		.157 - .197	0 - .00030
.250 - .394	- 0 - .0014		.197 - .500	0 - .00035
.472 - .630	-.0018 - .0036		.500 - .630	0 - .00045
.787	-.0025 - .0045		.787	0 - .00050

Tolerances



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

- Combination of multiple machining process :

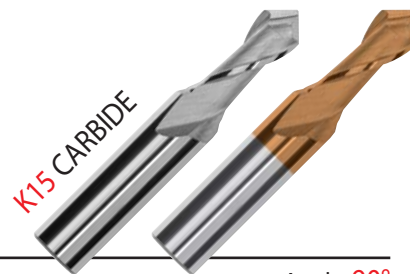
- reduction in machine set-up time,
- reduction of operating time.

- Improved performances :

- fine cutting edge : improved depthing and surface finish,
- micrograin solid carbide : better resistance to wear and greater rigidity,
- 30° spiral : facilitates chip removal.

- Easy storage :

- fewer tools required,
- less stock required.



STANDARD magafor

Angle 90°

Diameter inch mm		L	\	d2	T*	MULTI-V 8090	Hard'X 8090-H
.020	0,5	1-1/2	.040	.118	.002	80900050	80900050-H
.024	0,6	1-1/2	.047	.118	.002	80900060	80900060-H
.028	0,7	1-1/2	.055	.118	.003	80900070	80900070-H
.031	0,8	1-1/2	.063	.118	.003	80900080	80900080-H
.035	0,9	1-1/2	.071	.118	.003	80900090	80900090-H
.039	1,0	1-1/2	.080	.118	.004	80900100	80900100-H
.047	1,2	1-1/2	.095	.118	.005	80900120	80900120-H
.055	1,4	1-1/2	.110	.118	.006	80900140	80900140-H
.059	1,5	1-1/2	.120	.118	.006	80900150	80900150-H
.063	1,6	1-1/2	.125	.118	.006	80900160	80900160-H
.071	1,8	1-1/2	.140	.118	.007	80900180	80900180-H
.078	2,0	1-1/2	.160	.118	.008	80900200	80900200-H
.098	2,5	1-1/2	.195	.118	.010	80900250	80900250-H
.118	3	2	.240	.157	.012	80900300	80900300-H
.157	4	2	.315	.197	.016	80900400	80900400-H
3/16		2	.375	1/4	.020	80900476	80900476-H
.197	5	2	.395	.236	.020	80900500	80900500-H
.236	6	2-3/8	.475	.315	.023	80900600	80900600-H
1/4		2-3/8	.475	5/16	.023	80900635	80900635-H
5/16		2-3/4	.630	3/8	.031	80900793	80900793-H
.315	8	2-3/4	.630	.394	.031	80900800	80900800-H
3/8		2-3/4	.710	1/2	.039	80900952	80900952-H
.394	10	2-3/4	.710	.472	.039	80901000	80901000-H
.472	12	2-3/4	.790	.472	.047	80901200	80901200-H
1/2		2-3/4	.790	1/2	.051	80901270	80901270-H
5/8		3-1/8	1.000	5/8	.063	80901587	80901587-H
.630	16	3-1/8	1.025	.630	.063	80901600	80901600-H
.787	20	4	1.260	.787	.079	80902000	80902000-H

T* = 0.1 = .0039" / Web thickness

MULTI-V® 8 OPERATIONS



METRIC

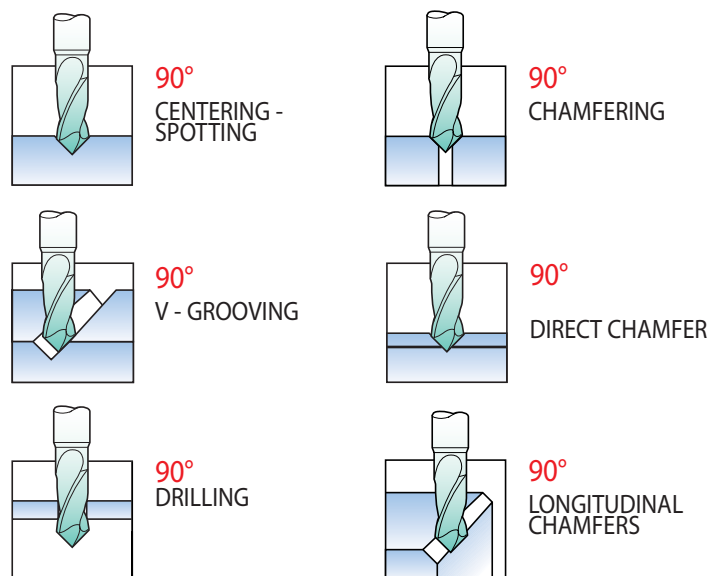
STANDARD magafor

Angle					40°	60°	120°		
Diameter		L	\	d2	MULTI-V	MULTI-V	Hard'X	MULTI-V	Hard'X
inch	mm				8040*	8088	8088-H	8092	8092-H
.020	0,5	39	1,0	3	8040005	8088005	8088005-H		
.039	1,0	39	2,0	3		8088010	8088010-H	8092010	8092010-H
.059	1,5	39	3,0	3		8088015	8088015-H	8092015	8092015-H
.078	2,0	39	4,0	3		8088020	8088020-H	8092020	8092020-H
.098	2,5	39	5,0	3		8088025	8088025-H	8092025	8092025-H
.118	3	50	6,0	4		8088030	8088030-H	8092030	8092030-H
.157	4	50	8,0	5		8088040	8088040-H	8092040	8092040-H
.197	5	50	10	6		8088050	8088050-H	8092050	8092050-H
.236	6	60	12	8		8088060	8088060-H	8092060	8092060-H
.315	8	70	16	10		8088080	8088080-H	8092080	8092080-H
.394	10	70	18	12		8088100	8088100-H	8092100	8092100-H
.472	12	70	20	12		8088120	8088120-H	8092120	8092120-H
.630	16	80	26	16		8088160	8088160-H	8092160	8092160-H
.787	20	100	32	20		8088200	8088200-H	8092200	8092200-H

* Angle 40° – 60° : special for engraving

AVAILABLE SEPTEMBER 2006
COBALT BASED – WITH HYBRID MULTI-LAYER COATING
FOR MACHINING WITH COOLANT AND DRY

COMBI-MAG 6 OPERATIONS

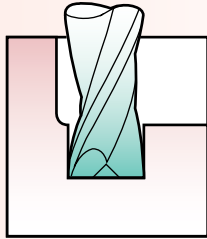


STANDARD					Angle 90°
Diameter inch mm	L	\	T*		Red'X 007
.118 3	1.970	.236	.012		0070300
1/8 3.17	1.970	.236	.015		0070317
.157 4	2.050	.315	.015		0070400
3/16 4.76	2.360	.354	.020		0070476
.197 5	2.360	.400	.020		0070500
.236 6	2.600	.472	.023		0070600
1/4 6.35	2.600	.472	.023		0070635
5/16 7.93	3.110	.552	.032		0070793
.315 8	3.110	.552	.032		0070800
3/8 9.52	3.500	.625	.040		0070952
.394 10	3.500	.625	.040		0071000
.472 12	4.000	.700	.050		0071200
1/2 12.7	4.000	.750	.050		0071270
.551 14	4.530	.825	.055		0071400
5/8 15.87	4.530	.950	.063		0071587
.630 16	4.530	.950	.063		0071600

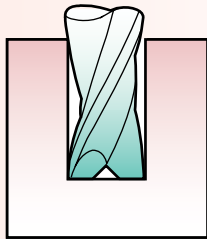
Red'X Coating can be used for dry machining
– and using coolant will add lubricity.

STANDARD LENGTH MINIATURE END-MILLS

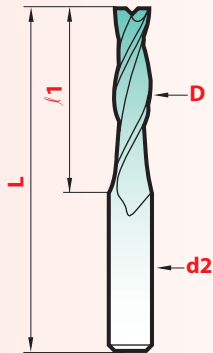
TOLERANCE 0 - .0004"



SLOTING
ENGRAVING



FLAT BOTTOM
BORING



USING
RECOMMENDATIONS
Page 43

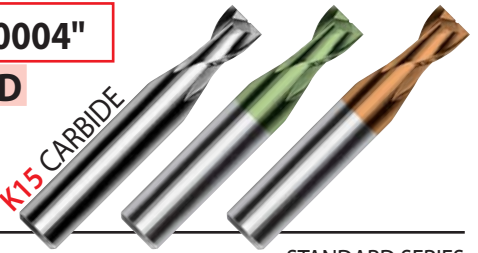
PRECISION MINIATURE END-MILLS

TOLERANCE 0 - .0004"

$\lambda \approx 2-3 \times D$



K15 CARBIDE



STANDARD SERIES

Diameter inch	mm	\1	L	d2	magaforce 8500	Graph'X 8500-G	Hard'X 8500-H
.0020	0,05	.004	1-1/2	.118 3 mm	85000005		
.0024	0,06	.005			85000006		
.0031	0,08	.006			85000008		
.0039	0,10	.008			85000010		
.0047	0,12	.009			85000012		
.0059	0,15	.012			85000015		
.0079	0,20	.020			85000020		
.0098	0,25	.020			85000025		
.0118	0,30	.039			85000030	85000030-G	8500030-H
.0138	0,35	.039			85000035	85000035-G	8500035-H
.0157	0,40	.039			85000040	85000040-G	8500040-H
.0177	0,45	.039			85000045	85000045-G	8500045-H
.0197	0,50	.059			85000050	85000050-G	8500050-H
.0216	0,55	.059			85000055	85000055-G	8500055-H
.0236	0,60	.059			85000060	85000060-G	8500060-H
.0256	0,65	.059			85000065	85000065-G	8500065-H
.0276	0,70	.079			85000070	85000070-G	8500070-H
.0295	0,75	.079			85000075	85000075-G	8500075-H
.0315	0,80	.079			85000080	85000080-G	8500080-H
.0335	0,85	.079			85000085	85000085-G	8500085-H
.0354	0,90	.098			85000090	85000090-G	8500090-H
.0374	0,95	.098			85000095	85000095-G	8500095-H
.0394	1,00	0,12			85000100	85000100-G	8500100-H
.0413	1,05	0,12			85000105	85000105-G	8500105-H
.0433	1,10	0,12			85000110	85000110-G	8500110-H
.0452	1,15	0,12			85000115	85000115-G	8500115-H
.0472	1,20	0,16			85000120	85000120-G	8500120-H
.0492	1,25	0,16			85000125	85000125-G	8500125-H
.0512	1,30	0,16			85000130	85000130-G	8500130-H
.0551	1,40	0,16			85000140	85000140-G	8500140-H
.0591	1,50	0,16			85000150	85000150-G	8500150-H
.0630	1,60	0,20			85000160	85000160-G	8500160-H
.0669	1,70	0,20			85000170	85000170-G	8500170-H
.0709	1,80	0,20			85000180	85000180-G	8500180-H
.0748	1,90	0,20			85000190	85000190-G	8500190-H
.0787	2,00	0,20			85000200	85000200-G	8500200-H
.0827	2,10	0,24			85000210	85000210-G	8500210-H
.0866	2,20	0,24			85000220	85000220-G	8500220-H

TOLERANCE 0 - .0004"



STANDARD SERIES

Diameter inch mm	λ1	L	d2	magaforce 8500	Graph'X 8500-G	Hard'X 8500-H
.0906 2,30	0.24	1-1/2	.118 3 mm	85000230	85000230-G	8500230-H
.0945 2,40	0.24			85000240	85000240-G	8500240-H
.0984 2,50	0.28			85000250	85000250-G	85000250-H
.1024 2,60	0.28			85000260	85000260-G	85000260-H
.1063 2,70	0.28			85000270	85000270-G	85000270-H
.1102 2,80	0.28			85000280	85000280-G	85000280-H
.1142 2,90	0.28			85000290	85000290-G	85000290-H
.1181 3,00	0.39			85000300	85000300-G	85000300-H
.1220 3,10	0.39	1-3/4	.157 4 mm	85000310	85000310-G	85000310-H
.1260 3,20	0.39			85000320	85000320-G	85000320-H
.1299 3,30	0.39			85000330	85000330-G	85000330-H
.1339 3,40	0.39			85000340	85000340-G	85000340-H
.1378 3,50	0.39			85000350	85000350-G	85000350-H
.1417 3,60	0.39			85000360	85000360-G	85000360-H
.1457 3,70	0.39			85000370	85000370-G	85000370-H
.1496 3,80	0.39			85000380	85000380-G	85000380-H
.1535 3,90	0.39			85000390	85000390-G	85000390-H

STANDARD SERIES

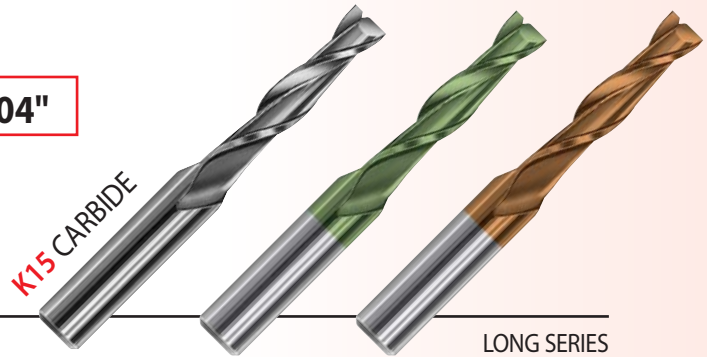
Diameter inch mm	λ1	L	d2	magaforce 8500	Graph'X 8500-G	Hard'X 8500-H
.1575 4,00	0.47	2-3/16	.197 5 mm	85000400	85000400-G	85000400-H
.1614 4,10	0.47			85000410	85000410-G	85000410-H
.1654 4,20	0.47			85000420	85000420-G	85000420-H
.1693 4,30	0.47			85000430	85000430-G	85000430-H
.1732 4,40	0.47			85000440	85000440-G	85000440-H
.1772 4,50	0.47			85000450	85000450-G	85000450-H
.1811 4,60	0.47			85000460	85000460-G	85000460-H
.1850 4,70	0.47			85000470	85000470-G	85000470-H
.1890 4,80	0.47	2-3/16	.236 6 mm	85000480	85000480-G	85000480-H
.1929 4,90	0.47			85000490	85000490-G	85000490-H
.1969 5,00	0.55			85000500	85000500-G	85000500-H
.2008 5,10	0.55			85000510	85000510-G	85000510-H
.2047 5,20	0.55			85000520	85000520-G	85000520-H
.2087 5,30	0.55			85000530	85000530-G	85000530-H
.2126 5,40	0.55			85000540	85000540-G	85000540-H
.2165 5,50	0.55			85000550	85000550-G	85000550-H
.2205 5,60	0.55			85000560	85000560-G	85000560-H
.2244 5,70	0.55			85000570	85000570-G	85000570-H
.2283 5,80	0.55			85000580	85000580-G	85000580-H
.2323 5,90	0.55			85000590	85000590-G	85000590-H

TOLERANCE 0 - .0004"

λ = 5 x D



L = 1-1/2 d2 = .118 / 3 mm

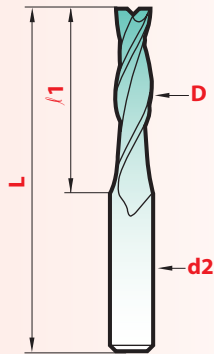
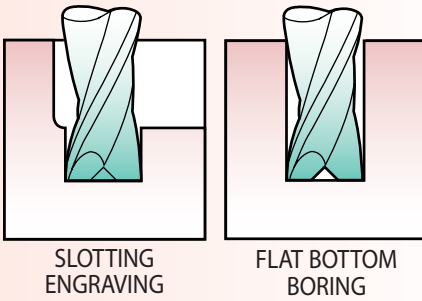


LONG SERIES

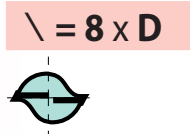
Diameter inch mm	λ1	magaforce 8509	Graph'X 8509-G	Hard'X 8509-H
.0157 0,4	.078	850904	850904-G	850904-H
.0197 0,5	.098	850905	850905-G	850905-H
.0236 0,6	.118	850906	850906-G	850906-H
.0276 0,7	.137	850907	850907-G	850907-H
.0315 0,8	.157	850908	850908-G	850908-H
.0354 0,9	.177	850909	850909-G	850909-H
.0394 1,0	.197	850910	850910-G	850910-H
.0472 1,2	.236	850912	850912-G	850912-H
.0591 1,5	.295	850915	850915-G	850915-H
.0787 2,0	.394	850920	850920-G	850920-H

*Call for pricing

EXTRA-LONG MINIATURE END-MILLS



TOLERANCE 0 - .0004"



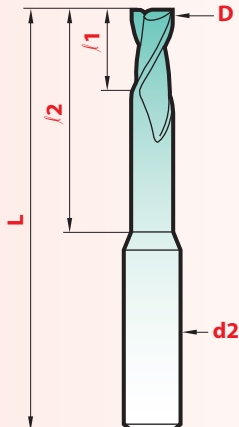
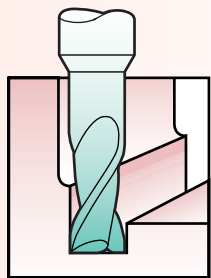
K15 CARBIDE

EXTRA LONG SERIES

Diameter		$\ 1$	L	d2	magaforce 8510	Graph'X 8510-G	Hard'X 8510-H
inch	mm						
.0197	0,5	.157	1-1/2	.118 3 mm	851005	851005-G	851005-H
.0236	0,6	.197			851006	851006-G	851006-H
.0315	0,8	.236			851008	851008-G	851008-H
.0394	1,0	.315			851010	851010-G	851010-H
.0472	1,2	.354	1-3/4	.157 4 mm	851012	851012-G	851012-H
.0591	1,5	.472			851015	851015-G	851015-H
.0787	2,0	.630			851020	851020-G	851020-H
.0984	2,5	.788	2-3/8	.197 5 mm	851025	851025-G	851025-H
.1181	3,0	.945			851030	851030-G	851030-H

*Call for pricing

MINIATURE END-MILLS WITH BACK CLEARANCE



$\ = 1,5 \times D$



K15 CARBIDE

LONG NECK SERIES

d2 = .118 / 3 mm

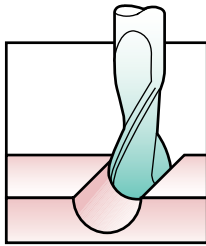
Diameter $\times 2$		$\ 1$	L	magaforce 8507-D	Graph'X 8507-DG	Hard'X 8507-DH
inch	mm					
.0157 x .078	0,4 x 2	.024	1-1/2	8507D0402	8507DG0402	8507DH0402
.0197 x .078	0,5 x 2	.027	1-1/2	8507D0502	8507DG0502	8507DH0502
.0197 x .157	0,5 x 4	.027	1-1/2	8507D0504	8507DG0504	8507DH0504
.0197 x .236	0,5 x 6	.027	2-3/8	8507D0506	8507DG0506	8507DH0506
.0236 x .157	0,6 x 4	.029	1-1/2	8507D0604	8507DG0604	8507DH0604
.0276 x .157	0,7 x 4	.035	1-1/2	8507D0704	8507DG0704	8507DH0704
.0315 x .157	0,8 x 4	.041	1-1/2	8507D0804	8507DG0804	8507DH0804
.0315 x .236	0,8 x 6	.041	1-1/2	8507D0806	8507DG0806	8507DH0806
.0315 x .354	0,8 x 9	.041	2-3/8	8507D0809	8507DG0809	8507DH0809
.0354 x .236	0,9 x 6	.053	1-1/2	8507D0906	8507DG0906	8507DH0906
.0394 x .157	1,0 x 4	.059	1-1/2	8507D1004	8507DG1004	8507DH1004
.0394 x .236	1,0 x 6	.059	1-1/2	8507D1006	8507DG1006	8507DH1006
.0394 x .354	1,0 x 9	.059	1-1/2	8507D1009	8507DG1009	8507DH1009
.0394 x .472	1,0 x 12	.059	2-3/8	8507D1012	8507DG1012	8507DH1012
.0472 x .236	1,2 x 6	.071	1-1/2	8507D1206	8507DG1206	8507DH1206
.0472 x .354	1,2 x 9	.071	1-1/2	8507D1209	8507DG1209	8507DH1209
.0551 x .236	1,4 x 6	.083	1-1/2	8507D1406	8507DG1406	8507DH1406
.0551 x .354	1,4 x 9	.083	1-1/2	8507D1409	8507DG1409	8507DH1409
.0591 x .236	1,5 x 6	.089	1-1/2	8507D1506	8507DG1506	8507DH1506
.0591 x .354	1,5 x 9	.089	1-1/2	8507D1509	8507DG1509	8507DH1509
.0591 x .472	1,5 x 12	.089	2-3/8	8507D1512	8507DG1512	8507DH1512
.0709 x .354	1,8 x 9	.106	1-1/2	8507D1809	8507DG1809	8507DH1809
.0709 x .472	1,8 x 12	.106	1-1/2	8507D1812	8507DG1812	8507DH1812
.0787 x .354	2,0 x 9	.118	1-1/2	8507D2009	8507DG2009	8507DH2009
.0787 x .472	2,0 x 12	.118	1-1/2	8507D2012	8507DG2012	8507DH2012
.0787 x .590	2,0 x 15	.118	2-3/8	8507D2015	8507DG2015	8507DH2015
.0984 x .590	2,5 x 15	.148	2-3/8	8507D2515	8507DG2515	8507DH2515

$\ 2$: tolerance - .0008 - .0020

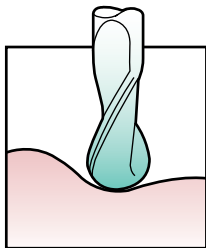
*Call for pricing

MINIATURE BALL-END END-MILLS

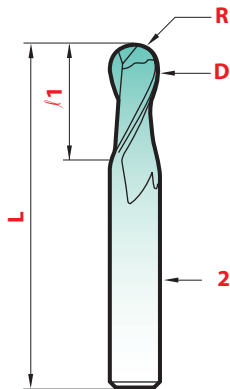
PRECISION $R \pm .0004$



SLOTING
ENGRAVING



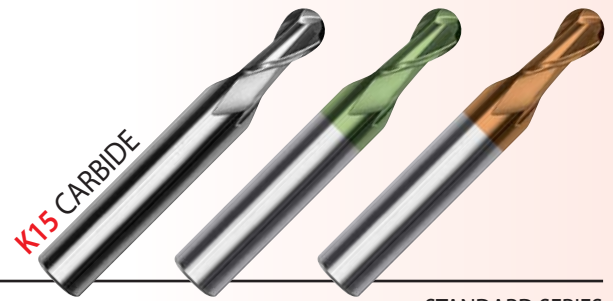
MOLD SHAPING



D	d2	L
.0039 to .0984	.118	1-1/2
.1181 to .1378	.157	1-3/4
.1575 to .1772	.197	2
.1968 to .2165	.236	2

Tolerances

$\backslash \approx 2-3 \times D$



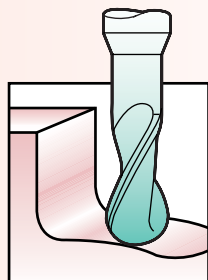
STANDARD SERIES

Diameter inch mm	$\backslash 1$	R	magaforce 8529	Graph'X 8529-G	Hard'X 8529-H
.0039 0,1	.008	.0020	85290010		
.0059 0,15	.012	.0030	85290015		
.0079 0,2	.020	.0040	85290020		
.0098 0,25	.020	.0049	85290025		
.0118 0,3	.040	.0059	85290030	85290030-G	85290030-H
.0138 0,35	.040	.0069	85290035		85290035-H
.0157 0,4	.040	.0079	85290040	85290040-G	85290040-H
.0197 0,5	.060	.0098	85290050	85290050-G	85290050-H
.0236 0,6	.060	.0118	85290060	85290060-G	85290060-H
.0276 0,7	.080	.0138	85290070	85290070-G	85290070-H
.0315 0,8	.080	.0158	85290080	85290080-G	85290080-H
.0354 0,9	.100	.0177	85290090	85290090-G	85290090-H
.0394 1,0	.120	.0197	85290100	85290100-G	85290100-H
.0433 1,1	.120	.0217	85290110	85290110-G	85290110-H
.0472 1,2	.160	.0236	85290120	85290120-G	85290120-H
.0551 1,4	.160	.0276	85290140	85290140-G	85290140-H
.0591 1,5	.160	.0295	85290150	85290150-G	85290150-H
.0630 1,6	.160	.0315	85290160	85290160-G	85290160-H
.0709 1,8	.200	.0354	85290180	85290180-G	85290180-H
.0787 2,0	.200	.0394	85290200	85290200-G	85290200-H
.0984 2,5	.275	.0492	85290250	85290250-G	85290250-H
.1181 3,0	.400	.0590	85290300	85290300-G	85290300-H
.1378 3,5	.400	.0689	85290350	85290350-G	85290350-H
.1575 4,0	.475	.0787	85290400	85290400-G	85290400-H
.1772 4,5	.475	.0886	85290450	85290450-G	85290450-H
.1968 5,0	.550	.0984	85290500	85290500-G	85290500-H
.2165 5,5	.550	.1083	85290550	85290550-G	85290550-H

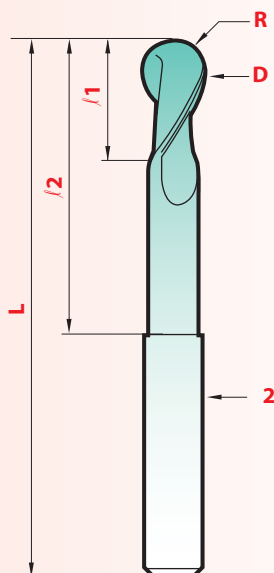
USING
RECOMMENDATIONS
Page 43

MINIATURE BALL-END END-MILLS WITH BACK CLEARANCE

PRECISION $R \pm .0004$



MACHININGS
HARD TO REACH



$\backslash = -1,5 \times D$



K15 CARBIDE

$d2 = .118 / 3 \text{ mm (except *)}$

LONG NECK SERIES

Diameter inch	$\backslash 2$ mm	L	$\backslash 1$	R	carbide 8527-D	Graph'X 8527-DG	Hard'X 8527-DH
.0157 x .078	0,4 x 2	1-1/2	.024	.0079	8527D0402	8527DG0402	8527DH0402
.0197 x .078	0,5 x 2	1-1/2	.027	.0098	8527D0502	8527DG0502	8527DH0502
.0197 x .157	0,5 x 4	1-1/2	.027	.0098	8527D0504	8527DG0504	8527DH0504
.0197 x .236	0,5 x 6	2-3/8	.027	.0098	8527D0506	8527DG0506	8527DH0506
.0236 x .157	0,6 x 4	1-1/2	.029	.0118	8527D0604	8527DG0604	8527DH0604
.0315 x .157	0,8 x 4	1-1/2	.041	.0158	8527D0804	8527DG0804	8527DH0804
.0315 x .236	0,8 x 6	1-1/2	.041	.0158	8527D0806	8527DG0806	8527DH0806
.0315 x .354	0,8 x 9	2-3/8	.041	.0158	8527D0809	8527DG0809	8527DH0809
.0394 x .157	1,0 x 4	1-1/2	.059	.0197	8527D1004	8527DG1004	8527DH1004
.0394 x .197	1,0 x 5	1-1/2	.059	.0197	8527D1005	8527DG1005	8527DH1005
.0394 x .236	1,0 x 6	1-1/2	.059	.0197	8527D1006	8527DG1006	8527DH1006
.0394 x .354	1,0 x 9	1-1/2	.059	.0197	8527D1009	8527DG1009	8527DH1009
.0394 x .472	1,0 x 12	2-3/8	.059	.0197	8527D1012	8527DG1012	8527DH1012
.0472 x .236	1,2 x 6	1-1/2	.071	.0236	8527D1206	8527DG1206	8527DH1206
.0551 x .276	1,4 x 7	1-3/4*	.083	.0276	8527D1407	8527DG1407	8527DH1407
.0591 x .236	1,5 x 6	1-1/2	.089	.0295	8527D1506	8527DG1506	8527DH1506
.0591 x .295	1,5 x 7,5	1-3/4*	.089	.0295	8527D1575	8527DG1575	8527DH1575
.0591 x .354	1,5 x 9	1-1/2	.089	.0295	8527D1509	8527DG1509	8527DH1509
.0591 x .472	1,5 x 12	2-3/8	.089	.0295	8527D1512	8527DG1512	8527DH1512
.0630 x .315	1,6 x 8	1-3/4*	.094	.0315	8527D1608	8527DG1608	8527DH1608
.0709 x .354	1,8 x 9	1-3/4*	.106	.0354	8527D1809	8527DG1809	8527DH1809
.0787 x .354	2,0 x 9	1-1/2	.118	.0394	8527D2009	8527DG2009	8527DH2009
.0787 x .394	2,0 x 10	1-3/4*	.118	.0394	8527D2010	8527DG2010	8527DH2010
.0787 x .472	2,0 x 12	1-1/2	.118	.0394	8527D2012	8527DG2012	8527DH2012
.0787 x .590	2,0 x 15	2-3/8	.118	.0394	8527D2015	8527DG2015	8527DH2015
.0984 x .472	2,5 x 12	1-3/4*	.148	.0492	8527D2512	8527DG2512	8527DH2512
.0984 x .590	2,5 x 15	2-3/8	.148	.0492	8527D2515	8527DG2515	8527DH2515
.1181 x .590	3,0 x 15	1-3/4*	.177	.0590	8527D3015	8527DG3015	8527DH3015

* $d2 = .157 / 4 \text{ mm}$

$\backslash = -1,5 \times D$



K15 CARBIDE

$L = 2-3/8$

$d2 = .118 / 3 \text{ mm}$

LONG SHANK SERIES

Diameter inch	mm	$\backslash 1$	R	carbide 8527-L
.0197	0,5	.027	.0098	8527L05
.0315	0,8	.041	.0158	8527L08
.0394	1,0	.059	.0197	8527L10
.0591	1,5	.089	.0295	8527L15
.0787	2,0	.118	.0394	8527L20
.0984	2,5	.148	.0492	8527L25

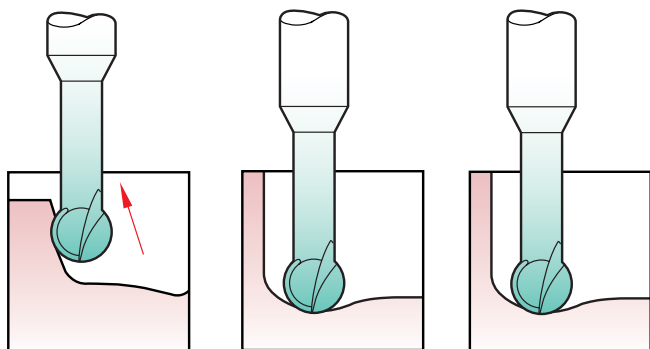
MINIATURE round corner MILLING CUTTERS



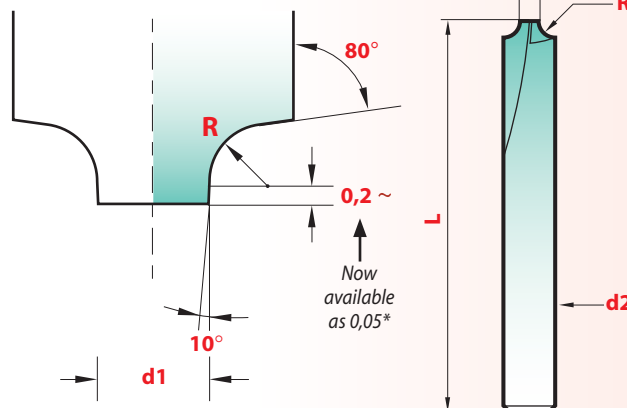
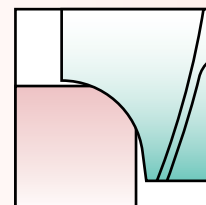
METRIC

Radius			d1	d2	L	Carbide 8555
	inch	mm				
.0040		0,10	0,8	3	50	8555010
.0060		0,15	0,8	3	50	8555015
.0080		0,20	0,8	3	50	8555020
.0100		0,25	1,0	3	50	8555025
.0120		0,30	1,0	3	50	8555030
.0160		0,40	1,0	3	50	8555040
.0195		0,50	1,5	4	50	8555050
.0235		0,60	1,5	4	50	8555060
.0275		0,70	1,5	4	50	8555070
.0295		0,75	1,5	4	50	8555075
.0315		0,80	1,5	4	50	8555080
.0355		0,90	1,5	4	50	8555090
.0395		1,00	1,5	4	50	8555100
.0490		1,25	2,0	6	50	8555125
.0590		1,50	2,0	6	50	8555150
.0690		1,75	2,0	6	50	8555175
.0790		2,00	2,5	8	50	8555200
.0885		2,25	2,5	8	50	8555225
.0985		2,50	2,5	8	50	8555250
.1180		3,00	3,0	10	55	8555300
.1575		4,00	3,0	12	63	8555400

*Call for pricing



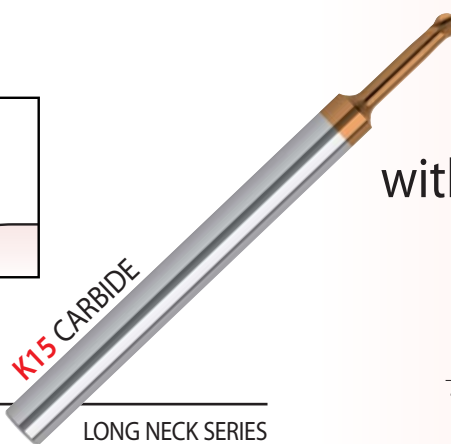
These cutters are designed for CNC machine. They allow machining even very thin materials. Many easy regrinds.



The radius is positioned in relation to the small Ø d1-: so it is possible to machine compound forms, small slots and holes from 0,8 mm.

We also offer a reduced neck series for machining inside smaller holes.

220° ball-end MINIATURE END-MILLS with back clearance



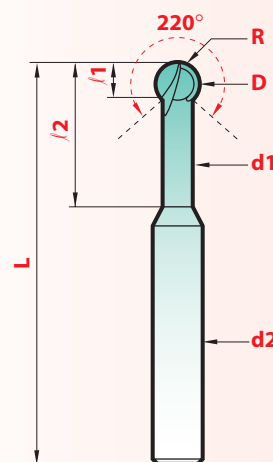
$$\backslash 2 = 5 \times D$$

METRIC

Diameter		d1	d2	L	\1	\2	R	Hard'X 8522-H
inch	mm							
.0315	0,8	0,70	3	60	0,55	4,0	0,4	8522H08
.0394	1,0	0,85	3	60	0,70	5,0	0,5	8522H10
.0472	1,2	1,00	3	60	0,80	6,0	0,6	8522H12
.0590	1,5	1,30	3	60	1,00	7,5	0,75	8522H15
.0787	2,0	1,70	3	60	1,35	10,0	1,0	8522H20
.1180	3,0	2,60	6	75	2,00	15,0	1,5	8522H30
.1575	4,0	3,45	6	75	2,70	20,0	2,0	8522H40
.1969	5,0	4,30	6	75	3,40	25,0	2,5	8522H50

*Call for pricing

LONG NECK SERIES



HIGH PRECISION

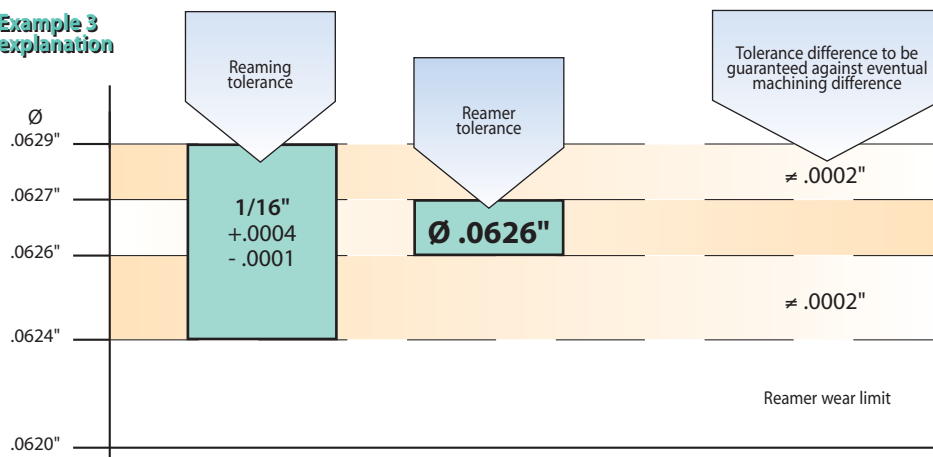


REAMERS

1 - HOW TO CHOOSE STANDARD INCH REAMERS

Examples	REAMING (Hole)		REAMER (Tool)	
	Ø	Tolerance	Ø	Tolerance
1	1/64" + .00006 - .00012	.01568" .01550"	EDP # 861000395 .01551"	.01559" .01551"
2	1/32" + .0001 - .0002	.03135" .03105"	EDP # 86000079 .03110"	.03122" .03110"
3	1/16" + .0004 - .0001	.0629" .0624"	EDP # 86000159 .0626"	.06272" .06260"

Example 3 explanation

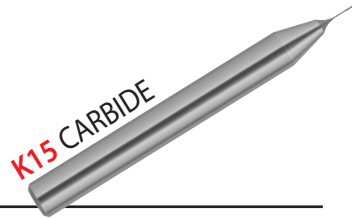


2 - HOW TO CHOOSE METRIC REAMERS

Code 8610 - 8600 : pages 37-41

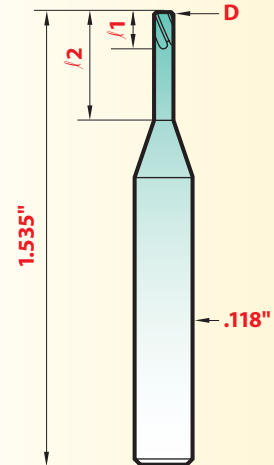
Tolerance	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14
D10	2,04	3,04	4,05	5,06	6,06	8,07	10,08	12,10	14,10
E 8	2,02	3,02	4,03	5,03	6,03	8,03	10,03	12,04	14,04
E 9	2,03	3,03	4,04	5,04	6,04	8,05	10,05	12,06	14,06
F 7	2,01	3,01	4,01	5,01	6,01	8,02	10,02	12,02	14,02
F 8	2,01	3,01	4,02	5,02	5,02	8,02	10,02	12,03	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	3,00	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	3,01	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





HIGH PRECISION MICRO-REAMERS

REAMING



MICRO-PRECISION

D .0002" increment	\1	\2	magaforce 8610
.0079 to .0096	.036	.079	EDP # SEE BELOW
.0098 to .0116	.043	.098	
.0118 to .0136	.055	.118	
.0138 to .0156	.067	.138	
.0157 to .0195	.079	.157	
.0197 to .0234	.091	.197	

Micro-reamers manufactured and stocked in all diameters at every .0002" increment. Their reinforced shank offers a greater stability necessary for these high precision tools.

TOLERANCE ± .00004"

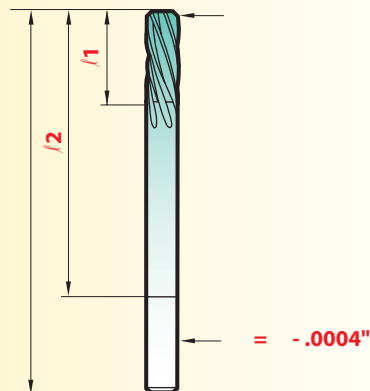
4 flutes, 10 degree left spiral, right hand cut.

EDP 8610				SIZE
#	mm	Decimal	inch	Wire
86100	0.200	.0079		92
86100	0.205	.0081		
86100	0.210	.0083		91
86100	0.215	.0085		
86100	0.220	.0087		90
86100	0.225	.0089		
86100	0.230	.0091		89
86100	0.235	.0093		
86100	0.240	.0094		88
86100	0.245	.0096		
86100	0.250	.0098		
86100	0.255	.0100		87
86100	0.260	.0102		
86100	0.265	.0104		86
86100	0.270	.0106		
86100	0.275	.0108		
86100	0.280	.0110		85
86100	0.285	.0112		
86100	0.290	.0114		84
86100	0.295	.0116		
86100	0.300	.0118		
86100	0.305	.0120		83
86100	0.310	.0122		
86100	0.315	.0124		82
86100	0.320	.0126		
86100	0.325	.0128		
86100	0.330	.0130		81

EDP 8610				SIZE
#	mm	Decimal	inch	Wire
86100	0.335	.0132		
86100	0.340	.0134		80
86100	0.345	.0136		
86100	0.350	.0138		
86100	0.355	.0140		
86100	0.360	.0142		
86100	0.365	.0144		79
86100	0.370	.0146		
86100	0.375	.0148		
86100	0.380	.0150		
86100	0.385	.0152		
86100	0.390	.0154		
86100	0.395	.0156	1/64	
86100	0.400	.0157		
86100	0.405	.0159		78
86100	0.410	.0161		
86100	0.415	.0163		
86100	0.420	.0165		
86100	0.425	.0167		
86100	0.430	.0169		
86100	0.435	.0171		
86100	0.440	.0173		
86100	0.445	.0175		
86100	0.450	.0177		
86100	0.455	.0179		77
86100	0.460	.0181		
86100	0.465	.0183		

EDP 8610				SIZE
#	mm	Decimal	inch	Wire
86100	0.470	.0185		
86100	0.475	.0187		
86100	0.480	.0189		
86100	0.485	.0191		
86100	0.490	.0193		
86100	0.495	.0195		
86100	0.500	.0197		
86100	0.505	.0199		76
86100	0.510	.0201		
86100	0.515	.0203		
86100	0.520	.0205		
86100	0.525	.0207		
86100	0.530	.0209		75
86100	0.535	.0211		
86100	0.540	.0213		
86100	0.545	.0215		
86100	0.550	.0217		
86100	0.555	.0219		
86100	0.560	.0220		
86100	0.565	.0222		
86100	0.570	.0224		74
86100	0.575	.0226		
86100	0.580	.0228		
86100	0.585	.0230		
86100	0.590	.0232		
86100	0.595	.0234		

HIGH PRECISION MINIATURE REAMERS



TOLERANCE 0 + .00012"

Ø .0236" to .0929" = 4 flutes,
Ø .0933" to .5138" = 6 flutes,
10 degree left spiral/right hand cut.



MICRO-PRECISION

D .0004" increment	\1	\2	L	d2	magaforce 8600
.0236 to .0413	.275	.393	1.30	D	EDP # SEE BELOW
.0417 to .0610	.393	.944	1.58	D	
.0614 to .0929	.433	1.220	1.97	D	
.0933 to .1476	.590	1.500	2.25	D	
.1480 to .1673	.748	1.930	2.95	.158	
.1677 to .1870	.827	2"	3.15	.177	
.1874 to .2087	.906	2.32	3.39	.197	
.209 to .228	1.024	2.560	3.66	.216	
.229 to .263	1.100	2.795	3.975	.236	

Note: larger sizes up to .790" Code 8600 and/or HSS-CO M35
Code 600 are available within 2 weeks. Call for information

EDP 8600					SIZE
#	mm	Decimal	inch	Wire	
86000	0.60	.0236			
86000	0.61	.0240		73	
86000	0.62	.0244			
86000	0.63	.0248		72	
86000	0.64	.0252			
86000	0.65	.0256			
86000	0.66	.0260		71	
86000	0.67	.0264			
86000	0.68	.0268			
86000	0.69	.0272			
86000	0.70	.0276			
86000	0.71	.0280		70	
86000	0.72	.0283			
86000	0.73	.0287			
86000	0.74	.0291		69	
86000	0.75	.0295			
86000	0.76	.0299			
86000	0.77	.0303			
86000	0.78	.0307			
86000	0.79	.0311	1/32	68	
86000	0.80	.0315			
86000	0.81	.0319		67	
86000	0.82	.0323			
86000	0.83	.0327			
86000	0.84	.0331		66	
86000	0.85	.0335			
86000	0.86	.0339			
86000	0.87	.0343			

EDP 8600					SIZE
#	mm	Decimal	inch	Wire	
86000	0.88	.0346			
86000	0.89	.0350		65	
86000	0.90	.0354			
86000	0.91	.0358		64	
86000	0.92	.0362			
86000	0.93	.0366			
86000	0.94	.0370		63	
86000	0.95	.0374			
86000	0.96	.0378		62	
86000	0.97	.0382			
86000	0.98	.0386			
86000	0.99	.0390		61	
86000	1.00	.0394			
86000	1.01	.0398		60	
86000	1.02	.0402			
86000	1.03	.0406			
86000	1.04	.0409		59	
86000	1.05	.0413			
86000	1.06	.0417			
86000	1.07	.0421		58	
86000	1.08	.0425			
86000	1.09	.0429		57	
86000	1.10	.0433			
86000	1.11	.0437			
86000	1.12	.0441			
86000	1.13	.0445			
86000	1.14	.0449			
86000	1.15	.0453			

EDP 8600					SIZE
#	mm	Decimal	inch	Wire	
86000	1.16	.0457			
86000	1.17	.0461			
86000	1.18	.0465		56	
86000	1.19	.0469	3/64		
86000	1.20	.0472			
86000	1.21	.0476			
86000	1.22	.0480			
86000	1.23	.0484			
86000	1.24	.0488			
86000	1.25	.0492			
86000	1.26	.0496			
86000	1.27	.0500			
86000	1.28	.0504			
86000	1.29	.0508			
86000	1.30	.0512			
86000	1.31	.0516			
86000	1.32	.0520		55	
86000	1.33	.0524			
86000	1.34	.0528			
86000	1.35	.0531			
86000	1.36	.0535			
86000	1.37	.0539			
86000	1.38	.0543			
86000	1.39	.0547			
86000	1.40	.0551		54	
86000	1.41	.0555			
86000	1.42	.0559			
86000	1.43	.0563			

EDP 8600					SIZE
#	mm	Decimal	inch	Wire	
86000	1.44	.0567			
86000	1.45	.0571			
86000	1.46	.0575			
86000	1.47	.0579			
86000	1.48	.0583			
86000	1.49	.0587			
86000	1.50	.0590			
86000	1.51	.0594		53	
86000	1.52	.0598			
86000	1.53	.0602			
86000	1.54	.0606			
86000	1.55	.0610			
86000	1.56	.0614			
86000	1.57	.0618			
86000	1.58	.0622			
86000	1.59	.0626	1/16		
86000	1.60	.0630			
86000	1.61	.0634		52	
86000	1.62	.0638			
86000	1.63	.0642			
86000	1.64	.0646			
86000	1.65	.0650			
86000	1.66	.0654			
86000	1.67	.0657			
86000	1.68	.0661			
86000	1.69	.0665			
86000	1.70	.0669		51	
86000	1.71	.0673			

EDP 8600					SIZE	EDP 8600					SIZE	EDP 8600					SIZE	EDP 8600					SIZE
#	mm	Decimal	inch	Wire		#	mm	Decimal	inch	Wire		#	mm	Decimal	inch	Wire		#	mm	Decimal	inch	Wire	
86000	1.72	.0677				86000	2.18	.0858				86000	2.64	.1039			37	86000	3.10	.1220			
86000	1.73	.0681				86000	2.19	.0862			44	86000	2.65	.1043				86000	3.11	.1224			
86000	1.74	.0685				86000	2.20	.0866				86000	2.66	.1047				86000	3.12	.1228			
86000	1.75	.0689				86000	2.21	.0870				86000	2.67	.1051				86000	3.13	.1232			
86000	1.76	.0693				86000	2.22	.0874				86000	2.68	.1055				86000	3.14	.1236			
86000	1.77	.0697				86000	2.23	.0878				86000	2.69	.1059				86000	3.15	.1240			
86000	1.78	.0701			50	86000	2.24	.0882				86000	2.70	.1063				86000	3.16	.1244			
86000	1.79	.0705				86000	2.25	.0886				86000	2.71	.1067			36	86000	3.17	.1248			
86000	1.80	.0709				86000	2.26	.0890			43	86000	2.72	.1071				86000	3.18	.1252	1/8		
86000	1.81	.0713				86000	2.27	.0894				86000	2.73	.1075				86000	3.19	.1256			
86000	1.82	.0717				86000	2.28	.0898				86000	2.74	.1079				86000	3.20	.1260			
86000	1.83	.0720				86000	2.29	.0902				86000	2.75	.1083				86000	3.21	.1264			
86000	1.84	.0724				86000	2.30	.0906				86000	2.76	.1087				86000	3.22	.1268			
86000	1.85	.0728				86000	2.31	.0909				86000	2.77	.1091				86000	3.23	.1272			
86000	1.86	.0732			49	86000	2.32	.0913				86000	2.78	.1094	7/64			86000	3.24	.1276			
86000	1.87	.0736				86000	2.33	.0917				86000	2.79	.1098				86000	3.25	.1280			
86000	1.88	.0740				86000	2.34	.0921				86000	2.80	.1102			35	86000	3.26	.1283			30
86000	1.89	.0744				86000	2.35	.0925				86000	2.81	.1106				86000	3.27	.1287			
86000	1.90	.0748				86000	2.36	.0929				86000	2.82	.1110			34	86000	3.28	.1291			
86000	1.91	.0752				86000	2.37	.0933				86000	2.83	.1114				86000	3.29	.1295			
86000	1.92	.0756				86000	2.38	.0937	3/32		42	86000	2.84	.1118				86000	3.30	.1299			
86000	1.93	.0760			48	86000	2.39	.0941				86000	2.85	.1122				86000	3.31	.1303			
86000	1.94	.0764				86000	2.40	.0945				86000	2.86	.1126				86000	3.32	.1308			
86000	1.95	.0768				86000	2.41	.0949				86000	2.87	.1130			33	86000	3.33	.1311			
86000	1.96	.0772				86000	2.42	.0953				86000	2.88	.1134				86000	3.34	.1315			
86000	1.97	.0776				86000	2.43	.0957				86000	2.89	.1138				86000	3.35	.1319			
86000	1.98	.0780	5/64			86000	2.44	.0961			41	86000	2.90	.1142				86000	3.36	.1323			
86000	1.99	.0783				86000	2.45	.0965				86000	2.91	.1146				86000	3.37	.1327			
86000	2.00	.0787			47	86000	2.46	.0969				86000	2.92	.1150				86000	3.38	.1331			
86000	2.01	.0791				86000	2.47	.0972				86000	2.93	.1154				86000	3.39	.1335			
86000	2.02	.0795				86000	2.48	.0976				86000	2.94	.1157				86000	3.40	.1339			
86000	2.03	.0799				86000	2.49	.0980			40	86000	2.95	.1161			32	86000	3.41	.1343			
86000	2.04	.0803				86000	2.50	.0984				86000	2.96	.1165				86000	3.42	.1346			
86000	2.05	.0807				86000	2.51	.0988				86000	2.97	.1169				86000	3.43	.1350			
86000	2.06	.0811			46	86000	2.52	.0992				86000	2.98	.1173				86000	3.44	.1354			
86000	2.07	.0815				86000	2.53	.0996			39	86000	2.99	.1177				86000	3.45	.1358			
86000	2.08	.0819			45	86000	2.54	.1000				86000	3.00	.1181				86000	3.46	.1362			29
86000	2.09	.0823				86000	2.55	.1004				86000	3.01	.1185				86000	3.47	.1366			
86000	2.10	.0827				86000	2.56	.1008				86000	3.02	.1189				86000	3.48	.1370			
86000	2.11	.0831				86000	2.57	.1012				86000	3.03	.1193				86000	3.49	.1374			
86000	2.12	.0835				86000	2.58	.1016			38	86000	3.04	.1197				86000	3.50	.1378			
86000	2.13	.0839				86000	2.59	.1020				86000	3.05	.1201			31	86000	3.51	.1382			
86000	2.14	.0843				86000	2.60	.1024				86000	3.06	.1205				86000	3.52	.1386			
86000	2.15	.0846				86000	2.61	.1028				86000	3.07	.1209				86000	3.53	.1390			
86000	2.16	.0850				86000	2.62	.1031				86000	3.08	.1213				86000	3.54	.1394			
86000	2.17	.0854				86000	2.63	.1035				86000	3.09	.1217				86000	3.55	.1398			

EDP 8600					SIZE
#	mm	Decimal	inch	Wire	
86000	3.56	.1402			
86000	3.57	.1406	9/64	28	
86000	3.58	.1409			
86000	3.59	.1413			
86000	3.60	.1417			
86000	3.61	.1421			
86000	3.62	.1425			
86000	3.63	.1429			
86000	3.64	.1433			
86000	3.65	.1437			
86000	3.66	.1441		27	
86000	3.67	.1445			
86000	3.68	.1449			
86000	3.69	.1453			
86000	3.70	.1457			
86000	3.71	.1461			
86000	3.72	.1465			
86000	3.73	.1469		26	
86000	3.74	.1472			
86000	3.75	.1476			
86000	3.76	.1480			
86000	3.77	.1484			
86000	3.78	.1488			
86000	3.79	.1492			
86000	3.80	.1496		25	
86000	3.81	.1500			
86000	3.82	.1504			
86000	3.83	.1508			
86000	3.84	.1512			
86000	3.85	.1516			
86000	3.86	.1520			
86000	3.87	.1524			
86000	3.88	.1528			
86000	3.89	.1531			
86000	3.90	.1535			
86000	3.91	.1539			
86000	3.92	.1543			
86000	3.93	.1547			
86000	3.94	.1551			
86000	3.95	.1555			
86000	3.96	.1559			
86000	3.97	.1563	5/32		
86000	3.98	.1567			
86000	3.99	.1571		22	
86000	4.00	.1575			
86000	4.01	.1579			

EDP 8600					SIZE
#	mm	Decimal	inch	Wire	
86000	4.02	.1583			
86000	4.03	.1587			
86000	4.04	.1591		21	
86000	4.05	.1594			
86000	4.06	.1598			
86000	4.07	.1602			
86000	4.08	.1606			
86000	4.09	.1610		20	
86000	4.10	.1614			
86000	4.11	.1618			
86000	4.12	.1622			
86000	4.13	.1626			
86000	4.14	.1630			
86000	4.15	.1634			
86000	4.16	.1638			
86000	4.17	.1642			
86000	4.18	.1646			
86000	4.19	.1650			
86000	4.20	.1654			
86000	4.21	.1657			
86000	4.22	.1661		19	
86000	4.23	.1665			
86000	4.24	.1669			
86000	4.25	.1673			
86000	4.26	.1677			
86000	4.27	.1681			
86000	4.28	.1685			
86000	4.29	.1689			
86000	4.30	.1693		18	
86000	4.31	.1697			
86000	4.32	.1701			
86000	4.33	.1705			
86000	4.34	.1709			
86000	4.35	.1713			
86000	4.36	.1717			
86000	4.37	.1720	11/64		
86000	4.38	.1724			
86000	4.39	.1728		17	
86000	4.40	.1732			
86000	4.41	.1736			
86000	4.42	.1740			
86000	4.43	.1744			
86000	4.44	.1748			
86000	4.45	.1752			
86000	4.46	.1756			
86000	4.47	.1760			

EDP 8600					SIZE
#	mm	Decimal	inch	Wire	
86000	4.48	.1764			
86000	4.49	.1768		16	
86000	4.50	.1772			
86000	4.51	.1776			
86000	4.52	.1780			
86000	4.53	.1783			
86000	4.54	.1787			
86000	4.55	.1791			
86000	4.56	.1795			
86000	4.57	.1799		15	
86000	4.58	.1803			
86000	4.59	.1807			
86000	4.60	.1811			
86000	4.61	.1815			
86000	4.62	.1819		14	
86000	4.63	.1823			
86000	4.64	.1827			
86000	4.65	.1831			
86000	4.66	.1835			
86000	4.67	.1839			
86000	4.68	.1843			
86000	4.69	.1846			
86000	4.70	.1850		13	
86000	4.71	.1854			
86000	4.72	.1858			
86000	4.73	.1862			
86000	4.74	.1866			
86000	4.75	.1870			
86000	4.76	.1874	3/16		
86000	4.77	.1878			
86000	4.78	.1882			
86000	4.79	.1886			
86000	4.80	.1890		12	
86000	4.81	.1984			
86000	4.82	.1898			
86000	4.83	.1902			
86000	4.84	.1906			
86000	4.85	.1909			
86000	4.86	.1913		11	
86000	4.87	.1917			
86000	4.88	.1921			
86000	4.89	.1925			
86000	4.90	.1929			
86000	4.91	.1933		10	
86000	4.92	.1937			
86000	4.93	.1941			

EDP 8600					SIZE
#	mm	Decimal	inch	Wire	
86000	4.94	.1945			
86000	4.95	.1949			
86000	4.96	.1953			
86000	4.97	.1957			
86000	4.98	.1961		9	
86000	4.99	.1965			
86000	5.00	.1969			
86000	5.01	.1972			
86000	5.02	.1976			
86000	5.03	.1980			
86000	5.04	.1984			
86000	5.05	.1988		8	
86000	5.06	.1992			
86000	5.07	.1996			
86000	5.08	.2000			
86000	5.09	.2004			
86000	5.10	.2008		7	
86000	5.11	.2012			
86000	5.12	.2016			
86000	5.13	.2020			
86000	5.14	.2024			
86000	5.15	.2028			
86000	5.16	.2031	13/64		
86000	5.17	.2035			
86000	5.18	.2039		6	
86000	5.19	.2043			
86000	5.20	.2047			
86000	5.21	.2051			
86000	5.22	.2055		5	
86000	5.23	.2059			
86000	5.24	.2063			
86000	5.25	.2067			
86000	5.26	.2071			
86000	5.27	.2075			
86000	5.28	.2079			
86000	5.29	.2083			
86000	5.30	.2087			
86000	5.31	.2091		4	
86000	5.32	.2094			
86000	5.33	.2098			
86000	5.34	.2102			
86000	5.35	.2106			
86000	5.36	.2110			
86000	5.37	.2114			
86000	5.38	.2118			
86000	5.39	.2122			

EDP 8600					SIZE	EDP 8600					SIZE	EDP 8600					SIZE	EDP 8600					SIZE
#	mm	Decimal	inch	Wire		#	mm	Decimal	inch	Wire		#	mm	Decimal	inch	Wire		#	mm	Decimal	inch	Wire	
86000	5.40	.2126				86000	5.65	.2224				86000	5.90	.2323				86000	6.15	.2421			C
86000	5.41	.2130		3		86000	5.66	.2228				86000	5.91	.2327				86000	6.16	.2425			
86000	5.42	.2134				86000	5.67	.2232				86000	5.92	.2331				86000	6.17	.2429			
86000	5.43	.2138				86000	5.68	.2236				86000	5.93	.2335				86000	6.18	.2433			
86000	5.44	.2142				86000	5.69	.2240				86000	5.94	.2339		A		86000	6.19	.2437			
86000	5.45	.2146				86000	5.70	.2244				86000	5.95	.2343	15/64			86000	6.20	.2441			
86000	5.46	.2150				86000	5.71	.2248				86000	5.96	.2347				86000	6.21	.2445			
86000	5.47	.2154				86000	5.72	.2252				86000	5.97	.2350				86000	6.22	.2449			
86000	5.48	.2158				86000	5.73	.2256				86000	5.98	.2354				86000	6.23	.2453			
86000	5.49	.2161				86000	5.74	.2260				86000	5.99	.2358				86000	6.24	.2457			
86000	5.50	.2165				86000	5.75	.2264				86000	6.00	.2362				86000	6.25	.2461		D	
86000	5.51	.2169				86000	5.76	.2268				86000	6.01	.2366				86000	6.26	.2465			
86000	5.52	.2173				86000	5.77	.2272				86000	6.02	.2370				86000	6.27	.2468			
86000	5.53	.2177				86000	5.78	.2276				86000	6.03	.2374				86000	6.28	.2472			
86000	5.54	.2181				86000	5.79	.2280		1		86000	6.04	.2378				86000	6.29	.2476			
86000	5.55	.2185				86000	5.80	.2284				86000	6.05	.2382		B		86000	6.30	.2480			
86000	5.56	.2189	7/32			86000	5.81	.2288				86000	6.06	.2386				86000	6.31	.2484			
86000	5.57	.2193				86000	5.82	.2291				86000	6.07	.2390				86000	6.32	.2488			
86000	5.58	.2197				86000	5.83	.2295				86000	6.08	.2394				86000	6.33	.2492			
86000	5.59	.2201				86000	5.84	.2299				86000	6.09	.2398				86000	6.34	.2496			
86000	5.60	.2205				86000	5.85	.2303				86000	6.10	.2402				86000	6.35	.2500	1/4	E	
86000	5.61	.2209		2		86000	5.86	.2307				86000	6.11	.2406				86000	6.36	.2504			
86000	5.62	.2213				86000	5.87	.2311				86000	6.12	.2410				86000	6.37	.2508			
86000	5.63	.2217				86000	5.88	.2315				86000	6.13	.2413				86000	6.38	.2512			
86000	5.64	.2220				86000	5.89	.2319				86000	6.14	.2417				86000	6.39	.2517			

SPECIAL REAMERS

Please fill out the following form :

1 HOLE

☐ Blind

☐ Through

Number of holes _____

2 UTILIZATION

☐ Hand

☐ Machine

Straight shank

Morse taper shank

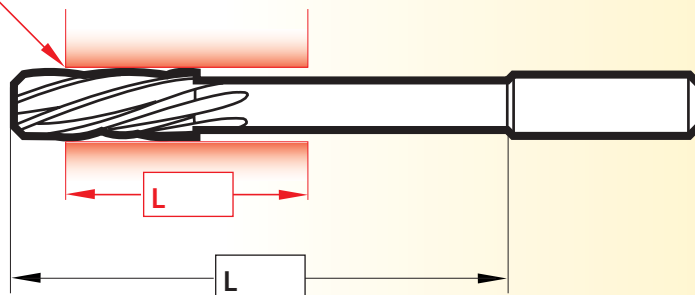
3 CONDITIONS

Material to bore

Material hardness

Drilling Ø

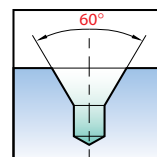
Tolerance =



Name and address

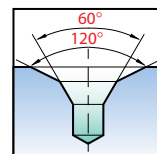
RECOMMENDATIONS FOR THE USE OF NC AND CENTER DRILLS

60° angle
standard center.



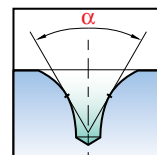
Form A

*The protective chamfer guarantees the center
from any risk of blows and deformation.
The 120° splay makes it easier to seize parts
between points on machine with automatic feed.*



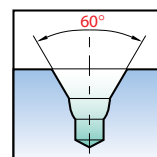
Form B

*The radius eliminates the risk of breakage,
provides an exact bearing,
saves as a protective chamfer.*



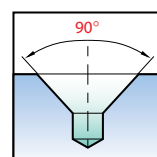
Form R

*The bulge reinforces the point, increases
the chips removal, makes the
lubrication of the drill easier.*



Form W

90° angle center.



MATERIAL	
STEEL:-	< 81 Rc (B)
	< 24 Rc (C)
	24 - 32 Rc
	32 - 41 Rc
Stainless Steel/Titanium	
Inconel/Nimonic/Waspaloy	
Brass/Copper	
Copper Alloys/Bronze	
Aluminum	
Hardened Aluminum < 6% Si	
Cast Aluminum > 6% Si	
Thermoplastics	

HSS						
SFM	FEED inch/rev					
	2mm 5/64	3mm 1/8	6mm 1/4	10mm 3/8	16mm 5/8	
99 - 148						
82 - 99	.0020	.0024	.0031	.0059	.0079	
49 - 82						
33 - 49	.0012	.0016	.0024	.0039	.0059	
20 - 33						
16 - 20	.0008	.0012	.0020	.0028	.0039	
132 - 197						
99 - 132	.0020	.0028	.0035	.0059	.0079	
494 - 658	.0031	.0039	.0079	.0157	.0197	
197 - 329	.0024	.0031	.0039	.0059	.0098	
132 - 197						
329 - 428	.0031	.0035	.0079	.0138	.0157	

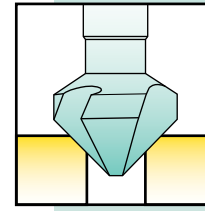
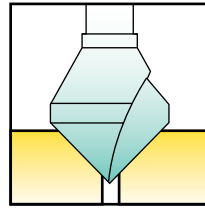
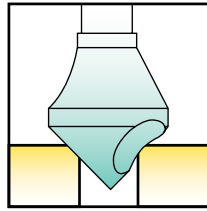
TIN						
SFM	FEED inch/rev					
	2mm 5/64	3mm 1/8	6mm 1/4	10mm 3/8	16mm 5/8	
197 - 296						
165 - 230	.0031	.0035	.0047	.0098	.0118	
115 - 148						
82 - 99	.0020	.0024	.0035	.0055	.0087	
39 - 53						
33 - 43	.0016	.0020	.0028	.0039	.0059	
362 - 428						
263 - 362	.0028	.0035	.0055	.0106	.0142	
1152 - 1481	.0047	.0055	.0118	.0217	.0256	
395 - 592						
263 - 395	.0031	.0039	.0059	.0118	.0157	
658 - 855	.0047	.0055	.0118	.0217	.0256	

MATERIAL	
STEEL:-	< 81 Rc (B)
	< 24 Rc (C)
	24 - 32 Rc
	32 - 41 Rc
Stainless Steel/Titanium	
Inconel/Nimonic/Waspaloy	
Brass/Copper	
Copper Alloys/Bronze	
Aluminum	
Hardened Aluminum < 6% Si	
Cast Aluminum > 6% Si	
Thermoplastics	

Futura						
SFM	FEED inch/rev					
	2mm 5/64	3mm 1/8	6mm 1/4	10mm 3/8	16mm 5/8	
296 - 395						
247 - 329	.0039	.0047	.0063	.0118	.0177	
165 - 214						
99 - 214	.0028	.0031	.0047	.0071	.0110	
59 - 79						
49 - 66	.0020	.0024	.0039	.0055	.0079	
428 - 494						
362 - 428	.0039	.0047	.0071	.0142	.0197	
1645 - 2300	.0063	.0071	.0157	.0295	.0354	
592 - 823	.0039	.0047	.0071	.0142	.0197	
395 - 559						
987 - 1316	.0063	.0071	.0157	.0295	.0354	

CARBIDE						
SFM	FEED inch/rev					
	2mm 5/64	3mm 1/8	6mm 1/4	10mm 3/8	16mm 5/8	
362 - 461						
296 - 362	.0047	.0055	.0079	.0138	.0217	
197 - 263						
115 - 165	.0035	.0039	.0055	.0087	.0094	
72 - 99						
63 - 82	.0031	.0028	.0047	.0067	.0094	
494 - 592						
428 - 494	.0047	.0055	.0087	.0173	.0240	
1974 - 2632	.0039	.0087	.0193	.0354	.0374	
658 - 987						
461 - 658	.0047	.0055	.0087	.0173	.0240	
1217 - 1579	.0079	.0087	.0193	.0354	.0374	

RECOMMENDATIONS OF USING



DEBURRING COUNTERSINKING

MATERIAL		0 flute				single flute				3 flute			
		SFM	#1	#3	#4	SFM	#1	#3	#4	SFM	#1	#3	#4
STEELS	<81 Rc (8)	115-148 IPM RPM	10.8 1250	5.4 625	3.5 430	115-148 IPM RPM	10.8 1250	5.4 625	3.5 420	56-72 IPM RPM	8.3 620	3.9 310	3.0 210
STEELS	<24 Rc (C)	66-99 IPM RPM	5.4 800	2.7 400	1.8 260	66-99 IPM RPM	5.4 800	2.7 400	1.8 260	33-49 IPM RPM	5.9 480	3.0 240	2.0 160
STEELS	24-32 Rc	49-66 IPM RPM	2.7 520	1.3 260	0.9 180	49-66 IPM RPM	2.7 520	1.3 260	0.9 180	26-39 IPM RPM	3.9 380	2.0 190	1.4 130
STEELS	32-41 Rc	39-49 IPM RPM	1.8 380	1.0 200	0.7 140	39-49 IPM RPM	1.8 380	1.0 200	0.7 140	20-26 IPM RPM	1.3 320	0.6 160	0.4 110
STAINLESS STEEL													
CAST IRON						66-132 IPM RPM	5.9 1200	5.1 550	3.9 430	49-82 IPM RPM	3.1 630	2.4 320	2.0 210
ALUMINUM		165-197 IPM RPM	15.7 1600	7.9 800	5.9 600	65-197 IPM RPM	15.7 1600	7.9 800	5.9 600	115-148 IPM RPM	14.8 1250	7.5 625	5.1 430
BRASS-BRONZE						99-132 IPM RPM	11.8 1200	5.9 600	3.5 370	66-99 IPM RPM	9.4 800	4.7 400	3.1 260
COPPER		66-99 IPM RPM	7.9 800	3.9 400	2.6 260	66-99 IPM RPM	7.9 800	3.9 400	2.6 260				
LAMINATE						165-329 IPM RPM	63.0 3200	31.5 1600	19.7 1000	115-230 IPM RPM	28.3 1600	14.2 800	9.4 530
PLASTICS		165-329 IPM RPM	63.0 3200	31.5 1600	19.7 1000	165-329 IPM RPM	63.0 3200	31.5 1600	19.7 1000	115-230 IPM RPM	28.3 1600	14.2 800	9.4 530

MINIATURE MILLING: RECOMMENDATIONS OF USING

- 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.

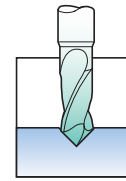
MINIATURE END MILLS

Material	Diameter(mm)	SFM	RPM	Inch/tooth	IPM
Steels 24-40Rc	0.5	132	25480	.000004	2.0
	1	132	12740	.0001	2.0
	1.5	132	8490	.0001	2.0
	2	132	6370	.0002	2.0
	3	132	4250	.0002	2.0
Steel 41Rc- 45Rc	0.5	82	15920	.000004	1.2
	1	82	7960	.0001	1.2
	1.5	82	5310	.0001	1.2
	2	82	3980	.0002	1.2
	3	82	2650	.0002	1.2
Steels >45Rc TiAlN coated tools only	0.5	132	25480	.000004	2.0
	1	132	12740	.0001	2.0
	1.5	132	8490	.0001	2.0
	2	132	6370	.0002	2.0
	3	132	4250	.0002	2.0

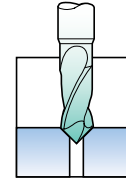
Material	Diameter(mm)	SFM	RPM	Inch/tooth	IPM
Plastics with glass or carbon filters	0.5	263	50960	.000004	20.1
	1	263	25480	.0002	20.1
	1.5	263	16990	.0006	20.1
	2	263	12740	.0008	20.1
	3	263	8490	.0012	20.1
Aluminum and other plastics	0.5	494	95540	.0002	37.8
	1	658	63690	.0005	60.2
	1.5	658	42460	.0007	60.2
	2	658	31850	.0009	60.2
	3	658	21230	.0014	60.2
Copper	0.5	263	50960	.0002	24.0
Brass	1	263	25480	.0005	24.0
Bronze	1.5	263	16990	.0007	24.0
and Steels	2	263	12740	.0009	24.0
<24 Rc	3	263	8490	.0014	24.0

MULTI-V : RECOMMENDATIONS OF USING

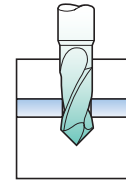
MATERIAL	SPEED SFM		diameter		FEED inches/rev.			
			3mm-3/16"	5mm-1/4"	10mm-5/16"	12mm-1/2"	16mm-5/8"	20mm
Steel < 81 Rc (B)	230-247	RPM	6400	4000	2500	1900	1500	1300
		IPM	12.6	12.6	13.8	14.2	14.2	14.3
		inch/tooth	.002	.0031	.0055	.0075	.0094	.0110
Steel < 24 Rc (C)	132-197	RPM	4000	2600	1600	1200	900	850
		IPM	7.9	8.2	8.8	9.4	8.9	9.4
		inch/tooth	.002	.0031	.0055	.0075	.0094	.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	.0018	.0028	.0047	.0071	.0087	.0110
Steels 32-41 Rc Cast 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	.0018	.0028	.0047	.0067	.0087	.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	.0016	.0024	.0043	.0063	.0087	.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	.0016	.0024	.0043	.0063	.0079	.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	.0039	.0059	.0098	.0118	.0138	.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	.0020	.0035	.0059	.0079	.0106	.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	.002	.0035	.0075	.0079	.0106	.0138



90°-120°
CENTERING - SPOTTING

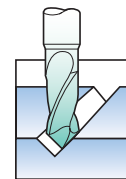


60°-90°-120°
CHAMFERING



90°-120°
DRILLING

MATERIAL	SPEED SFM		diameter		FEED inches/rev.			
			3mm-3/16"	5mm-1/4"	10mm-5/16"	12mm-1/2"	16mm-5/8"	20mm
Steel < 81 Rc (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	.0002	.0003	.0006	.0007	.0010	.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	.0002	.0003	.0006	.0007	.0010	.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	.0002	.0002	.0005	.0007	.0008	.0011
Steels 32-41 Rc Cast 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	.0002	.0002	.0005	.0006	.0008	.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	.0002	.0002	.0004	.0005	.0007	.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	.0001	.0002	.0004	.0005	.0007	.0010
Copper alloys Bronze	165-395	RPM	7000	6000	3500	3200	2200	1750
		IPM	4.4	4.7	4.7	5.0	5.2	5.5
		inch/tooth	.0003	.0004	.0007	.0008	.0012	.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	.0003	.0005	.0009	.0012	.0017	.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	.0004	.0006	.0010	.0013	.0018	.0022



90°-120°
V - GROOVING