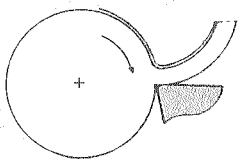
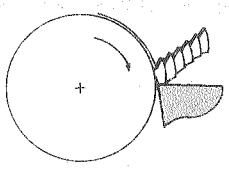
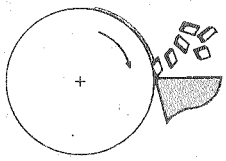
Contents

WIDIA Hardmetal Tips

WIDIA Hardmetal Tipped Tools

WIDIA Hardmetal grades for machining

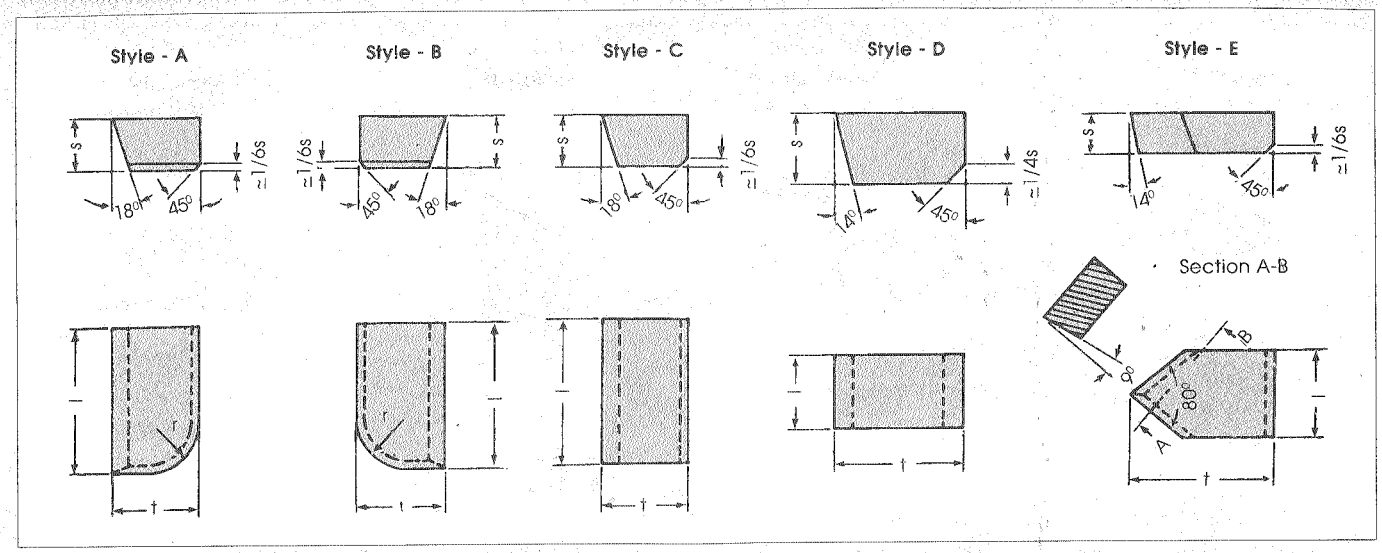
Hardmetal grades are classified and identified by main machining groups and application groups in accordance with the new standard DIN ISO 513 (replaces DIN 4990)

Application group	P	M	K
	P01 P10 P20 P30 P40	M10 M20 M30 M40	K01 K10 K20 K30
Material Composition	WC-TiC-TaC-Co	WC-TiC-TaC-Co	WC-Co
Main Features	High resistance to heat and welding, high content of TiC and TaC, resists thermal failures	Moderate content of TiC and TaC, resists thermal and mechanical failures	Mainly compound of WC which has high strength, resists mechanical failures
Cutting conditions	Large cutting force  continuous chip	Medium cutting force  sheared chips	Small cutting force  discontinuous chips
Work Material	Carbon and alloy steel, cast steel, stainless, ferritic and martensitic steel	Stainless, austenitic steel and cast steel	Grey, malleable and modular cast iron, non-ferrous metals, plastics.
Tendency Cutting Material	Toughness / Wear resistance	Toughness / Wear resistance	Toughness / Wear resistance
Tendency Application	Feed rate / Cutting speed	Feed rate / Cutting speed	Feed rate / Cutting speed

WIDIA Grade	Range of ISO Application Group	Field of Application
TTX	P10-P20	Finish turning of steel at high cutting speeds and feeds. Also useful for grooving, threading and deep hole drilling.
TTS	P20-P30	Rough and finish turning of long chipping material with large chip cross-section at medium cutting speeds. Also useful for grooving and threading under unfavourable conditions.
TTR	P30-P40 & M30-M40	Rough turning and milling of steel with high chip cross-section under unfavourable conditions.
ATM	M10-M30	Rough turning and milling of grey cast iron, alloyed iron, spheroidal graphite iron, white heart iron, stainless steel. Also for turning of aluminium with high silicon content and hardened steel.
TH 05	K01-K10	Precision turning of hard cast iron, hard steel and other tough materials under favourable machining conditions with light chip loads.
THM	K10-K20	Grade with extremely high cutting edge stability, suitable for turning and milling short chipping cast iron, non-ferrous and non-metallic materials. Also for deep hole drilling, reaming, scraping and broaching in all types of steel.

Note:
1. We recommend our grade GT10 for Tips for Centre and other items which are principally subject to wear.
2. For your requirements of carbide tips not covered in this catalogue and for special tips please let us have your enquiry.

ISO Tips



ISO Designation	Ordering Number	Dimensions in mm l	t	s	r
Style - A					
A 5	01 01 0005	5	3	2.0	2.0
A 6	01 01 0006	6	4	2.5	2.5
A 8	01 01 0008	8	5	3.0	3.0
A 10	01 01 0010	10	6	4.0	4.0
A 12	01 01 0012	12	8	5.0	5.0
A 16	01 01 0016	16	10	6.0	6.0
A 20	01 01 0020	20	12	7.0	7.0
A 25	01 01 0025	25	14	8.0	8.0
A 32	01 01 0032	32	18	10.0	10.0
A 40	01 01 0040	40	22	12.0	12.0
A 50	01 01 0050	50	25	14.0	14.0
Style - B					
B 5	01 01 0005	5	3	2.0	2.0
B 6	01 01 0006	6	4	2.5	2.5
B 8	01 01 0008	8	5	3.0	3.0
B 10	01 02 0010	10	6	4.0	4.0
B 12	01 02 0012	12	8	5.0	5.0
B 16	01 02 0016	16	10	6.0	6.0
B 20	01 02 0020	20	12	7.0	7.0
B 25	01 02 0025	25	14	8.0	8.0
B 32	01 02 0032	32	18	10.0	10.0
B 40	01 02 0040	40	22	12.0	12.0
B 50	01 02 0050	50	25	14.0	14.0
Style - C					
C 5	01 03 0005	5	3	2.0	-
C 6	01 03 0006	6	4	2.5	-
C 8	01 03 0008	8	5	3.0	-
C 10	01 03 0010	10	6	4	-
C 12	01 03 0012	12	8	5	-
C 16	01 03 0016	16	10	6	-
C 20	01 03 0020	20	12	7	-
C 25	01 03 0025	25	14	8	-
C 32	01 03 0032	32	18	10	-
C 40	01 03 0040	40	22	12	-
C 50	01 03 0050	50	25	14	-
Style - D*					
D 3	01 04 0003	3	8	3	-
D 4	01 04 0004	4	10	4	-
D 5	01 04 0005	5	12	5	-
D 6	01 04 0006	6	14	6	-
D 8	01 04 0008	8	16	8	-
D 10	01 04 0010	10	18	10	-
D 12	01 04 0012	12	20	12	-
Style - E					
E 4	01 05 0004	4	10	2.5	-
E 5	01 05 0005	5	12	3.0	
E 6	01 05 0006	6	14	3.5	-
E 8	01 05 0008	8	16	4.0	-
E 10	01 05 0010	10	18	5.0	-
E 12	01 05 0012	12	20	6.0	-
E 16	01 05 0016	16	22	7.0	-
E 20	01 05 0020	20	25	8.0	-
E 25	01 05 0025	25	28	9.0	-
E 32	01 05 0032	32	32	10.0	-

* Dimension 'l' will be 0.5 mm oversize for style D.

Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

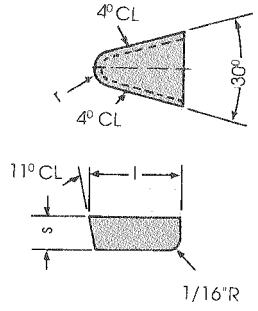
HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Tolerance

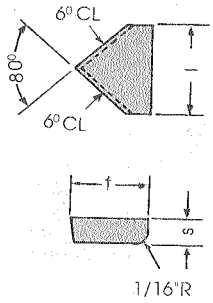
Nominal Dimension	mm	0.- 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

BSS Tips

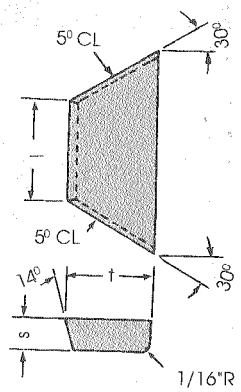
Series - 10



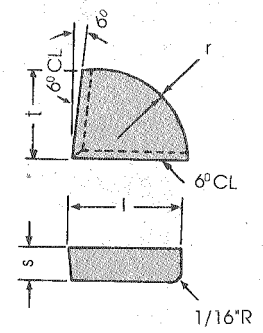
Series - 40



Series - 88



Series - 100 RH
LH Opposite



Tip Number	Ordering Number	Dimensions in inches l	t	s	r
Series - 10					
10	03 00 0010	7/16	-	3/32	1/16
12	02 00 0012	1/2	-	1/8	3/32
14	03 00 0014	7/16	-	5/32	1/16
16	02 00 0016	5/8	-	5/32	1/8
18	03 00 0018	1/2	-	3/16	3/32
20	02 00 0020	3/4	-	3/16	5/32
22	03 00 0022	5/8	-	1/4	1/8
24	02 00 0024	3/4	-	1/4	5/32
26	02 00 0026	7/8	-	1/4	3/16
28	03 00 0028	3/4	-	5/16	5/32
30	02 00 0030	7/8	-	5/16	3/16
32	03 00 0032	7/8	-	3/8	3/16
34	03 00 0034	1 1/8	-	5/16	7/32
36	03 00 0036	1 1/4	-	3/8	1/4
Series - 40					
40	02 00 0040	13/32	3/8	3/32	-
44	02 00 0044	17/32	1/2	1/8	-
48	03 00 0048	13/32	3/8	5/32	-
52	02 00 0052	21/32	5/8	5/32	-
56	03 00 0056	17/32	1/2	3/16	-
60	02 00 0060	25/32	3/4	3/16	-
64	03 00 0064	21/32	5/8	1/4	-
68	02 00 0068	25/32	3/4	1/4	-
72	02 00 0072	1 1/32	1	1/4	-
76	03 00 0076	25/32	3/4	5/16	-
80	03 00 0080	1 1/32	1	5/16	-
84	03 00 0084	1 1/32	1	3/8	-
300	03 00 0300	9/32	1/4	1/16	-
304	03 00 0304	11/32	5/16	5/64	-
312	03 00 0312	15/32	7/16	7/64	-

Tip Number	Ordering Number	Dimensions in inches l	t	s	r
Series - 88					
88	03 00 0088	9/16	15/32	3/16	-
90	03 00 0090	13/16	9/16	1/4	-
92	03 00 0092	1	11/16	5/16	-
94	03 00 0094	1 3/16	13/16	3/8	-
Series - 100 RH					
100	03 00 0100	5/16	1/4	3/32	1/4
102	02 00 0102	7/16	3/8	1/8	3/8
104	03 00 0104	5/16	1/4	5/32	1/4
106	02 00 0106	5/8	1/2	5/32	1/2
108	03 00 0108	7/16	3/8	3/16	3/8
110	02 00 0110	5/8	1/2	3/16	1/2
112	03 00 0112	5/8	1/2	1/4	1/2
116	02 00 0116	7/8	3/4	1/4	3/4
118	03 00 0118	5/8	1/2	5/16	1/2
120	02 00 0120	7/8	3/4	5/16	3/4
122	03 00 0122	7/8	3/4	3/8	3/4
184	02 00 0184	7/8	3/4	7/16	3/4
Series - 100 LH					
100	03 00 0100	5/16	1/4	3/32	1/4
102	02 00 0102	7/16	3/8	1/8	3/8
105	03 00 0105	5/16	1/4	5/32	1/4
107	02 00 0107	5/8	1/2	5/32	1/2
109	03 00 0109	7/16	3/8	3/16	3/8
111	02 00 0111	5/8	1/2	3/16	1/2
113	02 00 0113	5/8	1/2	1/4	1/2
117	02 00 0117	7/8	3/4	1/4	3/4
119	03 00 0119	5/8	1/2	5/16	1/2
121	02 00 0121	7/8	3/4	5/16	3/4
123	03 00 0123	7/8	3/4	3/8	3/4
185	03 00 0185	7/8	3/4	7/16	3/4

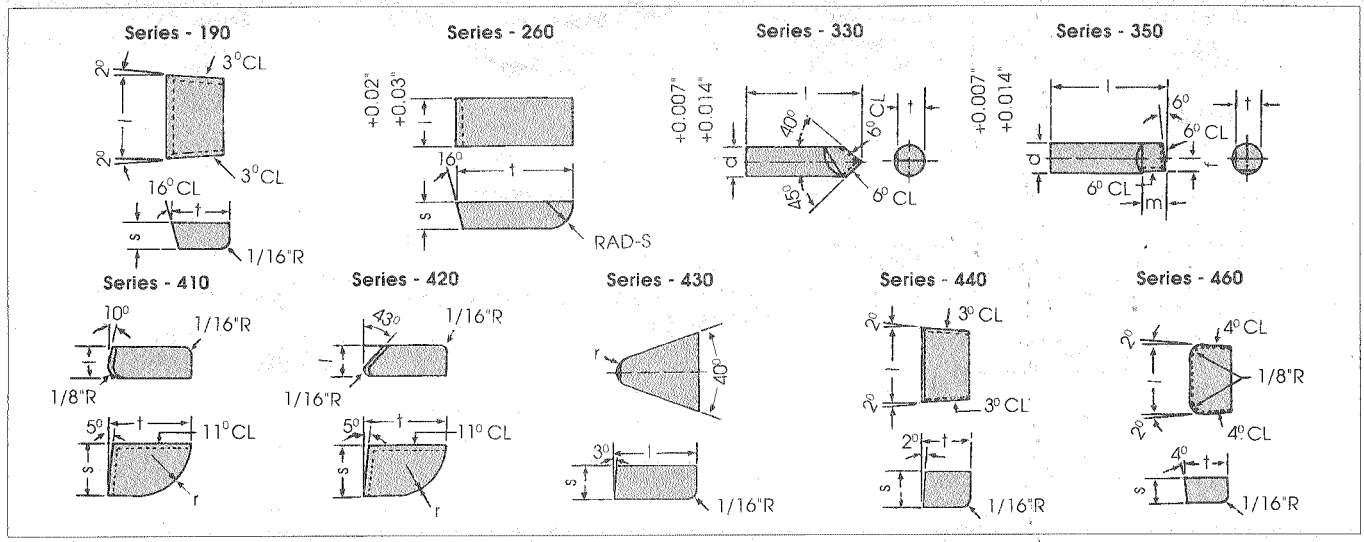
Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Tolerance

Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

BSS Tips



Tip Number	Ordering Number	Dimensions in inches l	t	s
Series - 190				
190	03 00 0190	13/32	5/16	3/32
192	02 00 0192	17/32	3/8	1/8
194	02 00 0194	13/32	5/16	5/32
196	02 00 0196	21/32	7/16	5/32
198	02 00 0198	17/32	3/8	3/16
200	02 00 0200	25/32	1/2	3/16
202	02 00 0202	21/32	7/16	1/4
204	02 00 0204	25/32	1/2	1/4
206	02 00 0206	1 1/32	5/8	1/4
208	03 00 0208	25/32	1/2	5/16
210	02 00 0210	1 1/32	5/8	5/16
212	02 00 0212	1 9/32	3/4	5/16
214	03 00 0214	1 1/32	5/8	3/8
216	03 00 0216	1 17/32	7/8	3/8
218	03 00 0218	1 9/32	3/4	7/16
Series - 260				
260	03 00 0260	3/32	3/8	3/32
262	02 00 0262	1/8	7/16	1/8
264	02 00 0264	3/16	9/16	5/32
265	03 00 0265	1/4	5/8	5/32
266	03 00 0266	5/16	3/4	3/16
268	03 00 0268	3/8	7/8	1/14

Tip Number	Ordering Number	Dimensions in inches l	d	t	f	m
Series - 330						
331	02 00 0331	25/32	3/16	11/64	-	-
333	02 00 0333	1 1/32	1/4	15/64	-	-
Series - 350						
351	03 00 0351	25/32	3/16	11/64	5/64	5/32
353	03 00 0353	1 1/32	1/4	15/64	1/11	3/16

Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
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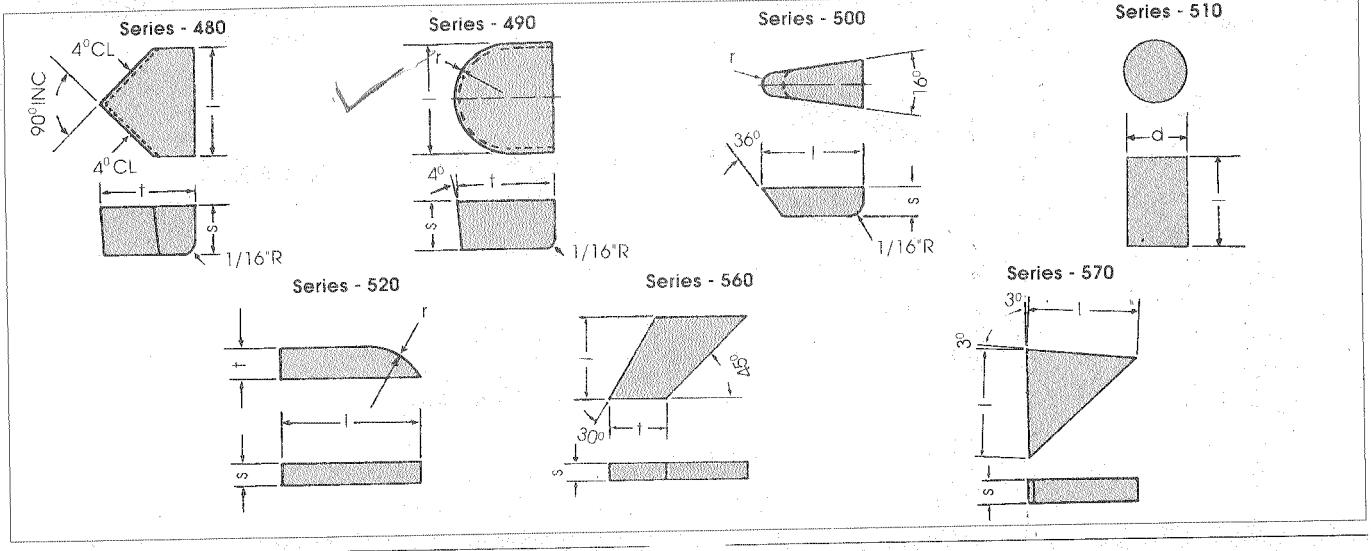
HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Tip Number	Ordering Number	Dimensions in inches l	t	s	r
Series - 410 RH					
410	03 00 0410	5/16	7/8	9/16	9/16
412	03 00 0412	3/8	1	11/16	11/16
414	03 00 0414	7/16	1 1/8	11/16	11/16
Series - 410 LH					
411	03 00 0411	5/16	7/8	9/16	9/16
413	03 00 0413	3/8	1	11/16	11/16
415	03 00 0415	7/16	1 1/8	11/16	11/16
Series - 420 RH					
420	03 00 0420	5/16	7/8	9/16	9/16
422	03 00 0422	3/8	1	11/16	11/16
424	03 00 0424	7/16	1 1/8	11/16	11/16
Series - 420 LH					
421	03 00 0421	5/16	7/8	9/16	9/16
423	03 00 0423	3/8	1	11/16	11/16
425	03 00 0425	7/16	1 1/8	11/16	11/16
Series - 430					
430	03 00 0430	3/4	-	5/16	1/8
432	03 00 0432	7/8	-	3/8	1/8
434	03 00 0434	1	-	7/16	5/32
Series - 440					
440	03 00 0440	25/32	1/2	5/16	-
442	03 00 0442	1 1/32	5/8	3/8	-
444	03 00 0444	1 9/32	3/4	7/16	-
Series - 460					
460	03 00 0460	1 1/32	5/8	3/8	-
462	03 00 0462	1 17/32	7/8	3/8	-
464	03 00 0464	2 1/32	1 1/4	3/8	-
466	03 00 0466	1 17/32	7/8	1/2	-
468	03 00 0468	2 1/32	1 1/4	1/2	-

Tolerance

Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

BSS Tips



Tip Number	Ordering Number	Dimensions in inches l	t	s	r
Series - 480					
480	03 00 0480	25/32	11/16	5/16	-
482	03 00 0482	1 1/32	15/16	3/8	-
484	03 00 0484	1 17/32	1 3/8	3/8	-
Series - 490					
490	03 00 0490	25/32	5/8	5/16	25/64
492	03 00 0492	1 1/32	7/8	3/8	33/64
494	03 00 0494	1 17/32	1 1/4	3/8	49/64
Series - 500					
500	03 00 0500	13/32	-	3/32	3/64
502	03 00 0502	15/32	-	1/8	1/16
504	03 00 0504	17/32	-	5/32	3/16
506	03 00 0506	21/32	-	3/16	3/32

Tip Number	Ordering Number	Dimensions in inches d	l
Series - 510			
510	03 00 0510	3/32	11/32
511	03 00 0511	1/8	17/32
512	03 00 0512	5/32	21/32
513	03 00 0513	3/16	25/32
514	03 00 0514	7/32	29/32
515	03 00 0515	1/4	1 1/32
516	03 00 0516	3/16	13/32
517	03 00 0517	1/4	17/32
518	03 00 0518	5/16	21/32
519	03 00 0519	3/8	25/32
9600	03 00 9600	1/8	1 1/32
9601	03 00 9601	3/16	1 1/2
9602	03 00 9602	1/4	1 1/2
FB IR		3/16	21/32

Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

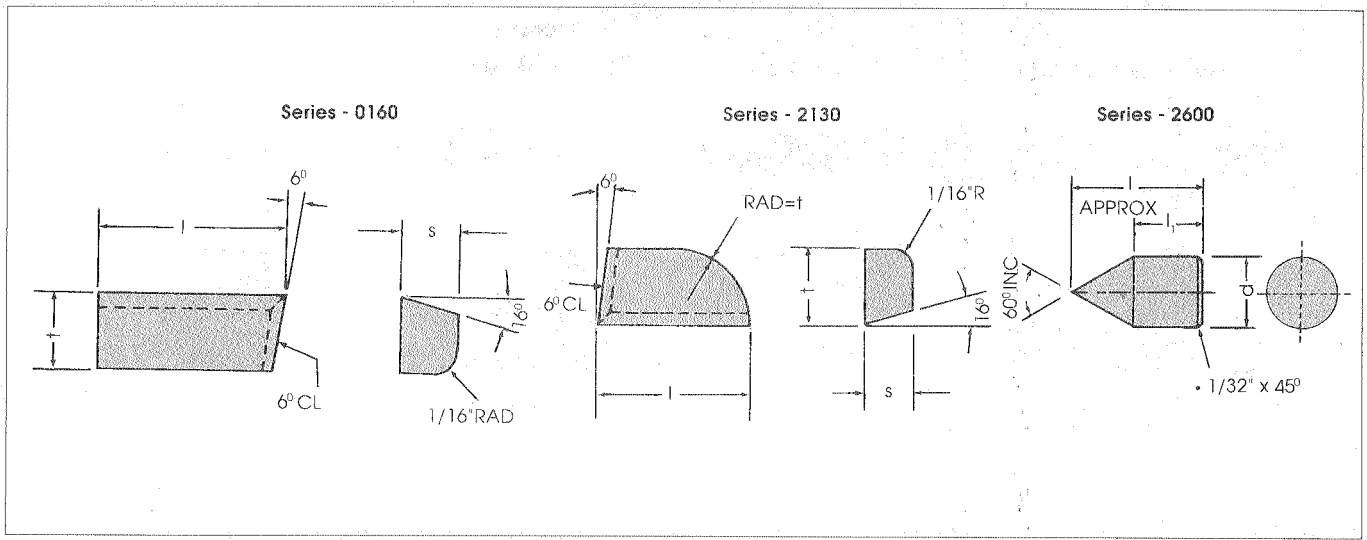
Tip Number	Ordering Number	Dimensions in inches l	t	s	r
Series - 520					
520	03 00 0520	3/8	0.065 0.075	0.030 0.035	1/4
521	03 00 0521	1/2	0.095 0.105	0.050 0.055	1/4
522	03 00 0522	11/16	0.125 0.135	0.070 0.075	1/4
523	03 00 0523	11/16	0.155 0.165	0.085 0.090	5/16
524	03 00 0524	3/4	3/16	0.105 0.110	5/16
525	03 00 0525	7/8	1/4	0.120 0.125	3/8
526	03 00 0526	1	5/16	0.135 0.140	1/2
527	03 00 0527	3/4	0.080 0.090	0.070 0.075	1/4
528	03 00 0528	3/4	0.100 0.110	0.085 0.090	1/4
Series - 560					
560	03 00 0560	13/32	5/16	3/32	-
561	03 00 0561	17/32	3/8	1/8	-
562	03 00 0562	21/32	7/16	5/32	-
563	03 00 0563	25/32	1/2	3/16	-
Series - 570					
570	03 00 0570	3/8	-	3/32	-
571	03 00 0571	1/2	-	1/8	-
572	03 00 0572	5/8	-	5/32	-
573	03 00 0573	3/4	-	3/16	-
574	03 00 0574	1	-	1/4	-

Tolerance

Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

WIDIA

BSS Tips



Tip Number	Ordering Number	Dimensions in inches l	t	s
Series - 0160				
0160	03 00 0160	1/2	3/16	3/32
0162	02 00 0162	5/8	1/4	1/8
0164 (R)	03 00 0164	1/2	3/16	5/32
0165 (L)	03 00 0165	1/2	3/16	5/32
0166 (R)	02 00 0166	3/4	5/16	5/32
0167 (L)	02 00 0167	3/4	5/16	5/32
0168 (R)	03 00 0168	5/8	1/4	3/16
0169 (L)	03 00 0169	5/8	1/4	3/16
0170 (R)	02 00 0170	7/8	3/8	3/16
0171 (L)	02 00 0171	7/8	3/8	3/16
0172 (R)	03 00 0172	3/4	5/16	1/4
0173 (L)	03 00 0173	3/4	5/16	1/4
0174 (R)	02 00 0174	7/8	3/8	1/4
0175 (L)	02 00 0175	7/8	3/8	1/4
0176 (R)	02 00 0176	1 3/16	1/2	1/4
0177 (L)	02 00 0177	1 3/16	1/2	1/4
0178 (R)	03 00 0178	7/8	3/8	5/16
0179 (L)	03 00 0179	7/8	3/8	5/16
0180 (R)	02 00 0180	1 3/16	1/2	5/16
0181 (L)	02 00 0181	1 3/16	1/2	5/16
0182 (R)	03 00 0182	1 3/16	1/2	3/8
0183 (L)	03 00 0183	1 3/16	1/2	3/8
Series - 2130				
2130	03 00 2130	1/2	1/4	3/32
2132	02 00 2132	5/8	5/16	1/8
2134 (R)	03 00 2134	1/2	1/4	5/32
2135 (L)	03 00 2135	1/2	1/4	5/32
2136 (R)	02 00 2136	3/4	3/8	5/32
2137 (L)	02 00 2137	3/4	3/8	5/32

Tip Number	Ordering Number	Dimensions in inches l	t	s
2138 (R)	03 00 2138	5/8	5/16	3/16
2139 (L)	03 00 2139	5/8	5/16	3/16
2140 (R)	02 00 2140	7/8	1/2	3/16
2141 (L)	02 00 2141	7/8	1/2	3/16
2142 (R)	03 00 2142	3/4	3/8	1/4
2143 (L)	03 00 2143	3/4	3/8	1/4
2144 (R)	02 00 2144	7/8	1/2	1/4
2145 (L)	02 00 2145	7/8	1/2	1/4
2146 (R)	02 00 2146	1 3/16	5/8	1/4
2147 (L)	02 00 2147	1 3/16	5/8	1/4
2148 (R)	03 00 2148	7/8	1/2	5/16
2149 (L)	03 00 2149	7/8	1/2	5/16
2150 (R)	02 00 2150	13/16	5/8	5/16
2151 (L)	02 00 2151	13/16	5/8	5/16
2152 (R)	03 00 2152	13/16	5/8	3/8
2153 (L)	03 00 2153	13/16	5/8	3/8
2154 (R)	03 00 2154	1 1/2	11/16	11/32
2155 (L)	03 00 2155	1 1/2	11/16	11/32
2156 (R)	03 00 2156	1 1/2	11/16	7/16
2157 (L)	03 00 2157	1 1/2	11/16	7/16

Tip Number	Ordering Number	Dimensions in inches Ød	l	l_1
Series - 2600				
2600	03 00 2600	3/16	23/64	3/16
2601	03 00 2601	1/4	29/64	7/32
2602	03 00 2602	5/16	17/32	1/4
2603	03 00 2603	7/16	49/64	3/8
2604	03 00 2604	5/8	1 3/64	1/2
2605	03 00 2605	3/4	1 9/32	5/8
2606	03 00 2606	7/8	1 29/64	11/16

Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

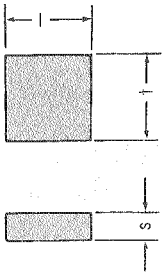
Tolerance

Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

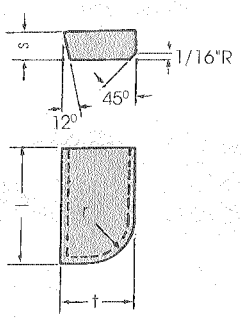
BSS Tips/DIN Tips

DIN Tips

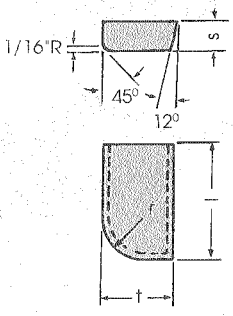
Series - 280, 530 & 9580



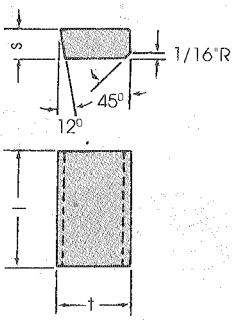
Style - G



Style - H



Style - J



Tip Number	Ordering Number	Dimensions in inches l	t	s
Series - 280, 530 & 9580				
280	02 00 0280	9/32	9/32	5/64
282	02 00 0282	11/32	11/32	5/64
530	02 00 0530	3/8	1/8	1/16
531	02 00 0531	1/2	5/32	1/16
532	02 00 0532	3/16	3/16	1/16
533	02 00 0533	1/2	3/16	3/32
534	02 00 0534	1/4	1/4	1/16
535	02 00 0535	5/16	1/4	3/32
536	02 00 0536	3/8	9/32	3/32
537	02 00 0537	7/16	11/32	1/8
538	02 00 0538	13/32	13/32	3/32
539	02 00 0539	1/2	13/32	1/8
540	02 00 0540	15/32	15/32	7/64
541	02 00 0541	9/16	15/32	5/32
542	02 00 0542	3/4	1/2	5/32
543	02 00 0543	5/8	17/32	5/32
544	02 00 0544	3/4	19/32	3/16
545	02 00 0545	3/4	3/32	1/16
546	02 00 0546	1	3/16	3/32
547	02 00 0547	1	1/4	3/32
548	02 00 0548	1 1/4	1/2	1/4
549	02 00 0549	1 7/8	3/8	1/8
550	02 00 0550	3/16	1/16	1/32
551	02 00 0551	1/4	3/32	1/32
9580	02 00 9580	1/2	9/32	3/32
9581	02 00 9581	1/2	13/32	3/16
9582	02 00 9582	1/2	1/2	5/32
9583	02 00 9583	5/8	3/16	3/16
9584	02 00 9584	5/8	3/8	5/32
9585	02 00 9585	3/4	1/4	1/8
9586	02 00 9586	3/4	3/8	5/32

Tip Number	Ordering Number	Dimensions in inches l	t	s
9587	02 00 9587	3/4	1/2	3/16
9588	02 00 9588	3/4	5/8	1/8
9589	02 00 9589	7/8	3/8	3/16
9590	02 00 9590	1	3/8	3/16
9591	02 00 9591	1	5/8	3/16
9592	02 00 9592	1	3/4	1/8
9593	02 00 9593	1 1/4	1/4	1/8
9594	02 00 9594	1 1/4	3/8	3/16
9595	02 00 9595	1 1/2	1/2	3/16
FB IS	02 00 0001	1/4	3/16	1/16

DIN Tips

Designation	Ordering Number	Dimensions in mm l	t	s	r
Style - G					
G 6	06 07 0006	6	4	2.0	2.5
G 8	06 07 0008	8	5	2.0	3.0
G 10	06 07 0010	10	6	2.5	4.0
G 12	06 07 0012	12	8	3.0	5.0
G 16	06 07 0016	16	10	4.0	6.0
Style - H					
H 6	06 07 0006	6	4	2.0	2.5
H 8	06 07 0008	8	5	2.0	3.0
H 10	06 07 0010	10	6	2.5	4.0
H 12	06 07 0012	12	8	3.0	5.0
H 16	06 07 0016	16	10	4.0	6.0
Style - J					
J 6	06 09 0006	6	4	2.0	-
J 8	06 09 0008	8	5	2.0	-
J 10	06 09 0010	10	6	2.5	-
J 12	06 09 0012	12	8	3.0	-
J 16	06 09 0016	16	10	4.0	-

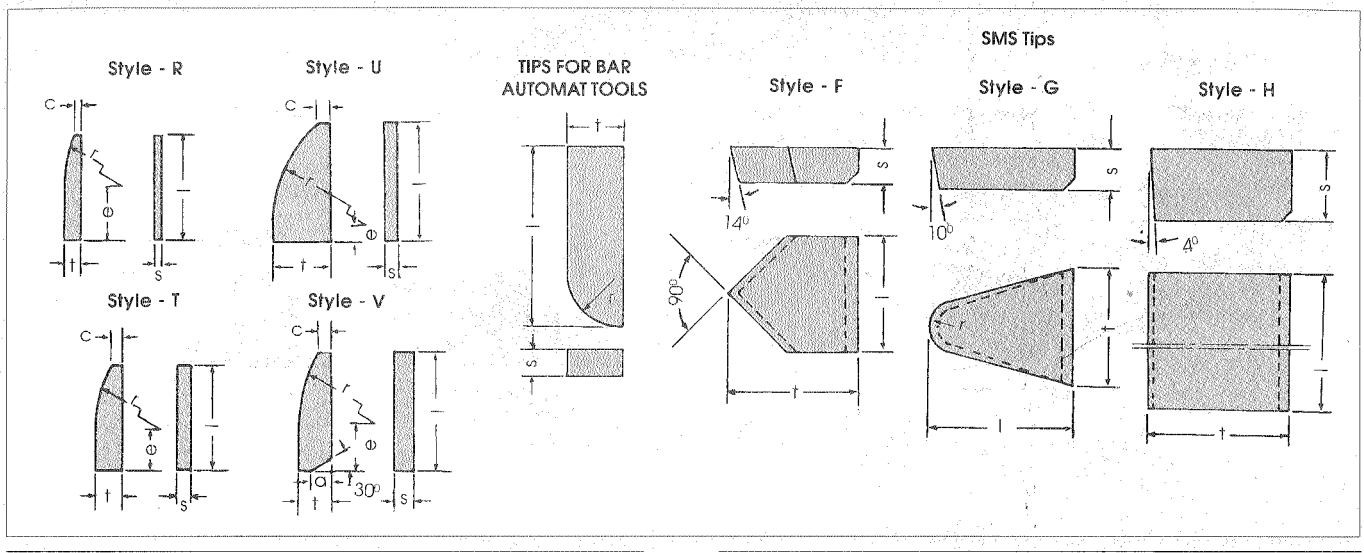
Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Tolerance

Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

DIN Tips / SMS Tips



Designation	Ordering Number	Dimensions in mm l	t	s	r	a	c	e
Style - R								
R 12	06 75 0120	12	2.0	0.8	25	-	0.8	5.0
R 16	06 75 0160	16	2.5	1.2	25	-	1.0	7.1
R 19	06 75 0190	19	3.0	1.4	25	-	1.0	9.0
R 22	06 75 0220	22	3.5	1.8	25	-	1.4	11.2
R 25	06 75 0250	25	4.0	2.2	25	-	1.4	15.0
R 30	06 75 0300	30	5.0	2.8	25	-	1.4	18.0
Style - T								
T 12	06 76 0120	12	3.0	1.2	15	-	1.0	4.5
T 16	06 76 0160	16	3.5	1.6	15	-	1.0	7.5
T 19	06 76 0190	19	4.5	2.0	25	-	1.8	7.5
T 22	06 76 0220	22	5.6	2.5	25	-	2.5	9.5
T 25	06 76 0250	25	8.0	2.8	25	-	3.0	10.0
Style - U								
U 12	06 77 0120	12	5.6	1.2	15	-	1.0	1.4
U 16	06 77 0160	16	6.7	1.6	15	-	1.0	4.0
U 19	06 77 0190	19	8.0	2.0	25	-	1.8	2.5
U 22	06 77 0220	22	11.2	2.5	25	-	2.5	2.8
U 25	06 77 0250	25	14.0	2.8	25	-	3.0	4.0
Style - V								
V 22	06 78 0220	22	5.6	2.5	25	4.0	2.5	9.0
V 25	06 78 0250	25	8.0	2.8	25	5.0	3.0	10.0
V 30	06 78 0300	30	12.0	4.0	25	8.0	3.0	11.0

Tips for Turning Tools for use on Bar Automats

Ordering Number	Dimensions in mm l	t	s	r
06 41 0090	10	2.5	1.5	2.5
06 41 0091	10	3.0	2.0	3.0
06 41 0092	15	2.5	1.5	2.5
06 41 0093	20	2.5	1.5	2.5
06 41 0094	20	2.5	2.0	2.5
06 41 0095	20	3.0	2.0	3.0
06 41 0096	20	5.0	3.0	5.0

Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

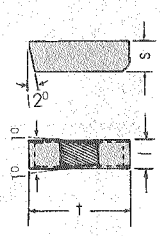
Designation	Ordering Number	Dimensions in mm l	t	s	r
SMS Tips					
Style - F					
F 10	04 06 0010	10	12	4	-
F 12	04 06 0012	12	15	4	-
F 16	04 06 0016	16	18	5	-
F 20	04 06 0020	20	20	7	-
F 25	04 06 0025	25	25	8	-
F 32	04 06 0032	32	30	9	-
F 40	04 06 0040	40	35	10	-
F 50	04 06 0050	50	40	10	-
F 60	04 06 0060	60	45	10	-
Style - G					
G 8	04 07 0008	12	8	4	1.0
G 10	04 07 0010	14	10	4	1.5
G 12	04 07 0012	17	12	5	2.5
G 16	04 07 0016	20	16	6	3.5
G 20	04 07 0020	24	20	6	4.5
G 25	04 07 0025	28	25	8	6.0
G 30	04 07 0030	34	30	10	8.0
Style - H					
H 50	05 08 0050	50	20	10	-
H 60	05 08 0060	60	20	10	-
H 70	05 08 0070	70	20	10	-
H 80	05 08 0080	80	20	10	-
H 90	05 08 0090	90	20	10	-
H 100	05 08 0100	100	20	10	-
H 115	05 08 0115	115	20	10	-

Tolerance

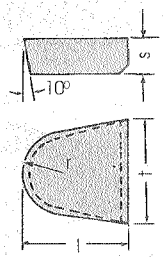
Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

SMS Tips

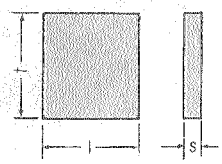
Style - K



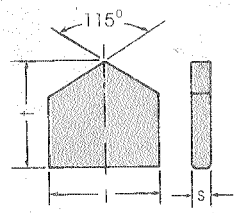
Style - L



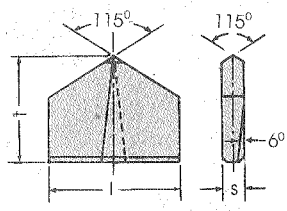
Style - AB 2-4



Style - AB 5-8



Style - AB 9-50



Designation	Ordering Number	Dimensions in mm l	t	s	r
Style - K					
K 2	04 10 0002	2.5	15	4	-
K 3	04 10 0003	3.5	15	4	-
K 4	04 10 0004	4.5	15	4	-
K 5	04 10 0005	5.5	15	4	-
K 6	04 10 0006	6.5	15	4	-
K 7	04 10 0007	7.5	15	4	-
K 8	04 10 0008	8.5	20	6	-
K 9	04 10 0009	9.5	20	6	-
K 10	04 10 0010	10.5	20	6	-
K 12	04 10 0012	12.8	20	6	-
Style - L					
L 10	05 11 0010	10	10	4	4
L 13	05 11 0013	13	13	4	5
L 16	05 11 0016	16	16	5	6
L 20	05 11 0020	20	20	7	8
L 25	05 11 0025	25	25	8	10
L 30	05 11 0030	30	30	9	12

Designation	Ordering Number	Dimensions in mm l	t	s
Style - AB				
AB 2	05 21 0002	2.5	3.5	0.4
AB 3	05 21 0003	3.5	4.5	0.6
AB 4	05 21 0004	4.5	5.0	0.9
AB 5	05 21 0005	5.5	6.0	0.9
AB 6	05 21 0006	6.5	7.0	1.2
AB 7	05 21 0007	7.5	8.0	1.5
AB 8	05 21 0008	8.5	8.0	1.5

Designation	Ordering Number	Dimensions in mm l	t	s
AB 9	05 21 0009	9.5	9	1.7
AB 10	05 21 0010	10.5	9	1.7
AB 11	05 21 0011	11.8	11	2.2
AB 12	05 21 0012	12.8	11	2.2
AB 13	05 21 0013	13.8	12	2.5
AB 14	05 21 0014	14.8	12	2.5
AB 15	05 21 0015	15.8	14	2.7
AB 16	05 21 0016	17.0	14	2.7
AB 17	05 21 0017	18.0	16	3.2
AB 18	05 21 0018	19.0	16	3.2
AB 19	05 21 0019	20.0	18	3.7
AB 20	05 21 0020	21.0	18	3.7
AB 21	05 21 0021	22.0	18	3.7
AB 22	05 21 0022	23.0	18	3.7
AB 23	05 21 0023	24.0	20	4.2
AB 24	05 21 0024	25.0	20	4.2
AB 25	05 21 0025	26.0	20	4.2
AB 26	05 21 0026	27.5	20	4.2
AB 27	05 21 0027	28.5	22	4.7
AB 28	05 21 0028	29.5	22	4.7
AB 29	05 21 0029	30.5	22	4.7
AB 30	05 21 0030	31.5	22	4.7
AB 31	05 21 0031	32.5	24	5.2
AB 32	05 21 0032	33.5	24	5.2
AB 33	05 21 0033	34.5	24	5.2
AB 34	05 21 0034	35.5	24	5.2
AB 35	05 21 0035	36.5	25	5.7
AB 36	05 21 0036	37.5	25	5.7
AB 37	05 21 0037	38.5	25	5.7
AB 38	05 21 0038	39.5	25	5.7

Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

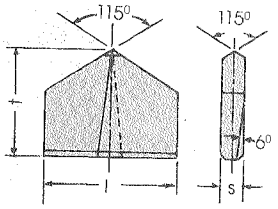
HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Tolerance

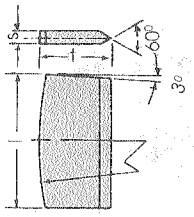
Nominal Dimension	mm	.0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

SMS Tips

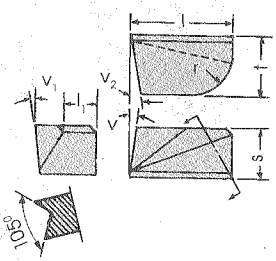
Style - AB



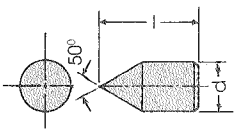
Style - AC



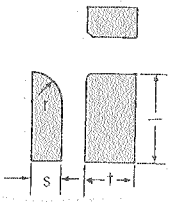
Style - AR



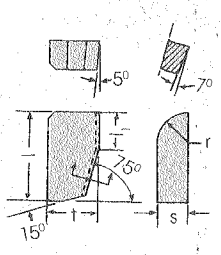
Style - AD



Style - AL



Style - AT



Designation	Ordering Number	Dimensions in mm l	t	s
Style - AB (contd.)				
AB 39	05 21 0039	40.5	26	6.6
AB 40	05 21 0040	41.5	26	6.6
AB 41	05 21 0041	42.5	26	6.6
AB 42	05 21 0042	43.5	26	6.6
AB 43	05 21 0043	44.5	28	7.6
AB 44	05 21 0044	45.5	28	7.6
AB 45	05 21 0045	46.5	28	7.6
AB 46	05 21 0046	47.5	28	7.6
AB 47	05 21 0047	48.5	29	8.6
AB 48	05 21 0048	49.5	29	8.6
AB 49	05 21 0049	50.5	29	8.6
AB 50	05 21 0050	51.5	29	8.6
Style - AC				
AC 15	05 22 0015	15.0	13	2.5
AC 20	05 22 0020	20.0	13	2.5
AC 25	05 22 0025	25.0	13	2.5
AC 30	05 22 0030	30.0	13	2.5
AC 35	05 22 0035	35.0	13	2.5
AC 40	05 22 0040	40.0	13	2.5

Designation	Ordering Number	Dimensions in mm. l	d
Style - AD			
AD 5	05 23 0005	10	5
AD 6	05 23 0006	12	6
AD 8	05 23 0008	16	8
AD 10	05 23 0010	20	10
AD 11	05 23 0011	20	11
AD 12	05 23 0012	22	12
AD 14	05 23 0014	25	14
AD 18	05 23 0018	32	18

Designation	Ordering Number	Dimensions in mm. l	t	s	r	l_1
Style - AL						
AL 12	05 24 0012	12	8	4	4	-
AL 16	05 24 0016	16	10	5	5	-
AL 18	05 24 0018	18	10	6	6	-
Style - AT						
AT 12	05 27 0012	12	8	4	4	5.5
AT 16	05 27 0016	16	10	5	5	7.3
AT 18	05 27 0018	18	10	6	6	8.1

Designation	Ordering Number	Dimensions in mm l	t	s	r	l_1	v	v_1	v_2
Style - AR									
AR 8	05 25 0008	8	6	5	3	4.1	4°	0°	7°
AR 12	05 25 0012	12	8	6	4	5.0	7°	3°	10°
AR 12-1	05 25 1012	12	8	6	4	4.8	4°	0°	7°
AR 16	05 25 0016	16	10	8	6	5.0	0°	5°	10°
AR 16-1	05 25 1016	16	10	8	6	5.8	7°	3°	10°
AR 16-2	05 25 2016	16	10	8	6	5.1	4°	0°	7°
AR 20	05 25 0020	20	12	10	8	4.7	0°	5°	10°
AR 20-1	05 25 1020	20	12	10	8	6.6	7°	3°	10°
AR 20-2	05 25 2020	20	12	10	8	5.7	4°	0°	7°

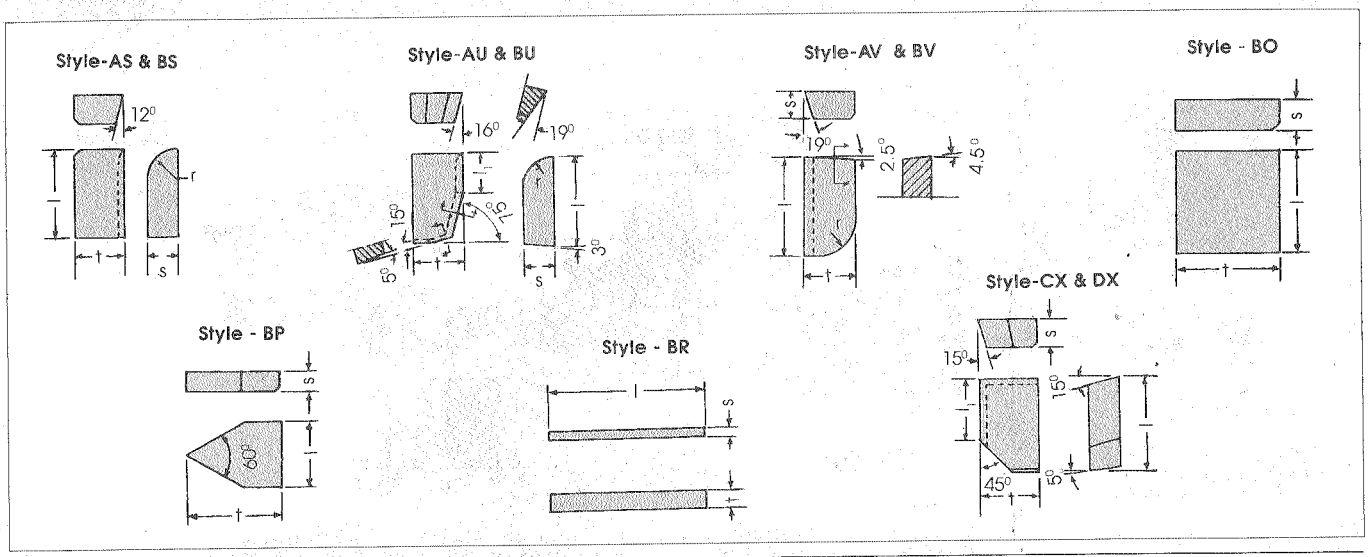
Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Tolerance

Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

SMS Tips



Designation	Ordering Number	Dimensions in mm				
		l	t	s	r	l_1
Style - AS (RH)						
AS 12	05 26 0012	12	8	4	4	-
AS 16	05 26 0016	16	10	5	5	-
AS 18	05 26 0018	18	10	6	6	-
Style - BS (LH)						
BS 12	05 36 0012	12	8	4	4	-
BS 16	05 36 0016	16	10	5	5	-
BS 18	05 36 0018	18	10	6	6	-
Style - AU (RH)						
AU 12	05 28 0012	12	8	4	4	5.5
AU 16	05 28 0016	16	10	5	5	7.3
AU 18	05 28 0018	28	10	6	6	8.1
Style - BU (LH)						
BU 12	05 38 0012	12	8	4	4	5.5
BU 16	05 38 0016	16	10	5	5	7.3
BU 18	05 38 0018	28	10	6	6	8.1
Style - AV (RH)						
AV 12	05 29 0012	12	8	4	4	-
AV 16	05 29 0016	16	10	5	5	-
AV 20	05 29 0020	20	10	6	8	-
Style - BV (LH)						
BV 12	05 39 0012	12	8	4	4	-
BV 16	05 39 0016	16	10	5	5	-
BV 20	05 39 0020	20	10	6	8	-
Style - BO						
BO 10	04 33 0010	9.9	9.9	3	-	-
BO 13	04 33 0013	12.5	12.5	4	-	-
Style - BP						
BP 10	04 34 0010	9.9	14	3	-	-
BP 13	04 34 0013	12.5	18	4	-	-

Designation	Ordering Number	Dimensions in mm				
		l	t	s	r	l_1
Style - BR						
BR 16	05 35 0016	16	1.5	1.0	-	-
BR 19	05 35 0019	19	1.7	1.2	-	-
BR 22	05 35 0022	22	2.2	1.5	-	-
BR 25	05 35 0025	25	2.5	1.5	-	-
BR 30	05 35 0030	30	3.0	1.8	-	-

Designation	Ordering Number	Dimensions in mm			
		l	t	s	l_1
Style - CX (RH)					
CX 5	05 46 0005	5.0	8	4	3.8
CX 7	05 46 0007	6.5	8	4	5.0
CX 9	05 46 0009	8.5	8	4	6.0
CX 10	05 46 0010	9.5	10	5	7.0
CX 12	05 46 0012	11.5	10	5	8.0
CX 14	05 46 0014	13.5	10	5	9.0
CX 16	05 46 0016	15.5	12	6	10.0
CX 17	05 46 0017	17.0	12	6	11.2
CX 19	05 46 0019	19.0	12	6	12.3
CX 22	05 46 0022	22.0	12	6	13.7
Style - DX (LH)					
DX 5	05 53 0005	5.0	8	4	3.8
DX 7	05 53 0007	6.5	8	4	5.0
DX 9	05 53 0009	8.5	8	4	6.0
DX 10	05 53 0010	9.5	10	5	7.0
DX 12	05 53 0012	11.5	10	5	8.0
DX 14	05 53 0014	13.5	10	5	9.0
DX 16	05 53 0016	15.5	12	6	10.0
DX 17	05 53 0017	17.0	12	6	11.2
DX 19	05 53 0019	19.0	12	6	12.3
DX 22	05 53 0022	22.0	12	6	13.7

Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

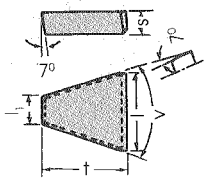
Tolerance

Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

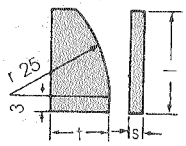
WIDIA

SMS Tips

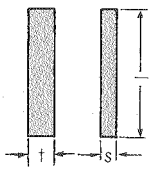
Style - CR



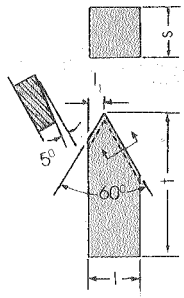
Style - DB



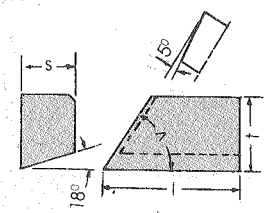
Style - DA



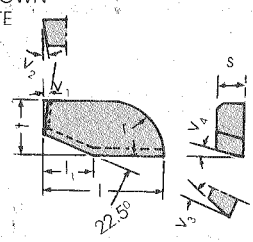
Style - FT & FU



Style-KD SHOWN
LD OPPOSITE



Style-XA & XC SHOWN
XB & XD OPPOSITE



Designation	Ordering Number	Dimensions in mm l	t	s	l_1	v
Style - CR						
CR 12	05 45 0012	12	15	5	4.6	30°
CR 16	05 45 0016	16	18	6	5.5	32°
CR 20	05 45 0020	20	22	6	7.2	32°
CR 25	05 45 0025	25	30	8	9.5	34°
CR 35	05 45 0035	35	40	10	15.2	34°
Style - DA						
DA 2	05 51 0002	12	2.5	1.5	-	-
DA 3	05 51 0003	16	3.5	1.8	-	-
DA 4	05 51 0004	20	4.5	2.5	-	-
DA 5	05 51 0005	25	5.0	3.0	-	-
Style - DB						
DB 5	05 52 0005	12	5.5	1.5	-	-
DB 6	05 52 0006	16	6.5	1.8	-	-
DB 7	05 52 0007	16	7.5	1.8	-	-
DB 8	05 52 0008	20	8.5	2.0	-	-
DB 9	05 52 0009	20	9.5	2.3	-	-
DB11	05 52 0011	20	11.0	2.3	-	-

Designation	Ordering Number	Dimensions in mm l	t	s	l_1
Style FT (RH)					
FT 12	05 57 0012	3	12	3	1.0
FT 14	05 57 0014	4	14	4	1.2
FT 16	05 57 0016	5	16	5	1.5
Style - FU (LH)					
FU 12	05 58 0012	3	12	3	1.0
FU 14	05 58 0014	4	14	4	1.2
FU 16	05 58 0016	5	16	5	1.5

Designation	Ordering Number	Dimensions in mm l	t	s	v
Style - KD					
KD 25 50°	04 63 2550	25	14	10	50°
KD 25 58°	04 63 2558	25	14	10	58°
KD 25 85°	04 63 2585	25	14	10	85°
Style - LD					
LD 25 50°	04 64 2550	25	12	8	50°
LD 25 58°	04 64 2558	25	12	8	58°

Designation	Ordering Number	Dimensions in mm l	t	s	r	l_1	v_1	v_2	v_3	v_4
Style - XA, XB, XC, & XD										
XA 20	05 71 0020	20	9	5	10	4.0	4°	0°	0°	0°
XA 22	05 71 0022	22	10	5	10	7.5	2°	0°	0°	0°
XB 20	05 72 0020	20	9	5	5	4.0	4°	0°	0°	0°
XB 22	05 72 0022	22	10	5	5	9.0	2°	0°	0°	0°
XC 22	05 73 0022	22	10	5	10	9.0	2°	8°	18°	14°
XD 22	05 74 0022	22	10	5	5	9.0	2°	8°	18°	14°

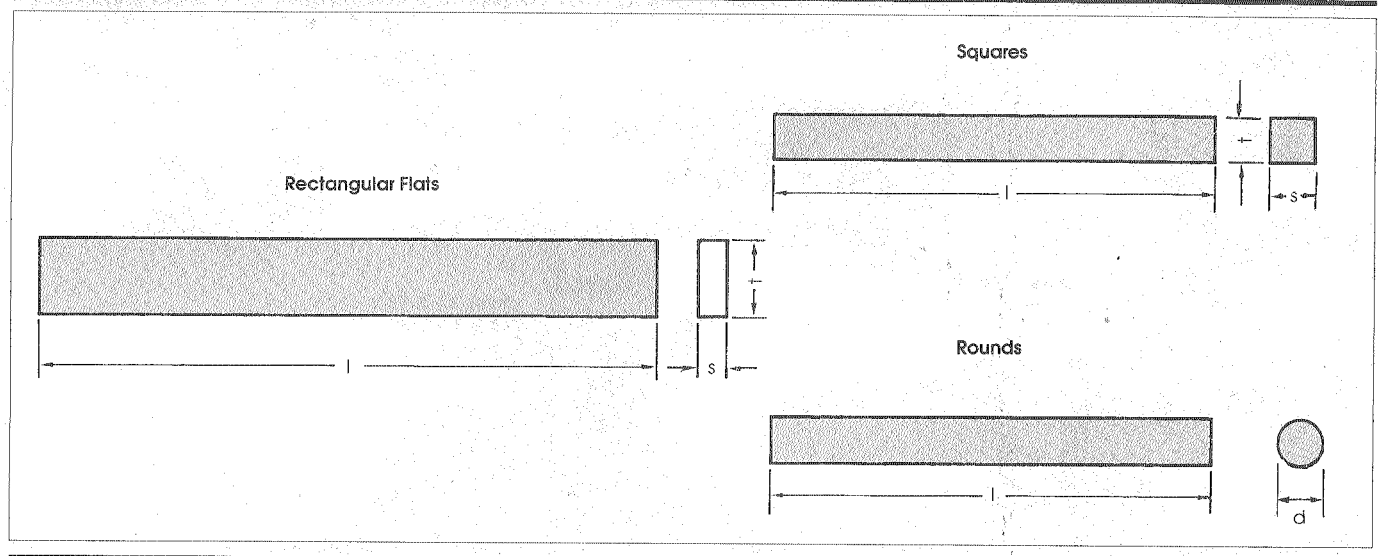
Note: Edges may be slightly chamfered/rounded. Tips with thickness <4 mm. are manufactured without bottom bevel or radius and clearance angle.
For availability of the above items, please refer our latest Price List.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Tolerance

Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

Flats, Squares & Rounds



Ordering Number	Dimensions in mm l	t	s
Flats			
06 91 0020	40	2.0	1.0
06 91 0024	30	2.5	1.0
06 91 0025	40	2.5	1.0
06 91 0028	85	2.5	1.0
06 91 0525	85	2.5	1.5
06 91 0534	40	3.5	1.5
06 91 0535	85	3.5	1.5
06 91 0545	85	4.5	1.5
06 91 0565	85	6.5	1.5
06 91 0505	85	10.5	1.5
06 92 0035	85	3.5	2.0
06 92 0044	50	4.5	2.0
06 92 0045	85	4.5	2.0
06 92 0055	85	5.5	2.0
06 92 0064	50	6.5	2.0
06 92 0065	85	6.5	2.0
06 92 0075	85	7.5	2.0
06 92 0005	85	10.5	2.0
06 92 0025	85	12.5	2.0
06 92 0530	85	3.0	2.5
06 92 0535	85	3.5	2.5
06 92 0540	85	4.0	2.5
06 92 0545	85	4.5	2.5
06 92 0550	85	5.0	2.5
06 92 0555	85	5.5	2.5
06 92 0565	85	6.5	2.5
06 92 0575	85	7.5	2.5
06 92 0525	85	12.5	2.5

Ordering Number	Dimensions in mm l	t	s
06 93 0065	85	6.5	3.0
06 93 0075	85	7.5	3.0
06 93 0085	85	8.5	3.0
06 93 0095	85	9.5	3.0
06 93 0105	85	10.5	3.0
06 93 0025	85	12.5	3.0
06 93 0055	85	15.5	3.0
06 93 0585	85	8.5	3.5
06 93 0505	85	10.5	3.5
06 94 0085	85	8.5	4.0
06 94 0005	85	10.5	4.0
06 94 0025	85	12.5	4.0
06 94 0055	85	15.5	4.0
Squares			
06 98 0030	60	3.0	3.0
06 98 0040	80	4.0	4.0
06 98 0050	100	5.0	5.0
06 98 0060	100	6.0	6.0

Ordering Number	Dimensions in mm Ø d	l
Rounds		
06 99 0010	1.0	20
06 99 0020	2.0	40
06 99 0030	3.0	60
06 99 0040	4.0	80
06 99 0050	5.0	100
06 99 0060	6.0	100
06 99 0080	8.0	100

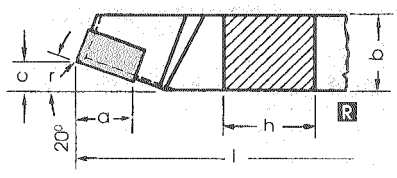
Note: The edges may be slightly chamfered/rounded.
For availability of the above items, please refer our latest Price List.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade.

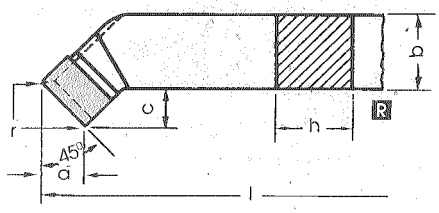
Tolerance

Nominal Dimension	mm	0 - 6	6 - 12	12 - 25	25 -50	50 - 100	>100
Tolerance	mm	+0.3 0	+0.4 0	+0.6 0	+1.0 0	+2.0 0	3%

Straight turning tool
Style ISO 1



Cranked turning tool
Style ISO 2



Shank Size	Ordering Number R	Ordering Number L	Dimensions in mm h	b	l	c	a	r	Tip used
Style ISO 1									
1010	60 07 1110	60 07 1210	10	10	90	4	7.5	0.4	C 8
1212	60 07 1112	60 07 1212	12	12	100	5	9.4	0.4	C 10
1616	60 07 1116	60 07 1216	16	16	110	6	11.2	0.4	C 12
2020	60 07 1120	60 07 1220	20	20	125	8	15.0	0.8	C 16
2525	60 07 1125	60 07 1225	25	25	140	10	18.8	1.2	C 20
3232	60 07 1132	60 07 1232	32	32	170	12	23.5	1.2	C 25
4040	60 07 1140	60 07 1240	40	40	200	16	30.0	1.6	C 32
1610	60 07 1316	60 07 1416	16	10	110	4	9.4	0.4	C 10
2012	60 07 1320	60 07 1420	20	12	125	5	11.2	0.4	C 12
2516	60 07 1325	60 07 1425	25	16	140	6	15.0	0.8	C 16
3220	60 07 1332	60 07 1432	32	20	170	8	18.8	1.2	C 20
4025	60 07 1340	60 07 1440	40	25	200	10	23.5	1.2	C 25
5032	60 07 1350	60 07 1450	50	32	240	12	30.0	1.6	C 32
Style ISO 2									
1010	60 07 2110	60 07 2210	10	10	90	6	5.6	0.4	C 8
1212	60 07 2112	60 07 2212	12	12	100	7	7.0	0.4	C 10
1616	60 07 2116	60 07 2216	16	16	110	8	8.5	0.4	C 12
2020	60 07 2120	60 07 2220	20	20	125	10	11.3	0.8	C 16
2525	60 07 2125	60 07 2225	25	25	140	12	14.1	1.2	C 20
3232	60 07 2132	60 07 2232	32	32	170	14	17.6	1.2	C 25
4040	60 07 2140	60 07 2240	40	40	200	18	22.6	1.6	C 32
1610	60 07 2316	60 07 2416	16	10	110	7	7.0	0.4	C 10
2012	60 07 2320	60 07 2420	20	12	125	8	8.5	0.4	C 12
2516	60 07 2325	60 07 2425	25	16	140	10	11.3	0.8	C 16
3220	60 07 2332	60 07 2432	32	20	170	12	14.1	1.2	C 20
4025	60 07 2340	60 07 2440	40	25	200	14	17.6	1.2	C 25
5032	60 07 2350	60 07 2450	50	32	240	18	22.6	1.6	C 32

Note: The above Tools are supplied in WIDIA grades TTS & TH 20. For availability of the above items, please refer our latest Price List. Specials can be made to order in other WIDIA grades also. Please write to us with drawings.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Unless otherwise specified the above tools are supplied with:

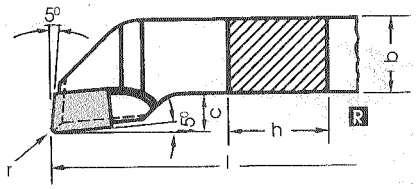
Rake angle 10°

Angle of inclination 4° for Style ISO 1

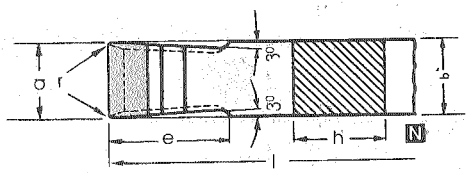
0° for Style ISO 2

WIDIA Hardmetal Tipped Tools

Offset turning and facing tool
Style ISO 3



Broad-nosed turning tool
Style ISO 4



Shank Size	Ordering Number R	Ordering Number L	h	b	l	c	e	a	r	Tip used
Style ISO 3										
1010	60 07 8310	60 07 8410	10	10	90	5	-	-	0.4	C 8
1212	60 07 8312	60 07 8412	12	12	100	6	-	-	0.4	C 10
1616	60 07 8316	60 07 8416	16	16	110	8	-	-	0.4	C 12
2020	60 07 8320	60 07 8420	20	20	125	10	-	-	0.8	C 16
2525	60 07 8325	60 07 8425	25	25	140	12	-	-	1.2	C 20
3232	60 07 8332	60 07 8432	32	32	170	14	-	-	1.2	C 25
4040	60 07 8340	60 07 8440	40	40	200	20	-	-	1.6	C 32
1610	60 07 8516	60 07 8616	16	10	110	5	-	-	0.4	C 8
2012	60 07 8520	60 07 8620	20	12	125	6	-	-	0.4	C 10
2516	60 07 8525	60 07 8625	25	16	140	8	-	-	0.4	C 12
3220	60 07 8532	60 07 8632	32	20	170	10	-	-	0.8	C 16
4025	60 07 8540	60 07 8640	40	25	200	12	-	-	1.2	C 20
5032	60 07 8550	60 07 8650	50	32	240	14	-	-	1.2	C 25
Style ISO 4										
1010	60 07 6510		10	10	90	-	10	10	0.4	C 10
1212	60 07 6512		12	12	100	-	12	12	0.4	C 12
1616	60 07 6516		16	16	110	-	16	16	0.8	C 16
2020	60 07 6520		20	20	125	-	20	20	1.2	C 20
2525	60 07 6525		25	25	140	-	25	25	1.2	C 25
3232	60 07 6532		32	32	170	-	32	32	1.6	C 32
4040	60 07 6540		40	40	200	-	40	40	2.0	C 40
1610	60 07 6616		16	10	110	-	16	10	0.4	C 10
2012	60 07 6620		20	12	125	-	20	12	0.4	C 12
2516	60 07 6625		25	16	140	-	25	16	0.8	C 16
3220	60 07 6632		32	20	170	-	32	20	1.2	C 20
4025	60 07 6640		40	25	200	-	40	25	1.2	C 25
5032	60 07 6650		50	32	240	-	50	32	1.6	C 32

Note: The above Tools are supplied in WIDIA grades TTS & TH 20. For availability of the above items, please refer our latest Price List. Specials can be made to order in other WIDIA grades also. Please write to us with drawings.

Unless otherwise specified the above tools are supplied with:

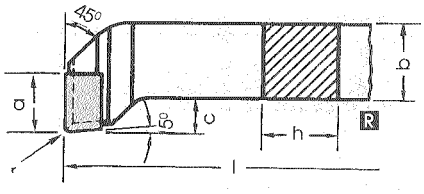
Rake angle 10°

Angle of inclination 0°

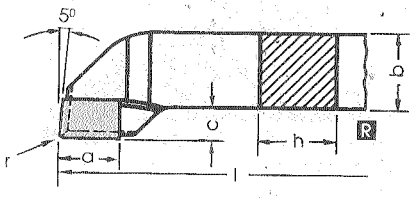
HOW TO ORDER: Please specify Ord. No. and WIDIA grade.

WIDIA Hardmetal Tipped Tools

Offset end-cutting tool
Style ISO 5



Offset side-cutting tool
Style ISO 6



Shank Size	Ordering Number R	Ordering Number L	Dimensions in mm h	b	l	c	a	r	Tip used
Style ISO 5									
1010	60 07 7110	60 07 7210	10	10	90	5	8	0.4	C 8
1212	60 07 7112	60 07 7212	12	12	100	6	10	0.4	C 10
1616	60 07 7116	60 07 7216	16	16	110	8	12	0.4	C 12
2020	60 07 7120	60 07 7220	20	20	125	10	16	0.8	C 16
2525	60 07 7125	60 07 7225	25	25	140	12	20	1.2	C 20
3232	60 07 7132	60 07 7232	32	32	170	16	25	1.2	C 25
4040	60 07 7140	60 07 7240	40	40	200	20	32	1.6	C 32
1610	60 07 7316	60 07 7416	16	10	110	6	10	0.4	C 10
2012	60 07 7320	60 07 7420	20	12	125	8	12	0.4	C 12
2516	60 07 7325	60 07 7425	25	16	140	10	16	0.8	C 16
3220	60 07 7332	60 07 7432	32	20	170	12	20	1.2	C 20
4025	60 07 7340	60 07 7440	40	25	200	16	25	1.2	C 25
5032	60 07 7350	60 07 7450	50	32	240	20	32	1.6	C 32
Style ISO 6									
1010	60 08 0110	60 08 0210	10	10	90	4	8	0.4	C 8
1212	60 08 0112	60 08 0212	12	12	100	5	10	0.4	C 10
1616	60 08 0116	60 08 0216	16	16	110	6	12	0.4	C 12
2020	60 08 0120	60 08 0220	20	20	125	8	16	0.8	C 16
2525	60 08 0125	60 08 0225	25	25	140	10	20	1.2	C 20
3232	60 08 0132	60 08 0232	32	32	170	12	25	1.2	C 25
4040	60 08 0140	60 08 0240	40	40	200	14	32	1.6	C 32
1610	60 08 0316	60 08 0416	16	10	110	5	10	0.4	C 10
2012	60 08 0320	60 08 0420	20	12	125	6	12	0.4	C 12
2516	60 08 0325	60 08 0425	25	16	140	8	12	0.8	C 12
3220	60 08 0332	60 08 0432	32	20	170	10	20	1.2	C 20
4025	60 08 0340	60 08 0440	40	25	200	12	25	1.2	C 25
5032	60 08 0350	60 08 0450	50	32	240	14	32	1.6	C 32

Note: The above Tools are supplied in WIDIA grades TTS & TH 20. For availability of the above items, please refer our latest Price List. Specials can be made to order in other WIDIA grades also. Please write to us with drawings.

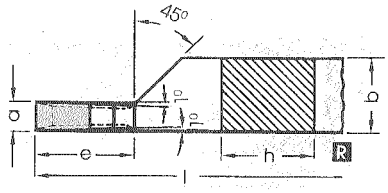
Unless otherwise specified the above tools are supplied with:

Rake angle 10^0

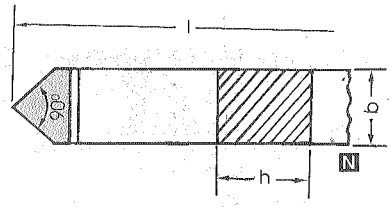
Angle of inclination 0^0

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Recessing tool
Style ISO 7



Turning and Grooving tool
Style 163



Shank Size	Ordering Number R	Ordering Number L	Dimensions in mm h	b	l	e	a	Tip used
Style ISO 7								
1006	60 08 1310	60 08 1410	10	6	90	12	3	D 3
1208	60 08 1312	60 08 1412	12	8	100	12	3	D 3
1610	60 08 1316	60 08 1416	16	10	110	14	4	D 4
2012	60 08 1320	60 08 1420	20	12	125	16	5	D 5
2516	60 08 1325	60 08 1425	25	16	140	20	6	D 6
3220	60 08 1332	60 08 1432	32	20	170	25	8	D 8
4025	60 08 1340	60 08 1440	40	25	200	32	10	D 10
5032	60 08 1350	60 08 1450	50	32	240	40	12	D 12
Style 163								
1010	60 73 1010		10	10	90	-	-	F 10
1212	60 73 1012		12	12	100	-	-	F 12
1616	60 73 1016		16	16	110	-	-	F 16
2020	60 73 1020		20	20	125	-	-	F 20
2525	60 73 1025		25	25	140	-	-	F 25
3232	60 73 1032		32	32	170	-	-	F 32
4040	60 73 1040		40	40	200	-	-	F 40

Note: The above Tools are supplied in WIDIA grades TTS & TH 20. For availability of the above items, please refer our latest Price List. Specials can be made to order in other WIDIA grades also. Please write to us with drawings.

HOW TO ORDER: Please specify Ord. No. and WIDIA grade.

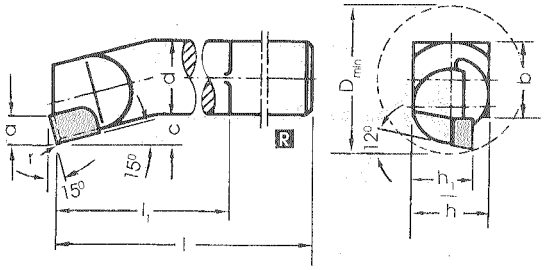
Unless otherwise specified the above tools are supplied with:

Rake angle 10° for Style ISO 7
0° for Turning & Grooving tool

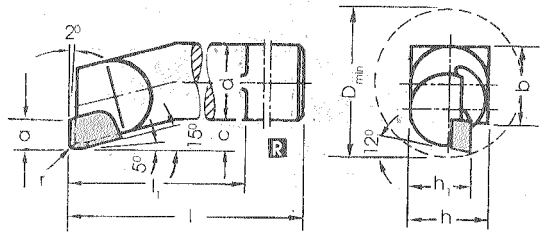
Angle of inclination 0°

WIDIA Hardmetal Tipped Tools

Boring tool
Style ISO 8



Boring tool
Style ISO 9



Shank Size	Ordering Number R	Ordering Number L	h/b/d	h_1	l	l_1	c	a	r	D_{min}	Tip used
Style ISO 8											
0808	60 07 3508		8	5.9	125	40	3	3.8	0.4	14	A 6
1010	60 07 3510		10	7.5	150	50	4	3.8	0.4	18	A 6
1212	60 07 3512		12	9.1	180	63	5	4.8	0.4	21	A 8
1616	60 07 3516		16	12.3	210	80	6	5.8	0.4	27	A 10
2020	60 07 3520		20	15.5	250	100	8	7.7	0.4	34	A 12
2525	60 07 3525		25	19.5	300	125	10	9.6	0.8	43	A 16
3232	60 07 3532		32	25.1	355	160	12	11.6	0.8	52	A 20
Ø 8	60 07 3708		8	5.9	125	-	3	3.8	0.4	14	A 6
Ø 10	60 07 3710		10	7.5	150	-	4	3.8	0.4	18	A 6
Ø 12	60 07 3712		12	9.1	180	-	5	4.8	0.4	21	A 8
Ø 16	60 07 3716		16	12.3	210	-	6	5.8	0.4	27	A 10
Ø 20	60 07 3720		20	15.5	250	-	8	7.7	0.4	34	A 12
Ø 25	60 07 3725		25	19.5	300	-	10	9.6	0.8	43	A 16
Ø 32	60 07 3732		32	25.1	355	-	12	11.6	0.8	52	A 20
Style ISO 9											
0808	60 07 4508		8	5.9	125	40	3	3.5	0.4	14	A 6
1010	60 07 4510		10	7.5	150	50	4	3.5	0.4	18	A 6
1212	60 07 4512		12	9.1	180	63	5	4.4	0.4	21	A 8
1616	60 07 4516		16	12.3	210	80	6	5.3	0.4	27	A 10
2020	60 07 4520		20	15.5	250	100	8	7.1	0.4	34	A 12
2525	60 07 4525		25	19.5	300	125	10	8.9	0.8	43	A 16
3232	60 07 4532		32	25.1	355	160	12	10.7	0.8	52	A 20
Ø 8	60 07 4708		8	5.9	125	-	3	3.5	0.4	14	A 6
Ø 10	60 07 4710		10	7.5	150	-	4	3.5	0.4	18	A 6
Ø 12	60 07 4712		12	9.1	180	-	5	4.4	0.4	21	A 8
Ø 16	60 07 4716		16	12.3	210	-	6	5.3	0.4	27	A 10
Ø 20	60 07 4720		20	15.5	250	-	8	7.1	0.4	34	A 12
Ø 25	60 07 4725		25	19.5	300	-	10	8.9	0.8	43	A 16
Ø 32	60 07 4732		32	25.1	355	-	12	10.7	0.8	52	A 20

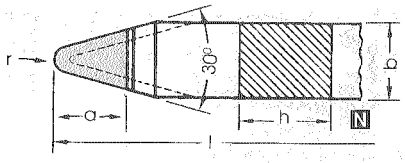
Note: The above Tools are supplied in WIDIA grades TTS & TH 20. For availability of the above items, please refer our latest Price List. Specials can be made to order in other WIDIA grades also. Please write to us with drawings.

Unless otherwise specified the above tools are supplied with:
Rake angle 10°
Angle of inclination 0°

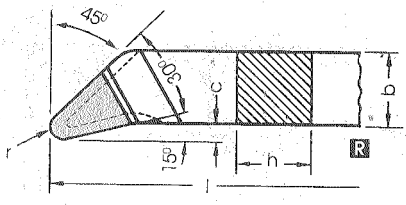
HOW TO ORDER: Please specify Ord. No. and WIDIA grade

WIDIA Hardmetal Tipped Tools

Straight round nose tool
Style 113



Cranked round nose tool
Style 115



Shank Size	Ordering Number R	Ordering Number L	Dimensions in mm h	b	l	c	a	r	Tip used
Style 113									
1010	60 16 1510		10	10	90	-	12	1.0	G 8
1212	60 16 1512		12	12	100	-	14	1.5	G 10
1616	60 16 1516		16	16	110	-	17	2.5	G 12
2020	60 16 1520		20	20	125	-	20	3.5	G 16
2525	60 16 1525		25	25	140	-	23	4.5	G 20
3232	60 16 1532		32	32	170	-	27	6.0	G 25
4040	60 16 1540		40	40	200	-	32	8.0	G 30
1610	60 16 1616		16	10	110	-	12	1.0	G 8
2012	60 16 1620		20	12	125	-	14	1.5	G 10
2516	60 16 1625		25	16	140	-	17	2.5	G 12
3220	60 16 1632		32	20	170	-	20	3.5	G 16
4025	60 16 1640		40	25	200	-	23	4.5	G 20
5032	60 16 1650		50	32	240	-	27	6.0	G 25
Style 115									
1010	60 17 1110	60 17 1210	10	10	90	3.0	-	1.0	G 8
1212	60 17 1112	60 17 1212	12	12	100	3.5	-	1.5	G 10
1616	60 17 1116	60 17 1216	16	16	110	4.5	-	2.5	G 12
2020	60 17 1120	60 17 1220	20	20	125	4.8	-	3.5	G 16
2525	60 17 1125	60 17 1225	25	25	140	5.5	-	4.5	G 20
3232	60 17 1132	60 17 1232	32	32	170	6.3	-	6.0	G 25
4040	60 17 1140	60 17 1240	40	40	200	7.0	-	8.0	G 30
1610	60 17 1316	60 17 1416	16	10	110	3.0	-	1.0	G 8
2012	60 17 1320	60 17 1420	20	12	125	3.5	-	1.5	G 10
2516	60 17 1325	60 17 1425	25	16	140	4.5	-	2.5	G 12
3220	60 17 1332	60 17 1432	32	20	170	4.8	-	3.5	G 16
4025	60 17 1340	60 17 1440	40	25	200	5.5	-	4.5	G 20
5032	60 17 1350	60 17 1450	50	32	240	6.3	-	6.0	G 25

Note: The above Tools are supplied in WIDIA grades TTS & TH 20. For availability of the above items, please refer our latest Price List. Specials can be made to order in other WIDIA grades also. Please write to us with drawings.

Unless otherwise specified the above tools are supplied with:

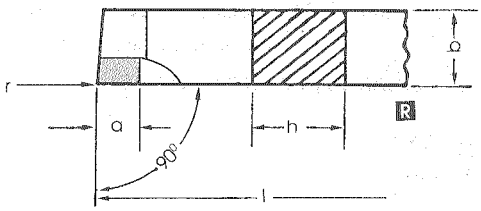
Rake angle 5°

Angle of inclination 0°

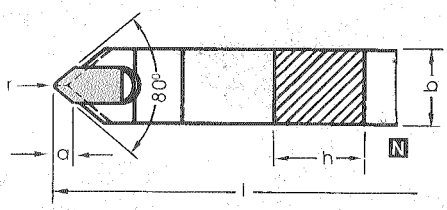
HOW TO ORDER: Please specify Ord. No. and WIDIA grade.

WIDIA Hardmetal Tipped Tools

Bar turning tool
Style 116



Straight finishing tool
Style 122



Shank Size	Ordering Number R	Ordering Number L	h	b	l	a	r	Tip used
Style 116								
1010	60 78 0110	60 78 0210	10	10	90	8.0	0.4	C 8
1212	60 78 0112	60 78 0212	12	12	100	10.0	0.4	C 10
1616	60 78 0116	60 78 0216	16	16	110	12.0	0.4	C 12
2020	60 78 0120	60 78 0220	20	20	125	16.0	0.8	C 16
2525	60 78 0125	60 78 0225	25	25	140	20.0	1.2	C 20
3232	60 78 0132	60 78 0232	32	32	170	25.0	1.2	C 25
4040	60 78 0140	60 78 0240	40	40	200	32.0	1.6	C 32
1610	60 78 0316	60 78 0416	16	10	110	10.0	0.4	C 10
2012	60 78 0320	60 78 0420	20	12	125	12.0	0.4	C 12
2516	60 78 0325	60 78 0425	25	16	140	16.0	0.8	C 16
3220	60 78 0332	60 78 0432	32	20	170	20.0	1.2	C 20
4025	60 78 0340	60 78 0440	40	25	200	25.0	1.2	C 25
5032	60 78 0350	60 78 0450	50	32	240	32.0	1.6	C 32
Style 122								
1010	60 07 5510		10	10	90	3.0	0.4	E 5
1212	60 07 5512		12	12	100	3.6	0.4	E 6
1616	60 07 5516		16	16	110	4.8	0.4	E 8
2020	60 07 5520		20	20	125	6.0	0.8	E 10
2525	60 07 5525		25	25	140	7.1	1.2	E 12
3232	60 07 5532		32	32	170	9.5	1.2	E 16
4040	60 07 5540		40	40	200	14.9	1.6	E 25
1610	60 07 5616		16	10	110	3.6	0.4	E 6
2012	60 07 5620		20	12	125	4.8	0.4	E 8
2516	60 07 5625		25	16	140	6.0	0.8	E 10
3220	60 07 5632		32	20	170	7.1	1.2	E 12
4025	60 07 5640		40	25	200	9.5	1.2	E 16
5032	60 07 5650		50	32	240	11.9	1.6	E 20

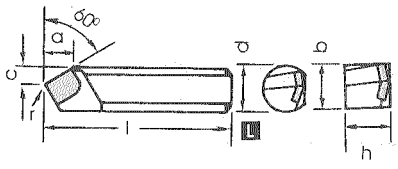
Note: The above Tools are supplied in WIDIA grades TTS & TH 20. For availability of the above items, please refer our latest Price List. Specials can be made to order in other WIDIA grades also. Please write to us with drawings.

Unless otherwise specified the above tools are supplied with:
Rake angle 10°
Angle of inclination 0°

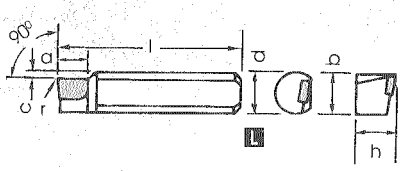
HOW TO ORDER: Please specify Ord. No. and WIDIA grade

WIDIA Hardmetal Tipped Tools

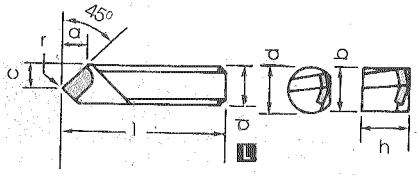
Boring tool (60°)
Style 140/E140



Boring tool (90°)
Style 141/E141



Boring tool (45°)
Style 142/E142



Shank Size	Ordering Number R	Ordering Number L	Dimensions in mm b/d	h	l	c	a	r	Tip used
Style 140/E140									
Ø 10		60 86 0010	10	8.5	50	5.0	6.5	0.4	B 8
Ø 12		60 86 0012	12	10.5	60	6.0	8.5	0.4	B 10
Ø 16		60 86 0016	16	14.0	90	8.0	10.0	0.8	B 12
Ø 20		60 86 0020	20	17.0	120	10.0	13.5	0.8	B 16
1010		60 86 0110	10	-	50	4.5	6.5	0.4	B 8
1212		60 86 0112	12	-	60	5.5	8.5	0.4	B 10
1616		60 86 0116	16	-	90	7.5	10.0	0.8	B 12
Ø 3/8"		61 86 0009	3/8"	8.3	50	4.3	6.5	0.5	B 8
Ø 1/2"		61 86 0012	1/2"	11.1	60	5.9	8.5	0.5	B 10
Ø 3/4"		61 86 0019	3/4"	16.0	120	8.9	13.5	0.8	B 16
Style 141/E141									
Ø 10		60 89 0010	10	8.5	50	0.4	8.0	0.4	B 8
Ø 12		60 89 0012	12	10.5	60	0.4	10.0	0.4	B 10
Ø 16		60 89 0016	16	14.0	90	0.4	12.0	0.8	B 12
Ø 20		60 89 00 20	20	17.0	120	0.5	16.0	0.8	B 16
Ø 3/8"		61 89 00 09	3/8"	8.3	50	0.4	8.0	0.5	B 8
Ø 1/2"		61 89 0012	1/2"	11.1	60	0.4	10.0	0.5	B 10
Ø 5/8"		61 89 0015	5/8"	14.0	90	0.4	12.0	0.8	B 12
Ø 3/4"		61 89 0019	3/4"	16.0	120	0.5	16.0	0.8	B 16
3/8" Sq.		61 89 01 09	3/8"	-	50	0.4	8.0	0.5	B 8
1/2" Sq.		61 89 0112	1/2"	-	60	0.4	10.0	0.5	B 10
Style 142/E142									
Ø 10		60 84 5010	10	9.2	8	50	6.5	5.5	0.5	B 8
Ø 12		60 84 5012	12	11.2	9.2	60	7.5	7.5	0.5	B 10
Ø 16		60 84 5016	16	14.5	12.9	90	9.5	8.5	0.8	B 12
Ø 3/8"		61 84 5009	3/8"	8.7	7.5	63	6.3	5.0	0.5	B 8
Ø 1/2"		61 84 5012	1/2"	11.9	9.9	76	7.9	7.0	0.5	B 10
Ø 5/8"		61 84 5015	5/8"	14.3	12.3	89	9.2	8.0	0.8	B 12
Ø 3/4"		61 84 5019	3/4"	16.7	14.7	120	11.9	11.0	0.8	B 16

Note: The above Tools are supplied in WIDIA grades TTS & TH 20. For availability of the above items, please refer our latest Price List. Specials can be made to order in other WIDIA grades also. Please write to us with drawings.

Unless otherwise specified the above tools are supplied with:

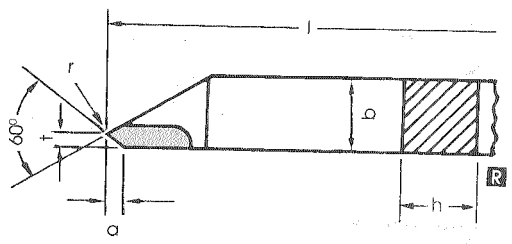
Rake angle 10°

Angle of inclination 5°

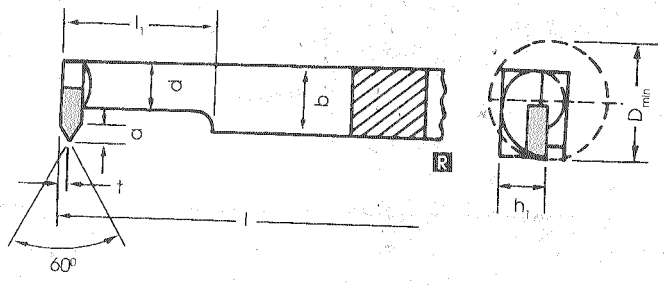
HOW TO ORDER: Please specify Ord. No. and WIDIA grade.

WIDIA Hardmetal Tipped Tools

External threading tool
Style - IND 2



Internal threading tool
Style - 116 - 11/14



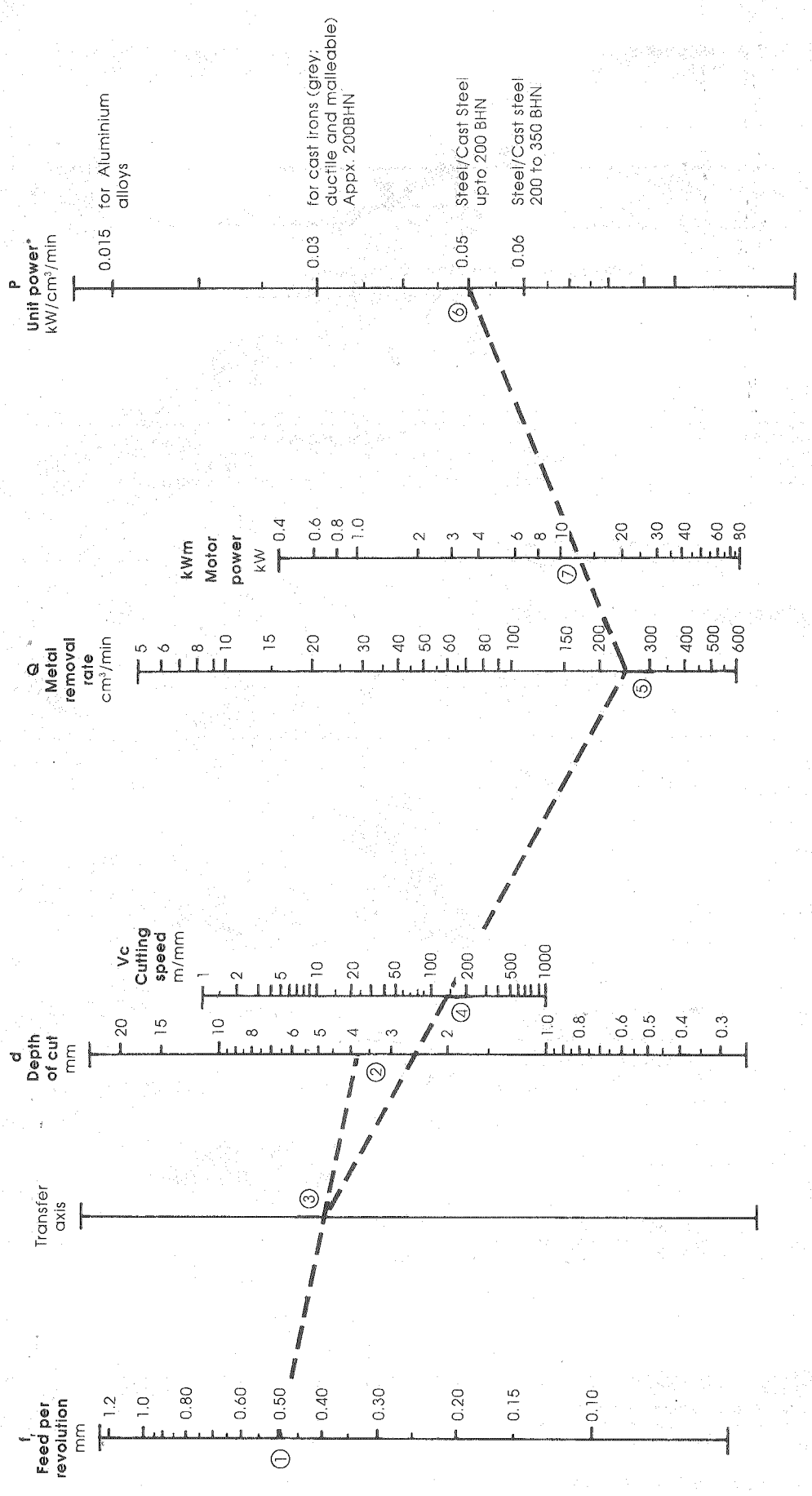
Shank Size	Ordering Number R	Ordering Number L	h/b	l	l_1	h_1	a	d	r	t	D_{min}	Tip used
Style IND 2												
2020	61 11 1120		20	125	-	-	4.3	-	0.1	2.5	-	FT 18
Style 166 - 11/14												
1616	*61 12 1516		16	140	30	7.8	1.7	10	-	1.0	15	FU 12
2020	61 12 1520		20	160	40	9.8	1.7	15	-	1.0	20	FU 12
2525	61 12 1525		25	180	50	12.3	2.0	18	-	1.2	25	FU 14
3232	61 12 1532		32	200	60	15.7	2.0	21	-	1.2	30	FU 14

Note: The above Tools are supplied in WIDIA grades TTS & TH 20. For availability of the above items, please refer our latest Price List. Specials can be made to order in other WIDIA grades also. Please write to us with drawings.

Unless otherwise specified the above tools are supplied with:
Rake angle 0°
Angle of inclination 0°

HOW TO ORDER: Please specify Ord. No. and WIDIA grade

Chart for determining metal removal rate and motor power in turning



To Determine Motor Power:

Connect Feed ① with Depth cut ② to obtain point ③ on Transfer axis.
Connect ③ with Cutting speed ④ to obtain point ⑤ on Metal removal rate scale.
Connect point ⑤ with Unit power ⑥ to obtain 12.35 kw at Motor, point ⑦

Example:

Power = feed x Depth x Speed x Unit power

fr = 0.5 mm d = 3.8 mm

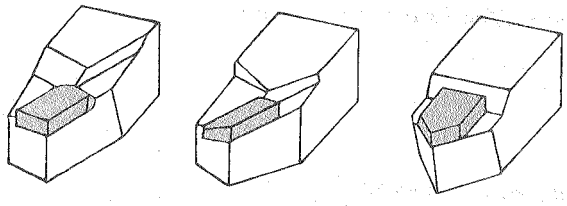
Vc = 130m/min , P = 0.05 kw/cm3/min

* for steel/cast steel upto 200 BHN

Brazing of Carbide Tips

1 Make tool shank of carbon steel having a tensile strength of not less than 45 tons/sq. in. Finish recess in shank, using a light milling or planing cut.

Recess for hard metal tips made to DIN 4950, Style A or similar	Recess for planing, rough turning and copy-turning tool tips	Recess for finishing tool tips



2 Stamp WIDIA grade on shank.

3 Clean up joint faces of tip with silicon carbide wheel.

4 Solders and fluxes.

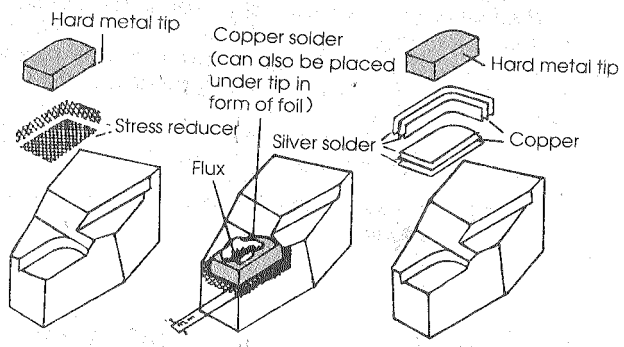
Solders (Brazing temperature)	Stress Reducer	Fluxes
Electrolytic copper (1120° C)	0.2... 0.3 mm gauge nickel wire or nickel-plated steel wire gauge*)	Borax (dehydrated)
Silver solders e.g. LAg 49 conforming to DIN 1734 (690.. 720° C)	0.2... 0.3 mm gauge copper foil*)	Special fluxes (to makers' specifications)
Soft solder in special cases; tips must then be copper-coated.		
*) Commercial foil of similar type can also be employed.		

Stress reducers are recommended for WIDIA grades highly resistant to wear. Under certain conditions, they can be dispensed with when tougher grades are to be brazed. The application of a stress reducer is governed by the solder, the method of brazing, the shape and size of the tool and the conditions under which it is to be used.

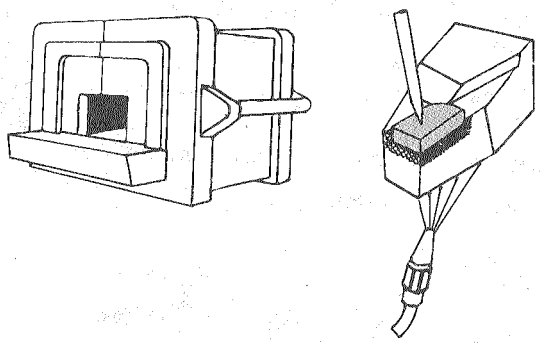
5 Clean recess, tip and foil; then degrease with solvent.

6 Allow stress reducer to project about 1 mm over edge of tip recess on all sides. If wire gauge is used as stress reducer, apply it in such a way that the filaments do not run parallel to the main cutting edge.

7 Place stress reducer, tip and copper solder in position and apply flux liberally. Insert sandwiched silver-copper-silver solder or just silver solder between the flux-coated brazing faces of tip and shank.

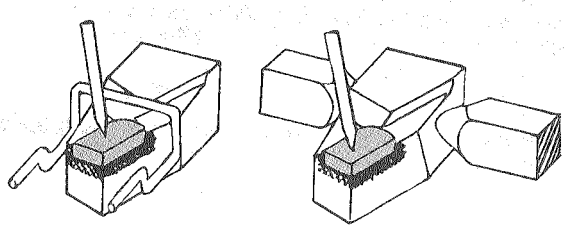


8 If brazing is done in a gas-fired muffle furnace, admit an excess amount of gas to the furnace; in electric muffle furnaces, inert gas should be used. Add flux liberally, so that the tip is completely enclosed in flux during the brazing process.



If using an oxy-acetylene brazing torch, work with an excess of acetylene and direct the flame towards the tool shank.

If using induction or resistance brazing equipment, see that the shank is uniformly heated up.

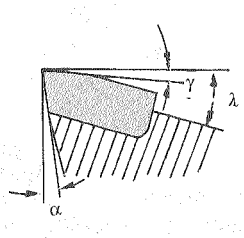


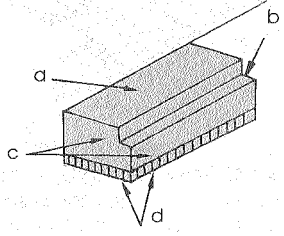
9 As soon as the solder runs freely, cut off the heat or withdraw the tool from the heating zone and place it on a heat-insulating support. Press the tip gently into the recess with a pointed rod until the solder has solidified.

10 Allow the tool to cool in preheated, dry sand, ash, or similar materials.

Grinding of Carbide Tipped Tools

- Use only true-running, properly dressed grinding wheels.
- Wet grinding is preferable to dry. A copious and constant supply of coolant should be directed to the tip.
- Always grind against the cutting edge, i.e. from tip to shank and never use heavy pressure. The finish ground tip must neither shine nor show any discolouring.
- Always use a gauge when grinding tool angles. The face of the chip breaker should also be ground true and square, not hollow ground.
- Never quench hot tools in water.
- Check tool after grinding and before use.
- Care should be taken while grinding since most carbide have low conductivity.





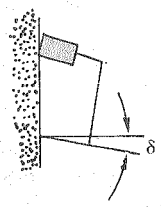
γ Top-rake angle (approx. 14° for TTS and 10° for TH20)
λ Tip seating angle
α Clearance angle

a Top face
b Chipbreaker groove
c Lapped primary clearances
d Secondary clearances

Sequence of operations for grinding

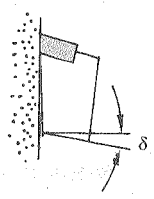
1. Badly worn or damaged tools

a.



Grinding away shank material under the tip.
Aluminium oxide wheel grit 24-36,Hardness J-L
Peripheral speed 20-25 m/sec. (4000-5000 ft/min.)
$\delta = 10 - 12^{\circ}$
Dry grinding.

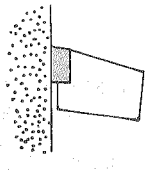
b.



Grinding clearances of the carbide tip.
Silicon carbide wheel (green grit) Grit 38-60,hardness H-J
Peripheral speed 20-25 m/sec. (4000-5000 ft/min.)
$\delta = 7 - 10^{\circ}$
Dry grinding.

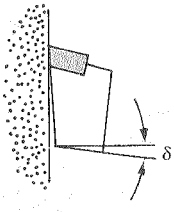
2. Normally or slightly worn tools and finish lapping of rough-ground tools.

a.



Lapping of top face.
Diamond lapping wheel.
Grit 180-220, metal bonded
Peripheral speed 12 - 18m/sec. (2400 - 3600 ft/min.)
Wet grinding.

b.

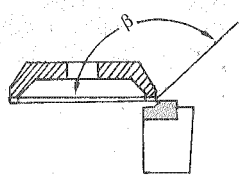


Lapping of primary clearances and nose radius.
Diamond lapping wheel
Grit 220-320, metal bonded.
Peripheral speed 12 - 18 m/sec (2400-3600 ft/min.)
$\delta = 5 - 7^{\circ}$
Wet grinding.

3. Nose radius

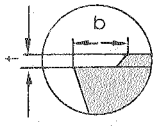
For finishing of steel 1.2 - 2 x the feed
For roughing of steel 3.0 - 4 x the feed
For cast iron a larger radius than for steel.

4. Grinding of chipbreaker



Diamond lapping wheel
Grit 180-220, metal bonded
Peripheral speed 12 - 18 m/sec. (2400-3600 ft/min.)
$\beta = 135^{\circ}$
Wet grinding.

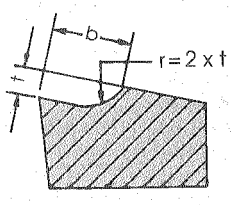
Guide for dimensioning of chipbreaker

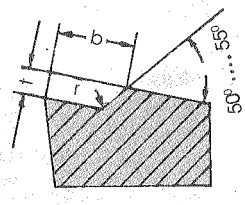


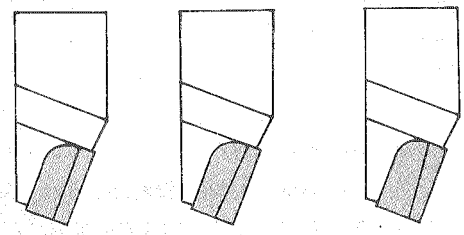
Chip Breaker Dimensions

Tensile strength of work tons/sq. in.	Width (b) when using feeds (s) of		Depth (t)
	under 0.5 mm[1]	over 0.5 mm	mm
Up to 48	12 to 8 x s	1mm + 6 x s	0.6...0.8
From 48 to 63	10 to 7 x s	1mm + 5 x s	0.4...0.6
Over 63	9 to 6 x s	1mm + 4 x s	0.3...0.4

1) The larger multipliers apply to smaller feeds and vice versa.

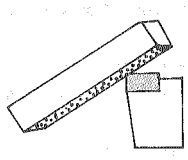






parallel type | for roughing cuts | for finishing cuts

5. Reinforcement of the edge



Silicon carbide handlap, Grit 320 - 400
Alternatively, a boron carbide handlap
Diamond handlap, Grit 320 - 400
Light handlapping for finishing of steel.
Generally the degree of protection required for the cutting edge determines the kind of reinforcement.

Carbide Tipped Tools - Trouble Shooting

Problem \ Recommended Solution	Increase Cutting Speed	Decrease Cutting Speed	Increase Feed	Decrease Feed	Select tough grade TT10 → TT20, TTX → TTS	Select harder grade/Coated grade TTS → TTX → TK15	Use negative rake angle	Use positive rake	Increase Relief & clearance angle	Decrease relief & clearance angle	Increase side cutting angle (lead angle)	Decrease nose radius	Increase nose radius	Hone cutting edge	Decrease tool overhang
Poor Finish	●			●				●			●		●		●
Built-up edge	●							●							
Chatter		●		●				●	●			●			●
Cratering		●		●		●		●							
Wear		●	●			●			●			●			
Chipping/Cracking				●	●		●			●	●		●	●	●
Breakage				●	●		●			●	●			●	●