PCE

PRECISE CUT ENGINEERS

Roller Grooving Tools & Brazed Turning Tools

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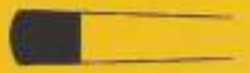
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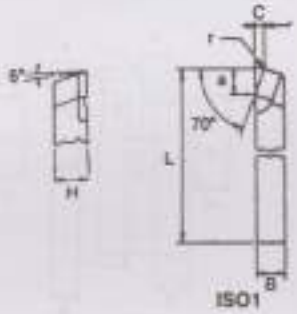
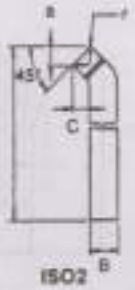
ISO1 Straight turning tool

ISO2 Cranked turning and facing tool



ISO1



ISO2

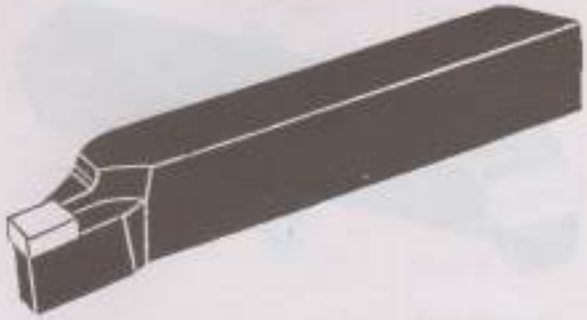
Right hand style shown

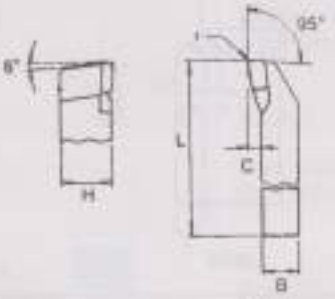
Entering angle Feed direction	Catalogue code	Dimensions in mm						Tip
		H	B	L	C	a	r	
70°	ISO1 R/L 1010	10	10	90	4	7.5	0.4	C8
	ISO1 R/L 1212	12	12	100	5	9.4	0.4	C10
	ISO1 R/L 1616	16	16	110	6	11.2	0.4	C12
	ISO1 R/L 2020	20	20	125	8	15.0	0.8	C16
	ISO1 R/L 2525	25	25	140	10	18.8	1.2	C20
	ISO1 R/L 3232	32	32	170	12	23.5	1.2	C25
	ISO1 R/L 4040	40	40	200	16	30.0	1.6	C32
	ISO1 R/L 1610	16	10	110	4	9.4	0.4	C10
	ISO1 R/L 2012	20	12	125	5	11.2	0.4	C12
	ISO1 R/L 2516	25	16	140	6	15.0	0.8	C16
	ISO1 R/L 3220	32	20	170	8	18.8	1.2	C20
	ISO1 R/L 4025	40	25	200	10	23.5	1.2	C25

Rake angle : 10°

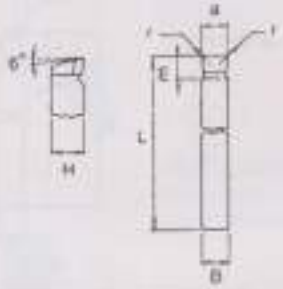
ISO3 Cranked turning and facing tool

ISO4 Recessing tool





ISO3

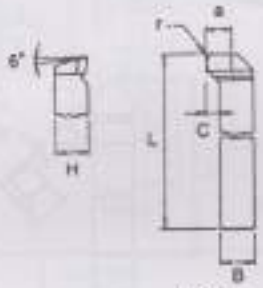


ISO4

Right hand style shown

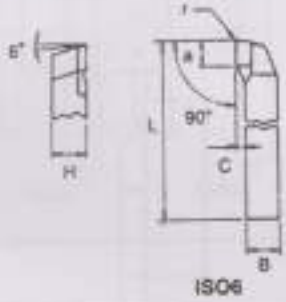
Entering angle / Feed direction	Catalogue code	Dimensions in mm							Tip
		H	B	L	C	E	a	r	
95°	ISO3 R/L 1010	10	10	90	5	-	-	0.4	C8
	ISO3 R/L 1212	12	12	100	6	-	-	0.4	C10
	ISO3 R/L 1616	16	16	110	8	-	-	0.4	C12
	ISO3 R/L 2020	20	20	125	10	-	-	0.8	C16
	ISO3 R/L 2525	25	25	140	12	-	-	1.2	C20
	ISO3 R/L 3232	32	32	170	14	-	-	1.2	C25
	ISO3 R/L 4040	40	40	200	20	-	-	1.6	C32
	ISO3 R/L 1610	16	10	110	5	-	-	0.4	C8
	ISO3 R/L 2012	20	12	125	6	-	-	0.4	C10
	ISO3 R/L 2516	25	16	140	8	-	-	0.4	C12
	ISO3 R/L 3220	32	20	170	10	-	-	0.8	C16
Rake angle : 10°	ISO3 R/L 4025	40	25	200	12	-	-	1.2	C20
Angle of inclination 0°	ISO3 R/L 5032	50	32	240	14	-	-	1.2	C25
	ISO4 1010	10	10	90	-	10	10	0.4	C10
	ISO4 1212	12	12	100	-	12	12	0.4	C12
	ISO4 1616	16	16	110	-	16	16	0.8	C16
	ISO4 2020	20	20	125	-	20	20	1.2	C20
	ISO4 2525	25	25	140	-	25	25	1.2	C25
	ISO4 3232	32	32	170	-	32	32	1.6	C32
	ISO4 4040	40	40	200	-	40	40	2.0	C40
	ISO4 1610	16	10	110	-	16	10	0.4	C10
	ISO4 2012	20	12	125	-	20	12	0.4	C12
	ISO4 2516	25	16	140	-	25	16	0.8	C16
	ISO4 3220	32	20	170	-	32	20	1.2	C20
Rake angle : 10°	ISO4 4025	40	25	200	-	40	25	1.2	C25
Angle of inclination 0°	ISO4 5032	50	32	240	-	50	32	1.6	C32

ISO5 Cranked facing tool



ISO5

ISO6 Cranked knife tool



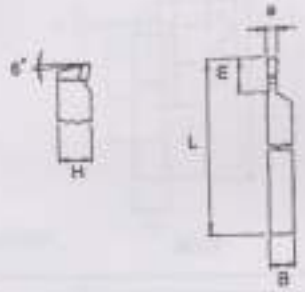
ISO6

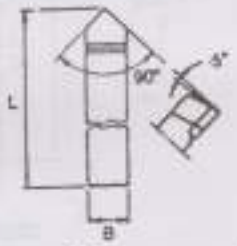
Right hand style shown

Entering angle Feed direction	Catalogue code	Dimensions in mm H	B	L	C	a	r	Tip
90°  Rake angle : 10° Angle of inclination 0°	ISO5 R/L 1010	10	10	90	5	8	0.4	C8
	ISO5 R/L 1212	12	12	100	6	10	0.4	C10
	ISO5 R/L 1616	16	16	110	8	12	0.4	C12
	ISO5 R/L 2020	20	20	125	10	16	0.8	C16
	ISO5 R/L 2525	25	25	140	12	20	1.2	C20
	ISO5 R/L 3232	32	32	170	16	25	1.2	C25
	ISO5 R/L 4040	40	40	200	20	32	1.6	C32
	ISO5 R/L 1610	16	10	110	6	10	0.4	C10
	ISO5 R/L 2012	20	12	125	8	12	0.4	C12
	ISO5 R/L 2516	25	16	140	10	16	0.8	C16
	ISO5 R/L 3220	32	20	170	12	20	1.2	C20
	ISO5 R/L 4025	40	25	200	16	25	1.2	C25
	ISO5 R/L 5032	50	32	240	20	32	1.6	C32
90°  Rake angle : 10° Angle of inclination 0°	ISO6 R/L 1010	10	10	90	4	8	0.4	C8
	ISO6 R/L 1212	12	12	100	5	10	0.4	C10
	ISO6 R/L 1616	16	16	110	6	12	0.4	C12
	ISO6 R/L 2020	20	20	125	8	16	0.8	C16
	ISO6 R/L 2525	25	25	140	10	20	1.2	C20
	ISO6 R/L 3232	32	32	170	12	25	1.2	C25
	ISO6 R/L 4040	40	40	200	14	32	1.6	C32
	ISO6 R/L 1610	16	10	110	5	10	0.4	C10
	ISO6 R/L 2012	20	12	125	6	12	0.4	C12
	ISO6 R/L 2516	25	16	140	8	12	0.8	C12
	ISO6 R/L 3220	32	20	170	10	20	1.2	C20
	ISO6 R/L 4025	40	25	200	12	25	1.2	C25
	ISO6 R/L 5032	50	32	240	14	32	1.6	C32

ISO7 Parting tool

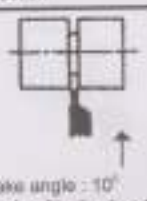
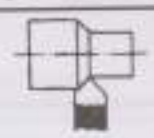
163 Turning and grooving tool





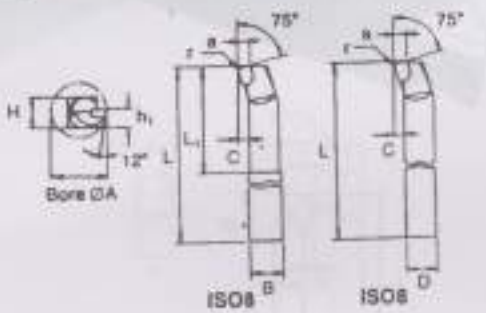
163

Right hand style shown

Entering angle Feed direction	Catalogue code	Dimensions in mm H	B	L	C	a	Tip
 Rake angle : 10° Angle of inclination 0°	ISO7 R/L 1006	10	06	90	12	3	D3
	ISO7 R/L 1208	12	08	100	12	3	D3
	ISO7 R/L 1610	16	10	110	14	4	D4
	ISO7 R/L 2012	20	12	125	16	5	D5
	ISO7 R/L 2516	25	16	140	20	6	D6
	ISO7 R/L 3220	32	20	170	25	8	D8
	ISO7 R/L 4025	40	25	200	32	10	D10
	ISO7 R/L 5032	50	32	240	40	12	D12
 Rake angle : 0° Angle of inclination 0°	163 - 1010	10	10	90	-	-	F10
	163 - 1212	12	12	100	-	-	F12
	163 - 1616	16	16	110	-	-	F16
	163 - 2020	20	20	125	-	-	F20
	163 - 2525	25	25	140	-	-	F25
	163 - 3232	32	32	170	-	-	F32
	163 - 4040	40	40	200	-	-	F40

ISO8 Boring bar

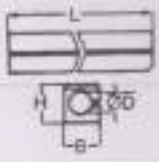
ISO9 Boring and facing bar



Right hand style shown

Entering angle Feed direction	Catalogue code	Dimensions in mm H/B/D	h_1	L	L_1	C	a	r	Ø A min	Tip
75°	ISO8 R 0808	8	5.9	125	40	3	3.8	0.4	14	A6
	ISO8 R 1010	10	7.5	150	50	4	3.8	0.4	18	A6
	ISO8 R 1212	12	9.1	180	63	5	4.8	0.4	21	A8
	ISO8 R 1616	16	12.3	210	80	6	5.8	0.4	27	A10
	ISO8 R 2020	20	15.5	250	100	8	7.7	0.4	34	A12
	ISO8 R 2525	25	19.5	300	125	10	9.6	0.8	43	A16
	ISO8 R 3232	32	25.1	355	160	12	11.6	0.8	52	A20
	ISO8 R 08	8	5.9	125	-	3	3.8	0.4	14	A6
	ISO8 R 10	10	7.5	150	-	4	3.8	0.4	18	A6
	ISO8 R 12	12	9.1	180	-	5	4.8	0.4	21	A8
	ISO8 R 16	16	12.3	210	-	6	5.8	0.4	27	A10
	ISO8 R 20	20	15.5	250	-	8	7.7	0.4	34	A12
Rake angle : 10°	ISO8 R 25	25	19.5	300	-	10	9.6	0.8	43	A16
Angle of inclination 0°	ISO8 R 32	32	25.1	355	-	12	11.6	0.8	52	A20
92°	ISO9 R 0808	8	5.9	125	40	3	3.5	0.4	14	A6
	ISO9 R 1010	10	7.5	150	50	4	3.5	0.4	18	A8
	ISO9 R 1212	12	9.1	180	63	5	4.4	0.4	21	A8
	ISO9 R 1616	16	12.3	210	80	6	5.3	0.4	27	A10
	ISO9 R 2020	20	15.5	250	100	8	7.1	0.4	34	A12
	ISO9 R 2525	25	19.5	300	125	10	8.9	0.8	43	A16
	ISO9 R 3232	32	25.1	355	160	12	10.7	0.8	52	A20
	ISO9 R 8	8	5.9	125	-	3	3.5	0.4	14	A6
	ISO9 R 10	10	7.5	150	-	4	3.5	0.4	18	A6
	ISO9 R 12	12	9.1	180	-	5	4.4	0.4	21	A8
	ISO9 R 16	16	12.3	210	-	6	5.3	0.4	27	A10
	ISO9 R 20	20	15.5	250	-	8	7.1	0.4	34	A12
Rake angle : 10°	ISO9 R 25	25	19.5	300	-	10	8.9	0.8	43	A16
Angle of inclination 0°	ISO9 R 32	32	25.1	355	-	12	10.7	0.8	52	A20

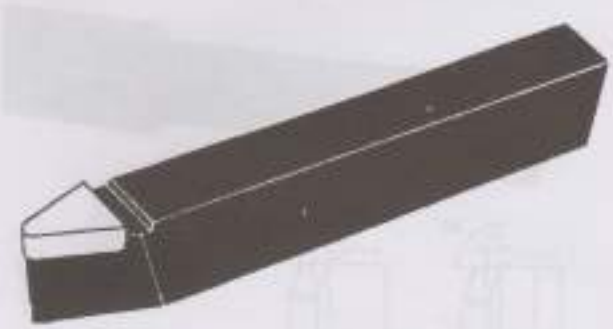
Boring bar holder-Adaptors for boring tools

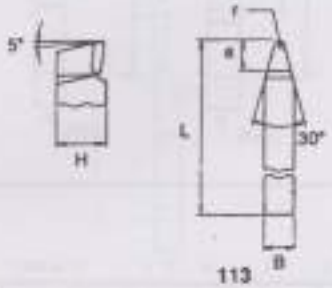


Catalogue code	Dimensions in mm Ø D	H	B	L
131 - 408	8.1	13	12	75
131 - 410	10.1	16	15	100
131 - 412	12.1	20	18	115
131 - 416	16.1	25	23	125
131 - 420	20.1	30	27.5	140
131 - 425	25.1	35	33	160
131 - 432	32.1	45	41.5	200

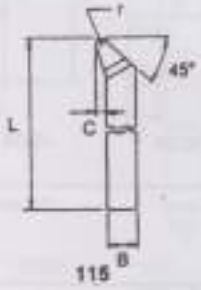
113 Straight, round nose turning tool

115 Cranked, round nose turning tool



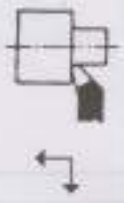


113

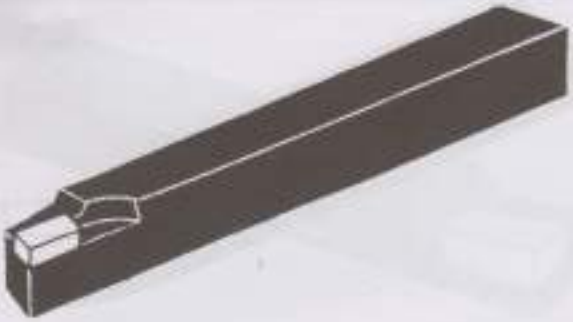


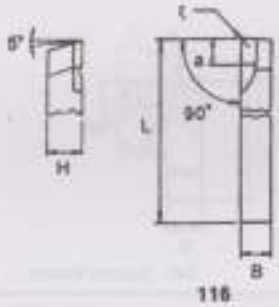
115

Right hand style shown

Entering angle Feed direction	Catalogue code	Dimensions in mm H	B	L	C	a	r	Tip
 Rake angle: 5° Angle of inclination 0°	113 - 1010	10	10	90	-	12	1.0	G8
	113 - 1212	12	12	100	-	14	1.5	G10
	113 - 1616	16	16	110	-	17	2.5	G12
	113 - 2020	20	20	125	-	20	3.5	G16
	113 - 2525	25	25	140	-	23	4.5	G20
	113 - 3232	32	32	170	-	27	6.0	G25
	113 - 4040	40	40	200	-	32	8.0	G30
	113 - 1610	16	10	110	-	12	1.0	G8
	113 - 2012	20	12	125	-	14	1.5	G10
	113 - 2516	25	16	140	-	17	2.5	G12
	113 - 3220	32	20	170	-	20	3.5	G16
	113 - 4025	40	25	200	-	23	4.5	G20
	113 - 5032	50	32	240	-	27	6.0	G25
 Rake angle: 5° Angle of inclination 0°	R/L 115 - 1010	10	10	90	3.0	-	1.0	G8
	R/L 115 - 1212	12	12	100	3.5	-	1.5	G10
	R/L 115 - 1616	16	16	110	4.5	-	2.5	G12
	R/L 115 - 2020	20	20	125	4.8	-	3.5	G16
	R/L 115 - 2525	25	25	140	5.5	-	4.5	G20
	R/L 115 - 3232	32	32	170	6.3	-	6.0	G25
	R/L 115 - 4040	40	40	200	7.0	-	8.0	G30
	R/L 115 - 1610	16	10	110	3.0	-	1.0	G8
	R/L 115 - 2012	20	12	125	3.5	-	1.5	G10
	R/L 115 - 2516	25	16	140	4.5	-	2.5	G12
	R/L 115 - 3220	32	20	170	4.8	-	3.5	G16
	R/L 115 - 4025	40	25	200	5.5	-	4.5	G20
	R/L 115 - 5032	50	32	240	6.3	-	6.0	G25

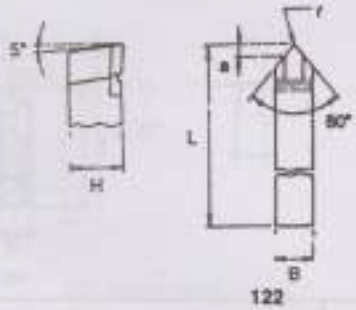
116 Bar tuning tool





116

122 Straight finishing tool

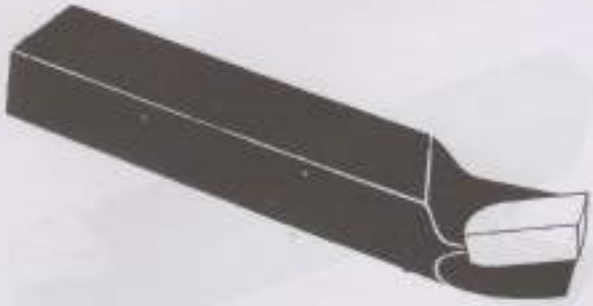


122

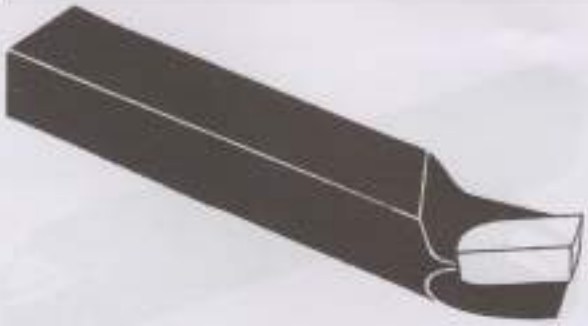
Right hand style shown

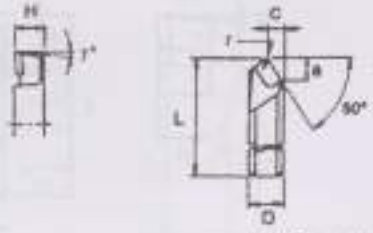
Entering angle Feed direction	Catalogue code	Dimensions in mm H	B	L	a	r	Tip
90°  Rake angle : 10° Angle of inclination 0°	R/L 116 - 1010	10	10	90	8	0.4	C8
	R/L 116 - 1212	12	12	100	10	0.4	C10
	R/L 116 - 1616	16	16	110	12	0.4	C12
	R/L 116 - 2020	20	20	125	16	0.8	C16
	R/L 116 - 2525	25	25	140	20	1.2	C20
	R/L 116 - 3232	32	32	170	25	1.2	C25
	R/L 116 - 4040	40	40	200	32	1.6	C32
	R/L 116 - 1610	16	10	110	10	0.4	C10
	R/L 116 - 2012	20	12	125	12	0.4	C12
	R/L 116 - 2516	25	16	140	16	0.8	C16
	R/L 116 - 3220	32	20	170	20	1.2	C20
	R/L 116 - 4025	40	25	200	25	1.2	C25
	R/L 116 - 5032	50	32	240	32	1.6	C32
 Rake angle : 10° Angle of inclination 0°	122 - 1010	10	10	90	3.0	0.4	E5
	122 - 1212	12	12	100	3.6	0.4	E6
	122 - 1616	16	16	110	4.8	0.4	E8
	122 - 2020	20	20	125	6.0	0.8	E10
	122 - 2525	25	25	140	7.1	1.2	E12
	122 - 3232	32	32	170	9.5	1.2	E16
	122 - 4040	40	40	200	14.9	1.6	E25
	122 - 1610	16	10	110	3.6	0.4	E6
	122 - 2012	20	12	125	4.8	0.4	E8
	122 - 2516	25	16	140	6.0	0.8	E10
	122 - 3220	32	20	170	7.1	1.2	E12
	122 - 4025	40	25	200	9.5	1.2	E16
	122 - 5032	50	32	240	11.9	1.6	E20

140 Boring tool

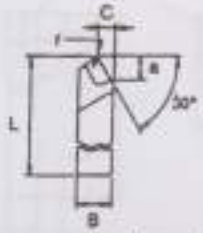


E140 Boring tool





140 Round shank



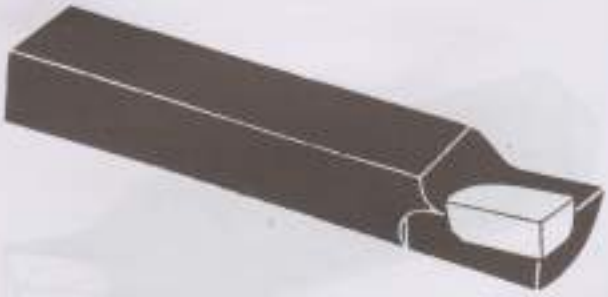
140 Square shank

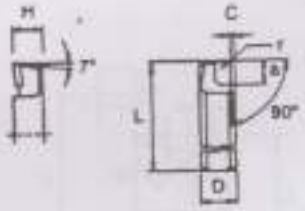
Left hand style shown

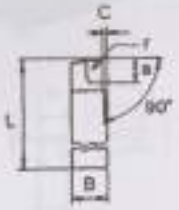
Entering angle Feed direction	Catalogue code	Dimensions in mm B/D	H	L	C	a	r	Tip
60°	L 140 - 6	6	5.5	20	3.0	6.0	0.3	Solid
	L 140 - 8	8	7.0	24	3.7	7.5	0.3	Solid
	L 140 - 10	10	8.5	50	5.0	6.5	0.4	B8
	L 140 - 12	12	10.5	60	6.0	8.5	0.4	B10
	L 140 - 16	16	14.0	90	8.0	10.0	0.8	B12
	L 140 - 20	20	17.0	120	10.0	13.5	0.8	B16
	L 140 - 1010	10	-	50	4.5	6.5	0.4	B8
	L 140 - 1212	12	-	60	5.5	8.5	0.4	B10
	L 140 - 1616	16	-	90	7.5	10.0	0.8	B12
	LE 140 - 3/8" dia.	"3/8	8.3	50	4.3	6.5	0.5	B8
	LE 140 - 1/2" dia.	"1/2	11.1	60	5.9	8.5	0.5	B10
Angle of inclination 5°	LE 140 - 3/4" dia.	"3/4	16.0	120	8.9	13.5	0.8	B16

141 Boring tool

E141 Boring tool





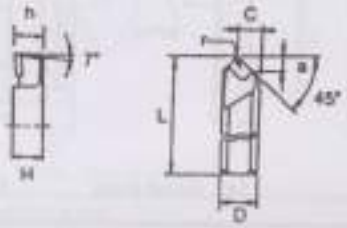


141 Round shank **141** Square shank

Entering angle Feed direction	Catalogue code	Dimensions in mm						Tip
		B/D	H	L	C	a	r	
90°	L 141 - 6	6	5.5	20	1.2	7.0	0.3	Solid
	L 141 - 8	8	7.0	24	1.4	7.0	0.3	Solid
	L 141 - 10	10	8.5	50	0.4	8.0	0.4	B8
	L 141 - 12	12	10.5	60	0.4	10.0	0.4	B10
	L 141 - 16	16	14.0	90	0.4	12.0	0.8	B12
	L 141 - 20	20	17.0	120	0.5	16.0	0.8	B16
	LE 141 - 1/4" dia.	"1/4	5.7	20	1.2	7.0	0.3	Solid
	LE 141 - 3/8" dia.	"3/8	8.3	50	0.4	8.0	0.5	B8
	LE 141 - 1/2" dia.	"1/2	11.1	60	0.4	10.0	0.5	B10
	LE 141 - 5/8" dia.	"5/8	14.0	90	0.4	12.0	0.8	B12
	LE 141 - 3/4" dia.	"3/4	16.0	120	0.5	16.0	0.8	B16
	LE 141 - 3/8" sq.	"3/8	-	50	0.4	8.0	0.5	B8
Angle of inclination 5°	LE 141 - 1/2" sq.	"1/2	-	60	0.4	10.0	0.5	B10

142 Boring tool

E142 Boring tool



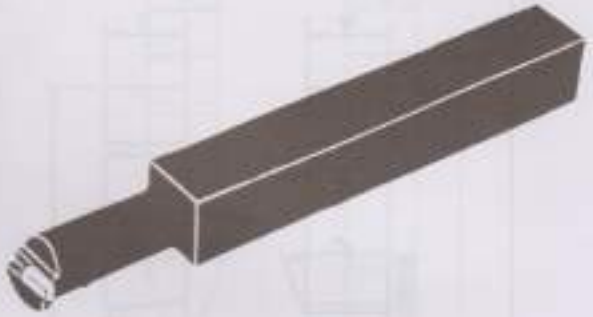
142

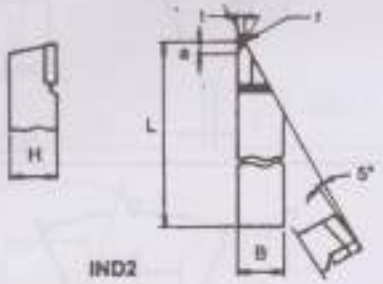
Left hand style shown

Entering angle Feed direction	Catalogue code	Dimensions in mm							Tip
		D	H	h	L	C	a	r	
45°  ← Angle of inclination 5°	L 142 - 6	6	5.5	5.2	20	3.2	3.0	0.3	Solid
	L 142 - 8	8	7.0	6.5	24	5.0	4.0	0.3	Solid
	L 142 - 10	10	9.2	8	50	6.5	5.5	0.5	B8
	L 142 - 12	12	11.2	9.2	60	7.5	7.5	0.5	B10
	L 142 - 16	16	14.5	12.9	90	9.5	8.5	0.8	B12
	LE 142 - 1/4" dia.	"1/4	6.0	5.6	20	3.5	3.5	0.3	Solid
	LE 142 - 3/8" dia.	"3/8	8.7	7.5	63	6.3	5.0	0.5	B8
	LE 142 - 1/2" dia.	"1/2	11.9	9.9	76	7.9	7.0	0.5	B10
	LE 142 - 5/8" dia.	"5/8	14.3	12.3	89	9.2	8.0	0.8	B12
	LE 142 - 3/4" dia.	"3/4	16.7	14.7	120	11.9	11.0	0.8	B16

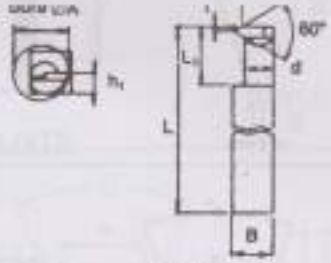
IND2 Threading tool, external

166-11/14 Threading tool, Internal

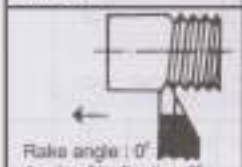
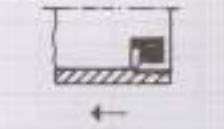




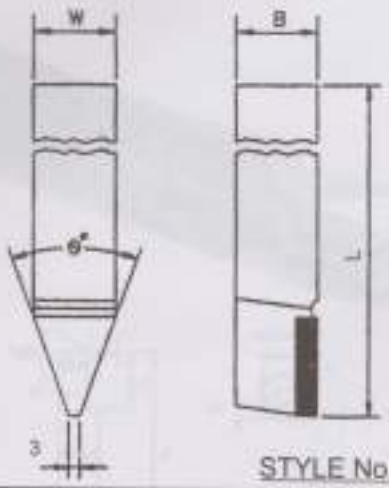
IND2



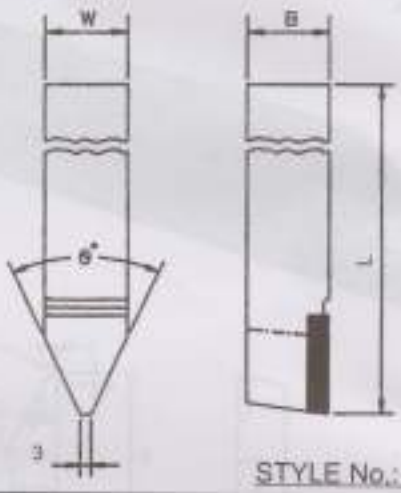
R 166

Entering angle Feed direction	Catalogue code	Dimensions in mm H/B	L	L_1	h_1	a	d	t	r	ØA min	Tip
 Rake angle : 0° Angle of inclination 0°	IND 2 R 60° 2020	20	125	-	-	4.3	-	2.5	0.1	-	FT18
 Rake angle : 0° Angle of inclination 0°	R 166 - 11	16	140	30	7.8	1.7	10	1.0	-	15	FU12
	R 166 - 12	20	160	40	9.8	1.7	15	1.0	-	20	FU12
	R 166 - 13	25	180	50	12.3	2.0	18	1.2	-	25	FU14
	R 166 - 14	32	200	60	15.7	2.0	21	1.2	-	30	FU14

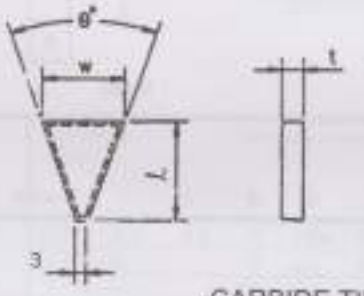
REMOVE ALL SHARP CORNERS	APPLY RUST PREVENTIVE OIL TO ALL MACHINED SURFACES	DO NOT SCALE DRG.
NOTE : TOLERANCE AS PER IS : 2102 - 1969 - TABLE - 1, CLASS OF DEVIATION MEDIUM		IF IN DOUBT ASK



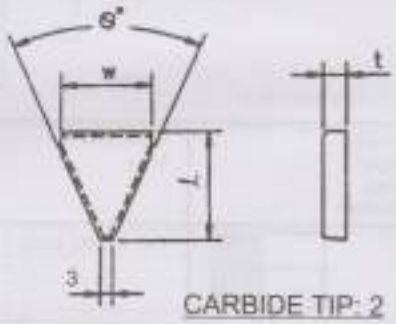
STYLE No.: 1



STYLE No.: 2



CARBIDE TIP: 1



CARBIDE TIP: 2

SR. NO.	TOOL SHANK SIZE				TIP SIZES				STYLE NO.	REMARKS
	W	B	L	θ	W	L	t	θ		
1	40	40	300	35°	34	50	10	35°	1	
2	40	40	300	40°	40	50	10	40°	1	
3	40	40	300	45°	40	50	10	45°	2	
4	40	40	300	50°	40	50	10	50°	2	
5	40	40	300	55°	40	50	10	55°	2	
6	40	40	300	60°	40	50	10	60°	2	

INDEX	M.NO.	DESCRIPTION	DATE	SIGN	INDEX	M.NO.	DESCRIPTION	DATE	SIGN

ALL DIMENSIONS IN mm

PROJECT: SUGAR ROLLER

MODEL: SPECIAL TOOLS

	1988	DATE	SIGN
DRN. BY		2/12	P.D.K.
CKD. BY		2.12	P.D.K.
APD. BY		3/12	

SCALE : NTS

PRECISE CUT ENGINEERS
PUNE - 411 014

SUGAR ROLLER GROOVING TOOL

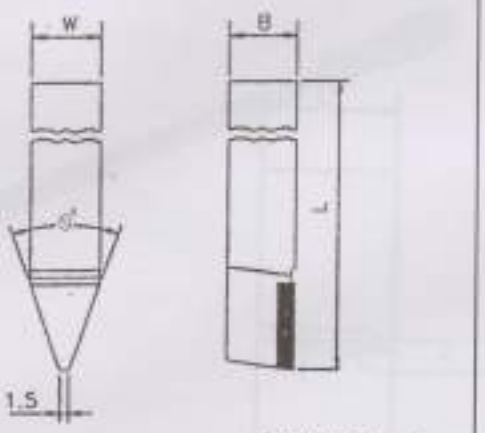
PCE

PCE - 2345 / B

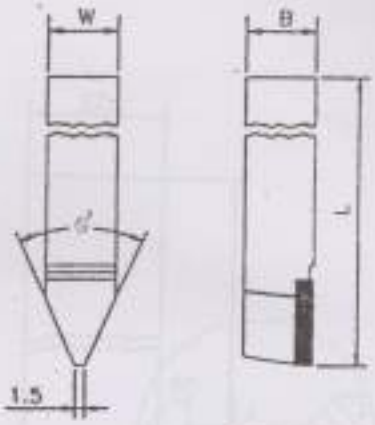
SUPERSEDES NO.

SUPERSEDES BY NO.

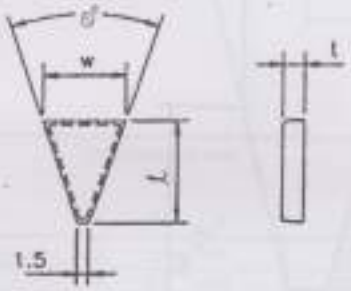
REMOVE ALL SHARP CORNERS	APPLY RUST PREVENTIVE OIL TO ALL MACHINED SURFACES	DO NOT SCALE DRG.
NOTE : TOLERANCE AS PER IS : 2102 - 1969 - TABLE - 1, CLASS OF DEVIATION MEDIUM		IF IN DOUBT ASK



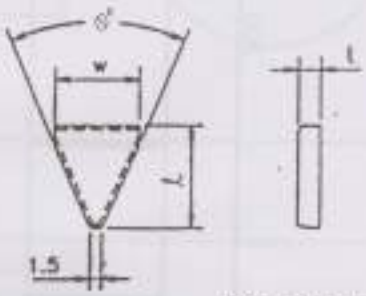
STYLE No,: 1



STYLE No,: 2



CARBIDE TIP : 1



CARBIDE TIP : 2

SR. NO.	TOOL SHANK SIZE				TIP SIZES				STYLE NO.	REMARKS
	W	B	L	⦸	w	ℓ	t	⦸		
1	25	25	300	35°	21	30	8	35°	1	
2	25	25	300	40°	24	30	8	40°	1	
3	25	25	300	45°	25	30	8	45°	2	
4	25	25	300	50°	25	30	8	50°	2	
5	25	25	300	55°	25	30	8	55°	2	
6	25	25	300	60°	25	30	8	60°	2	

INDEX	M.NO.	DESCRIPTION	DATE	SIGN.	INDEX	M.NO.	DESCRIPTION	DATE	SIGN.

ALL DIMENSIONS IN mm.

PROJECT : SUGAR ROLLER

MODEL : SPECIAL TOOLS

	DATE	SIGN
DRN. BY	28/3	P.D.K.
CKD. BY	28/3	A.N.L.
APD. BY	28/3	

SCALE : NTS

PRECISE CUT ENGINEERS
PUNE - 411 014

SUGAR ROLLER GROOVING TOOL

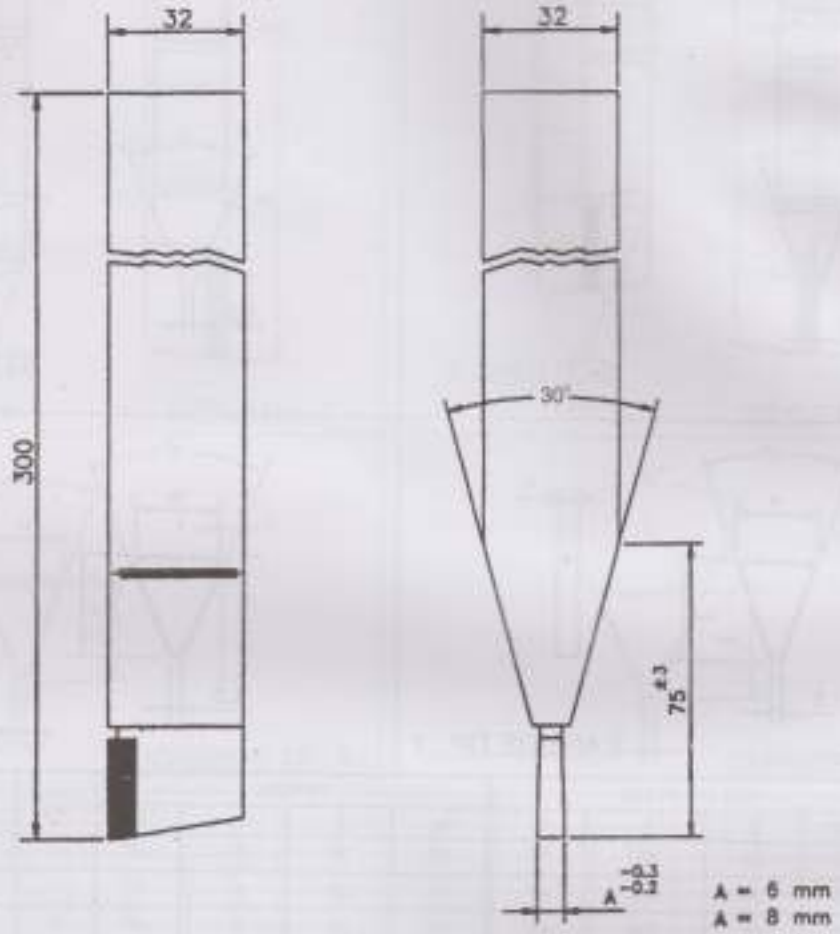
PCE

PCE - 2347

SUPERSEDES NO.

SUPERSEDES BY NO.

REMOVE ALL SHARP CORNERS	APPLY RUST PREVENTIVE OIL TO ALL MACHINED SURFACES	DO NOT SCALE DRG.
NOTE : TOLERANCE AS PER IS : 2102 - 1969 - TABLE - 1, CLASS OF DEVIATION MEDIUM		IF IN DOUBT ASK



NOTES:

- TIP SIZE 6mm X 6mm X 30mm Or 8mm x 8mm X 30mm Or AS PER YOUR REQUIREMENT.
- SHANK SIZE AND TOTAL LENGTH OF SHANK IS ALSO GIVEN AS PER YOUR REQUIRMENT

INDEX	M.NO.	DESCRIPTION	DATE	SIGN	INDEX	M.NO.	DESCRIPTION	DATE	SIGN

ALL DIMENSIONS IN mm

PROJECT: FEED ROLLER

MODEL: SPECIAL TOOLS

	DATE	SIGN
DRN. BY	3/12	P.D.K.
CKD. BY	3/12	P.D.K.
APD. BY	3/12	

SCALE : NTS

PRECISE CUT ENGINEERS
PUNE - 411 014

PCE

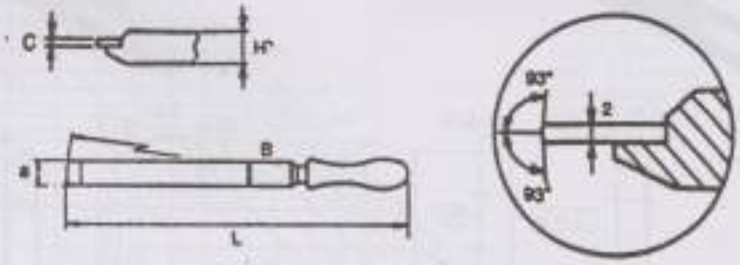
MESSCHAERT GROOVING TOOL FOR FEED ROLLER

PCE - 2346 / B

SUPERSEDES NO.

SUPERSEDES BY NO.

620 Scraper

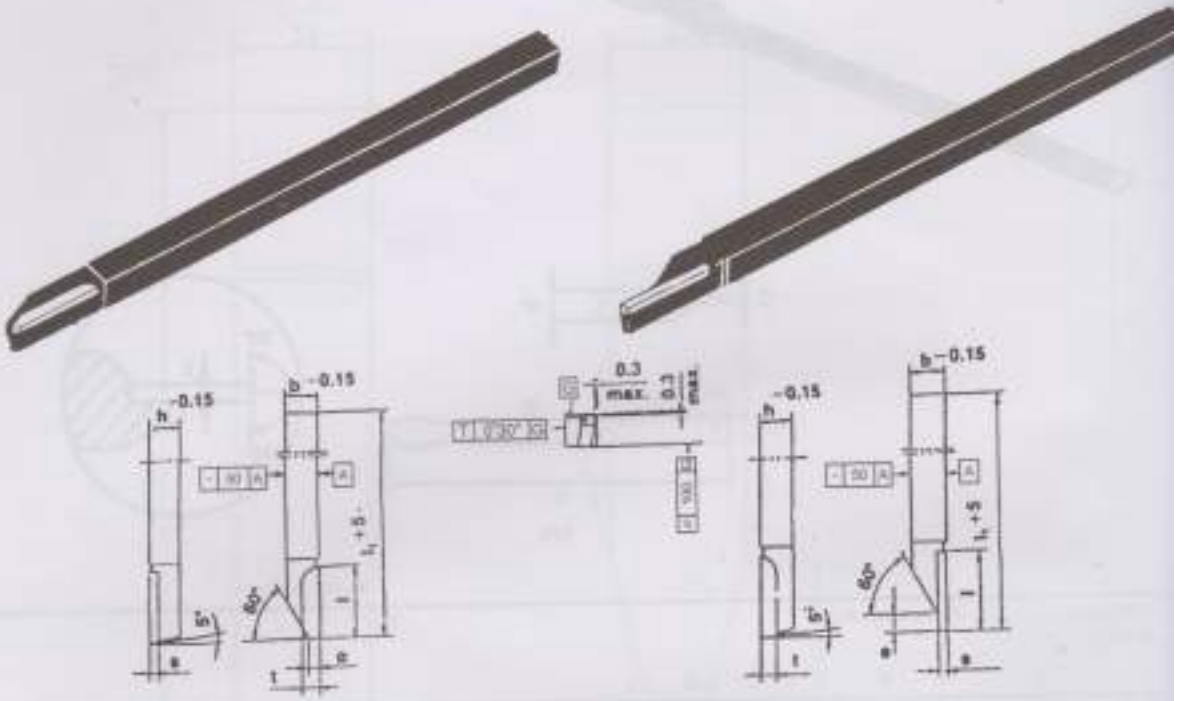


620

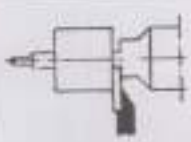
Catalogue code	Dimensions in mm						Tip
	H	B	L	C	a	r	
620 - 1315	4.5	15	320	2	15	200	AC15
620 - 1320	5	20	360	2	20	200	AC20
620 - 1325	5	25	400	2	25	300	AC25
620 - 1330	5	30	465	2	30	300	AC30

196 Turning tool

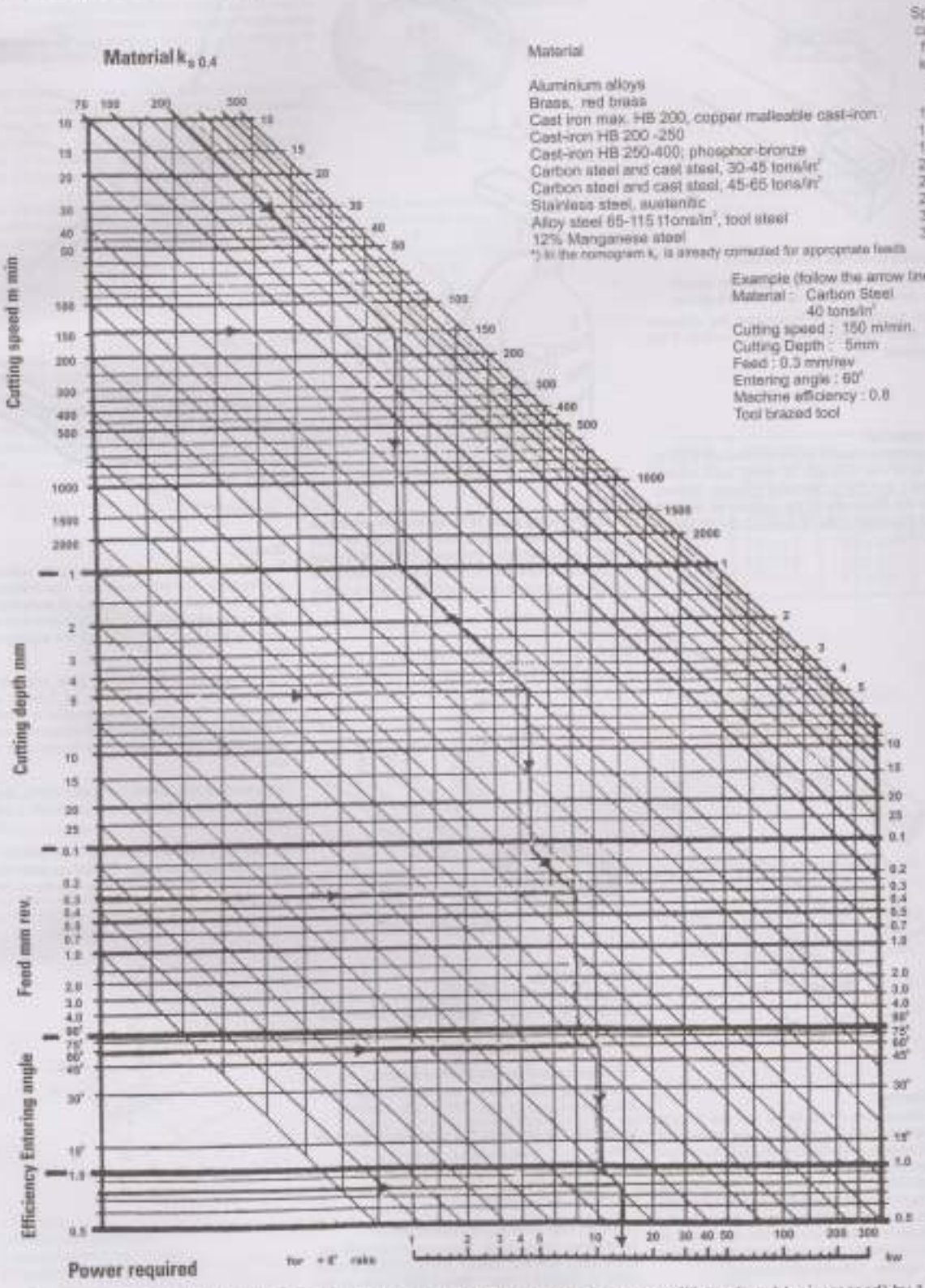
197 Parting tool



Right hand style shown

Entering angle Feed direction	Catalogue code	Dimensions in mm							
		h	b	L	l	e	t	s	o
 Rake angle : 0° Angle of inclination 0°	R/L 196 0404	4	4	110	10	-	2.5	1.5	0.5
	R/L 196 0505	5	5	125	20	-	2.5	1.5	0.5
	R/L 196 0606	6	6	125	20	-	2.5	2.0	1.5
	R/L 196 0707	7	7	125	20	-	3.0	2.0	2.0
	R/L 196 0808	8	8	125	20	-	3.0	2.0	2.0
	R/L 196 1010	10	10	150	20	-	4.0	2.5	2.5
	R/L 196 1212	12	12	150	20	-	5.0	3.0	3.0
	R/L 196 1414	14	14	200	20	-	6.0	3.0	5.0
 Rake angle : 0° Angle of inclination 0°	R/L 197 0404	4	4	110	10	1.0	2.5	1.5	-
	R/L 197 0505	5	5	125	20	1.0	2.5	1.5	-
	R/L 197 0606	6	6	125	20	1.0	2.5	2.0	-
	R/L 197 0707	7	7	125	20	2.5	3.0	2.0	-
	R/L 197 0808	8	8	125	20	2.5	3.0	2.0	-
	R/L 197 1010	10	10	150	20	3.0	4.0	2.5	-
	R/L 197 1212	12	12	150	20	3.5	5.0	3.0	-
	R/L 197 1414	14	14	200	20	5.0	6.0	3.0	-

Power requirements for turning



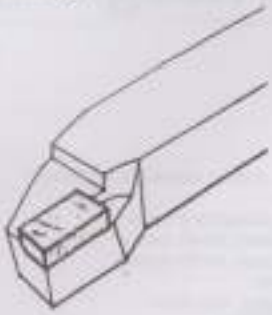
Material	Specific cutting force $k_{s\,0.4}$
Aluminium alloys	70
Brass, red brass	75
Cast iron max. HB 200, copper malleable cast-iron	110
Cast-iron HB 200 -250	150
Cast-iron HB 250-400; phosphor-bronze	175
Carbon steel and cast steel, 30-45 tons/in²	210
Carbon steel and cast steel, 45-65 tons/in²	230
Stainless steel, austenitic	260
Alloy steel 65-115 11ons/in², tool steel	300
12% Manganese steel	360

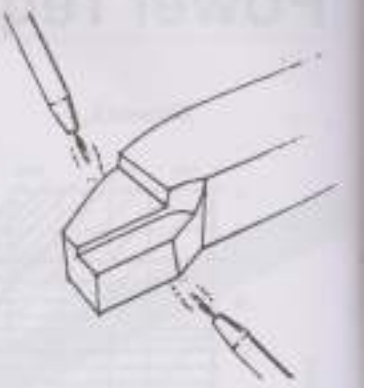
*) In the nomogram k_s is already corrected for appropriate feeds

Example (follow the arrow line)
Material : Carbon Steel
40 tons/in²
Cutting speed : 150 m/min.
Cutting Depth : 5mm
Feed : 0.3 mm/rev
Entering angle : 60°
Machine efficiency : 0.8
Tool brazed tool

For every degree rise (or fall) in rake angle above + 6° the power required, as above, will be reduced (or increased) by 1.5%

Brazing



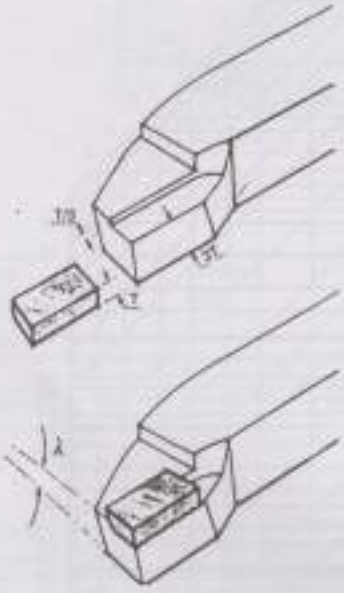


The brazed joint has two functions :

- It has to hold the carbide tip in position despite heavy shearing forces and high temperatures.
- It must be capable of minimizing the stresses which occur during the heating and cooling of the tool material.

Shank material

A suitable shank material is carbon steel with 0.70% C and a tensile strength of about 685 N/mm2 (70kp/mm^2). In order to minimise stresses, the ratio between the thickness of the carbide tip and the height of the shank material beneath the tip should be about 1:3.

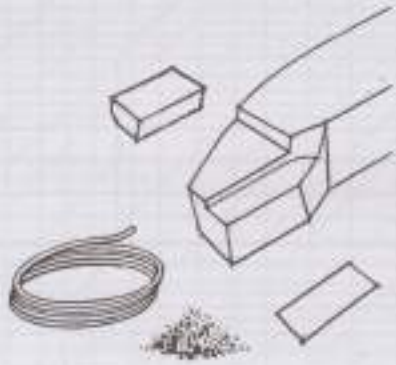


Seat of the tip

Arrange the seating of the tip so that the brazing stresses are as small as possible. 'Open' seatings of the tip generally give the best result. Only the underside of the tip and one side face (max. 1/3 of the tip's thickness) should come into contact with the tool shank. Regrinding is facilitated and the carbide tip's thickness is facilitated and the carbide tip's thickness is better preserved if the tip is set at an inclination (λ) greater than that which the top-rake angle (γ) requires. (See top of next page.)

Cleaning

Grind the brazing areas of the tip on a silicon carbide or diamond wheel. Alternatively, they may be hard blasted with steel shot. Degrease the tip, and when necessary the tip-seating of the shank as well, with a suitable solvent such as trichloroethylene or acetone.



Brazing agents

The brazing method and brazing agents are selected according to the tool's working temperature and calculated stresses. The following brazing procedures can be recommended.

Tools for normal working temperatures :

Low-melting silver solder with appropriate fluks. Brazing temperature 650-700°C (1200-1290°F).

Tools with thin and long tips or with a complex design :

The tips should be brazed with a shim of copper, thickness 0.2-0.3 mm. Silver solder, temperature 650-700°C (1200-1290°F).

Tools for high working temperatures :

for instance parting tools, heavy roughing tools etc. Electrolytic, non-acid copper with a melting point of 1073° C (1963°F). Flux : anhydrous borax, or according to recommendations from the supplier of the brazing agent.

Brazing

Brazing or welding torches are primarily suitable f making tools in smaller quantities. Use a slightly r ducing flame, that is to say, surplus of acetylene ga Start the heating with the flame directed against th under-side of the tool and behine the seating of th tip.

High-frequency units have a great capacity an therefore are most economical for brazing large quantities. The scope of application is limited t small and medium-sized tools. It isimportant that th shape of the high-frequency coil be matched to th tool.

Use plenty of flux. When the solder melts, stop th heating and press the tip into position with a pointe iron rod.

For standard tools in ordinary grades, gradual coo ing is not necessary, but for complicated tools a container with mica or charcoal powder is recom mended.

Grinding

Grind with care - It pays!

A stable grinding table or holder, which can be set at the desired angle by means of a graduated scale, and vibration-free running grinding spindles are necessary for a good working result.

Rough grinding can as a rule be done with advantage on a silicon carbide wheel. Finish grinding or lapping must on the other hand always, be done on a diamond wheel. A longer life for the cutting edges, and fewer tip breakages, fully outweigh the increased costs entailed by correct grinding.

Keep the grinding wheel properly clean. The cutting capacity depends to the highest degree on this. Always grind into the cutting edge, and as far as possible at right angles to it.

Most carbides have more or less low heat conductivity and must therfore be ground with care.

For wet grinding, the coolant should be applied abundantly and in an even stream. Never cool a carbide tool by dipping it in any fluid.

Turning tools usually have the carbide tip set at a greater inclination (λ) than that top-rake angle (γ). By this means regrinding is facilitated. Only the primary rake portion of the top face needs to be ground. The effective thickness of the tip is thus better preserved.

γ Top-rake angle
γ Tip seating angle
α Clearance angle

Top-rake angles (γ):
γ = 14° Grades S6 and R4
γ = 10° others grades.

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

Sequence of operations for grinding

1a. Badly worm or damaged tools

Grinding away shank material under the up.
Aluminium oxide wheel grit 24-36.
Hardness J-L.
Peripheral speed 20-25 m/sec.
(4000-5000 ft/min)
δ = 10 - 12°
Dry grinding.

1b.

Grinding clearances of the carbide tip.
Silicon carbide wheel (green grit)
Grit 38-60, heardness H-J.
Peripheral speed 20-25 m/sec.
(4000-5000 ft/min)
δ = 7-10°
Dry grinding.

2.a. Normally of slightly worm tools and finish lapping of rough-ground tools.

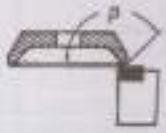
Lapping of top face.
Diamond lapping wheel
Grit 180-220, metal bonded.
Peripheral speed 12-18 m/sec.
(2400-3600 ft/min)
Wet grinding.

2b.

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)
δ =5-7°
Wet grinding

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

3. Grinding of chipbreaker



Diamond lapping wheel
Grit 180 -220, metal bonded
peripherial speed 12-18 m/sec.
(2400-3600 (ft/min)
β = 135°
Wet grinding

Guide of dimensioning of chipbreaker

Depth of cut mm	Feed mm /rev.		
	0.20	0.36	0.55
	Chipbreaker b x t mm		
1	1.5 x 0.3	2.0 x 0.4	3.0 x 0.
4	2.5 x 0.5	3.0 x 0.5	4.5 x 0
9	3.0 x 0.5	4.5 x 0.6	4.5 x 0

4. Reinforcement for the edge

Silicon carbide handlap. Grit 320-400
Alternatively, a boron carbide handlap.
Diamond handlap. Grit 320-400.
Light handlapping for finishing of steel.
In other cases according to the degree of protec
required for the cutting edge.

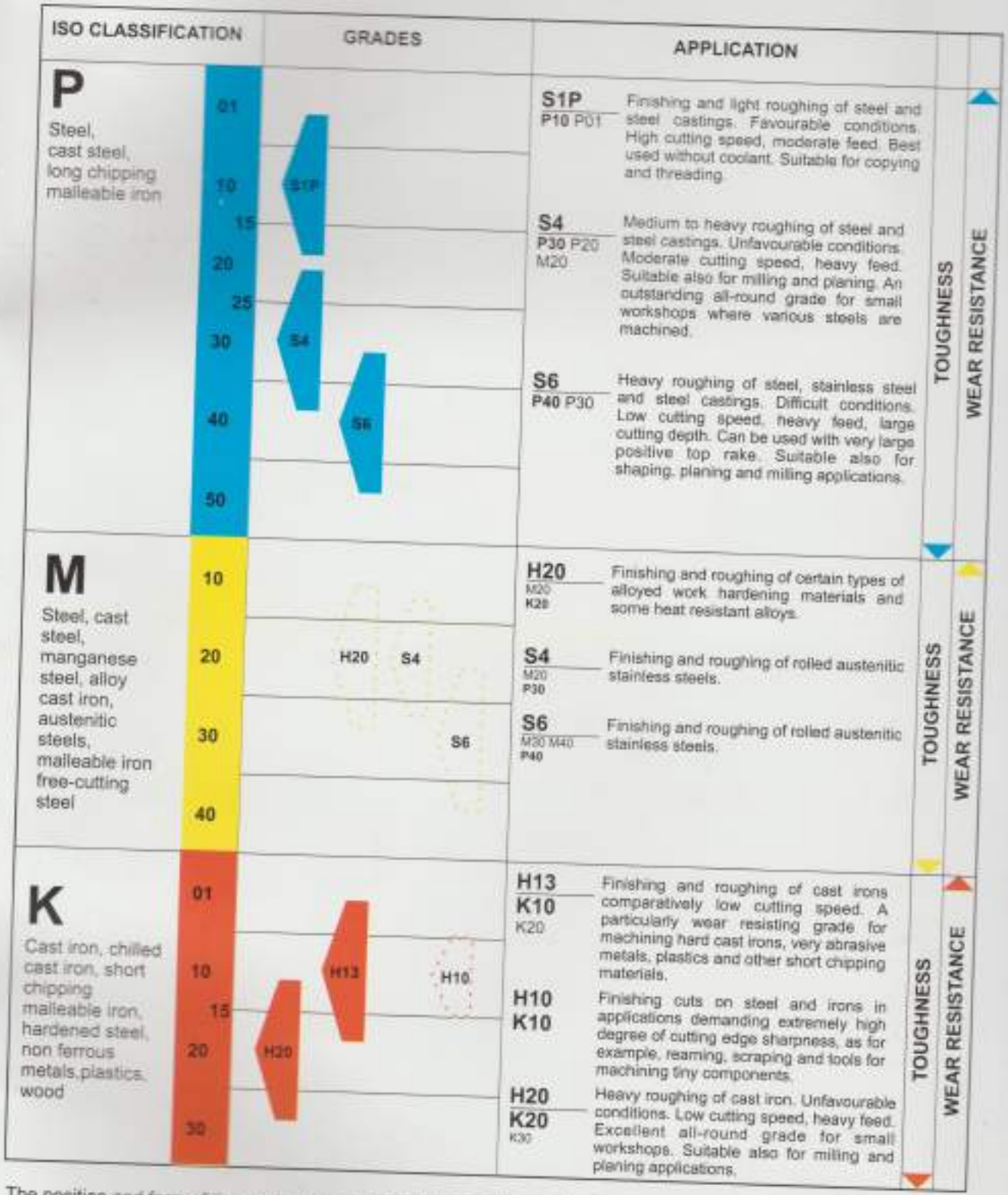
Nominal values for cutting speeds for turning with brazed tools

Material	Specific cutting force ks 0.4 kp/mm²	Brinell Hardness HB	Tensile Strength kp/mm²	S1P	S4	S6	
				Feed mm/rev.			
				0.7-0.3-0.1	2.0-0.4-0.2	3.0-0.4	
				Cutting speed m/min.			
Non-alloy carbon steel Normalised							
C 0.15%	190	125	45	170-240-330	60-150-200	35-125	
C 0.35%	210	150	55	140-200-280	45-120-160	25-100	
C 0.70%	230	250	80	110-155-220	35-90-125	20- 70	
Alloy Steel Annealed	210	150-200	50-56	110-155-220	40-95-125	20-70	
Hardened and Tempered	250	200-275	65-90	85-120-175	30-75-100	20-60	
	275	275-325	90-110	65-95-140	25-60-80	15-45	
	300	325-450	110-150	55-75-110	20-50-60	15-35	
Stainless steels annealed Ferritic, martensitic	230	180-220	70-85	160-225	80-125-155	45-90	
Austenitic	280	150-180	55-70		70-105-135	70-90	
Steel castings Non-alloy	180	<150	<50		45-90-115	25-70	
Low-alloy	210	150-250	50-80	125-160	30-60-80	15-45	
High-alloy	240	160-200	50-65	90-125	70-105-135	55-80	

Material	Specific cutting force ks 0.4 kp/mm²	Brinell Hardness HB	H-13	H20	S4	
			Feed mm/rev.			
			1.0-0.5-0.2	1.2-0.7	1.2-0.7-0.3	
			Cutting speed m/min			
12% Manganese steel[1]	360	200		8-25		
Rolled Steel[1,2]	450	50-65 HRC		8-15		
Malleable irons Short Chipping	110	110-145	50-80-115	45-70	45-90	
Long chipping	100	200-250	35-100-135		45-90-135	
Cast-irons, low-tensile grey	110	180	50-110-135	50-70		
Cast-irons, high-tensile grey alloy	150	250	35-65-100	35-50		
Nodular SG irons Ferritic	110	160	35-70-100		55-90	
Pearlitic	180	250	25-60-90		25-45	
Chilled cast-iron[3]	275	400				
	350	600				
Electrolytic copper	110	50-85		270-450		
Bronze-Brass alloys Lead alloy	70	60-150		180-250		
Brass, fed brass	75	60-110		135-180		
Phosphor-bronze	175	85-110		90-155		
Aluminium Alloys Non-heat-treatable	50	30-80		900-1350		
Heat treatable	70	80-120		180-270		
Aluminium alloys (cast) Non-heat-treatable	75	100		90-180		
Heat treatable	90	130		70-115		
Other materials Hard rubber, ebonite				90-180		
Fibre				65-130		
Hard plastic(s)				135-270		
Porcelain[1]				4-10		
Soft natural stone (marble)[1]				45-70		
Hard natural stone (granite)[1]				5-8		

1) Negative rake should be used. 2) 15° approach angle and feed rate 1-5 mm/rev may often be used.
3) Negative primary land may be necessary

Grade selection



The position and form of the grade symbols indicate the suitable field of application. Heavy type indicates main group of application and the ISO symbol shown on inserts, the other symbols give further ranges of application for the grade in question. Grade symbols with broken lines are complementary choices.

PCE

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