

PULSAR END MILLS

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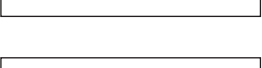
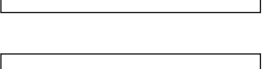


DESIGNED
SPECIFICALLY FOR
USE IN DRY CUTTING
CONDITIONS

Europa Tool 8TH EDITION











PULSAR END MILL CONTENTS

(Carbide high speed & dry cutting condition materials up to Hrc 65)

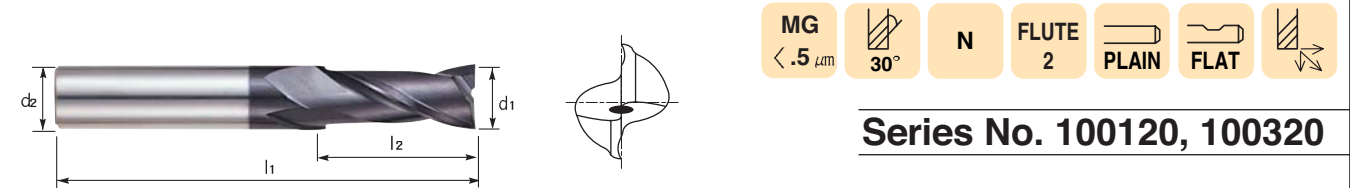
PRODUCTS	SERIES	SHANK TYPE	DESCRIPTION	PAGE
	100120 100320	• FLAT • STRAIGHT	2 FL SHORT PULSAR END MILLS	20
	102120 102320	• FLAT • STRAIGHT	2 FL LONG PULSAR END MILLS	21
	155120 155320	• FLAT • STRAIGHT	2 FL CORNER RADIUS LONG PULSAR END MILLS	22
	112120 112320	• FLAT • STRAIGHT	2 FL BALL NOSE LONG PULSAR END MILLS	23
	118120 118320	• FLAT • STRAIGHT	2 FL BALL NOSE SHORT PULSAR END MILLS	24
	114120 114320	• FLAT • STRAIGHT	2 FL BALL NOSE LONG REACH PULSAR END MILLS	25
	103120 103320	• FLAT • STRAIGHT	3 FL MINIATURE PULSAR END MILLS	26
	109120 109320	• FLAT • STRAIGHT	4 FL SHORT PULSAR END MILLS	27
	111120 111320	• FLAT • STRAIGHT	4 FL LONG PULSAR END MILLS	28
	157120 157320	• FLAT • STRAIGHT	4 FL CORNER RADIUS LONG PULSAR END MILLS	29
	156120 156320	• FLAT • STRAIGHT	4 FL CORNER RADIUS STUB CUT PULSAR END MILLS	30
	116120 116320	• FLAT • STRAIGHT	2 FL BALL NOSE STUB CUT LENGTH for OVER HRc55	31
	115120 115320	• FLAT • STRAIGHT	4 FL BALL NOSE LONG PULSAR END MILLS	32
	149120 149320	• FLAT • STRAIGHT	6&8 FL 45° HELIX LONG PULSAR END MILLS	33
	150120 150320	• FLAT • STRAIGHT	6 FL 45° HELIX EXTRA LONG PULSAR END MILLS	34
	158120 158320	• FLAT • STRAIGHT	6 FL 45° HELIX CORNER RADIUS LONG PULSAR END MILLS	35

PULSAR END MILL CONTENTS

(Carbide high speed & dry cutting condition materials up to Hrc 65)

PRODUCTS	SERIES	SHANK TYPE	DESCRIPTION	PAGE
	148120 148320	• FLAT • STRAIGHT	MULTI FL ROUGHING SHORT PULSAR END MILLS	36
	147120 147320	• FLAT • STRAIGHT	MULTI FL ROUGHING LONG PULSAR END MILLS	37
	145120 145320	• FLAT • STRAIGHT	3, 4 FL ROUGHING BALL NOSE, LONG LENGTH END MILLS	38
	100320	• STRAIGHT	2 FL MINIATURE PULSAR END MILLS	39
	105320	• STRAIGHT	2 FL BALL NOSE MINIATURE PULSAR END MILLS	40
	143320	• STRAIGHT	2 FL BALL NOSE PULSAR END MILLS for RIB PROCESSING	41
	107320 108320	• STRAIGHT	2 FL PULSAR END MILLS for RIB PROCESSING	42
	120320	• STRAIGHT	4 FL PULSAR END MILLS for RIB PROCESSING	43/44
	130320	• STRAIGHT	4 FL BALL NOSE PULSAR END MILLS for RIB PROCESSING	45/46
CUTTING DATA				47 ~ 60

2 FLUTE, SHORT LENGTH



Series No. 100120, 100320

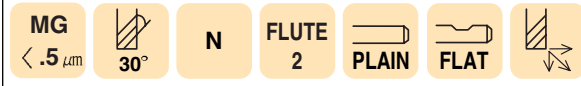
2 SCHNEIDEN, KURZ, "PULSAR" SCHAFTFRÄSER
2 DENTS, SÉRIE COURTE, FRAISES À RAINURER "PULSAR"
2 LABIOS, SERIE CORTA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
FLAT	STRAIGHT				
—	1003200100	1.0	4	2.5	40
—	1003200150	1.5			
—	1003200200	2.0			
—	1003200250	2.5			
1001200300	1003200300	3.0	6	8	45
1001200350	1003200350	3.5			
1001200400	1003200400	4.0			
1001200450	1003200450	4.5			
1001200500	1003200500	5.0	8	11	50
1001200550	1003200550	5.5			
1001200600	1003200600	6.0			
1001200650	1003200650	6.5			
1001200700	1003200700	7.0	10	13	60
1001200750	1003200750	7.5			
1001200800	1003200800	8.0			
1001200850	1003200850	8.5			
1001200900	1003200900	9.0	12	16	70
1001200950	1003200950	9.5			
1001201000	1003201000	10.0			
1001201050	1003201050	10.5			
1001201100	1003201100	11.0	14	19	75
1001201150	1003201150	11.5			
1001201200	1003201200	12.0			
1001201300	1003201300	13.0			
1001201400	1003201400	14.0	16	22	85
1001201500	1003201500	15.0			
1001201600	1003201600	16.0			
1001201700	1003201700	17.0			
1001201800	1003201800	18.0	18	26	90
1001201900	1003201900	19.0			
1001202000	1003202000	20.0			
1001202000	1003202000	20.0			
1001202200	1003202200	22.0	20	32	100
1001202400	1003202400	24.0			
1001202400	1003202400	24.0			
1001202500	1003202500	25.0			
1001202500	1003202500	25.0	25	38	105
				45	
				45	

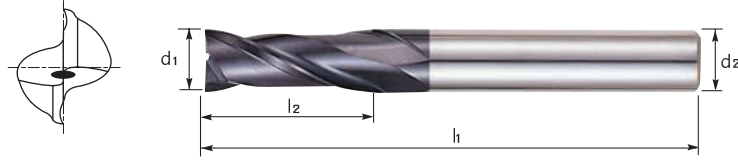
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

2 FLUTE, LONG LENGTH



Series No. 102120, 102320



2 SCHNEIDEN, LANG, "PULSAR" SCHAFTFRÄSER
 2 DENTS, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
 2 LABIOS, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d ₁)	SHANK DIAMETER h6(d ₂)	LENGTH OF CUT l ₂	OVERALL LENGTH l ₁
FLAT	STRAIGHT				
—	1023200200	2.0	4	8	40
1021200300	1023200300	3.0	6	12	50
1021200400	1023200400	4.0		15	
1021200500	1023200500	5.0		20	60
1021200600	1023200600	6.0	20		
1021200800	1023200800	8.0	8	25	70
1021201000	1023201000	10.0	10	30	90
1021201200	1023201200	12.0	12	30	
1021201400	1023201400	14.0	16	40	110
1021201600	1023201600	16.0		50	
1021201800	1023201800	18.0	20	50	
1021202000	1023202000	20.0		55	
1021202500	1023202500	25.0	25	75	140

Tolerances according to DIN 7160 & 7161
 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

2 FLUTE, CORNER RADIUS, LONG LENGTH



Series No. 155120, 155320



2 SCHNEIDEN, ECKENRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
 2 DENTS, RAYON EN COIN, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
 2 LABIOS, RADIO EN EL ÁNGULO LATERAL, SERIE LARGA, FRESAS "PULSAR"

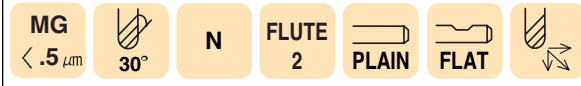
EDP. No		MILL DIAMETER e8(d ₁)	SHANK DIAMETER h6(d ₂)	LENGTH OF CUT l ₂	OVERALL LENGTH l ₁
FLAT	STRAIGHT				
1551200600	1553200600	6 × R0.5	6	20	60
1551209001	1553209001	6 × R1		20	
1551200800	1553200800	8 × R0.5	8	25	70
1551209002	1553209002	8 × R1		25	
1551209003	1553209003	8 × R1.5		25	
1551209004	1553209004	8 × R2	10	25	90
1551201000	1553201000	10 × R0.5		30	
1551209005	1553209005	10 × R1	12	30	
1551209006	1553209006	10 × R1.5		30	
1551209007	1553209007	10 × R2		30	
1551201200	1553201200	12 × R0.5	12	30	90
1551209008	1553209008	12 × R1		30	
1551209009	1553209009	12 × R1.5		30	
1551209010	1553209010	12 × R2	12	30	30

► Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

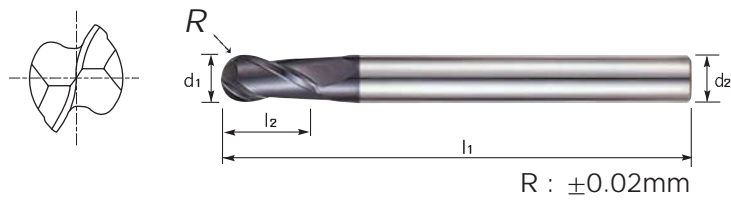
Tolerances according to DIN 7160 & 7161
 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

2 FLUTE, BALL NOSE, LONG LENGTH



Series No. 112120, 112320



R : ±0.02mm

2 SCHNEIDEN, STIRNRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
 2 DENTS, FRAISES HÉMISPHERIQUES, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
 2 LABIOS, PUNTA ESFÉRICA, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
FLAT	STRAIGHT				
—	1123200100	1.0	4	2.5	50
—	1123200120	1.2			
—	1123200150	1.5			
1121200200	1123200200	2.0	6	5	60
1121200300	1123200300	3.0			
1121200400	1123200400	4.0			
1121200500	1123200500	5.0	8	8	70
1121200600	1123200600	6.0			
1121200700	1123200700	7.0			
1121200800	1123200800	8.0	10	10	80
1121200900	1123200900	9.0			
1121201000	1123201000	10.0			
1121201200	1123201200	12.0	12	12	90
1121201400	1123201400	14.0			
1121201600	1123201600	16.0			
1121201800	1123201800	18.0	14	14	100
1121202000	1123202000	20.0			
1121202500	1123202500	25.0			
1121202000	1123202000	20.0	16	18	110
1121202500	1123202500	25.0			
1121202500	1123202500	25.0			
1121202500	1123202500	25.0	18	22	140
1121202500	1123202500	25.0			
1121202500	1123202500	25.0			
1121202500	1123202500	25.0	20	26	160
1121202500	1123202500	25.0			
1121202500	1123202500	25.0			
1121202500	1123202500	25.0	25	30	180
1121202500	1123202500	25.0			
1121202500	1123202500	25.0			

► Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

► For copy - milling machines

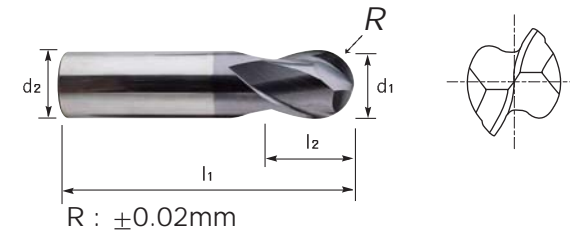
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

2 FLUTE BALL NOSE, SHORT LENGTH



Series No. 118120, 118320



R : ±0.02mm

2 SCHNEIDEN, STIRNRADIUS, KURZ, "PULSAR" SCHAFTFRÄSER
 2 DENTS, FRAISES HEMISPHERIQUES, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
 2 LABIOS, PUNTA ESFERICA, SERIE CORTA, FRESAS "PULSAR"

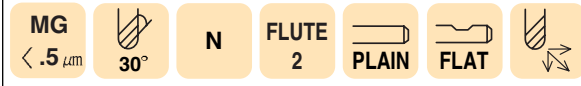
EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
FLAT	STRAIGHT				
1181200300	1183200300	3	6	4	50
1181200400	1183200400	4			
1181200500	1183200500	5			
1181200600	1183200600	6	8	6	54
1181200700	1183200700	7			
1181200800	1183200800	8			
1181200900	1183200900	9	10	7	58
1181201000	1183201000	10			
1181201200	1183201200	12			
1181201400	1183201400	14	12	8	66
1181201600	1183201600	16			
1181201800	1183201800	18			
1181202000	1183202000	20	14	9	73
1181202000	1183202000	20			
1181202000	1183202000	20			
1181202000	1183202000	20	16	10	75
1181202000	1183202000	20			
1181202000	1183202000	20			
1181202000	1183202000	20	18	11	82
1181202000	1183202000	20			
1181202000	1183202000	20			
1181202000	1183202000	20	20	12	84
1181202000	1183202000	20			
1181202000	1183202000	20			
1181202000	1183202000	20	20	14	92
1181202000	1183202000	20			
1181202000	1183202000	20			

► Radius Tolerance: ±0.02

Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

2 FLUTE, BALL NOSE, LONG REACH



Series No. 114120, 114320

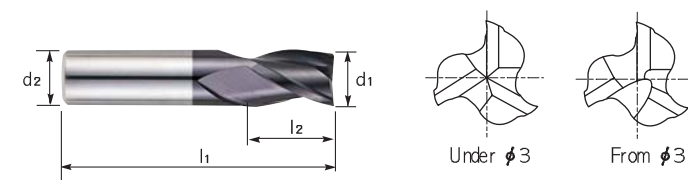
2 SCHNEIDEN, STIRNRADIUS, LANG REACH, "PULSAR" SCHAFTFRÄSER
 2 DENTS, FRAISES HÉMISPHERIQUES, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
 2 LABIOS, PUNTA ESFÉRICA, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d ₁)	SHANK DIAMETER h6(d ₂)	LENGTH OF CUT l ₂	OVERALL LENGTH l ₁
FLAT	STRAIGHT				
—	1143200200	2	3	6	80
—	1143200300	3		8	
—	1143200400	4	4	8	100
1141200500	1143200500	5	6	10	
1141200600	1143200600	6		10	120
1141200800	1143200800	8	8	14	
1141201000	1143201000	10	10	18	180
1141201200	1143201200	12	12	22	
1141201600	1143201600	16	16	30	250
1141202000	1143202000	20	20	38	

**Tolerances according to DIN 7160 & 7161
 Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

3 FLUTE, MINIATURE



Series No. 103120, 103320

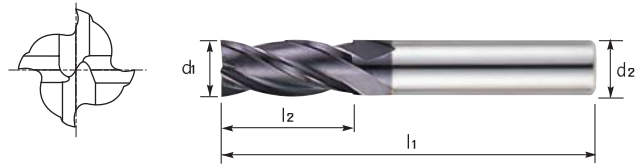
3 SCHNEIDEN, MINI, "PULSAR" SCHAFTFRÄSER
 3 DENTS, MINI, FRAISES À RAINURER "PULSAR"
 3 LABIOS, MINI, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d ₁)	SHANK DIAMETER h6(d ₂)	LENGTH OF CUT l ₂	OVERALL LENGTH l ₁
FLAT	STRAIGHT				
—	1033200100	1	4	2	35
—	1033200200	2		4	
1031200300	1033200300	3	6	5	36
1031200400	1033200400	4		7	
1031200500	1033200500	5	8	8	39
1031200600	1033200600	6		8	
1031200800	1033200800	8	8	11	43
1031201000	1033201000	10	10	13	
1031201200	1033201200	12	12	15	50
1031201400	1033201400	14	14	15	
1031201600	1033201600	16	16	18	58
1031201800	1033201800	18	18	20	
1031202000	1033202000	20	20	22	62
—	—	—	—	—	
—	—	—	—	—	70
—	—	—	—	—	
—	—	—	—	—	75
—	—	—	—	—	

**Tolerances according to DIN 7160 & 7161
 Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

4 FLUTE, SHORT LENGTH



Series No. 109120, 109320

4 SCHNEIDEN, KURZ, "PULSAR" SCHAFTFRÄSER
 4 DENTS, SÉRIE COURTE, FRAISES À RAINURER "PULSAR"
 4 LABIOS, SERIE CORTA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
FLAT	STRAIGHT				
—	1093200200	2.0	4	6	40
—	1093200250	2.5			
1091200300	1093200300	3.0	6	8	45
1091200350	1093200350	3.5			
1091200400	1093200400	4.0			
1091200450	1093200450	4.5	8	11	50
1091200500	1093200500	5.0			
1091200550	1093200550	5.5			
1091200600	1093200600	6.0	10	13	60
1091200650	1093200650	6.5			
1091200700	1093200700	7.0			
1091200750	1093200750	7.5	12	16	70
1091200800	1093200800	8.0			
1091200850	1093200850	8.5			
1091200900	1093200900	9.0	14	19	75
1091200950	1093200950	9.5			
1091201000	1093201000	10.0			
1091201050	1093201050	10.5	16	22	85
1091201100	1093201100	11.0			
1091201150	1093201150	11.5			
1091201200	1093201200	12.0	18	26	90
1091201300	1093201300	13.0			
1091201400	1093201400	14.0			
1091201500	1093201500	15.0	20	26	100
1091201600	1093201600	16.0			
1091201700	1093201700	17.0			
1091201800	1093201800	18.0	25	32	105
1091201900	1093201900	19.0			
1091202000	1093202000	20.0			
1091202200	1093202200	22.0	25	38	120
1091202400	1093202400	24.0			
1091202500	1093202500	25.0			

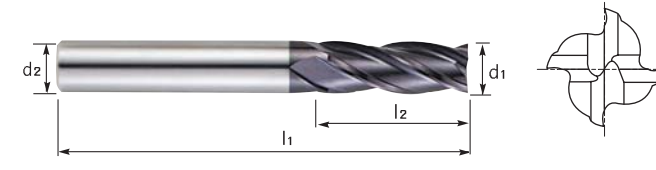
► Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

► 4 Flute allows for better workpiece finishes.

Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

4 FLUTE, LONG LENGTH



Series No. 111120, 111320

4 SCHNEIDEN, LANG, "PULSAR" SCHAFTFRÄSER
 4 DENTS, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
 4 LABIOS, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
FLAT	STRAIGHT				
—	1113200200	2.0	4	8	40
1111200300	1113200300	3.0	6	12	50
1111200400	1113200400	4.0			
1111200500	1113200500	5.0			
1111200600	1113200600	6.0	8	20	60
1111200800	1113200800	8.0			
1111201000	1113201000	10.0			
1111201200	1113201200	12.0	10	30	70
1111201400	1113201400	14.0			
1111201600	1113201600	16.0			
1111201800	1113201800	18.0	12	50	90
1111202000	1113202000	20.0			
1111202500	1113202500	25.0		25	75

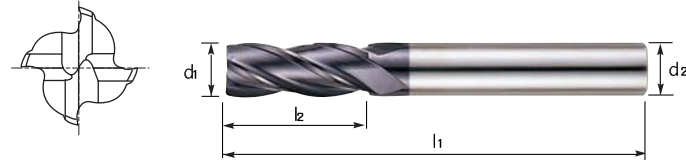
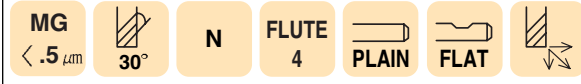
► Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

► 4 Flute allows for better workpiece finishes.

Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

4 FLUTE, CORNER RADIUS, LONG LENGTH



Series No. 157120, 157320

4 SCHNEIDEN, ECKENRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
 4 DENTS, RAYON EN COIN, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
 4 LABIOS, RADIO EN EL ÁNGULO LATERAL, SERIE LARGA, FRESAS "PULSAR"

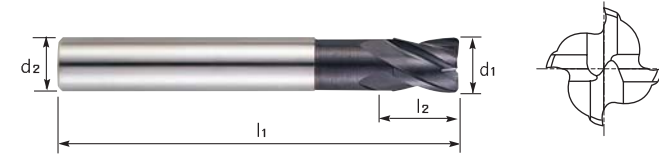
EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
FLAT	STRAIGHT				
1571200600	1573200600	6 × R0.5	6	20	60
1571209001	1573209001	6 × R1		20	
1571200800	1573200800	8 × R0.5	8	25	70
1571209002	1573209002	8 × R1		25	
1571209003	1573209003	8 × R1.5		25	
1571209004	1573209004	8 × R2		25	
1571201000	1573201000	10 × R0.5	10	30	90
1571209005	1573209005	10 × R1		30	
1571209006	1573209006	10 × R1.5		30	
1571209007	1573209007	10 × R2		30	
1571201200	1573201200	12 × R0.5	12	30	90
1571209008	1573209008	12 × R1		30	
1571209009	1573209009	12 × R1.5		30	
1571209010	1573209010	12 × R2		30	

► Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

**Tolerances according to DIN 7160 & 7161
 Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

4 FLUTE, CORNER RADIUS, STUB CUT LENGTH



Series No. 156120, 156320

4 SCHNEIDEN, ECKENRADIUS, EXTRA KURZ, "PULSAR" SCHAFTFRÄSER
 4 DENTS, RAYON EN COIN, FRAISES À RAINURER "PULSAR"
 4 LABIOS, RADIO EN EL ÁNGULO, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
FLAT	STRAIGHT				
1561200200	1563200200	2 × R0.2	6	2.5	50
1561200250	1563200250	2.5 × R0.25		3	
1561200300	1563200300	3 × R0.3		4	
1561200350	1563200350	3.5 × R0.35		4.5	
1561200400	1563200400	4 × R0.4		5	
1561200500	1563200500	5 × R0.5		6	
1561200600	1563200600	6 × R0.6		7	
1561200800	1563200800	8 × R0.8	8	10	60
1561201000	1563201000	10 × R1	10	12	70
1561201200	1563201200	12 × R1.2	12	15	80
1561201600	1563201600	16 × R1.6	16	18	90

**Tolerances according to DIN 7160 & 7161
 Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

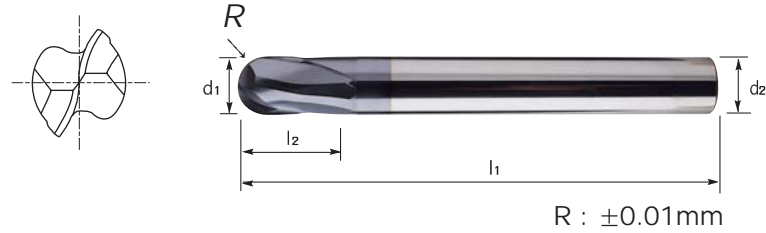
2 FLUTE, BALL NOSE, STUB CUT LENGTH for OVER HRc55



Series No. 116120, 116320



2 SCHNEIDEN, STIRNRADIUS, EXTRA KURZ für ÜBER HRc55



EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
FLAT	STRAIGHT				
—	1163200100	1.0	4	1	50
—	1163200120	1.2		1.2	
—	1163200150	1.5		1.5	
1161200200	1163200200	2.0	6	2	60
1161200300	1163200300	3.0		3	
1161200400	1163200400	4.0		4	
1161200500	1163200500	5.0	8	5	70
1161200600	1163200600	6.0		6	
1161200700	1163200700	7.0		7	
1161200800	1163200800	8.0	10	8	80
1161200900	1163200900	9.0		9	
1161201000	1163201000	10.0		10	
1161201200	1163201200	12.0	12	12	90
1161201400	1163201400	14.0		14	
1161201600	1163201600	16.0		16	
1161201800	1163201800	18.0	18	18	100
1161202000	1163202000	20.0		20	
1161202500	1163202500	25.0		25	

- ▶ Suitable for HRc55~HRc65 high hardened materials.
- ▶ Strong cutting edges and higher tool rigidity.
- ▶ Radius tolerance ± 0.01mm.

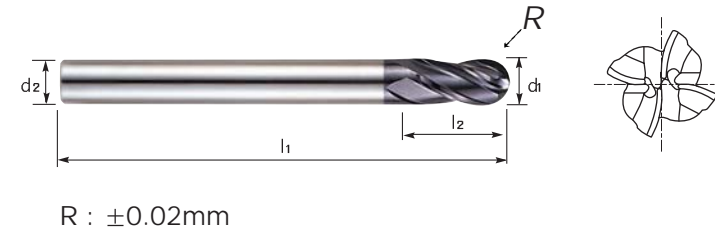
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

4 FLUTE, BALL NOSE, LONG LENGTH



Series No. 115120, 115320



4 SCHNEIDEN, STIRNRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
4 DENTS, FRAISES HÉMISPHERIQUES, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
4 LABIOS, PUNTA ESFÉRICA, SERIE LARGA, FRESAS "PULSAR"

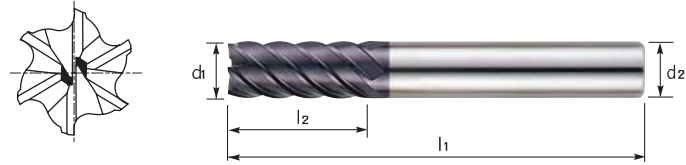
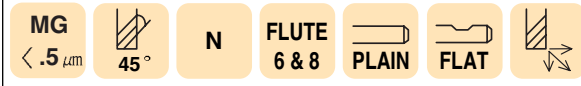
EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1
FLAT	STRAIGHT				
—	1153200100	1.0	4	2.5	50
—	1153200150	1.5		4	
1151200200	1153200200	2.0		5	
1151200300	1153200300	3.0	6	8	60
1151200400	1153200400	4.0		8	
1151200500	1153200500	5.0		10	
1151200600	1153200600	6.0	8	12	70
1151200700	1153200700	7.0		14	
1151200800	1153200800	8.0		14	
1151200900	1153200900	9.0	10	18	80
1151201000	1153201000	10.0		18	
1151201200	1153201200	12.0		22	
1151201400	1153201400	14.0	12	26	90
1151201600	1153201600	16.0		30	
1151201800	1153201800	18.0		34	
1151202000	1153202000	20.0	18	38	100
1151202500	1153202500	25.0		50	

- ▶ Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ▶ For copy - milling machines

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

6,8 FLUTE, 45° HELIX, LONG LENGTH



Series No. 149120, 149320

6,8 SCHNEIDEN, 45° RECHTSSPIPALE, LANG, "PULSAR" SCHAFTFRÄSER
 6,8 DENTS, HÉLICE 45°, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
 6,8 LABIOS, HÉLICE 45°, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1	NO. OF FLUTE
FLAT	STRAIGHT					
1491200600	1493200600	6.0	6	13	57	6
1491200700	1493200700	7.0	8	16	63	6
1491200800	1493200800	8.0		19		6
1491200900	1493200900	9.0	10	19	72	6
1491201000	1493201000	10.0		22		6
1491201200	1493201200	12.0	12	26	83	6
1491201400	1493201400	14.0	14	26		6
1491201600	1493201600	16.0	16	32	92	6
1491201800	1493201800	18.0	18	32		8
1491202000	1493202000	20.0	20	38	104	8
1491202500	1493202500	25.0	25	44		8

- ▶ Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ▶ High speed cutting and finish milling with high feed rates.

**Tolerances according to DIN 7160 & 7161
 Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

6 FLUTE, 45° HELIX, EXTRA LONG LENGTH



Series No. 150120, 150320

6 SCHNEIDEN, 45° RECHTSSPIPALE, EXTRA LANG, "PULSAR" SCHAFTFRÄSER
 6 DENTS, HÉLICE 45°, SÉRIE EXTRA-LONGUE, FRAISES À RAINURER "PULSAR"
 6 LABIOS, HÉLICE 45°, SERIE EXTRA-LARGA, FRESAS "PULSAR"

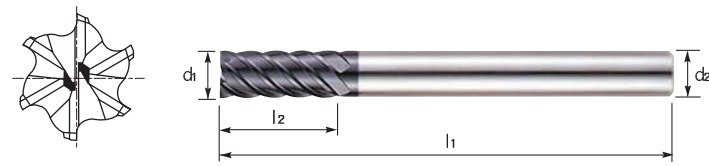
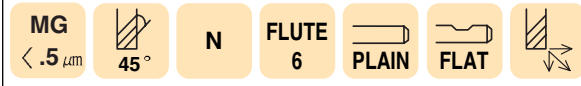
EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1	NO. OF FLUTE
FLAT	STRAIGHT					
1501200600	1503200600	6.0	6	26	70	6
1501200800	1503200800	8.0	8	36	90	6
1501201000	1503201000	10.0	10	46	100	6
1501201200	1503201200	12.0	12	56	110	6
1501201600	1503201600	16.0	16	66	130	6
1501202000	1503202000	20.0	20	76	140	6
1501202500	1503202500	25.0	25	92	180	6

- ▶ Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ▶ High speed cutting and finish milling with high feed rates.

**Tolerances according to DIN 7160 & 7161
 Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

6 FLUTE, 45° HELIX, CORNER RADIUS, LONG LENGTH



Series No. 158120, 158320

6 SCHNEIDEN, 45° RECHTSSPIPALE, ECKENRADIUS, LANG, "PULSAR" SCHAFTFRÄSER
 6 DENTS, HÉLICE 45°, RAYON EN COIN, SÉRIE LONGUE, FRAISES À RAINURER "PULSAR"
 6 LABIOS, HÉLICE 45°, RADIO EN EL ÁNGULO, SERIE LARGA, FRESAS "PULSAR"

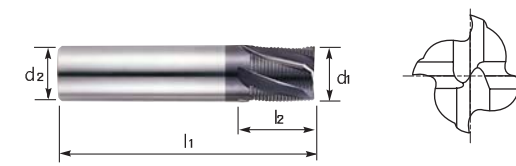
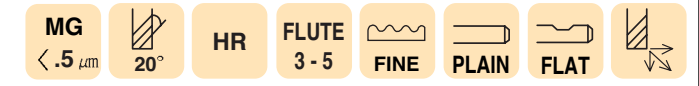
EDP. No		MILL DIAMETER e8(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1	NO. OF FLUTE
FLAT	STRAIGHT					
1581200600	1583200600	6 × R0.5	6	13	70	6
1581200800	1583200800	8 × R0.5	8	19	90	6
1581201000	1583201000	10 × R0.5	10	22	100	6
1581209001	1583209001	10 × R1.0		22		6
1581201200	1583201200	12 × R0.5	12	26	110	6
158120 9002	158320 9002	12 × R1.0		26		6
1581201600	1583201600	16 × R1.0	16	32	130	6
1581209003	1583209003	16 × R1.5		32		6
1581202000	1583202000	20 × R1.0	20	38	140	6
1581209004	1583209004	20 × R1.5		38		6
1581209005	1583209005	20 × R2.0		38		6

- ▶ Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ▶ High speed cutting and finish milling with high feed rates.

Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

MULTI FLUTE, ROUGHING, SHORT LENGTH



Series No. 148120, 148320

MULTI. SCHNEIDEN, SCHRUPPFRÄSER, KURZ, "PULSAR" SCHAFTFRÄSER
 MULTI-DENTS, SÉRIE COURTE, FRAISES "PULSAR" EN BOUT RAVAGEUSES
 MULTI-LABIOS, GRAN DESBATE, SERIE CORTA, FRESAS "PULSAR"

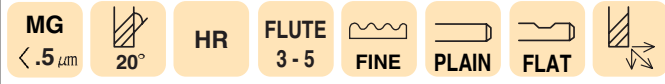
EDP. No		MILL DIAMETER h10(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1	NO. OF FLUTE
FLAT	STRAIGHT					
1481200600	1483200600	6.0	6	7	54	3
1481200700	1483200700	7.0	8	8	58	3
1481200800	1483200800	8.0		9		3
1481200900	1483200900	9.0	10	13	66	4
1481201000	1483201000	10.0		14		4
1481201200	1483201200	12.0	12	16	73	4
1481201400	1483201400	14.0	14	18	75	4
1481201600	1483201600	16.0	16	22	82	4
1481201800	1483201800	18.0	18	24	84	4
1481202000	1483202000	20.0	20	26	92	4
1481202500	1483202500	25.0	25	25	110	5

- ▶ Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ▶ High velocity milling of hardened steels.

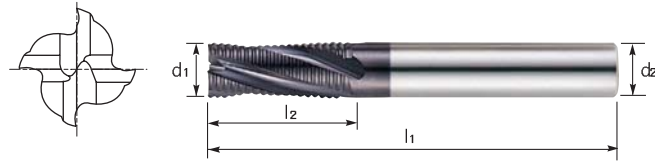
Tolerances according to DIN h10 not e8 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

MULTI FLUTE, ROUGHING, LONG LENGTH



Series No. 147120, 147320



MULTI. SCHNEIDEN, SCHRUPPFRÄSER, LANG, "PULSAR" SCHAFTFRÄSER
 MULTI-DENTS, SÉRIE LONGUE, FRAISES "PULSAR" EN BOUT RAVAGEUSES
 MULTI-LABIOS, GRAN DESBATE, SERIE LARGA, FRESAS "PULSAR"

EDP. No		MILL DIAMETER h10(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1	NO. OF FLUTE
FLAT	STRAIGHT					
1471200600	1473200600	6.0	6	16	57	3
1471200700	1473200700	7.0	8	16	63	3
1471200800	1473200800	8.0		16		3
1471200900	1473200900	9.0	10	19	72	4
1471201000	1473201000	10.0		22		4
1471201200	1473201200	12.0	12	26	83	4
1471201400	1473201400	14.0	14	26		4
1471201600	1473201600	16.0	16	32	92	4
1471201800	1473201800	18.0	18	32		4
1471202000	1473202000	20.0	20	38	104	4
1471202500	1473202500	25.0	25	45	121	5

- ▶ Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ▶ High velocity milling of hardened steels.

**Tolerances according to DIN h10 not e8
 Toleranzen nach DIN 7160 & 7161**

	Toleranzwerte in µm / Tolerance range in µm				
	Nennmaßbereich in mm / Nominal-Diameter in mm				
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

3, 4 FLUTE, ROUGHING BALL NOSE, LONG LENGTH



Series No. 145120, 145320



R : ±0.02mm

EDP. No		MILL DIAMETER h10(d1)	SHANK DIAMETER h6(d2)	LENGTH OF CUT l2	OVERALL LENGTH l1	NO. OF FLUTE
FLAT	STRAIGHT					
1451200600	1453200600	6.0	6	16	57	3
1451200800	1453200800	8.0	8	16	63	3
1451201000	1453201000	10.0	10	22	72	4
1451201200	1453201200	12.0	12	26	83	4
1451201400	1453201400	14.0	14	26		4
1451201600	1453201600	16.0	16	32	92	4
1451201800	1453201800	18.0	18	32		4
1451202000	1453202000	20.0	20	38	104	4

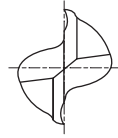
**Tolerances according to DIN h10 not e8
 Toleranzen nach DIN 7160 & 7161**

	Toleranzwerte in µm / Tolerance range in µm				
	Nennmaßbereich in mm / Nominal-Diameter in mm				
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
h6	0 -6	0 -8	0 -9	0 -11	0 -13

2 FLUTE, MINIATURE



Series No. 100320



EDP. No	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	OVERALL LENGTH
1003200040	0.4	3	0.8	40
1003200050	0.5	3	1.0	40
1003200060	0.6	3	1.2	40
1003200070	0.7	3	1.4	40
1003200080	0.8	3	1.6	40
1003200090	0.9	3	2.0	40
1003200100	1.0	4	2.5	40
1003200110	1.1	4	2.5	40
1003200120	1.2	4	4.0	40
1003200130	1.3	4	4.0	40
1003200140	1.4	4	4.0	40
1003200150	1.5	4	4.0	40

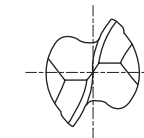
Unit : mm

MILL DIAMETER	0.4 ~ 0.9	1.0 ~ 1.5
MILL DIA. TOLERANCE	0 -0.012	-0.014 -0.028
SHANK DIA. TOLERANCE	0 -0.006	0 -0.008

2 FLUTE, MINIATURE BALL NOSE



Series No. 105320



EDP. No	R	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	OVERALL LENGTH
1053200060	R0.30	0.6	3	1.1	40
1053200070	R0.35	0.7	3	1.5	40
1053200080	R0.40	0.8	3	2.0	40
1053200090	R0.45	0.9	3	2.2	40
1053200100	R0.50	1.0	3	2.5	40
1053200110	R0.55	1.1	3	3.0	40
1053200120	R0.60	1.2	3	3.0	40
1053200130	R0.65	1.3	3	3.5	40
1053200140	R0.70	1.4	3	3.5	40
1053200150	R0.75	1.5	3	4.0	40

Unit : mm

RADIUS TOLERANCE	± 0.010
MILL DIA. TOLERANCE	-0.014 -0.028
SHANK DIA. TOLERANCE	0 -0.006

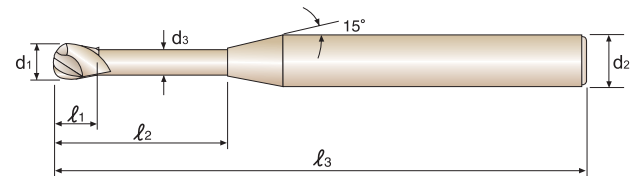
2 FLUTE, BALL NOSE for RIB PROCESSING



Series No. 143320

R : ±0.01mm

EDP. No	MILL DIAMETER d ₁	SHANK DIAMETER d ₂ (h6)	LENGTH OF CUT l ₁	LENGTH BELOW SHANK l ₂	OVERALL LENGTH l ₃	NECK DIAMETER d ₃
1433200060	0.6	3	0.9	6	35	0.55
1433200080	0.8	4	1.2	6	45	0.75
1433200081	0.8	4	1.2	8	45	0.75
1433200100	1.0	4	1.5	6	45	0.97
1433200101	1.0	4	1.5	8	45	0.95
1433200102	1.0	4	1.5	12	45	0.93
1433200120	1.2	4	1.8	8	45	1.15
1433200121	1.2	4	1.8	12	45	1.13
1433200140	1.4	4	2.1	12	45	1.33
1433200150	1.5	4	2.3	8	45	1.45
1433200151	1.5	4	2.3	12	45	1.43
1433200152	1.5	4	2.3	16	50	1.41
1433200160	1.6	4	2.4	16	50	1.51
1433200180	1.8	4	2.7	16	50	1.71
1433200200	2.0	4	3.0	8	45	1.95
1433200201	2.0	4	3.0	16	50	1.91
1433200202	2.0	4	3.0	20	55	1.89
1433200300	3.0	6	4.5	16	55	2.85
1433200301	3.0	6	4.5	20	60	2.85
1433200400	4.0	6	6.0	16	60	3.85
1433200401	4.0	6	6.0	20	65	3.85



MILL DIAMETER (mm)	0.6	0.8 ~ 3.0	4.0
MILL DIA. TOLERANCE(mm)	-0.014	-0.020	-0.020
	-0.028	-0.038	-0.038
SHANK DIA. TOLERANCE	h6		

2 FLUTE END MILLS for RIB PROCESSING

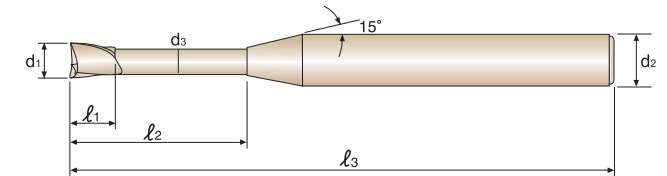


Series No. 107320, 108320

EDP. No	MILL DIAMETER d ₁	SHANK DIAMETER d ₂ (h6)	LENGTH OF CUT l ₁	LENGTH BELOW SHANK l ₂	OVERALL LENGTH l ₃	NECK DIAMETER d ₃
1073200080	0.8	4	1.2	6	45	0.75
1083200080	0.8	4	1.2	8	45	0.75
1073200100	1.0	4	1.5	6	45	0.97
1083200100	1.0	4	1.5	8	45	0.95
1073200102	1.0	4	1.5	12	45	0.93
1073200120	1.2	4	1.8	8	45	1.15
1083200120	1.2	4	1.8	12	45	1.13
1073200140	1.4	4	2.1	12	45	1.33
1073200150	1.5	4	2.3	8	45	1.45
1083200150	1.5	4	2.3	10	45	1.45
1073200152	1.5	4	2.3	12	45	1.43
1073200153	1.5	4	2.3	16	50	1.41
1073200160	1.6	4	2.4	12	45	1.53
1073200180	1.8	4	2.7	12	45	1.73
1073200200	2.0	4	3.0	12	45	1.93
1083200200	2.0	4	3.0	16	50	1.91
1073200250	2.5	4	3.7	12	45	2.40
1083200250	2.5	4	3.7	16	55	2.40
1073200300	3.0	6	4.5	14	50	2.85
1083200300	3.0	6	4.5	18	55	2.85

Unit : mm

MILL DIA. TOLERANCE	SHANK DIA. TOLERANCE
0 -0.015	0 -0.008



4 FLUTE, TAPER for RIB PROCESSING



Series No. 120320

EDP. No	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	TAPER ANGLE	OVERALL LENGTH
1203200100	1.0	4	8	30'	45
1203200101	1.0	4	12	30'	45
1203200102	1.0	4	8	1°	45
1203200103	1.0	4	12	1°	45
1203200104	1.0	4	8	1° 30'	45
1203200105	1.0	4	12	1° 30'	45
1203200106	1.0	4	8	2°	45
1203200107	1.0	4	12	2°	45
1203200120	1.2	4	8	30'	45
1203200121	1.2	4	12	30'	45
1203200122	1.2	4	8	1°	45
1203200123	1.2	4	12	1°	45
1203200124	1.2	4	8	1° 30'	45
1203200125	1.2	4	12	1° 30'	45
1203200126	1.2	4	8	2°	45
1203200127	1.2	4	12	2°	45
1203200150	1.5	4	8	30'	45
1203209001	1.5	4	12	30'	45
1203209002	1.5	4	16	30'	50
1203209003	1.5	4	8	1°	45

MILL DIA. TOLERANCE(mm)	$\begin{matrix} 0 \\ -0.015 \end{matrix}$
TAPER ANGLE TOLERANCE	$\pm 5'$
SHANK DIA. TOLERANCE(mm)	$\begin{matrix} 0 \\ -0.008 \end{matrix}$

4 FLUTE, TAPER for RIB PROCESSING



Series No. 120320

EDP. No	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	TAPER ANGLE	OVERALL LENGTH
1203209004	1.5	4	12	1°	45
1203209005	1.5	4	16	1°	50
1203209006	1.5	4	8	1° 30'	45
1203209007	1.5	4	12	1° 30'	45
1203209008	1.5	4	16	1° 30'	50
1203209009	1.5	4	8	2°	45
1203209010	1.5	4	12	2°	45
1203209011	1.5	4	16	2°	50
1203200200	2.0	4	12	30'	45
1203200201	2.0	4	16	30'	50
1203200202	2.0	4	12	1°	45
1203200203	2.0	4	16	1°	50
1203200204	2.0	4	12	1° 30'	45
1203200205	2.0	4	16	1° 30'	50
1203200206	2.0	4	12	2°	45
120300207	2.0	4	16	2°	50

MILL DIA. TOLERANCE(mm)	$\begin{matrix} 0 \\ -0.015 \end{matrix}$
TAPER ANGLE TOLERANCE	$\pm 5'$
SHANK DIA. TOLERANCE(mm)	$\begin{matrix} 0 \\ -0.008 \end{matrix}$

4 FLUTE, TAPER BALL NOSE for RIB PROCESSING



Series No. 130320

$R : \pm 0.01mm$

EDP. No	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	TAPER ANGLE	OVERALL LENGTH
1303200100	1.0	4	8	30'	45
1303200101	1.0	4	12	30'	45
1303200102	1.0	4	8	1°	45
1303200103	1.0	4	12	1°	45
1303200104	1.0	4	8	1° 30'	45
1303200105	1.0	4	12	1° 30'	45
1303200106	1.0	4	8	2°	45
1303200107	1.0	4	12	2°	45
1303200120	1.2	4	8	30'	45
1303200121	1.2	4	12	30'	45
1303200122	1.2	4	8	1°	45
1303200123	1.2	4	12	1°	45
1303200124	1.2	4	8	1° 30'	45
1303200125	1.2	4	12	1° 30'	45
1303200126	1.2	4	8	2°	45
1303200127	1.2	4	12	2°	45
1303200130	1.5	4	8	30'	45
1303209001	1.5	4	12	30'	45
1303209002	1.5	4	16	30'	50
1303209003	1.5	4	8	1°	45

RADIUS TOLERANCE(mm)	±0.010
TAPER ANGLE TOLERANCE	± 5'
SHANK DIA. TOLERANCE(mm)	$\begin{matrix} 0 \\ -0.008 \end{matrix}$

4 FLUTE, TAPER BALL NOSE for RIB PROCESSING



Series No. 130320

$R : \pm 0.01mm$

EDP. No	MILL DIAMETER	SHANK DIAMETER h6	LENGTH OF CUT	TAPER ANGLE	OVERALL LENGTH
1303209004	1.5	4	12	1°	45
1303209005	1.5	4	16	1°	50
1303209006	1.5	4	8	1° 30'	45
1303209007	1.5	4	12	1° 30'	45
1303209008	1.5	4	16	1° 30'	50
1303209009	1.5	4	8	2°	45
1303209010	1.5	4	12	2°	45
1303209011	1.5	4	16	2°	50
1303200200	2.0	4	12	30'	45
1303200201	2.0	4	16	30'	50
1303200202	2.0	4	12	1°	45
1303200203	2.0	4	16	1°	50
1303200204	2.0	4	12	1° 30'	45
1303200205	2.0	4	16	1° 30'	50
1303200206	2.0	4	12	2°	45
1303200207	2.0	4	16	2°	50

RADIUS TOLERANCE(mm)	±0.010
TAPER ANGLE TOLERANCE	± 5'
SHANK DIA. TOLERANCE(mm)	$\begin{matrix} 0 \\ -0.008 \end{matrix}$

PULSAR cutting condition

2 FLUTE, SHORT, SLOTTING

100120, 100320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc30 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1000 ~ 1500N/mm ²		1500 ~ 2000N/mm ²		2000N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	11560	190	7560	120	6300	90	5040	35		
3	8920	210	5560	140	4620	120	3360	40	1900	40
4	7560	300	4620	180	3880	150	2940	40	1480	40
5	6300	320	3780	190	3160	160	2320	50	1260	40
6	5560	350	3360	220	2840	180	2000	55	1100	40
8	4200	380	2520	200	2100	180	1680	75	840	40
10	3260	330	2000	160	1680	160	1360	60	680	35
12	2740	280	1680	130	1360	130	1160	55	560	35
16	2200	220	1360	110	1060	110	900	40	440	20
20	1680	170	1060	80	840	80	680	30	320	20
25	1360	130	840	70	680	60	540	20	260	15

(UP TO φ3:0.2D)

R.P.M = rev./min, Feed = mm/min

2 FLUTE, LONG, SLOTTING

102120, 102320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc30 ~ HRc45	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1000 ~ 1500N/mm ²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
2	6300	60	5040	50	3150	25
3	4410	70	3570	60	2200	30
4	3570	85	2840	70	1790	35
5	3050	105	2420	85	1580	40
6	2630	125	2100	105	1370	50
8	2000	135	1580	105	1050	50
10	1680	135	1370	105	840	50
12	1370	105	1160	95	700	40
16	1160	95	890	75	560	35
20	840	70	680	50	420	25

(UP TO φ3:0.4mm)

R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

2 FLUTE, CORNER RADIUS, LONG, SLOTTING

155120, 155320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1500 ~ 2000N/mm ²		2000N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2630	125	2100	105	1370	50	1160	35
8	2000	135	1580	105	1050	50	840	35
10	1680	135	1370	105	840	50	670	35
12	1370	105	1160	95	700	40	550	25

R.P.M = rev./min, Feed = mm/min

2 FLUTE, BALL NOSE, LONG

112120, 112320



HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc65		~HRc45		HRc45 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1500N/mm ² ~		~1500N/mm ²		1500N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	15760	250	12720	200	5800	90	25000	650	25000	400
1.5	15760	350	12140	270	5320	120	23000	700	23000	430
2	15760	530	11560	320	4840	110	21000	740	21000	470
2.5	14400	750	10700	490	4680	150	21000	880	19000	490
3	13100	680	10000	460	4520	150	21000	1000	17000	520
4	10500	740	8400	530	4200	180	21000	1470	13660	580
5	9140	820	7300	580	3680	180	21000	1800	12000	600
6	7780	840	6300	630	3160	190	21000	2310	10500	630
8	5260	950	4420	660	2100	190	15760	2840	7880	740
10	4620	1020	3780	710	1780	190	13660	3050	6300	840
12	3780	900	2940	660	1360	190	10500	2630	5260	840
16	2740	920	2320	650	1160	190	8200	2630	3780	710
20	2100	840	1900	630	840	190	6300	2520	2940	530

Ae : D1 ~ D6 = 0.2mm
D8 ~ D20 = 0.3mm
Ap : 0.2 × D

Ae : D1 ~ D6 = 0.2mm
D8 ~ D20 = 0.3mm
Ap : 0.05 × D

R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

2 FLUTE BALL NOSE FOR OVER HRC55

116320, 116120



HIGH SPEED CUTTING

MATERIAL	HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc45 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	1400 ~ 1750N/mm ²		1750 ~ 2000N/mm ²		2000 ~ 2080N/mm ²		2080N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	20000	460	20000	400	20000	350	20000	240
1.5	16300	640	16100	580	16000	570	14200	360
2	14500	800	14200	740	13850	760	11300	465
2.5	13400	950	13000	890	12600	920	9600	560
3	12700	1100	12300	1050	11800	1000	8400	660
4	10600	1100	10300	1050	9800	1000	6650	650
5	9400	1100	9050	1050	8600	950	5600	680
6	8600	1150	8250	1100	7850	950	4850	700
8	7000	1050	6700	1000	6350	950	3800	650
10	6050	1000	5800	960	5450	900	3200	620
12	5450	1000	5200	960	4900	900	2750	610
16	4350	870	4150	830	3900	820	2100	265
20	3500	690	3300	650	3100	630	1700	220

MATERIAL	HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc45 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60	
STRENGTH	1400 ~ 1750N/mm ²		1750 ~ 2000N/mm ²		2000 ~ 2080N/mm ²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
1	20000	460	20000	400	20000	350
1.5	16300	640	16100	580	16000	570
2	14500	800	14200	740	13850	760
2.5	13400	950	13000	890	12600	920
3	12700	1100	12300	1050	11800	1000
4	10600	1100	10300	1050	9800	1000
5	9400	1100	9050	1050	8600	950
6	8600	1150	8250	1100	7850	950
8	7000	1050	6700	1000	6350	950
10	6050	1000	5800	960	5450	900
12	5450	1000	5200	960	4900	900
16	4350	870	4150	830	3900	820
20	3500	690	3300	650	3100	630

Ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.25mm
D10 ~ D20 = 0.30mm

Ap : D1 ~ D20 = 0.1 × D

Ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.25mm
D10 ~ D20 = 0.30mm
Ap : D1 ~ D20 = 0.05 × D

R.P.M = rev./min, Feed = mm/min

2 FLUTE, BALL NOSE

118120, 118320



HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1500N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
1	15760	250	12720	200	5800	90
1.5	15760	350	12140	270	5320	120
2	14400	750	10700	490	4680	150
2.5	14400	750	10700	490	4680	150
3	13100	680	10000	460	4520	150
4	10500	740	8400	530	4200	180
5	9140	820	7300	580	3680	180
6	7780	840	6300	630	3160	190
8	5260	950	4420	660	2100	190
10	4620	1020	3780	710	1780	190
12	3780	900	2940	660	1360	190
16	2740	920	2320	650	1160	190
20	2100	840	1900	630	840	190

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
HARDNESS	~HRc45		HRc45 ~ HRc65	
STRENGTH	~1500N/mm ²		1500N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED
1	25000	650	25000	400
1.5	23000	700	23000	430
2	21000	740	21000	470
2.5	21000	880	19000	490
3	21000	1000	17000	520
4	21000	1470	13660	580
5	21000	1800	12000	600
6	21000	2310	10500	630
8	15760	2840	7880	740
10	13660	3050	6300	840
12	10500	2630	5260	840
16	8200	2630	3780	710
20	6300	2520	2940	530

Ae : D1 ~ D6 = 0.2mm
D8 ~ D20 = 0.3mm
Ap : 0.2D

Ae : D1 ~ D6 = 0.2mm
D8 ~ D20 = 0.3mm
Ap : 0.1D

R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

2 FLUTE, BALL NOSE LONG REACH

114320, 114120



HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1500N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
1	12600	200	10180	160	4640	70
1.5	12600	280	9710	220	4250	95
2	12600	420	9250	260	3870	90
2.5	11520	600	8560	390	3740	120
3	10500	540	8000	370	3620	120
4	8400	590	6720	420	3360	140
5	7310	660	5840	460	2940	140
6	6220	670	5040	500	2530	150
8	4210	760	3540	530	1680	150
10	3700	820	3020	570	1420	150
12	3020	720	2350	530	1090	150
16	2190	740	1860	520	930	150
20	1680	670	1520	500	670	150

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
HARDNESS	~HRc45		HRc45 ~ HRc65	
STRENGTH	~1500N/mm ²		1500N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED
1	20000	520	20000	320
1.5	18400	560	18400	340
2	16800	590	16800	380
2.5	16800	700	15200	390
3	16800	800	13600	420
4	16800	1180	10930	460
5	16800	1440	9600	480
6	16800	1850	8400	500
8	12610	2270	6300	590
10	10930	2440	5040	670
12	8400	2100	4210	670
16	6560	2100	3020	570
20	5040	2020	2350	420

Ae : D1 ~ D6 = 0.2mm
D8 ~ D20 = 0.3mm
Ap : 0.2D

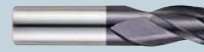
Ae : D1 ~ D6 = 0.2mm
D8 ~ D20 = 0.3mm
Ap : 0.1D

R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

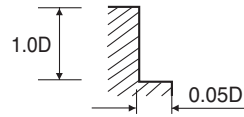
3 FLUTE MINIATURE

103320, 103120



SIDE CUTTING

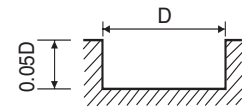
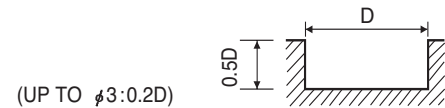
MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45				HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²				1500 ~ 2000N/mm ²		2000N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	11560	210	7560	140	6300	115	5040	30		
3	8920	240	5560	150	4620	125	3360	40	1900	45
4	7560	430	4620	260	3880	210	2940	45	1480	45
5	6300	450	3780	270	3160	230	2320	55	1260	45
6	5560	500	3360	310	2840	250	2000	60	1100	45
8	4200	530	2520	290	2100	265	1680	80	840	45
10	3260	460	2000	230	1680	230	1360	70	680	35
12	2740	390	1680	190	1360	180	1160	60	560	35
16	2200	310	1360	150	1060	150	900	45	440	20
20	1940	280	1210	135	950	130	790	35	380	20
25	1680	240	1060	120	840	115	680	30	320	20



R.P.M = rev./min, Feed = mm/min

SLOTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45				HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²				1500 ~ 2000N/mm ²		2000N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	11560	170	7560	110	6300	80	5040	30		
3	8920	190	5560	130	4620	110	3360	35	1900	40
4	7560	270	4620	160	3880	130	2940	35	1480	35
5	6300	280	3780	170	3160	140	2320	45	1260	35
6	5560	310	3360	200	2840	160	2000	50	1100	35
8	4200	340	2520	180	2100	160	1680	65	840	35
10	3260	300	2000	140	1680	145	1360	55	680	30
12	2740	250	1680	120	1360	120	1160	50	560	30
16	2200	200	1360	100	1060	100	900	35	440	20
20	1940	175	1210	85	950	85	790	30	380	20
25	1680	150	1060	70	840	70	680	25	320	20



R.P.M = rev./min, Feed = mm/min

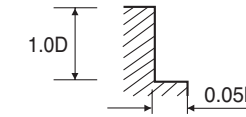
PULSAR cutting condition

4 FLUTE, SHORT, SIDE CUTTING

109120, 109320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45				HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²				1500 ~ 2000N/mm ²		2000N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	11560	280	7560	170	6300	140	5040	50		
3	8920	320	5560	200	4620	170	3360	60	1900	60
4	7560	570	4620	350	3880	280	2940	60	1480	60
5	6300	600	3780	360	3160	300	2320	70	1260	60
6	5560	660	3360	410	2840	330	2000	80	1100	60
8	4200	710	2520	380	2100	350	1680	110	840	60
10	3260	610	2000	300	1680	300	1360	90	680	50
12	2740	520	1680	250	1360	240	1160	80	560	50
16	2200	410	1360	200	1100	200	900	60	440	30
20	1680	320	1060	160	840	150	680	40	320	30
25	1360	250	840	130	680	120	540	30	260	20



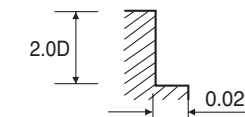
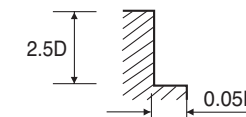
R.P.M = rev./min, Feed = mm/min

4 FLUTE, LONG, SIDE CUTTING

111120, 111320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1500 ~ 2000N/mm ²		2000N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	6300	100	5040	80	3150	45		
3	4410	115	3570	100	2200	55	1890	30
4	3570	140	2840	115	1790	60	1470	35
5	3050	180	2420	140	1580	70	1260	40
6	2630	215	2100	180	1370	90	1160	50
8	2000	230	1580	180	1050	90	840	50
10	1680	230	1370	180	840	90	670	50
12	1370	180	1160	160	700	70	560	40
16	1160	160	890	125	560	60	440	35
20	840	115	680	90	420	45	340	25



R.P.M = rev./min, Feed = mm/min

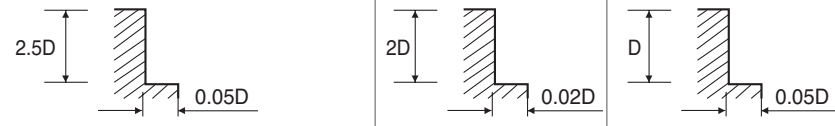
PULSAR cutting condition

4 FLUTE, CORNER RADIUS, LONG, SIDE CUTTING

157120, 157320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRC30		HRC30 ~ HRC45		HRC45 ~ HRC55		HRC55 ~ HRC65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1500 ~ 2000N/mm ²		2000N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2630	215	2100	180	1370	85	1160	50
8	2000	230	1580	180	1050	85	840	50
10	1680	230	1370	180	840	85	670	50
12	1370	180	1160	160	700	70	550	40



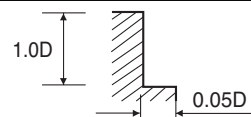
R.P.M = rev./min, Feed = mm/min

4 FLUTE, CORNER RADIUS STUB, SIDE CUTTING

156320, 156120



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRC30		HRC30 ~ HRC45		HRC45 ~ HRC55		HRC55 ~ HRC65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1500 ~ 2000N/mm ²		2000N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	13870	340	9070	205	6050	60		
2.5	12290	360	7870	220	5040	65		
3	10700	385	6670	240	4030	70	2280	70
3.5	9890	535	6100	330	3780	70	2030	70
4	9070	685	5540	420	3530	70	1780	70
5	7560	720	4540	430	2780	85	1510	70
6	6670	790	4030	490	2400	95	1320	70
8	5040	850	3020	455	2020	130	1010	70
10	3910	730	2400	360	1630	110	820	60
12	3290	625	2020	300	1390	95	670	60
16	2640	490	1630	240	1080	70	530	35



R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

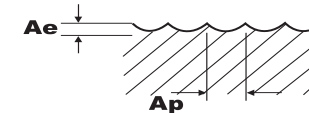
4 FLUTE, BALL NOSE, LONG

115120, 115320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRC30		HRC30 ~ HRC45		HRC45 ~ HRC65	
STRENGTH	~1000N/mm ²		1000 ~ 1500N/mm ²		1500N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
1	15760	380	12720	300	5800	130
1.5	15760	530	12140	410	5320	180
2	15760	800	11560	480	4840	160
3	13100	1020	10000	690	4520	220
4	10500	1110	8400	800	4200	270
5	9140	1230	7300	870	3680	270
6	7780	1260	6300	950	3160	280
8	5260	1430	4420	990	2100	280
10	4620	1530	3780	1070	1780	280
12	3780	1350	2940	990	1360	280
16	2740	1380	2320	980	1160	280
20	2100	1260	1900	950	840	280

Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : 0.2 × D



R.P.M = rev./min, Feed = mm/min

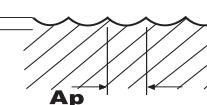
115120, 115320



HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
HARDNESS	~HRC45		HRC45 ~ HRC65	
STRENGTH	~1500N/mm ²		1500N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED
1	25000	980	25000	600
1.5	23000	1050	23000	640
2	21000	1110	21000	700
3	21000	1500	17000	780
4	21000	2210	13660	870
5	21000	2700	12000	900
6	21000	3470	10500	940
8	15760	4260	7880	1110
10	13660	4580	6300	1260
12	10500	3950	5260	1260
16	8200	3950	3780	1060
20	6300	3780	2940	790

Ae : D1 ~ D6 =0.2mm
D8 ~ D20=0.3mm
Ap : 0.05 × D



R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

6 & 8 FLUTE, 45° HELIX, LONG, SIDE CUTTING

149120, 149320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1750N/mm ²		1750 ~ 2080N/mm ²		2080N/mm ²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	5560	2000	3880	1370	1580	210	1100	130
8	4200	2000	2940	1370	1160	210	840	130
10	3360	2000	2320	1370	1000	210	680	130
12	2840	1680	2000	1160	840	180	560	110
16	2100	1260	1480	880	640	130	420	70
20	1680	1010	1160	690	500	110	320	60
25	1500	900	1100	600	430	90	260	50

R.P.M = rev./min, Feed = mm/min

149120, 149320



HIGH SPEED CUTTING

MATERIAL	HEAT RESISTANT STEELS HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~1750N/mm ²		1750 ~ 2080N/mm ²		2080N/mm ²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
6	16800	6090	8400	3050	4200	1470
8	12600	6090	6300	3050	3160	1470
10	9980	5990	5040	3050	2520	1470
12	8400	5040	4200	2520	2100	1260
16	6300	3780	3160	1890	1580	950
20	5040	3050	2520	1470	1260	760
25	4500	2700	2200	1300	1120	670

R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

6 FLUTE, 45° HELIX, EXTRA LONG, SIDE CUTTING

150120, 150320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc40		HRc40 ~ HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~1250N/mm ²		1250 ~ 1750N/mm ²		1750 ~ 2080N/mm ²		2080N/mm ²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2230	470	1670	350	1390	250	1110	200
8	1670	450	1250	330	1050	240	840	180
10	1330	440	1000	300	840	230	680	160
12	1110	400	840	270	690	210	560	150
16	840	330	630	230	530	170	420	130
20	670	280	500	200	420	150	320	120
25	540	240	400	170	340	130	270	95

R.P.M = rev./min, Feed = mm/min

6 FLUTE, 45° HELIX, CORNER RADIUS, SIDE CUTTING

158120, 158320



HIGH SPEED CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~1750N/mm ²		1750 ~ 2080N/mm ²		2080N/mm ²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
6	16800	6090	8400	3050	4200	1470
8	12600	6090	6300	3050	3150	1470
10	9980	5990	5040	3050	2520	1470
12	8400	5040	4200	2520	2100	1260
16	6300	3780	3150	1890	1580	950
20	5040	3050	2520	1470	1260	760

R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

MULTI. FLUTE, ROUGHING, SIDE CUTTING

148120, 148320, 147120, 147320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
	~HRc30		HRc30 ~ HRc38		HRc38 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~1000N/mm ²		1000 ~ 1200N/mm ²		1200 ~ 1400N/mm ²		1400 ~ 2000N/mm ²		2000N/mm ² ~	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	15600	2320	12400	840	8400	570	3400	260	2400	190
8	11600	2320	9200	840	6300	570	2400	240	1800	180
10	9200	2320	7600	840	5100	570	2000	290	1300	190
12	8000	2400	6000	800	4200	570	1680	260	1200	190
14	6800	2400	5200	840	3600	570	1400	200	900	130
16	6000	2400	4800	760	3300	510	1200	160	800	110
18	5200	2320	4400	720	2700	420	1100	150	700	100
20	4800	2160	3600	560	2400	360	1000	150	660	100
25	4300	2150	3200	620	2160	410	900	160	600	100

1.5D
0.3D

1.0D
0.05D

R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

2 FLUTE, MINIATURE BALL NOSE

105320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON		HARDENED STEELS	
	HRc30 ~ HRc45		HRc45 ~ HRc55	
STRENGTH	1000 ~ 1500N/mm ²		1500 ~ 2000N/mm ²	
DIAMETER	RPM	RPM	RPM	RPM
0.6	30000	510	30000	360
0.8	27000	560	27000	330
1	25000	560	25000	340
1.2	24000	570	24000	350
1.5	23000	600	23000	370

D < 1
Ae=0.05 × D
Ap=0.15 × D
D ≥ 1
Ae=0.075 × D
Ap=0.15 × D

D < 1
Ae=0.05 × D
Ap=0.1 × D
D ≥ 1
Ae=0.05 × D
Ap=0.15 × D

R.P.M = rev./min, Feed = mm/min

2FLUTE, MINIATURE, SLOTTING

100320



MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
	HRc30 ~ HRc45		HRc45 ~ HRc55	
STRENGTH	1000 ~ 1500N/mm ²		1500 ~ 2000N/mm ²	
DIAMETER	RPM	RPM	RPM	RPM
0.4	30000	90	23000	50
0.8	24000	150	18000	65
1	20000	160	15000	75
1.2	16000	160	12000	75
1.5	12000	150	9000	70

D < 1
Depth=0.15 × D
D ≥ 1
Depth=0.25 × D

D < 1
Depth=0.02 × D
D ≥ 1
Depth=0.05 × D

R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

2 FLUTE for RIB PROCESSING

107320, 108320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc30			HRc 30 ~ HRc 45			HRc 45 ~ HRc 55		
STRENGTH	~ 1000N/mm ²			1000 ~ 1500N/mm ²			1500 ~ 2000N/mm ²		
DIAMETER	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.4	31000-40000	200-440	0.007-0.018	22500-28000	85-340	0.007-0.018	14300-17000	30-90	0.004-0.008
0.5	31000-40000	200-440	0.009-0.022	22500-28000	85-340	0.009-0.022	14300-17000	30-90	0.004-0.009
0.6	31000-40000	250-570	0.011-0.026	22500-28000	110-430	0.011-0.026	14300-17000	40-110	0.005-0.011
0.7	31000-40000	250-570	0.012-0.031	22500-28000	110-430	0.012-0.031	14300-17000	40-110	0.006-0.013
0.8	27000-35000	280-630	0.014-0.035	19500-24500	120-480	0.014-0.035	12500-14800	45-125	0.007-0.015
0.9	25000-31500	280-720	0.030-0.060	17500-22500	160-540	0.030-0.060	11000-12500	55-130	0.008-0.016
1	22500-28000	280-810	0.045-0.090	15700-20000	190-600	0.045-0.090	10000-12500	65-130	0.009-0.018
1.2	18500-22500	280-900	0.055-0.100	13000-16500	190-600	0.055-0.100	8300-10500	65-130	0.010-0.022
1.4	16000-20000	280-900	0.062-0.125	11500-14000	190-600	0.062-0.125	7200-9000	65-130	0.012-0.025
1.5	14500-18500	280-900	0.070-0.135	10500-13500	190-600	0.070-0.135	6700-8200	65-130	0.014-0.028
1.6	14000-18000	280-900	0.075-0.145	10200-12800	190-600	0.075-0.145	6400-8000	65-130	0.015-0.030
1.8	13000-16500	280-900	0.080-0.160	9200-11500	190-600	0.080-0.160	5700-7200	65-130	0.016-0.032
2	12000-14500	280-900	0.090-0.180	8300-10500	190-600	0.090-0.180	5300-6600	65-130	0.018-0.035
2.5	9500-12000	280-900	0.112-0.235	6700-8500	190-600	0.112-0.235	4300-5300	65-130	0.022-0.045
3	8000-10000	280-900	0.135-0.270	5500-7000	190-600	0.135-0.270	3500-4400	65-130	0.028-0.055
2	6000-7500	280-900	0.180-0.360	4100-5300	190-600	0.180-0.360	2600-3300	65-130	0.036-0.072
5	4800-6000	280-900	0.225-0.450	3300-4200	190-600	0.225-0.450	2100-2600	65-130	0.045-0.090
6	4000-5000	280-900	0.270-0.540	2800-3500	190-600	0.270-0.540	1750-2600	65-130	0.054-0.108

(Depth of Cut per one pass) R.P.M = rev./min, Feed = mm/min

2 FLUTE, BALL NOSE for RIB PROCESSING

143320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc 30			HRc 30 ~ HRc 45			HRc 45 ~ HRc 55		
STRENGTH	~ 1000N/mm ²			1000 ~ 1500N/mm ²			1500 ~ 2000N/mm ²		
DIAMETER	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.4	31000-40000	175-490	0.018-0.036	22500-28500	88-270	0.018-0.036	14300-18000	88-175	0.004-0.007
0.5	31000-40000	175-490	0.023-0.045	22500-28500	88-270	0.023-0.045	14300-18000	88-175	0.005-0.009
0.6	31000-40000	225-630	0.027-0.054	22500-28500	110-350	0.027-0.054	14300-18000	110-225	0.005-0.011
0.8	31000-40000	225-630	0.036-0.072	22500-28500	110-350	0.036-0.072	14300-18000	110-225	0.007-0.014
1	29000-36500	250-700	0.045-0.090	20500-26000	125-390	0.045-0.090	13000-16300	125-250	0.009-0.018
1.2	24000-30500	250-780	0.055-0.100	17000-21500	125-390	0.055-0.100	10800-13700	125-250	0.010-0.022
1.4	21000-26000	250-780	0.062-0.125	15000-18000	125-390	0.062-0.125	9400-11700	125-250	0.012-0.025
1.5	19000-24000	250-780	0.070-0.135	13500-17500	125-390	0.070-0.135	8700-10700	125-250	0.014-0.028
1.6	18000-23500	250-780	0.075-0.145	13200-16500	125-390	0.075-0.145	8300-10400	125-250	0.015-0.030
1.8	17000-21500	250-780	0.080-0.160	12000-15000	125-390	0.080-0.160	7400-9400	125-250	0.016-0.032
2	15500-19000	250-780	0.090-0.180	11000-13500	125-390	0.090-0.180	6900-8600	125-250	0.018-0.035
3	10500-13000	250-780	0.135-0.270	7000-9000	125-390	0.135-0.270	4600-5700	125-250	0.028-0.055
4	8500-11000	250-780	0.180-0.360	5800-7800	125-390	0.180-0.360	3900-4900	125-250	0.035-0.070
5	6800-8800	250-780	0.225-0.450	4600-6200	125-390	0.225-0.450	3100-3900	125-250	0.044-0.088
6	5700-7300	250-780	0.270-0.540	3900-5200	125-390	0.270-0.540	2600-3300	125-250	0.053-0.105

(Depth of Cut per one pass) R.P.M = rev./min, Feed = mm/min

PULSAR cutting condition

4 FLUTE, TAPER for RIB PROCESSING

120320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc 30			HRc 30 ~ HRc 45			HRc 45 ~ HRc 55		
STRENGTH	~ 1000N/mm ²			1000 ~ 1500N/mm ²			1500 ~ 2000N/mm ²		
DIAMETER	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
1	20000	700	0.020-0.040	15000	500	0.020-0.030	10000	300	0.010-0.020
1.2	16000	700	0.025-0.050	13000	500	0.025-0.040	8000	300	0.012-0.025
1.5	13000	700	0.030-0.060	10000	500	0.030-0.050	6500	300	0.015-0.030
2	10000	700	0.040-0.080	8000	500	0.040-0.060	5000	300	0.020-0.040

(Depth of Cut per one pass) R.P.M = rev./min, Feed = mm/min

4 FLUTE, TAPER BALL NOSE for RIB PROCESSING

130320



MATERIAL	NON-ALLOYED STEELS ALLOY STEELS CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc 30			HRc 30 ~ HRc 45			HRc 45 ~ HRc 55		
STRENGTH	~ 1000N/mm ²			1000 ~ 1500N/mm ²			1500 ~ 2000N/mm ²		
DIAMETER	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
1	20000	700	0.020-0.040	15000	500	0.020-0.030	10000	300	0.010-0.020
1.2	16000	700	0.025-0.050	13000	500	0.025-0.040	8000	300	0.012-0.025
1.5	13000	700	0.030-0.060	10000	500	0.030-0.050	6500	300	0.015-0.030
2	10000	700	0.040-0.080	8000	500	0.040-0.060	5000	300	0.020-0.040

(Depth of Cut per one pass) R.P.M = rev./min, Feed = mm/min