

SUPERIOR PERFORMANCE



COARSE PITCH ROUGHING/FINISHING



Truncated knuckle form for use in roughing and finishing operations.

3 to 6 flute depending on diameter.

Premium grade HSSCo8 substrate for increased tool life. TiAlN coating available to order.

Centre cutting up to 20.0mm, can be used for plunging.

IDEAL FOR MATERIAL GROUPS



HSSCo FLATTED SHANK END MILLS



8% Cobalt milling cutters for general use on a variety of materials



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APPLICATION GUIDE

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▶ For material group examples, refer to page 2

▶ For full material group tables, refer to pages 444-449

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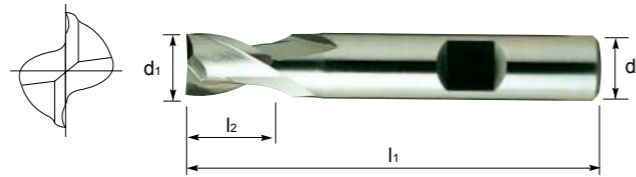
2 FLUTE, SHORT LENGTH



Series No. 100102

▶ cutting conditions : p.374-375

Artikel Nr.: 621 (810PM)



TWO FLUTE END MILLS

Short Length, 2 Flute, Centre Cutting, with Flatted Shank

Mill Dia. e8(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8	
1.0	6.0	2.5	47.0	1001020100	1001210100	
1.5		3.0		1001020150	1001210150	
2.0		4.0		1001020200	1001210200	
2.5		5.0	49.0	1001020250	1001210250	
2.8		5.0		1001020280	1001210280	
3.0		5.0		1001020300	1001210300	
3.5		6.0	50.0	1001020350	1001210350	
3.8		7.0	51.0	1001020380	1001210380	
4.0		7.0		1001020400	1001210400	
4.5		7.0		1001020450	1001210450	
4.8		8.0	52.0	1001020480	1001210480	
5.0		8.0		1001020500	1001210500	
5.5		8.0		1001020550	1001210550	
5.75		8.0	60.0	1001020575	1001210575	
6.0		8.0		1001020600	1001210600	
6.5	10.0	1001020650		1001210650		
6.75	10.0	1001020675		1001210675		
7.0	10.0	1001020700		1001210700		
7.5	10.0	1001020750		1001210750		
7.75	10.0	11.0		61.0	1001020775	1001210775
8.0		11.0			1001020800	1001210800
8.5		11.0			1001020850	1001210850
8.7		11.0			1001020870	1001210870
9.0		11.0			1001020900	1001210900
9.5		11.0			1001020950	1001210950
10.0	12.0	13.0		63.0	1001021000	1001211000
11.0		13.0		70.0	1001021100	1001211100

▶ TiAIN Coating to Order

Tolerances according to 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	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

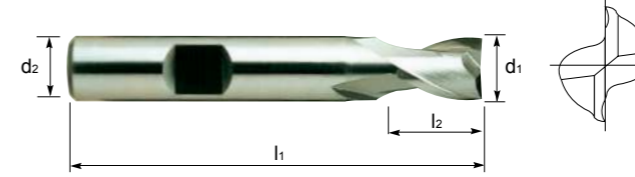
2 FLUTE, SHORT LENGTH



Series No. 100102

▶ cutting conditions : p.374-375

Artikel Nr.: 621 (810PM)



TWO FLUTE END MILLS

Short Length, 2 Flute, Centre Cutting, with Flatted Shank

Mill Dia. e8(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
8.0	8.0	11.0	55.0	1001029002	1001219002
12.0	12.0	16.0	73.0	1001021200	1001211200
13.0		16.0		1001021300	1001211300
14.0		16.0		1001021400	1001211400
15.0		16.0		1001021500	1001211500
15.7	16.0	19.0	79.0	1001021570	1001211570
16.0		19.0		1001021600	1001211600
17.0		19.0		1001021700	1001211700
17.7		19.0		1001021770	1001211770
18.0		19.0		1001021800	1001211800
19.0		19.0		1001021900	1001211900
20.0	20.0	22.0	88.0	1001022000	1001212000
22.0		22.0		1001022200	1001212200
24.0	25.0	26.0	102.0	1001022400	1001212400
25.0		26.0		1001022500	1001212500
26.0		26.0		1001022600	1001212600
28.0		26.0		1001022800	1001212800
30.0		26.0		1001023000	1001213000
32.0		32.0		32.0	112.0

▶ TiAIN Coating to Order

Tolerances according to 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	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

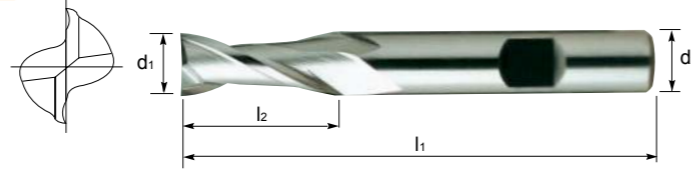
2 FLUTE, LONG LENGTH



Series No. 101102

▶ cutting conditions : p.374-375

Artikel Nr.: 622 (811PM)



TWO FLUTE END MILLS

Long Length, 2 Flute, Centre Cutting, with Flatted Shank

Mill Dia. e8(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
2.0	6.0	7.0	51.0	1011020200	1011210200
3.0		8.0	52.0	1011020300	1011210300
4.0		11.0	55.0	1011020400	1011210400
5.0		13.0	57.0	1011020500	1011210500
6.0		13.0		1011020600	1011210600
7.0	10.0	16.0	66.0	1011020700	1011210700
8.0		19.0	69.0	1011020800	1011210800
10.0		22.0	72.0	1011021000	1011211000
12.0	12.0	26.0	83.0	1011021200	1011211200
14.0		26.0		1011021400	1011211400
16.0	16.0	32.0	92.0	1011021600	1011211600
18.0		32.0		1011021800	1011211800
20.0	20.0	38.0	104.0	1011022000	1011212000
22.0		38.0		1011022200	1011212200
25.0		45.0		121.0	1011022500

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16

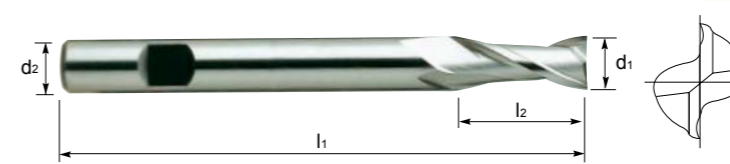
2 FLUTE, EXTRA LONG LENGTH



Series No. 102102

▶ cutting conditions : p.374-375

Artikel Nr.: 623 (812PM)



TWO FLUTE END MILLS

Extra Long Length, 2 Flute, Centre Cutting, with Flatted Shank

Mill Dia. e8(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
3.0	6.0	8.0	56.0	1021020300	1021210300
3.5		10.0	59.0	1021020350	1021210350
4.0		11.0	63.0	1021020400	1021210400
4.5		11.0		1021020450	1021210450
5.0		13.0	68.0	1021020500	1021210500
5.5	13.0	1021020550		1021210550	
6.0	13.0	1021020600		1021210600	
6.5	10.0	16.0	80.0	1021020650	1021210650
7.0		16.0		1021020700	1021210700
8.0		19.0	88.0	1021020800	1021210800
8.5		19.0		1021020850	1021210850
9.0		19.0		1021020900	1021210900
10.0	12.0	22.0	95.0	1021021000	1021211000
12.0		26.0	110.0	1021021200	1021211200
14.0		26.0		1021021400	1021211400
16.0		32.0	123.0	1021021600	1021211600
18.0		32.0		1021021800	1021211800
20.0	20.0	38.0	141.0	1021022000	1021212000
22.0		38.0		1021022200	1021212200
25.0		45.0		166.0	1021022500

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16

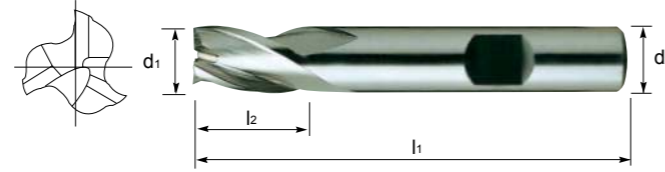
3 FLUTE, STUB LENGTH



Series No. 103102

▶ cutting conditions : p.376-379

Artikel Nr.: 631 (820PM)



THREE FLUTE END MILLS

Stub Length, 3 Flute, Centre Cutting, with Flatted Shank

Mill Dia. e8(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
2.0	6.0	4.0	48.0	1031020200	1031210200
3.0		5.0	49.0	1031020300	1031210300
4.0		7.0	51.0	1031020400	1031210400
5.0		8.0	52.0	1031020500	1031210500
6.0		8.0		1031020600	1031210600
7.0	10.0	10.0	60.0	1031020700	1031210700
8.0		11.0	61.0	1031020800	1031210800
10.0		13.0	63.0	1031021000	1031211000
12.0	12.0	16.0	73.0	1031021200	1031211200
14.0		16.0		1031021400	1031211400
16.0	16.0	19.0	79.0	1031021600	1031211600
18.0		19.0		1031021800	1031211800
20.0	20.0	22.0	88.0	1031022000	1031212000
22.0		22.0		1031022200	1031212200
25.0		26.0		1031022500	1031212500

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16

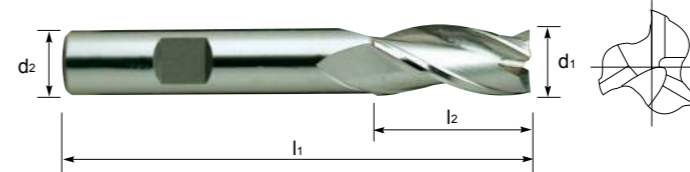
3 FLUTE, SHORT LENGTH



Series No. 104102

▶ cutting conditions : p.376-379

Artikel Nr.: 632 (821PM)



THREE FLUTE END MILLS

Short Length, 3 Flute, Centre Cutting, with Flatted Shank

Mill Dia. e8(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
1.5	6.0	7.0	51.0	1041020150	1041210150
2.0		7.0		1041020200	1041210200
2.5		8.0	52.0	1041020250	1041210250
3.0		8.0		1041020300	1041210300
3.5		10.0	54.0	1041020350	1041210350
4.0	10.0	11.0	55.0	1041020400	1041210400
4.5		11.0		1041020450	1041210450
5.0		13.0	57.0	1041020500	1041210500
5.5		13.0		1041020550	1041210550
6.0		13.0		1041020600	1041210600
6.5	16.0	16.0	66.0	1041020650	1041210650
7.0		16.0		1041020700	1041210700
7.5		16.0	69.0	1041020750	1041210750
8.0		19.0		1041020800	1041210800
8.5		19.0		1041020850	1041210850
9.0	20.0	19.0	72.0	1041020900	1041210900
10.0		22.0		1041021000	1041211000
12.0		26.0	83.0	1041021200	1041211200
14.0		26.0		1041021400	1041211400
16.0		16.0	32.0	92.0	1041021600
18.0	32.0		1041021800		1041211800
20.0	20.0	38.0	104.0	1041022000	1041212000
22.0		38.0		1041022200	1041212200
25.0		45.0	121.0	1041022500	1041212500
28.0	45.0	1041022800		1041212800	
30.0	45.0	1041023000		1041213000	

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16

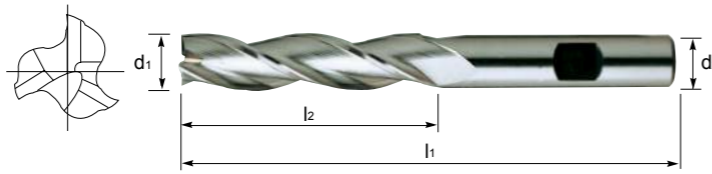
3 FLUTE, LONG LENGTH



Series No. 105102

▶ cutting conditions : p.376-379

Artikel Nr.: 633 (822PM)



THREE FLUTE END MILLS

Long Length, 3 Flute, Centre Cutting, with Flatted Shank

Mill Dia. e8(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
3.0	6.0	12.0	56.0	1051020300	1051210300
4.0		19.0	63.0	1051020400	1051210400
5.0		24.0	68.0	1051020500	1051210500
6.0		24.0		1051020600	1051210600
7.0	10.0	30.0	80.0	1051020700	1051210700
8.0		38.0	88.0	1051020800	1051210800
9.0		38.0		1051020900	1051210900
10.0		45.0	95.0	1051021000	1051211000
12.0	12.0	53.0	110.0	1051021200	1051211200
14.0		53.0		1051021400	1051211400
16.0	16.0	63.0	123.0	1051021600	1051211600
18.0		63.0		1051021800	1051211800
20.0	20.0	75.0	141.0	1051022000	1051212000
22.0		75.0		1051022200	1051212200
25.0		90.0	166.0	1051022500	1051212500

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
e8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89
h6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16

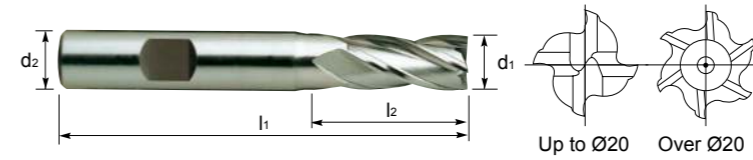
4&6 FLUTE, SHORT LENGTH



Series No. 107102

▶ cutting conditions : p.380-381

Artikel Nr.: 611 (801PM)



MULTI FLUTE END MILLS

Short Length, 4 & 6 Flute, with Flatted Shank

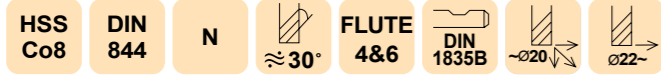
Mill Dia. d ₁	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAIN HSS Co8	
2.0	6.0	7.0	51.0	4	1071020200	1071210200	
2.5		8.0	52.0	4	1071020250	1071210250	
3.0		8.0		4	1071020300	1071210300	
3.5		10.0	10.0	54.0	4	1071020350	1071210350
4.0		10.0	11.0	55.0	4	1071020400	1071210400
5.0			13.0	57.0	4	1071020500	1071210500
6.0	13.0		4		1071020600	1071210600	
7.0	10.0		16.0	66.0	4	1071020700	1071210700
8.0		19.0	69.0	4	1071020800	1071210800	
9.0		19.0		4	1071020900	1071210900	
10.0	12.0	22.0	72.0	4	1071021000	1071211000	
11.0		22.0	79.0	4	1071021100	1071211100	
12.0		26.0	83.0	4	1071021200	1071211200	
13.0		26.0		4	1071021300	1071211300	
14.0	16.0	26.0	92.0	4	1071021400	1071211400	
16.0		32.0		4	1071021600	1071211600	
18.0		32.0	4	1071021800	1071211800		
20.0		20.0	38.0	104.0	4	1071022000	1071212000
22.0	38.0		6		1071022200	1071212200	
25.0	25.0		45.0	121.0	6	1071022500	1071212500
28.0		45.0	6		1071022800	1071212800	
30.0		45.0	6	1071023000	1071213000		
32.0		32.0	53.0	133.0	6	1071023200	1071213200

▶ TiAIN Coating to Order

TOLERANCE

MILL DIA.	+0.040 -0
SHANK DIA.	h6

4&6 FLUTE, LONG LENGTH



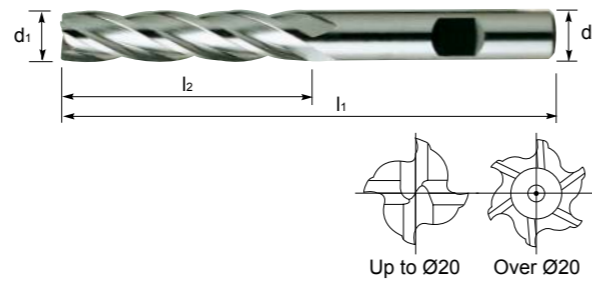
Series No. 108102

▶ cutting conditions : p.380-381

Artikel Nr.: 612 (802PM)

MULTI FLUTE END MILLS

Long Length, 4 & 6 Flute, with Flatted Shank



Mill Dia. d ₁	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAIN HSS Co8
3.0	6.0	12.0	56.0	4	1081020300	1081210300
3.5		15.0	59.0	4	1081020350	1081210350
4.0		19.0	63.0	4	1081020400	1081210400
4.5		19.0		4	1081020450	1081210450
5.0		24.0	68.0	4	1081020500	1081210500
6.0	24.0	4		1081020600	1081210600	
7.0	10.0	30.0	80.0	4	1081020700	1081210700
8.0		38.0	88.0	4	1081020800	1081210800
9.0		38.0		4	1081020900	1081210900
10.0		45.0	95.0	4	1081021000	1081211000
11.0	12.0	45.0	102.0	4	1081021100	1081211100
12.0		53.0	110.0	4	1081021200	1081211200
14.0		53.0		4	1081021400	1081211400
16.0	16.0	63.0	123.0	4	1081021600	1081211600
18.0		63.0		4	1081021800	1081211800
20.0	20.0	75.0	141.0	4	1081022000	1081212000
22.0		75.0		6	1081022200	1081212200
24.0	25.0	90.0	166.0	6	1081022400	1081212400
25.0		90.0		6	1081022500	1081212500

TOLERANCE		
MILL DIA.	Ø2.0~Ø6.0	+0.040 -0
	Ø6.5~	+0.050 -0
SHANK DIA.	h6	

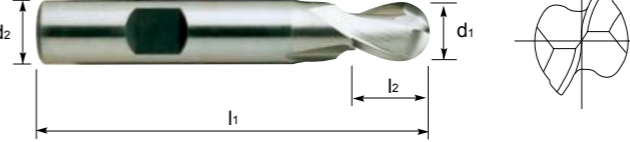
2 FLUTE, SHORT LENGTH, BALL NOSE



Series No. 112102

▶ cutting conditions : p.370

Artikel Nr.: 641 (814PM)



R : ±0.02mm

BALL END MILLS

Short Length, 2 Flute, Ball End, with Flatted Shank

Mill Dia. d ₁	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
3.0	6.0	5.0	49.0	1121020300	1121210300
3.5		6.0	50.0	1121020350	1121210350
4.0		7.0	51.0	1121020400	1121210400
4.5		7.0		1121020450	1121210450
5.0		8.0	52.0	1121020500	1121210500
5.5	8.0	1121020550		1121210550	
6.0	8.0	1121020600		1121210600	
7.0	10.0	10.0	60.0	1121020700	1121210700
8.0		11.0	61.0	1121020800	1121210800
9.0		11.0		1121020900	1121210900
10.0		13.0	63.0	1121021000	1121211000
12.0	12.0	16.0	73.0	1121021200	1121211200
13.0		16.0		1121021300	1121211300
14.0		16.0		1121021400	1121211400
15.0		16.0		1121021500	1121211500
16.0	16.0	19.0	79.0	1121021600	1121211600
17.0		19.0		1121021700	1121211700
18.0		19.0		1121021800	1121211800
19.0		19.0		1121021900	1121211900
20.0		22.0		88.0	1121022000
22.0	22.0	1121022200	1121212200		
24.0	25.0	26.0	102.0	1121022400	1121212400
25.0		26.0		1121022500	1121212500

▶ TiAIN Coating to Order

TOLERANCE	
MILL DIA.	+0 -0.030
SHANK DIA.	h6

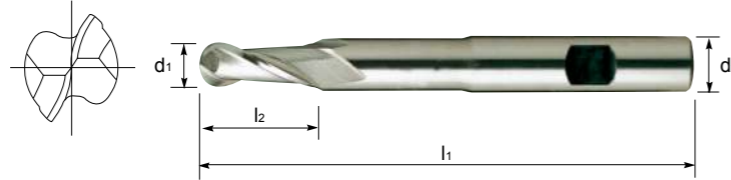
2 FLUTE, LONG LENGTH, BALL NOSE



Series No. 114102

▶ cutting conditions : p.370

Artikel Nr.: 642 (827PM)



R : ±0.02mm

BALL END MILLS

Extra Long Length, 2 Flute, Ball End, with Flatted Shank

Mill Dia. d ₁	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
3.0	6.0	8.0	56.0	1141020300	1141210300
4.0		11.0	63.0	1141020400	1141210400
5.0		13.0	68.0	1141020500	1141210500
6.0		13.0		1141020600	1141210600
8.0	10.0	19.0	88.0	1141020800	1141210800
10.0		22.0	95.0	1141021000	1141211000
12.0	12.0	26.0	110.0	1141021200	1141211200
13.0		26.0		1141021300	1141211300
14.0		26.0		1141021400	1141211400
15.0		26.0		1141021500	1141211500
16.0	16.0	32.0	123.0	1141021600	1141211600
18.0		32.0		1141021800	1141211800
20.0	20.0	38.0	141.0	1141022000	1141212000
22.0		38.0		1141022200	1141212200
25.0	25.0	45.0	166.0	1141022500	1141212500

▶ TiAIN Coating to Order

TOLERANCE	
MILL DIA.	+0 -0.030
SHANK DIA.	h6

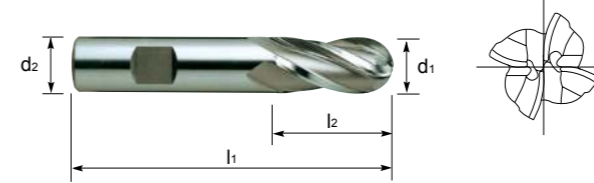
4&6 FLUTE, SHORT LENGTH, BALL NOSE



Series No. 115102

▶ cutting conditions : p.371

Artikel Nr.: 308



R : ±0.02mm

BALL END MILLS

Short Length, Multi Flute, Ball End, with Flatted Shank

Mill Dia. d ₁	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAIN HSS Co8
6.0	6.0	13.0	57.0	4	1151020600	1151210600
8.0	10.0	19.0	69.0	4	1151020800	1151210800
10.0		22.0	72.0	4	1151021000	1151211000
12.0	12.0	26.0	83.0	4	1151021200	1151211200
16.0	16.0	32.0	92.0	4	1151021600	1151211600
20.0	20.0	38.0	104.0	4	1151022000	1151212000
25.0	25.0	45.0	121.0	6	1151022500	1151212500

▶ TiAIN Coating to Order

TOLERANCE	
MILL DIA.	+0 -0.030
SHANK DIA.	h6

4&6 FLUTE, LONG LENGTH, BALL NOSE

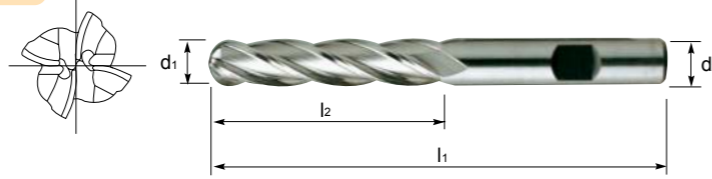


HSS Co8
DIN 1889
N
30°
FLUTE 4&6
DIN 1835B

Series No. 116102

▶ cutting conditions : p.371

Artikel Nr.: 309



R : ±0.02mm

BALL END MILLS

Long Length, Multi Flute, Ball End, with Flatted Shank

Mill Dia. d ₁	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAIN HSS Co8
10.0	10.0	45.0	95.0	4	1161021000	1161211000
12.0	12.0	53.0	110.0	4	1161021200	1161211200
16.0	16.0	63.0	123.0	4	1161021600	1161211600
20.0	20.0	75.0	141.0	4	1161022000	1161212000
25.0	25.0	90.0	166.0	6	1161022500	1161212500

▶ TiAIN Coating to Order

TOLERANCE	
MILL DIA.	+0 -0.030
SHANK DIA.	h6

MULTI FLUTE, SHORT LENGTH, 50° HELIX

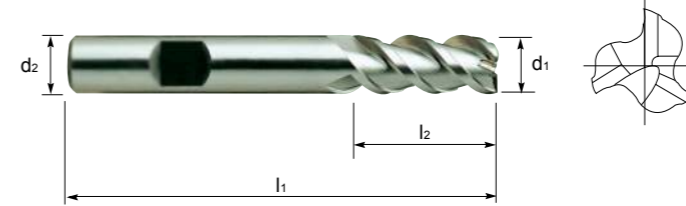


HSS Co8
DIN 844
N
50°
FLUTE 2-4
DIN 1835B

Series No. 132102

▶ cutting conditions : p.372

Artikel Nr.: 634



END MILLS HIGH HELIX

Multi-Flute, High Helical 50°, Centre Cutting, with Flatted Shank

Mill Dia. d ₁	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAIN HSS Co8
2.0	6.0	7.0	51.0	2	1321020200	1321210200
3.0		8.0	52.0	2	1321020300	1321210300
4.0		11.0	55.0	2	1321020400	1321210400
5.0		13.0	57.0	2	1321020500	1321210500
6.0		13.0		3	1321020600	1321210600
7.0	10.0	16.0	66.0	3	1321020700	1321210700
8.0		19.0	69.0	3	1321020800	1321210800
9.0		19.0		3	1321020900	1321210900
10.0	12.0	22.0	72.0	3	1321021000	1321211000
12.0		26.0	83.0	3	1321021200	1321211200
14.0		26.0		3	1321021400	1321211400
15.0		26.0		3	1321021500	1321211500
16.0	16.0	32.0	92.0	3	1321021600	1321211600
18.0		32.0		3	1321021800	1321211800
20.0	20.0	38.0	104.0	3	1321022000	1321212000
25.0	25.0	45.0	121.0	4	1321022500	1321212500
30.0		45.0		4	1321023000	1321213000

▶ TiAIN Coating to Order

TOLERANCE		
MILL DIA.	Ø2.0~Ø6.0	+0.040 -0
	Ø4.0~Ø6.0	+0.048 -0
	Ø7.0~Ø10.0	+0.058 -0
	Ø10.5~Ø18.0	+0.070 -0
	Ø18.5~Ø30.0	+0.084 -0
SHANK DIA.	h6	

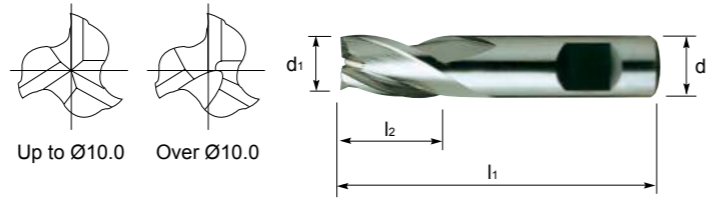
3 FLUTE, SHORT LENGTH, THROW AWAY, DIN STD



Series No. 128102

▶ cutting conditions : p.376-379

Artikel Nr.: 1331D (824M)



THREE FLUTE THROW AWAY END MILLS

Short Length, 3 Flute, Centre Cutting, with Flatted Shank

Mill Dia. e8(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
1.0	6.0	2.0	34.0	1281020100	1281210100
1.5		3.0		1281020150	1281210150
1.8		3.0		1281020180	1281210180
2.0		4.0	35.0	1281020200	1281210200
2.3		4.0		1281020230	1281210230
2.5		5.0	36.0	1281020250	1281210250
2.8		5.0		1281020280	1281210280
3.0		5.0	37.0	1281020300	1281210300
3.3		6.0		1281020330	1281210330
3.5		6.0	38.0	1281020350	1281210350
3.8		7.0		1281020380	1281210380
4.0		7.0	39.0	1281020400	1281210400
4.3		7.0		1281020430	1281210430
4.5		7.0	42.0	1281020450	1281210450
4.8		8.0		1281020480	1281210480
5.0		8.0	43.0	1281020500	1281210500
5.5	8.0	1281020550		1281210550	
5.75	8.0	48.0	1281020575	1281210575	
6.0	8.0		1281020600	1281210600	
6.5	8.0	10.0	42.0	1281020650	1281210650
7.0		10.0		1281020700	1281210700
7.5		10.0	43.0	1281020750	1281210750
8.0		11.0		1281020800	1281210800
8.5	11.0	48.0	1281020850	1281210850	
9.0	11.0		1281020900	1281210900	
9.5	10.0	11.0	50.0	1281020950	1281210950
10.0		13.0		1281021000	1281211000
12.0		12.0	16.0	58.0	1281021200
16.0	16.0	19.0	64.0	1281021600	1281211600
20.0	20.0	22.0	78.0	1281022000	1281212000

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
e8	— 14
	— 28
h6	0
	— 6

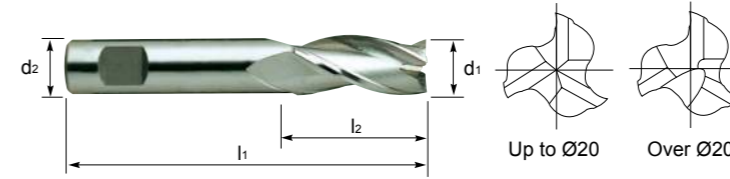
3 FLUTE, LONG LENGTH, THROW AWAY, DIN STD



Series No. 129102

▶ cutting conditions : p.376-379

Artikel Nr.: 1332D (824L)



THREE FLUTE THROW AWAY END MILLS

Long Length, 3 Flute, Centre Cutting, with Flatted Shank

Mill Dia. e8(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
1.5	6.0	4.0	35.0	1291020150	1291210150
2.0		7.0	38.0	1291020200	1291210200
2.5		8.0	39.0	1291020250	1291210250
3.0		8.0		1291020300	1291210300
3.5		10.0	41.0	1291020350	1291210350
4.0		11.0	42.0	1291020400	1291210400
4.5		11.0		1291020450	1291210450
5.0		13.0	44.0	1291020500	1291210500
5.5		13.0		1291020550	1291210550
6.0		13.0	48.0	1291020600	1291210600
6.5		16.0		1291020650	1291210650
7.0		16.0	51.0	1291020700	1291210700
7.5		16.0		1291020750	1291210750
8.0		19.0	56.0	1291020800	1291210800
8.5		19.0	59.0	1291020850	1291210850
9.0		19.0		1291020900	1291210900
10.0	22.0	59.0	1291021000	1291211000	

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

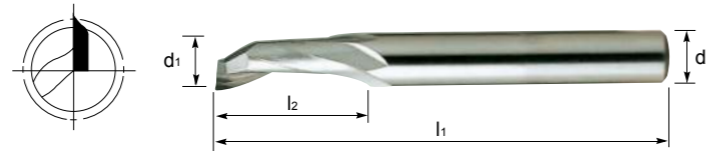
Toleranzwerte in µm / Tolerance range in µm	
Nennmaßbereich in mm / Nominal-Diameter in mm	
	von 1 bis 3 from 1 to 3
e8	— 14
	— 28
h6	0
	— 6

ALUMINIUM ROUTER



Series No. 135316

▶ cutting conditions : p.372



ONE FLUTE END MILLS

Short Length, 1 Flute, with Plain Shank for Aluminium Machining

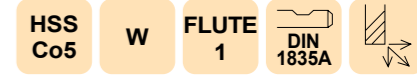
Mill Dia. js14(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co5	TiAIN HSS Co5
3.0	8.0	12.0	60.0	1353160300	1353270300
4.0		12.0		1353160400	1353270400
5.0		14.0		1353160500	1353270500
6.0		14.0		1353160600	1353270600
8.0		14.0		1353160800	1353270800
10.0		14.0		1353161000	1353271000

▶ TiAIN Coating to Order

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

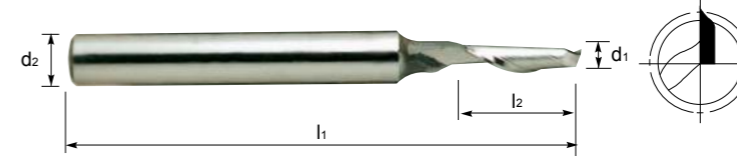
Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal-Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js14	± 125	± 150	± 180	± 215	± 260	± 310
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

ALUMINIUM ROUTER



Series No. 136316

▶ cutting conditions : p.372



ONE FLUTE END MILLS

Short Length, 1 Flute, with Plain Shank for Aluminium Machining

Mill Dia. js14(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co5	TiAIN HSS Co5
5.0	8.0	18.0	80.0	1363160500	1363270500
5.0		40.0	100.0	1363169001	1363279001
8.0		14.0	120.0	1363160800	1363270800
8.0		14.0	120.0	1363160800	1363270800

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
js14	± 125	± 150	± 180	± 215	± 260	± 310
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

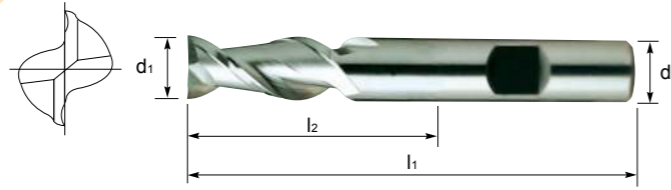
2 FLUTE, SHORT LENGTH, 42° HELIX for ALUMINIUM



Series No. 131102

▶ cutting conditions : p.373

Artikel Nr.: 625



END MILLS FOR ALUMINIUM

Short Length, 2 Flute, Helix 42°, Centre Cutting, with Flatted Shank

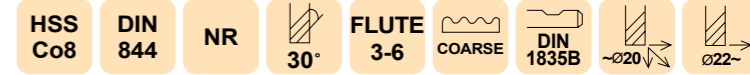
Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	HSS Co8	TiAIN HSS Co8
2.0	6.0	7.0	51.0	1311020200	1311210200
2.5		8.0	52.0	1311020250	1311210250
3.0		8.0		1311020300	1311210300
3.5		10.0	54.0	1311020350	1311210350
4.0		11.0	55.0	1311020400	1311210400
4.5		11.0		1311020450	1311210450
5.0		13.0	57.0	1311020500	1311210500
5.5		13.0		1311020550	1311210550
6.0		13.0		1311020600	1311210600
6.5		16.0		66.0	1311020650
7.0	16.0	1311020700	1311210700		
7.5	16.0	1311020750	1311210750		
8.0	10.0	19.0	1311020800		1311210800
8.5		19.0	1311020850		1311210850
9.0		19.0	1311020900	1311210900	
10.0	12.0	22.0	72.0	1311021000	1311211000
11.0		22.0	79.0	1311021100	1311211100
12.0		26.0	83.0	1311021200	1311211200
13.0		26.0		1311021300	1311211300
14.0		26.0		1311021400	1311211400
15.0		26.0		1311021500	1311211500
16.0	16.0	32.0	92.0	1311021600	1311211600
17.0		32.0		1311021700	1311211700
18.0		32.0		1311021800	1311211800
19.0		32.0		1311021900	1311211900
20.0	20.0	38.0	104.0	1311022000	1311212000
21.0		38.0		1311022100	1311212100
22.0		38.0		1311022200	1311212200
23.0		38.0		1311022300	1311212300
24.0	25.0	45.0	121.0	1311022400	1311212400
25.0		45.0		1311022500	1311212500

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

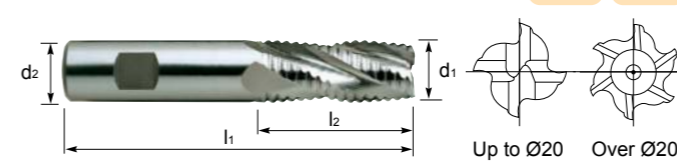
MULTI FLUTE, SHORT LENGTH, COARSE PITCH ROUGHING



Series No. 118102

▶ cutting conditions : p.382-383

Artikel Nr.: 521 (876M..G)



ROUGHING END MILLS

Short Length, Multi-Flute, Coarse Pitch, Round Profile, with Flatted Shank

Mill Dia. js12(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	No. of Flute	HSS Co8	TiAIN HSS Co8	
6.0	6.0	13.0	57.0	3	1181020600	1181210600	
7.0	10.0	16.0	66.0	3	1181020700	1181210700	
8.0		19.0	69.0	3	1181020800	1181210800	
9.0		19.0		3	1181020900	1181210900	
10.0	12.0	22.0	72.0	4	1181021000	1181211000	
11.0		22.0	79.0	4	1181021100	1181211100	
12.0		26.0	83.0	4	1181021200	1181211200	
13.0		26.0		4	1181021300	1181211300	
14.0		26.0		4	1181021400	1181211400	
15.0	16.0	26.0	92.0	4	1181021500	1181211500	
16.0		32.0		4	1181021600	1181211600	
17.0		32.0		4	1181021700	1181211700	
18.0		32.0		4	1181021800	1181211800	
19.0	20.0	32.0	98.0	4	1181021900	1181211900	
20.0		38.0		4	1181029001	1181219001	
20.0		38.0		104.0	4	1181022000	1181212000
22.0		38.0		5	1181022200	1181212200	
22.0		38.0		114.0	5	1181029002	1181219002
24.0	25.0	45.0	121.0	5	1181022400	1181212400	
25.0		45.0		5	1181022500	1181212500	
26.0		45.0		6	1181022600	1181212600	
28.0		45.0		6	1181022800	1181212800	
30.0	32.0	45.0	133.0	6	1181023000	1181213000	
32.0		53.0		6	1181023200	1181213200	
35.0		53.0		6	1181023500	1181213500	
36.0	40.0	53.0	155.0	6	1181023600	1181213600	
38.0		63.0		6	1181023800	1181213800	
38.0		63.0		6	1181029003	1181219003	
40.0		63.0		6	1181024000	1181214000	
40.0	40.0	63.0	177.0	6	1181029004	1181219004	
50.0	50.0	75.0		6	1181025000	1181215000	

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

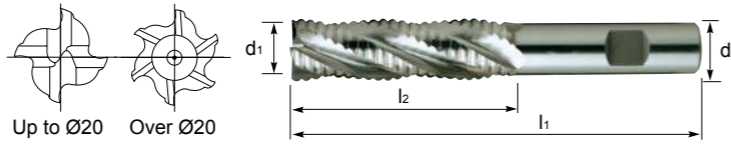
MULTI FLUTE, LONG LENGTH, COARSE PITCH ROUGHING



Series No. 119102

▶ cutting conditions : p.382-383

Artikel Nr.: 522 (876L..G)



Up to Ø20 Over Ø20

ROUGHING END MILLS

Long Length, Multi-Flute, Coarse Pitch, Round Profile, with Flatted Shank

Mill Dia. d ₁	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No.of Flute	HSS Co8	TiAIN HSS Co8
6.0	6.0	24.0	68.0	3	1191020600	1191210600
7.0	10.0	30.0	80.0	3	1191020700	1191210700
8.0		38.0	88.0	3	1191020800	1191210800
9.0		38.0		3	1191020900	1191210900
10.0	12.0	45.0	95.0	4	1191021000	1191211000
11.0		45.0	102.0	4	1191021100	1191211100
12.0		53.0	110.0	4	1191021200	1191211200
13.0		53.0		4	1191021300	1191211300
14.0	53.0	4		1191021400	1191211400	
15.0	16.0	53.0	123.0	4	1191021500	1191211500
16.0		63.0		4	1191021600	1191211600
17.0		63.0		4	1191021700	1191211700
18.0		63.0		4	1191021800	1191211800
19.0		63.0		4	1191021900	1191211900
20.0	20.0	75.0	135.0	4	1191029001	1191219001
20.0		75.0	141.0	4	1191022000	1191212000
22.0	25.0	75.0	166.0	5	1191022200	1191212200
22.0		75.0		5	1191029002	1191219002
24.0		90.0		5	1191022400	1191212400
25.0		90.0		5	1191022500	1191212500
26.0		90.0		6	1191022600	1191212600
28.0		90.0		6	1191022800	1191212800
30.0		90.0		6	1191023000	1191213000
32.0	32.0	106.0	186.0	6	1191023200	1191213200
35.0		106.0		6	1191023500	1191213500
36.0		106.0		6	1191023600	1191213600
38.0		125.0		6	1191023800	1191213800
38.0	40.0	125.0	217.0	6	1191029003	1191219003
40.0	32.0	125.0		6	1191024000	1191214000
40.0	40.0	125.0		6	1191029004	1191219004
40.0	40.0	125.0		6	1191029004	1191219004

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

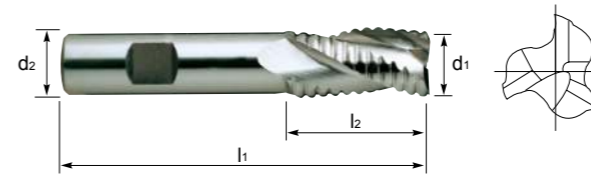
3 FLUTE, SHORT LENGTH, COARSE PITCH ROUGHING



Series No. 133102

▶ cutting conditions : p.382-383

Artikel Nr.: 5213 (804M..G)



ROUGHING END MILLS

Short Length, 3 Flute, Coarse Pitch, Round Profile, with Flatted Shank

Mill Dia. js12(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
10.0	10.0	22.0	72.0	1331021000	1331211000
12.0	12.0	26.0	83.0	1331021200	1331211200
14.0		26.0		1331021400	1331211400
16.0	16.0	32.0	92.0	1331021600	1331211600
18.0		32.0		1331021800	1331211800
20.0	20.0	38.0	104.0	1331022000	1331212000
22.0		38.0		1331022200	1331212200
25.0	25.0	45.0	121.0	1331022500	1331212500
28.0		45.0		1331022800	1331212800
30.0		45.0		1331023000	1331213000
32.0	32.0	53.0	133.0	1331023200	1331213200
36.0		53.0		1331023600	1331213600
40.0		63.0		155.0	1331024000

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

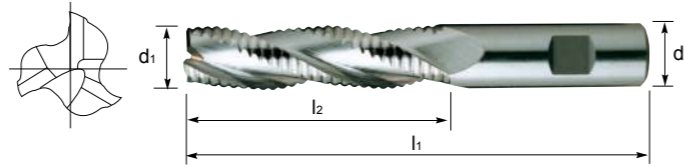
3 FLUTE, LONG LENGTH, COARSE PITCH ROUGHING



Series No. 134102

▶ cutting conditions : p.382-383

Artikel Nr.: 5217 (814M..G)



ROUGHING END MILLS

Long Length, 3 Flute, Coarse Pitch, Round Profile, with Flatted Shank

Mill Dia. js12(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
10.0	10.0	45.0	95.0	1341021000	1341021000
12.0	12.0	53.0	110.0	1341021200	1341021200
14.0		53.0		1341021400	1341021400
16.0	16.0	63.0	123.0	1341021600	1341021600
18.0		63.0		1341021800	1341021800
20.0	20.0	75.0	141.0	1341022000	1341022000
22.0		75.0		1341022200	1341022200
25.0	25.0	90.0	166.0	1341022500	1341022500
28.0		90.0		1341022800	1341022800
30.0		90.0		1341023000	1341023000
36.0	32.0	106.0	186.0	1341023600	1341023600
40.0		125.0		1341024000	1341024000

▶ TiAIN Coating to Order

Tolerances according to 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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

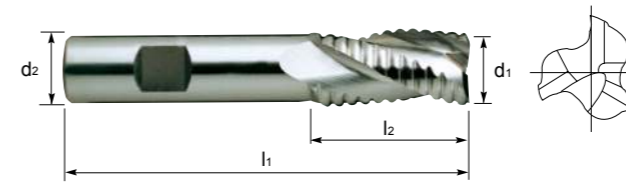
3 FLUTE, SHORT LENGTH, 37° HELIX, COARSE PITCH



Series No. 124102

▶ cutting conditions : p.382-383

Artikel Nr.: 5215 (876A..G)



ROUGHING END MILLS FOR ALUMINIUM

Short Length, 3 Flute, Coarse Pitch, Helix 37°, Round Profile, with Flatted Shank

Mill Dia. js12(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
6.0	6.0	13.0	57.0	1241020600	1241210600
8.0	10.0	19.0	69.0	1241020800	1241210800
10.0		22.0		1241021000	1241211000
12.0	12.0	26.0	83.0	1241021200	1241211200
14.0		26.0		1241021400	1241211400
16.0	16.0	32.0	92.0	1241021600	1241211600
18.0		32.0		1241021800	1241211800
20.0	20.0	38.0	104.0	1241022000	1241212000
22.0		38.0		1241022200	1241212200
25.0	25.0	45.0	121.0	1241022500	1241212500
30.0		45.0		1241023000	1241213000

▶ TiAIN Coating to Order

Tolerances according to 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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

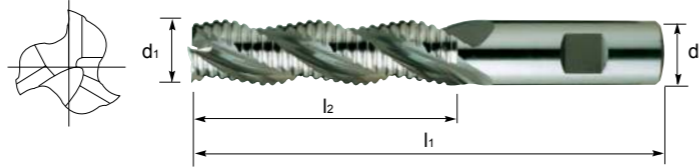
3 FLUTE, LONG LENGTH, 37° HELIX, COARSE PITCH



Series No. 125102

▶ cutting conditions : p.382-383

Artikel Nr.: 5216



ROUGHING END MILLS FOR ALUMINIUM

Long Length, 3 Flute, Coarse Pitch, Helix 37°, Round Profile, with Flatted Shank

Mill Dia. js12(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAlN HSS Co8
10.0	10.0	45.0	95.0	1251021000	1251211000
12.0	12.0	53.0	110.0	1251021200	1251211200
14.0		53.0		1251021400	1251211400
16.0	16.0	63.0	123.0	1251021600	1251211600
18.0		63.0		1251021800	1251211800
20.0	20.0	75.0	141.0	1251022000	1251212000
22.0		75.0		1251022200	1251212200
25.0	25.0	90.0	166.0	1251022500	1251212500
30.0		90.0		1251023000	1251213000

▶ TiAlN Coating to Order

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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

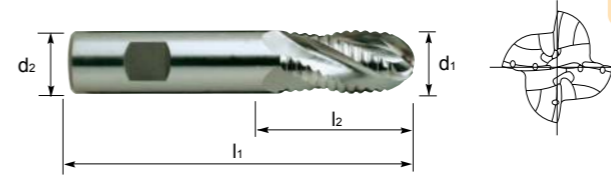
3&4 FLUTE, SHORT LENGTH, BALL NOSE, COARSE PITCH



Series No. 127102

▶ cutting conditions : p.385

Artikel Nr.: 525



R : ±0.02mm

ROUGHING DIE-SINKING CUTTERS

Short Length, Multi-Flute Coarse Pitch, Round Profile, Ball End Centre Cutting, with Flatted Shank

Mill Dia. js12(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAlN HSS Co8
8.0	10.0	19.0	69.0	3	1271020800	1271210800
10.0		22.0	72.0	3	1271021000	1271211000
12.0	12.0	26.0	83.0	4	1271021200	1271211200
16.0	16.0	32.0	92.0	4	1271021600	1271211600
20.0	20.0	38.0	104.0	4	1271022000	1271212000
25.0	25.0	45.0	121.0	4	1271022500	1271212500
32.0	32.0	53.0	133.0	4	1271023200	1271213200
40.0		63.0	155.0	4	1271024000	1271214000

▶ TiAlN Coating to Order

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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

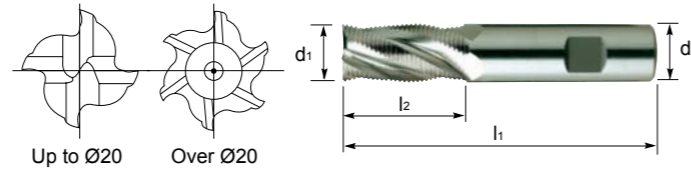
MULTI FLUTE, SHORT LENGTH, FINE PITCH ROUGHING



Series No. 121102

▶ cutting conditions : p.382-383

Artikel Nr.: 5211 (876M..FP)



FINE PITCH ROUGHING END MILLS

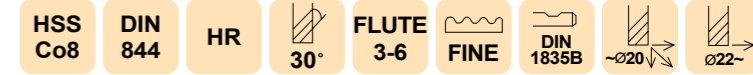
Short Length, Multi-Flute, Fine Pitch, Round Profile, with Flatted Shank

Mill Dia. js12(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAlN HSS Co8
6.0	6.0	13.0	57.0	3	1211020600	1211210600
8.0	10.0	19.0	69.0	3	1211020800	1211210800
10.0		22.0	72.0	4	1211021000	1211211000
12.0	12.0	26.0	83.0	4	1211021200	1211211200
14.0		26.0		4	1211021400	1211211400
16.0	16.0	32.0	92.0	4	1211021600	1211211600
18.0		32.0		4	1211021800	1211211800
20.0	20.0	38.0	104.0	4	1211022000	1211212000
25.0	25.0	45.0	121.0	5	1211022500	1211212500
30.0		45.0		6	1211023000	1211213000
32.0	32.0	53.0	133.0	6	1211023200	1211213200

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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

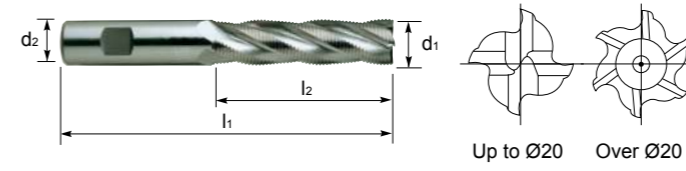
MULTI FLUTE, LONG LENGTH, FINE PITCH ROUGHING



Series No. 122102

▶ cutting conditions : p.382-383

Artikel Nr.: 5221 (876L..FP)



FINE PITCH ROUGHING END MILLS

Long Length, Multi-Flute, Fine Pitch, Round Profile, with Flatted Shank

Mill Dia. js12(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAlN HSS Co8	
6.0	6.0	24.0	68.0	3	1221020600	1221210600	
7.0	10.0	30.0	80.0	3	1221020700	1221210700	
8.0		38.0	88.0	3	1221020800	1221210800	
9.0		38.0		3	1221020900	1221210900	
10.0	12.0	45.0	95.0	4	1221021000	1221211000	
11.0		45.0	102.0	4	1221021100	1221211100	
12.0		53.0	110.0	4	1221021200	1221211200	
13.0		53.0		4	1221021300	1221211300	
14.0	53.0	4		1221021400	1221211400		
15.0	16.0	53.0	123.0	4	1221021500	1221211500	
16.0		63.0		4	1221021600	1221211600	
17.0		63.0		4	1221021700	1221211700	
18.0		63.0		4	1221021800	1221211800	
19.0	20.0	63.0	141.0	4	1221021900	1221211900	
20.0		75.0		4	1221022000	1221212000	
22.0		75.0		5	1221022200	1221212200	
24.0		90.0		166.0	5	1221022400	1221212400
25.0	90.0	5	1221022500		1221212500		
26.0	90.0	6	1221022600		1221212600		
28.0	25.0	90.0	186.0	6	1221022800	1221212800	
30.0		90.0		6	1221023000	1221213000	
32.0		106.0		186.0	6	1221023200	1221213200
35.0		106.0			6	1221023500	1221213500
36.0	32.0	106.0	217.0	6	1221023600	1221213600	
38.0		125.0		6	1221023800	1221213800	
38.0		125.0		6	1221029001	1221219001	
40.0		125.0		6	1221024000	1221214000	
40.0	40.0	125.0		6	1221029002	1221219002	

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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

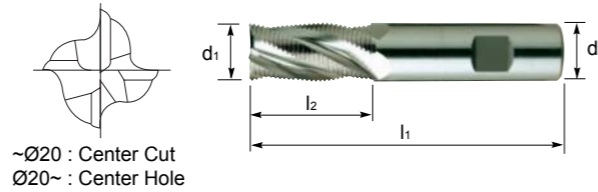
MULTI FLUTE, SHORT LENGTH, FINE PITCH ROUGHING



Series No. 121113

▶ cutting conditions : p.384

Artikel Nr.: 5211PM



FINE PITCH ROUGHING END MILLS

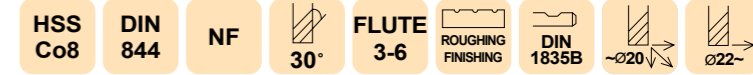
Short Length, Multi-Flute, Centre Cutting, 1 Tooth Over Centre, Fine Pitch, Round Profile with Flatted Shank

Mill Dia. js12(d1)	Shank Dia. h6(d2)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	ASP-60	TiAIN ASP-60
6.0	6.0	13.0	57.0	4	1211130600	1211220600
7.0	10.0	16.0	66.0	4	1211130700	1211220700
8.0		19.0	69.0	4	1211130800	1211220800
9.0		19.0		5	1211130900	1211220900
10.0		22.0	72.0	5	1211131000	1211221000
11.0	12.0	22.0	79.0	5	1211131100	1211221100
12.0		26.0		5	1211131200	1211221200
13.0		26.0	83.0	5	1211131300	1211221300
14.0		26.0		5	1211131400	1211221400
15.0		26.0		5	1211131500	1211221500
16.0	16.0	32.0	92.0	5	1211131600	1211221600
18.0		32.0		5	1211131800	1211221800
20.0	20.0	38.0	104.0	5	1211132000	1211222000
22.0		38.0		5	1211132200	1211222200
25.0	25.0	45.0	121.0	6	1211132500	1211222500
30.0		45.0		6	1211133000	1211223000

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	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

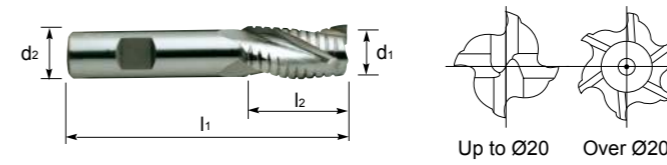
MULTI FLUTE, SHORT LENGTH, ROUGHING & FINISHING



Series No. 126102

▶ cutting conditions : p.386-387

Artikel Nr.: 421



ROUGHING-FINISHING END MILLS

Short Length, Multi-Flute, Rough-Finishing Profile, with Flatted Shank

Mill Dia. k10(d1)	Shank Dia. h6(d2)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAIN HSS Co8
6.0	6.0	13.0	57.0	3	1261020600	1261210600
7.0	10.0	16.0	66.0	3	1261020700	1261210700
8.0		19.0	69.0	4	1261020800	1261210800
9.0		19.0		4	1261020900	1261210900
10.0		22.0	72.0	4	1261021000	1261211000
11.0	12.0	22.0	79.0	4	1261021100	1261211100
12.0		26.0		4	1261021200	1261211200
13.0		26.0	83.0	4	1261021300	1261211300
14.0		26.0		4	1261021400	1261211400
16.0		32.0		92.0	4	1261021600
18.0	32.0	4	1261021800		1261211800	
20.0	20.0	38.0	104.0	4	1261022000	1261212000
22.0		38.0		5	1261022200	1261212200
25.0	25.0	45.0	121.0	5	1261022500	1261212500
28.0		45.0		5	1261022800	1261212800
30.0		45.0		5	1261023000	1261213000
32.0	32.0	53.0	133.0	5	1261023200	1261213200
36.0		53.0		6	1261023600	1261213600
40.0		63.0	155.0	6	1261024000	1261214000

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
k10	+ 40 0	+ 48 0	+ 58 0	+ 70 0	+ 84 0	+ 100 0
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

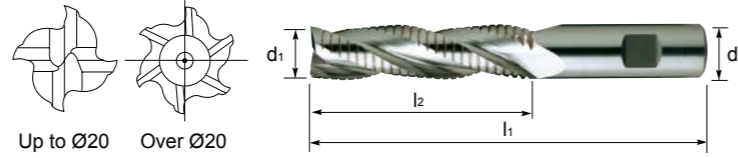
MULTI FLUTE, LONG LENGTH, ROUGHING & FINISHING



Series No. 137102

▶ cutting conditions : p.386-387

Artikel Nr.: 422



ROUGHING-FINISHING END MILLS

Long Length, Multi-Flute, Rough-Finishing Profile, with Flatted Shank

Mill Dia. k10(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	No. of Flute	HSS Co8	TiAIN HSS Co8
6.0	6.0	24.0	68.0	3	1371020600	1371210600
8.0	10.0	38.0	88.0	4	1371020800	1371210800
10.0		45.0	95.0	4	1371021000	1371211000
12.0	12.0	53.0	110.0	4	1371021200	1371211200
14.0		53.0		4	1371021400	1371211400
16.0	16.0	63.0	123.0	4	1371021600	1371211600
18.0		63.0		4	1371021800	1371211800
20.0	20.0	75.0	141.0	4	1371022000	1371212000
22.0		75.0		5	1371022200	1371212200
25.0	25.0	90.0	166.0	5	1371022500	1371212500
30.0		90.0		5	1371023000	1371213000
32.0	32.0	106.0	186.0	5	1371023200	1371213200

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
k10	+ 40 0	+ 48 0	+ 58 0	+ 70 0	+ 84 0	+ 100 0
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

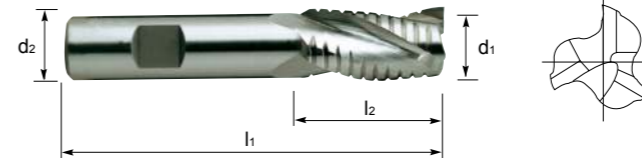
3 FLUTE, SHORT LENGTH, ROUGHING & FINISHING



Series No. 138102

▶ cutting conditions : p.386-387

Artikel Nr.: 431



ROUGHING-FINISHING END MILLS

Short Length, 3 Flute, Rough-Finishing Profile, with Flatted Shank

Mill Dia. k10(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
6.0	6.0	13.0	57.0	1381020600	1381210600
8.0	10.0	19.0	69.0	1381020800	1381210800
10.0		22.0	72.0	1381021000	1381211000
12.0	12.0	26.0	83.0	1381021200	1381211200
14.0		26.0		1381021400	1381211400
16.0	16.0	32.0	92.0	1381021600	1381211600
18.0		32.0		1381021800	1381211800
20.0	20.0	38.0	104.0	1381022000	1381212000
22.0		38.0		1381022200	1381212200
25.0	25.0	45.0	121.0	1381022500	1381212500
28.0		45.0		1381022800	1381212800
30.0	25.0	45.0	121.0	1381023000	1381213000
32.0		53.0		1381023200	1381213200
36.0	32.0	53.0	133.0	1381023600	1381213600
40.0		63.0		1381024000	1381214000

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
k10	+ 40 0	+ 48 0	+ 58 0	+ 70 0	+ 84 0	+ 100 0
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

3 FLUTE, LONG LENGTH, ROUGHING & FINISHING

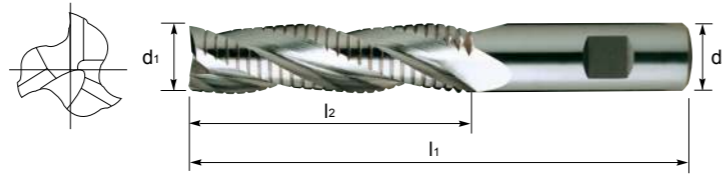


HSS Co8
DIN 844
NF
30°
FLUTE 3
ROUGHING FINISHING
DIN 1835B

Series No. 139102

▶ cutting conditions : p.386-387

Artikel Nr.: 432



ROUGHING-FINISHING END MILLS

Long Length, 3 Flute, Rough-Finishing Profile, with Flatted Shank

Mill Dia. k10(d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	HSS Co8	TiAIN HSS Co8
6.0	6.0	24.0	68.0	1391020600	1391210600
8.0	10.0	38.0	88.0	1391020800	1391210800
10.0		45.0	95.0	1391021000	1391211000
12.0	12.0	53.0	110.0	1391021200	1391211200
14.0		53.0		1391021400	1391211400
16.0	16.0	63.0	123.0	1391021600	1391211600
18.0		63.0		1391021800	1391211800
20.0	20.0	75.0	141.0	1391022000	1391212000
22.0		75.0		1391022200	1391212200
25.0	25.0	90.0	166.0	1391022500	1391212500
28.0		90.0		1391022800	1391212800
30.0		90.0		1391023000	1391213000
36.0	32.0	106.0	186.0	1391023600	1391213600
40.0		125.0	217.0	1391024000	1391214000

▶ TiAIN Coating to Order

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	über 30 bis 50 over 30 to 50
k10	+ 40 0	+ 48 0	+ 58 0	+ 70 0	+ 84 0	+ 100 0
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16

3 FLUTE, SHORT SERIES, THROW AWAY, BS STD

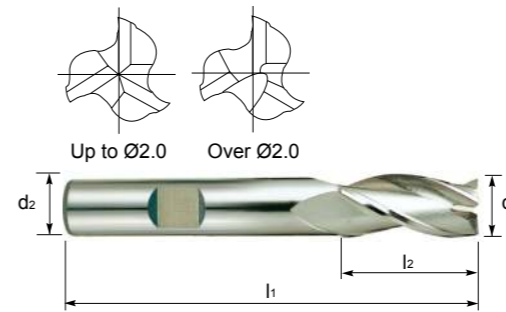


HSS Co8
BS 122/4
30°
FLUTE 3

Series No. 328102

▶ cutting conditions : p.376-379

Artikel Nr.: 1331 (24M)



Mil Dia. d ₁	Shank Dia. d ₂	Length of Cut l ₂	Overall Length l ₁	Europa Code	Clarkson Code
				HSS Co8	HSS Co8
1.0	6	2	24.5	3281020100	24M02
1.5	6	2.5	24.5	3281020150	24M03
2.0	6	3	25.5	3281020200	24M04
2.5	6	4	26	3281020250	24M05
2.8	6	4.5	28	3281020280	24M28
3.0	6	4.5	28	3281020300	24M06
3.5	6	5.5	30	3281020350	24M07
3.8	6	6.5	32.5	3281020380	24M38
4.0	6	6.5	32.5	3281020400	24M08
4.5	6	7.5	36	3281020450	24M09
4.8	6	7.5	36	3281020480	24M48
5.0	6	7.5	36	3281020500	24M10
5.5	6	7.5	36	3281020550	24M11
5.75	6	9.5	36	3281020575	24M57
6.0	6	9.5	36	3281020600	24M12
7.0	10	10.5	46	3281020700	24M14B
8.0	10	11	47.5	3281020800	24M16B
9.0	10	13	51	3281020900	24M18B
10.0	10	13	51.5	3281021000	24M20B

Imperial sizes also available while stocks last.

Contact sales office for dimensions.

Please check stock before ordering.

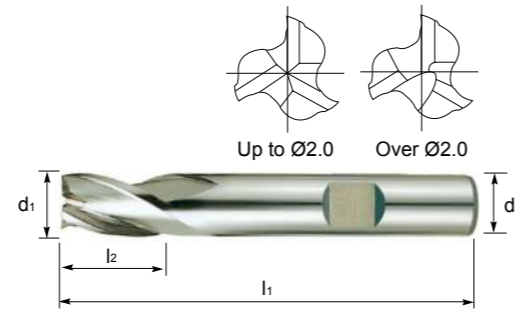
3 FLUTE, LONG SERIES, THROW AWAY, BS STD



Series No. 329102

▶ cutting conditions : p.376-379

Artikel Nr.: 1332 (24L)



Mil Dia. d ₁	Shank Dia. d ₂	Length of Cut l ₂	Overall Length l ₁	Europa Code	Clarkson Code
				HSS Co8	HSS Co8
1.5	6	4	28	3291020150	24L03
2.0	6	4.5	29	3291020200	24L04
2.5	6	6.5	32	3291020250	24L05
3.0	6	7.5	34	3291020300	24L06
3.5	6	8.5	36.5	3291020350	24L07
4.0	6	9.5	39	3291020400	24L08
4.5	6	11	42	3291020450	24L09
5.0	6	12.5	44.5	3291020500	24L10
5.5	6	14.5	46	3291020550	24L11
6.0	6	16	44.5	3291020600	24L12
8.0	10	19	55.5	3291020800	24L16B
10.0	10	22.5	61	3291021000	24L20B

Imperial sizes also available while stocks last.
Contact sales office for dimensions.
Please check stock before ordering.

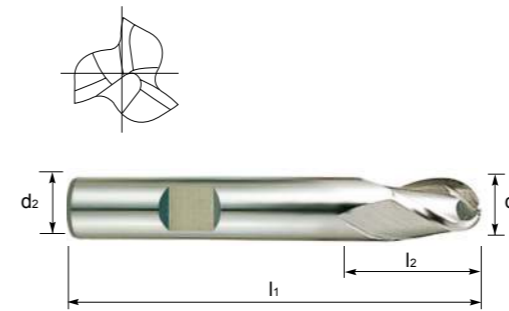
3 FLUTE, LONG SERIES, BALL NOSE THROWAWAY, BS STD



Series No. 334102

▶ cutting conditions : p.376-379

Artikel Nr.: 1341 (24N)



Mil Dia. d ₁	Shank Dia. d ₂	Length of Cut l ₂	Overall Length l ₁	Europa Code	Clarkson Code
				HSS Co8	HSS Co8
2.0	6	4.5	29	3341020200	24N04
2.5	6	4.5	35	3341020250	24N05
3.0	6	7.5	34	3341020300	24N06
4.0	6	9.5	39	3341020400	24N08
5.0	6	12.5	44.5	3341020500	24N10
6.0	6	16	44.5	3341020600	24N12

Imperial sizes also available while stocks last.
Contact sales office for dimensions.
Please check stock before ordering.



HSSCo FLATTED SHANK CUTTING DATA

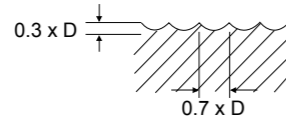
FLATTED SHANK CUTTING CONDITION



112102, 114102 (2 Flute, Ball Nose)



MATERIAL GROUP	HRc		Size (mm)									
			3.0	4.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0	
P	< 20	11	v_c (m/min)	30	30	30	30	30	30	30	30	30
		12	n	3400	2400	1700	1200	1000	800	600	500	400
			f_z	0.01	0.017	0.026	0.044	0.06	0.066	0.083	0.085	0.088
			f (mm/min)	70	80	90	105	120	105	100	85	70
	20-30	11	v_c (m/min)	20	20	20	20	20	15	20	20	15
		12	n	2000	1400	1000	700	560	450	350	300	220
			f_z	0.008	0.013	0.026	0.036	0.054	0.061	0.079	0.083	0.091
			f (mm/min)	30	35	45	50	60	55	55	50	40
	30-40	13	v_c (m/min)	15	15	15	15	15	15	15	15	15
		14	n	1400	1000	700	500	400	320	250	200	160
			f_z	0.007	0.013	0.018	0.03	0.044	0.055	0.07	0.088	0.094
			f (mm/min)	20	25	25	30	35	35	35	35	30
N	71	v_c (m/min)	105	100	105	100	100	95	100	100	100	
	72	n	11000	8000	5600	4000	3200	2500	2000	1600	1300	
	73	f_z	0.01	0.016	0.025	0.044	0.056	0.068	0.075	0.088	0.096	
		f (mm/min)	230	260	280	350	360	340	300	280	250	



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c * 1000}{\pi * \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n * \pi * \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

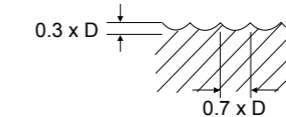
FLATTED SHANK CUTTING CONDITION



115102, 116102 (Multiflute, Ball Nose)



MATERIAL GROUP	HRc		Size (mm)							
			6.0	8.0	10.0	12.0	16.0	20.0	25.0	
P	< 20	11	v_c (m/min)	30	30	30	30	30	30	30
		12	n	1700	1200	1000	800	600	500	400
			f_z	0.026	0.044	0.06	0.067	0.083	0.087	0.088
			f (mm/min)	135	160	180	160	150	130	105
	20-30	11	v_c (m/min)	20	20	20	15	20	20	15
		12	n	1000	700	560	450	350	300	220
			f_z	0.023	0.036	0.054	0.059	0.076	0.083	0.091
			f (mm/min)	70	75	90	80	80	75	60
	30-40	13	v_c (m/min)	15	15	15	15	15	15	15
		14	n	700	500	400	320	250	200	160
			f_z	0.019	0.03	0.042	0.052	0.067	0.083	0.094
			f (mm/min)	40	45	50	50	50	50	45
N	71	v_c (m/min)	105	100	100	95	100	100	100	
	72	n	5600	4000	3200	2500	2000	1600	1300	
	73	f_z	0.025	0.044	0.056	0.068	0.075	0.088	0.097	
		f (mm/min)	420	530	540	510	450	420	380	



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c * 1000}{\pi * \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n * \pi * \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

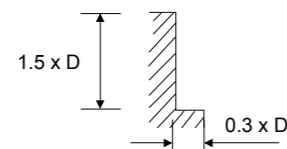
FLATTED SHANK CUTTING CONDITION



132102 (Multiflute, 50° Helix)



MATERIAL GROUP	HRc		Size (mm)													
			2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0	30.0		
P	< 20	11	v_c (m/min)	30	35	30	30	35	30	30	35	30	30	35	35	
			n	5000	3500	2500	2000	1800	1200	1000	900	600	500	450	350	
			f_z	0.004	0.007	0.012	0.019	0.016	0.026	0.032	0.041	0.053	0.063	0.047	0.046	
		12	f (mm/min)	35	50	60	75	85	95	95	110	95	95	85	85	
			20-30	v_c (m/min)	30	30	25	30	25	25	30	25	25	30	25	25
				n	4500	2800	2000	1800	1300	1000	900	700	500	450	350	280
	f_z	0.003		0.006	0.01	0.015	0.014	0.022	0.026	0.033	0.043	0.048	0.039	0.04		
	30-40	13	f (mm/min)	25	35	40	55	55	65	70	70	65	65	55	45	
			14	v_c (m/min)	15	15	15	15	15	15	15	15	15	15	15	15
				n	2500	1800	1200	1000	900	600	500	450	300	250	200	180
		f_z		0.002	0.006	0.01	0.015	0.013	0.022	0.027	0.033	0.044	0.053	0.038	0.035	
		f (mm/min)	10	20	25	30	35	40	40	45	40	40	30	25		

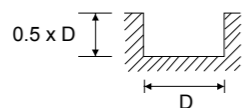


- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

135316, 136316 (1 Flute Aluminium Router)



MATERIAL GROUP	HRc		Size (mm)					
			3.0	4.0	5.0	6.0	8.0	10.0
N	71	v_c (m/min)	188	226	220	207	214	220
		n	20000	18000	14000	11000	85000	7000
		f_z	0.055	0.053	0.054	0.055	0.053	0.054
		f (mm/min)	1100	950	750	600	450	380



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$
 To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

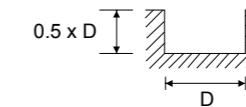
FLATTED SHANK CUTTING CONDITION



131102 (3 Flute Aluminium Roughing)

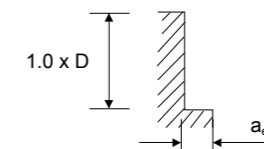


MATERIAL GROUP	HRc		Size (mm)								
			3.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
N	71	v_c (m/min)	75	130	150	155	190	155	175	130	145
		n	8000	7000	6000	5000	5000	3500	3500	2300	2300
		f_z	0.035	0.05	0.071	0.12	0.12	0.177	0.177	0.283	0.283
		f (mm/min)	560	700	850	1200	1200	1240	1240	1300	1300



MATERIAL GROUP	HRc		Size (mm)								
			3.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
N	71	v_c (m/min)	75	130	150	155	190	155	175	130	145
		n	8000	7000	6000	5000	5000	3500	3500	2300	2300
		f_z	0.046	0.064	0.092	0.15	0.15	0.229	0.229	0.37	0.37
		f (mm/min)	730	900	1100	1500	1500	1600	1600	1700	1700

$a_e : \phi 3.0\text{mm} - \phi 10.0\text{mm} = 0.25 \times D$
 $a_e : \phi 12.0\text{mm} - \phi 20.0\text{mm} = 0.5 \times D$



- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$
 To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

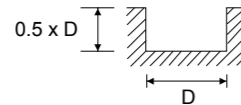
FLATTED SHANK CUTTING CONDITION



100102, 101102, 102102 (2 Flute)



MATERIAL GROUP	HRc		Size (mm)									
			2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	
P	< 20	11	v_c (m/min)	30	30	30	30	30	30	30	30	30
		12	n	4500	3200	2200	1800	1600	1100	900	800	700
			f_z	0.003	0.007	0.013	0.019	0.025	0.041	0.05	0.063	0.064
			f (mm/min)	30	45	55	70	80	90	90	100	90
		11	v_c (m/min)	25	25	25	25	25	25	25	25	25
		12	n	4000	2500	1800	1600	1200	900	800	630	560
		f_z	0.004	0.008	0.013	0.019	0.025	0.039	0.05	0.063	0.071	
		f (mm/min)	30	40	45	60	60	70	80	80	80	
	30-40	13	v_c (m/min)	15	15	15	15	15	15	15	15	15
		14	n	2200	1600	1100	900	800	560	450	400	350
			f_z	0.003	0.006	0.014	0.019	0.025	0.04	0.05	0.063	0.071
			f (mm/min)	15	20	30	35	40	45	45	50	50
N		71	v_c (m/min)	75	105	100	100	105	100	95	95	95
		72	n	12000	11000	8000	6300	5600	4000	3100	2500	2200
	73	f_z	0.007	0.011	0.018	0.025	0.028	0.049	0.065	0.076	0.08	
		f (mm/min)	160	250	290	310	310	390	400	380	350	



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c * 1000}{\pi * \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n * \pi * \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

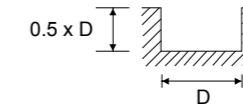
FLATTED SHANK CUTTING CONDITION



100102, 101102, 102102 (2 Flute)



MATERIAL GROUP	HRc		Size (mm)								
			16.0	18.0	20.0	22.0	25.0	28.0	30.0	32.0	
P	< 20	11	v_c (m/min)	30	30	30	30	30	30	30	30
		12	n	560	500	450	450	400	350	310	280
			f_z	0.08	0.09	0.1	0.1	0.1	0.1	0.097	0.098
			f (mm/min)	90	90	90	90	80	70	60	55
		11	v_c (m/min)	25	25	25	25	25	25	25	25
		12	n	450	400	400	350	310	280	250	220
		f_z	0.078	0.088	0.088	0.1	0.097	0.098	0.1	0.102	
		f (mm/min)	70	70	70	70	60	55	50	45	
	30-40	13	v_c (m/min)	15	15	15	15	15	15	15	15
		14	n	280	250	220	220	180	160	160	140
			f_z	0.08	0.09	0.102	0.102	0.097	0.094	0.094	0.107
			f (mm/min)	45	45	45	45	35	30	30	30
N		71	v_c (m/min)	100	100	100	95	95	95	105	100
		72	n	2000	1800	1600	1400	1200	1100	1100	1000
	73	f_z	0.088	0.097	0.1	0.107	0.117	0.123	0.123	0.12	
		f (mm/min)	350	350	320	300	280	270	270	240	



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c * 1000}{\pi * \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n * \pi * \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

FLATTED SHANK CUTTING CONDITION

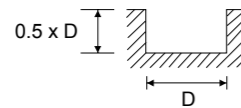


103102, 104102, 105102, 128102, 129102, 328102, 329102, 334102 (3 Flute)



SLOTING

MATERIAL GROUP	HRc		Size (mm)								
			2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	
P	< 20	v _c (m/min)	30	30	30	30	30	30	30	30	30
		n	4500	3200	2200	1800	1600	1100	900	800	800
		f _z	0.002	0.004	0.007	0.01	0.014	0.021	0.026	0.033	0.033
		f (mm/min)	25	35	45	55	65	70	70	80	80
	20-30	v _c (m/min)	25	25	25	25	25	25	25	25	25
		n	4000	2500	1800	1600	1200	900	800	630	630
		f _z	0.002	0.003	0.006	0.008	0.011	0.019	0.023	0.029	0.029
		f (mm/min)	20	25	30	40	40	50	55	55	55
	30-40	v _c (m/min)	15	15	15	15	15	15	15	15	15
		n	2200	1600	1100	900	800	560	450	400	400
		f _z	0.002	0.003	0.006	0.007	0.01	0.018	0.022	0.029	0.029
		f (mm/min)	10	15	20	20	25	30	30	35	35
N		v _c (m/min)	75	105	100	100	105	100	95	95	95
		n	12000	11000	8000	6300	5600	4000	3100	2500	2500
		f _z	0.003	0.005	0.008	0.011	0.013	0.022	0.029	0.035	0.035
		f (mm/min)	110	170	200	210	210	260	270	260	260



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAIN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

FLATTED SHANK CUTTING CONDITION

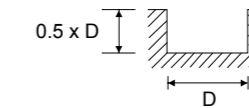


103102, 104102, 105102, 128102, 129102, 328102, 329102, 334102 (3 Flute)



SLOTING

MATERIAL GROUP	HRc		Size (mm)								
			14.0	16.0	18.0	20.0	22.0	25.0	28.0	30.0	
P	< 20	v _c (m/min)	30	30	30	30	30	30	30	30	30
		n	700	560	500	450	450	400	350	310	310
		f _z	0.033	0.042	0.047	0.052	0.052	0.054	0.052	0.054	0.054
		f (mm/min)	70	70	70	70	70	65	55	50	50
	20-30	v _c (m/min)	25	25	25	25	25	25	25	25	25
		n	560	450	400	400	350	310	280	250	250
		f _z	0.033	0.037	0.042	0.042	0.048	0.043	0.042	0.04	0.04
		f (mm/min)	55	50	50	50	50	40	35	30	30
	30-40	v _c (m/min)	15	15	15	15	15	15	15	15	15
		n	350	280	250	220	220	180	160	160	160
		f _z	0.033	0.036	0.04	0.045	0.045	0.37	0.042	0.042	0.042
		f (mm/min)	35	30	30	30	30	20	20	20	20
N		v _c (m/min)	95	100	100	100	95	95	95	105	105
		n	2200	2000	1800	1600	1400	1200	1100	1100	1100
		f _z	0.036	0.04	0.044	0.046	0.048	0.053	0.055	0.055	0.055
		f (mm/min)	240	240	240	220	200	190	180	180	180



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAIN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

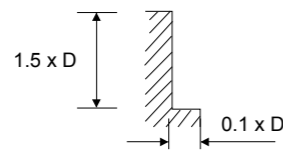
FLATTED SHANK CUTTING CONDITION



103102, 104102, 105102, 128102, 129102, 328102, 329102, 334102 (3 Flute)



MATERIAL GROUP	HRc		Size (mm)								
			2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	
P	< 20	v _c (m/min)	30	30	30	30	30	30	30	30	30
		n	4500	3200	2200	1800	1600	1100	900	800	800
		f _z	0.003	0.006	0.011	0.018	0.023	0.036	0.044	0.056	0.056
		f (mm/min)	40	60	75	95	110	120	120	135	135
	20-30	v _c (m/min)	25	25	25	25	25	25	25	25	25
		n	4000	2500	1800	1600	1200	900	800	630	630
		f _z	0.003	0.006	0.00-	0.014	0.018	0.03	0.038	0.048	0.048
		f (mm/min)	35	45	50	65	65	80	90	90	90
	30-40	v _c (m/min)	15	15	15	15	15	15	15	15	15
		n	2200	1600	1100	900	800	560	450	400	400
		f _z	0.002	0.004	0.009	0.013	0.019	0.03	0.037	0.046	0.046
		f (mm/min)	15	20	30	35	45	50	50	55	55
N	71 72 73	v _c (m/min)	75	105	100	100	105	100	95	95	95
		n	12000	11000	8000	6300	5600	4000	3100	2500	2500
		f _z	0.005	0.008	0.014	0.019	0.021	0.037	0.048	0.057	0.057
		f (mm/min)	180	280	330	350	350	440	450	430	430



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

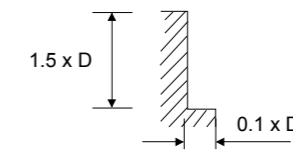
FLATTED SHANK CUTTING CONDITION



103102, 104102, 105102, 128102, 129102, 328102, 329102, 334102 (3 Flute)



MATERIAL GROUP	HRc		Size (mm)								
			14.0	16.0	18.0	20.0	22.0	25.0	28.0	30.0	
P	< 20	v _c (m/min)	30	30	30	30	30	30	30	30	30
		n	700	560	500	450	450	400	350	310	310
		f _z	0.057	0.071	0.08	0.089	0.089	0.092	0.09	0.086	0.086
		f (mm/min)	120	120	120	120	120	110	95	80	80
	20-30	v _c (m/min)	25	25	25	25	25	25	25	25	25
		n	560	450	400	400	350	310	280	250	250
		f _z	0.054	0.059	0.067	0.067	0.076	0.07	0.071	0.073	0.073
		f (mm/min)	90	80	80	80	80	65	60	55	55
	30-40	v _c (m/min)	15	15	15	15	15	15	15	15	15
		n	350	280	250	220	220	180	160	160	160
		f _z	0.052	0.06	0.067	0.076	0.076	0.065	0.063	0.063	0.063
		f (mm/min)	55	50	50	50	50	35	30	30	30
N	71 72 73	v _c (m/min)	95	100	100	100	95	95	95	105	105
		n	2200	2000	1800	1600	1400	1200	1100	1100	1100
		f _z	0.061	0.067	0.074	0.075	0.081	0.089	0.091	0.091	0.091
		f (mm/min)	400	400	400	360	340	320	300	300	300



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

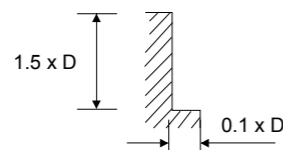
FLATTED SHANK CUTTING CONDITION



107102, 108102 (4 Flute)



MATERIAL GROUP	HRc		Size (mm)									
			2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	
P	< 20	11	v_c (m/min)	30	30	30	30	30	30	30	30	30
		12	n	4500	3200	2200	1800	1600	1100	900	800	700
			f_z	0.003	0.006	0.011	0.017	0.023	0.036	0.044	0.056	0.057
			f (mm/min)	55	80	100	125	145	160	160	180	160
		11	v_c (m/min)	25	25	25	25	25	25	25	25	25
		12	n	4000	2500	1800	1600	1200	900	800	630	560
		f_z	0.003	0.006	0.009	0.014	0.019	0.029	0.038	0.048	0.054	
		f (mm/min)	45	60	65	90	90	105	120	120	120	
	13-14	13	v_c (m/min)	15	15	15	15	15	15	15	15	15
		14	n	2200	1600	1100	900	800	560	450	400	350
			f_z	0.002	0.005	0.01	0.014	0.019	0.029	0.036	0.047	0.054
			f (mm/min)	20	30	45	50	60	65	65	75	75
N		71	v_c (m/min)	75	105	100	100	105	100	95	95	95
		72	n	12000	11000	8000	6300	5600	4000	3100	2500	2200
	73	f_z	0.005	0.009	0.014	0.019	0.021	0.036	0.048	0.057	0.06	
		f (mm/min)	240	380	440	470	470	580	600	570	530	



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAIN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c * 1000}{\pi * \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n * \pi * \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

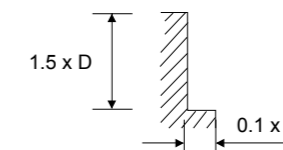
FLATTED SHANK CUTTING CONDITION



107102, 108102 (4 Flute)



MATERIAL GROUP	HRc		Size (mm)								
			16.0	18.0	20.0	22.0	25.0	28.0	30.0	32.0	
P	< 20	11	v_c (m/min)	30	30	30	30	30	30	30	30
		12	n	560	500	450	450	400	350	310	310
			f_z	0.071	0.08	0.089	0.059	0.06	0.06	0.059	0.09
			f (mm/min)	160	160	160	160	145	125	110	100
		11	v_c (m/min)	25	25	25	25	25	25	25	20
		12	n	450	400	400	350	310	280	250	220
		f_z	0.058	0.066	0.066	0.05	0.048	0.048	0.05	0.049	
		f (mm/min)	105	105	105	105	90	80	75	65	
	13-14	13	v_c (m/min)	15	15	15	15	15	15	15	15
		14	n	280	250	220	220	180	160	160	140
			f_z	0.058	0.065	0.074	0.049	0.046	0.047	0.047	0.054
			f (mm/min)	65	65	65	65	50	45	45	45
N		71	v_c (m/min)	100	100	100	95	95	95	105	100
		72	n	2000	1800	1600	1400	1200	1100	1100	1000
	73	f_z	0.066	0.074	0.075	0.054	0.058	0.061	0.061	0.06	
		f (mm/min)	100	100	100	95	95	95	105	100	



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAIN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c * 1000}{\pi * \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n * \pi * \phi}{1000}$

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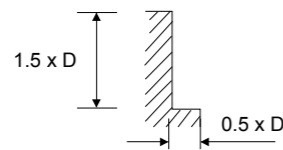
FLATTED SHANK CUTTING CONDITION



118102, 119102, 121102, 122102, 124102, 125102, 133102, 134102 (Multiflute Roughing)



MATERIAL GROUP	HRc		Size (mm)							
			6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
P	< 20	v _c (m/min)	30	30	30	30	30	30	30	30
		n	1600	1100	900	800	700	560	500	450
		f _z	0.013	0.023	0.033	0.044	0.05	0.063	0.07	0.078
		f (mm/min)	60	75	120	140	140	140	140	140
	20-30	v _c (m/min)	25	25	25	25	25	25	25	25
		n	1200	900	800	630	560	450	400	400
		f _z	0.015	0.024	0.034	0.044	0.049	0.061	0.069	0.069
		f (mm/min)	55	65	110	110	110	110	110	110
	30-40	v _c (m/min)	15	15	15	15	15	15	15	15
		n	800	560	450	400	350	280	250	220
		f _z	0.013	0.021	0.033	0.044	0.05	0.063	0.07	0.08
		f (mm/min)	30	35	60	70	70	70	70	70
N	71 72 73	v _c (m/min)	85	80	80	75	80	80	80	75
		n	4500	3100	2500	2000	1800	1600	1400	1200
		f _z	0.015	0.025	0.035	0.05	0.058	0.07	0.084	0.104
		f (mm/min)	200	230	350	400	420	450	470	500



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

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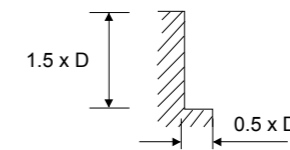
FLATTED SHANK CUTTING CONDITION



118102, 119102, 121102, 122102, 124102, 125102, 133102, 134102 (Multiflute Roughing)



MATERIAL GROUP	HRc		Size (mm)							
			22.0	25.0	28.0	30.0	32.0	36.0	40.0	50.0
P	< 20	v _c (m/min)	30	30	30	30	30	30	30	30
		n	450	400	350	310	280	250	220	180
		f _z	0.076	0.085	0.076	0.086	0.095	0.107	0.114	0.157
		f (mm/min)	170	170	160	160	160	160	150	170
	20-30	v _c (m/min)	25	25	25	25	25	25	25	25
		n	350	310	280	250	220	200	180	160
		f _z	0.08	0.09	0.077	0.087	0.098	0.108	0.111	0.146
		f (mm/min)	140	140	130	130	130	130	120	140
	30-40	v _c (m/min)	15	15	15	15	15	15	15	15
		n	220	180	160	160	140	120	110	90
		f _z	0.077	0.094	0.089	0.089	0.101	0.118	0.121	0.148
		f (mm/min)	85	85	85	85	85	85	80	80
N	71 72 73	v _c (m/min)	75	80	80	85	80	80	80	80
		n	1100	1000	900	900	800	700	630	500
		f _z	0.085	0.09	0.094	0.098	0.104	0.112	0.119	0.123
		f (mm/min)	470	450	510	530	500	470	450	370



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

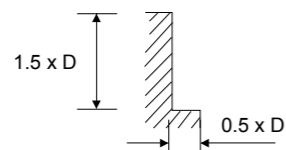
FLATTED SHANK CUTTING CONDITION



121113 (Multiflute Roughing ASP60)



MATERIAL GROUP	HRc		Size (mm)												
			6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	25.0	28.0	30.0	
P	< 20	v _c (m/min)	30	30	30	30	30	30	30	30	30	30	30	30	30
		n	1600	1100	900	800	700	560	500	450	450	400	350	310	
		f _z	0.013	0.023	0.033	0.044	0.05	0.063	0.07	0.078	0.076	0.085	0.076	0.086	
		f (mm/min)	60	75	120	140	140	140	140	140	170	170	160	160	
	20-30	v _c (m/min)	25	25	25	25	25	25	25	25	25	25	25	25	
		n	1200	900	800	630	560	450	400	400	350	310	280	250	
		f _z	0.015	0.024	0.034	0.044	0.049	0.061	0.069	0.069	0.08	0.09	0.077	0.087	
		f (mm/min)	55	65	110	110	110	110	110	110	140	140	130	130	
	30-40	v _c (m/min)	15	15	15	15	15	15	15	15	15	15	15	15	
		n	800	560	450	400	350	280	250	220	220	180	160	160	
		f _z	0.013	0.021	0.033	0.044	0.05	0.063	0.07	0.08	0.077	0.096	0.089	0.089	
		f (mm/min)	30	35	60	70	70	70	70	70	85	85	85	85	
N	71-73	v _c (m/min)	85	80	80	75	80	80	80	75	75	80	80	85	
		n	4500	3100	2500	2000	1800	1600	1400	1200	1100	1000	900	900	
		f _z	0.015	0.025	0.035	0.05	0.058	0.07	0.084	0.104	0.085	0.09	0.094	0.098	
		f (mm/min)	200	230	350	400	420	450	470	500	470	450	510	530	



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

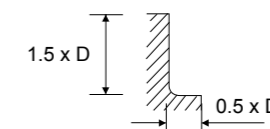
FLATTED SHANK CUTTING CONDITION



127102 (3&4 Flute Roughing, Ball Nose)



MATERIAL GROUP	HRc		Size (mm)							
			8.0	10.0	12.0	16.0	20.0	25.0	32.0	40.0
P	< 20	v _c (m/min)	30	30	30	30	30	30	30	30
		n	1100	900	800	560	450	400	280	220
		f _z	0.023	0.044	0.044	0.063	0.078	0.105	0.143	0.17
		f (mm/min)	75	120	140	140	140	170	160	150
	20-30	v _c (m/min)	25	25	25	25	25	25	25	25
		n	900	800	630	450	400	310	220	180
		f _z	0.024	0.046	0.044	0.061	0.069	0.113	0.148	0.167
		f (mm/min)	65	110	110	110	110	140	130	120
	30-40	v _c (m/min)	15	15	15	15	15	15	15	15
		n	560	450	400	280	220	180	140	110
		f _z	0.021	0.044	0.044	0.063	0.08	0.118	0.152	0.182
		f (mm/min)	35	60	70	70	70	85	85	80
N	71-73	v _c (m/min)	80	80	75	80	75	80	80	80
		n	3100	2500	2000	1600	1200	1000	800	630
		f _z	0.025	0.033	0.05	0.07	0.104	0.113	0.156	0.179
		f (mm/min)	230	250	400	450	500	450	500	450



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAlN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

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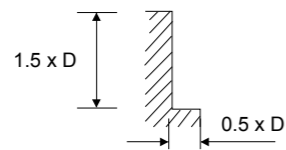
FLATTED SHANK CUTTING CONDITION



126102, 137102, 138102, 139102 (Multiflute Roughing & Finishing)



MATERIAL GROUP	HRc		Size (mm)							
			6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
P	< 20	v _c (m/min)	30	30	30	30	30	30	30	30
		n	1600	1100	900	800	700	560	500	450
		f _z	0.01	0.014	0.026	0.034	0.039	0.049	0.055	0.061
		f (mm/min)	50	60	95	110	110	110	110	110
	20-30	v _c (m/min)	25	25	25	25	25	25	25	25
		n	1200	900	800	630	560	450	400	400
		f _z	0.013	0.014	0.028	0.036	0.04	0.05	0.056	0.056
		f (mm/min)	45	50	90	90	90	90	90	90
	30-40	v _c (m/min)	15	15	15	15	15	15	15	15
		n	800	560	450	400	350	280	250	220
		f _z	0.01	0.013	0.028	0.034	0.039	0.049	0.055	0.063
		f (mm/min)	25	30	50	55	55	55	55	55
N	71 72 73	v _c (m/min)	85	80	80	80	80	80	80	80
		n	4500	3100	2500	2000	1800	1600	1400	1200
		f _z	0.012	0.015	0.028	0.04	0.047	0.056	0.068	0.083
		f (mm/min)	160	185	280	320	340	360	380	400



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAIN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
 z - No. of teeth
 a_p - axial depth of cut
 a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

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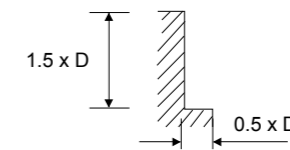
FLATTED SHANK CUTTING CONDITION



126102, 137102, 138102, 139102 (Multiflute Roughing & Finishing)



MATERIAL GROUP	HRc		Size (mm)						
			22.0	25.0	28.0	30.0	32.0	36.0	40.0
P	< 20	v _c (m/min)	30	30	30	30	30	30	30
		n	450	400	350	310	280	250	220
		f _z	0.06	0.068	0.074	0.084	0.093	0.087	0.091
		f (mm/min)	135	135	130	130	130	130	120
	20-30	v _c (m/min)	25	25	25	25	25	25	25
		n	350	310	280	250	220	200	180
		f _z	0.063	0.071	0.075	0.084	0.095	0.088	0.088
		f (mm/min)	350	310	280	250	220	200	180
	30-40	v _c (m/min)	15	15	15	15	15	15	15
		n	220	180	160	160	140	120	110
		f _z	0.064	0.078	0.088	0.088	0.1	0.097	0.098
		f (mm/min)	70	70	70	70	70	70	65
N	71 72 73	v _c (m/min)	80	80	80	85	80	80	80
		n	1100	1000	900	900	800	700	630
		f _z	0.069	0.072	0.091	0.093	0.1	0.09	0.095
		f (mm/min)	380	360	410	420	400	380	360



- ▶ The feed rate for long and long reach tools should be reduced by up to 50%
- ▶ The speeds and feeds for TiAIN coated tools can be increased by up to 30%

v_c - cutting speed (m/min)
 n - RPM (rev/min)
 f_z - feed rate (mm/tooth)
 f - feed rate (mm/rev)
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