COBALT MILLING CUTTER (FLATTED SHANK) END MILLS

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Europa Tool 10TH EDITION

COBALT MILLING CUTTERS
(Standard cobalt milling cutter range)

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(Standard cobalt milling cutter range)

PRODUCTS	SERIES	DESCRIPTION	PAGE

3 FLUTE / THROW AWAY TYPE / 8% COBALT HSS

1 FLUTE FOR ALUMINIUM / 5% COBALT HSS

2 FLUTE FOR ALUMINIUM / DIN STANDARDS / 8% COBALT HSS

MULTI FLUTE / COARSE PITCH ROUGHING END MILL / DIN STANDARDS / 8% COBALT HSS

3 FLUTE / COARSE PITCH ROUGHING END MILL / DIN STANDARDS / 8% COBALT HSS

3 FLUTE / COARSE PITCH ROUGHING END MILLS FOR ALUMINIUM / DIN STANDARDS / 8% COBALT HSS

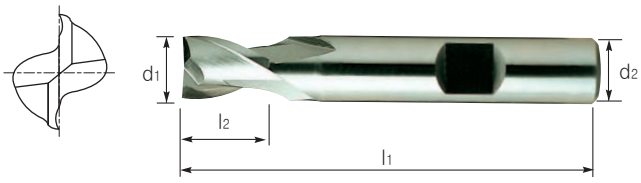
COBALT MILLING CUTTERS
(Standard cobalt milling cutter range)

2 FLUTE, SHORT LENGTH

HSS Co8 | DIN 327 | N | 30° | FLUTE 2 | DIN 1835B

Series No. 100102

▶cutting conditions : p.264, 265



TWO FLUTE END MILLS

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

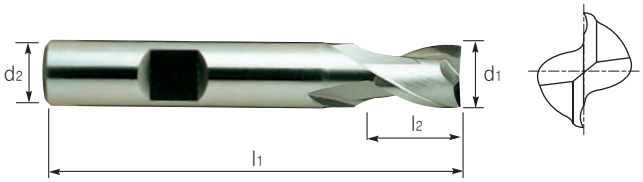
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
1.0	6.0	2.5	47.0	1001020100	1001210100
1.5		3.0		1001020150	1001210150
2.0		4.0	48.0	1001020200	1001210200
2.5		5.0	49.0	1001020250	1001210250
2.8		5.0		1001020280	1001210280
3.0		5.0		1001020300	1001210300
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		1001020575	1001210575
6.0		8.0		1001020600	1001210600
6.5	10.0	10.0	60.0	1001020650	1001210650
6.75		10.0		1001020675	1001210675
7.0		10.0		1001020700	1001210700
7.5		10.0		1001020750	1001210750
7.75		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		13.0	63.0	1001021000	1001211000
11.0	12.0	13.0	70.0	1001021100	1001211100

▶ 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
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



HSS Co8 | DIN 327 | N | ≈ 30° | FLUTE 2 | DIN 1835B

Series No. 100102

▶ cutting conditions : p.264, 265

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	TiAlN HSS Co8
8.0	8.0	11.0	55.0	1001029002	1001219002
8.0		11.0	61.0	1001029003	1001219003
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	1001023200	1001213200

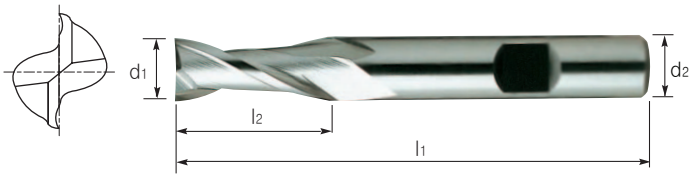
▶ TiAlN Coating to Order

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
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

HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 2 | DIN 1835B



Series No. 101102

▶ cutting conditions : p.264, 265

TWO FLUTE END MILLS

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

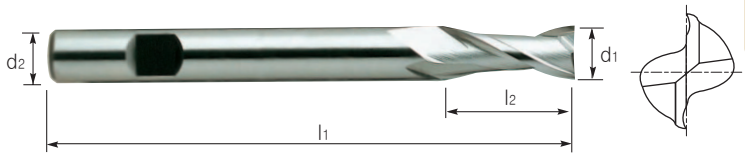
Mill Dia. $e8(d_1)$	Shank Dia. $h6(d_2)$	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
2.0	6.0	7.0	51.0	1011020200	1011210200
3.0		8.0	52.0	1011020300	1011210300
4.0		11.0	55.0	1011020400	1011210400
5.0		13.0	57.0	1011020500	1011210500
6.0		13.0		1011020600	1011210600
7.0	10.0	16.0	66.0	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	25.0	45.0	121.0	1011022500	1011212500

▶ 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
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



HSS Co8 | DIN 844 | N | 30° | FLUTE 2 | DIN 1835B

Series No. 102102

▶cutting conditions : p.264, 265

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	TiAlN 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		22.0	95.0	1021021000	1021211000
12.0	12.0	26.0	110.0	1021021200	1021211200
14.0		26.0		1021021400	1021211400
16.0	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	25.0	45.0	166.0	1021022500	1021212500

▶ TiAlN Coating to Order

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

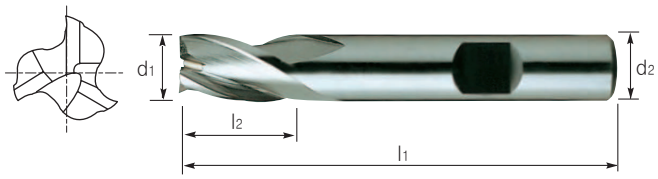
Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
e8	— 14 — 28	— 20 — 38	— 25 — 47	— 32 — 59	— 40 — 73	— 50 — 89
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, STUB LENGTH

HSS Co8 | DIN 327 | N | ≈ 30° | FLUTE 3 | DIN 1835B

Series No. 103102

▶ cutting conditions : p.266, 267



THREE FLUTE END MILLS

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

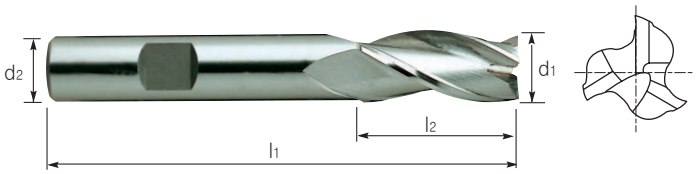
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
2.0	6.0	4.0	48.0	1031020200	1031210200
3.0		5.0	49.0	1031020300	1031210300
4.0		7.0	51.0	1031020400	1031210400
5.0		8.0	52.0	1031020500	1031210500
6.0		8.0		1031020600	1031210600
7.0	10.0	10.0	60.0	1031020700	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	25.0	26.0	102.0	1031022500	1031212500

▶ 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
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



HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 3 | DIN 1835B

Series No. 104102

▶ cutting conditions : p.266, 267

THREE FLUTE END MILLS

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

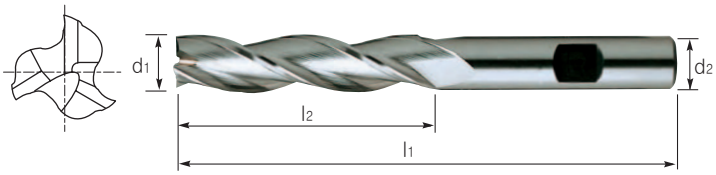
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
1.5	6.0	7.0	51.0	1041020150	1041210150
2.0		7.0		1041020200	1041210200
2.5		8.0	52.0	1041020250	1041210250
3.0		8.0		1041020300	1041210300
3.5		10.0	54.0	1041020350	1041210350
4.0		11.0	55.0	1041020400	1041210400
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	10.0	16.0	66.0	1041020650	1041210650
7.0		16.0		1041020700	1041210700
7.5		16.0		1041020750	1041210750
8.0		19.0	69.0	1041020800	1041210800
8.5		19.0		1041020850	1041210850
9.0		19.0		1041020900	1041210900
10.0		22.0	72.0	1041021000	1041211000
12.0	12.0	26.0	83.0	1041021200	1041211200
14.0		26.0		1041021400	1041211400
16.0	16.0	32.0	92.0	1041021600	1041211600
18.0		32.0		1041021800	1041211800
20.0	20.0	38.0	104.0	1041022000	1041212000
22.0		38.0		1041022200	1041212200
25.0	25.0	45.0	121.0	1041022500	1041212500
28.0		45.0		1041022800	1041212800
30.0		45.0		1041023000	1041213000

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

HSS Co8 | DIN 844 | N | 30° | FLUTE 3 | DIN 1835B



Series No. 105102

▶ cutting conditions : p.266, 267

THREE FLUTE END MILLS

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

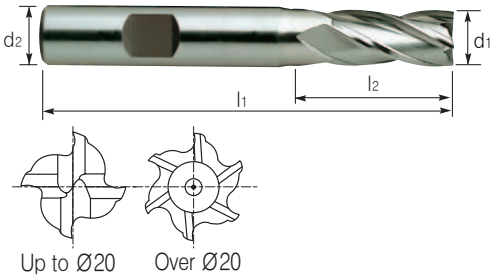
Mill Dia. $e8(d_1)$	Shank Dia. $h6(d_2)$	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
3.0	6.0	12.0	56.0	1051020300	1051210300
4.0		19.0	63.0	1051020400	1051210400
5.0		24.0	68.0	1051020500	1051210500
6.0		24.0		1051020600	1051210600
7.0	10.0	30.0	80.0	1051020700	1051210700
8.0		38.0	88.0	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	25.0	90.0	166.0	1051022500	1051212500

▶ 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
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



HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 4&6 | DIN 1835B | ~Ø20 | Ø22~

Series No. 107102

▶ cutting conditions : p.268, 269

MULTI FLUTE END MILLS

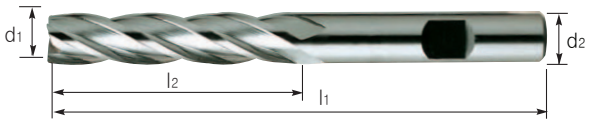
Short Length, 4 & 6 Flute, with Flatted Shank

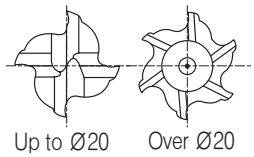
Mill Dia. d_1	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8
2.0	6.0	7.0	51.0	4	1071020200	1071210200
2.5		8.0	52.0	4	1071020250	1071210250
3.0		8.0		4	1071020300	1071210300
3.5		10.0	54.0	4	1071020350	1071210350
4.0		11.0	55.0	4	1071020400	1071210400
5.0		13.0	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		22.0	72.0	4	1071021000	1071211000
11.0	12.0	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		26.0		4	1071021400	1071211400
16.0	16.0	32.0	92.0	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

TOLERANCE	
MILL DIA.	+0.040 −0
SHANK DIA.	h6

4&6 FLUTE, LONG LENGTH

HSS Co8 | DIN 844 | N | ≈ 30° | FLUTE 4&6 | DIN 1835B | ~Ø20 | Ø22~





Series No. 108102

▶cutting conditions : p.268, 269

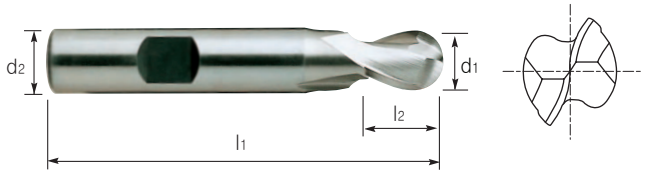
MULTI FLUTE END MILLS

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	TiAlN 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, BALL NOSE, SHORT LENGTH



HSS Co8 | DIN 327 | N | ≈ 30° | FLUTE 2 | DIN 1835B

Series No. 112102

▶cutting conditions : p. 259

R : ±0.02mm

BALL END MILLS

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

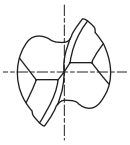
Mill Dia. d_1	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
3.0	6.0	5.0	49.0	1121020300	1121210300
3.5		6.0	50.0	1121020350	1121210350
4.0		7.0	51.0	1121020400	1121210400
4.5		7.0		1121020450	1121210450
5.0		8.0	52.0	1121020500	1121210500
5.5		8.0		1121020550	1121210550
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	20.0	22.0	88.0	1121022000	1121212000
22.0		22.0		1121022200	1121212200
24.0	25.0	26.0	102.0	1121022400	1121212400
25.0		26.0		1121022500	1121212500

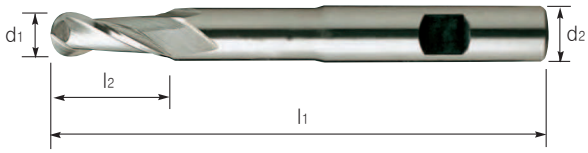
▶ TiAlN Coating to Order

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

2 FLUTE, BALL NOSE LONG LENGTH

HSS Co8 | DIN 1889 | N | ≈ 30° | FLUTE 2 | DIN 1835B





Series No. 114102

▶cutting conditions : p.259

R : ±0.02mm

BALL END MILLS

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

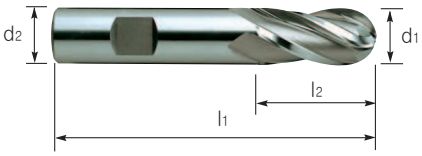
Mill Dia. d_1	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
3.0	6.0	8.0	56.0	1141020300	1141210300
4.0		11.0	63.0	1141020400	1141210400
5.0		13.0	68.0	1141020500	1141210500
6.0		13.0		1141020600	1141210600
8.0	10.0	19.0	88.0	1141020800	1141210800
10.0		22.0	95.0	1141021000	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

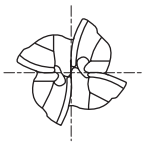
▶ TiAlN Coating to Order

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

4&6 FLUTE, BALL NOSE SHORT LENGTH

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





R : ±0.02mm

Series No. 115102

▶cutting conditions : p.260

BALL END MILLS

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

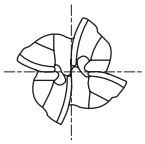
Mill Dia. d_1	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8
6.0	6.0	13.0	57.0	4	1151020600	1151210600
8.0	10.0	19.0	69.0	4	1151020800	1151210800
10.0		22.0	72.0	4	1151021000	1151211000
12.0	12.0	26.0	83.0	4	1151021200	1151211200
16.0	16.0	32.0	92.0	4	1151021600	1151211600
20.0	20.0	38.0	104.0	4	1151022000	1151212000
25.0	25.0	45.0	121.0	6	1151022500	1151212500

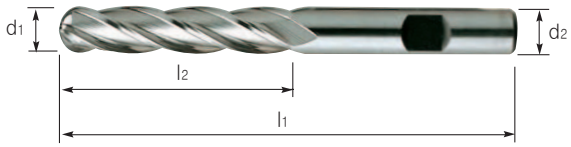
▶ TiAlN Coating to Order

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

4&6 FLUTE, BALL NOSE LONG LENGTH

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





Series No. 116102

▶cutting conditions : p.260

R : ±0.02mm

BALL END MILLS

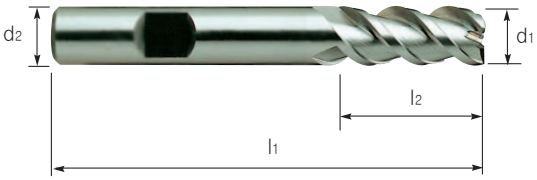
Long Length, Multi Flute, Ball End, with Flatted Shank

Mill Dia. d_1	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN 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

▶ TiAlN Coating to Order

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

MULTI FLUTE, 50° HELIX SHORT LENGTH



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

Series No. 132102

▶ cutting conditions : p.261

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	TiAlN 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		16.0	66.0	3	1321020700	1321210700
8.0	10.0	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

▶ TiAlN Coating to Order

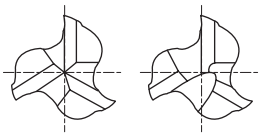
TOLERANCE		
MILL DIA.	Ø2.0~Ø3.0	$^{+0.040}_{-0}$
	Ø4.0~Ø6.0	$^{+0.048}_{-0}$
	Ø7.0~Ø10.0	$^{+0.058}_{-0}$
	Ø10.5~Ø18.0	$^{+0.070}_{-0}$
	Ø18.5~Ø30.0	$^{+0.084}_{-0}$
SHANK DIA.	h6	

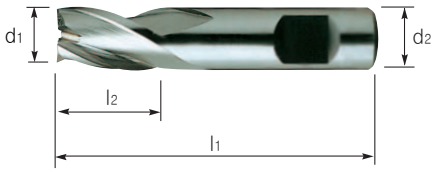
3 FLUTE, SHORT LENGTH, THROW AWAY

HSS Co8 | N | 30° | FLUTE 3 | DIN 1835B

Series No. 128102

▶cutting conditions : p.266,267





THREE FLUTE THROW AWAY END MILLS

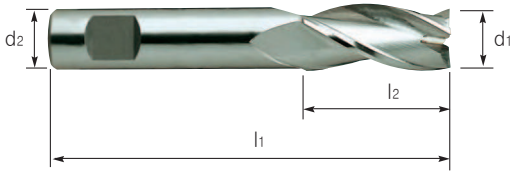
Short Length, 3 Flute, Centre Cutting, with Flatted Shank

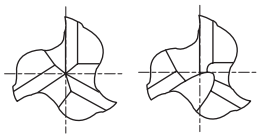
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
1.0	6.0	2.0	34.0	1281020100	1281210100
1.5		3.0		1281020150	1281210150
1.8		3.0		1281020180	1281210180
2.0		4.0	35.0	1281020200	1281210200
2.3		4.0		1281020230	1281210230
2.5		5.0	36.0	1281020250	1281210250
2.8		5.0		1281020280	1281210280
3.0		5.0		1281020300	1281210300
3.3		6.0	37.0	1281020330	1281210330
3.5		6.0		1281020350	1281210350
3.8		7.0	38.0	1281020380	1281210380
4.0		7.0		1281020400	1281210400
4.3		7.0		1281020430	1281210430
4.5		7.0		1281020450	1281210450
4.8		8.0	39.0	1281020480	1281210480
5.0		8.0		1281020500	1281210500
5.5		8.0		1281020550	1281210550
5.75		8.0		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		1281020750	1281210750
8.0		11.0	43.0	1281020800	1281210800
8.5		11.0	48.0	1281020850	1281210850
9.0	10.0	11.0		1281020900	1281210900
9.5		11.0		1281020950	1281210950
10.0		13.0	50.0	1281021000	1281211000
12.0	12.0	16.0	58.0	1281021200	1281211200
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	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, THROW AWAY





Up to Ø2.0 Over Ø2.0

HSS Co8 | N | 30° | FLUTE 3 | DIN 1835B

Series No. 129102

▶cutting conditions : p.266,267

THREE FLUTE THROW AWAY END MILLS

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

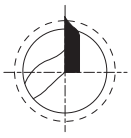
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
1.5	6.0	4.0	35.0	1291020150	1291210150
2.0		7.0	38.0	1291020200	1291210200
2.5		8.0	39.0	1291020250	1291210250
3.0		8.0		1291020300	1291210300
3.5		10.0	41.0	1291020350	1291210350
4.0		11.0	42.0	1291020400	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		1291020600	1291210600
6.5	8.0	16.0	48.0	1291020650	1291210650
7.0		16.0		1291020700	1291210700
7.5		16.0		1291020750	1291210750
8.0		19.0	51.0	1291020800	1291210800
8.5	10.0	19.0	56.0	1291020850	1291210850
9.0		19.0		1291020900	1291210900
10.0		22.0	59.0	1291021000	1291211000

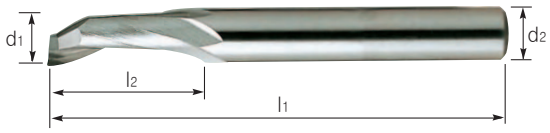
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	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

1 FLUTE END MILLS for ALUMINIUM

HSS Co5 | W | FLUTE 1 | DIN 1835A





Series No. 135316

▶ cutting conditions : p.262

ONE FLUTE END MILLS

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

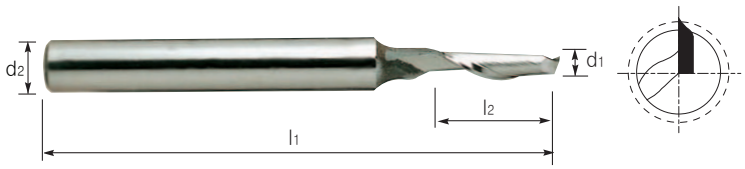
Mill Dia. js14(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co5	TiAlN HSS Co5
3.0	8.0	12.0	60.0	1353160300	1353270300
4.0		12.0		1353160400	1353270400
5.0		14.0		1353160500	1353270500
6.0		14.0		1353160600	1353270600
8.0		14.0	80.0	1353160800	1353270800
10.0		14.0		1353161000	1353271000

▶ 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
js14	± 125	± 150	± 180	± 215	± 260	± 310
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

1 FLUTE END MILLS for ALUMINIUM



HSS Co5 | W | FLUTE 1 | DIN 1835A

Series No. 136316

▶ cutting conditions : p.262

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	TiAlN 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

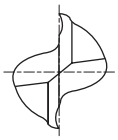
▶ TiAlN Coating to Order

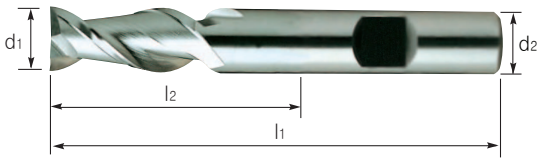
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

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
js14	± 125	± 150	± 180	± 215	± 260	± 310
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

2 FLUTE, 42° HELIX SHORT LENGTH, for ALUMINIUM

HSS Co8 | DIN 844 | W | 42° | FLUTE 2 | DIN 1835B





Series No. 131102

▶ cutting conditions : p.263

END MILLS FOR ALUMINIUM

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

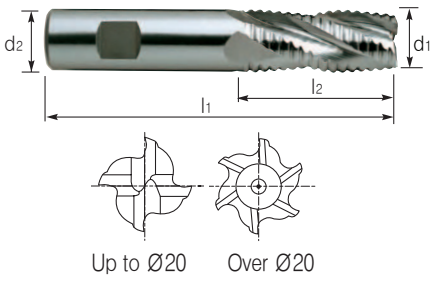
Mill Dia. e8(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
2.0	6.0	7.0	51.0	1311020200	1311210200
2.5		8.0	52.0	1311020250	1311210250
3.0		8.0		1311020300	1311210300
3.5		10.0	54.0	1311020350	1311210350
4.0		11.0	55.0	1311020400	1311210400
4.5		11.0		1311020450	1311210450
5.0		13.0	57.0	1311020500	1311210500
5.5		13.0		1311020550	1311210550
6.0		13.0		1311020600	1311210600
6.5	10.0	16.0	66.0	1311020650	1311210650
7.0		16.0		1311020700	1311210700
7.5		16.0		1311020750	1311210750
8.0		19.0	69.0	1311020800	1311210800
8.5		19.0		1311020850	1311210850
9.0		19.0		1311020900	1311210900
10.0		22.0	72.0	1311021000	1311211000
11.0	12.0	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

▶ 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
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, COARSE PITCH ROUGHING, SHORT LENGTH



HSS Co8 | DIN 844 | NR | 30° | FLUTE 3 - 6 | COARSE | DIN 1835B | ~Ø20 | Ø22~

Series No. 118102

▶ cutting conditions : p.270

ROUGHING END MILLS

Short Length, Multi-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	No.of Flute	HSS Co8	TiAlN 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		22.0	72.0	4	1181021000	1181211000
11.0	12.0	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		26.0		4	1181021500	1181211500
16.0	16.0	32.0	92.0	4	1181021600	1181211600
17.0		32.0		4	1181021700	1181211700
18.0		32.0		4	1181021800	1181211800
19.0		32.0		4	1181021900	1181211900
20.0		38.0	98.0	4	1181029001	1181219001
20.0	20.0	38.0	104.0	4	1181022000	1181212000
22.0		38.0		5	1181022200	1181212200
22.0	25.0	38.0	114.0	5	1181029002	1181219002
24.0		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		45.0		6	1181023000	1181213000
32.0	32.0	53.0	133.0	6	1181023200	1181213200
35.0		53.0		6	1181023500	1181213500
36.0		53.0		6	1181023600	1181213600
38.0		63.0	155.0	6	1181023800	1181213800
38.0	40.0	63.0		6	1181029003	1181219003
40.0	32.0	63.0		6	1181024000	1181214000
40.0	40.0	63.0		6	1181029004	1181219004
50.0	50.0	75.0	177.0	6	1181025000	1181215000

▶ TiAlN Coating to Order

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

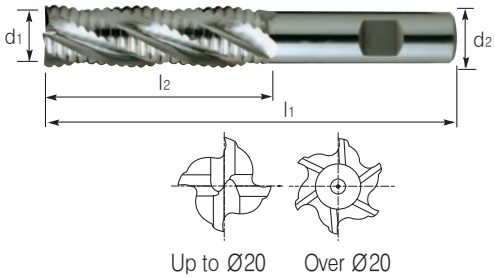
Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

MULTI. FLUTE, COARSE PITCH ROUGHING, LONG LENGTH

HSS Co8 | DIN 844 | NR | 30° | FLUTE 3 - 6 | COARSE | DIN 1835B | ~Ø20 | Ø22~

Series No. 119102

▶ cutting conditions : p.270



ROUGHING END MILLS

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

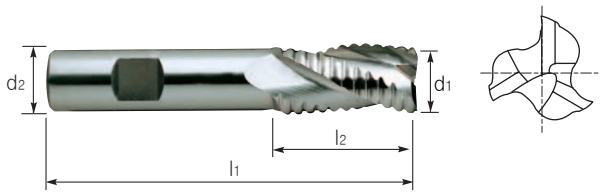
Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8
6.0	6.0	24.0	68.0	3	1191020600	1191210600
7.0	10.0	30.0	80.0	3	1191020700	1191210700
8.0		38.0	88.0	3	1191020800	1191210800
9.0		38.0		3	1191020900	1191210900
10.0		45.0	95.0	4	1191021000	1191211000
11.0	12.0	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		53.0		4	1191021500	1191211500
16.0	16.0	63.0	123.0	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		75.0	135.0	4	1191029001	1191219001
20.0	20.0	75.0	141.0	4	1191022000	1191212000
22.0		75.0		5	1191022200	1191212200
22.0	25.0	75.0	151.0	5	1191029002	1191219002
24.0		90.0	166.0	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	217.0	6	1191023800	1191213800
38.0	40.0	125.0		6	1191029003	1191219003
40.0	32.0	125.0		6	1191024000	1191214000
40.0	40.0	125.0		6	1191029004	1191219004

▶ 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 FLUTE, COARSE PITCH ROUGHING, SHORT LENGTH



HSS Co8 | DIN 844 | NR | 30° | FLUTE 3 | COARSE | DIN 1835B

Series No. 133102

▶ cutting conditions : p.270

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	TiAlN 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	1331214000

▶ TiAlN Coating to Order

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

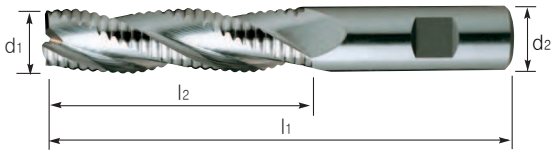
Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

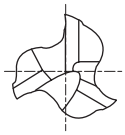
3 FLUTE, COARSE PITCH ROUGHING, LONG LENGTH

HSS Co8 | DIN 844 | NR | 30° | FLUTE 3 | COARSE | DIN 1835B

Series No. 134102

▶ cutting conditions : p.270





ROUGHING END MILLS

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

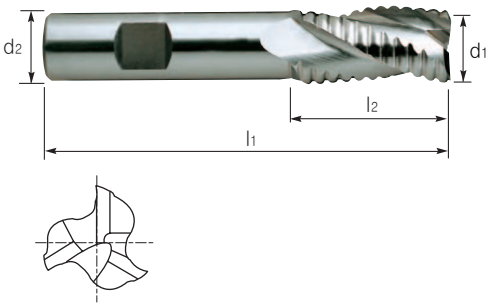
Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
10.0	10.0	45.0	95.0	1341021000	1341211000
12.0	12.0	53.0	110.0	1341021200	1341211200
14.0		53.0		1341021400	1341211400
16.0	16.0	63.0	123.0	1341021600	1341211600
18.0		63.0		1341021800	1341211800
20.0	20.0	75.0	141.0	1341022000	1341212000
22.0		75.0		1341022200	1341212200
25.0	25.0	90.0	166.0	1341022500	1341212500
28.0		90.0		1341022800	1341212800
30.0		90.0		1341023000	1341213000
36.0	32.0	106.0	186.0	1341023600	1341213600
40.0		125.0	217.0	1341024000	1341214000

▶ 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 FLUTE, 37° HELIX, COARSE PITCH ROUGHING, SHORT LENGTH for ALUMINIUM



HSS Co8 | DIN 844 | WR | 37° | FLUTE 3 | ALUMINIUM | DIN 1835B

Series No. 124102

▶ cutting conditions : p. 270

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	TiAlN 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	72.0	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

▶ TiAlN Coating to Order

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

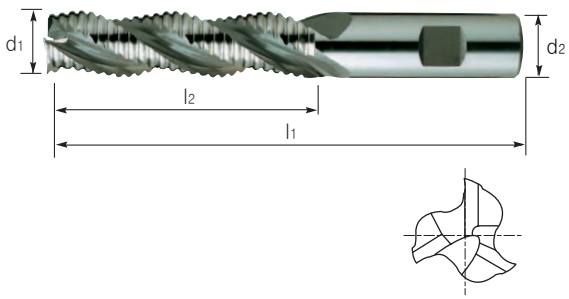
Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, 37° HELIX, COARSE PITCH ROUGHING, LONG LENGTH for ALUMINIUM

HSS Co8 | DIN 844 | WR | 37° | FLUTE 3 | ALUMINIUM | DIN 1835B

Series No. 125102

▶ cutting conditions : p.270



ROUGHING END MILLS FOR ALUMINIUM

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

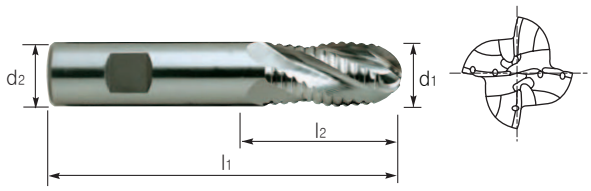
Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
10.0	10.0	45.0	95.0	1251021000	1251211000
12.0	12.0	53.0	110.0	1251021200	1251211200
14.0		53.0		1251021400	1251211400
16.0	16.0	63.0	123.0	1251021600	1251211600
18.0		63.0		1251021800	1251211800
20.0	20.0	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, BALL NOSE COARSE PITCH ROUGHING SHORT LENGTH



HSS Co8 | DIN 1889 | NR | 30° | FLUTE 3&4 | COARSE | DIN 1835B

Series No. 127102

▶cutting conditions : p.272

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

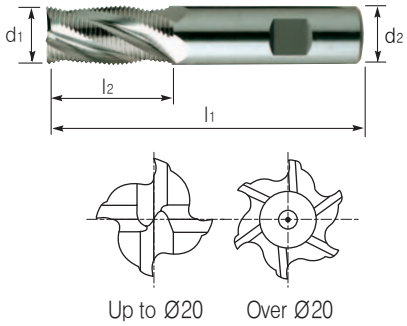
Toleranzwerte in µm / Tolerance range in µm						
Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

MULTI. FLUTE, FINE PITCH ROUGHING, SHORT LENGTH

HSS Co8 | DIN 844 | HR | 30° | FLUTE 3 - 6 | FINE | DIN 1835B | ~Ø20 | Ø22

Series No. 121102

▶cutting conditions : p.270



FINE PITCH ROUGHING END MILLS

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

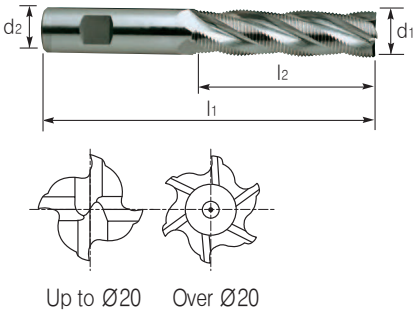
Mill Dia. js12(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8
6.0	6.0	13.0	57.0	3	1211020600	1211210600
8.0	10.0	19.0	69.0	3	1211020800	1211210800
10.0		22.0	72.0	4	1211021000	1211211000
12.0	12.0	26.0	83.0	4	1211021200	1211211200
14.0		26.0		4	1211021400	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, FINE PITCH ROUGHING, LONG LENGTH

HSS Co8 | DIN 844 | HR | 30° | FLUTE 3 - 6 | FINE | DIN 1835B | ~Ø20 | Ø22~



Up to Ø20 Over Ø20

Series No. 122102

▶cutting conditions : p.270

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		45.0	95.0	4	1221021000	1221211000
11.0	12.0	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		53.0		4	1221021500	1221211500
16.0	16.0	63.0	123.0	4	1221021600	1221211600
17.0		63.0		4	1221021700	1221211700
18.0		63.0		4	1221021800	1221211800
19.0		63.0		4	1221021900	1221211900
20.0	20.0	75.0	141.0	4	1221022000	1221212000
22.0		75.0		5	1221022200	1221212200
24.0	25.0	90.0	166.0	5	1221022400	1221212400
25.0		90.0		5	1221022500	1221212500
26.0		90.0		6	1221022600	1221212600
28.0		90.0		6	1221022800	1221212800
30.0		90.0		6	1221023000	1221213000
32.0	32.0	106.0	186.0	6	1221023200	1221213200
35.0		106.0		6	1221023500	1221213500
36.0		106.0		6	1221023600	1221213600
38.0		125.0	217.0	6	1221023800	1221213800
38.0	40.0	125.0		6	1221029001	1221219001
40.0	32.0	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

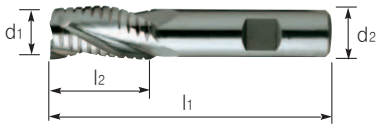
Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

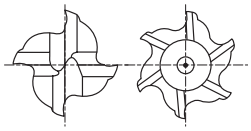
MULTI. FLUTE, ROUGHING & FINISHING, SHORT LENGTH

HSS Co8 | DIN 844 | NF | 30° | FLUTE 3 - 6 | ROUGHING FINISHING | DIN 1835B | ~Ø20 | Ø22~

Series No. 126102

▶cutting conditions : p.273





Up to Ø20 Over Ø20

ROUGHING-FINISHING END MILLS

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

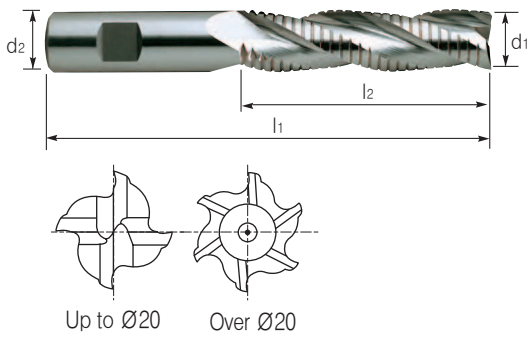
Mill Dia. k10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	HSS Co8	TiAlN HSS Co8
6.0	6.0	13.0	57.0	3	1261020600	1261210600
7.0	10.0	16.0	66.0	3	1261020700	1261210700
8.0		19.0	69.0	4	1261020800	1261210800
9.0		19.0		4	1261020900	1261210900
10.0		22.0	72.0	4	1261021000	1261211000
11.0	12.0	22.0	79.0	4	1261021100	1261211100
12.0		26.0	83.0	4	1261021200	1261211200
13.0		26.0		4	1261021300	1261211300
14.0		26.0		4	1261021400	1261211400
16.0	16.0	32.0	92.0	4	1261021600	1261211600
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

▶ 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
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, ROUGHING & FINISHING, LONG LENGTH



HSS Co8 | DIN 844 | NF | 30° | FLUTE 3 - 5 | ROUGHING FINISHING | DIN 1835B | ~Ø20 | Ø22~

Series No. 137102

▶ cutting conditions : p.273

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	TiAlN 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

▶ TiAlN Coating to Order

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

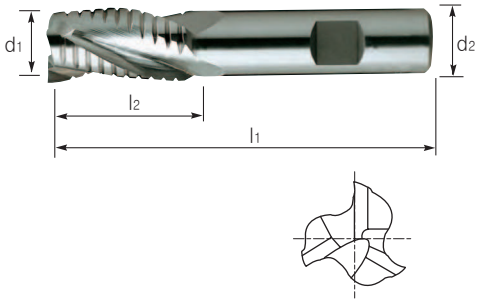
Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
k10	+ 40 0	+ 48 0	+ 58 0	+ 70 0	+ 84 0	+ 100 0
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

3 FLUTE, ROUGHING & FINISHING SHORT LENGTH

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

Series No. 138102

▶ cutting conditions : p.273



ROUGHING-FINISHING END MILLS

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

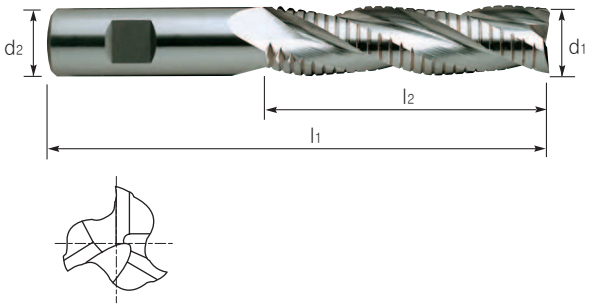
Mill Dia. k10(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	HSS Co8	TiAlN HSS Co8
6.0	6.0	13.0	57.0	1381020600	1381210600
8.0	10.0	19.0	69.0	1381020800	1381210800
10.0		22.0	72.0	1381021000	1381211000
12.0	12.0	26.0	83.0	1381021200	1381211200
14.0		26.0		1381021400	1381211400
16.0	16.0	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		45.0		1381023000	1381213000
32.0	32.0	53.0	133.0	1381023200	1381213200
36.0		53.0		1381023600	1381213600
40.0		63.0	155.0	1381024000	1381214000

▶ 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
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, ROUGHING & FINISHING LONG LENGTH



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

Series No. 139102

▶ cutting conditions : p.273

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	TiAlN 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

▶ TiAlN Coating to Order

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

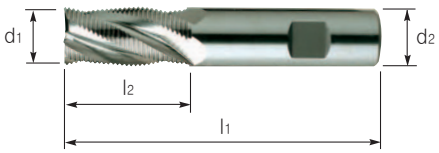
Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
k10	+ 40 0	+ 48 0	+ 58 0	+ 70 0	+ 84 0	+ 100 0
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

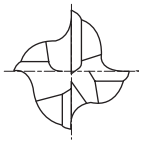
MULTI. FLUTE, FINE PITCH ROUGHING SHORT LENGTH

PREMIUM PM | DIN 844 | HR | 30° | FLUTE 4 - 6 | FINE | DIN 1835B | ~Ø20 | Ø22~

Series No. 121113

▶cutting conditions : p.271





~Ø20 : Center Cut
Ø20~ : Center Hole

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(d_1)	Shank Dia. h6(d_2)	Length of Cut l_2	Overall Length l_1	No.of Flute	ASP-60	TiAlN 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	83.0	5	1211131200	1211221200
13.0		26.0		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

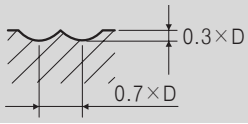
Toleranzwerte in µm / Tolerance range in µm Nennmaßbereich in mm / Nominal–Diameter in mm						
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30	über 30 bis 50 over 30 to 50
js12	± 50	± 60	± 75	± 90	± 105	± 125
h6	0 — 6	0 — 8	0 — 9	0 — 11	0 — 13	0 — 16

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

2 FLUTE BALL NOSE

114102, 112102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.5 × 3.0	4500	95	3400	70	2000	30	1400	20	11000	230
R 2.0 × 4.0	3200	115	2400	80	1400	35	1000	25	8000	260
R 3.0 × 6.0	2200	135	1700	90	1000	45	700	25	5600	280
R 4.0 × 8.0	1600	160	1200	105	700	50	500	30	4000	350
R 5.0 × 10.0	1300	180	1000	120	560	60	400	35	3200	360
R 6.0 × 12.0	1000	170	800	105	450	55	320	35	2500	340
R 8.0 × 16.0	800	150	600	100	350	55	250	35	2000	300
R 10.0 × 20.0	600	140	500	85	300	50	200	35	1600	280
R 12.5 × 25.0	500	130	400	70	220	40	160	30	1300	250



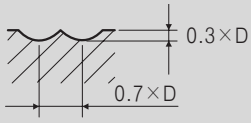
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

2 FLUTE BALL NOSE, TiAlN-COATED

114121, 112121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.5 × 3.0	6300	135	4750	100	2800	40	1950	30	15400	320
R 2.0 × 4.0	4500	160	3350	110	1950	50	1400	35	11200	365
R 3.0 × 6.0	3100	190	2400	125	1400	65	1000	35	7850	390
R 4.0 × 8.0	2250	225	1700	145	1000	70	700	40	5600	490
R 5.0 × 10.0	1800	250	1400	170	800	85	550	50	4500	505
R 6.0 × 12.0	1400	240	1100	145	650	75	450	50	3500	475
R 8.0 × 16.0	1100	210	850	140	500	75	350	50	2800	420
R 10.0 × 20.0	850	195	700	120	400	70	300	50	2250	390
R 12.5 × 25.0	700	180	550	100	300	55	200	40	1800	350



※The FEED, in long & extra long types, should be reduced by around 50%

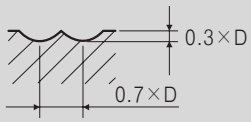
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

MULTI FLUTE BALL NOSE

115102, 116102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 3.0 × 6.0	2200	200	1700	135	1000	70	700	40	5600	420
R 4.0 × 8.0	1600	240	1200	160	700	75	500	45	4000	530
R 5.0 × 10.0	1300	270	1000	180	560	90	400	50	3200	540
R 6.0 × 12.0	1000	260	800	160	450	80	320	50	2500	510
R 8.0 × 16.0	800	230	600	150	350	80	250	50	2000	450
R 10.0 × 20.0	600	210	500	130	300	75	200	50	1600	420
R 12.5 × 25.0	500	200	400	105	220	60	160	45	1300	380



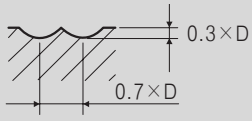
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

MULTI FLUTE BALL NOSE, TiAlN-COATED

115121, 116121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 3.0 × 6.0	3100	280	2400	190	1400	100	1000	55	7850	590
R 4.0 × 8.0	2250	335	1700	225	1000	105	700	65	5600	740
R 5.0 × 10.0	1800	380	1400	250	800	125	550	70	4500	755
R 6.0 × 12.0	1400	365	1100	225	650	110	450	70	3500	715
R 8.0 × 16.0	1100	320	850	210	500	110	350	70	2800	630
R 10.0 × 20.0	850	295	700	180	400	105	300	70	2250	590
R 12.5 × 25.0	700	280	550	145	300	85	200	65	1800	530



※The FEED, in long & extra long types, should be reduced by around 50%

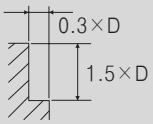
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

MULTI FLUTE, 50° HELIX SHORT LENGTH

132102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40	
STRENGTH	500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
2	5000	35	4500	25	2500	10
3	3500	50	2800	35	1800	20
4	2500	60	2000	40	1200	25
5	2000	75	1800	55	1000	30
6	1800	85	1300	55	900	35
8	1200	95	1000	65	600	40
10	1000	95	900	70	500	40
12	900	110	700	70	450	45
14	800	95	600	70	400	45
16	600	95	500	65	300	40
18	550	95	450	65	280	40
20	500	95	450	65	250	40
22	500	95	400	65	250	40
25	450	85	350	55	200	30
28	400	75	300	50	180	25
30	350	65	280	45	180	25

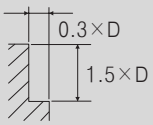


RPM=REVOLUTION PER MIN.
FEED=mm/min.

MULTI FLUTE, 50° HELIX SHORT LENGTH,TiAlN-COATED

132121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40	
STRENGTH	500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
2	7000	50	6300	35	3500	15
3	4900	70	3920	50	2520	30
4	3500	85	2800	55	1680	35
5	2800	105	2520	75	1400	40
6	2520	120	1820	75	1260	50
8	1680	135	1400	90	840	55
10	1400	135	1260	100	700	55
12	1260	155	980	100	630	65
14	1120	135	840	100	560	65
16	840	135	700	90	420	55
18	770	135	630	90	390	55
20	700	135	630	90	350	55
22	700	135	560	90	350	55
25	630	120	490	75	280	40
28	560	105	420	70	250	35
30	490	90	390	65	250	35



RPM=REVOLUTION PER MIN.
FEED=mm/min.

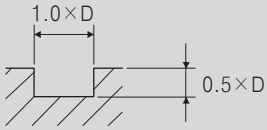
TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

HSS-Co5(M35), 1 FLUTE E/M FOR ALUMINUM

135316, 136316

<Slotting>

MATERIAL	ALUMINUM ALUMINUM ALLOYS	
DIAMETER	RPM	FEED
3	12000	280
4	11000	300
5	10500	300
6	10500	350
7	10000	330
8	9500	400
9	9300	450
10	9000	500



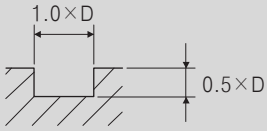
RPM=REVOLUTION PER MIN.
FEED=mm/min.

HSS-Co5(M35), 1 FLUTE E/M FOR ALUMINUM, TiAlN-COATED

135327, 136327

<Slotting>

MATERIAL	ALUMINUM ALUMINUM ALLOYS	
DIAMETER	RPM	FEED
3	16800	390
4	15400	420
5	14700	420
6	14700	490
7	14000	460
8	13300	560
9	13000	630
10	12600	700



RPM=REVOLUTION PER MIN.
FEED=mm/min.

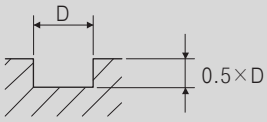
TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

2FLUTE, SHORT LENGTH, FOR ALUMINIUM

131102

<Slotting>

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	8000	560
6	7000	700
8	6000	850
10	5000	1200
12	5000	1200
14	3500	1240
16	3500	1240
18	2300	1300
20	2300	1300

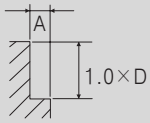


RPM=REVOLUTION PER MIN.
FEED=mm/min.

<Side Cutting>

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	8000	730
6	7000	900
8	6000	1100
10	5000	1500
12	5000	1500
14	3500	1600
16	3500	1600
18	2300	1700
20	2300	1700

A : Ø3 ~ Ø10 = 0.25×D
Ø12 ~ Ø20 = 0.5×D



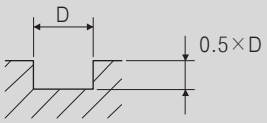
RPM=REVOLUTION PER MIN.
FEED=mm/min.

2FLUTE, SHORT LENGTH, FOR ALUMINIUM,TiAlN-COATED

131121

<Slotting>

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	11200	785
6	9800	980
8	8400	1190
10	7000	1680
12	7000	1680
14	4900	1740
16	4900	1740
18	3220	1820
20	3220	1820

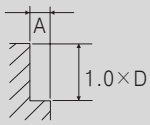


RPM=REVOLUTION PER MIN.
FEED=mm/min.

<Side Cutting>

MATERIAL	ALUMINUM NONFERROUS METALS	
DIAMETER	RPM	FEED
3	11200	1020
6	9800	1260
8	8400	1540
10	7000	2100
12	7000	2100
14	4900	2240
16	4900	2240
18	3220	2380
20	3220	2380

A : Ø3 ~ Ø10 = 0.25×D
Ø12 ~ Ø20 = 0.5×D



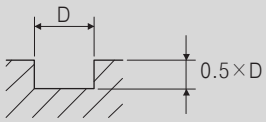
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

2FLUTE, SLOTTING

102102, 100102, 101102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5600	40	4500	30	4000	30	2200	15	12000	160
3	3500	55	3200	45	2500	40	1600	20	11000	250
4	2800	70	2200	55	1800	45	1100	30	8000	290
5	2200	90	1800	70	1600	60	900	35	6300	310
6	1800	90	1600	80	1200	60	800	40	5600	310
8	1400	100	1100	90	900	70	560	45	4000	390
10	1100	100	900	90	800	80	450	45	3100	400
12	900	110	800	100	630	80	400	50	2500	380
14	800	110	700	90	560	80	350	50	2200	350
16	700	110	560	90	450	70	280	45	2000	350
18	630	100	500	90	400	70	250	45	1800	350
20	560	100	450	90	400	70	220	45	1600	320
22	500	100	450	90	350	70	220	45	1400	300
25	450	90	400	80	310	60	180	35	1200	280
28	400	80	350	70	280	55	160	30	1100	270
30	350	70	310	60	250	50	160	30	1100	270
32	350	70	280	55	220	45	140	30	1000	240
36	310	60	250	50	200	40	120	25	900	220
40	280	60	220	50	180	40	110	25	800	200



※The FEED, in long & extra long types, should be reduced by around 50%

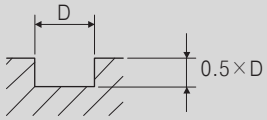
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

2FLUTE, SLOTTING, TiAlN-COATED

102121, 100121, 101121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7850	55	6300	40	5600	40	3100	20	16800	225
3	4900	75	4500	65	3500	55	2250	30	15400	350
4	3900	100	3100	75	2500	65	1550	40	11200	405
5	3100	125	2500	100	2250	85	1250	50	8800	435
6	2500	125	2250	110	1700	85	1100	55	7850	435
8	1950	140	1550	125	1250	100	800	65	5600	545
10	1550	140	1250	125	1100	110	650	65	4350	560
12	1250	155	1100	140	900	110	550	70	3500	530
14	1100	155	1000	125	800	110	500	70	3100	490
16	1000	155	800	125	650	100	400	65	2800	490
18	900	140	700	125	550	100	350	65	2500	490
20	800	140	650	125	550	100	300	65	2250	450
22	700	140	650	125	500	100	300	65	1950	420
25	650	125	550	110	450	85	250	50	1700	390
28	550	110	500	100	400	75	200	40	1550	380
30	500	100	450	85	350	70	200	40	1550	380
32	500	100	400	75	300	65	200	40	1400	335
36	450	85	350	70	300	55	150	35	1250	310
40	400	85	300	70	250	55	150	35	1100	280



※The FEED, in long & extra long types, should be reduced by around 50%

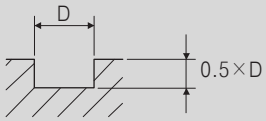
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

3 FLUTE SLOTTING

105102, 128102, 129102, 103102, 104102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5600	60	4500	45	4000	45	2200	20	12000	240
3	3500	80	3200	65	2500	60	1600	30	11000	380
4	2800	105	2200	80	1800	65	1100	45	8000	440
5	2200	135	1800	105	1600	90	900	50	6300	470
6	1800	135	1600	120	1200	90	800	60	5600	470
8	1400	150	1100	135	900	105	560	65	4000	580
10	1100	150	900	135	800	120	450	65	3100	600
12	900	165	800	150	630	120	400	75	2500	570
14	800	165	700	135	560	120	350	75	2200	530
16	700	165	560	135	450	105	280	65	2000	530
18	630	150	500	135	400	105	250	65	1800	530
20	560	150	450	135	400	105	220	65	1600	480
22	500	150	450	135	350	105	220	65	1400	450
25	450	135	400	120	310	90	180	50	1200	420
28	400	120	350	105	280	80	160	45	1100	400
30	350	105	310	90	250	75	160	45	1100	400



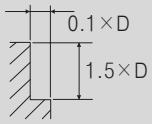
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

3 FLUTE FINISH SIDE CUTTING

105102, 128102, 129102, 103102, 104102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5600	60	4500	40	4000	35	2200	15	12000	180
3	3500	80	3200	60	2500	45	1600	20	11000	280
4	2800	105	2200	75	1800	50	1100	30	8000	330
5	2200	135	1800	95	1600	65	900	35	6300	350
6	1800	135	1600	110	1200	65	800	45	5600	350
8	1400	150	1100	120	900	80	560	50	4000	440
10	1100	150	900	120	800	90	450	50	3100	450
12	900	165	800	135	630	90	400	55	2500	430
14	800	165	700	120	560	90	350	55	2200	400
16	700	165	560	120	450	80	280	50	2000	400
18	630	150	500	120	400	80	250	50	1800	400
20	560	150	450	120	400	80	220	50	1600	360
22	500	150	450	120	350	80	220	50	1400	340
25	450	135	400	110	310	65	180	35	1200	320
28	400	120	350	95	280	60	160	30	1100	300
30	350	105	310	80	250	55	160	30	1100	300



※The FEED, in long & extra long types, should be reduced by around 50%

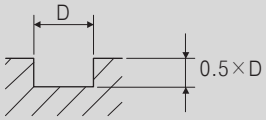
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

3 FLUTE SLOTTING, TiAlN-COATED

105121, 128121, 129121, 103121, 104121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7850	85	6300	65	5600	65	3100	30	16800	335
3	4900	110	4500	90	3500	85	2250	40	15400	530
4	3900	145	3100	110	2500	90	1550	65	11200	615
5	3100	190	2500	145	2250	125	1250	70	8800	660
6	2500	190	2250	170	1700	125	1100	85	7850	660
8	1950	210	1550	190	1250	145	800	90	5600	810
10	1550	210	1250	190	1100	170	650	90	4350	840
12	1250	230	1100	210	900	170	550	105	3500	800
14	1100	230	1000	190	800	170	500	105	3100	740
16	1000	230	800	190	650	145	400	90	2800	740
18	900	210	700	190	550	145	350	90	2500	740
20	800	210	650	190	550	145	300	90	2250	670
22	700	210	650	190	500	145	300	90	1950	630
25	650	190	550	170	450	125	250	70	1700	590
28	550	170	500	145	400	110	200	65	1550	560
30	500	145	450	125	350	105	200	65	1550	560



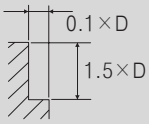
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

3 FLUTE SIDE CUTTING, TiAlN-COATED

105121, 128121, 129121, 103121, 104121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7850	85	6300	55	5600	50	3100	20	16800	250
3	4900	110	4500	85	3500	65	2250	30	15400	390
4	3900	145	3100	105	2500	70	1550	40	11200	460
5	3100	190	2500	135	2250	90	1250	50	8800	490
6	2500	190	2250	155	1700	90	1100	65	7850	490
8	1950	210	1550	170	1250	110	800	70	5600	615
10	1550	210	1250	170	1100	125	650	70	4350	630
12	1250	230	1100	190	900	125	550	75	3500	600
14	1100	230	1000	170	800	125	500	75	3100	560
16	1000	230	800	170	650	110	400	70	2800	560
18	900	210	700	170	550	110	350	70	2500	560
20	800	210	650	170	550	110	300	70	2250	505
22	700	210	650	170	500	110	300	70	1950	475
25	650	190	550	155	450	90	250	50	1700	450
28	550	170	500	135	400	85	200	40	1550	420
30	500	145	450	110	350	75	200	40	1550	420



※The FEED, in long & extra long types, should be reduced by around 50%

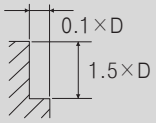
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

4&6 FLUTE, FINISH SIDE CUTTING

107102, 108102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5600	80	4500	55	4000	45	2200	20	12000	240
3	3500	110	3200	80	2500	60	1600	30	11000	380
4	2800	140	2200	100	1800	65	1100	45	8000	440
5	2200	180	1800	125	1600	90	900	50	6300	470
6	1800	180	1600	145	1200	90	800	60	5600	470
8	1400	200	1100	160	900	105	560	65	4000	580
10	1100	200	900	160	800	120	450	65	3100	600
12	900	220	800	180	630	120	400	75	2500	570
14	800	220	700	160	560	120	350	75	2200	530
16	700	220	560	160	450	105	280	65	2000	530
18	630	200	500	160	400	105	250	65	1800	530
20	560	200	450	160	400	105	220	65	1600	480
22	500	200	450	160	350	105	220	65	1400	450
25	450	180	400	145	310	90	180	50	1200	420
28	400	160	350	125	280	80	160	45	1100	400
30	350	140	310	110	250	75	160	45	1100	400
32	350	140	280	100	220	65	140	45	1000	360
36	310	120	250	90	200	60	120	35	900	330
40	280	120	220	90	180	60	110	35	800	300



※The FEED, in long & extra long types, should be reduced by around 50%

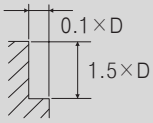
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

4&6 FLUTE, FINISH SIDE CUTTING, TiAlN-COATED

107121, 108121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7850	110	6300	75	5600	65	3100	30	16800	335
3	4900	155	4500	110	3500	85	2250	40	15400	530
4	3900	195	3100	140	2500	90	1550	65	11200	615
5	3100	250	2500	175	2250	125	1250	70	8800	660
6	2500	250	2250	205	1700	125	1100	85	7850	660
8	1950	280	1550	225	1250	145	800	90	5600	810
10	1550	280	1250	225	1100	170	650	90	4350	840
12	1250	310	1100	250	900	170	550	105	3500	800
14	1100	310	1000	225	800	170	500	105	3100	740
16	1000	310	800	225	650	145	400	90	2800	740
18	900	280	700	225	550	145	350	90	2500	740
20	800	280	650	225	550	145	300	90	2250	670
22	700	280	650	225	500	145	300	90	1950	630
25	650	250	550	205	450	125	250	70	1700	590
28	550	225	500	175	400	110	200	65	1550	560
30	500	195	450	155	350	105	200	65	1550	560
32	500	195	400	140	300	90	200	65	1400	505
36	450	170	350	125	300	85	150	50	1250	460
40	400	170	300	125	250	85	150	50	1100	420



※The FEED, in long & extra long types, should be reduced by around 50%

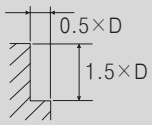
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

MULTI FLUTE, SIDE CUTTING, ROUGHING

118102, 119102, 121102, 124102, 125102, 122102, 133102, 134102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	1800	80	1600	60	1200	55	800	30	4500	200
8	1400	105	1100	75	900	65	560	35	3100	230
10	1100	150	900	120	800	110	450	60	2500	350
12	900	180	800	140	630	110	400	70	2000	400
14	800	180	700	140	560	110	350	70	1800	420
16	700	180	560	140	450	110	280	70	1600	450
18	630	180	500	140	400	110	250	70	1400	470
20	560	180	450	140	400	110	220	70	1200	500
22	500	220	450	170	350	140	220	85	1100	470
25	450	220	400	170	310	140	180	85	1000	450
28	400	210	350	160	280	130	160	85	900	510
30	350	210	310	160	250	130	160	85	900	530
32	350	210	280	160	220	130	140	85	800	500
36	310	210	250	160	200	130	120	85	700	470
40	280	200	220	150	180	120	110	80	630	450
50	220	200	180	170	160	140	90	80	500	370



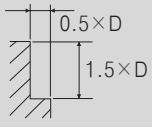
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

MULTI FLUTE, SIDE CUTTING, ROUGHING, TiAlN-COATED

118121, 119121, 121121, 124121, 125121, 122121, 133121, 134121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2500	110	2250	85	1700	75	1100	40	6300	280
8	1950	145	1550	105	1250	90	800	50	4350	320
10	1550	210	1250	170	1100	155	650	85	3500	490
12	1250	250	1100	195	900	155	550	100	2800	560
14	1100	250	1000	195	800	155	500	100	2500	590
16	1000	250	800	195	650	155	400	100	2250	630
18	900	250	700	195	550	155	350	100	1950	660
20	800	250	650	195	550	155	300	100	1700	700
22	700	310	650	240	500	195	300	120	1550	660
25	650	310	550	240	450	195	250	120	1400	630
28	550	295	500	225	400	180	220	120	1250	715
30	500	295	450	225	350	180	220	120	1250	740
32	500	295	400	225	300	180	200	120	1100	700
36	450	295	350	225	300	180	170	120	1000	660
40	400	280	300	210	250	170	130	110	900	630
50	300	280	250	240	220	195	120	110	700	520



※The FEED, in long & extra long types, should be reduced by around 50%

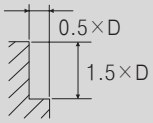
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (HSS-PM, Short Type*)

MULTI FLUTE, ROUGHING SHORT LENGTH

121113

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40		HRc30 ~ HRc40	
STRENGTH	500 ~ 800N/mm²		800 ~ 900N/mm²		900 ~ 1100N/mm²		1100 ~ 1300N/mm²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2300	100	2000	75	1500	70	1000	35
8	1800	130	1400	95	1100	80	700	45
10	1400	190	1100	150	1000	140	560	75
12	1100	230	1000	180	800	140	500	85
14	1000	230	900	180	700	140	450	85
16	900	230	700	180	560	140	350	85
18	800	230	600	180	500	140	300	85
20	700	230	560	180	500	140	300	85
22	600	280	560	210	450	180	300	105
25	560	280	500	210	400	180	230	105
28	500	260	450	200	350	160	200	105
30	450	260	400	200	300	160	200	105



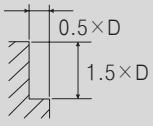
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

MULTI FLUTE, ROUGHING SHORT LENGTH, TiAlN-COATED

121122

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40		HRc30 ~ HRc40	
STRENGTH	500 ~ 800N/mm²		800 ~ 900N/mm²		900 ~ 1100N/mm²		1100 ~ 1300N/mm²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	3220	140	2800	105	2100	100	1400	50
8	2520	180	1960	135	1540	110	980	65
10	1960	265	1540	210	1400	195	785	105
12	1540	320	1400	250	1120	195	700	120
14	1400	320	1260	250	980	195	630	120
16	1260	320	980	250	790	195	490	120
18	1120	320	840	250	700	195	420	120
20	980	320	790	250	700	195	420	120
22	840	390	790	295	630	250	420	145
25	790	390	700	295	560	250	320	145
28	700	365	630	280	490	225	280	145
30	630	365	560	280	420	225	280	145



※The FEED, in long & extra long types, should be reduced by around 50%

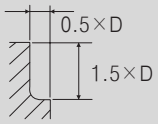
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

3&4 FLUTE, BALL LOSE ROUGHING SHORT LENGTH

127102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 4.0 × 8.0	1400	105	1100	75	900	65	560	35	3100	230
R 5.0 × 10.0	1100	150	900	120	800	110	450	60	2500	250
R 6.0 × 12.0	900	180	800	140	630	110	400	70	2000	400
R 8.0 × 16.0	700	180	560	140	450	110	280	70	1600	450
R 10.0 × 20.0	560	180	450	140	400	110	220	70	1200	500
R 12.5 × 25.0	450	220	400	170	310	140	180	85	1000	450
R 16.0 × 32.0	350	210	280	160	220	130	140	85	800	500
R 20.0 × 40.0	280	200	220	150	180	120	110	80	630	450



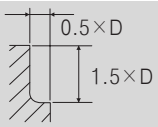
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

3&4 FLUTE, BALL LOSE ROUGHING SHORT LENGTH, TiAlN-COATED

127121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 4.0 × 8.0	1960	150	1540	105	1260	90	790	50	4340	320
R 5.0 × 10.0	1540	210	1260	170	1120	155	630	85	3500	350
R 6.0 × 12.0	1260	250	1120	195	880	155	560	100	2800	560
R 8.0 × 16.0	980	250	790	195	630	155	390	100	2240	630
R 10.0 × 20.0	790	250	630	195	560	155	310	100	1680	700
R 12.5 × 25.0	630	310	560	240	440	195	250	120	1400	630
R 16.0 × 32.0	490	295	390	225	310	180	200	120	1120	700
R 20.0 × 40.0	390	280	310	210	250	170	160	110	880	630



※The FEED, in long & extra long types, should be reduced by around 50%

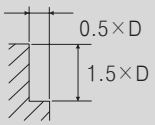
RPM=REVOLUTION PER MIN.
FEED=mm/min.

TABLE OF CUTTING CONDITION (8% Co HSS, Short Type*)

MULTI FLUTE SIDE CUTTING, ROUGHING & FINISHING

126102, 138102, 139102,137102

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	1800	65	1600	50	1200	45	800	25	4500	160
8	1400	85	1100	60	900	50	560	30	3100	185
10	1100	120	900	95	800	90	450	50	2500	280
12	900	145	800	110	630	90	400	55	2000	320
14	800	145	700	110	560	90	350	55	1800	340
16	700	145	560	110	450	90	280	55	1600	360
18	630	145	500	110	400	90	250	55	1400	380
20	560	145	450	110	400	90	220	55	1200	400
22	500	175	450	135	350	110	220	70	1100	380
25	450	175	400	135	310	110	180	70	1000	360
28	400	170	350	130	280	105	160	70	900	410
30	350	170	310	130	250	105	160	70	900	420
32	350	170	280	130	220	105	140	70	800	400
36	310	170	250	130	200	105	120	70	700	380
40	280	160	220	120	180	95	110	65	630	360



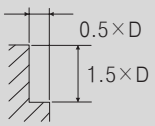
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

MULTI FLUTE SIDE CUTTING, ROUGHING & FINISHING, TiAlN-COATED

126121, 138121, 139121,137121

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		ALUMINUM ALUMINUM ALLOYS	
HARDNESS			~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40			
STRENGTH	~ 500N/mm²		500 ~ 800N/mm²		800 ~ 1000N/mm²		1000 ~ 1300N/mm²			
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2500	90	2250	70	1700	65	1100	35	6300	225
8	1950	120	1550	85	1250	70	800	40	4350	260
10	1550	170	1250	135	1100	125	650	70	3500	390
12	1250	205	1100	155	900	125	550	75	2800	450
14	1100	205	1000	155	800	125	500	75	2500	475
16	1000	205	800	155	650	125	400	75	2250	505
18	900	205	700	155	550	125	350	75	1950	530
20	800	205	650	155	550	125	300	75	1700	560
22	700	245	650	190	500	155	300	100	1550	530
25	650	245	550	190	450	155	250	100	1400	505
28	550	240	500	180	400	145	200	100	1250	575
30	500	240	450	180	350	145	200	100	1250	590
32	500	240	400	180	300	145	170	100	1100	560
36	450	240	350	180	280	145	150	100	1000	530
40	400	225	300	170	250	135	150	90	900	505



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.