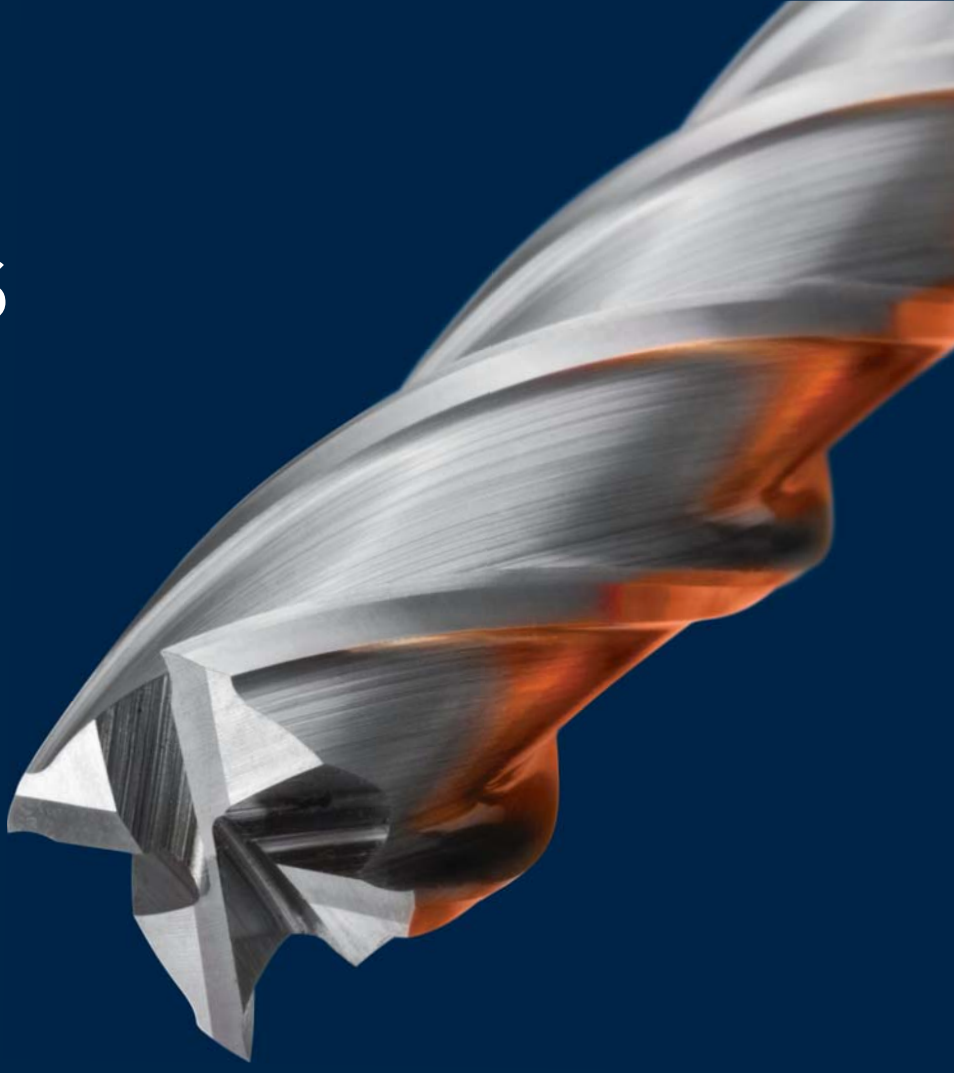
END MILLS



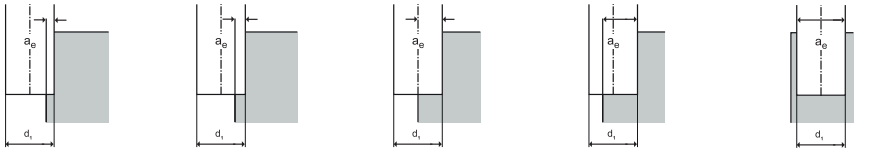
ROTEC®
CUTTING TOOLS

Cutting conditions for solid carbide end mills from groups 632, 633, 634 and 635.

ROTEC® CUTTING TOOLS

				F_z (Feedrate per tooth) per diameter				
P	**Steel**	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
1.1	Soft construction steel, magnetic steel	< 500 N/mm²	85 - 110	0,02	0,03	0,04	0,07	0,08
1.2	Free cutting steels, constructional steel	300 - 500 N/mm²	80 - 100	0,02	0,04	0,05	0,08	0,12
1.3	Constructional and carbon steel, low-alloy and cast steel	400 - 800 N/mm²	80 - 100	0,02	0,03	0,04	0,07	0,08
1.4	Alloyed steel, cold work tools steel	800 - 1.000 N/mm²	70 - 90	0,02	0,03	0,04	0,07	0,08
1.5	Tempered steel < 38 HRc	1.000 - 1.200 N/mm²	65 - 75	0,01	0,01	0,02	0,03	0,05
1.6	High alloyed steels (hardened) < 44 HRc	1.200 - 1.400 N/mm²	60 - 70	0,01	0,01	0,02	0,03	0,05
M	**Stainless steel**	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
2.1	Ferritic & martensitic stainless steel	400 - 900 N/mm²	45 - 55	0,01	0,01	0,02	0,04	0,05
2.2	Austenitic stainless steel	500 - 900 N/mm²	45 - 55	0,01	0,01	0,02	0,04	0,05
2.3	Austenitic-ferritic stainless steel (Duplex)	500 - 1.200 N/mm²	35 - 45	0,01	0,01	0,02	0,04	0,05
K	**Cast iron**	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
3.1	Grey cast iron	400 - 600 N/mm²	100 - 130	0,02	0,03	0,05	0,08	0,12
3.2	Malleable cast iron	400 - 800 N/mm²	80 - 100	0,01	0,02	0,04	0,07	0,08
3.3	Nodular cast iron	400 - 900 N/mm²	80 - 100	0,01	0,02	0,04	0,07	0,08
N	**NON FERROUS METALS - Aluminium (alloys)**	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
4.1	Unalloyed aluminium	< 500 N/mm²	400 - 500	0,02	0,03	0,05	0,08	0,12
4.2	Aluminium alloys (Si < 7%)	< 700 N/mm²	350 - 450	0,02	0,03	0,05	0,08	0,12
4.3	Aluminium alloys (Si > 7%)	< 900 N/mm²	200 - 250	0,01	0,02	0,04	0,06	0,10
	Copper (alloys)	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
4.4	Unalloyed copper	< 400 N/mm²	80 - 90	0,01	0,02	0,04	0,07	0,10
4.5	Copper- and znc alloys (brass, long chipping)	< 600 N/mm²	90 - 110	0,01	0,02	0,04	0,07	0,10
4.6	Copper- and zinc alloys (brass, short chipping)	< 600 N/mm²	90 - 110	0,01	0,02	0,04	0,07	0,10
4.7	Copper- and aluminium alloys (long chipping)	< 800 N/mm²	80 - 100	0,01	0,02	0,04	0,07	0,10
4.8	Copper- and tin alloys (long chipping)	< 800 N/mm²	80 - 100	0,01	0,02	0,04	0,07	0,10
4.9	Copper- and tin alloys (short chipping)	< 400 N/mm²	80 - 100	0,01	0,02	0,04	0,07	0,10
	Magnesium alloys	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
4.10	Magnesium wrought alloys	< 400 N/mm²						
	Synthetics	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
4.11	Duroplasts (short chipping)	-	105 - 130	0,01	0,02	0,03	0,05	0,07
4.12	Thermoplasts (long chipping)	-	100 - 120	0,01	0,02	0,03	0,05	0,07
4.13	Fibre reinforced plastics	-						
S	**EXOTIC MATERIALS - Titanium (alloys)**	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
5.1	Unalloyed titanium	500 - 600 N/mm²	45 - 55	0,007	0,015	0,025	0,035	0,045
5.2	Titanium alloys	700 - 1.200 N/mm²	35 - 45	0,005	0,010	0,020	0,030	0,038
	Heat resistant materials	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
5.3	Unalloyed nickel	< 600 N/mm²	20 - 25	0,01	0,01	0,02	0,04	0,05
5.4	Nickel alloys	< 1.400 N/mm²	15 - 20	0,01	0,01	0,02	0,03	0,04
H	**High strength steels, hardened steels, hard castings**	**Tensile str. / Hardness**	**V_c [m/min]**	**ø2 - 3**	**ø4 - 5**	**ø6 - 10**	**ø12 - 16**	**ø20**
6.1	Hard(ened) materials (<50 HRc)	< 50 HRc	50 - 60	0,02	0,04	0,05	0,07	0,15
6.2	Hard(ened) materials (<55 HRc)	< 55 HRc	45 - 55	0,02	0,04	0,05	0,07	0,15
6.3	Hard(ened) materials (<60 HRc)	< 60 HRc	35 - 40	0,02	0,04	0,05	0,07	0,15
6.4	Hard(ened) materials (<65 HRc)	< 65 HRc	25 - 30	0,02	0,04	0,05	0,07	0,15

Correction factor (F_X) as a result of milling width A_e with a milling depth (A_p) of 1 x d_1



A_e = 10% x d_1	A_e = 25% x d_1	A_e = 50% x d_1	A_e = 75% x d_1	A_e = 100% x d_1
↓	↓	↓	↓	↓
F_x = 1,0	F_x = 0,8	F_x = 0,7	F_x = 0,5	F_x = 0,4

Calculating the needed rpm:

$$n = \frac{V_c \times 1000}{3{,}14 \times d_1}$$

Calculating the needed feedrate:

$$F = \frac{V_c \times 1000 \times F_z \times Z \times F_x}{3{,}14 \times d_1} = n \times F_z \times F_x$$

V_c = Cutting speed in meters per minute
F_z = Feedrate per cutting edge in millimeters
Z = Number of cutting edges
F_z = Feedrate correction factor
d_1 = Diameter of end mill in millimeters

Example:
Milling free cutting steel with a solid carbide end mill, diameter 12, with 4 cutting edges and 6mm milling width:

$$F = \frac{90 \times 1000 \times 0{,}08 \times 4 \times 0{,}7}{3{,}14 \times 12} = 2.387 \times 4 \times 0{,}08 \times 0{,}7 = 535 \text{ mm/min}$$

DIMENSIONS

DIN 844

Standard defining the dimensions of end mills related to the cutting diameter.

MATERIALS

HSS-E

High-speed steel alloy with an extra element to increase material properties.

SC Ultra-Fine

Solid carbide, ultra fine grain for tougher and more wear resistant properties.

GEOMETRIES

N TYPE

Type N geometry; standard geometry for normal materials.

W TYPE

Type W geometry; sharper geometry for non-ferrous and softer materials.

HR TYPE

Type HR geometry; fine pitched roughing profile.

End mills with 2 cutting edges.

End mills with 3 cutting edges.

End mills with 4 or more cutting edges (depending on diameter)

SHANKS & DRIVES

DIN 1835-B

Standard defining place and dimensions of the weldon slot on a parallel shank.

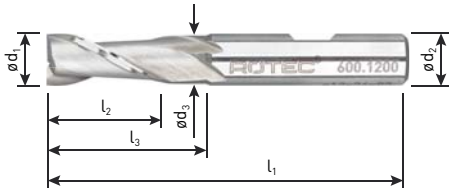
COATINGS

An extremely wear resistant coating with excellent hot hardness and thermal shock stability. In short: The universal coating for superb results in dry and wet machining at high cutting speeds.

600 HSS-E Slotting end mills, short, weldon

ROTEC®

Execution: Short model according to DIN 844, type N, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B.



DIN 844 | DIN 1835-B | HSS-E | N TYPE | 30° HELIX | Z=2

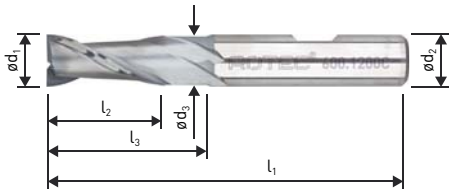
ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
1,5	7			51	6	2	600.0150	18,72
2	7			51	6	2	600.0200	12,16
2,5	8			52	6	2	600.0250	13,83
3	8			52	6	2	600.0300	12,16
3,5	10			54	6	2	600.0350	13,83
4	11			55	6	2	600.0400	12,16
4,5	13			57	6	2	600.0450	12,16
5	13			57	6	2	600.0500	12,16
5,5	13			57	6	2	600.0550	13,83
6	13	21	5,5	57	6	2	600.0600	12,16
6,5	16			60	8	2	600.0650	14,21
7	16			60	8	2	600.0700	15,23
7,5	19			63	8	2	600.0750	18,44
8	19	33	7,5	69	8	2	600.0800	15,65
8,5	19			69	10	2	600.0850	21,52
9	19			69	10	2	600.0900	20,63
9,5	22			72	10	2	600.0950	22,54
10	22	32	9	72	10	2	600.1000	16,77
11	22			79	12	2	600.1100	18,21

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
12	26	38	11	83	12	2	600.1200	18,44
13	26			83	12	2	600.1300	33,16
14	26			83	12	2	600.1400	22,17
15	32			92	16	2	600.1500	33,67
16	32	44	15	92	16	2	600.1600	25,90
17	32			92	16	2	600.1700	45,88
18	32			92	16	2	600.1800	29,99
19	38			104	20	2	600.1900	54,82
20	38	54	19	104	20	2	600.2000	34,47
21	38			104	20	2	600.2100	50,81
22	38			104	20	2	600.2200	50,81
24	45			121	25	2	600.2400	69,44
25	45	65	24	121	25	2	600.2500	66,46
28	45			121	25	2	600.2800	94,64
30	45			121	25	2	600.3000	97,85
32	53	73	31	133	32	2	600.3200	150,48
36	53			133	32	2	600.3600	144,48
40	63	85	39	155	40	2	600.4000	270,88

HSS-E Slotting end mills, short, weldon, coated

ROTEC®

Execution: Short model according to DIN 844, type N, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B, with ALCRONA-PRO® coating.



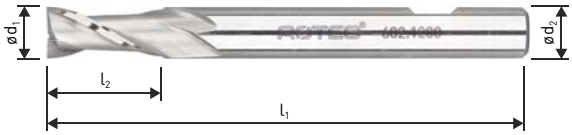
DIN 844 | DIN 1835-B | HSS-E | N TYPE | 30° HELIX | Z=2 | AlCrN

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
2	7			51	6	2	600.0200C	25,19
3	8			52	6	2	600.0300C	23,09
4	11			55	6	2	600.0400C	23,09
5	13			57	6	2	600.0500C	23,09
6	13	21	5,5	57	6	2	600.0600C	23,21
7	16			60	8	2	600.0700C	28,66
8	19	33	7,5	69	8	2	600.0800C	26,20
9	19			69	10	2	600.0900C	30,88
10	22	32	9	72	10	2	600.1000C	28,74

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
12	26	38	11	83	12	2	600.1200C	34,51
14	26			83	12	2	600.1400C	44,52
15	32			92	16	2	600.1500C	51,30
16	32	44	15	92	16	2	600.1600C	47,31
18	32			92	16	2	600.1800C	60,39
20	38	54	19	104	20	2	600.2000C	64,26
25	45	65	24	121	25	2	600.2500C	109,35
30	45			121	25	2	600.3000C	154,52

HSS-E Slotting end mills, long, weldon

Execution: Long model according to DIN 844, type N, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B.



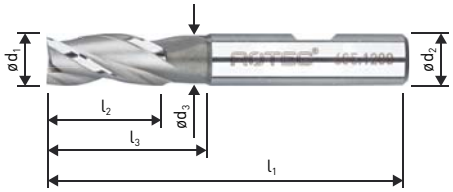
DIN 844 | DIN 1835-B | HSS-E | N TYPE | 30° HELIX | Z=2

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
2,5	**8**	56	6	2	602.0250	**20,26**
3	**8**	56	6	2	602.0300	**20,26**
4	**11**	63	6	2	602.0400	**20,26**
5	**13**	68	6	2	602.0500	**20,26**
6	**13**	68	6	2	602.0600	**20,26**
8	**19**	88	8	2	602.0800	**21,89**
10	**22**	95	10	2	602.1000	**23,19**

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
12	**26**	110	12	2	602.1200	**27,67**
14	**26**	110	12	2	602.1400	**37,68**
16	**32**	123	16	2	602.1600	**40,75**
18	**32**	123	16	2	602.1800	**48,81**
20	**38**	141	20	2	602.2000	**60,31**
24	**45**	166	25	2	602.2400	**107,08**
25	**45**	166	25	2	602.2500	**107,08**

605 HSS-E Universal end mills, short, weldon

Execution: Short model according to DIN 844, type N, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B.

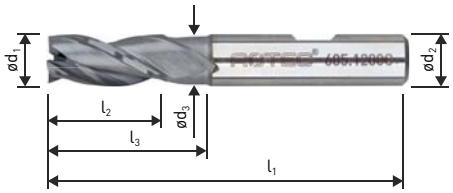


DIN 844 | DIN 1835-B | HSS-E | N TYPE | 30° HELIX | Z=3

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
1,5	7			51	6	3	605.0150	16,53
2	7			51	6	3	605.0200	15,65
2,5	8			52	6	3	605.0250	16,53
3	8			52	6	3	605.0300	15,00
3,5	10			54	6	3	605.0350	16,53
4	11			55	6	3	605.0400	15,00
4,5	13			57	6	3	605.0450	16,53
5	13			57	6	3	605.0500	15,00
5,5	13			57	6	3	605.0550	16,67
6	13	21	5,5	57	6	3	605.0600	15,00
6,5	16			60	8	3	605.0650	21,66
7	16			60	8	3	605.0700	18,44
8	19	33	7,5	69	8	3	605.0800	17,93
9	19			69	10	3	605.0900	21,01
10	22	32	9	72	10	3	605.1000	20,12
12	26	38	11	83	12	3	605.1200	23,05
14	26			83	12	3	605.1400	28,04
15	32			92	16	3	605.1500	34,33
16	32	44	15	92	16	3	605.1600	31,25
18	32			92	16	3	605.1800	39,08
20	38	54	19	104	20	3	605.2000	47,65
22	38			104	20	3	605.2200	53,28
24	45			121	25	3	605.2400	69,44
25	45	65	24	121	25	3	605.2500	69,44

HSS-E Universal end mills, short, weldon, coated

Execution: Short model according to DIN 844, type N, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B, with ALCRONA-PRO® coating.

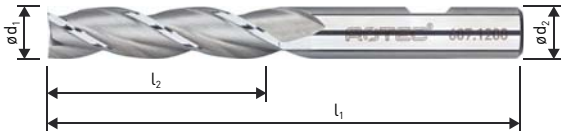


DIN 844 | DIN 1835-B | HSS-E | N TYPE | 30° HELIX | Z=3 | AlCrN

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
1,5	7			51	6	3	605.0150C	25,87
2	7			51	6	3	605.0200C	25,19
2,5	8			52	6	3	605.0250C	25,87
3	8			52	6	3	605.0300C	23,09
4	11			55	6	3	605.0400C	23,09
5	13			57	6	3	605.0500C	23,09
6	13	21	5,5	57	6	3	605.0600C	23,21
8	19	33	7,5	69	8	3	605.0800C	26,20
10	22	32	9	72	10	3	605.1000C	28,74
12	26	38	11	83	12	3	605.1200C	34,51
14	26			83	12	3	605.1400C	44,52
16	32	44	15	92	16	3	605.1600C	47,31
18	32			92	16	3	605.1800C	60,39
20	38	54	19	104	20	3	605.2000C	64,26
25	45	65	24	121	25	3	605.2500C	109,35

607 HSS-E Universal end mills, long, weldon

Execution: Long model according to DIN 844, type N, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B.



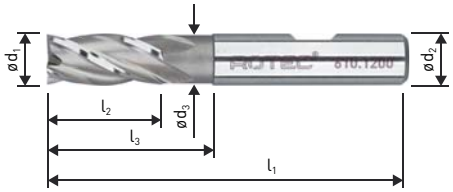
DIN 844 | DIN 1835-B | HSS-E | N TYPE | 30° HELIX | Z=3

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
2	**10**	54	6	3	607.0200	**17,70**
3	**12**	56	6	3	607.0300	**17,70**
4	**19**	63	6	3	607.0400	**17,70**
5	**24**	68	6	3	607.0500	**17,70**
6	**24**	68	6	3	607.0600	**17,70**
7	**30**	74	8	3	607.0700	**23,85**
8	**38**	82	8	3	607.0800	**21,89**
9	**38**	88	10	3	607.0900	**27,43**
10	**45**	95	10	3	607.1000	**23,19**
11	**45**	102	12	3	607.1100	**30,51**
12	**53**	110	12	3	607.1200	**27,67**
14	**53**	110	12	3	607.1400	**37,68**
16	**63**	123	16	3	607.1600	**40,75**
18	**63**	123	16	3	607.1800	**48,81**
20	**75**	141	20	3	607.2000	**60,31**

610 HSS-E End mills, short, weldon

ROTEC®

Execution: Short model according to DIN 844, type N, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B.



DIN 844 | DIN 1835-B | HSS-E | N TYPE | 30° HELIX | Z ≥ 4

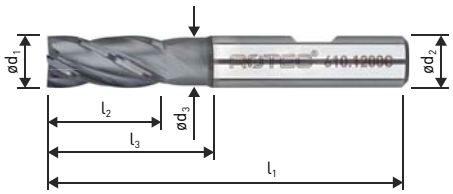
ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
2	7			51	6	4	610.0200	16,91
3	8			52	6	4	610.0300	15,65
4	11			55	6	4	610.0400	15,65
5	13			57	6	4	610.0500	15,65
6	13	21	5,5	57	6	4	610.0600	15,88
7	16			60	8	4	610.0700	20,63
8	19	33	7,5	69	8	4	610.0800	19,47
9	19			69	10	4	610.0900	22,91
10	22	32	9	72	10	4	610.1000	21,89
11	22			79	12	4	610.1100	31,25
12	26	38	11	83	12	4	610.1200	24,87
13	26			83	12	4	610.1300	37,17
14	26			83	12	4	610.1400	30,88
15	32			92	16	4	610.1500	36,75

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
16	32	44	15	92	16	4	610.1600	34,47
17	32			92	16	4	610.1700	56,73
18	32			92	16	4	610.1800	43,31
19	38			104	20	4	610.1900	71,59
20	38	54	19	104	20	4	610.2000	52,12
22	38			104	20	5	610.2200	59,71
24	45			121	25	5	610.2400	76,10
25	45	65	24	121	25	5	610.2500	76,10
26	45			121	25	6	610.2600	89,94
28	45			121	25	6	610.2800	124,49
30	45			121	25	6	610.3000	141,26
32	53	73	31	133	32	6	610.3200	157,66
36	53			133	32	6	610.3600	201,72
40	63	85	39	155	40	6	610.4000	288,95

HSS-E End mills, short, weldon, coated

ROTEC®

Execution: Short model according to DIN 844, type N, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B, with ALCRONA-PRO® coating.



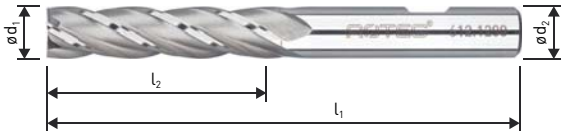
DIN 844 | DIN 1835-B | HSS-E | N TYPE | 30° HELIX | Z ≥ 4 | AlCrN

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
2	7			51	6	4	610.0200C	29,99
3	8			52	6	4	610.0300C	26,96
4	11			55	6	4	610.0400C	26,96
5	13			57	6	4	610.0500C	26,96
6	13	21	5,5	57	6	4	610.0600C	27,21
8	19	33	7,5	69	8	4	610.0800C	29,99
10	22	32	9	72	10	4	610.1000C	31,85
12	26	38	11	83	12	4	610.1200C	35,32

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
14	26			83	12	4	610.1400C	48,72
16	32	44	15	92	16	4	610.1600C	51,06
18	32			92	16	4	610.1800C	66,04
20	38	54	19	104	20	4	610.2000C	70,40
25	45	65	24	121	25	5	610.2500C	112,90
30	45			121	25	6	610.3000C	163,84
32	53	73	31	133	32	6	610.3200C	184,15

612 HSS-E End mills, long, weldon

Execution: Long model according to DIN 844, type N, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B.



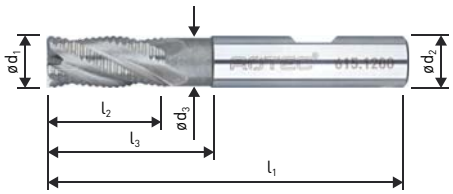
DIN 844 | DIN 1835-B | HSS-E | N TYPE | 30° HELIX | Z ≥ 4

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
2	**10**	54	6	4	612.0200	**18,72**
3	**12**	56	6	4	612.0300	**18,72**
4	**19**	63	6	4	612.0400	**18,72**
5	**24**	68	6	4	612.0500	**18,72**
6	**24**	68	6	4	612.0600	**18,72**
7	**30**	74	8	4	612.0700	**25,48**
8	**38**	82	8	4	612.0800	**23,71**
9	**38**	88	10	4	612.0900	**29,06**
10	**45**	95	10	4	612.1000	**25,48**
11	**45**	102	12	4	612.1100	**31,90**
12	**53**	110	12	4	612.1200	**29,58**

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
14	**53**	110	12	4	612.1400	**40,10**
16	**63**	123	16	4	612.1600	**43,55**
18	**63**	123	16	4	612.1800	**52,77**
20	**75**	141	20	4	612.2000	**64,18**
22	**75**	141	20	5	612.2200	**86,44**
25	**90**	166	25	6	612.2500	**110,52**
30	**90**	166	25	6	612.3000	**170,09**
32	**106**	186	32	6	612.3200	**204,18**
36	**106**	186	32	6	612.3600	**220,30**
40	**125**	217	40	6	612.4000	**400,64**

615 HSS-E Roughing end mills, short, weldon

Execution: Short model according to DIN 844, fine pitched roughing profile type HR, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B.



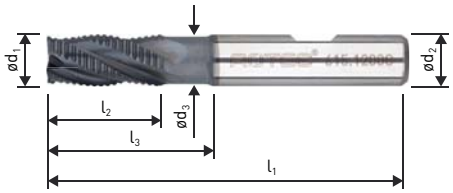
DIN 844 | DIN 1835-B | HSS-E | HR TYPE | 30° HELIX | Z ≥ 4

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
4	**11**			55	6	4	615.0400	**31,39**
5	**13**			57	6	4	615.0500	**31,39**
6	**13**	21	5,5	57	6	4	615.0600	**26,50**
7	**16**			60	8	4	615.0700	**34,98**
8	**19**	33	7,5	63	8	4	615.0800	**30,23**
9	**19**			69	10	4	615.0900	**39,31**
10	**22**	32	9	72	10	4	615.1000	**31,02**
11	**22**			79	12	4	615.1100	**44,43**
12	**26**	38	11	83	12	4	615.1200	**34,98**
13	**26**			83	12	4	615.1300	**51,51**
14	**26**			83	12	4	615.1400	**41,64**
15	**32**			92	16	4	615.1500	**63,02**

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
16	**32**	44	15	92	16	4	615.1600	**45,36**
18	**32**			92	16	4	615.1800	**54,45**
20	**38**	54	19	104	20	4	615.2000	**66,74**
22	**38**			104	20	4	615.2200	**84,39**
25	**45**	65	24	121	25	5	615.2500	**105,91**
26	**45**			121	25	6	615.2600	**125,38**
28	**45**			121	25	6	615.2800	**125,38**
30	**45**			121	25	6	615.3000	**145,13**
32	**53**	73	31	133	32	6	615.3200	**153,70**
36	**53**			133	32	6	615.3600	**196,50**
40	**63**	85	39	155	40	6	615.4000	**288,21**

HSS-E Roughing end mills, short, weldon, coated

Execution: Short model according to DIN 844, fine pitched roughing profile type HR, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B, with ALCRONA-PRO® coating.



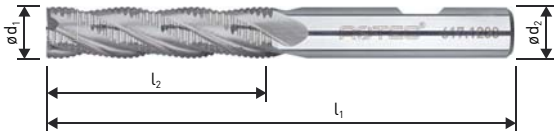
DIN 844 | DIN 1835-B | HSS-E | HR TYPE | 30° HELIX | Z ≥ 4 | AlCrN

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
4	**11**			55	6	4	615.0400C	**35,40**
5	**13**			57	6	4	615.0500C	**35,40**
6	**13**	21	5,5	57	6	4	615.0600C	**32,21**
8	**19**	33	7,5	63	8	4	615.0800C	**35,32**
10	**22**	32	9	72	10	4	615.1000C	**35,64**
12	**26**	38	11	83	12	4	615.1200C	**40,53**

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
14	**26**			83	12	4	615.1400C	**57,28**
16	**32**	44	15	92	16	4	615.1600C	**61,52**
18	**32**			92	16	4	615.1800C	**73,26**
20	**38**	54	19	104	20	4	615.2000C	**87,03**
25	**45**	65	24	121	25	5	615.2500C	**127,11**
32	**53**	73	31	133	32	6	615.3200C	**209,90**

617 HSS-E Roughing end mills, long, weldon

Execution: Long model according to DIN 844, fine pitched roughing profile type HR, 30° helix angle, cylindrical shank with weldon according to DIN 1835-B.



DIN 844 | DIN 1835-B | HSS-E | HR TYPE | 30° HELIX | Z ≥ 4

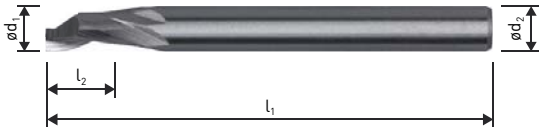
ød1	l2	l1	ød2	Z	Item nr.	€ / pc
6	**24**	68	6	4	617.0600	**40,24**
8	**38**	88	8	4	617.0800	**42,52**
10	**45**	95	10	4	617.1000	**47,79**
12	**53**	110	12	4	617.1200	**55,47**
14	**53**	110	12	4	617.1400	**61,48**
16	**63**	123	16	4	617.1600	**72,75**

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
18	**63**	123	16	4	617.1800	**88,12**
20	**75**	141	20	4	617.2000	**96,32**
22	**75**	141	20	5	617.2200	**108,75**
25	**90**	166	25	5	617.2500	**126,31**
28	**90**	166	25	6	617.2800	**184,44**
30	**90**	166	25	6	617.3000	**235,95**

618 HSS-E Single fluted end mills

Execution: Single fluted end mills with cylindrical shank according to DIN 1835-A. Higher (sharper) cutting angle specifically for aluminium and plastics.

Application: Typically used in the plastic and aluminium working industry, for example for routing key-holes in aluminium door and window profiles.



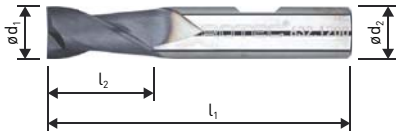
DIN 1835-A | HSS-E | W TYPE | 30° HELIX

ød1	l1	l2	ød2	Item nr.	€ / pc
4,0	60	12	8,0	618.0402	**29,56**
5,0	60	12	8,0	618.0503	**29,56**
5,0	80	18/35	8,0	618.0510	**40,22**
6,0	60	14	8,0	618.0602	**31,60**
6,0	90	16	8,0	618.0603	**45,47**

ød1	l1	l2	ød2	Item nr.	€ / pc
8,0	80	14	8,0	618.0802	**31,60**
8,0	100	14/68	8,0	618.0804	**60,36**
10,0	80	14	8,0	618.1002	**42,95**
10,0	80	14	10,0	618.1004	**42,95**

632 Solid carbide slotting end mills, Silver-Line

Execution: Solid carbide slotting end mills, short model, cylindrical shank with weldon according to DIN 6535-HB, with TiAlN-coating.



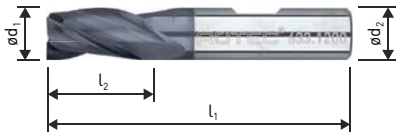
DIN 6535-HB | VHM UF | N TYPE | 30° HELIX | Z=2 | TiAlN

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
1	5	50	6	2	632.0100	19,30
2	6	50	6	2	632.0200	19,30
3	6	50	6	2	632.0300	19,30
4	8	50	6	2	632.0400	19,30
5	8	50	6	2	632.0500	19,30
6	16	50	6	2	632.0600	21,72

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
8	20	60	8	2	632.0800	31,45
10	22	70	10	2	632.1000	43,59
12	22	70	12	2	632.1200	57,08
16	25	75	16	2	632.1600	95,20
20	32	100	20	2	632.2000	158,62

633 Solid carbide universal end mills, Silver-Line

Execution: Solid carbide universal end mills, short model, cylindrical shank with weldon according to DIN 6535-HB, with TiAlN-coating.



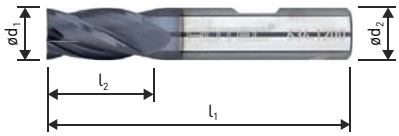
DIN 6535-HB | VHM UF | N TYPE | 30° HELIX | Z=3 | TiAlN

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
1	5	50	6	3	633.0100	19,30
2	6	50	6	3	633.0200	19,30
3	6	50	6	3	633.0300	19,30
4	8	50	6	3	633.0400	19,30
5	8	50	6	3	633.0500	19,30
6	16	50	6	3	633.0600	21,72

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
8	20	60	8	3	633.0800	31,45
10	22	70	10	3	633.1000	43,59
12	22	70	12	3	633.1200	57,08
16	25	75	16	3	633.1600	95,20
20	32	100	20	3	633.2000	158,62

634 Solid carbide square end mills, short, coated, Silver-Line

Execution: Solid carbide square end mills, short model, cylindrical shank with weldon according to DIN 6535-HB, with TiAlN-coating.



DIN 6535-HB | VHM UF | N TYPE | 30° HELIX | Z=4 | TiAlN

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
1	5	50	6	4	634.0100	19,30
2	7	50	6	4	634.0200	19,30
3	8	50	6	4	634.0300	19,30
4	11	50	6	4	634.0400	19,30
5	13	50	6	4	634.0500	19,30
6	16	50	6	4	634.0600	21,72

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
8	20	60	8	4	634.0800	31,45
10	22	70	10	4	634.1000	43,59
12	22	70	12	4	634.1200	57,08
16	25	75	16	4	634.1600	95,20
20	32	100	20	4	634.2000	158,62

635 Solid carbide square end mills, long, coated, Silver-Line

Execution: Solid carbide square end mills, long model, cylindrical shank with weldon according to DIN 6535-HB, with TiAlN-coating.

DIN 6535-HB | VHM UF | N TYPE | 30° HELIX | Z=4 | TiAlN

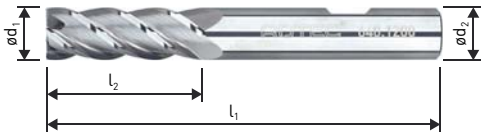
ød1	l2	l1	ød2	Z	Item nr.	€ / pc
3	**12**	50	6	4	635.0300	**19,79**
4	**15**	50	6	4	635.0400	**19,79**
5	**20**	60	6	4	635.0500	**26,60**
6	**20**	60	6	4	635.0600	**29,03**
8	**25**	70	8	4	635.0800	**36,33**

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
10	**30**	90	10	4	635.1000	**52,09**
12	**30**	90	12	4	635.1200	**69,34**
16	**50**	110	16	4	635.1600	**124,11**
20	**55**	110	20	4	635.2000	**182,65**

640 Solid carbide end mills for non-ferrous metals, Silver-Line

Execution: Solid carbide end mills, cylindrical shank with weldon according to DIN 6535-HB. Special polished cutting geometry and an optimized helix angle (39°) for non-ferrous metals.

Application: Specific cutting geometry for non-ferrous metals such as aluminium and copper. The optimized helix angle ensures a smooth cut and a good chip evacuation.



DIN 6535-HB | VHM UF | W TYPE | 39° HELIX | Z=4

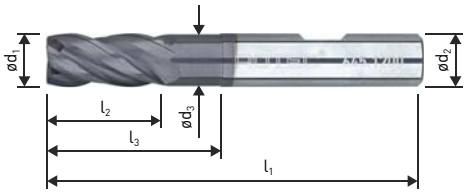
ød1	l2	l1	ød2	Z	Item nr.	€ / pc
4	**15**	50	6	4	640.0400	**21,72**
5	**20**	60	6	4	640.0500	**24,18**
6	**20**	60	6	4	640.0600	**26,60**
8	**25**	70	8	4	640.0800	**36,33**

ød1	l2	l1	ød2	Z	Item nr.	€ / pc
10	**30**	90	10	4	640.1000	**46,02**
12	**30**	90	12	4	640.1200	**69,34**
16	**50**	110	16	4	640.1600	**124,11**
20	**55**	110	20	4	640.2000	**178,29**

645 Solid carbide Vario end mills, Silver-Line

Execution: Solid carbide end mills, cylindrical shank with weldon according DIN 6535-HB. Special DHC (Double helix cutter) geometry for high performance cutting (HPC) applications. Differential helixes (2 flutes with 35° and 2 flutes with 38°) and a TiAlN-coating for more tool life.

Application: The double helix design ensures a smooth and nearly vibration free cut allowing machining at very high metal removal rates and yet realising an excellent surface finish on the machined workpieces.



DIN 6535-HB | VHM UF | N TYPE | 35°/38° HELIX | Z=4 | TiAlN | DHC HPC VARIO

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
3	**11**	21	2,6	57	6	4	645.0300	**37,44**
4	**11**	21	3,6	57	6	4	645.0400	**37,44**
5	**13**	21	4,6	57	6	4	645.0500	**37,44**
6	**13**	21	5,5	57	6	4	645.0600	**41,02**
8	**19**	27	7,5	63	8	4	645.0800	**56,40**
10	**22**	32	9,5	72	10	4	645.1000	**71,66**

ød1	l2	l3	ød3	l1	ød2	Z	Item nr.	€ / pc
12	**26**	38	11,5	83	12	4	645.1200	**99,98**
14	**26**	42	13,5	83	14	4	645.1400	**125,50**
16	**32**	44	15,5	92	16	4	645.1600	**151,38**
18	**32**	50	17,5	92	18	4	645.1800	**182,29**
20	**38**	54	19,5	104	20	4	645.2000	**234,60**