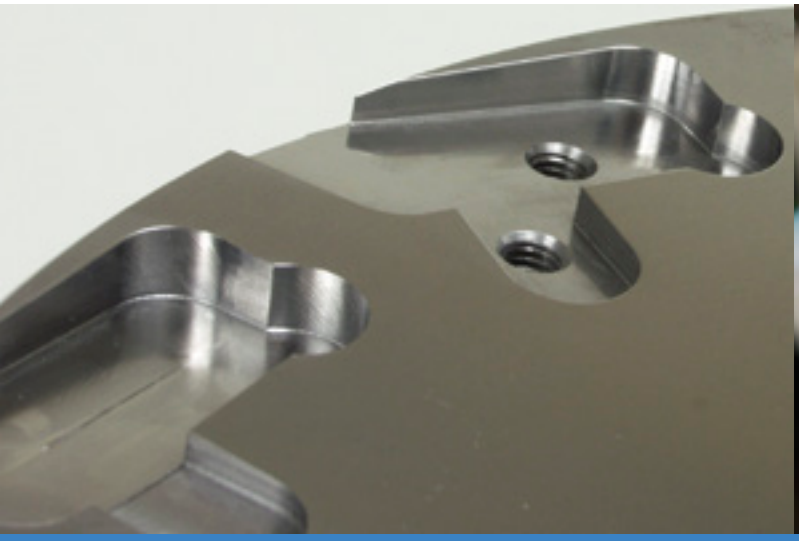
Milling cutters



Kyocera cutting tools

Sales hotline number 01543 267 760

Recommended cutting data

Recommended cutting data

The cutting data in this catalogue is only recommended cutting data and may vary depending on the specific machining situation. Below the general conditions are described on which the recommended cutting data in this catalogue is based.

The machine and tool clamping
The recommended cutting data for milling and drilling is based on a machining situation with a relatively stable machine. Also, total runout from the machine and the tool clamping must be under 0.04 mm for HSS end mills and under 0.02 mm for carbide end mills and carbide drills.

Tool projection
The recommended cutting data for milling assumes that tools with a short or standard overall length have a projection which is no more than three times the tool diameter. For tools with a long or extra long overall length the projection must be no more than five times the tool diameter. If vibrations occur the cutting speed should be reduced. If the tool projection is larger than described above, the cutting speed and feed should be reduced by approx. 50 per cent.

Coolant and swarf removal
The recommended cutting data for milling and drilling assumes that the pressure from the coolant/lubricant or air used is high enough to remove chips from the machining zone and cool down the tool. When cutting hardened steel (>50 HRC) it is not necessary to cool down the tool as the heat generated disappears with the chips.

Clamping the workpiece
The recommended cutting data is based on a correctly clamped workpiece as vibrations can otherwise occur. Vibrations may cause the tool to break and will always reduce tool life. If the workpiece is badly clamped or thin we recommend that you reduce cutting speed and feed.

Professional advice

Correct choice of tool and cutting data always depends on the specific machining situation which means that insight into machine optimisation, workpiece properties and tooling technology is important when choosing the optimum cutting data.
Contact our technical sales engineers and specialists who offer professional advice to ensure high process security and the lowest unit costs.

Milling cutters

Standard HSS CO8 Roughing end mills

Item no.								Page
258020		Z 3-6	HSS Co8	NRF	TiCN	50% Up to ø20¹	λ 30°	02.16.05

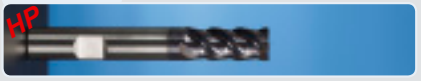
High performance HSS PM end mills

Item no.								Page
258004		Z 2	HSS PM	N	TiCN	25%	λ 32°	02.22.02
258005		Z 3	HSS PM	N	TiCN	25%	λ 30°	02.23.02
258007		Z 4-6	HSS PM	N	TiCN	25%	λ 32°	02.24.02
258142		Z 2	HSS PM	N	TiCN	25%	λ 30°	02.27.02

Standard carbide end mills

Item no.								Page
254702		Z 2	HM MG	N	TiAlN	25%	λ 30°	02.52.02
254703		Z 3	HM MG	N	TiAlN	25%	λ 30°	02.53.02
254704		Z 4	HM MG	N	TiAlN	25%	λ 30°	02.54.02
254012		Z 4	HM MG	N	TiAlN	25%	λ 30°	02.54.03
254802		Z 2	HM MG	N	TiAlN	25%	λ 30°	02.57.02

High performance carbide end mills

Item no.								Page
258920		Z 4-6	HM UF2	NRF	TiAlN	25%	λ 45°	02.66.70

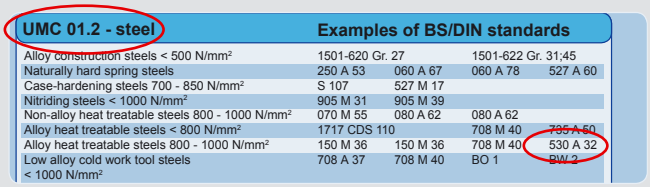
How to use the catalogue

An example of how to find a suitable end mill

We need a coated standard length carbide end mill (Ø3 mm, Z2) for slot milling in steel, 708 M 40.

1. Material class

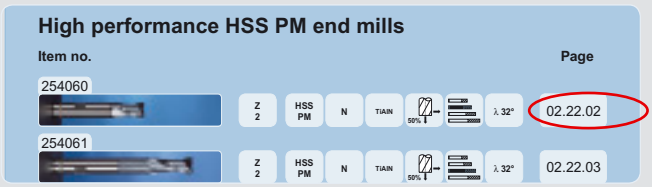
Find the workpiece material in UNIMERCO material class (UMC). The workpiece material 708 M 40 with a tensile strength under 1000 N/mm² is found in the material class UMC 01.2 on page 06.00.01.



UMC 01.2 - steel	Examples of BS/DIN standards			
Alloy construction steels < 500 N/mm²	1501-620 Gr. 27		1501-622 Gr. 31;45	
Naturally hard spring steels	250 A 53	060 A 67	060 A 78	527 A 60
Case-hardening steels 700 - 850 N/mm²	S 107	527 M 17		
Nitriding steels < 1000 N/mm²	905 M 31	905 M 39		
Non-alloy heat treatable steels 800 - 1000 N/mm²	070 M 55	080 A 62	080 A 62	
Alloy heat treatable steels < 800 N/mm²	1717 CDS 110		708 M 40	735 A 50
Alloy heat treatable steels 800 - 1000 N/mm²	150 M 36	150 M 36	708 M 40	530 A 32
Low alloy cold work tool steels < 1000 N/mm²	708 A 37	708 M 40	BO 1	BW 2

2. Choosing a tool

Use the index on page 02.01.01 to find the most suitable end mill, in the case above, a 254702 found on page 02.52.02



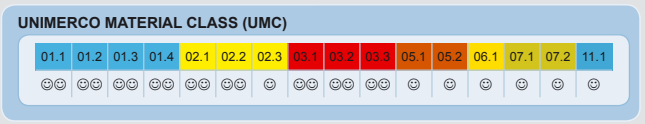
High performance HSS PM end mills

Item no.								Page
254060	Z 2	HSS PM	N	TiAlN	59%		λ 32°	02.22.02
254061	Z 2	HSS PM	N	TiAlN	59%		λ 32°	02.22.03

3. Suitability of the tool

Each page has detailed information regarding the end mill chosen. Suitablility for the material classes is shown in a table at the bottom of each page.

☺ indicates that the tool is well suited whereas ☺☺ indicates that the tool, as shown in this example is highly recommended



UNIMERCO MATERIAL CLASS (UMC)

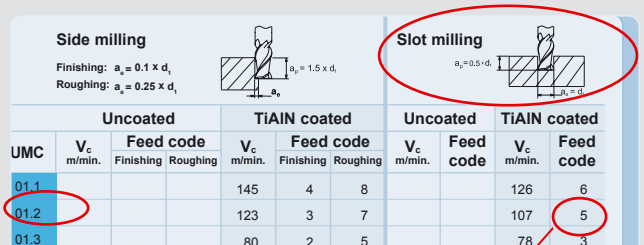
01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	05.1	05.2	06.1	07.1	07.2	11.1
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺	☺	☺	☺	☺	☺

4. Cutting data and feed

The back of the page shows the recommended cutting data. For slot milling with a depth of cut (a_p) = 0.5xd1 = 1.5 mm, the cutting speed (V_c) 107 m/min. and the feed code should be 5.

Use the feed code, 5, to find the feed per tooth (f_z) in the table at the bottom of the page. In this case (Ø3 mm, feed code 5) the feed per tooth is 0.010 mm.

Spindle speed (rpm) and table feed are calculated as follows:



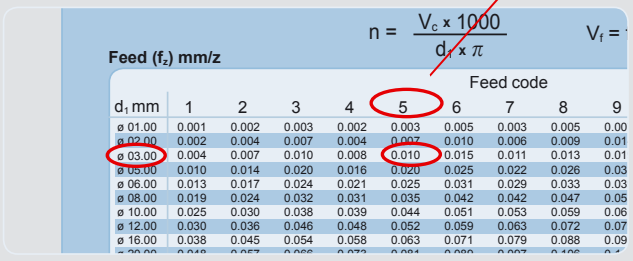
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$

Slot milling

UMC	Uncoated V_c m/min.	Uncoated Feed code Finishing	Uncoated Feed code Roughing	TiAlN coated V_c m/min.	TiAlN coated Feed code Finishing	TiAlN coated Feed code Roughing	Uncoated V_c m/min.	Uncoated Feed code	TiAlN coated V_c m/min.	TiAlN coated Feed code
01.1				145	4	8			126	6
01.2				123	3	7			107	5
01.3				80	2	5			78	3



$$n = \frac{V_c \times 1000}{d_1 \times \pi} \quad V_f =$$

Feed (f_z) mm/z

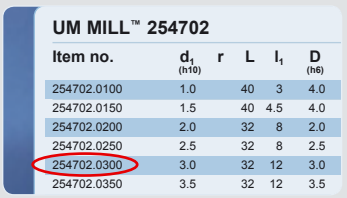
d_1 mm	Feed code 1	2	3	4	5	6	7	8	9
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.00
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.01
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.01
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.03
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.03
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.05
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.06
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.07
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.09

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \quad <=> \quad n = \frac{107 \times 1000}{3 \times \pi} \quad <=> \quad n = 11{,}353 \text{ rpm}$$

$$V_f = f_z \times Z \times n \quad <=> \quad V_f = 0.010 \times 2 \times 11{,}353 \quad <=> \quad V_f = 227 \text{ mm/min}$$

5. Ordering

When ordering, please state the item no. and size required. In this case the ordering code would be 254702.0300



UM MILL™ 254702

Item no.	d_1 (h10)	r	L	l_1	D (h6)
254702.0100	1.0		40	3	4.0
254702.0150	1.5		40	4.5	4.0
254702.0200	2.0		32	8	2.0
254702.0250	2.5		32	8	2.5
254702.0300	3.0		32	12	3.0
254702.0350	3.5		32	12	3.5

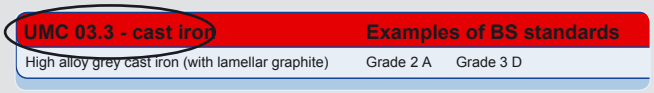
How to use the catalogue

An example of how to find a suitable end mill

We need a coated standard length carbide end mill (Ø16 mm, Z3) for slot milling in Cast Iron, Grade 220.

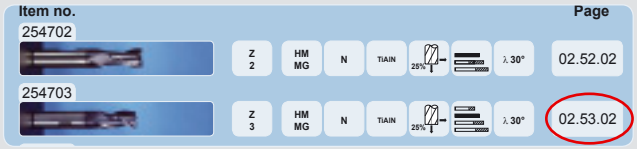
1. Material class

Find the workpiece material in UNIMERCO material class (UMC). The workpiece material Grade 220 with hardness <180HB is found in the material class UMC 03.1 on page 0.06.03



2. Choosing a tool

Use the index on page 02.01.03 to find the most suitable end mill, in the case above, a 254703 found on page 02.53.02

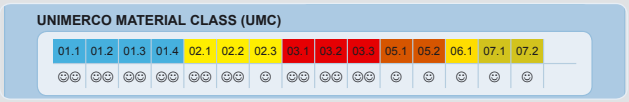


3. Suitability of the tool

Each page has detailed information regarding the end mill chosen. Suitability for the material classes is shown in a table at the bottom of each page.

☺ indicates that the tool is well suited whereas

☺☺ indicates that the tool, as shown in this example is highly recommended

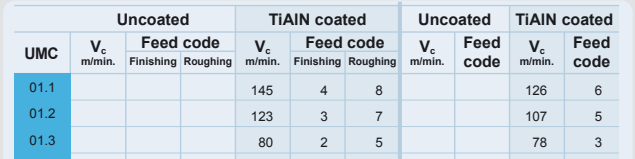


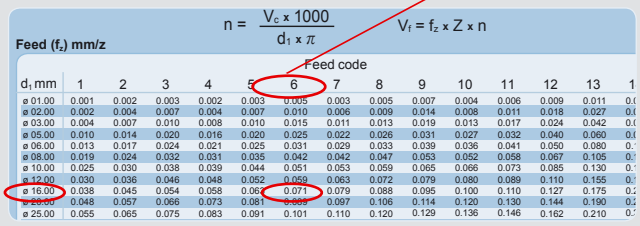
4. Cutting data and feed

The back of the page shows the recommended cutting data. For slot milling with a depth of cut (a_p) = 0.5xd1 = 8 mm, the cutting speed (V_c) 97 m/min. and the feed code should be 6.

Use the feed code, 6, to find the feed per tooth (f_z) in the table at the bottom of the page. In this case (Ø16 mm, feed code 6) the feed per tooth is 0.071 mm.

Spindle speed (rpm) and table feed are calculated as follows:



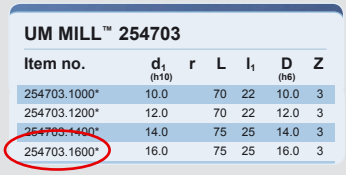


$$n = \frac{V_c \times 1000}{d_1 \times \pi} \quad <=> \quad n = \frac{97 \times 1000}{16 \times \pi} \quad <=> \quad n = 1930 \text{ rpm}$$

$$V_f = f_z \times Z \times n \quad <=> \quad V_f = 0.071 \times 3 \times 1930 \quad <=> \quad V_f = 411 \text{ mm/min}$$

5. Ordering

When ordering, please state the item no. and size required. In this case the ordering code would be 254703.1600



Guide to symbols used

Milling cutters

This page explains the symbols used for milling cutters.

HSS

Material

The symbol shows the tool material.

See chapter back of catalogue for information on tool materials.

N

Cutting edge geometry

The geometry of the milling cutters can be as follows:

- N — Finishing profile.
- UM — UNIMERCO profile
- W — Finishing profile, for soft long chipped materials.
- NRF — Roughing profile, type NRF.
- H — Cutting edge with 0° rake angle.
- HX — Cutting edge with negative rake angle.
- H HSC — Cutting edge with 0° rake angle, also for high speed cutting.
- HX HSC — Cutting edge with negative rake angle, also for high speed cutting.

TiCN

Coating

The symbol shows the type of coating used.

See chapter 15 for detailed information on surface

Cutting direction

The symbol shows the cutting direction of the tool.

- Only for side milling.
- 50% — For both side milling and drilling with 50% feed.
- For side milling and ramping at a horizontal angle of approx. 15°.

Overall length

The symbol shows the overall length of the tool (short, standard, long and extra long).

λ 30°

Helix angle

The symbol shows the helix angle of the tool (λ).

Emulsion

Coolant

The symbol shows the recommended type of coolant.

- Emulsion — The tool should be used with emulsion.
- Emul./Air — Emulsion is recommended for normal cutting and air is recommend for high speed cutting.

DIN 327D

Production standard

The symbol shows which standard the tool has been manufactured to or if it has corner radius.

- DIN 327D — The tool has been manufactured to DIN 327D.
- r — The tool has corner radius.

DIN 1835 B

Shank standard

The symbol shows which standard the shank has been manufactured to.

- DIN 1835 B — Standard weldon shank according to DIN 1835 B.
- FIT — Smooth shank - also suitable for shrinking.

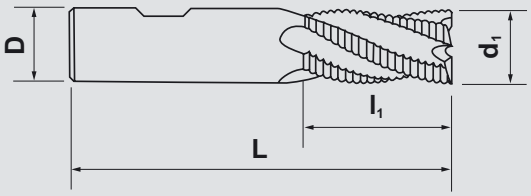
Standard HSS CO Roughing end mills

HSS Co8	NRF	TiCN	50% Up to ø20[1]		λ 30°	Emulsion	DIN 844K/B	DIN 1835 B

UM MILL™ 258020

Item no.	d_1 (js12)	r	L	l_1	D (h6)	Z
258020.0600	6.0		57	13	6	3
258020.0700	7.0		66	16	10	3
258020.0800	8.0		69	19	10	3
258020.0900	9.0		69	19	10	3
258020.1000	10.0		72	22	10	4
258020.1100	11.0		79	22	12	4
258020.1200	12.0		83	26	12	4
258020.1300	13.0		83	26	12	4
258020.1400	14.0		83	26	12	4
258020.1500	15.0		83	26	12	4
258020.1600	16.0		92	32	16	4
258020.1800	18.0		92	32	16	4
258020.2000	20.0		104	38	20	4
258020.2200	22.0		104	38	20	5
258020.2500	25.0		121	45	25	5
258020.2800	28.0		121	45	25	5
258020.3000	30.0		121	45	25	6
258020.3200	32.0		133	53	32	6
258020.3500	35.0		133	53	32	6
258020.4000	40.0		155	63	32	6

[1] Only drilling up to and including d_1 = 20mm



01.1	01.2	01.3	01.4	02.1	02.2	03.1	03.2	03.3	05.1	06.1
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺	☺

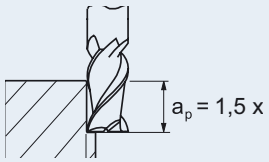
See cutting data on the next page

Recommended cutting data

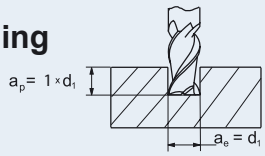
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiCN coated			Uncoated		TiCN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1				66		12			57	9
01.2				57		11			48	8
01.3				44		8			35	6
01.4				33		8			26	6
02.1				48		11			40	8
02.2				35		11			31	8
03.1				50		11			50	8
03.2				39		11			39	8
03.3				22		8			22	5
05.1				77		11			77	9
06.1				88		11			88	9

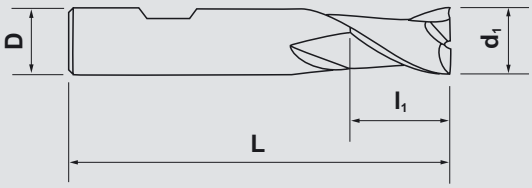
$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

d_1 mm	Feed code 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

HSS PM end mills

HSS PM	N	TiCN	25%		λ 30°	Emulsion	DIN 327 D	DIN 1835 B



UM MILL™ 258004

Item no.	d_1	r	L	l_1	D (h6)	Z
258004.0200	2.0		48	4	6	2
258004.0300	3.0		49	5	6	2
258004.0400	4.0		51	7	6	2
258004.0500	5.0		52	8	6	2
258004.0600	6.0		52	8	6	2
258004.0700	7.0		60	10	10	2
258004.0800	8.0		61	11	10	2
258004.0900	9.0		61	11	10	2
258004.1000	10.0		63	13	10	2
258004.1100	11.0		70	13	12	2
258004.1200	12.0		73	16	12	2
258004.1300	13.0		73	16	12	2
258004.1400	14.0		73	16	12	2
258004.1600	16.0		79	19	16	2
258004.1800	18.0		79	19	16	2
258004.2000	20.0		88	22	20	2
258004.2200	22.0		88	22	20	2
258004.2500	25.0		102	26	25	2
258004.1500	15,0		79	19	16	2

UNIMERCO MATERIAL CLASS (UMC)

01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	06.1	08.1
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺☺	☺

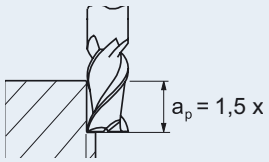
See cutting data on the next page

Recommended cutting data

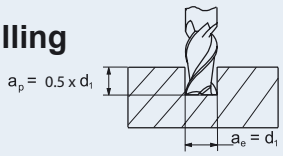
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiCN coated			Uncoated		TiCN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1				69	7	11			60	8
01.2				60	5	10			51	7
01.3				46	3	7			37	5
01.4				35	3	7			28	5
02.1				51	5	10			41	7
02.2				37	5	10			32	7
02.3				10	2	5			8	4
03.1				52	5	10			46	7
03.2				40	5	10			35	7
03.3				23	3	7			20	4
06.1				81	7	11			81	8
08.1				92	7	11			92	8

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

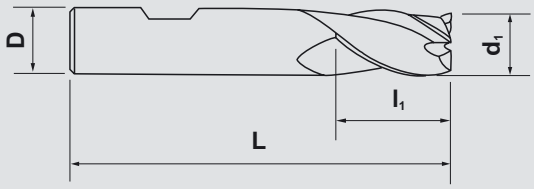
	Feed code													
d_1 mm	1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

HSS PM end mills

HSS PM	N	TiCN	25%		λ 30°	Emulsion	DIN 327D	DIN 1835 B

UM MILL™ 258005

Item no.	d_1	r	L	l_1	D (h6)	Z
258005.0300	3.0		49	5	6	3
258005.0400	4.0		51	7	6	3
258005.0500	5.0		52	8	6	3
258005.0600	6.0		52	8	6	3
258005.0800	8.0		61	11	10	3
258005.1000	10.0		63	13	10	3
258005.1200	12.0		73	16	12	3
258005.1400	14.0		73	16	12	3
258005.1600	16.0		79	19	16	3
258005.1800	18.0		79	19	16	3
258005.2000	20.0		88	22	20	3
258005.2200	22.0		88	22	20	3
258005.2500	25.0		102	26	25	3
258005.0700	7,0		60	10	10	3
258005.0900	9,0		61	11	10	3
258005.1100	11,0		73	16	12	3
258005.1300	13,0		73	16	12	3



UNIMERCO MATERIAL CLASS (UMC)

01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	06.1	08.1				
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺☺	☺				

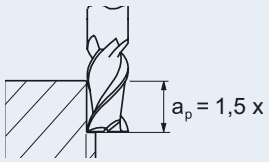
See cutting data on the next page

Recommended cutting data

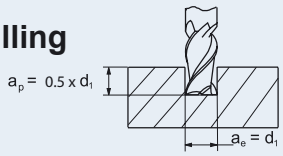
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiCN coated			Uncoated		TiCN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1				69	7	11			60	8
01.2				60	5	10			51	7
01.3				46	3	7			37	5
01.4				35	3	7			28	5
02.1				51	5	10			41	7
02.2				37	5	10			32	7
02.3				10	2	5			8	4
03.1				52	5	10			46	7
03.2				40	5	10			35	7
03.3				23	3	7			20	4
06.1				81	7	11			81	8
08.1				92	7	11			92	8

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

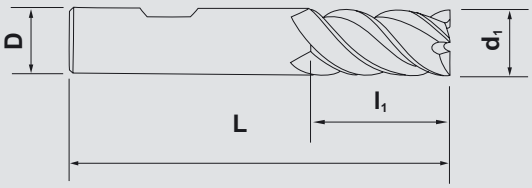
	Feed code													
d_1 mm	1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

HSS PM end mills

HSS PM	N	TiCN	25%		λ 30°	Emulsion	DIN 844K/B	DIN 1835 B

UM MILL™ 258007

Item no.	d_1	r	L	l_1	D (h6)	Z
258007.0300	3.0		52	8	6	4
258007.0400	4.0		55	11	6	4
258007.0500	5.0		57	13	6	4
258007.0600	6.0		57	13	6	4
258007.0800	8.0		69	19	10	4
258007.1000	10.0		72	22	10	4
258007.1200	12.0		83	26	12	4
258007.1400	14.0		83	26	12	4
258007.1600	16.0		92	32	16	4
258007.1800	18.0		92	32	16	4
258007.2000	20.0		104	38	20	4
258007.2200	22.0		104	38	20	4
258007.2500	25.0		121	45	25	4
258007.0700	7,0		66	16	10	4
258005.0900	9,0		69	19	10	4
258005.1500	15,0		92	32	16	4



UNIMERCO MATERIAL CLASS (UMC)

01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	06.1	08.1				
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺☺	☺				

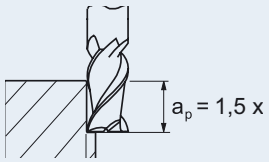
See cutting data on the next page

Recommended cutting data

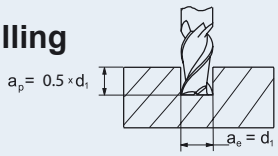
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiCN coated			Uncoated		TiCN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1				69	7	11			60	8
01.2				60	5	10			51	7
01.3				46	3	7			37	5
01.4				35	3	7			28	5
02.1				51	5	10			41	7
02.2				37	5	10			32	7
02.3				10	2	5			8	4
03.1				52	5	10			46	7
03.2				40	5	10			35	7
03.3				23	3	7			20	4
06.1				81	7	11			81	8
08.1				92	7	11			92	8

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

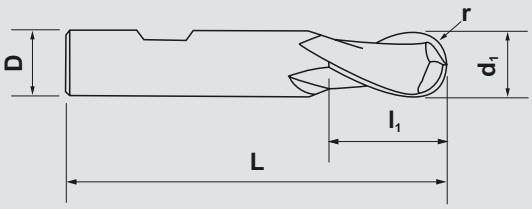
d_1 mm	Feed code 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

HSS PM end mills

HSS PM	N	TiCN	25%		λ 30°	Emulsion	DIN 327D	DIN 1835 B

UM MILL™ 258142

Item no.	d_1	r (±0.02)	L	l_1	D (h6)	Z
258142.0400	4.0	2.0	51	7	6	2
258142.0600	6.0	3.0	52	8	6	2
258142.0800	8.0	4.0	61	11	10	2
258142.1000	10.0	5.0	63	13	10	2
258142.1200	12.0	6.0	73	16	12	2
258142.1400	14.0	7.0	73	16	12	2
258142.1600	16.0	8.0	79	19	16	2
258142.2000	20.0	10.0	88	22	20	2
258142.0300	3,0	1,5	49	5	6	2
258142.0500	5,0	2,5	52	8	6	2



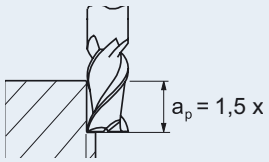
01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	06.1	08.1
☺☺	☺☺	☺☺	☺	☺☺	☺	☺☺	☺☺	☺	☺☺	☺	☺☺

Recommended cutting data

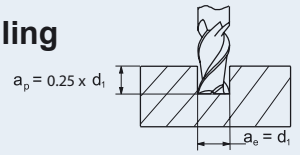
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated V_c m/min.	Uncoated Feed code Finishing	Uncoated Feed code Roughing	TiCN coated V_c m/min.	TiCN coated Feed code Finishing	TiCN coated Feed code Roughing	Uncoated V_c m/min.	Uncoated Feed code	TiCN coated V_c m/min.	TiCN coated Feed code
01.1									60	8
01.2									51	7
01.3									37	5
01.4									28	5
02.1									41	7
02.2									32	7
02.3									8	4
03.1									46	7
03.2									35	7
03.3									20	4
06.1									81	8
08.1									92	8

$$n = \frac{V_C \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

d_1 mm	Feed code 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

Carbide end mills

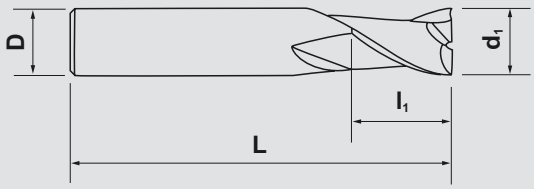
HM MG	N	TiAlN	25%		λ 30°	Emulsion		DIN 6535 HA or HB

UM MILL™ 254702

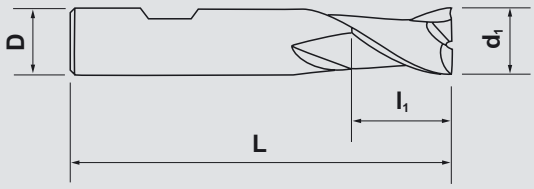
Item no.	d_1 (h10)	r	L	l_1	D (h6)	Z
254702.0100	1.0		40	3	4.0	2
254702.0150	1.5		40	4.5	4.0	2
254702.0200	2.0		32	8	2.0	2
254702.0250	2.5		32	8	2.5	2
254702.0300	3.0		32	12	3.0	2
254702.0350	3.5		32	12	3.5	2
254702.0400	4.0		40	12	4.0	2
254702.0450	4.5		50	14	4.5	2
254702.0500	5.0		50	14	5.0	2
254702.0550	5.5		50	16	5.5	2
254702.0600*	6.0		50	16	6.0	2
254702.0700	7.0		60	20	7.0	2
254702.0800*	8.0		60	20	8.0	2
254702.0900	9.0		60	20	9.0	2
254702.1000*	10.0		70	22	10.0	2
254702.1200*	12.0		70	22	12.0	2
254702.1400*	14.0		75	25	14.0	2
254702.1600*	16.0		75	25	16.0	2
254702.2000*	20.0		100	32	20.0	2

** Weldon shank (DIN 6535 HB)*

DIN 6535 HA



DIN 6535 HB



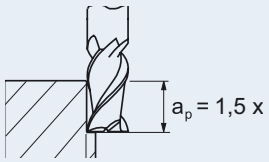
01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	05.1	05.2	06.1	07.1	07.2	11.1
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺	☺	☺	☺	☺	☺

Recommended cutting data

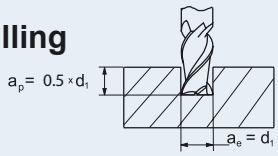
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiAlN coated			Uncoated		TiAlN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1				145	4	8			126	6
01.2				123	3	7			107	5
01.3				80	2	5			78	3
01.4				68	2	5			59	3
02.1				85	4	8			86	6
02.2				60	4	8			67	6
02.3				30	2	5			17	3
03.1				112	4	8			97	6
03.2				85	4	8			74	6
03.3				48	2	5			42	3
05.1				176	5	10			155	7
05.2				145	4	8			126	6
06.1				176	5	10			155	7
07.1				145	4	8			126	5
07.2				75	4	8			65	5
11.1				176	5	10			155	7

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

d_1 mm	Feed code 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

Carbide end mills

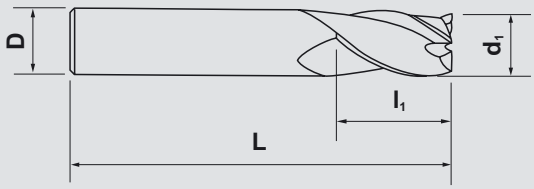
HM MG	N	TiAlN	25%		λ 30°	Emulsion		DIN 6535 HA or HB

UM MILL™ 254703

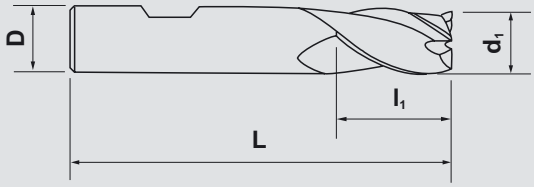
Item no.	d_1 (h10)	r	L	l_1	D (h6)	Z
254703.0200	2.0		32	8	2.0	3
254703.0250	2.5		32	8	2.5	3
254703.0300	3.0		32	12	3.0	3
254703.0350	3.5		32	12	3.5	3
254703.0400	4.0		40	12	4.0	3
254703.0450	4.5		50	14	4.5	3
254703.0500	5.0		50	14	5.0	3
254703.0550	5.5		50	16	5.5	3
254703.0600*	6.0		50	16	6.0	3
254703.0700	7.0		60	20	7.0	3
254703.0800*	8.0		60	20	8.0	3
254703.0900	9.0		60	20	9.0	3
254703.1000*	10.0		70	22	10.0	3
254703.1200*	12.0		70	22	12.0	3
254703.1400*	14.0		75	25	14.0	3
254703.1600*	16.0		75	25	16.0	3
254703.1800*	18.0		84	18	18.0	3
254703.2000*	20.0		100	32	20.0	3

** Weldon shank (DIN 6535 HB)*

DIN 6535 HA



DIN 6535 HB



01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	05.1	05.2	06.1	07.1	07.2
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺	☺	☺	☺	☺

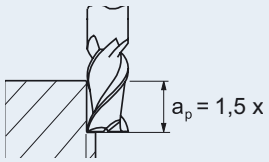
See cutting data on the next page

Recommended cutting data

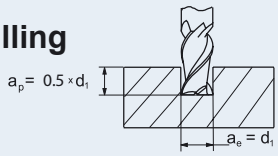
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiAlN coated			Uncoated		TiAlN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1				145	4	8			126	6
01.2				123	3	7			107	5
01.3				80	2	5			78	3
01.4				68	2	5			59	3
02.1				85	4	8			86	6
02.2				60	4	8			67	6
02.3				30	2	5			17	3
03.1				112	4	8			97	6
03.2				85	4	8			74	6
03.3				48	2	5			42	3
05.1				176	5	10			155	7
05.2				145	4	8			126	6
06.1				176	5	10			155	7
07.1				145	4	8			126	5
07.2				75	4	8			65	5

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

d_1 mm	Feed code 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

Carbide end mills

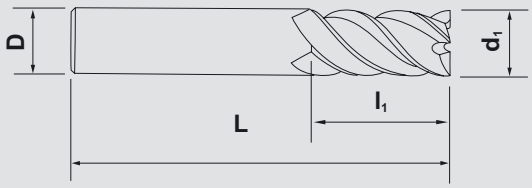
HM MG	N	TiAlN	25%		λ 30°	Emulsion		DIN 6535 HA or HB

UM MILL™ 254704

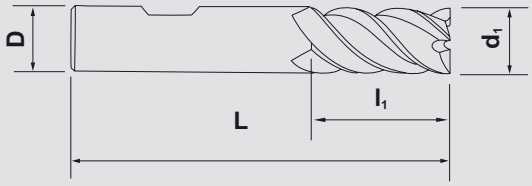
Item no.	d_1 (h10)	r	L	l_1	D (h6)	Z
254704.0200	2.0		32	8	2.0	4
254704.0250	2.5		32	8	2.5	4
254704.0300	3.0		32	12	3.0	4
254704.0350	3.5		32	12	3.5	4
254704.0400	4.0		40	12	4.0	4
254704.0450	4.5		50	14	4.5	4
254704.0500	5.0		50	14	5.0	4
254704.0550	5.5		50	16	5.5	4
254704.0600*	6.0		50	16	6.0	4
254704.0700	7.0		60	20	7.0	4
254704.0800*	8.0		60	20	8.0	4
254704.0900	9.0		60	20	9.0	4
254704.1000*	10.0		70	22	10.0	4
254704.1200*	12.0		70	22	12.0	4
254704.1400*	14.0		75	25	14.0	4
254704.1600*	16.0		75	25	16.0	4
254704.2000*	20.0		100	32	20.0	4

** Weldon shank (DIN 6535 HB)*

DIN 6535 HA



DIN 6535 HB



01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	05.1	05.2	06.1	07.1	07.2
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺	☺	☺	☺	☺

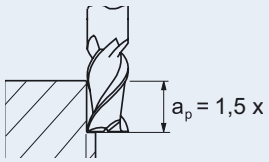
See cutting data on the next page

Recommended cutting data

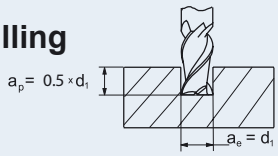
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiAlN coated			Uncoated		TiAlN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1				145	4	8			126	6
01.2				123	3	7			107	5
01.3				80	2	5			78	3
01.4				68	2	5			59	3
02.1				85	4	8			86	6
02.2				60	4	8			67	6
02.3				30	2	5			17	3
03.1				112	4	8			97	6
03.2				85	4	8			74	6
03.3				48	2	5			42	3
05.1				176	5	10			155	7
05.2				145	4	8			126	6
06.1				176	5	10			155	7
07.1				145	4	8			126	5
07.2				75	4	8			65	5

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

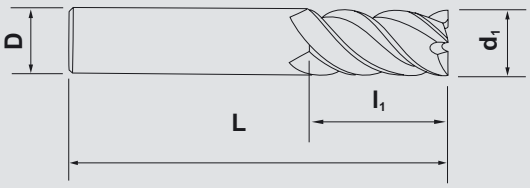
d_1 mm	Feed code 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

Carbide end mills

HM MG	N	TiAlN	25%		λ 30°	Emulsion		DIN 6535 HA

UM MILL™ 254012

Item no.	d_1 (h10)	r	L	l_1	D (h6)	Z
254012.0300	3.0		75	30	3.0	4
254012.0400	4.0		75	30	4.0	4
254012.0500	5.0		100	40	5.0	4
254012.0600	6.0		150	50	6.0	4
254012.0800	8.0		150	50	8.0	4
254012.1000	10.0		150	60	10.0	4
254012.1200	12.0		150	75	12.0	4
254012.2000	20.0		150	65	20.0	4



01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	05.1	05.2	06.1	07.1	07.2
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺	☺	☺	☺	☺

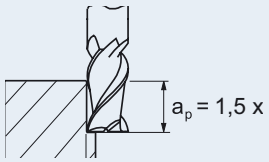
See cutting data on the next page

Recommended cutting data

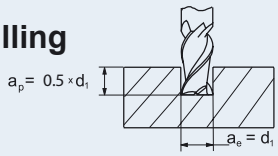
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiAlN coated			Uncoated		TiAlN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1				145	2	4			126	2
01.2				123	1	3			107	2
01.3				80	1	2			78	1
01.4				68	1	2			59	1
02.1				85	2	4			86	2
02.2				60	2	4			67	2
02.3				30	1	2			17	1
03.1				112	2	4			97	2
03.2				85	2	4			74	2
03.3				48	1	2			42	1
05.1				176	2	5			155	3
05.2				145	2	4			126	2
06.1				176	2	5			155	3
07.1				145	2	5			126	2
07.2				75	2	5			65	2

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

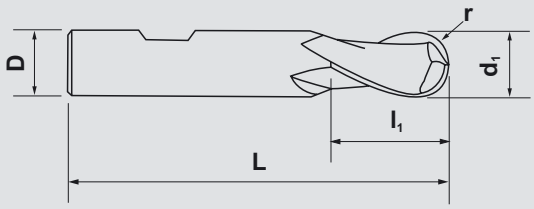
d_1 mm	Feed code 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

Carbide end mills

HM MG	N	TiAlN	25%		λ 30°	Emulsion		DIN 6535 HB

UM MILL™ 254802

Item no.	d_1 (e8)	r	L	l_1	D (h6)	Z
254802.0200	2.0	1.00	48	4	6	2
254802.0250	2.5	1.25	48	4	6	2
254802.0300	3.0	1.50	48	4	6	2
254802.0400	4.0	2.00	50	6	6	2
254802.0500	5.0	2.50	51	7	6	2
254802.0600	6.0	3.00	51	7	6	2
254802.0800	8.0	4.00	59	9	8	2
254802.1000	10.0	5.00	60	10	10	2
254802.1200	12.0	6.00	71	14	12	2
254802.1400	14.0	7.00	71	14	14	2
254802.1600	16.0	8.00	76	16	16	2
254802.1800	18.0	9.00	76	18	18	2
254802.2000	20.0	10.00	82	20	20	2



01.1	01.2	01.3	01.4	02.1	02.2	02.3	03.1	03.2	03.3	05.1	05.2	06.1	07.1	07.2
☺☺	☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺	☺	☺	☺	☺

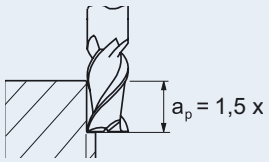
See cutting data on the next page

Recommended cutting data

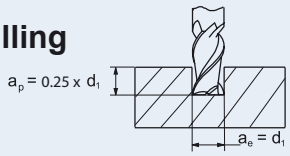
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiAlN coated			Uncoated		TiAlN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1									126	6
01.2									107	5
01.3									78	3
01.4									59	3
02.1									86	6
02.2									67	6
02.3									17	3
03.1									97	6
03.2									74	6
03.3									42	3
05.1									155	7
05.2									126	6
06.1									155	7
07.1									126	5
07.2									65	5

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

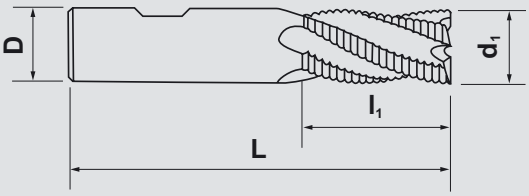
d_1 mm	Feed code 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

Carbide end mills

HM UF1	NRF	TiAlN	25%		λ 45°	Emulsion		DIN 1835 B

UM *HP* MILL™ 258920

Item no.	d_1 (h10)	r	L	l_1	D (h6)	Z
258920.0400	4.0		57	11	6	3
258920.0500	5.0		57	13	6	4
258920.0600	6.0		57	16	6	4
258920.0700	7.0		63	16	8	4
258920.0800	8.0		63	16	8	4
258920.0900	9.0		72	19	10	4
258920.1000	10.0		72	22	10	4
258920.1200	12.0		83	26	12	4
258920.1400	14.0		83	26	14	5
258920.1600	16.0		92	32	16	5
258920.2000	20.0		104	38	20	6
258920.2500	25.0		121	45	25	6



01.1	01.2	01.3	01.4	01.5	01.6	02.1	02.2	02.3	03.1	03.2	03.3	08.1	09.1	09.2	09.3
☺☺	☺☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺	☺☺	☺☺	☺☺	☺	☺☺	☺☺	☺

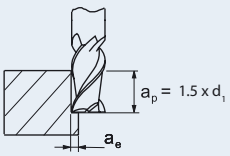
See cutting data on the next page

Recommended cutting data

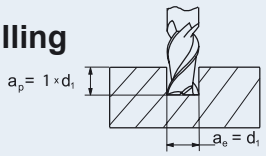
Side milling

Finishing: $a_e = 0.1 \times d_1$

Roughing: $a_e = 0.25 \times d_1$



Slot milling



UMC	Uncoated			TiAlN coated			Uncoated		TiAlN coated	
	V_c m/min.	Feed code		V_c m/min.	Feed code		V_c m/min.	Feed code	V_c m/min.	Feed code
		Finishing	Roughing		Finishing	Roughing				
01.1				240		8			200	5
01.2				210		7			180	5
01.3				180		6			155	3
01.4				150		4			130	3
01.5				120		3			100	2
01.6				80		2			70	2
02.1				150		6			130	4
02.2				120		5			100	3
02.3				45		4			40	2
03.1				210		7			180	5
03.2				180		6			155	3
03.3				150		4			130	3
08.1				45		5			40	3
09.1				100		5			85	3
09.2				70		3			60	2
09.3				50		3			40	2

$$n = \frac{V_c \times 1000}{d_1 \times \pi} \qquad V_f = f_z \times Z \times n$$

Feed (f_z) mm/z

d_1 mm	Feed code 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ø 01.00	0.001	0.002	0.003	0.002	0.003	0.005	0.003	0.005	0.007	0.004	0.006	0.009	0.011	0.013
ø 02.00	0.002	0.004	0.007	0.004	0.007	0.010	0.006	0.009	0.014	0.008	0.011	0.018	0.027	0.036
ø 03.00	0.004	0.007	0.010	0.008	0.010	0.015	0.011	0.013	0.019	0.013	0.017	0.024	0.042	0.060
ø 05.00	0.010	0.014	0.020	0.016	0.020	0.025	0.022	0.026	0.031	0.027	0.032	0.040	0.060	0.080
ø 06.00	0.013	0.017	0.024	0.021	0.025	0.031	0.029	0.033	0.039	0.036	0.041	0.050	0.080	0.110
ø 08.00	0.019	0.024	0.032	0.031	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.067	0.105	0.146
ø 10.00	0.025	0.030	0.038	0.039	0.044	0.051	0.053	0.059	0.065	0.066	0.073	0.085	0.130	0.170
ø 12.00	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.080	0.089	0.110	0.155	0.195
ø 16.00	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.127	0.175	0.220
ø 20.00	0.048	0.057	0.066	0.073	0.081	0.089	0.097	0.106	0.114	0.120	0.130	0.144	0.190	0.244
ø 25.00	0.055	0.065	0.075	0.083	0.091	0.101	0.110	0.120	0.129	0.136	0.146	0.162	0.210	0.268
ø 32.00	0.063	0.073	0.084	0.094	0.103	0.112	0.123	0.134	0.143	0.152	0.163	0.180	0.240	0.293
ø 40.00	0.073	0.084	0.094	0.105	0.114	0.125	0.136	0.147	0.157	0.167	0.178	0.200	0.260	0.315

Kyocera Unimerco material class (UMC)

List of material classes

UNIMERCO material class (UMC) is a clear grouping of workpiece materials. The list shows the most common standards for each class.

Where relevant, the recommended UMC (material classes) are shown at the bottom of the page. The tool is suited for machining all the materials comprised in the material classes shown. This is indicated by ☺.

If the tool is highly suited, this is indicated by ☺☺.

01.1	01.2	01.3	01.4	02.1	02.2	03.1	03.2	03.3	04.1	04.2	05.1	06.1	10.1	10.2
☺☺	☺☺	☺☺	☺	☺☺	☺	☺☺	☺☺	☺	☺☺	☺	☺☺	☺☺	☺☺	☺

UMC 01.1 - steel	Examples of BS standards			
Free-cutting steels	230 M 07	210 M 15	212 M 44	240 M 07
Non-alloy construction steels	4360-43 B	4360-50 B	4360-40 C	4360-SSE
Annealed spring steels	250 A 53	060 A 67	060 A 96	527 A 60
Case-hardening steels < 700 N/mm²	045 M 10	045 M 10	080 M 15	523 M 15
Non-alloy heat treatable steels < 800 N/mm²	070 M 26	080 M 46	070 M 26	080 M 40
Alloy heat treatable steels < 800 N/mm²	120 M 19	640 A 35	530 A 30	530 A 32
Unalloy tool steels	BW 1A	BW 1B		

UMC 01.2 - steel	Examples of BS/DIN standards			
Alloy construction steels < 500 N/mm²	1501-620 Gr. 27		1501-622 Gr. 31;45	
Naturally hard spring steels	250 A 53	060 A 67	060 A 78	527 A 60
Case-hardening steels 700 - 850 N/mm²	S 107	527 M 17		
Nitriding steels < 1000 N/mm²	905 M 31	905 M 39		
Non-alloy heat treatable steels 800 - 1000 N/mm²	070 M 55	080 A 62	080 A 62	
Alloy heat treatable steels < 800 N/mm²	1717 CDS 110		708 M 40	735 A 50
Alloy heat treatable steels 800 - 1000 N/mm²	150 M 36	150 M 36	708 M 40	530 A 32
Low alloy cold work tool steels < 1000 N/mm²	708 A 37	708 M 40	BO 1	BW 2
Low alloy hot work tool steels 800 - 1000 N/mm²	40 CMD			
High alloy hot work tool steels, after annealing < 1100 N/mm²	BH 13	BH 21		
Conventional steel castings	GS-60	GS-Ck 45	GS-42 CrMo 4	

UMC 01.3 - steel	Examples of BS standards		
Alloy heat treatable steels 1000 - 1300 N/mm²	817 M 40	708 M 40	735 A 50
High alloy cold work tool steels	2260		
Treated hot work tool steels 1100 - 1350 N/mm²	40 CMD		
High alloy hot work tool steels, after annealing < 1100 N/mm²	BH 11	BH 21	
Conventional steel castings	Z 120 M 12		

Kyocera Unimerco material class (UMC)

UMC 01.4 - steel	Examples of BS standards
High alloy cold work tool steels	BA 2
Treated hot work tool steels 1100 - 1350 N/mm²	
Conventional steel castings	Z 120 M 12

UMC 01.5 - steel	Examples of BS standards			
Spring hard spring steels	250 A 53	060 A 78	060 A 96	735 A 50
Alloy construction steels 1300 - 1600 N/mm²	823 M 30		722 M 24	
Treated hot work tool steels 1350 - 1600 N/mm²	BH 13			

UMC 01.6 - steel
Hardened tool steels < 45 HRC

UMC 01.7 - steel
Hardened tool steels < 55 HRC

UMC 01.8 - steel
Hardened tool steels > 55 HRC

UMC 02.1 - stainless steel	Examples of BS standards			
Stainless chromium steels (ferritic/martensitic)	403 S 17	416 S 21	420 S 37	431 S 29
Chromium steel castings (ferritic/martensitic)	420 C 29			

UMC 02.2 - stainless steel	Examples of BS/USA standards			
Stainless chromium steels (ferritic/martensitic)	440 A	440 C		
Stainless chromium-nickel steels (austenitic)	304 S 15	304 S 62	316 S 16	316 S 11
Heat resisting steels (nickel-base alloys)	NiCu30Fe	NiCu30Al		
Heat resisting steels (Co-base alloys)	CoCr20W15Ni		CoCr28MoNi	
Chromium steel castings (ferritic/martensitic)	G-X 40 CrSi 17		G-X 3 CrNi 13 4	
Chromium steel castings (austenitic)	G-X 2 CrNi 18 9		G-X 5 CrNi 13 4	

UMC 02.3 - stainless steel	Examples of BS/AFOR standards			
Treated aerospace material 280 - 450 HB	431 S 29			
Heat resisting steels	321 S 12	NA 17	430 S 15	
Heat resisting steels (nickel-base alloys)	Inconel	Hastelloy	Nimonic	Waspaloy
Chromium steel castings (ferritic/martensitic)				

Kyocera Unimerco material class (UMC)

UMC 03.1 - cast iron	Examples of BS standards			
Non-alloy grey cast iron < 180 HB	Grade 150	Grade 220		
Non-alloy nodular graphite cast iron < 180 HB	SNG 420/12	SNG 370/17		

UMC 03.2 - cast iron	Examples of BS standards			
Non-alloy grey cast iron (with lamellar graphite) > 180 HB	Grade 260	Grade 300	Grade 350	Grade 400
Alloy grey cast iron (with lamellar graphite)	L-NiMn 13 7	L-NiCr 20 2		
Non-alloy nodular graphite cast iron > 180 HB	SNG 500/7	SNG 600/3	SNG 700/2	
Alloy nodular graphite cast iron	S-NiCr 20 2	S-nICr 30 1		

UMC 03.3 - cast iron	Examples of BS standards	
High alloy grey cast iron (with lamellar graphite)	Grade 2 A	Grade 3 D

UMC 04.1 - aluminium	Examples of DIN standards			
Non-alloy aluminium 20 - 50 HB	Al99	Al99.5	Al99.8	Al99.9
Non-hardened wrought alloys 30 - 80 HB	AlMnCu	AlMn1Mg0.5	AlMg1	AlMg3
Hardened wrought alloys 75 - 150 HB	AlMgSi 1	AlCuMg2	AlZnMgCu0.5	
Cast material < 6% Si	G-AlCu4Ti	G-AlMg5Si	G-AlMg3	
Aluminium magnesium	MgMn2	MgAl8Zn	G-MgZn5Th2Zr1	

UMC 04.2 - aluminium	Examples of DIN standards		
Cast material 6 - 12% Si	G-AlSi9Mg	G-AlSi12	G-AlSi10Mg (Cu)
Cast material > 12% Si	G-AlSi18		
Magnesium alloys (cast material)	GD-MgAl4sI1		GD-MgAl6Zn1

UMC 05.1 - copper	Examples of DIN standards			
Non-alloy copper	E-Cu57	SE-Cu	SW-Cu	SF-Cu
Non-hardened wrought alloys	CuZn20	CuPb 1P	CuFe 2p	CuMn5

UMC 05.2 - copper	Examples of DIN standards			
Hardened wrought alloys	CuNi2Si	CuBe1.7	CuCrZr	CuZr
CuNi alloys	CuNi25	CuNi9Sn2	CuNi30FeMn2	
CuNi alloys, short chips	CuNi12Zn24		CuNi12Zn30Pb1	

UMC 06.1 - brass	Examples of DIN standards			
CuZn (brass), long chips	CuZn20	CuZn30	CuZn36	CuZn40
CuZn (brass), short chips	CuZn39Pb2		CuZn38Sn1	

Kyocera Unimerco material class (UMC)

UMC 07.1 - bronze	Examples of DIN standards		
CuSn (bronze), long chips	CuSn4	CuSn8	CuSn6ZnNi

UMC 07.2 - bronze	Examples of DIN standards		
CuAlFe (Ampco), long chips	CuAl8	CuAl8Fe3	CuAl11Fe4

UMC 08.1 - nickel	Examples of DIN standards			
Non-alloy nickel	Ni99CSi	Ni99.6	Ni99.4Fe	NiAlBz

UMC 09.1 - titanium	Examples of BS standards		
Non-alloy titanium 110 - 270 HB	TA 7	TA 6	TA 9

UMC 09.2 - titanium	Examples of BS/DIN standards		
Alloy titanium 300 - 340 HB	TA 14 / 17	Ti6Al6V2Sn	Ti7Al4Mo

UMC 09.3 - titanium	Examples of BS standards		
Hardened alloys 340 - 450 HB	TA 40	TA 48	TA 28

UMC 10.1 - plastics	Examples of BS standards			
Thermoplastics (PE, PP, PVC, PS, PMMA, PTFE, PA, PC, PI)	Eraclene	Viplast	Sinvet	Lacrilex

UMC 10.2 - plastics	Examples of BS standards			
Duroplastics (PF, MF, UF, PUR, SI, PI, UP, EP)	Formolo	Melochem	Puriplast	Conapoxy

UMC 11.1 - plastics	Examples of DIN standards
Fibre reinforced plastics	Kevlar

UMC 12.1 - graphite
Graphite

Corporate Motto: "Respect the Divine and Love People"

敬天愛人

Preserve the spirit to work fairly and honorably,
respecting people, our work, our company
and our global community.

THE NEW VALUE FRONTIER

KYOCERA

"The New Value Frontier" reflects Kyocera's commitment to continuously creating new value at the cutting edge of technology. The global Kyocera Group develops unique technologies and applies its vision to create valuable products that the markets continually seek.

Industrial tooling solutions

Kyocera Unimerco is a global manufacturer and distributor, providing standard and customized cutting tool solutions as well as know-how and optimization guidance for the manufacturing industry.

The company was founded in 1964 and has since expanded into 17 countries, with more than 700 employees.
Today the company is part of the Japan-based Kyocera Corporation.

In 1998 the Sheffield branch was established. It is specialised in supplying the industrial market with inserts, standard tools and related tooling solutions.

KYOCERA

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