CERATIZIT

hard material matters

Contents

Introduction

B2-B5
B6-B7
B8-B22
B23-B24
B25

Application

B36-B37
B38
B39
B40-B41
B42

Inserts

A
B46
C
B47-B48
L
B49-B55
O
B56-B57
R
B58-B61
S
B62-B66
T
B67-B68
V
B69
W
B70
X
B71-B75
Z
B76
B77-B78
Other systems
B79

Tools

B86-B113
B114-B123
B124-B127
B128-B156
B157-B169

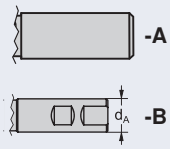
Technical information

B170-B176
B177-B189
B190-B203
B204-B227
B228-B236
B237-B239
B240-B241
B242-B246
B247-B252

CERATIZIT designation system

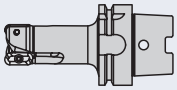
Milling tools

C



G

M



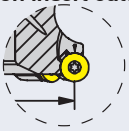
A

Connection/ interface

shoulder/slot cutters

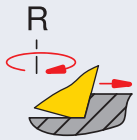
face milling cutters

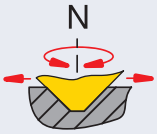
button insert cutters



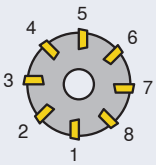
cassette cutters

Diameter





Cutting direction



Effective number of cutting edges

* only when a distinction is necessary

A = with adjustable inserts

(B* = irregular pitch)

C 490 . 25 . R . 02 K4 A 31

System

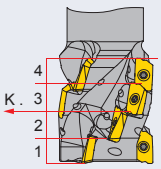
270 = face milling cutters
273 = face milling cutters
274 = face milling cutters
272 = chamfering cutters
251 = button insert cutters

260 = cassette cutters
211 = shoulder/slot cutters
210 = shoulder/slot cutters
141 = shoulder/slot cutters
241 = shoulder/slot cutters
490 = shoulder/slot cutters
BF = drill and slot cutters
212 = drill and slot cutters
244 = long edge cutters
HDM = heavy duty milling cutters
HSC = high-speed cutters
HPC = high-performance cutters
HEC = high-efficiency cutters

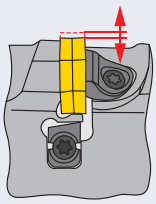
HFC = high-feed cutters

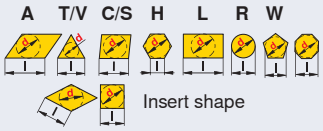
KF = ball nose cutters
NF = T-slot cutters
ZF = circlip groove cutters

Heavy duty milling cutters



Number of adjustable inserts

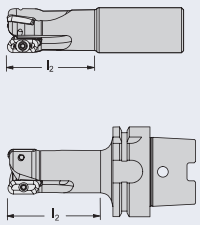




d[mm]	A	T/V	C/S	H	L	R	W	O
5,00	-	-	-	-	-	05	-	-
5,56	-	09	05	-	08	-	03	-
6,00	-	-	-	-	-	06	-	-
6,35	-	11	06	03	10	-	04	02
6,65	10	-	-	-	-	-	-	-
7,94	-	-	07	-	-	-	-	-
8,00	-	-	-	-	-	08	-	-
9,00	-	-	-	-	12	-	-	-
9,52	-	16	09	05	15	-	06	04
9,57	15	-	-	-	-	-	-	-
10,00	-	-	-	-	-	10	-	-
12,00	-	-	-	-	-	12	-	-
12,70		22	12	07	20		08	05
15,87		27	15	09			10	06
16,00						16		
16,74			16					
19,05		33	19	11			13	07
20,00						20		

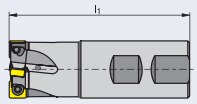
Cutting edge length

l_2 [mm]



Working length

l_1 [mm]

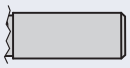


Overall length

09 - A20 - 40 - 165

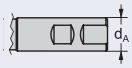
Details connection, shank

A
$d_A = d_1$



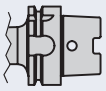
A20
d_A = 20 mm

B
$d_A = d_1$



B25
d_A = 25 mm

H63A



CERATIZIT designation system

Inserts

Insert shape

A	▯▯
B	▯▯
K	▯▯
H	▯▯▯
L	▯▯
O	▯▯▯
P	▯▯▯
C	▯▯
D	▯▯
E	▯▯
M	▯▯
V	▯▯
R	-
S	▯▯
T	▯▯
W	▯▯
X	Special shapes

Tolerances

	d [±mm]	m [±mm]	s [±mm]	d=6,35/9,52	d=12,7	d=15,8/19,05
A	0,025	0,005	0,025	●	●	●
C	0,025	0,013	0,025	●	●	●
E	0,025	0,025	0,025	●	●	●
F	0,013	0,005	0,025	●	●	●
G	0,025	0,025	0,13	●	●	●
H	0,013	0,013	0,025	●	●	●
J	0,05	0,005	0,025	●		
	0,08	0,005	0,025		●	
	0,10	0,005	0,025			●
K	0,05	0,013	0,025	●		
	0,08	0,013	0,025		●	
	0,10	0,013	0,025			●

	d [±mm]	m [±mm]	s [±mm]	d=6,35/9,52	d=12,7	d=15,8/19,05
M	0,05	0,08	0,13	●		
	0,08	0,13	0,13		●	
	0,10	0,15	0,13			●
N	0,05	0,08	0,025	●		
	0,08	0,13	0,025		●	
	0,10	0,15	0,025			●
U	0,08	0,13	0,13	●		
	0,13	0,20	0,13		●	
	0,18	0,27	0,13			●

Form of top surface

A	
F	
G	
M	
N	
Q	
R	
T	
U	
W	
X	Special shapes

S D N T 09

Clearance angle

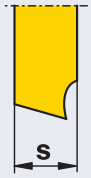
	α
A	▯
B	▯
C	▯
D	▯▯
E	▯▯
F	▯▯
G	▯▯
N	▯
P	▯▯
O	Special version

Cutting edge length

A T/V C/S H L R W

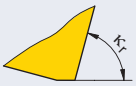
Insert shape

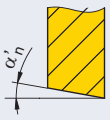
d[mm]	A	T/V	C/S	H	L	R	W	O
5,00	-	-	-	-	-	05	-	-
5,56	-	09	05	-	08	-	03	-
6,00	-	-	-	-	-	06	-	-
6,35	-	11	06	03	10	-	04	02
6,65	10	-	-	-	-	-	-	-
7,94	-	-	07	-	-	-	-	-
8,00	-	-	-	-	-	08	-	-
9,00	-	-	-	-	12	-	-	-
9,52	-	16	09	05	15	-	06	04
9,57	15	-	-	-	-	-	-	-
10,00	-	-	-	-	-	10	-	-
12,00	-	-	-	-	-	12	-	-
12,70		22	12	07	20		08	05
15,87		27	15	09			10	06
16,00						16		
16,74			16					
19,05		33	19	11			13	07
20,00						20		



	s [mm]
01	1,59
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94
09	9,52

Insert thickness





1st sign

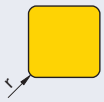
	κ_r
A	▯▯
D	▯▯
E	▯▯
F	▯▯
P	▯▯
Z	Others

2nd sign

	α'_n
A	▯
B	▯
C	▯
D	▯▯
E	▯▯
F	▯▯
G	▯▯
N	▯
P	▯▯
Z	Others

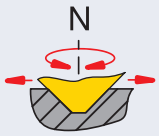
Radius

	r (mm)
M0*	
02	0,2
04	0,4
08	0,8
12	1,2



* Shape R only

Facet corner radius



Cutting direction

Manufacturer specific detail

particularly for:

-27	Non ferrous metals
-29	Steel
-31	Cast iron
-33	Stainless steels
F50	Fine
M50	Medium
R50	Rough

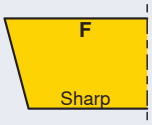
additional characteristic:

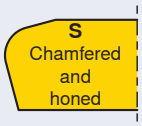
P	Polished (Microfinish)
R	Rough
M	Medium
F	Fine

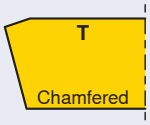
Chip groove

03 AE SN -29

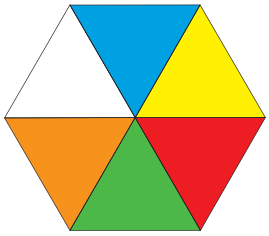
Cutting edge







Material



%DVHG RQ 9' ,&(5 7,=,7·V 0 DVWHU XLGHOLQHV P DWHULDO DUH six main groups (P, M, K, N, S, H).
Each is given a colour, according to the system partly adopted in ISO 513.

Blue: steel
Machining, cementation, tempered and constructional steels

Yellow: stainless steel
Ferritic Cr-steels, austenitic CrNi-steels, martensitic Cr-steels, duplex steels

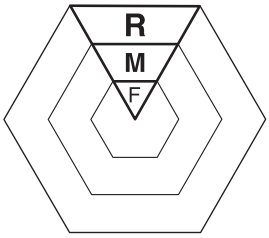
Red: cast iron
Cast iron, grey cast iron, tempered iron, spheroidal cast LURQ &* ,VOQWHG LURQ

Green: non ferrous metals and non metals
Al wrought and Al cast alloys, copper, copper alloys, non metal materials

Orange: heat resistant alloys / titanium
Ni/Co-base alloys, Ti alloys

White: hard materials
Hardened steels (≥ 45 HRC), chilled castings, hard cast irons

Machining application type



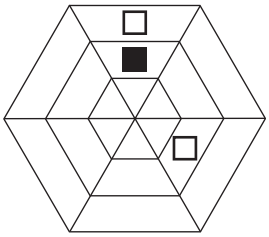
Each coloured segment is divided into three sections, and each section indicates the relevant machining application type:

R = rough machining

M = medium machining

F = fine machining

Application

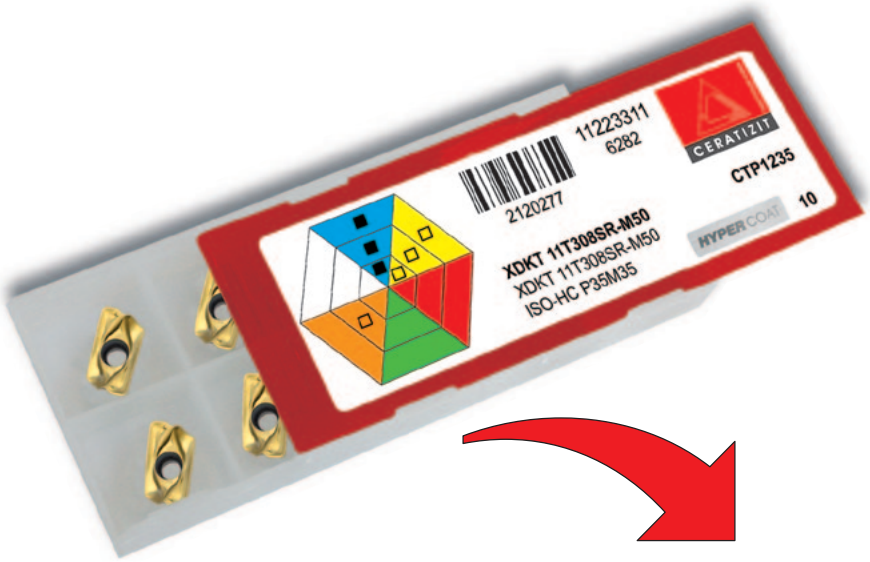


The ideal application area for each insert is indicated by a black square. Extended applications are indicated by an open square. 7KH&(5 7,=,7 0DVWHU XLGH SURYLGHV R XZLWKDQ HDVLO understandable structure for choosing a product and enables youto reduce grade and geometry inventory.

■ **Main application**

□ **Extended application**

The right indexable insert at a glance



Main application:
Medium, finish and rough machining of steel.

Extended application:
Medium machining of heat resistant alloys.
Medium, fine and rough machining of stainless steels.

The CERATIZIT designation system

for new cutting materials

CTC 3215

Manufacturer: CERATIZIT

Cutting material

W Uncoated carbide
C CVD coated carbide
P PVD coated carbide
T Uncoated cermet
E Coated cermet
N Uncoated silicon nitride
M Coated silicon nitride
S Mixed ceramic
I Sialon
D PCD
B CBN
L CBN coated
H Sintered HSS

ISO 513 Application range

For example:
05 ISO K05/P05
10
15
25-

Main application (material) Variant 1: number

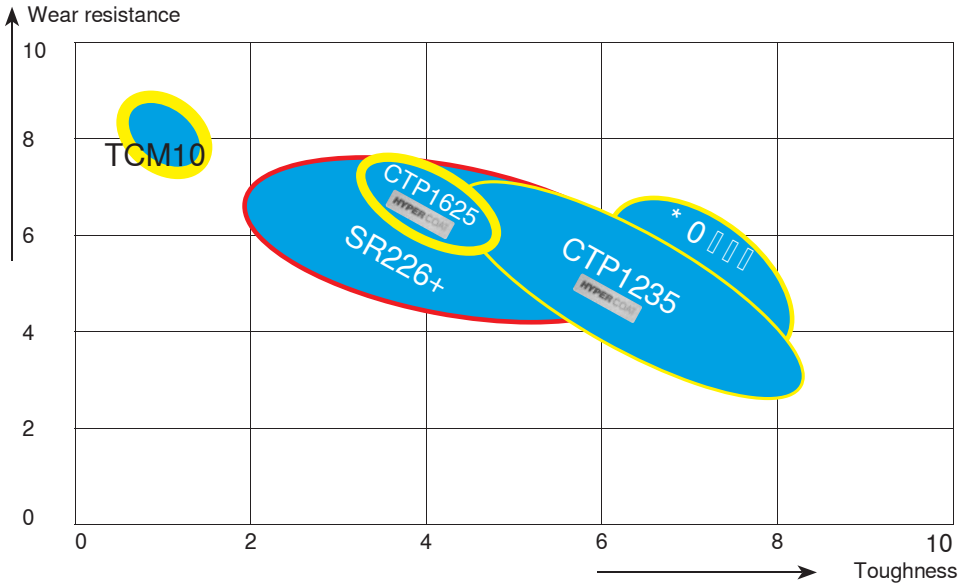
1 Steel
2 Stainless steel
3 Cast iron
4 Light and non ferrous metals, non metals
5 Heat resistant alloys, titanium
6 Hard materials
7 Universal grade for a variety of applications

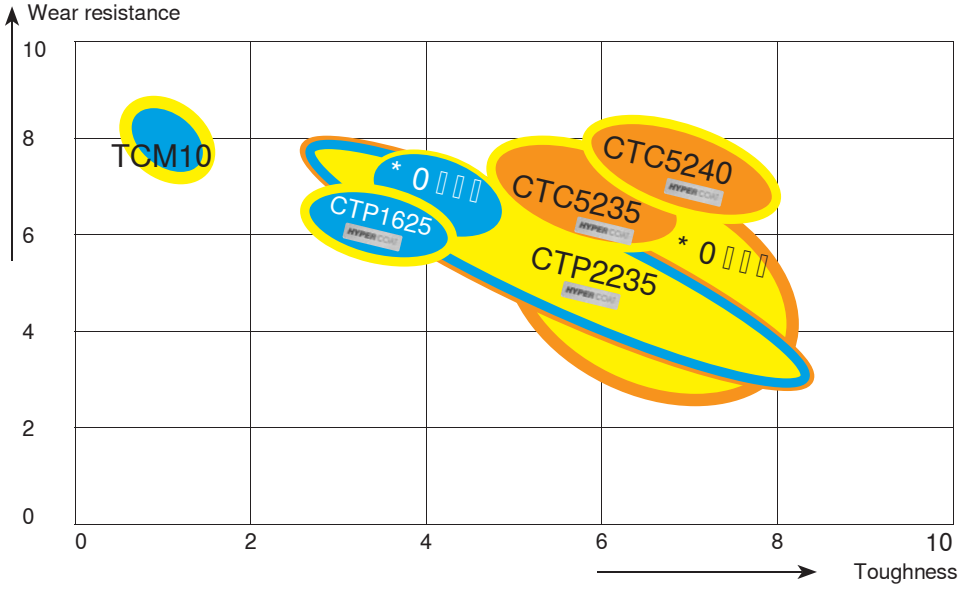
Main application (machining method)

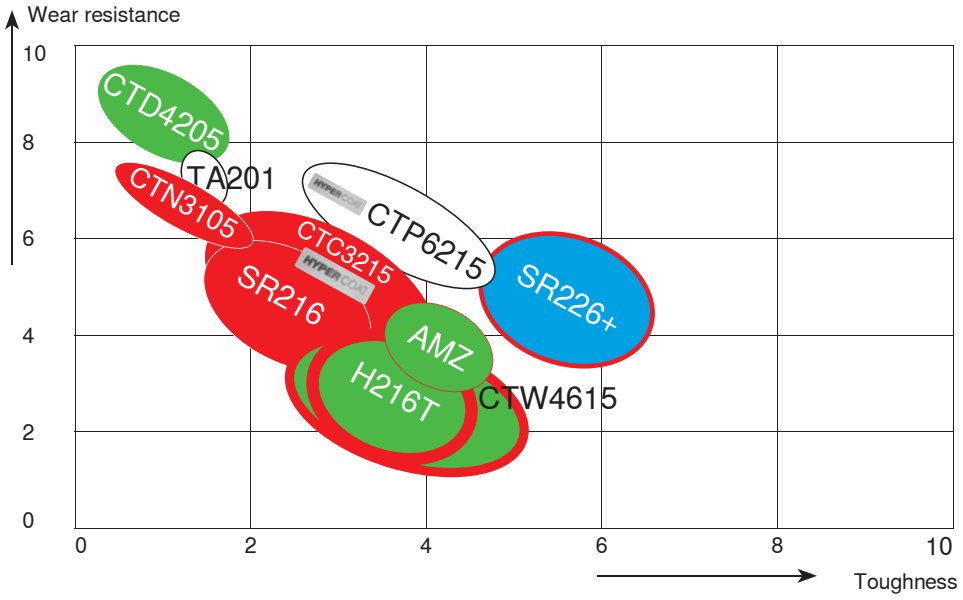
1 Turning
2 Milling
3 Parting and grooving
4 Drilling
5 Threading
6 Others
7 Universal grade for a variety of applications

Main application (material) Variant 2: ISO letter

P Steel
M Stainless steel
K Cast iron
N Light and non ferrous metals, non metals
S Heat resistant alloys, titanium
H Hard materials
X Universal grade for a variety of applications


Wear resistance
10
8
6
4
2
0
0
2
4
6
8
10
Toughness
TCM10
CTP1625
SR226+
CTP1235
* 0


Wear resistance
10
8
6
4
2
0
0
2
4
6
8
10
Toughness
TCM10
* 0
CTP1625
CTC5240
CTC5235
CTP2235
* 0


Wear resistance
10
8
6
4
2
0
0
2
4
6
8
10
Toughness
CTD4205
TA201
CTN3105
CTC3215
CTP6215
SR216
SR226+
AMZ
H216T
CTW4615

Grade overview

Grade designation	Standard designation	*Cutting material	Application range (01 05 10 15 20 25 30 35 40 45 50)	P Steel	M Stainless	K Cast iron	N Non ferrous metals	S Heat resistant	H Hard materials
AMZ	HC-K10	P		○	○	○	●	○	
CTC3215	HC-K15	C				●			
CTC5235	HC-M35	C		○	●	○		●	
CTC5240	HC-M40	C						●	
CTP1235	HC-P35	P		●					
	HC-M30	P			○			○	
CTP1625	HC-P25	P		●					
	HC-M25	P			●			○	
	HC-K20	P				○			
CTP2235	HC-P40	P		○					
	HC-M40	P			●			○	
CTP3220	HC-K20	P				●			
CTP6215	HC-K15	P				●			●
CTW4615	HW-K15	W				●	●		
GM246	HC-P40	C		○					
	HC-M40	C			●			●	
GM43+	HC-P35	C		●					
	HC-M35	C			○			○	
H216T	HW-K15	W				●	●		
S26T	HW-P20	W		●	○				
SR216	HC-K10	C				●			
SR226+	HC-P25	C		●					
	HC-M25	C			○				
	HC-K20	C				●			

● Main application
○ Extended application

*Type of cutting material

B8

Grade designation	Standard designation	*Cutting material	Application range (01 05 10 15 20 25 30 35 40 45 50)	P Steel	M Stainless	K Cast iron	N Non ferrous metals	S Heat resistant	H Hard materials
TCC410	HC-P10	E		●					
	HC-M10	E			○				
	HC-K05	E				●			
TCM10	HT-P15	T		●					
	HT-M10	T			●				
	HT-K10	T				○			

● Main application
○ Extended application

Grade designation	Standard designation	*Cutting material	Application range (0 05 10 15 20 25)	P Steel	M Stainless	K Cast iron	N Non ferrous metals	S Heat resistant	H Hard materials
CTD4205	DP-K01	D					●		
CTL3215	BN-K10	L				●			○
CTN3105	CN-K05	N				●			

● Main application
○ Extended application

*Type of cutting material

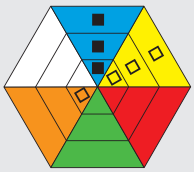
B8

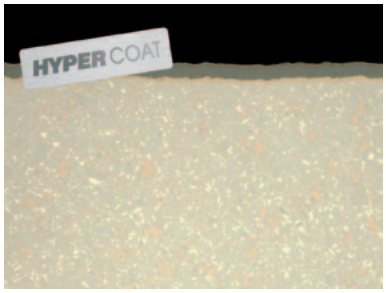
Grade description

Steel

CTP1235

HC-P35
HC-M30





Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

Composition:
Co 9.0%; mixed carbides 4.0%; WC balance

Grain size:
1-1.5 μm

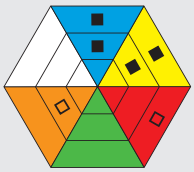
Hardness:
HV 1510

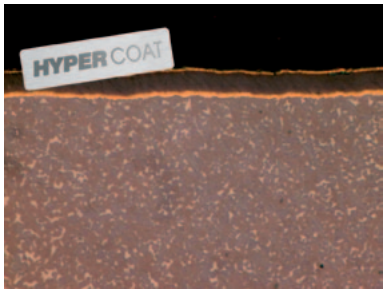
Coating specification:
PVD
(Ti,Al)N + TiN; 4 μm

Wet / dry:

CTP1625

HC-P25
HC-M25
HC-K20





Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

Composition:
Co 9.5%; mixed carbides 20.6%; WC balance

Grain size:
1.5 μm

Hardness:
HV 1550

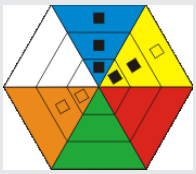
Coating specification:
PVD
TiN + TiAlN + TiN; 3-4 μm

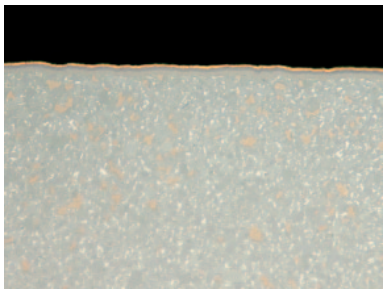
Wet / dry:

Carbide grade for milling with side and face milling cutters

GM43+

HC-P35
HC-M35





Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

Composition:
Co 9.0%; mixed carbides 4.0%; WC balance

Grain size:
1 - 1.5 μm

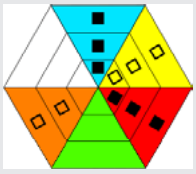
Hardness:
HV 1510

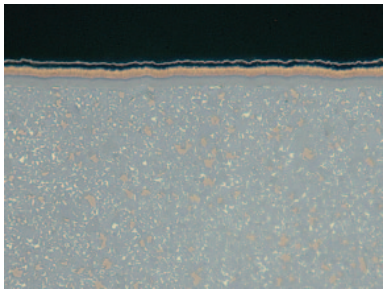
Coating specification:
CVD
TiN + Ti(C,N) + TiC; 3 μm

Wet / dry:

SR226+

HC-P25
HC-M25
HC-K20





Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

Composition:
Co 9.0%; mixed carbides 4.0%; WC balance

Grain size:
1 - 1.5 μm

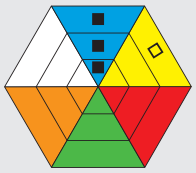
Hardness:
HV 1510

Coating specification:
CVD
Al_2O_3 + TiN + Ti (C,N); 5.5 μm

Wet / dry:

S26T

HW-P20



Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

Composition:
Co 9.5%; mixed carbides 20.6%; WC balance

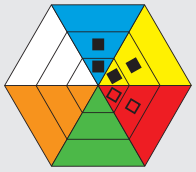
Grain size:
1.5 μm

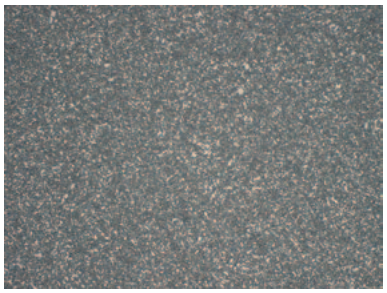
Hardness:
HV 1550

Wet / dry:

TCM10

HT-P15
HT-M10
HT-K10





Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

Composition: cermet
Co/Ni 12.2%; WC 15.0%; TaNbC 10.0%; TiCN balance

Hardness:
HV 1620

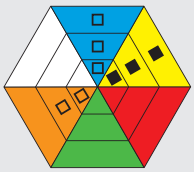
Wet / dry:

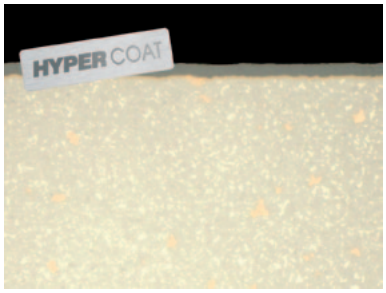
Grade description

Stainless steel

CTP2235

HC-P40
HC-M40





Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

Composition:
Co 12.5%; mixed carbides 2.0%; WC balance

Grain size:
1 μm

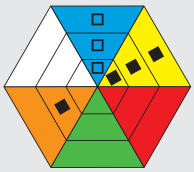
Hardness:
HV 1380

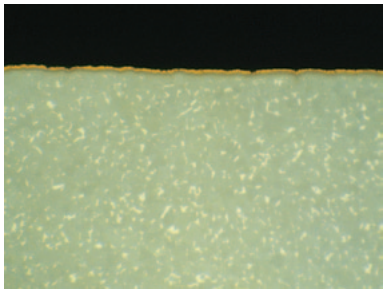
Coating specification:
PVD
(TiAl)N; 4 μm

Wet / dry:

GM246

HC-P40
HC-M40





Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

Composition:
Co 8.0%; WC balance

Grain size:
2 μm

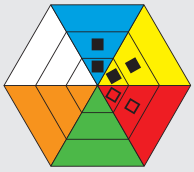
Hardness:
HV 1280

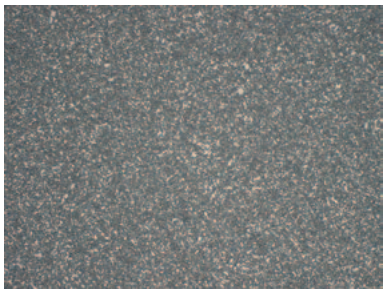
Coating specification:
CVD
TiN + Ti(C,N) + TiC; 3 μm

Wet / dry:

TCM10

HT-P15
HT-M10
HT-K10





Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

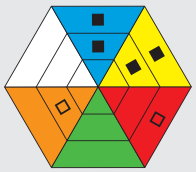
Composition: cermet
Co/Ni 12.2%; WC 15.0%; TaNbC 10.0%; TiCN balance

Hardness:
HV 1620

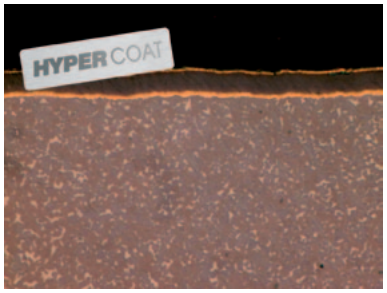
Wet / dry:

CTP1625

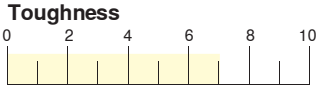
HC-P25
HC-M25
HC-K20



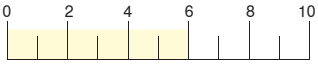
Carbide grade for milling with side and face milling cutters



Toughness



Wear resistance



Composition:
Co 9.5%; mixed carbides 20.6%; WC balance

Grain size:
1.5 μm

Hardness:
HV 1550

Coating specification:
PVD
TiN + TiAlN + TiN; 3-4 μm

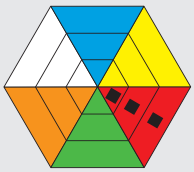
Wet / dry:

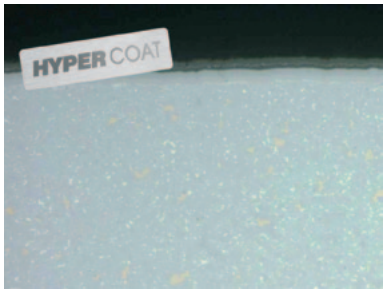
Grade description

Cast iron

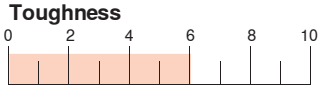
CTC3215

HC-K15

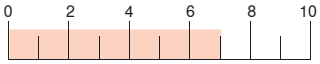




Toughness



Wear resistance



Composition:
Co 6.0%; mixed carbides 2.0%; WC balance

Grain size:
1 μm

Hardness:
HV 1630

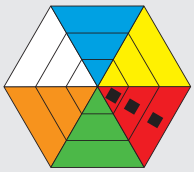
Coating specification:
CVD
Ti(C,N) + Al_2O_3; 5 μm

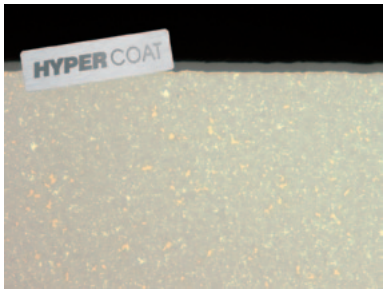
Wet / dry:

Special grade for the machining of cast iron

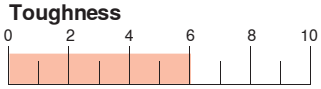
CTP3220

HC-K20

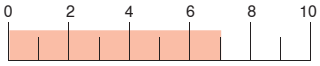




Toughness



Wear resistance



Composition:
Co 6.0%; TaC 2.0%; WC balance

Grain size:
1 μm

Hardness:
HV_{30} 1630

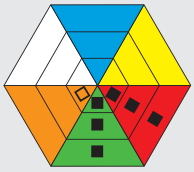
Coating specification:
PVD
TiAlN; 3 μm

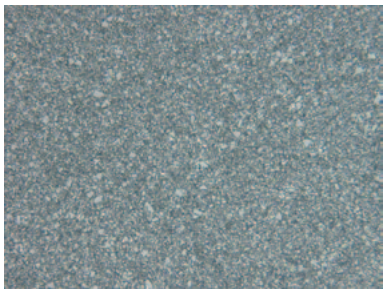
Wet / dry:

Special grade for the machining of cast iron

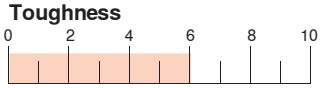
CTW4615

HW-K15

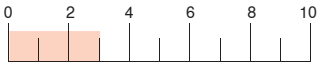




Toughness



Wear resistance

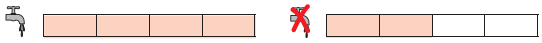


Composition:
Co 6.0%; WC balance

Grain size:
1 μm

Hardness:
HV 1630

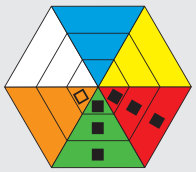
Wet / dry:

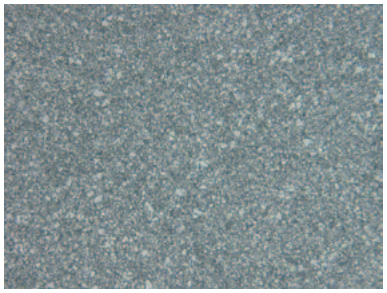


Precision manufactured

H216T

HW-K15





Composition:
Co 6.0%; WC balance

Grain size:
1 μm

Hardness:
HV_{30} 1630

Toughness
0 2 4 6 8 10

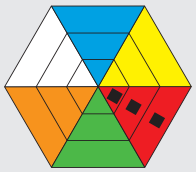
Wear resistance
0 2 4 6 8 10

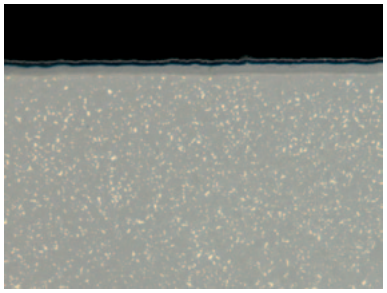
Wet / dry:

Microfinish

SR216

HC-K10





Composition:
Co 6.0%; WC balance

Grain size:
1 μm

Hardness:
HV 1630

Coating specification:
CVD
Al_2O_3 + Ti(C,N) + Ti(C,N); 5.5 μm

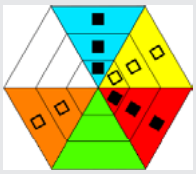
Toughness
0 2 4 6 8 10

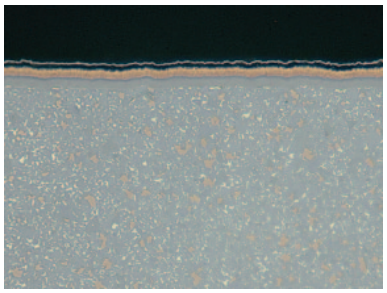
Wear resistance
0 2 4 6 8 10

Wet / dry:

SR226+

HC-P25
HC-M25
HC-K20





Composition:
Co 9.0%; mixed carbides 4.0%; WC balance

Grain size:
1 - 1.5 μm

Hardness:
HV 1510

Coating specification:
CVD
Al_2O_3 + TiN + Ti (C,N); 5.5 μm

Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

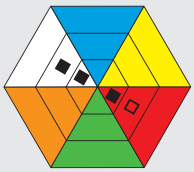
Wet / dry:

Grade description

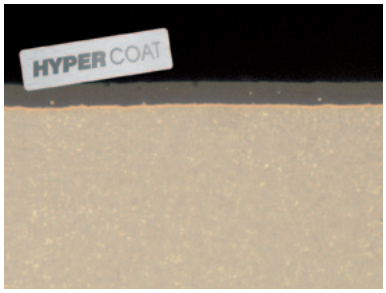
Cast iron

CTP6215

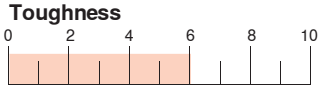
HC-K15



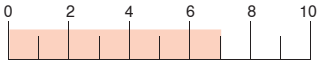
Carbide grade for hard material machining.



Toughness



Wear resistance



Composition:
Co 12.0%; WC balance

Grain size:
.4 μm

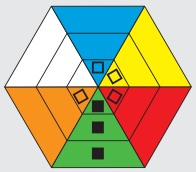
Hardness:
HV 1730

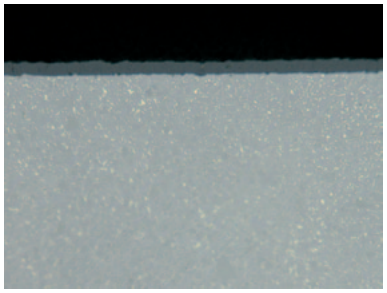
Coating specification:
PVD
(TiAl)N; 4 μm

Wet / dry:

AMZ

HC-K10





Composition:
Co 6.0%; WC balance

Grain size:
1 μm

Hardness:
HV 1630

Coating specification:
PVD
TiAlN; 2 - 4 μm

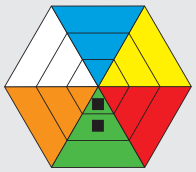
Toughness
0 2 4 6 8 10

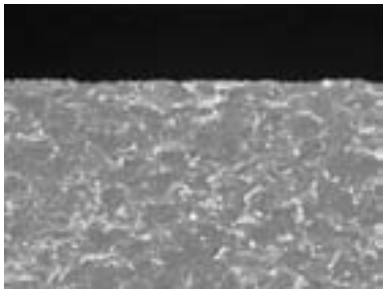
Wear resistance
0 2 4 6 8 10

Wet / dry:

CTD4205

DP-K01





Composition:
Polycrystalline diamond (PCD)

Grain size:
~ 25 μm

Toughness
0 2 4 6 8 10

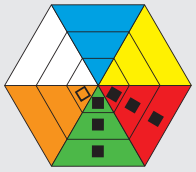
Wear resistance
0 2 4 6 8 10

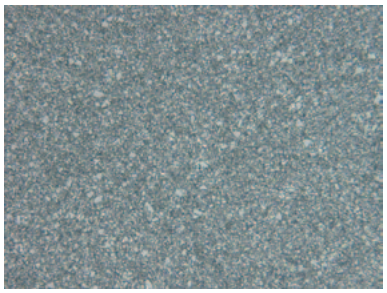
Wet / dry:

PCD for milling non ferrous metals, plastics and graphite

CTW4615

HW-K15





Composition:
Co 6.0%; WC balance

Grain size:
1 μm

Hardness:
HV 1630

Toughness
0 2 4 6 8 10

Wear resistance
0 2 4 6 8 10

Wet / dry:

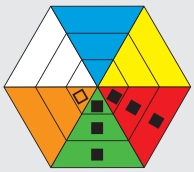
Precision manufactured

Grade description

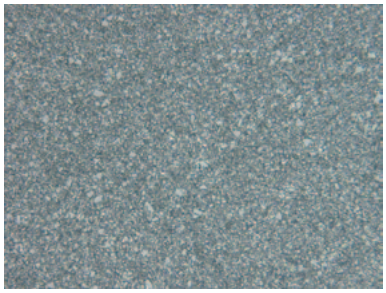
Non ferrous metals and non metals

H216T

HW-K15



Microfinish

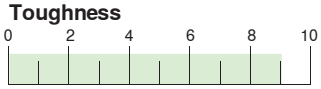


Composition:
Co 6.0%; WC balance

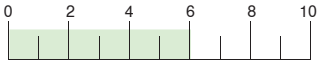
Grain size:
1 μm

Hardness:
HV_{30} 1630

Toughness



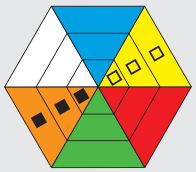
Wear resistance

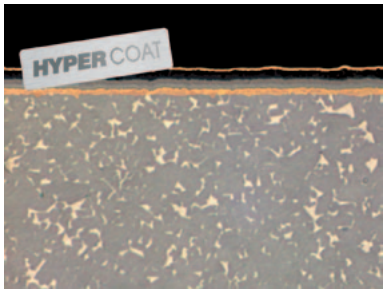


Wet / dry:

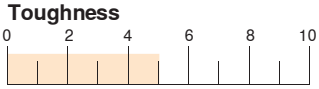
CTC5235

HC-M35

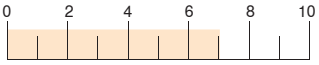




Toughness



Wear resistance



Carbide grade for milling heat-resistant alloys (e.g. turbine blades etc.)

Composition:
10.0% binder; WC balance

Grain size:
2 μm

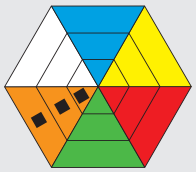
Hardness:
HV 1330

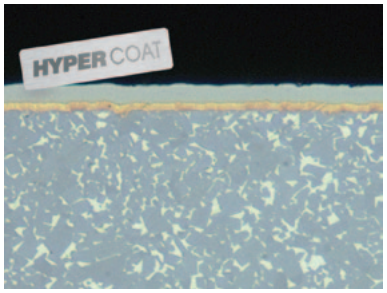
Coating specification:
CVD
TiN-Ti (C,N); Al_2O_3; Ti (N,B); 6 μm

Wet / dry:

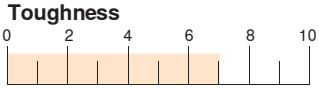
CTC5240

HC-M40

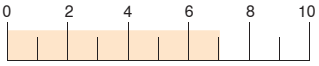




Toughness



Wear resistance



Carbide grade for milling titanium alloys

Composition:
10.0% binder; WC balance

Grain size:
2 μm

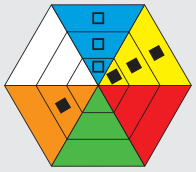
Hardness:
HV 1330

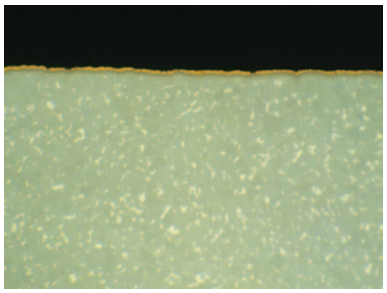
Coating specification:
CVD
TiN + TiB_2; 4 μm

Wet / dry:

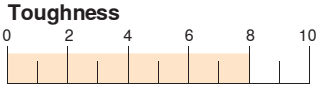
GM246

HC-P40
HC-M40

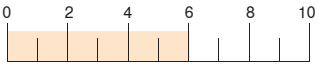




Toughness



Wear resistance



Composition:
Co 8.0%; WC balance

Grain size:
2 μm

Hardness:
HV 1280

Coating specification:
CVD
TiN + Ti(C,N) + TiC; 3 μm

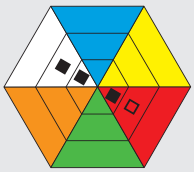
Wet / dry:

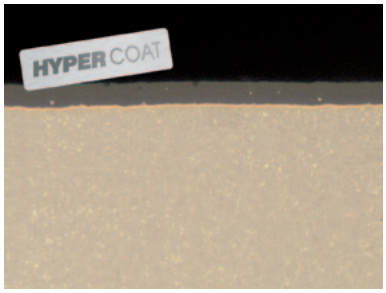
Grade description

Hard materials

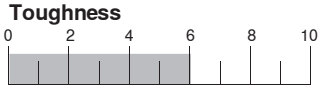
CTP6215

HC-K15

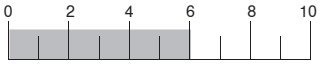




Toughness



Wear resistance



Composition:
Co 12.0%; WC balance

Grain size:
.4 µm

Hardness:
HV 1730

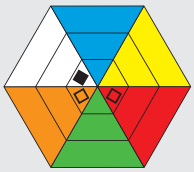
Coating specification:
PVD
(TiAl)N; 4 µm

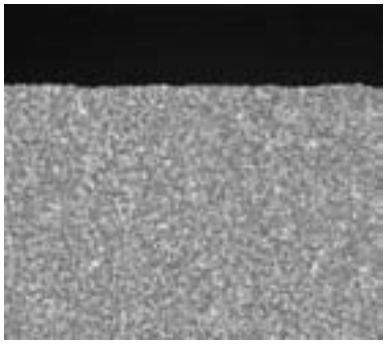
Wet / dry:

Carbide grade for hard material machining.

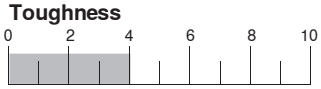
TA201

BN-K10

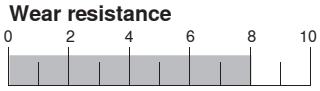




Toughness



Wear resistance



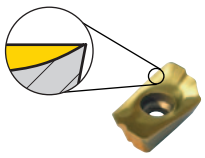
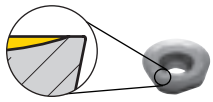
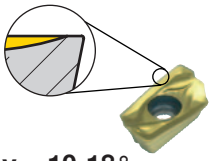
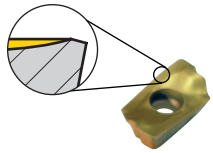
Composition:
Cubic boron nitride (CBN), 65 vol.% + binder (TiN)

Grain size:
~ 2 µm

Insert type:
Brazed segment

Wet / dry:

Particularly suitable for hard materials.

	Chip groove	Chip groove code	Material	Machining situation and stability				Machining type
				○	◐	◔	⊗	F / M / R
 γ = 12-30°	27P F10 F20		▼ ▽	×	×	×		F
	F40		Ti ▼ ▼	×	×			
	F50 33 29M		▼ ▼ ▼	×	×	×		
	M31 M32		Ti ▼	×	×			M
 γ = 10-18°	M50 29 31		▼ ▼ ▼		×	×		
 γ = 0-12°	R50		▼ ▼ ▽			×	×	R
	R60		▼ ▼			×	×	

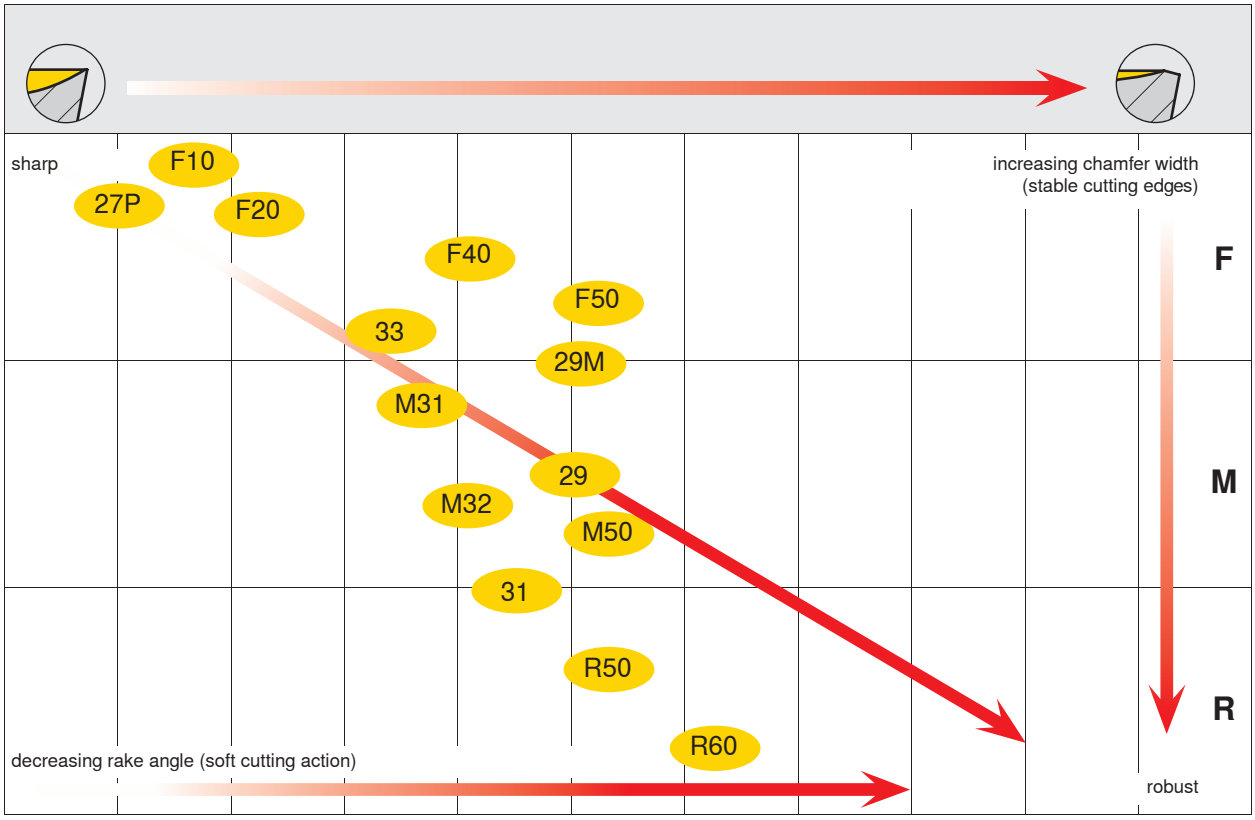
MasterGuide:
- ▼ Steel
- ▼ Stainless
- ▼ Cast iron
- ▼ Non ferrous metals
- ▼ Heat resistant
- ▼ Ti Heat resistant
- ▽ materials Hard materials

- ▼ Main application
- ▽ Extended application

Machining situation and stability:
- ○ excellent
- ◐ good
- ◔ acceptable
- ⊗ difficult

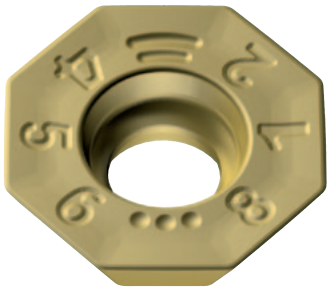
Machining type:
F Fine machining
M Medium machining
R Rough machining

Chip grooves



Chip groove code

				Cutting edge		
				sharp 10-20	medium 30-40	stable 50-60
Level of machining	easy	F		●	●●	●●●
	universal	M		●	●●	●●●
	difficult	R		●	●●	●●●

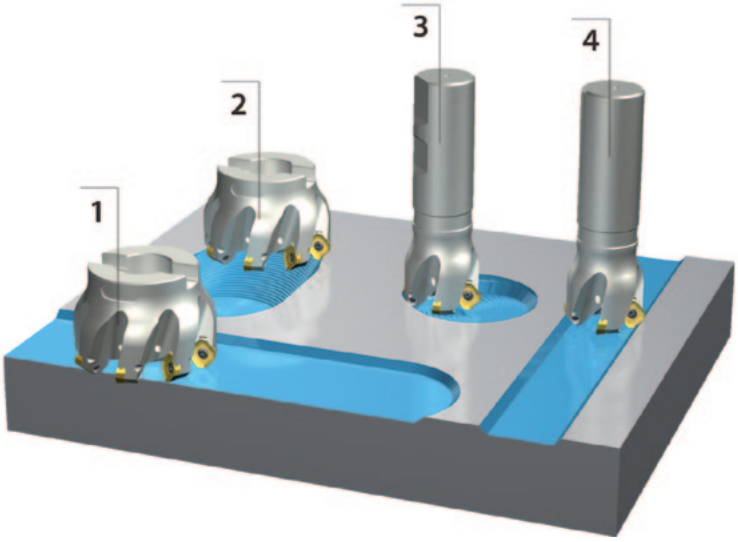


Chip groove M50

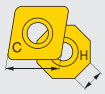
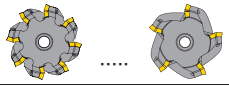
= M
= 50

MaxiMill 270

- Maximal chip volume
- 45° approach angle
- Soft cutting action

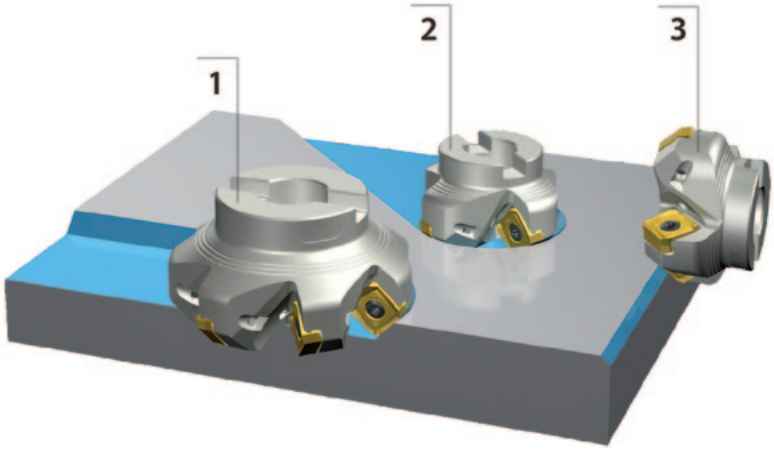


1 Face milling
2 Angled ramping
3 Helical plunge milling
4 Slot milling

		
	‘ [illegible] P P	09 12 15

MaxiMill 271

- 8 effective cutting edges
- Maximum depth of cut 8.4 mm



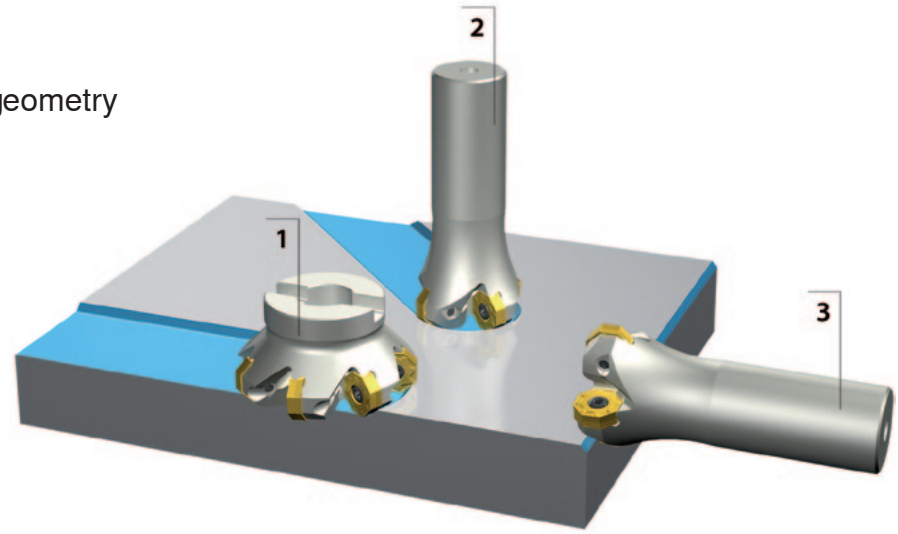
1 Face milling
2 Slot milling
3 Chamfering

[illegible]	‘ [illegible] P P	17

MaxiMill 273

- 16 cutting edges
- Approach angle 44.6°
- Positive cutting edge geometry

1 Face milling
2 Slot milling
3 Chamfering

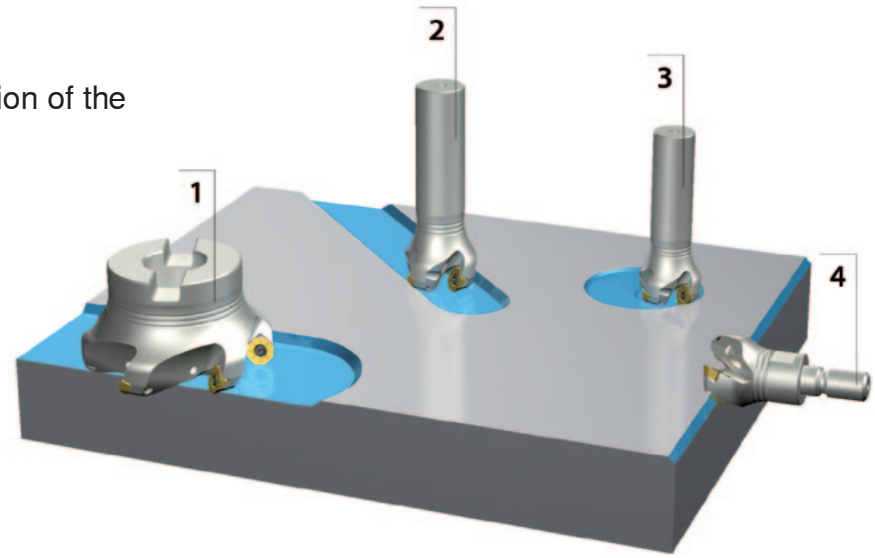


.....	‘ [illegible] P P [illegible]	06

MaxiMill 274

- 8 cutting edges
- Approach angle 43°
- Extremely positive position of the insert when mounted

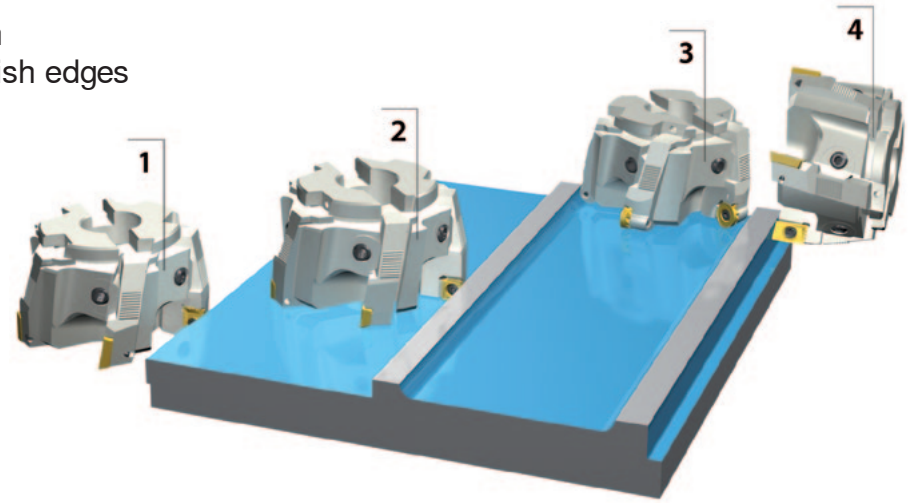
1 Face milling
2 Slot milling
3 Helical plunge milling
4 Chamfering



.....	‘ [illegible] P P	OF.. 04.. SF.. 09..

MaxiMill 260

- Universal application
- Adjustable Masterfinish edges
- Long tool life

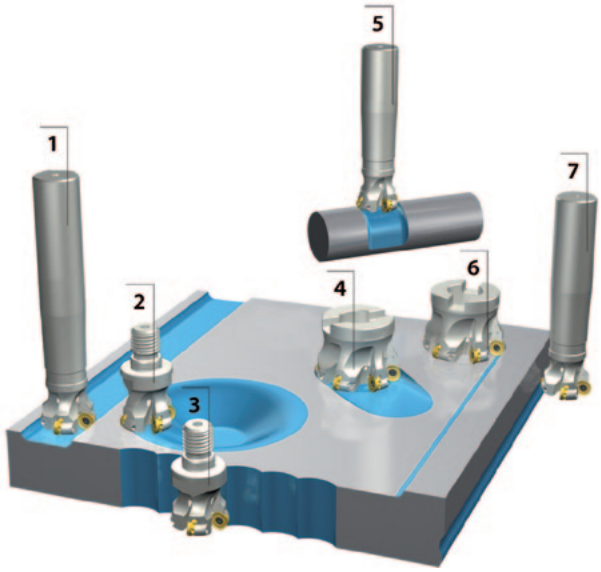


1 Peripheral milling
2 Face milling
3 Slot milling
4 Shoulder milling

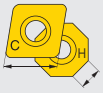
‘ [illegible] P P	

MaxiMill 251/251RS

- Very high feed rates
- Maximum stability
- 8 indexes



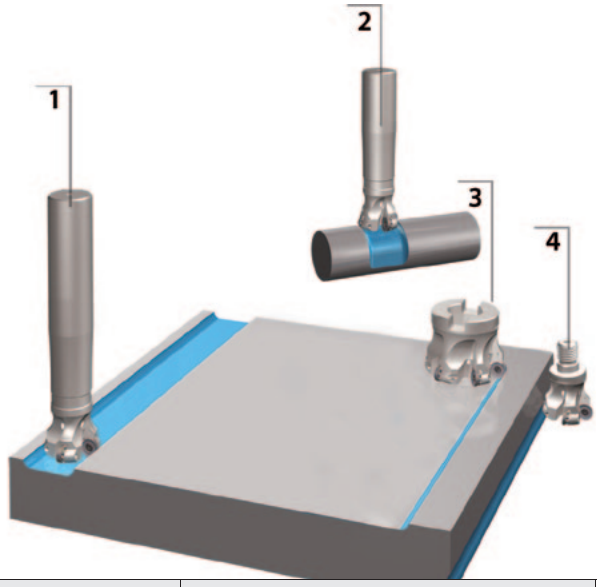
1 Slot milling
2 Profile milling
3 Plunging
4 Angled ramping
5 Turn milling
6 Face milling
7 Reverse copy milling

		
	‘ [illegible] P P	05 08 10 12 16 20

MaxiMill 252

- Double the number of cutting edges combined with optimum depth of cut
- Optimized chip geometry

1 Slot milling
2 Turn milling
3 Face milling
4 Reverse copy milling

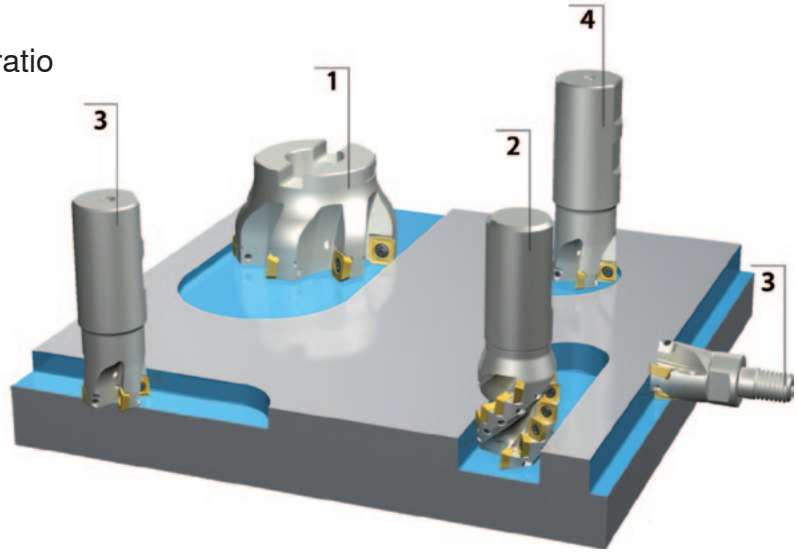


[illegible]	[illegible]	10 12

MaxiMill 490

- 4 cutting edges
- Optimum price-performance ratio
- 90° approach angle

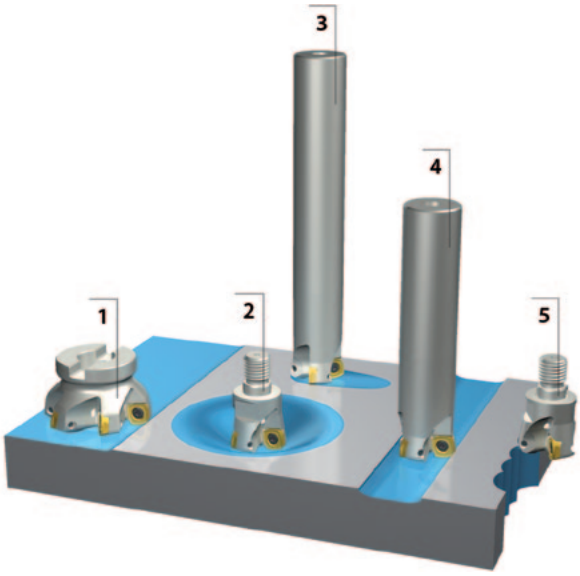
1 Face milling
2 Slot milling
3 Shoulder milling
4 Angled ramping



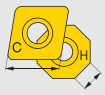
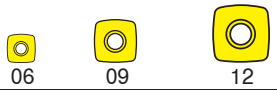
.....	[illegible]	09 12

MaxiMill HFC

- Extremely high feed rates
- Maximum chip removal rates

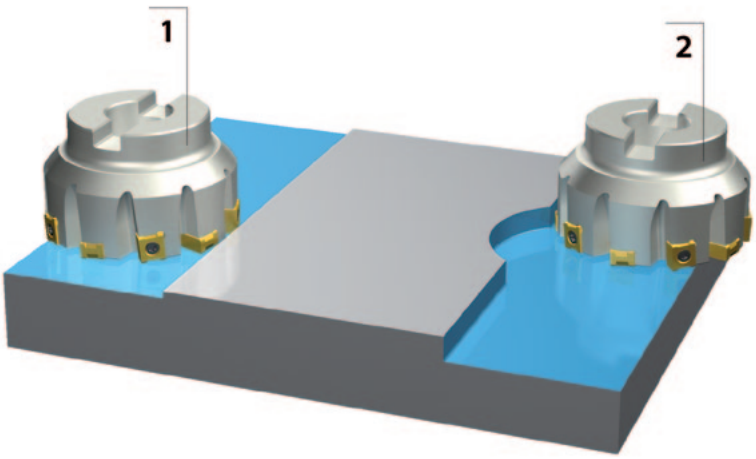


1 Face milling
2 Helical plunge milling
3 Angled ramping
4 Slot milling
5 Plunge milling

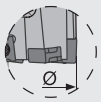
		
	‘ □□ □ □2 □□ □ □ □P P	 06 09 12

MaxiMill HEC-11

- 8 usable cutting edges
- Low cutting forces
- High process security
- Optimal solution for cast iron



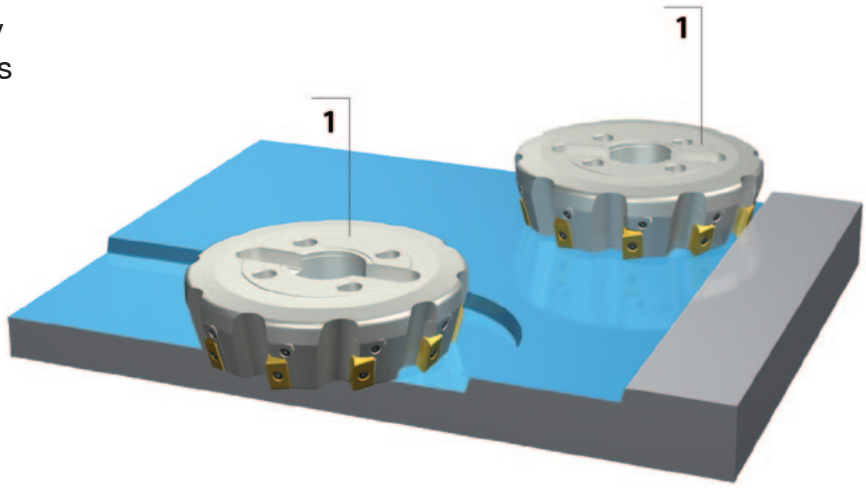
1 Face milling
2 Shoulder milling

		
‘ □□ □ □2 □□ □ □ □P P	11	One insert with three cutting materials: ceramic, CBN, hard materials

MaxiMill AHDM

- High application security
- Wide field of applications
- Outstanding tool life

1 Face milling

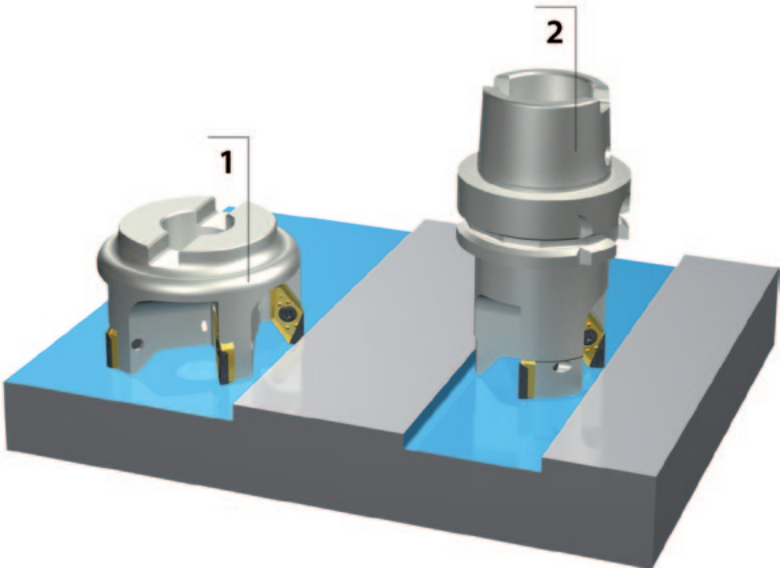


‘ [illegible] [illegible]² [illegible] [illegible] [illegible]P P	22	[illegible] [illegible]

MaxiMill HSV-22

- Stable and secure
- Robust insert

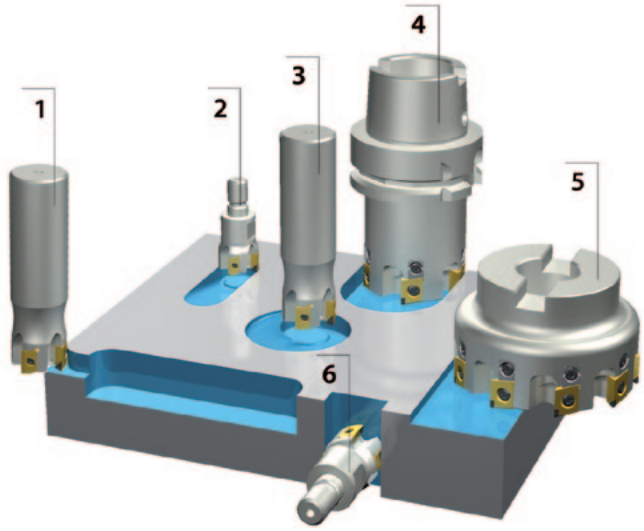
1 Face milling
2 Slot milling



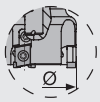
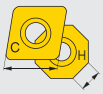
‘ [illegible] [illegible]² [illegible] [illegible] [illegible]P P	22	Monobloc shell milling cutters HSK63A

MaxiMill HPC-12 / HPC-04

- High productivity matters
- Low cutting forces
- Easy radial precision adjustment

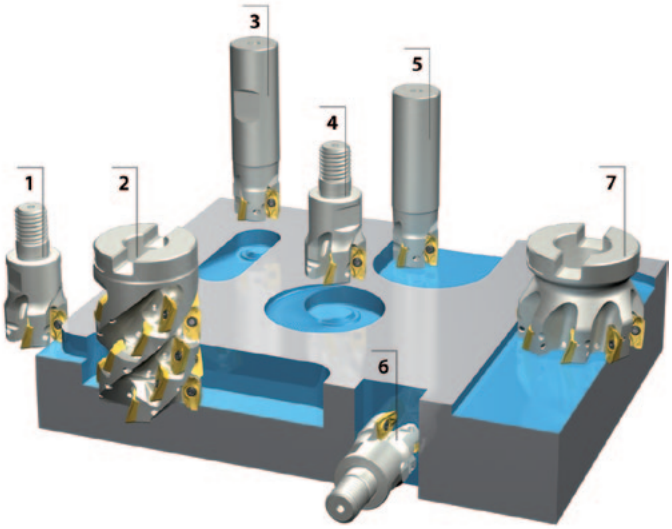


1 Peripheral milling
2 Angled ramping & pocket milling
3 Axial plunging & helical plunging
4 Trochoidal slot milling
5 Shoulder & face milling
6 Slot milling

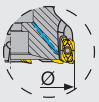
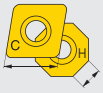
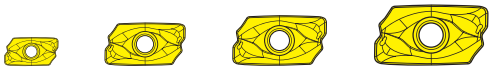
		
‘ [illegible] P P	12	Semi-finishing and finishing of aluminium components, finishing of cast iron components

MaxiMill 211

- Milling with radial force compensation
- Minimum vibration
- Maximum chip removal rates

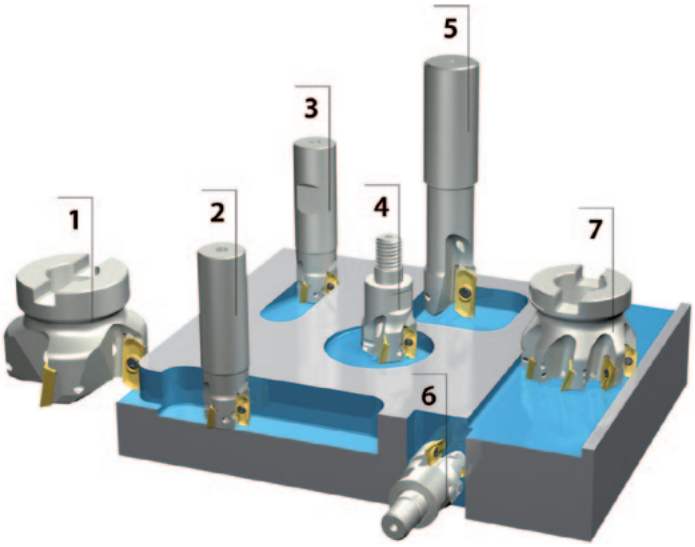


1 Peripheral milling
2 Shoulder milling
3 Angled ramping & pocket milling
4 Axial plunging & helical plunging
5 Trochoidal slot milling
6 Slot milling
7 Shoulder & face milling

		
	‘ [illegible] P P	 07 11 15 20

MaxiMill HSC/HPC

- Aluminium milling at high speed
- Maximum chip removal rates

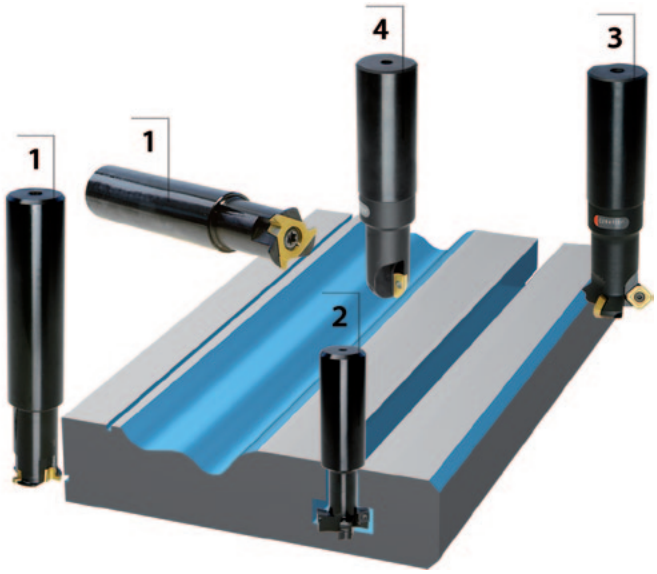


1 Peripheral milling
2 Shoulder milling
3 Angled ramping
4 Axial plunging & helical plunge milling
5 Pocket milling
6 Slot milling
7 Shoulder & face milling

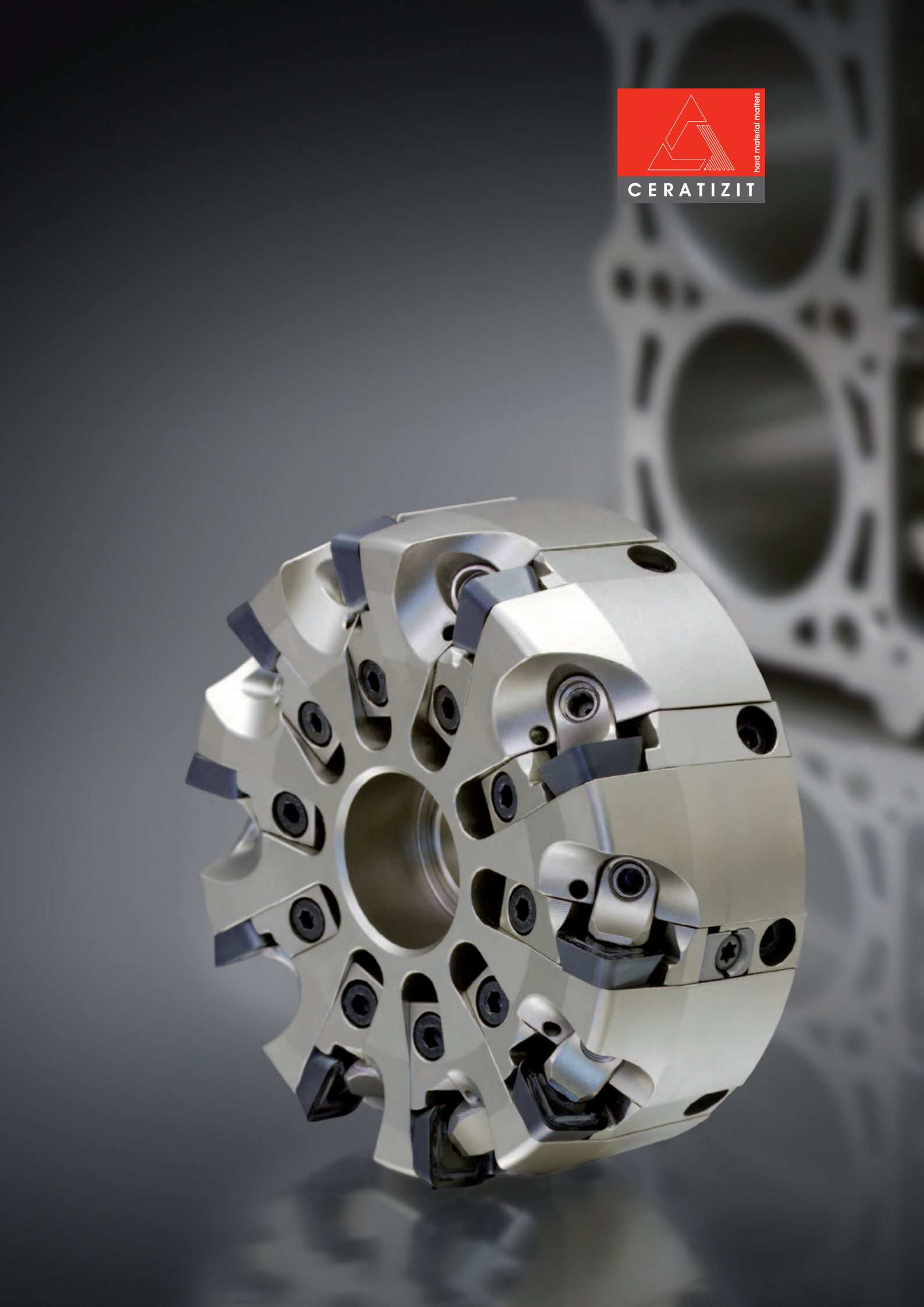
.....	‘ 2 P P	XDHT-11 XDHT-19 XDHX-19

Profile milling cutters

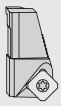
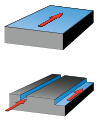
- Always a solution for specific machining tasks



1 Slot milling (circlip)
2 T-slot milling
3 Chamfering
4 Profile milling


hard material matters
CERATIZIT

Overview of machining operations

					
A..					
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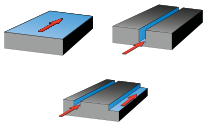
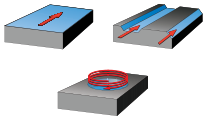
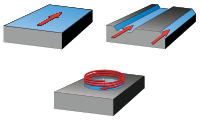
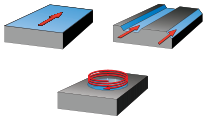
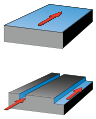
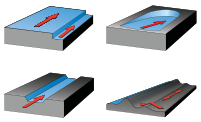
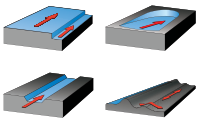
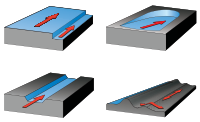
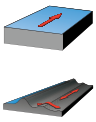
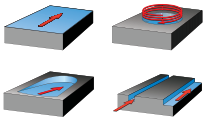
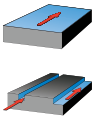
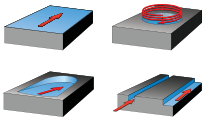
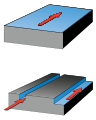
L..					
O..					
R..					
S..					
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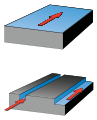
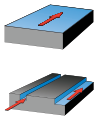
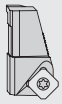
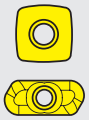
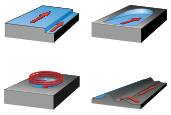
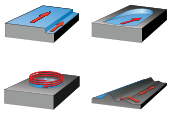
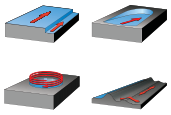
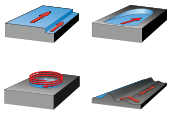
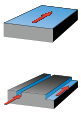
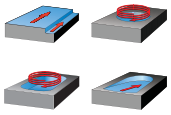
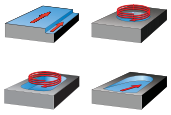
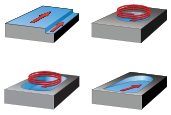
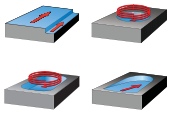
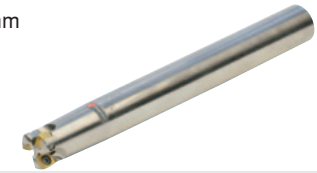
V..					

					
 X..					
Z..					
XA/XD. SP. OD.					

Application

Face milling

C270 45° $a_p \leq 4$ mm 	**C251** $a_p \leq 6$ mm 	**C252** $a_p \leq 2{,}5$ mm
6 - 32 mm B86	10 - 32 mm B88-B89	32 mm B90
C273 45° $a_p \leq 3{,}5$ mm 	**C274** 45° $a_p \leq 3{,}8$ mm 	**C490** 90° $a_p \leq 11$ mm
32 - 40 mm B91	20 - 32 mm B92-B93	25 - 40 mm B95
CHFC 90° $a_p \leq 2$ mm 	**G251** $a_p \leq 6$ mm 	**G252** $a_p \leq 2{,}5$ mm
16 - 35 mm B94	20 - 35 mm B114	32 mm B115
G490 90° $a_p \leq 11$ mm 	**G274** 45° $a_p \leq 3{,}8$ mm 	**GHFC** 90° $a_p \leq 2$ mm
25 - 40 mm B117	20 - 32 mm B120-B121	16 - 35 mm B116
GHPC-04 90° $a_p \leq 4$ mm 	**MHPC-12** 90° $a_p \leq 11$ mm 	**A270** 45° $a_p \leq 9$ mm
20 - 40 mm B122	40 - 160 mm B125	32 - 160 mm B128-B130
AHPC-12 90° $a_p \leq 11$ mm 	**AHEC-11** 90° $a_p \leq 4$ mm 	**A490** 90° $a_p \leq 12$ mm
40 - 315 mm B153	50 - 160 mm B141-B142	40 - 125 mm B143

A251

$a_p \leq 10$ mm

40 - 125 mm | B131-B132

A252

$a_p \leq 3$ mm

40 - 80 mm | B133

A271

45°

$a_p \leq 8{,}4$ mm

50 - 250 mm | B134

A273

45°

$a_p \leq 3{,}5$ mm

40 - 315 mm | B135-B137

A274

45°

$a_p \leq 3{,}8$ mm

32 - 125 mm | B138-B139

AHFC

90°

$a_p \leq 2$ mm

32 - 100 mm | B140

AHDM

75°

$a_p \leq 20$ mm

160 - 315 mm | B150

A260/041
A260/031

45°

$a_p \leq 6$ mm

80 - 398 mm | B157

A260/029

45°

$a_p \leq 6$ mm

80 - 398 mm | B158

A260/032

45°

$a_p \leq 9$ mm

80 - 393 mm | B158

A260/018

75°

$a_p \leq 9$ mm

82 - 400 mm | B160

A260/039
A260/055

90°

$a_p \leq 12$ mm

89 - 407 mm | B165

A260/058

45°

$a_p \leq 8{,}4$ mm

77 - 395 mm | B159

A260/052

$a_p \leq 6$ mm

80 - 398 mm | B162

A260/053

$a_p \leq 8$ mm

80 - 398 mm | B162

A260/057

45°

$a_p \leq 3{,}5$ mm

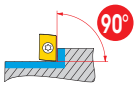
82 - 400 mm | B161

Application

Shoulder and slot milling

C211 90° $a_p \leq 14$ mm 	**C211K** 90° $a_p \leq 50{,}5$ mm 	**C210** 90° $a_p \leq 8$ mm
10 - 40 mm B97-B100	25 - 50 mm B101	16 - 32 mm B102
C BF 90° $a_p \leq 8$ mm 	**C212** 90° $a_p \leq 19$ mm 	**CHPC-04** 90° $a_p \leq 4$ mm
10 - 20 mm B104	20 - 25 mm B103	20 - 40 mm B110
CHSC/CHPC 90° $a_p \leq 18$ mm HSC High Speed Cutting 	**C490** 90° $a_p \leq 11$ mm 	**C490K** 90° $a_p \leq 41$ mm
16 - 32 mm B106-B108	25 - 40 mm B95	32 - 40 mm B96
G211 90° $a_p \leq 14$ mm 	**G210** 90° $a_p \leq 8$ mm 	**GHPC-04** 90° $a_p \leq 4$ mm
16 - 40 mm B118	16 - 32 mm B119	20 - 40 mm B122
GHSC-11 90° $a_p \leq 10$ mm HSC High Speed Cutting 	**GHSC-19** 90° $a_p \leq 18$ mm 	**G490** 90° $a_p \leq 11$ mm
16 - 40 mm B123	25 - 40 mm B123	25 - 40 mm B117
MHSC-11 **MHSC-19** 90° $a_p \leq 18$ mm 	**MHSC-19** 90° $a_p \leq 18$ mm 	**MHSV-22** 90° $a_p \leq 15$ mm
25 - 50 mm B124	25 - 50 mm B126	50 - 125 mm B127

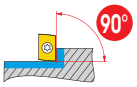
MHPC-12



$a_p \leq 11$ mm

40 - 160 mm B125

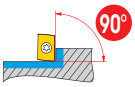
A211



$a_p \leq 19$ mm

32 - 160 mm B145-B146

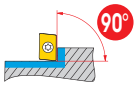
A211K



$a_p \leq 75{,}5$ mm

40 - 80 mm B147

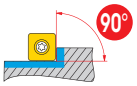
A210



$a_p \leq 8$ mm

40 - 125 mm B148

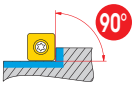
A490



$a_p \leq 12$ mm

40 - 125 mm B143

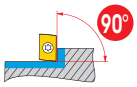
A490K



$a_p \leq 41$ mm

40 - 63 mm B144

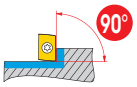
AHSC-11
AHSC-19



$a_p \leq 18$ mm

40 - 125 mm B151

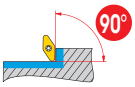
AHPC-19



$a_p \leq 18$ mm

40 - 63 mm B152

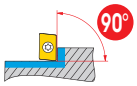
AHSV-22



$a_p \leq 15$ mm

50 - 125 mm B154

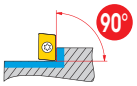
A260/054



$a_p \leq 10$ mm

89 - 407 mm B163

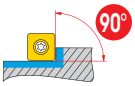
A260/056



$a_p \leq 14$ mm

89 - 407 mm B163

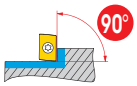
A260/039
A260/055



$a_p \leq 12$ mm

89 - 407 mm B165

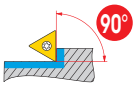
A260/051
A260/042



$a_p \leq 14$ mm

89 - 407 mm B164

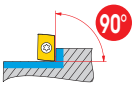
A260/025



$a_p \leq 18$ mm

89 - 407 mm B166

A260/026



$a_p \leq 18$ mm

89 - 407 mm B167

b = 6-9 mm **90LN**

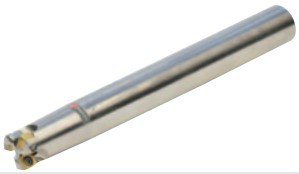
80 - 125 mm B155

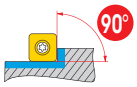
b = 14-22 mm **90CN**

125 - 200 mm B156

Application

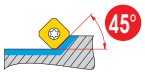
Form milling

CHSC/CHPC 90° $a_p \leq 18$ mm HSC High Speed Cutting 	**C251** $a_p \leq 6$ mm 	**C252** $a_p \leq 2{,}5$ mm
16 - 32 mm B106-B109	10 - 32 mm B88-B89	32 mm B90
C KF $a_p \leq 16$ mm 	**C211** 90° $a_p \leq 14$ mm 	**CHFC** 90° $a_p \leq 2$ mm 
12 - 32 mm B111	10 - 40 mm B97-B100	16 - 35 mm B94
GHSC-11 90° $a_p \leq 10$ mm HSC High Speed Cutting 	**GHSC-19** 90° $a_p \leq 18$ mm HSC High Speed Cutting 	**G251** $a_p \leq 6$ mm
16 - 40 mm B123	25 - 40 mm B123	20 - 35 mm B114
G252 $a_p \leq 2{,}5$ mm 	**G211** 90° $a_p \leq 14$ mm 	**GHFC** 90° $a_p \leq 2$ mm
32 mm B115	16 - 40 mm B118	16 - 35 mm B116
MHSC-11 **MHSC-19** 90° $a_p \leq 18$ mm 	**MHSC-19** 90° $a_p \leq 18$ mm 	**A251** $a_p \leq 10$ mm
25 - 50 mm B124	25 - 50 mm B126	40 - 125 mm B131-B132
AHSC-11 **AHSC-19** 90° $a_p \leq 18$ mm HSC High Speed Cutting 	**AHPC-19** 90° $a_p \leq 18$ mm HSC High Speed Cutting 	**A211** 90° $a_p \leq 19$ mm
40 - 125 mm B151	40 - 63 mm B152	32 - 160 mm B145-B146

AHFC  $a_p \leq 2$ mm 	**A260/052** $a_p \leq 6$ mm 	**A260/053** $a_p \leq 8$ mm
32 - 100 mm B140	80 - 398 mm B162	80 - 398 mm B162

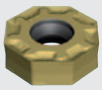
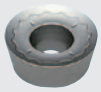
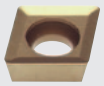
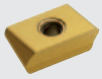
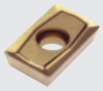
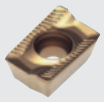
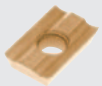
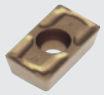
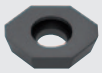
Application

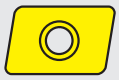
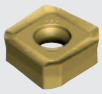
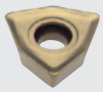
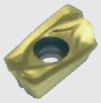
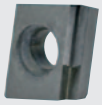
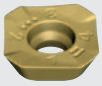
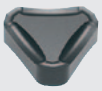
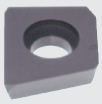
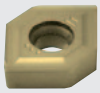
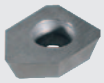
Profile milling

a = 8 - 20 mm **C NF**	a = 1,1 - 2,65 mm **C ZF**	**C272-09**
		 $a_p \leq 4$ mm
‘ 17,5 - 48 mm B112	‘ 16 - 25 mm B113	‘ 6 - 25 mm B87

hard material matters
CERATIZIT
CERATIZIT

Overview

	A	C	L	O	R
CERATIZIT systems	AP.. B46	CN.. B47	LD../LE.. B49	OA..  B56	RD..  B58-B59
		CP..  B48	LD.. B50+B51	OF.. B57	RP.. B58-B59
			LN..  B52-B54		RN.. B60
			LP..  B55		R.. B61
Other systems	AD..  B79		LD..  B79	OF.. B80	
	AP..  B79				
Finishing				OD..  B77	

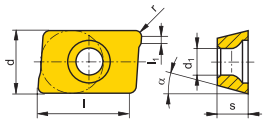
S	T	V	W	X	Z
					
SA..  B62	TC.. B67	VC.. B69	WP..  B70	XD..  B71-B74	ZN..  B76
SD.. B63-B64	TP.. B68			XD../XO../XP.. B74-B75	
SF..  B57					
SE.. / SP.. B65-B66					
SE.. B80-B82	TN..  B81				
SP.. B80-B82	TP.. B81				
SP..  B77				XA..  B78	
				XD..  B78	

System 210, 212

AP..

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215
P			●	○					●	●	●	●	●	○		○	○	●	●			
M			○	○					○	●	○	○	○	●		●	●	○	●			
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●
N	●	●		●																●		
S				○						○	○	○	○	●	●	○	●					
H							●															○

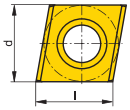
	Image	Ref.	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215	d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
-27P		APHT 100302FR-27P		●		●																			6.65	9.80	3.50	1.7	0.20	2.80
		APHT 100304FR-27P		●		●																			6.65	9.80	3.50	1.7	0.40	2.80
		APHT 100308FR-27P		●		●																			6.65	9.80	3.50	1.7	0.80	2.80
-29		APKT 1003PDSR-29			●					●		●	●												6.65	9.80	3.50	1.0	0.50	2.80
-29M		APKT 1003PDSR-29M								●		●	●												6.65	9.94	3.80	1.6	0.50	2.80
-31		APKT 1003PDSR-31					●																		6.65	9.80	3.50	1.0	0.50	2.80
-33		APHT 100308SR-33P																●							6.65	9.80	3.50	1.7	0.80	2.80
		APHT 100308SR-33																●							6.65	9.80	3.50	1.7	0.80	2.80
		APHT 100312SR-33																●							6.65	9.80	3.50	2.0	1.20	2.80
		APHT 100320SR-33																●							6.65	9.80	3.50	1.0	2.00	2.80
		APHT 100332SR-33																●							6.65	9.80	3.50		3.20	2.80
APHW		APHW 100308SR																		●					6.65	10.10	3.50	1.4	0.80	2.80
			CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215	d	l	s	l_1	r	d_1

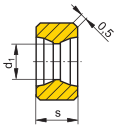


B10-B11 B23-B24 B34-B35 B194-B203 B102-B103 B119 B148 B164

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215						
P			●	○					●	●	●	●	●	○		○	○	●	●									
M			○	○					○	●	○	○	○	●		●	●	○	●									
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●						
N	●	●		●																●								
S				○						○	○	○	○	●	●	○	●											
H							●															○						

			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]
CNHT		CNHT 1005	10.00	10.15	5.40	0.50	4.70
		CNHT 1205	10.00	12.90	5.40	0.50	4.70
CNHW		CNHW 1005	10.00	10.15	5.40	0.50	4.70
		CNHW 1205	10.00	12.90	5.40	0.50	4.70





B10-B11 B34-B35 B194-B203 B156

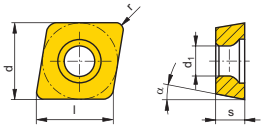
System CNF

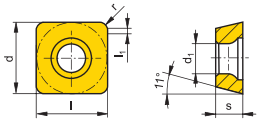
CP.. SP..

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215		
P			●	○					●	●	●	●	●	○		○	○	●	●					
M			○	○					○	●	○	○	○	●		●	●	○	●					
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●		
N	●	●		●																●				
S				○						○	○	○	○	●	●	○	●							
H							●															○		

			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]
CPMT		CPMT 060304EN	6.35	6.40	3.18	0.40	2.80
		CPMT 09T308SN	9.52	9.70	3.97	0.80	4.40
CPMW		CPMW 060304EN	6.35	6.40	3.18	0.40	2.80
		CPMW 09T308EN	9.52	9.70	3.97	0.80	4.40
SP..W		63* : (1	5.56	5.56	2.38	0.40	2.80

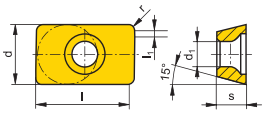
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	r	d_1

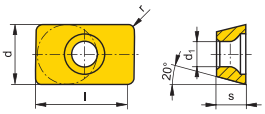




B10-B11 B34-B35 B194-B203 B112

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●										
M				○	○					○	●	○	○	○	●		●	●	○	●										
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●							
N		●	●		●																●									
S					○						○	○	○	○	●	●	○	●												
H								●															○							
-29	LDHT 100204ER-29												●													6.35	10.00	2.58	0.40	2.80
LE..-29	LEHT 08T104ER-29												●													5.56	8.00	1.98	0.40	2.50
LEHW	LEHW 08T104ER												●													5.56	8.00	1.98	0.40	2.50
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	r	d_1

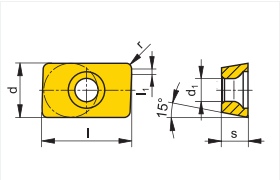




System HSC

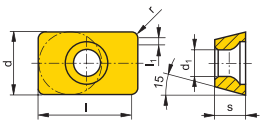
LD..

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●										
M				○	○					○	●	○	○	○	●		●	●	○	●										
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●							
N		●	●		●																●									
S					○						○	○	○	○	●	●	○	●												
H								●															○							
-27P	LDHT 120404FR-27P		●																							9.00	12.00	4.00	0.40	3.40
	LDHT 120408FR-27P		●																							9.00	12.00	4.00	0.80	3.40
	LDHT 120425FR-27P		●																							9.00	12.00	4.00	2.50	3.40
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	r	d_1



B10-B11 B23-B24 B34-B35 B194-B203

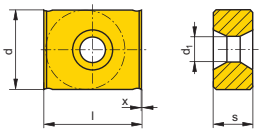
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●											
M				○	○					○	●	○	○	○	●		●	●	○	●											
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N		●	●		●																●										
S					○						○	○	○	○	●	●	○	●													
H								●															○								
-27P	LDFT 150405FR-27P				●																					9.52	15.00	4.76	1.2	0.50	4.40
	LDFT 150408FR-27P		●																							9.52	15.00	4.76	1.2	0.80	4.40
-29	LDFT 1504PDSR-29									●		●	●													9.52	15.00	4.76	1.2	0.80	4.40
	LDMT 1504PDSR-29									●			●													9.52	15.00	4.76	1.2	0.80	4.40
-33	LDFT 1504PDSR-33																●	●								9.52	15.00	4.76	0.8	1.20	4.40
	LDFT 150416SR-33																	●								9.52	15.00	4.76	0.9	1.60	4.40
	LDFT 150420SR-33																	●								9.52	15.00	4.76	0.9	2.00	4.40
	LDFT 150432SR-33																	●								9.52	15.00	4.76	1.0	3.20	4.40
	LDFT 150440SR-33																	●								9.52	15.00	4.76		4.00	4.40
LDFT	LDFT 150408ER															●										9.52	15.00	4.76		0.80	4.40
LDFT-P	LDFT 150408FR-P		●																							9.52	15.00	4.76	1.2	0.80	4.40
LDFW	LDFW 1504PDSR					●	●			●																9.52	15.00	4.76	1.2	0.80	4.40
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1



System S90

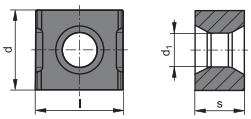
LN..

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215	d [mm]	l [mm]	s [mm]	d_1 [mm]	x [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●								
M				○	○					○	●	○	○	○	●		●	●	○	●								
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●					
N		●	●		●																●							
S					○						○	○	○	○	●	●	○	●										
H								●															○					
LNET	LNET 1235										●													9.52	12.70	3.50	4.40	0.3
	LNET 1240		●								●													9.52	12.70	4.00	4.40	0.3
	LNET 1245		●								●													9.52	12.70	4.50	4.40	0.4
	LNET 1250		●								●													9.52	12.70	5.00	4.40	0.4
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215	d	l	s	d_1	x



B10-B11
B34-B35
B194-B203
B155

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215						
P			●	○					●	●	●	●	●	○		○	○	●	●									
M			○	○					○	●	○	○	○	●		●	●	○	●									
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●						
N	●	●		●																●								
S				○						○	○	○	○	●	●	○	●											
H							●															○						
-R50																										d [mm]	l [mm]	s [mm]	d_1 [mm]
	LNHX 1106PNER-R50					●			●																	10.00	11.00	6.35	4.27
	LNHX 110608EN-R50								●																	10.00	11.00	6.35	4.27
LNHX																													
	LNHX 1106PNER					●			●									●								10.00	11.00	6.35	4.27
	LNHX 1106PNSR																				●	●				10.00	11.00	6.35	4.27
	LNHX 1106ZZER-Q					●																●				10.00	11.00	6.35	4.27
	LNHX 110608SN																				●					10.00	11.00	6.35	4.27
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215				d	l	s	d_1



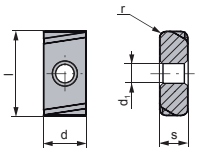
B10-B11 B23-B24 B34-B35 B194-B203 B141-B142

System HDM

LN..

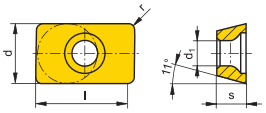
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215
P			●	○					●	●	●	●	●	○		○	○	●	●			
M			○	○					○	●	○	○	○	●		●	●	○	●			
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●
N	●	●		●																●		
S				○						○	○	○	○	●	●	○	●					
H							●															○

			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]
LNUC		LNUC 220920ER (CTC3215)	14.28	28.57	9.52	2.00	5.90
LNUJ		LNUJ 220920SR (CTC3215)	15.81	27.85	9.52	2.00	5.90



B10-B11 B34-B35 B194-B203 B150

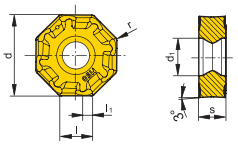
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●										
M				○	○					○	●	○	○	○	●		●	●	○	●										
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●							
N		●	●		●																●									
S					○						○	○	○	○	●	●	○	●												
H								●															○							
-29	LPHT 200408ER-29												●													12.70	20.00	4.76	0.80	5.50
LPHW	LPHW 200408ER		●																							12.70	20.00	4.76	0.80	5.50
	LPHW 200408SR												●													12.70	20.00	4.76	0.80	5.50



System A273

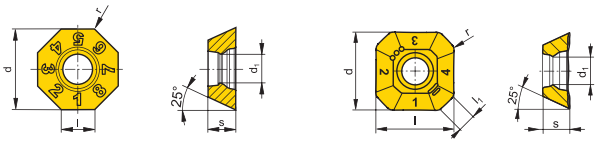
OA..

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P			●	○					●	●	●	●	●	○		○	○	●	●											
M			○	○					○	●	○	○	○	●		●	●	○	●											
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N	●	●		●																●										
S				○						○	○	○	○	●	●	○	●													
H							●															○								
-F40																														
OAKU 060508ER-F40														●	●										17.18	6.00	5.56	2.0	0.80	5.80
-F50																														
OAKU 060508SR-F50									●		●					●									17.18	6.00	5.56	2.0	0.80	5.80
-M50																														
OAKU 060508SL-M50					●			●																	17.18	6.00	5.56	2.0	0.80	5.80
OAKU 060508SR-M50					●			●	●		●					●									17.18	6.00	5.56	2.0	0.80	5.80
-R50																														
OAKU 060508SR-R50					●			●																	17.18	6.00	5.56	2.0	0.80	5.80
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1



B10-B11 B23-B24 B34-B35 B194-B203 B91 B135-B137 B161

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●										
M				○	○					○	●	○	○	○	●		●	●	○	●										
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●							
N		●	●		●																●									
S					○						○	○	○	○	●	●	○	●												
H								●															○							
OF..-F10	OFHT 040305FN-F10	●																								9.52	3.94	3.18	0.50	3.35
SF..-F10	SFHT 0903AFFR-F10	●																								9.52	9.52	3.18	1.00	3.35
SF..-F40	SFHT 0903AFER-F40															●										9.52	9.52	3.18	1.00	3.35
OF..-F50	OFHT 040305SN-F50									●		●			●		●									9.52	3.94	3.18	0.50	3.35
-F50	SFHT 0903AFSR-F50									●		●			●		●									9.52	9.52	3.18	1.00	3.35
OF..-M50	OFHT 040305SN-M50					●				●		●					●									9.52	3.94	3.18	0.50	3.35
SF..-M50	SFKT 0903AFSR-M50									●		●														9.52	9.52	3.18	1.00	3.35
SF..-R50	SFKT 0903AFSR-R50					●			●																	9.52	9.52	3.18	1.00	3.35
OFHW	OFHW 040302EN														●	●										9.52	3.94	3.18	0.20	3.35
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	r	d_1



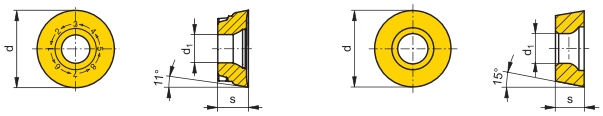
CERATIZIT hard material matters

System 251 / 251-RS

RD.. RP..

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215					
P			●	○					●	●	●	●	●	○		○	○	●	●								
M			○	○					○	●	○	○	○	●		●	●	○	●								
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●					
N	●	●		●																●							
S				○						○	○	○	○	●	●	○	●										
H							●															○					
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215					

			d [mm]	s [mm]	d_1 [mm]
-27P		RPHX 10T3MOFN-27P	10.00	3.97	3.40
		RPHX 1204MOFN-27P	12.00	4.76	4.40
		RPHX 1605MOFN-27P	16.00	5.56	5.50
-29		RPNX 10T3MOSN-29	10.00	3.97	3.40
		RPNX 1204MOSN-29	12.00	4.76	4.40
		RPNX 1605MOSN-29	16.00	5.56	5.50
RDHX -33		RDHX 0802MOEN-33	8.00	2.38	2.80
-33		RPHX 10T3MOEN-33	10.00	3.97	3.40
		RPHX 1204MOEN-33	12.00	4.76	4.40
		RPHX 1605MOEN-33	16.00	5.56	5.50
-33M		RPHX 2006MOSN-33M	20.00	6.35	6.00
-33R		RPNX 2006MOSN-33R	20.00	6.35	6.00
RDHX -M31		RDHX 0501MOEN-M31	5.00	1.59	2.50
		RDHX 0802MOEN-M31	8.00	2.38	2.80
-M31		RDHX 0802M4EN-M31	8.00	2.38	2.80
		RPHX 10T3M4EN-M31	10.00	3.97	3.40
		RPHX 10T3M8EN-M31	10.00	3.97	3.40
		RPHX 1204M4EN-M31	12.00	4.76	4.40
		RPHX 1204M6EN-M31	12.00	4.76	4.40
		RPHX 1204M8EN-M31	12.00	4.76	4.40
		RPHX 1605M8EN-M31	16.00	5.56	5.50
		RPHX 2006M4EN-M31	20.00	6.35	6.00
		RPNX 10T3M4EN-M31	10.00	3.97	3.40
		RPNX 10T3M8EN-M31	10.00	3.97	3.40
		RPNX 1204M4EN-M31	12.00	4.76	4.40
		RPNX 1204M8EN-M31	12.00	4.76	4.40
		RPNX 2006M8EN-M31	20.00	6.35	6.00



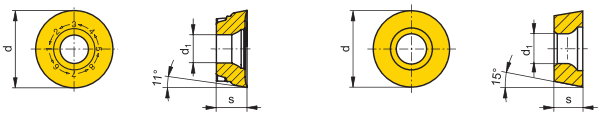
B10-B11 B23-B24 B34-B35 B194-B203 B88-B89 B114 B131-B132 B162

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215		
P			●	○					●	●	●	●	●	○		○	○	●	●					
M			○	○					○	●	○	○	○	●		●	●	○	●					
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●		
N	●	●		●																●				
S				○						○	○	○	○	●	●	○	●							
H							●															○		

			d [mm]	s [mm]	d_1 [mm]
-M32		RPHX 10T3M4EN-M32	10.00	3.97	3.40
		RPHX 1204M4EN-M32	12.00	4.76	4.40
-R60		RPNX 1204M8EN-R60	12.00	4.76	4.40
RDHX		RDHX 0501MOFN	5.00	1.59	2.50
		RDHX 0501MOSN	5.00	1.59	2.50
		RDHX 0802MOEN	8.00	2.38	2.80
		RDHX 0802MOFN	8.00	2.38	2.80
		RDHX 0802MOSN	8.00	2.38	2.80
RPHX		RPHX 10T3MOEN	10.00	3.97	3.40
		RPHX 10T3MOSN	10.00	3.97	3.40
		RPHX 1204MOSN	12.00	4.76	4.40
		RPHX 1204M4EN	12.00	4.76	4.40
		RPHX 1605MOSN	16.00	5.56	5.50
		RPNX 1204MOSN	12.00	4.76	4.40
		RPNX 1605MOSN	16.00	5.56	5.50

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215		

d	s	d_1

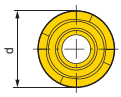


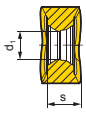
System 252

RN..

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215
P			●	○					●	●	●	●	●	○		○	○	●	●			
M			○	○					○	●	○	○	○	●		●	●	○	●			
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●
N	●	●		●																●		
S				○						○	○	○	○	●	●	○	●					
H							●															○

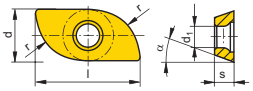
			d [mm]	s [mm]	d_1 [mm]
-M31		RNHU 1004M4ER-M31	10.00	5.28	3.40
		RNHU 1205M4ER-M31	12.00	6.34	4.40
-M32		RNHU 1004M4ER-M32	10.00	5.28	3.40
		RNHU 1205M4ER-M32	12.00	6.34	4.40





B10-B11 B23-B24 B34-B35 B194-B203 B90 B115 B133

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]
P			●	○					●	●	●	●	●	○		○	○	●	●										
M			○	○					○	●	○	○	○	●		●	●	○	●										
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●							
N	●	●		●																●									
S				○						○	○	○	○	●	●	○	●												
H							●															○							
R..E																													
R06E 0602ZZER											●														6.35	13.00	2.38	6.00	2.80
R08E 0803ZZSR											●														8.33	14.93	3.18	8.00	3.40
R..D																													
R10D 0602ZZER											●														6.35	13.40	2.38	10.00	2.80
R12D 0803ZZSR											●														8.00	17.00	3.18	12.50	3.40
R16D 10T3ZZER											●	●													10.00	17.00	3.97	16.00	4.40
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	r	d_1

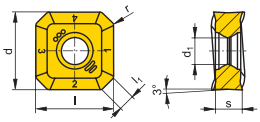


B10-B11
B34-B35
B194-B203
B111

System 271

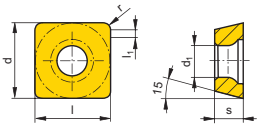
SA..

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●											
M				○	○					○	●	○	○	○	●		●	●	○	●											
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N		●	●		●																●										
S					○						○	○	○	○	●	●	○	●													
H								●															○								
-F50	SAKU 1706ABSR-F50									●		●			●											17.00	17.00	6.35	3.70	0.80	5.80
-M50	SAKU 1706ABSR-M50					●			●	●		●														17.00	17.00	6.35	3.70	0.80	5.80
-R50	SAKU 1706ABSR-R50					●			●																	17.00	17.00	6.35	3.70	0.80	5.80
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1



B10-B11 B23-B24 B34-B35 B194-B203 B134 B159

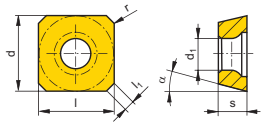
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215	d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●									
M				○	○					○	●	○	○	○	●		●	●	○	●									
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●						
N		●	●		●																●								
S					○						○	○	○	○	●	●	○	●											
H								●															○						
-27P	SDHT 09T308ER-27															●								9.52	9.52	3.97	2.5	0.80	4.40
	SDHT 09T308FR-27P		●		●																			9.52	9.52	3.97	2.5	0.80	4.40
	SDHT 120508FR-27P		●		●																			12.70	12.70	5.00	2.2	0.80	5.00
	SDHT 120525FR-27P		●		●																			12.70	12.70	5.00	2.2	2.50	5.00
-29	SDMT 1205ZZSN-29									●		●	●					●						12.70	12.70	5.00	0.9	0.80	5.00
	SDNT 09T308SR-29									●		●	●											9.52	9.52	3.97	2.5	0.80	4.40
-31	SDMT 1205ZZSN-31					●																		12.70	12.70	5.00	0.9	0.80	5.00
	SDNT 09T308SR-31					●	●																	9.52	9.52	3.97	2.5	0.80	4.40
-33	SDHT 120512SR-33																●	●						12.70	12.70	5.00	1.8	1.20	5.00
	SDHT 120520SR-33																	●						12.70	12.70	5.00	1.0	2.00	5.00
	SDNT 09T308SR-33																●	●						9.52	9.52	3.97	2.5	0.80	4.40
-M31	SDMT 120508ER-M31														●	●								12.70	12.70	5.00		0.80	5.50
	SDNT 09T308ER-M31														●	●								9.52	9.52	3.97	2.5	0.80	4.40
SD..T	SDHT 09T308SR																			●				9.52	9.52	3.97	2.5	0.80	4.40
	SDNT 09T308ER											●												9.52	9.52	3.97	2.5	0.80	4.40
SD..W	SDHW 120508SR																			●				12.70	12.70	5.00	2.2	0.80	5.00



System 270, 272

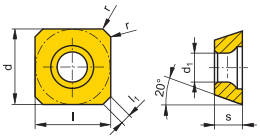
SD..

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●											
M				○	○					○	●	○	○	○	●		●	●	○	●											
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N		●	●		●																●										
S					○						○	○	○	○	●	●	○	●													
H								●															○								
-27P	SDHT 0903AEFN-27P		●		●																					9.52	9.52	3.18	1.68	1.00	3.40
	SDHT 1204AEFN-27		●																							12.70	12.70	4.76	1.74	0.20	5.50
	SDHT 1204AEFN-27P		●																							12.70	12.70	4.76	1.74	0.20	5.50
	SDHT 1504AEFN-27		●																							15.88	15.88	4.76	1.74	0.20	5.50
-29	SDMT 1204AESN-29R									●		●	●													12.70	12.70	4.76	1.74	1.00	5.50
	SDNT 0903AESN-29									●		●	●													9.52	9.52	3.18	1.68	1.00	3.40
-31	SDMT 1204AEEN-31					●	●																			12.70	12.70	4.76	1.74	1.00	5.50
	SDNT 0903AESN-31					●																				9.52	9.52	3.18	1.61	1.00	3.40
-33	SDHT 0903AESN-33P																	●								9.52	9.52	3.18	1.68	1.00	3.40
	SDHT 0903AESN-33																●	●								9.52	9.52	3.18	1.68	1.00	3.40
	SDHT 1204AESN-33																●	●								12.70	12.70	4.76	1.74	1.00	5.50
-M31	SDHT 0903AESN-M31														●	●										9.52	9.52	3.18	1.68	1.00	3.40
	SDHT 1204AESN-M31														●	●										12.70	12.70	4.76	1.74	1.00	5.50
SD..T	SDHT 1204AESN			●																●						12.70	12.70	4.76	1.74	0.20	5.50
	SDHT 1204AESN-R									●			●													12.70	12.70	4.76	1.74	1.00	5.50
	SDHT 1504AESN												●													15.88	15.88	4.76	1.74	0.20	5.50
SD..W	SDHW 0903AESN																			●						9.52	9.52	3.18	1.68	1.00	3.40
	SDHW 1204AEEN		●																							12.70	12.70	4.76	1.74	0.20	5.50
	SDHW 1204AEEN-R					●	●																			12.70	12.70	4.76	1.74	1.00	5.50
	SDHW 1204AESN-R									●			●							●						12.70	12.70	4.76	1.74	1.00	5.50
	SDHW 1504AEEN		●																							15.88	15.88	4.76	1.74	0.20	5.50
	SDHW 1504AESN									●		●														15.88	15.88	4.76	1.74	0.20	5.50
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1



B10-B11 B23-B24 B34-B35 B194-B203 B86-B87 B128-B130 B157-B158

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215							
P			●	○					●	●	●	●	●	○		○	○	●	●										
M			○	○					○	●	○	○	○	●		●	●	○	●										
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●							
N	●	●		●																●									
S				○						○	○	○	○	●	●	○	●												
H							●															○							
																									d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
-27P	SEHT 1204AEFN-27P	●																							12.70	12.70	4.76	1.60	0.20	5.50
	SEHT 1204AEFN-27	●																							12.70	12.70	4.76	1.60	0.20	5.50
-33	SEHT 1204AFSN-33																●								12.70	12.70	4.76	1.63	1.20	5.50
SE..T	SEHT 1204AFSN											●													12.70	12.70	4.76	2.40	0.20	5.50
SE..W	SEHW 1204AFSN				●							●													12.70	12.70	4.76	2.30	0.30	5.50
	SEKW 1204AFSN				●				●			●													12.70	12.70	4.76	2.20	2.40	5.50
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1

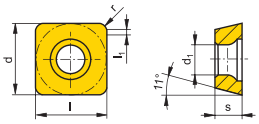


B10-B11 B23-B24 B34-B35 B194-B203 B158

System A260-018

SP..

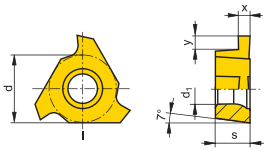
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P			●	○					●	●	●	●	●	○		○	○	●	●											
M			○	○					○	●	○	○	○	●		●	●	○	●											
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N	●	●		●																●										
S				○						○	○	○	○	●	●	○	●													
H							●															○								
-29		SPKT 1204EDSR-29								●															12.70	12.70	4.76	1.4	0.25	5.50
SP..W		SPKW 1204EDER				●																			12.70	12.70	4.76	1.8	0.25	5.50
		SPKW 1204EDSR										●													12.70	12.70	4.76	1.8	0.25	5.50



B10-B11 B23-B24 B34-B35 B194-B203 B160

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215
P			●	○					●	●	●	●	●	○		○	○	●	●			
M			○	○					○	●	○	○	○	●		●	●	○	●			
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●
N	●	●		●																●		
S				○						○	○	○	○	●	●	○	●					
H							●															○

			d [mm]	s [mm]	d_1 [mm]	y [mm]	x [mm]
TC..		TC 1103ER160	6.35	3.18	2.80	1.40	1.60
		TC 1103ER185	6.35	3.18	2.80	1.70	1.85
		TC 1103ER215	6.35	3.18	2.80	2.00	2.15
		TC 1103ER265	6.35	3.18	2.80	2.20	2.65
		TC 16T3ER110	9.53	3.97	4.20	0.90	1.10
		TC 16T3ER130	9.53	3.97	4.20	1.30	1.30
		TC 16T3ER160	9.53	3.97	4.20	1.40	1.60

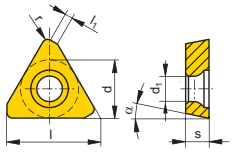


B10-B11 B23-B24 B34-B35 B194-B203 B113

System A260-025

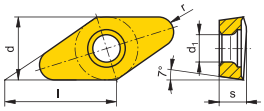
TP..

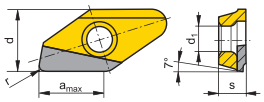
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●											
M				○	○					○	●	○	○	○	●		●	●	○	●											
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N		●	●		●																●										
S					○						○	○	○	○	●	●	○	●													
H								●															○								
TPKW																															
	TPKW 2204PDER		●																							12.70	20.80	4.76	1.60	1.20	5.50
	TPKW 2204PDSR												●													12.70	20.80	4.76	1.60	1.20	5.50
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1



B10-B11 B34-B35 B194-B203 B166

			CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]	a_{max} [mm]
		P			●	○					●	●	●	●	●	○		○	○	●	●											
		M			○	○					○	●	○	○	○	●		●	●	○	●											
		K	●	●		○	●	●	●	●	●	○				○				●	○		●	●								
		N	●	●		●																●										
		S				○						○	○	○	○	●	●	○	●													
		H							●															○								
-27MP		9&* 7) 1 0 3		●																							12.70	22.10	5.56	3.00	5.50	
		9&* ;) 1 0 3		●																							12.70	22.10	5.56	3.00	5.50	
VC..W		9&* : 3&(5 5																				●					12.70	22.10	5.56	0.80	5.50	8.5
		9&* : 3&65 0																				●					12.70	22.10	5.56	0.80	5.50	5.0
			CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	r	d_1	a_{max}



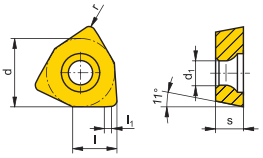


System 280

WP..

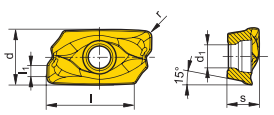
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215		
P			●	○					●	●	●	●	●	○		○	○	●	●					
M			○	○					○	●	○	○	○	●		●	●	○	●					
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●		
N	●	●		●																●				
S				○						○	○	○	○	●	●	○	●							
H							●															○		

			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
-29		WPHT 0603PDSR-29	9.52	6.00	3.18	1.2	0.80	3.40
		WPMT 0603PDSR-29	9.52	6.00	3.18	1.2	0.80	3.40
-31		WPHT 0603PDSR-31	9.52	6.00	3.18	1.2	0.80	3.40
-33		WPHT 0603PDSR-33	9.52	6.00	3.18	1.2	0.80	3.40



B10-B11 B23-B24 B34-B35 B194-B203

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215	d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
	P			●	○					●	●	●	●	●	○		○	○	●	●									
	M			○	○					○	●	○	○	○	●		●	●	○	●									
	K	●	●		○	●	●	●	●	●	○				○				●	○		●	●						
	N	●	●		●																●								
	S				○						○	○	○	○	●	●	○	●											
	H							●															○						
-F20	XDKT 070304FR-F20	●																						4.90	7.80	3.18	1.5	0.40	2.50
	XDKT 070308FR-F20	●																						4.90	7.80	3.18	1.1	0.80	2.50
	XDKT 11T302FR-F20	●																						6.80	10.60	3.80	2.0	0.20	2.80
	XDKT 11T304FR-F20	●																						6.80	10.60	3.80	1.8	0.40	2.80
	XDKT 11T308FR-F20	●																						6.80	10.60	3.80	1.4	0.80	2.80
	XDKT 11T320FR-F20	●																						6.80	10.60	3.80	1.7	2.00	2.80
	XDKT 11T325FR-F20	●																						6.80	10.60	3.80	1.2	2.50	2.80
	XDKT 150508FR-F20	●																						9.30	14.80	5.56	1.6	0.80	4.50
-F40	XDKT 070304ER-F40														●	●								4.90	7.80	3.18	1.2	0.40	2.50
	XDKT 070308ER-F40														●	●								4.90	7.80	3.18	0.8	0.80	2.50
	XDKT 11T304ER-F40														●	●								6.80	10.60	3.80	1.7	0.40	2.80
	XDKT 11T308ER-F40														●	●								6.80	10.60	3.80	1.4	0.80	2.80
	XDKT 11T312ER-F40														●	●								6.80	10.60	3.80	1.1	1.20	2.80
	XDKT 11T316ER-F40														●	●								6.80	10.60	3.80	0.8	1.60	2.80
	XDKT 11T320ER-F40														●									6.80	10.60	3.80	0.3	2.00	2.80
	XDKT 11T325ER-F40														●	●								6.80	10.60	3.80	1.6	2.50	2.80
	XDKT 11T332ER-F40														●	●								6.80	10.60	3.80	1.5	3.20	2.80
	XDKT 11T340ER-F40														●	●								6.80	10.60	3.80		4.00	2.80
	XDKT 150508ER-F40														●	●								9.30	14.80	5.56	1.6	0.80	4.50
	XDKT 150532ER-F40														●	●								9.30	14.80	5.56	1.9	3.20	4.50
	XDKT 150540ER-F40														●	●								9.30	14.80	5.56	1.2	4.00	4.50
	XDKT 200708ER-F40														●	●								12.50	18.80	6.93	2.8	0.80	5.50
	XDKT 200732ER-F40														●	●								12.50	18.80	6.82	0.9	3.20	5.50
-F50	XDKT 070304SR-F50									●		●					●							4.90	7.80	3.18	1.2	0.40	2.50
	XDKT 070308SR-F50									●		●					●							4.90	7.80	3.18	1.0	0.80	2.50
	XDKT 11T304SR-F50									●		●	●											6.80	10.60	3.80	1.8	0.40	2.80
	XDKT 11T308SR-F50									●		●	●				●	●						6.80	10.60	3.80	1.4	0.80	2.80
	XDKT 11T312SR-F50																●	●						6.80	10.60	3.80	1.0	1.20	2.80
	XDKT 11T320SR-F50									●		●	●				●	●						6.80	10.60	3.80	2.1	2.00	2.80
	XDKT 11T325SR-F50									●		●	●											6.80	10.60	3.80	1.6	2.50	2.80
	XDKT 11T332SR-F50																●	●						6.80	10.60	3.80	1.5	3.20	2.80
	XDKT 150508SR-F50									●		●					●							9.30	14.80	5.56	1.6	0.80	4.50
-M50	XDKT 070304SR-M50									●		●					●							4.90	7.80	3.18	1.0	0.40	2.50
	XDKT 070308SR-M50									●		●					●							4.90	7.80	3.18	1.0	0.80	2.50
	XDKT 11T304SR-M50					●				●		●	●											6.80	10.60	3.80	1.8	0.40	2.80
	XDKT 11T308SR-M50					●				●		●	●				●							6.80	10.60	3.80	1.4	0.80	2.80
	XDKT 11T312SR-M50																●							6.80	10.60	3.80	1.0	1.20	2.80
	XDKT 11T320SR-M50									●		●	●				●							6.80	10.60	3.80	2.1	2.00	2.80
	XDKT 11T325SR-M50									●		●	●											6.80	10.60	3.80	1.6	2.50	2.80
	XDKT 11T332SR-M50																●							6.80	10.60	3.80	1.5	3.20	2.80
	XDKT 150508SR-M50					●			●	●		●					●							9.30	14.80	5.56	1.6	0.80	4.50
	XDKT 150520SR-M50									●														9.30	14.80	5.56	1.6	2.00	4.50
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215	d	l	s	l_1	r	d_1

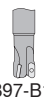


B10-B11

B23-B24

B34-B35

B194-B203


B97-B101

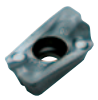
B118

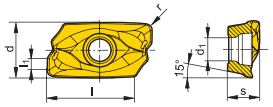
B145-B147

B163

System 211

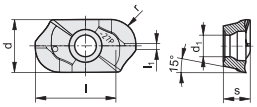
XD..

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
	P			●	○					●	●	●	●	●	○		○	○	●	●											
	M			○	○					○	●	○	○	○	●		●	●	○	●											
	K	●	●		○	●	●	●	●	●	○				○				●	○		●	●								
	N	●	●		●																●										
	S				○						○	○	○	○	●	●	○	●													
	H							●															○								
-R50		XDKT 11T304SR-R50								●		●	●													6.80	10.60	3.80	1.8	0.40	2.80
		XDKT 11T308SR-R50				●				●		●	●				●	●								6.80	10.60	3.80	1.4	0.80	2.80
		XDKT 11T312SR-R50															●	●								6.80	10.60	3.80	1.0	1.20	2.80
		XDKT 11T320SR-R50								●		●	●				●	●								6.80	10.60	3.80	2.1	2.00	2.80
		XDKT 11T325SR-R50								●		●	●													6.80	10.60	3.80	1.6	2.50	2.80
		XDKT 11T332SR-R50															●	●								6.80	10.60	3.80	1.5	3.20	2.80
		XDKT 150508SR-R50				●			●	●		●														9.30	14.80	5.56	1.6	0.80	4.50
		XDKT 150520SR-R50								●																9.30	14.80	5.56	1.6	2.00	4.50
-R60		XDKT 11T308SR-R60						●																		6.80	10.60	3.80	1.4	0.80	2.80
		XDKT 150508SR-R60						●																		9.30	14.80	5.56	1.6	0.80	4.50
			CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1



B10-B11 B23-B24 B34-B35 B194-B203 B97-B101 B118 B145-B147 B163

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P		●	○					●	●	●	●	●	○		○	○	●	●												
M			○	○				○	●	○	○	○	●		●	●	○	●												
K	●	●		○	●	●	●	●	○				○				●	○		●	●									
N	●	●		●																●										
S				○						○	○	○	○	●	●	○	●													
H							●															○								
-27P																														
XDHT 11T302FR-27P		●																							6.80	10.60	3.50	2.0	0.20	2.80
XDHT 11T304FR-27P		●																							6.80	10.60	3.50	1.8	0.40	2.80
XDHT 11T308FR-27P		●																							6.80	10.60	3.50	1.4	0.80	2.80
XDHT 11T312FR-27P		●																							6.80	10.60	3.50	1.4	1.20	2.80
XDHT 11T316FR-27P		●																							6.80	10.60	3.50	1.4	1.60	2.80
XDHT 11T320FR-27P		●																							6.80	10.60	3.50	1.4	2.00	2.80
XDHT 11T325FR-27P		●																							6.80	10.60	3.50	1.4	2.50	2.80
XDHT 11T332FR-27P		●																							6.80	10.60	3.50	0.8	3.20	2.80
XDHT 11T340FR-27P		●																							6.80	10.60	3.50		4.00	2.80
XDHT 11T350FR-27P		●																							6.80	10.60	3.50		5.00	2.80
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1

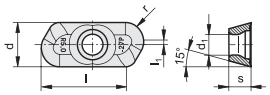


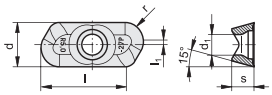
B10-B11 B23-B24 B34-B35 B194-B203 B106 B98-B99 B123+B118 B151+B145 B124 B163

System HSC

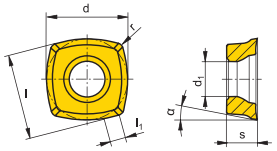
XD..19..

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●											
M				○	○					○	●	○	○	○	●		●	●	○	●											
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N		●	●		●																●										
S					○						○	○	○	○	●	●	○	●													
H								●															○								
XDHT	XDHT 190402FR-27P		●																							9.52	19.00	4.76	2.0	0.20	4.65
	XDHT 190404FR-27P		●																							9.52	19.00	4.76	2.0	0.40	4.65
	XDHT 190408FR-27P		●																							9.52	19.00	4.76	2.0	0.80	4.65
	XDHT 190412FR-27P		●																							9.52	19.00	4.76	2.0	1.20	4.65
	XDHT 190416FR-27P		●																							9.52	19.00	4.76	2.0	1.60	4.65
	XDHT 190420FR-27P		●																							9.52	19.00	4.76	2.0	2.00	4.65
	XDHT 190425FR-27P		●																							9.52	19.00	4.76	1.4	2.50	4.65
	XDHT 190432FR-27P		●																							9.52	19.00	4.76	1.0	3.20	4.65
	XDHT 190440FR-27P		●																							9.52	19.00	4.76	1.0	4.00	4.65
	XDHT 190450FR-27P		●																							9.52	19.00	4.76		5.00	4.65
XDHX	XDHX 190402FR-27P		●																							9.52	19.00	4.76	2.0	0.20	4.65
	XDHX 190404FR-27P		●																							9.52	19.00	4.76	2.0	0.40	4.65
	XDHX 190408FR-27P		●																							9.52	19.00	4.76	2.0	0.80	4.65
	XDHX 190412FR-27P		●																							9.52	19.00	4.76	2.0	1.20	4.65
	XDHX 190416FR-27P		●																							9.52	19.00	4.76	2.0	1.60	4.65
	XDHX 190420FR-27P		●																							9.52	19.00	4.76	2.0	2.00	4.65
	XDHX 190425FR-27P		●																							9.52	19.00	4.76	1.4	2.50	4.65
	XDHX 190432FR-27P		●																							9.52	19.00	4.76	1.0	3.20	4.65
	XDHX 190440FR-27P		●																							9.52	19.00	4.76	1.0	4.00	4.65
	XDHX 190450FR-27P		●																							9.52	19.00	4.76		5.00	4.65
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1





	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P			●	○					●	●	●	●	●	○		○	○	●	●											
M			○	○					○	●	○	○	○	●		●	●	○	●											
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N	●	●		●																●										
S				○						○	○	○	○	●	●	○	●													
H							●															○								
-F40																														
XDLX 09T308ER-F40														●	●										9.60	9.00	3.97	2.4	0.80	4.40
XOLX 120410ER-F40														●	●										12.70	12.00	4.76	2.2	1.00	5.50
XPLX 060305ER-F40														●	●										6.35	6.00	2.75	1.0	0.50	2.80
-M50																														
XDLX 09T308SR-M50					●				●		●					●									9.60	9.00	3.97	1.5	0.80	4.40
XOLX 120410SR-M50									●		●					●									12.70	12.00	4.76	2.2	1.00	5.50
XPLX 060305SR-M50					●						●					●									6.35	6.00	2.75	1.0	0.50	2.80
-R50																														
XOLX 120410SR-R50											●														12.70	12.00	4.76	2.2	1.00	5.50
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1

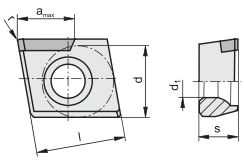


B10-B11 B23-B24 B34-B35 B194-B203 B94 B116 B140

System HPC

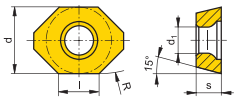
ZN..

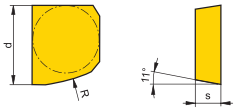
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]	a_{max} [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●											
M				○	○					○	●	○	○	○	●		●	●	○	●											
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N		●	●		●																●										
S					○						○	○	○	○	●	●	○	●													
H								●															○								
0003	ZNHW 120508SR-0003																				●					10.00	12.40	5.40	0.80	4.85	3.0
0007	ZNHW 120504FR-0007																				●					10.00	12.40	5.40	0.40	4.85	7.0
1002	ZNHW 1205EOER-1002																						●			10.00	12.40	5.40		4.85	2.0
	ZNHW 1205EOSR-1002																						●			10.00	12.40	5.40		4.85	2.0
1204	ZNHW 04T3POER-1204																				●					7.00	11.00	3.97		2.80	4.0
	ZNHW 04T305ER-1204																						●			7.00	11.00	3.97	0.50	2.80	4.0
1503	ZNHW 1205POSR-1503																				●					10.00	12.40	5.40		4.85	3.0
	ZNHW 120504ER-1503																				●					10.00	12.40	5.40	0.40	4.85	3.0
	ZNHW 120508ER-1503																				●					10.00	12.40	5.40	0.80	4.85	3.0
1506	ZNHW 1205POSR-1506																				●					10.00	12.40	5.40		4.85	6.0
	ZNHW 1205POSR-1506-R																				●					10.00	12.40	5.40		4.85	6.0
1511	ZNHW 1205POER-1511																				●					10.00	12.40	5.40		4.85	11.0
3003	ZNHW 1205POSR-3003																				●					10.00	12.40	5.40		4.85	3.0
5003	ZNHW 1205ZZSR-5003-Q																				●					10.00	12.40	5.40		4.85	3.0
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	r	d_1	a_{max}

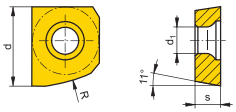


B10-B11 B23-B24 B34-B35 B194-B203 B110 B122 B153 B125

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	d_1 [mm]	R [mm]
P			●	○					●	●	●	●	●	○		○	○	●	●										
M			○	○					○	●	○	○	○	●		●	●	○	●										
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●							
N	●	●		●																●									
S				○						○	○	○	○	●	●	○	●												
H							●															○							
2' * ;	2' * ; ▯▯▯▯ ' 61								●																12.70	7.17	4.76	5.50	400
SPEX-1	SPEX 1203EDER-1					●																			12.70	12.00	3.18		500
SPEX	SPEX 1204EETR		●																						12.70	12.00	4.76	5.50	400
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	d_1	R



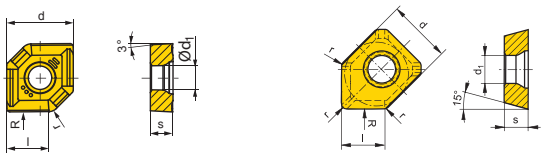




System 270, 273

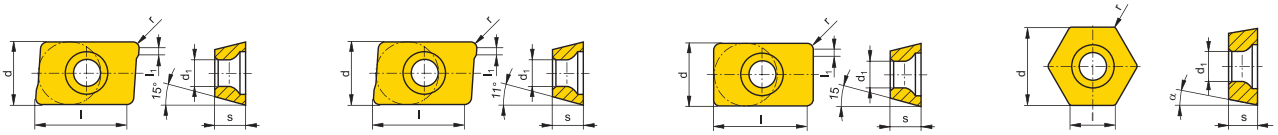
XA.. XD..

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]	R [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●											
M				○	○					○	●	○	○	○	●		●	●	○	●											
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N		●	●		●																●										
S					○						○	○	○	○	●	●	○	●													
H								●															○								
-M50	XAHT 060525SL-M50					●																				17.08	10.00	5.56	2.50	6.00	640
	XAHT 060525SR-M50					●			●	●		●					●									17.08	10.00	5.56	2.50	6.00	640
XDHW	XDHW 0903AEEN					●																				9.52	5.50	3.18	1.00	3.40	125
	XDHW 0903AEFN		●																							9.52	5.50	3.18	1.00	3.40	125
	XDHW 0903AESN									●			●							●						9.52	5.50	3.18	1.00	3.40	125
	XDHW 1204AEEN					●																				12.70	7.50	4.76	1.00	5.50	150
	XDHW 1204AEFN		●																							12.70	7.50	4.76	1.00	5.50	150
	XDHW 1204AESN									●			●							●						12.70	7.50	4.76	1.00	5.50	150
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	r	d_1	R



B10-B11 B23-B24 B34-B35 B194-B203 B134 B128-B129 B157+B159

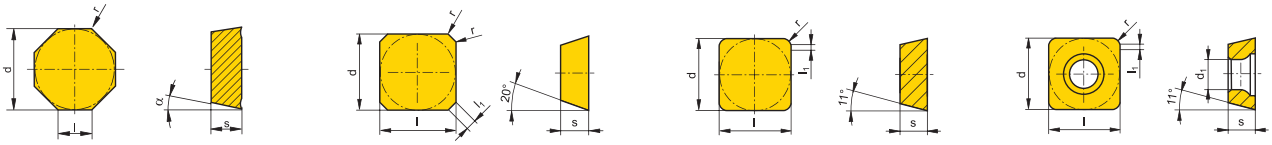
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215				d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P			●	○					●	●	●	●	●	○		○	○	●	●												
M			○	○					○	●	○	○	○	●		●	●	○	●												
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●									
N	●	●		●																●											
S				○						○	○	○	○	●	●	○	●														
H							●															○									
-29		ADKT 1505PDSR-29								●		●	●				●									9.57	15.20	5.65	1.2	0.80	4.40
APFT...-29		APFT 1604PDSR-29								●			●													9.52	16.00	4.76	1.2	0.80	4.40
APKT...-29		APKT 1604PDSR-29								●			●		●											9.52	16.39	5.26	1.4	0.80	4.40
LDHT...-29		LDHT 15T3PDSR-29											●													9.52	15.00	3.97	1.2	0.80	4.40
		LDHT 15T308FR-29		●																						9.52	15.00	3.97		0.80	4.40
+1* ; 4		+1* ; (1 4				●																				16.20	9.35	5.56		3.00	3.81
LDHT		LDHT 15T308FR		●																						9.52	15.00	3.97		0.80	4.40
LDHW		LDHW 15T308ER		●		●																				9.52	15.00	3.97		0.80	4.40
		LDHW 15T308SR							●			●							●							9.52	15.00	3.97		0.80	4.40
	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215				d	l	s	l_1	r	d_1



Other systems

O.. S.. T..

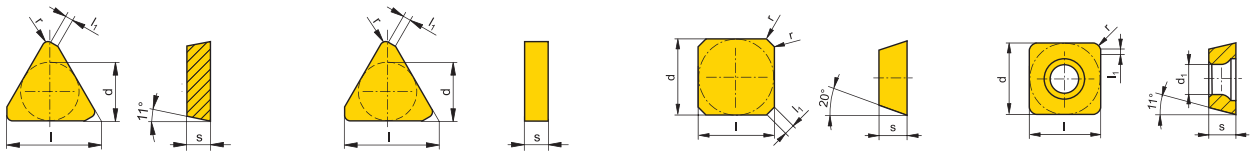
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
P				●	○					●	●	●	●	●	○		○	○	●	●											
M				○	○					○	●	○	○	○	●		●	●	○	●											
K		●	●		○	●	●	●	●	●	○				○				●	○		●	●								
N		●	●		●																●										
S					○						○	○	○	○	●	●	○	●													
H								●															○								
OFHR..-27P	OFHR 070410FN-27P		●																							18.18	7.00	4.97	1.5	1.00	
SEKR..-29	SEKR 1203AFSN-29									●			●													12.70	12.70	3.18		2.40	
SPKR..-29	SPKR 1203EDSR-29									●			●													12.70	12.70	3.18		0.30	
-29	SPKT 1204EDSR-29									●																12.70	12.70	4.76	1.4	0.25	5.50
		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1



B10-B11 B23-B24 B34-B35 B194-B203

	CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215
P			●	○					●	●	●	●	●	○		○	○	●	●			
M			○	○					○	●	○	○	○	●		●	●	○	●			
K	●	●		○	●	●	●	●	●	○				○				●	○		●	●
N	●	●		●																●		
S				○						○	○	○	○	●	●	○	●					
H							●															○

			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
TPKR...-29		TPKR 1603PPSR-29	9.52	15.50	3.18	1.2		
		TPKR 2204PDSR-29	12.70	20.70	4.76	1.4		
TNHF...-31		TNHF 1204ANEN-31M	12.70	18.90	4.76	2.6		
		TNHF 1204ANEN-31	12.70	18.90	4.76	2.6		
		TNHF 1204ANSN-31Q	12.70	18.90	4.76	2.6		
		TNHF 1204ANSN-31	12.70	18.90	4.76	2.6		
SEHR...-33		SEHR 1203AFSN-33	12.70	12.70	3.18		1.20	
SPMT...-33		SPMT 070308SN-33	7.94	7.94	3.18		0.80	2.80
		SPMT 120408SN-33	12.70	12.70	4.76		0.80	5.50
SEKN		SEKN 1203AFEN	12.70	12.70	3.18		2.40	
		SEKN 1203AFSN	12.70	12.70	3.18		2.40	
		SEKN 1504AFSN	15.88	15.88	4.76		2.40	

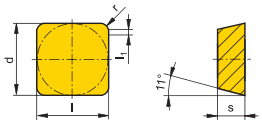


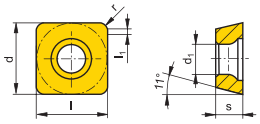
B10-B11 B23-B24 B34-B35 B194-B203

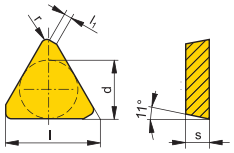
Other systems

O.. S.. T..

		CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d [mm]	l [mm]	s [mm]	l_1 [mm]	r [mm]	d_1 [mm]
	P			●	○					●	●	●	●	●	○		○	○	●	●											
	M			○	○					○	●	○	○	○	●		●	●	○	●											
	K	●	●		○	●	●	●	●	●	○				○				●	○		●	●								
	N	●	●		●																●										
	S				○						○	○	○	○	●	●	○	●													
	H							●															○								
SPKN		SPKN 1203EDER		●			●	●																		12.70	12.70	3.18			
		SPKN 1203EDSR			●					●			●													12.70	12.70	3.18			
		SPKN 1504EDSR			●					●			●													15.88	15.88	4.76			
SPKR		SPKR 1203EDFR		●																						12.70	12.70	3.18			
SP..W		SPKW 1204EDER					●																			12.70	12.70	4.76	1.8	0.25	5.50
		SPKW 1204EDSR											●													12.70	12.70	4.76	1.8	0.25	5.50
SPMT		SPMT 090308SN											●													9.52	9.52	3.18		0.80	3.40
		SPMT 120408EN		●				●																		12.70	12.70	4.76		0.80	5.50
		SPMT 120408SN											●													12.70	12.70	4.76		0.80	5.50
TPKN		TPKN 1603PPER						●																		9.52	15.50	3.18	1.4		
		TPKN 1603PPSR			●					●			●													9.52	15.50	3.18	1.4		
		TPKN 2204PDER						●																		12.70	22.00	4.76	1.4		
		TPKN 2204PDSR			●					●			●													12.70	22.00	4.76	1.4		
TPKW		TPKW 16T3PPSR											●													9.52	15.50	3.97	1.4	1.10	4.40
			CTW4615	H216T	S26T	AMZ	CTC3215	SR216	CTP6215	CTP3220	SR226+	CTP1625	CTP1235	GM43+	GM43	CTC5235	CTC5240	CTP2235	GM246	TCC410	TCM10	CTD4205	CTN3105	CTL3215			d	l	s	l_1	r	d_1







B10-B11

B23-B24

B34-B35

B194-B203

CERATIZIT

hard material matters

Overview

MaxiMill end mills

Face milling cutters C270

B86

Chamfering cutters C272

B87

Button insert cutters C251 / C252

B88-B90

Face milling cutters C273

B91

Face milling cutters C274

B92-B93

Face milling cutters CHFC

B94

Shoulder & slot milling cutters C490

B95-B96

Shoulder & slot milling cutters C211

B97-B101

MaxiMill end mills

Shoulder & slot milling cutters C210

B102

Drill and slot milling cutters C212

B103

Drill and slot milling cutters C BF

B104

Shoulder & slot milling cutters CHSC

B106-B108

Shoulder & slot milling cutters CHPC

B109

Ball nose milling cutters C KF

B111

T-slot milling cutters C NF

B112

Circlip groove milling cutters C ZF

B113

MaxiMill threaded shank milling cutters

Button insert milling cutters G251 / G252

B114-B115

Face milling cutters GHFC

B116

Shoulder & slot milling cutters G490

B117

Shoulder & slot milling cutters G211

B118

Shoulder & slot milling cutters G210

B119

Face milling cutters G274

B120-B121

Shoulder & slot milling cutters GHPC

B122

Shoulder & slot milling cutters GHSC

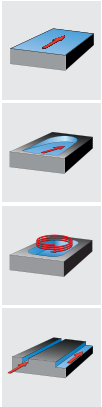
B123

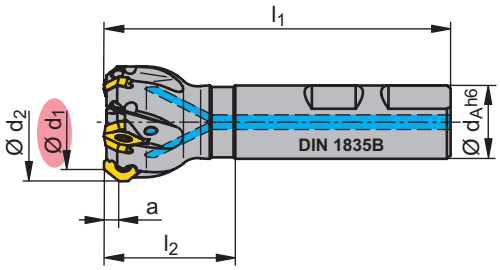
MaxiMill monobloc milling cutters	MaxiMill shell milling cutters	MaxiMill shell milling cutters	MaxiMill cassette cutters
HSC milling cutters MHSC B124+B126	Face milling cutters A270 B128-B130	Shoulder & slot milling cutters A211 B145-B147	Face milling cutters A260 B157-B161
HSC milling cutters MHPC B125	Button insert cutters A251 / A252 B131-B133	Shoulder & slot milling cutters A210 B148	Button insert cutters A260 B162
HSC milling cutters MHSV B127	Face milling cutters A271 B134	Face milling cutters AHDM B150	Shoulder & slot milling cutters A260 B163-B167
	Face milling cutters A273 B135-B137	Shoulder & slot milling cutters AHSC B151	Cutter body A260 B168
	Face milling cutters A274 B138-B139	Shoulder & slot milling cutters AHPC-19 B152	Cassettes A260 B169
	Face milling cutters AHFC B140	Face milling cutters AHPC-12 B153	
	Shoulder & face milling cutters AHEC-11 B141-B142	Shoulder & slot milling cutters AHSV B154	
	Shoulder & slot milling cutters A490 B143-B144	Side & face milling cutters 90LN / 90CN B155-B156	

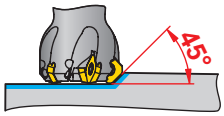
CERATIZIT hard material matters

Face milling cutters

C270-09







d_1 [mm]	Type, description	d_2 [mm]	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	z	
6	C270.06.R.01-09	14.4	80	32	16	4	1	SD/XD.. 0903..
12	C270.12.R.01-09	20.4	80	32	16	4	1	
16	C270.16.R.02-09	24.4	90	40	20	4	2	
20	C270.20.R.03-09	28.4	90	40	20	4	3	
25	C270.25.R.04-09	33.4	100	44	25	4	4	
32	C270.32.R.05-09	40.4	95	36	25	4	5	

Ordering example: 1 piece C270.06.R.01-09

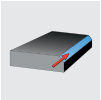
Supply details: cutter body and insert clamping screws

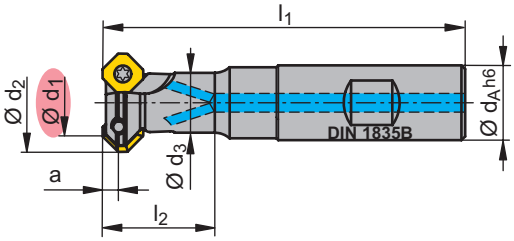
	d_1 [mm]			
SD/XD.. 0903..	**6 - 12**	7883214/M3,0X5,7/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
SD/XD.. 0903..	**16 - 32**	7883203/M3,0X7,3/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08

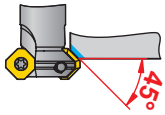
B190-B193 B204-B218 B242-B246 B64

Chamfering cutters

C272-09







d_1 [mm]	Type, description	d_2 [mm]	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	z	
6	C272.06.R.01-09	14.4	91	24	16	4	1	SD.. 0903..
8	C272.08.R.01-09	16.4	91	25.5	16	4	1	
12	C272.12.R.01-09	20.4	91	26	16	4	1	
16	C272.16.R.02-09	24.4	97	30	20	4	2	
18	C272.18.R.02-09	26.4	97	30	20	4	2	
25	C272.25.R.03-09	33.4	109	35	25	4	3	

Ordering example: 1 piece C272.06.R.01-09

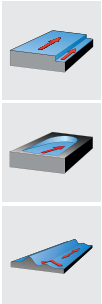
Supply details: cutter body and insert clamping screws

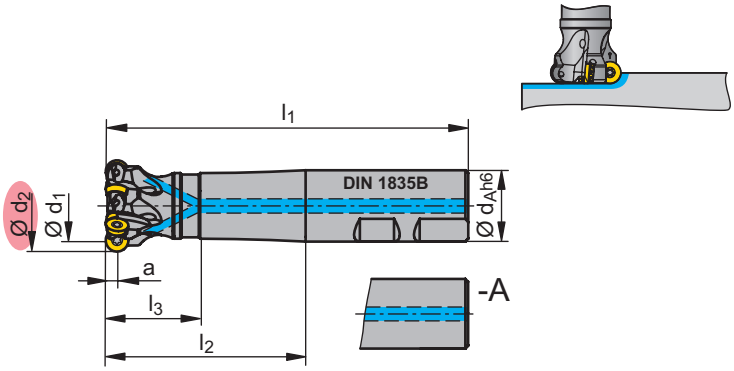
	d_1 [mm]			
SD.. 0903..	**6 - 12**	7883214/M3,0X5,7/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
SD.. 0903..	**16 - 25**	7883203/M3,0X7,3/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08

B190-B193 B242-B246 B64

Button insert cutters

C251





to be discontinued

d_2 [mm]	Type, description	d_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
10	C251.10.R.02-05-A-45-165	5	165	45	27	12	2.5	12000	2	RD.. 0501..
16	C251.16.R.04-05	11	88	40	28	16	2.5	40000	4	
	C251.16.R.04-05-A	11	88	40	28	16	2.5	40000	4	
20	C251.20.R.03-08	12	100	50	35	20	4	31800	3	RD.. 0802..
25	C251.25.R.04-08	17	116	60	38	25	4	25450	4	
	C251.25.R.03-10-B-60	15	116	60	38	25	5	25450	3	RP.. 10T3..
	C251.25.R.03-10-AR-60	15	116	60		25	5	25450	3	

Ordering example: 1 piece C251.10.R.02-05-A-45-165

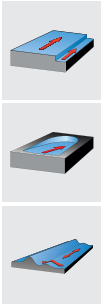
Supply details: cutter body and insert clamping screws

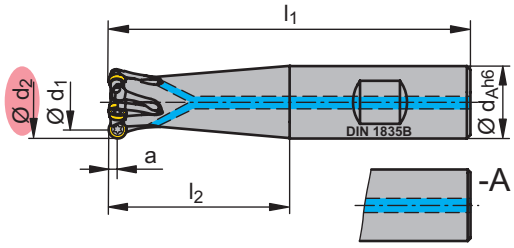
	d_2 [mm]			
RD.. 0501..	**10 - 16**	7801175/M2,0X3,3/T06	7883305/TORX T06	DMSD 0,7Nm/SORT T06
RD.. 0802..	**20 - 25**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
RP.. 10T3..	**25**	10007085/M3,0X7,3/T10	7883306/TORX T10	DMSD 2,0Nm/SORT T10

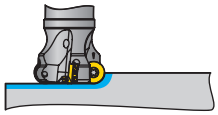
B190-B193 B204-B218 B242-B246 B247-B252 B60

Button insert cutters

C251-RS







d_2 [mm]	Type, description	d_1 [mm]	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
10	C251.10.R.02-05-A-25-165-RS	5	165	25	10	2.5	12000	2	RD.. 0501..
	C251.10.R.02-05-B12-20-RS	5	67	20	12	2.5	40000	2	
12	C251.12.R.03-05-A-32-165-RS	7	165	32	12	2.5	16000	3	
	C251.12.R.03-05-B16-25-RS	7	75	25	16	2.5	40000	3	
16	C251.16.R.04-05-A-40-165-RS	11	165	40	16	2.5	18000	4	
	C251.16.R.04-05-B-32-RS	11	81	32	16	2.5	40000	4	
20	C251.20.R.05-05-A-50-165-RS	15	165	50	20	2.5	18000	5	
	C251.20.R.05-05-B-40-RS	15	91	40	20	2.5	31800	5	
16	C251.16.R.02-08-A-40-165-RS	8	165	40	16	4	18000	2	RD.. 0802..
	C251.16.R.02-08-B-32-RS	8	81	32	16	4	40000	2	
20	C251.20.R.03-08-A-50-200-RS	12	200	50	20	4	25000	3	
	C251.20.R.03-08-A-60-RS	12	110	60	20	4	27300	3	
	C251.20.R.03-08-B-40-RS	12	91	40	20	4	31800	3	
25	C251.25.R.04-08-A-60-225-RS	17	225	60	25	4	18000	4	
	C251.25.R.04-08-A-60-RS	17	116	60	25	4	20000	4	
	C251.25.R.04-08-B-50-RS	17	107	50	25	4	25500	4	
20	C251.20.R.02-10-A-50-RS	10	102	50	20	5	31800	2	RP.. 10T3..
	C251.20.R.02-10-A-50-200-RS	10	200	50	20	5	25000	2	
25	C251.25.R.03-10-A-60-RS	15	116	60	25	5	20000	3	
	C251.25.R.03-10-A-60-225-RS	15	225	60	25	5	18000	3	
	C251.25.R.03-10-B-60-RS	15	116	60	25	5	20000	3	
32	C251.32.R.04-10-A-70-RS	22	130	70	32	5	19000	4	
25	C251.25.R.02-12-B-30-RS	13	86	30	25	6	25000	2	RP.. 1204..
32	C251.32.R.03-12-A-40-RS	20	100	40	32	6	19000	3	
	C251.32.R.03-12-B-40-RS	20	100	40	32	6	19000	3	

Ordering example: 1 piece C251.10.R.02-05-A-25-165-RS

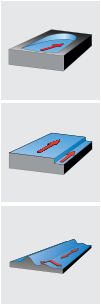
Supply details: cutter body and insert clamping screws

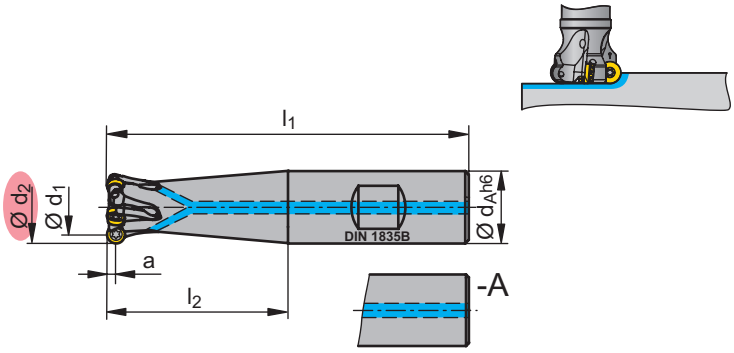
	d_2 [mm]			
RD.. 0501..	**12 - 20**	7801175/M2,0X3,3/T06	7883305/TORX T06	DMSD 0,7Nm/SORT T06
RD.. 0802..	**20 - 25**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
RP.. 10T3..	**20 - 32**	10007085/M3,0X7,3/T10	7883306/TORX T10	DMSD 2,0Nm/SORT T10
RP.. 1204..	**25 - 32**	7883209/M3,5X8,6/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15

B190-B193 B204-B218 B242-B246 B247-B252 B60

Button insert cutters

C252





d_2 [mm]	Type, description	d_1 [mm]	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
32	C252.32.R.04-10-A-70	22	131	70	32	2.5	19850	4	RN.. 1004..

Ordering example: 1 piece C252.32.R.04-10-A-70

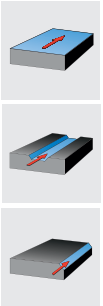
Supply details: cutter body and insert clamping screws

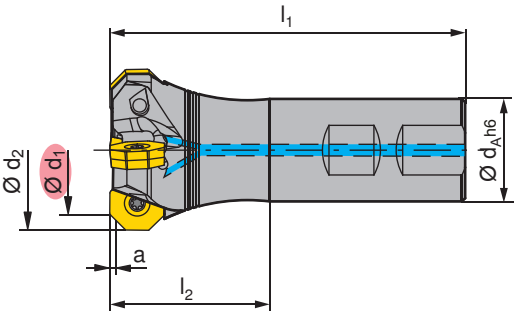
	d_2 [mm]		
RN.. 1004..	**32**	10009229/M3X7,5/10IP	DMSD 2,0Nm/SORT 10IP

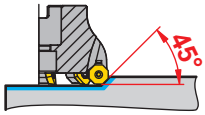
B190-B193 B204-B218 B242-B246 B247-B252 B60

Face milling cutters

C273-06







d_1 [mm]	Type, description	d_2 [mm]	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
32	C273.32.R.03-06-B-40	42.2	101	40	32	3.5	19600	3	OAKU 06..
40	C273.40.R.04-06-B32-50	50.2	111	50	32	3.5	17000	4	

Ordering example: 1 piece C273.32.R.03-06-B-40

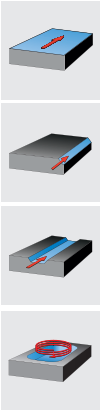
Supply details: cutter body and insert clamping screws

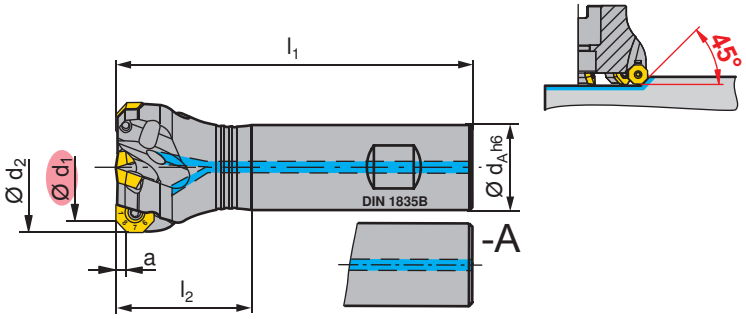
	d_1 [mm]			
OAKU 06..	**32 - 40**	10000155/M5,0X14/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20

B190-B193 B242-B246 B56

Face milling cutters

C274-09 OF..





d_1 [mm]	Type, description	d_2 [mm]	l_1 [mm]	l_2 [mm]	a [mm]	d_A [mm]	n_{max} [min^{-1}]	z	
20	C274.20.R.03-09-A-25	25.6	77	25	2.5	20	42600	3	OF.. 0403..
	C274.20.R.03-09-B-25	25.6	77	25	2.5	20	42600	3	
25	C274.25.R.04-09-A20-32	30.7	84	32	2.5	20	37200	4	
	C274.25.R.04-09-B20-32	30.7	84	32	2.5	20	37200	4	
32	C274.32.R.05-09-A25-40	37.7	98	40	2.5	25	32200	5	
	C274.32.R.05-09-B25-40	37.7	98	40	2.5	25	32200	5	

Ordering example: 1 piece C274.20.R.03-09-A-25

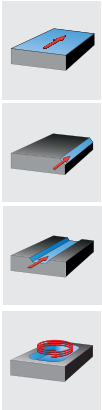
Supply details: cutter body and insert clamping screws

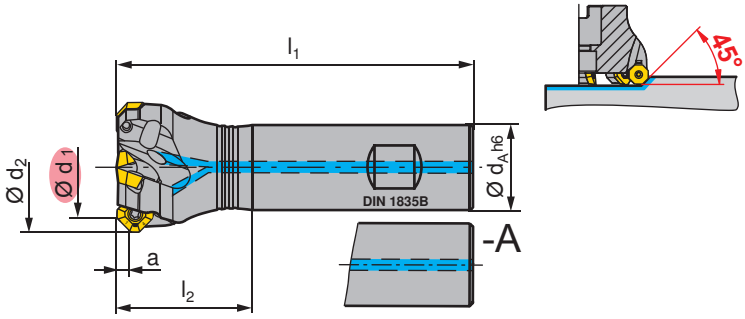
	d_1 [mm]			
OF.. 0403..	**20 - 32**	10007562/M2,5X7,6/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP

B190-B193 B242-B246 B57

Face milling cutters

C274-09 SF..





d_1 [mm]	Type, description	d_2 [mm]	l_1 [mm]	l_2 [mm]	a [mm]	d_A [mm]	n_{max} [min^{-1}]	z	
18.9	C274.20.R.03-09-A-25	27.4	77.7	25.7	3.8	20	42600	3	SF.. 0903..
	C274.20.R.03-09-B-25	27.4	77.7	25.7	3.8	20	42600	3	
23.8	C274.25.R.04-09-A20-32	32.5	84.7	32.7	3.8	20	37200	4	
	C274.25.R.04-09-B20-32	32.5	84.7	32.7	3.8	20	37200	4	
30.7	C274.32.R.05-09-A25-40	39.5	98.7	40.7	3.8	25	32200	5	
	C274.32.R.05-09-B25-40	39.5	98.7	40.7	3.8	25	32200	5	

Ordering example: 1 piece C274.20.R.03-09-A-25

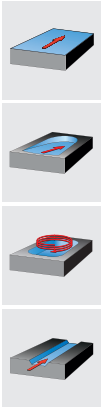
Supply details: cutter body and insert clamping screws

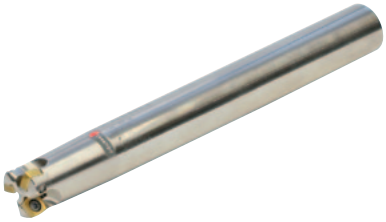
	d_1 [mm]			
SF.. 0903..	**18.9 - 30.7**	10007562/M2,5X7,6/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP

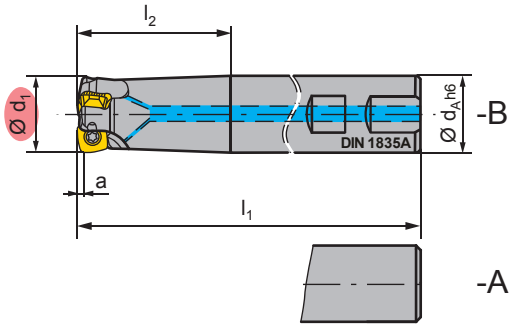
B190-B193 B242-B246 B57

Face milling cutters

CHFC-06/-09/-12







HFC high feed cutting

d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
16	CHFC.16.R.02-06-A-40-200	200	40	16	0.8	4600	2	XP.. 06
	CHFC.16.R.02-06-B-40	89	40	16	0.8	17300	2	
20	CHFC.20.R.03-06-A-50-225	225	50	20	0.8	4200	3	
	CHFC.20.R.03-06-B-50	101	50	20	0.8	14500	3	
25	CHFC.25.R.04-06-A-50-225	225	50	25	0.8	4600	4	
	CHFC.25.R.04-06-B-50	107	50	25	0.8	15600	4	
32	CHFC.32.R.05-06-A25-60-225	225	60	25	0.8	3900	5	
	CHFC.32.R.05-06-B25-60	117	60	25	0.8	11000	5	
25	CHFC.25.R.02-09-A-50-225	225	50	25	1	9000	2	XD.. 09..
	CHFC.25.R.03-09-A-50-225	225	50	25	1	9000	3	
32	CHFC.32.R.03-09-A-63-250	250	63	32	1	8100	3	
	CHFC.32.R.02-12-A-63-250	250	63	32	2	6480	2	XO.. 12..
35	CHFC.35.R.03-12-A-63-250	250	63	32	2	6480	3	

Ordering example: 1 piece CHFC.16.R.02-06-A-40-200

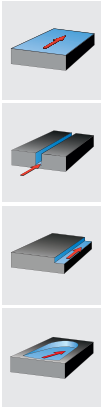
Supply details: cutter body and insert clamping screws

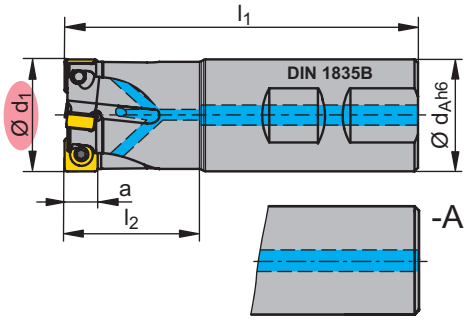
	d_1 [mm]			
XP.. 06	**16 - 32**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
XD.. 09..	**25**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15
XD.. 09..	**32**	7883209/M3,5X8,6/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15
XO.. 12..	**32 - 35**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20

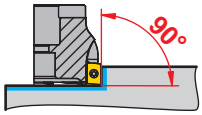
B190-B193 B204-B218 B242-B246 B247-B252 B75

Shoulder & slot milling cutters

C490-09/-12







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
25	C490.25.R.02-09-A20-40-165	165	40	20	8	17700	2	SD.. 09T3..
	C490.25.R.02-09-A-40-165	165	40	25	8	17700	2	
	C490.25.R.03-09-B-32	88	32	25	8	23700	3	
32	C490.32.R.04-09-B25-40	96	40	25	8	19700	4	
	C490.32.R.04-09-B-40	100	40	32	8	19700	4	
	C490.32.R.03-12-B-40	101	40	32	11	16300	3	SD.. 1205..
40	C490.40.R.04-12-B32-50	112	50	32	11	13600	4	

Ordering example: 1 piece C490.25.R.02-09-A20-40-165

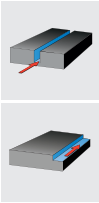
Supply details: cutter body and insert clamping screws

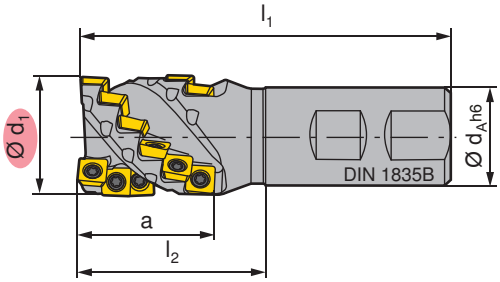
	d_1 [mm]			
SD.. 09T3..	**25 - 32**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15
SD.. 1205..	**32 - 40**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20

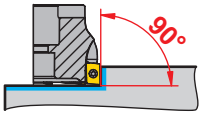
B190-B193 B204-B218 B242-B246 B247-B252 B63

Shoulder & slot milling cutters

C490-09K







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	n		z	
32	C490.32.R.02K3-09-B-40	100	40	32	21	9700	6		2	SD.. 09T3..
40	C490.40.R.03K6-09-B32-60	120	60	32	41	8000	18		3	

Ordering example: 1 piece C490.32.R.02K3-09-B-40

Supply details: cutter body and insert clamping screws

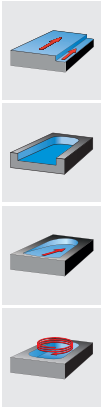
n = number of inserts

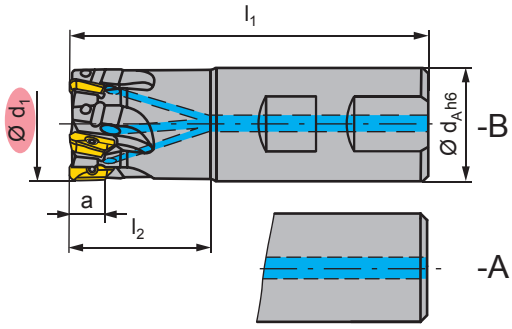
	d_1 [mm]			
SD.. 09T3..	**32 - 40**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15

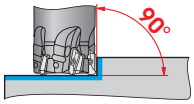
B190-B193 B204-B218 B242-B246 B247-B252 B63

Shoulder & slot milling cutters

C211-07







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
10	C211.10.R.01-07-A-20	61	20	10	6	72000	1	XD.. 07..
12	C211.12.R.02-07-A-20	66.5	20	12	6	66600	2	
16	C211.16.R.03-07-A-32-165	165	32	16	6	17760	3	
	C211.16.R.04-07-A-25	74.5	25	16	6	50400	4	
	C211.16.R.04-07-B-25	74.5	25	16	6	50400	4	
20	C211.20.R.04-07-A-40-200	200	40	20	6	12600	4	
	C211.20.R.05-07-A-25	77	25	20	6	44280	5	
	C211.20.R.05-07-B-25	77	25	20	6	44280	5	
25	C211.25.R.05-07-A20-50-225	225	50	20	6	11280	5	
	C211.25.R.06-07-A20-32	84	32	20	6	39840	6	
	C211.25.R.06-07-B20-32	84	32	20	6	39840	6	
32	C211.32.R.08-07-A25-40	98	40	25	6	36240	8	
	C211.32.R.08-07-B25-40	98	40	25	6	36240	8	

Ordering example: 1 piece C211.10.R.01-07-A-20

Supply details: cutter body and insert clamping screws

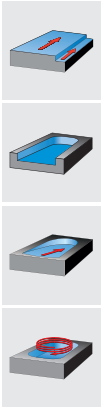
	d_1 [mm]			
XD.. 07..	**10 - 32**	10006888/M2,2X4,2/07IP	10006918/TORX 07IP	DMSD 1,0Nm/SORT 07IP

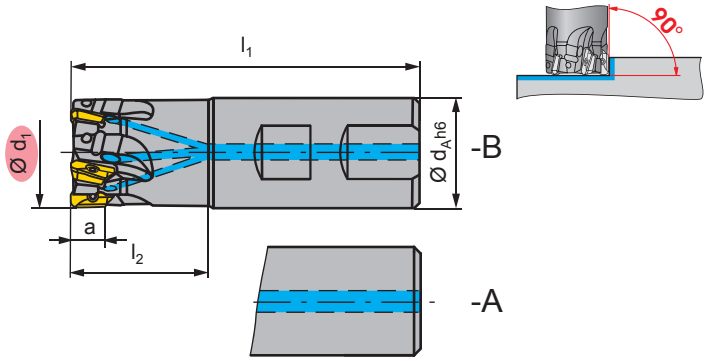
B190-B193 B204-B218 B236 B242-B246 B247-B252 B71

CERATIZIT hard material matters

Shoulder & slot milling cutters

C211-11





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
12	C211.12.R.01-11-B-20	75	20	16	10	55500	1	XD.. 11..
15.7	C211.15.7.R.02-11-B-25	75	25	16	10	42000	2	
16	C211.16.R.02-11-A-25	75	25	16	10	42000	2	
	C211.16.R.02-11-A-32-165	165	32	16	10	14800	2	
	C211.16.R.02-11-A15-32-165	165	32	15	10	14800	2	
	C211.16.R.02-11-B-25	75	25	16	10	42000	2	
19.7	C211.19.7.R.03-11-B-25	77	25	20	10	36900	3	
20	C211.20.R.02-11-A19-40-200	200	40	19	10	10500	2	
	C211.20.R.02-11-A-25	77	25	20	10	36900	2	
	C211.20.R.02-11-A-40-200	200	40	20	10	10500	2	
	C211.20.R.03-11-A-25	77	25	20	10	36900	3	
	C211.20.R.03-11-A-32-165	165	32	20	10	15800	3	
	C211.20.R.02-11-B-25	77	25	20	10	36900	2	
	C211.20.R.03-11-B-25	77	25	20	10	36900	3	
24.7	C211.24.7.R.04-11-B-32	90	32	25	10	33200	4	
25	C211.25.R.02-11-A-50-225	225	50	25	10	9400	2	
	C211.25.R.03-11-A24-50-225	225	50	24	10	9400	3	
	C211.25.R.03-11-A-32	90	32	25	10	33200	3	
	C211.25.R.03-11-A-50-225	225	50	25	10	9400	3	
	C211.25.R.04-11-A-32	90	32	25	10	33200	4	
	C211.25.R.04-11-A-40-165	165	40	25	10	19900	4	
	C211.25.R.03-11-B-32	90	32	25	10	33200	3	
	C211.25.R.04-11-B-32	90	32	25	10	33200	4	

Ordering example: 1 piece C211.12.R.01-11-B-20

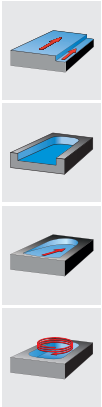
Supply details: cutter body and insert clamping screws

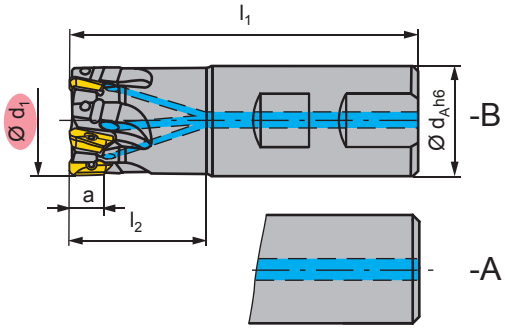
	d_1 [mm]			
XD.. 11..	**12**	10005892/M2,5X5,0/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP
XD.. 11..	**15.7 - 25**	10000126/M2,5X5,6/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP

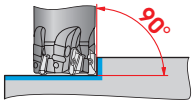
B190-B193 B204-B218 B236 B242-B246 B247-B252 B71-B73

Shoulder & slot milling cutters

C211-11







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
31.7	C211.31.7.R.05-11-B-40	102	40	32	10	30200	5	XD.. 11..
32	C211.32.R.02-11-A-64-250	250	64	32	10	8500	2	
	C211.32.R.04-11-A25-40	102	40	25	10	30200	4	
	C211.32.R.04-11-A-40	102	40	32	10	30200	4	
	C211.32.R.04-11-A-64-250	250	64	32	10	8500	4	
	C211.32.R.05-11-A25-40	102	40	25	10	30200	5	
	C211.32.R.05-11-A-40	102	40	32	10	30200	5	
	C211.32.R.05-11-A-50-165	165	50	32	10	20900	5	
	C211.32.R.04-11-B-40	102	40	32	10	30200	4	
	C211.32.R.05-11-B25-40	102	40	25	10	30200	5	
	C211.32.R.05-11-B-40	102	40	32	10	30200	5	
40	C211.40.R.06-11-B32-50	110	50	32	10	27700	6	
	C211.40.R.06-11-B-50	122	50	40	10	27700	6	

Ordering example: 1 piece C211.31.7.R.05-11-B-40

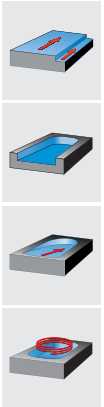
Supply details: cutter body and insert clamping screws

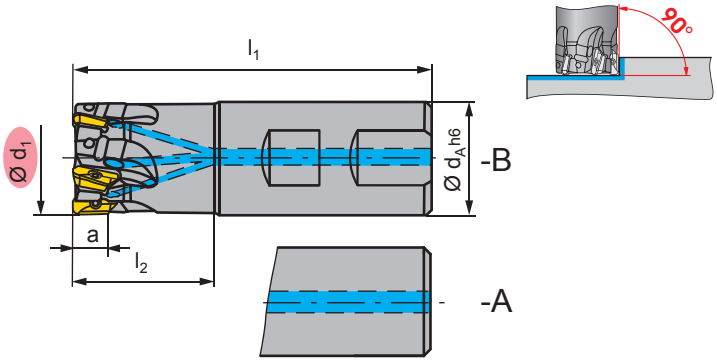
	d_1 [mm]			
XD.. 11..	**31.7 - 32**	10000126/M2,5X5,6/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP
XD.. 11..	**40**	10000125/M2,5X7,3/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP

B190-B193 B204-B218 B236 B242-B246 B247-B252 B71-B73

Shoulder & slot milling cutters

C211-15





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
25	C211.25.R.02-15-A-32	90	32	25	14	26560	2	XD.. 15..
	C211.25.R.02-15-A-50-225	225	50	25	14	7520	2	
	C211.25.R.02-15-B-32	90	32	25	14	26560	2	
	C211.25.R.02-15-B20-32	83	32	20	14	26560	2	
32	C211.32.R.03-15-A-40	103	40	32	14	24160	3	
	C211.32.R.03-15-A-63-250	250	63	32	14	6800	3	
	C211.32.R.03-15-B-40	103	40	32	14	24160	3	
	C211.32.R.03-15-B25-40	96	40	25	14	24160	3	
40	C211.40.R.04-15-A32-50	110	50	32	14	22160	4	
	C211.40.R.03-15-A32-50-275	275	50	32	14	6120	3	
	C211.40.R.04-15-B32-50	110	50	32	14	22160	4	

Ordering example: 1 piece C211.25.R.02-15-A-32

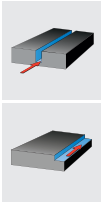
Supply details: cutter body and insert clamping screws

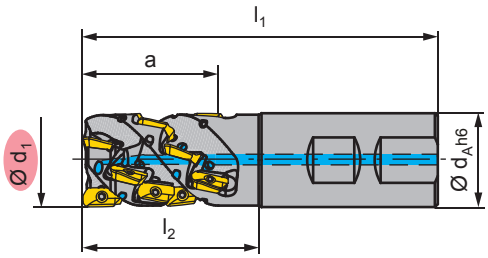
	d_1 [mm]			
XD.. 15..	**25 - 40**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP	DMSD 3,2Nm/SORT 15IP

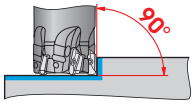
B190-B193 B204-B218 B236 B242-B246 B247-B252 B71-B73

Shoulder & slot milling cutters

C211K-11/15







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	n	
25	C211.25.R.02K3-11-B-40	97	40	25	27	22200	2	6	XD.. 11..
	C211.25.R.02K4-11-B-50	107	50	25	37	19400	2	8	
	C211.25.R.02K5-11-B-60	117	60	25	45.5	19400	2	10	
32	C211.32.R.02K4-11-B-50	111	50	32	37	20200	2	8	
	C211.32.R.03K5-11-B-60	121	60	32	45.5	20200	3	15	
40	C211.40.R.03K4-11-B32-50	110	50	32	37	18500	3	12	
	C211.40.R.04K5-11-B32-60	120	60	32	45.5	18500	4	20	
	C211.40.R.02K3-15-B32-60	120	60	32	38	14800	2	6	XD.. 15..
50	C211.50.R.03K4-15-B40-64	134	64	40	50.5	13600	3	12	

Ordering example: 1 piece C211.25.R.02K3-11-B-40

Supply details: cutter body and insert clamping screws

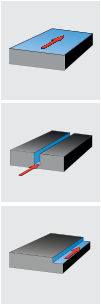
n = number of inserts

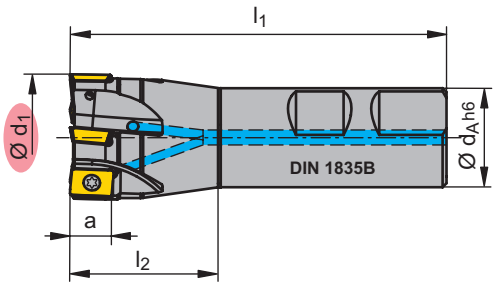
	d_1 [mm]			
XD.. 11..	**25**	10000126/M2,5X5,6/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP
XD.. 11..	**32 - 40**	10000125/M2,5X7,3/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP
XD.. 15..	**40 - 50**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP	DMSD 3,2Nm/SORT 15IP

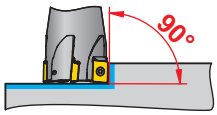
B190-B193 B204-B218 B236 B242-B246 B247-B252 B71

Shoulder & slot milling cutters

C210







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]		z	
16	C210.16.R.02	80	32	16	8		2	AP.. 1003..
20	C210.20.R.03	90	40	20	8		3	
25	C210.25.R.04	100	44	25	8		4	
32	C210.32.R.05	95	38	25	8		5	

Ordering example: 1 piece C210.16.R.02

Supply details: cutter body and insert clamping screws

	d_1 [mm]			
AP.. 1003..	**16 - 20**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
AP.. 1003..	**25 - 32**	7815101/M2,5X6,0/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08

B190-B193

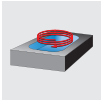
B204-B218

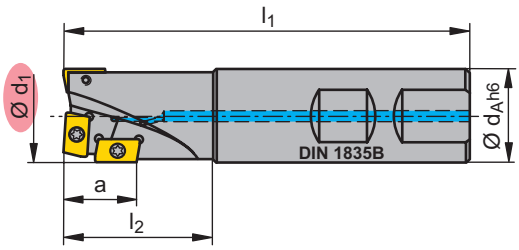
B236

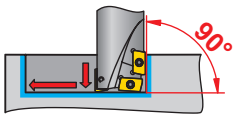
B242-B246

B247-B252

B46







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	z	k	n	
20	C212.20.R.01	90	35	20	19	1	2	3	AP.. 1003..
25	C212.25.R.01	110	50	25	19	1	2	3	

Ordering example: 1 piece C212.20.R.01

Supply details: cutter body and insert clamping screws

k = number of rows
n = number of inserts

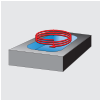
! = second row inserts corner radius ≤ 1.0 mm!

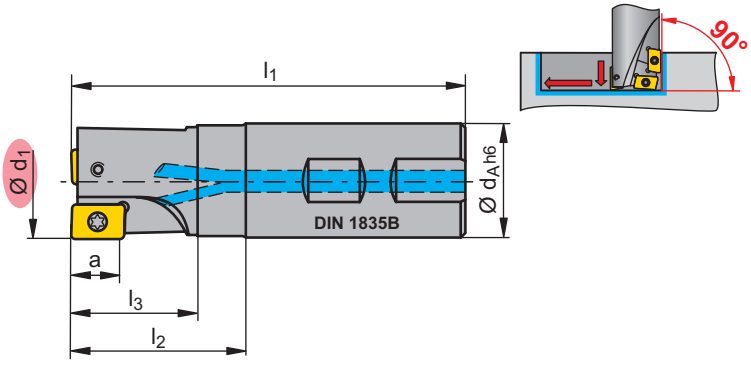
	d_1 [mm]			
AP.. 1003..	**20 - 25**	7815101/M2,5X6,0/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08

B190-B193 B242-B246 B247-B252 B46

Drill & slot milling cutters

C BF





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	l_3 [mm]	d_A [mm]	a [mm]	z	n	
10	C BF.10.R.01	82	35	21	16	6	1	1	LE.. 08T1..
16	C BF.16.R.01	88	38	25	20	6	1	2	
18	C BF.18.R.01	91	41	28	20	6	1	2	
12	C BF.12.R.01	85	37	24	16	8	1	1	LD.. 1002..
20	C BF.20.R.01	99	43	30	25	8	1	2	

Ordering example: 1 piece C BF.10.R.01

Supply details: cutter body and insert clamping screws

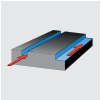
z = effective number of teeth for the calculation of the feed rate
n = number of inserts

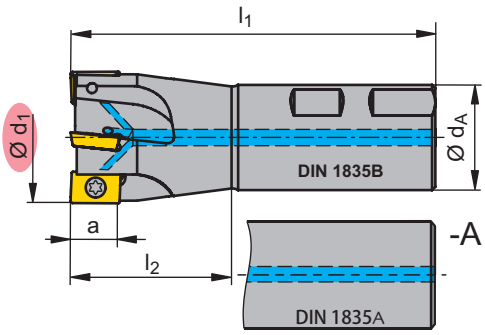
	d_1 [mm]			
LE.. 08T1..	**10**	7883215/M2,2X4,0/T07	7724105/TORX T07	DMSD 1,0Nm/SORT T07
LE.. 08T1..	**16 - 18**	7722113/M2,2X5/T07	7724105/TORX T07	DMSD 1,0Nm/SORT T07
LD.. 1002..	**12**	7883212/M2,5X4,2/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
LD.. 1002..	**20**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08

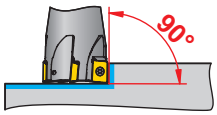
B190-B193 B242-B246 B247-B252 B49

Shoulder & slot milling cutters

C141







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]		z	
16	C141.16.R.01	75	27	16	14		1	LD.. 1504..
20	C141.20.R.01.A	95	39	25	14		1	
	C141.20.R.01	95	39	25	14		1	
25	C141.25.R.02	100	44	25	14		2	
32	C141.32.R.03	108	48	32	14		3	
40	C141.40.R.04	111	51	32	14		4	

Ordering example: 1 piece C141.16.R.01

Supply details: cutter body and insert clamping screws

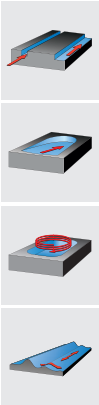
	d_1 [mm]			
LD.. 1504..	**16**	7801177/M3,5X6,7/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15
LD.. 1504..	**20 - 40**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15

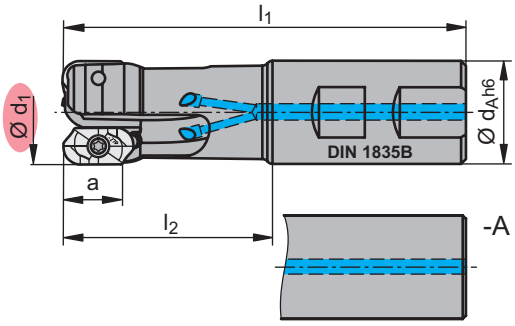
B190-B193 B204-B218 B242-B246 B51

CERATIZIT hard material matters

Shoulder & slot milling cutters

CHSC-11





HSC High Speed Cutting

d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
16	CHSC.16.R.02-11-A-25	75	25	16	10	56200	2	XD.. 11..
	CHSC.16.R.02-11-A-32	165	32	16	10	18800	2	
	CHSC.16.R.02-11-B-25	75	25	16	10	56200	2	
18	CHSC.18.R.02-11-A-25	77.7	25	20	10	53000	2	
	CHSC.18.R.02-11-A-32	165	32	20	10	23900	2	
19	CHSC.19.R.02-11-A-25	77.7	25	20	10	51600	2	
	CHSC.19.R.02-11-A-32	165	32	20	10	25400	2	
20	CHSC.20.R.02-11-A-32	84	32	20	10	50300	2	
	CHSC.20.R.02-11-A-40	165	40	20	10	26700	2	
	CHSC.20.R.03-11-B-32	84	32	20	10	50300	3	
22	CHSC.22.R.02-11-A-32	91	32	25	10	47900	2	
	CHSC.22.R.02-11-A-40	165	40	25	10	30200	2	
25	CHSC.25.R.02-11-A-40	98	40	25	10	45000	2	
	CHSC.25.R.02-11-A-50	165	50	25	10	31700	2	
	CHSC.25.R.03-11-A-50	165	50	25	10	31700	3	
	CHSC.25.R.03-11-A-40	98	40	25	10	45000	3	
	CHSC.25.R.04-11-B-40	98	40	25	10	45000	4	
32	CHSC.32.R.03-11-A-50	112	50	32	10	39700	3	
	CHSC.32.R.03-11-A-63	165	63	32	10	33400	3	
	CHSC.32.R.05-11-B-50	112	50	32	10	39300	5	

Ordering example: 1 piece CHSC.16.R.02-11-A-25

Supply details: cutter body and insert clamping screws

	d_1 [mm]			
XD.. 11..	**16 - 25**	10000126/M2,5X5,6/08TP	10000276/TORX 08IP	DMSD 1,8Nm/SORT 08IP
XD.. 11..	**32**	10000125/M2,5X7,3/08TP	10000276/TORX 08IP	DMSD 1,8Nm/SORT 08IP

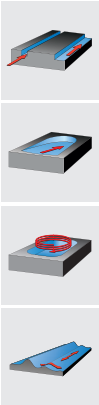
B190-B193 B204-B218 B236 B242-B246 B227-B234 B73

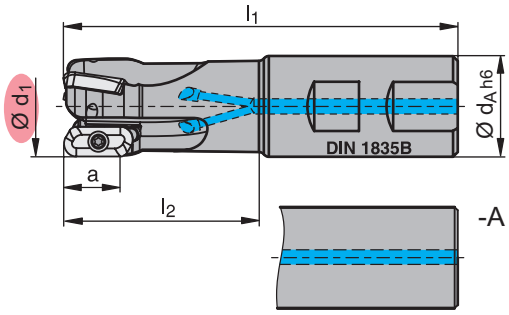
CERATIZIT

hard material matters

Shoulder & slot milling cutters

CHSC-19





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
25	CHSC.25.R.02-19-A-50	121	50	25	18	32400	2	XD.T 19..
	CHSC.25.R.02-19-A-63	165	63	25	18	24700	2	
	CHSC.25.R.02-19	121	65	25	18	32400	2	
32	CHSC.32.R.02-19-A-63	125	63	32	18	28900	2	
	CHSC.32.R.02-19-A-80	165	80	32	18	24400	2	
	CHSC.32.R.03-19-A-63	125	63	32	18	28900	3	
	CHSC.32.R.03-19-A-80	165	80	32	18	24400	3	
	CHSC.32.R.02-19	125	65	32	18	28900	2	
	CHSC.32.R.03-19	125	65	32	18	28900	3	

Ordering example: 1 piece CHSC.25.R.02-19-A-50

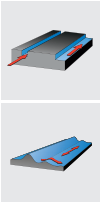
Supply details: cutter body and insert clamping screws

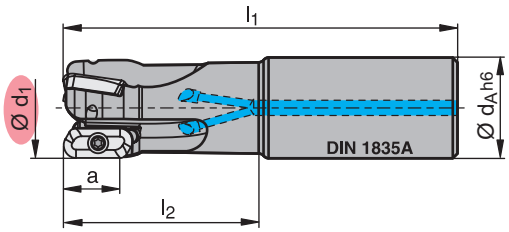
	d_1 [mm]			
XD.T 19..	25	7818430/M4,0X7,0/T15	7724103/TORX T15	DMSD 6,0Nm/SORT T15
XD.T 19..	32	7818428/M4,0X8,5/T15	7724103/TORX T15	DMSD 6,0Nm/SORT T15

B190-B193 B204-B218 B236 B242-B246 B227-B234 B74

Shoulder & slot milling cutters

CHPC-19





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
22	CHPC.22.R.02-19-A-40	165	40	22	18	31900	2	XD.X 19..
25	CHPC.25.R.02-19-A-50	121	65	25	18	41800	2	
	CHPC.25.R.02-19-A-63	165	63	25	18	31900	2	
32	CHPC.32.R.02-19-A-63	125	63	32	18	39800	2	
	CHPC.32.R.02-19-A-80	165	65	32	18	33500	2	
	CHPC.32.R.03-19-A-63	125	63	32	18	39800	3	
	CHPC.32.R.03-19-A-80	165	80	32	18	33500	3	

Ordering example: 1 piece CHPC.22.R.02-19-A-40

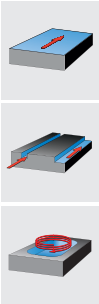
Supply details: cutter body and insert clamping screws

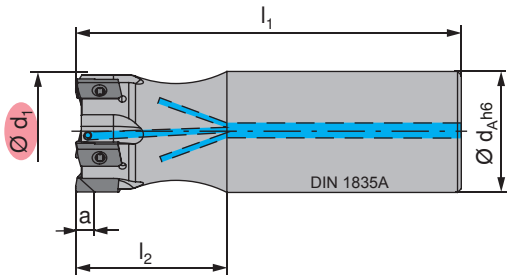
	d_1 [mm]			
XD.X 19..	**22 - 25**	7818430/M4,0X7,0/T15	7724103/TORX T15	DMSD 5,0Nm/SORT T15
XD.X 19..	**32**	7818428/M4,0X8,5/T15	7724103/TORX T15	DMSD 5,0Nm/SORT T15

B190-B193 B204-B218 B236 B242-B246 B227-B234 B74

Shoulder & slot milling cutters

CHPC-04





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
20	CHPC.20.R.03-04-A-25	77	25	20	4	52000	3	ZNHW 04T3..
25	CHPC.25.R.04-04-A-32	90	32	25	4	45000	4	
32	CHPC.32.R.05-04-A-40	102	40	32	4	39000	5	
40	CHPC.40.R.06-04-A32-50	122	50	32	4	34000	6	

Ordering example: 1 piece CHPC.20.R.03-04-A-25

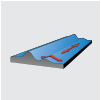
Supply details: cutter body and insert clamping screws

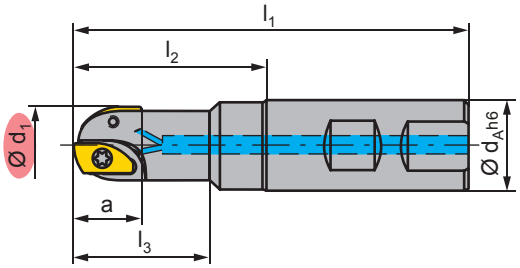
	d_1 [mm]		
ZNHW 04T3..	**20 - 40**	10000125/M2,5X7,3/08TP	DMSD 1,6Nm/SORT 08IP

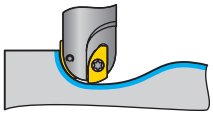
B190-B193 B242-B246 B76

Ball nose milling cutters

C KF







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	l_3 [mm]	d_A [mm]	a [mm]	z	n	
12	C KF.12.R.01	87	39	24	16	10	1	1	R06E 0602..
16	C KF.16.R.01	96	46	31	20	12	1	1	R08E 0803..
20	C KF.20.R.01	109	53	37	25	12	1	2	R10D 0602..
25	C KF.25.R.01	112	56	56	25	14	1	2	R12D 0803..
32	C KF.32.R.01	120	60	60	32	16	1	2	R16D 10T3..

Ordering example: 1 piece C KF.12.R.01

Supply details: cutter body and insert clamping screws

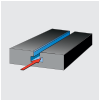
z = effective number of teeth for the calculation of the feed rate
n = number of inserts

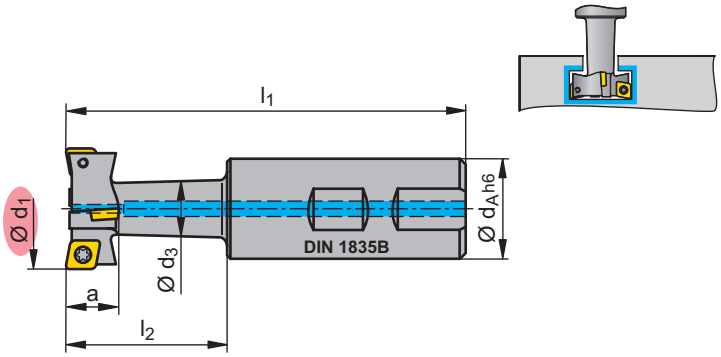
	d_1 [mm]			
R06E 0602..	**12**	7883212/M2,5X4,2/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
R08E 0803..	**16**	7883213/M3,0X5,0/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
R10D 0602..	**20**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
R12D 0803..	**25**	7883203/M3,0X7,3/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
R16D 10T3..	**32**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 1,2Nm/SORT T08

B190-B193 B242-B246 B247-B252 B61

T-slot milling cutters

C NF





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_3 [mm]	d_A [mm]	a [mm]	z	n	
17.5	C NF.17.R.01	80	25	8.5	16	8	1	2	SP.. 0502..
20.5	C NF.20.R.01	85	30	10.5	16	9	1	2	CP.. 0603..
24.0	C NF.23.R.01	95	32	12.5	25	10	1	2	
31.0	C NF.30.R.02	105	40	16	25	12	2	4	
38.5	C NF.37.R.02	115	50	20	32	16	2	4	CP.. 09T3..
48.0	C NF.47.R.02	125	60	26	32	20	2	4	

Ordering example: 1 piece C NF.17.R.01

Supply details: cutter body and insert clamping screws

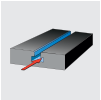
z = effective number of teeth for the calculation of the feed rate
n = number of inserts

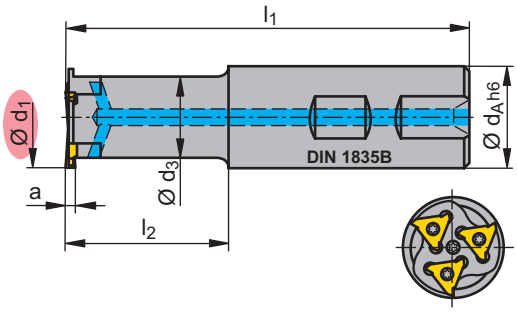
	d_1 [mm]			
SP.. 0502..	**17.5**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
CP.. 0603..	**20.5 - 31.0**	7815101/M2,5X6,0/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
CP.. 09T3..	**38.5 - 48.0**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 1,2Nm/SORT T08

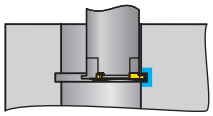
B190-B193 B242-B246 B247-B252 B48

Circlip groove milling cutters

C ZF







d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_3 [mm]	d_A [mm]	a [mm]	z	n	
16	C ZF.16.R.03	84	24	13	16	1,1-1,6	3	1	TC 16T3..
25	C ZF.25.R.03	100	40	20.5	25	1,6-2,65	3	3	TC 1103..

Ordering example: 1 piece C ZF.16.R.03

Supply details: cutter body and insert clamping screws

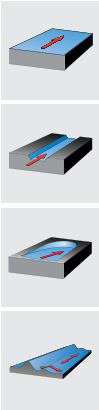
z = effective number of teeth for the calculation of the feed rate
n = number of inserts

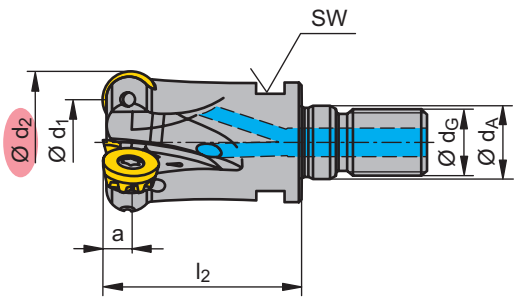
	d_1 [mm]			
TC 16T3..	**16**	7883209/M3,5X8,6/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15
TC 1103..	**25**	7815101/M2,5X6,0/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08

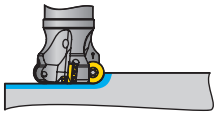
B190-B193 B242-B246 B67

Button insert cutters

* [illegible]56







d_2 [mm]	Type, description	d_1 [mm]	l_2 [mm]	d_A [mm]	d_G [mm]	a [mm]	n_{max} [min^{-1}]	z	
20	* [illegible]56	15	33	10.5	10	2.5	31800	5	RD.. 0501..
25	* [illegible]56	20	35	12.5	12	2.5	25450	6	
32	* [illegible]56	27	35	17.0	16	2.5	19850	7	
20	* [illegible]56	12	33	10.5	10	4	31800	3	RD.. 0802..
25	* [illegible]56	17	35	12.5	12	4	25450	4	
32	* [illegible]56	24	35	17.0	16	4	19850	5	
20	* [illegible]56	10	33	10.5	10	5	31800	2	RP.. 10T3..
25	* [illegible]56	15	35	12.5	12	5	25450	3	
32	* [illegible]56	22	35	17.0	16	5	19850	4	
25	* [illegible]56	13	35	12.5	12	6	25000	2	RP.. 1204..
42	* [illegible]56	30	42	17.0	16	6	15000	4	
32	* [illegible]56	20	35	17.0	16	6	19000	3	
35	* [illegible]56	23	35	17.0	16	6	15900	3	

2 UGHUQ[illegible]H[DP SG[illegible]SLHFH[illegible]* [illegible]56

Supply details: cutter body and insert clamping screws

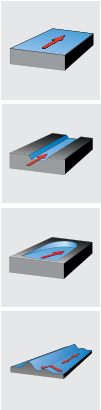
n_{max} = depends on the overhang and number of interfaces in the complete tool

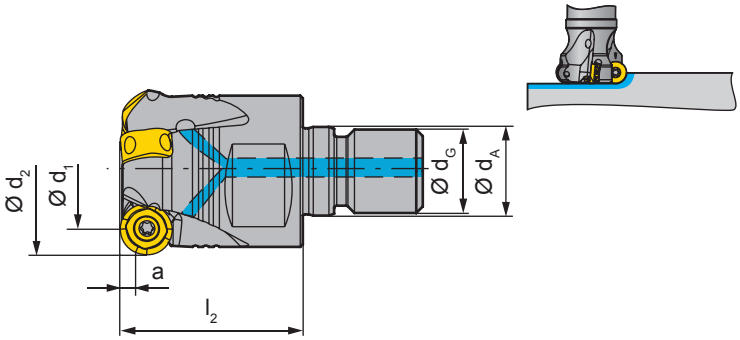
	d_2 [mm]			
RD.. 0501..	**20 - 32**	7801175/M2,0X3,3/T06	7883305/TORX T06	DMSD 0,7Nm/SORT T06
RD.. 0802..	**20 - 32**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
RP.. 10T3..	**20 - 32**	10007085/M3,0X7,3/T10	7883306/TORX T10	DMSD 2,0Nm/SORT T10
RP.. 1204..	**25 - 42**	7883209/M3,5X8,6/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15

B190-B193 B204-B218 B242-B246 B247-B252 B58

Button insert cutters

* [illegible]





d_2 [mm]	Type, description	d_1 [mm]	l_2 [mm]	d_A [mm]	d_G [mm]	a [mm]	n_{max} [min^{-1}]	z	
32	* [illegible]	22	35	17.0	16	2.5	19850	4	RN.. 1004..

2 UGHUQ UHQDP SOD SLHFH * [illegible]
Supply details: cutter body and insert clamping screws

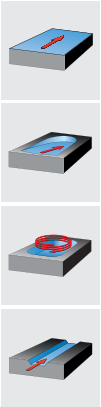
	d_2 [mm]		
RN.. 1004..	**32**	10009229/M3X7,5/10IP	DMSD 2,0Nm/SORT 10IP

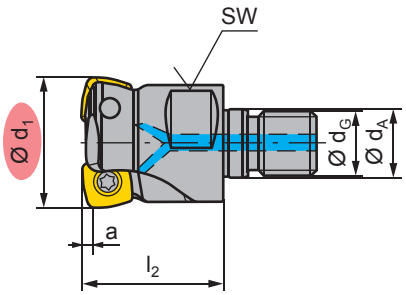
B190-B193 B204-B218 B242-B246 B247-B252 B60

CERATIZIT hard material matters

Face milling cutters

* +) &[illegible]





HFC high feed cutting

d_1 [mm]	Type, description	l_2 [mm]	d_A [mm]	d_G [mm]	a [mm]	n_{max} [min^{-1}]	z	
16	* +) &[illegible]5[illegible]	27	8.5	8	0.8	20800	2	XP.. 06
20	* +) &[illegible]5[illegible]	33	10.5	10	0.8	19800	3	
25	* +) &[illegible]5[illegible]	35	12.5	12	0.8	18700	4	
32	* +) &[illegible]5[illegible]	35	17.0	16	0.8	22000	5	
25	* +) &[illegible]5[illegible]	35	12.5	12	1	30000	2	XD.. 09..
25	* +) &[illegible]5[illegible]	35	12.5	12	1	30000	3	
32	* +) &[illegible]5[illegible]	35	17.0	16	1	27000	3	
32	* +) &[illegible]5[illegible]	35	17.0	16	2	21600	2	XO.. 12..
35	* +) &[illegible]5[illegible]	35	17.0	16	2	21360	3	

2 UGHUQ HDP SGI SLHFH * +) &[illegible]5[illegible]

Supply details: cutter body and insert clamping screws

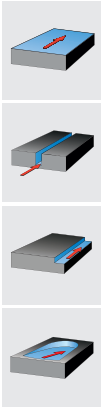
n_{max} = depends on the overhang and number of interfaces in the complete tool

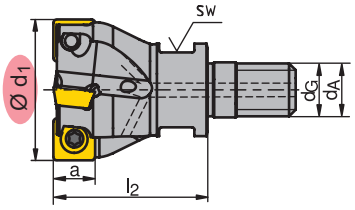
	d_1 [mm]			
XP.. 06	**16 - 32**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
XD.. 09..	**25**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15
XD.. 09..	**32**	7883209/M3,5X8,6/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15
XO.. 12..	**32 - 35**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20

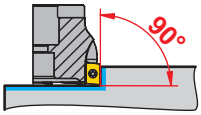
B190-B193 B204-B218 B242-B246 B247-B252 B75

Shoulder & slot milling cutters

* [illegible]







d_1 [mm]	Type, description	l_2 [mm]	d_A [mm]	d_G [mm]	a [mm]	n_{max} [min^{-1}]	z	
25	* [illegible] 5 [illegible]	35	12.5	12	8	23700	3	SD.. 09T3..
32	* [illegible] 5 [illegible]	35	17.0	16	8	19700	4	
	* [illegible] 5 [illegible]	35	17.0	16	11	16300	3	SD.. 1205..
40	* [illegible] 5 [illegible]	40	17.0	16	11	13600	4	

2 UGHUQ HDP SDD SLHFH * [illegible] 5 [illegible]

Supply details: cutter body and insert clamping screws

n_{max} = depends on the overhang and number of interfaces in the complete tool

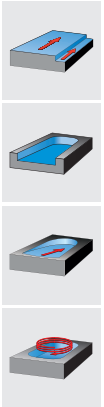
	d_1 [mm]			
SD.. 09T3..	**25 - 32**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15
SD.. 1205..	**32 - 40**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20

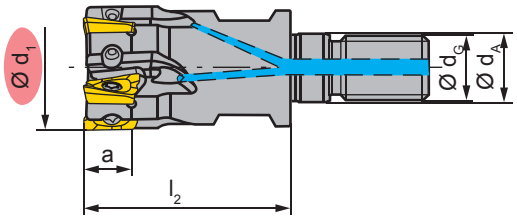
B190-B193 B242-B246 B247-B252 B63

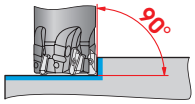
CERATIZIT hard material matters

Shoulder & slot milling cutters

* [illegible]







d_1 [mm]	Type, description	l_2 [mm]	d_A [mm]	d_G [mm]	a [mm]	n_{max} [min^{-1}]	z	
16	* [illegible]	27	8.5	8	6	50400	4	XD.. 07..
20	* [illegible]	33	10.5	10	6	44280	5	
25	* [illegible]	35	12.5	12	6	39480	6	
32	* [illegible]	35	17.0	16	6	36240	8	
16	* [illegible]	27	8.5	8	10	42000	2	XD.. 11..
20	* [illegible]	33	10.5	10	10	36900	2	
	* [illegible]	33	10.5	10	10	36900	3	
25	* [illegible]	35	12.5	12	10	33200	3	
	* [illegible]	35	12.5	12	10	33200	4	
32	* [illegible]	35	17.0	16	10	30200	4	
	* [illegible]	35	17.0	16	10	30200	5	
40	* [illegible]	35	17.0	16	10	27700	6	
25	* [illegible]	35	12.5	12	14	26560	2	XD.. 15..
32	* [illegible]	35	17.0	16	14	30200	3	
40	* [illegible]	35	17.0	16	14	27700	4	

2 UGHUQJ HDP SOI SLHFH * [illegible]

Supply details: cutter body and insert clamping screws

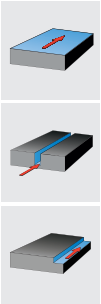
n_{max} = depends on the overhang and number of interfaces in the complete tool

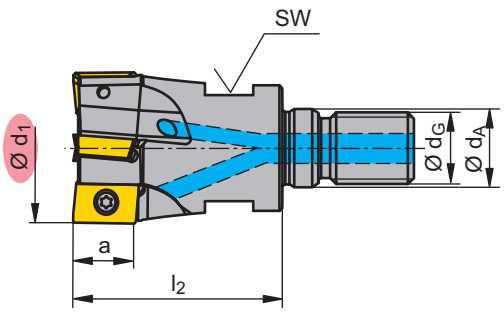
	d_1 [mm]			
XD.. 07..	**16 - 32**	10006888/M2,2X4,2/07IP	10006918/TORX 07IP	DMSD 1,0Nm/SORT 07IP
XD.. 11..	**16 - 32**	10000126/M2,5X5,6/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP
XD.. 11..	**40**	10000125/M2,5X7,3/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP
XD.. 15..	**25 - 40**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP	DMSD 3,2Nm/SORT 15IP

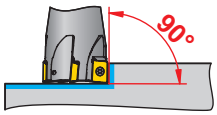
B190-B193 B204-B218 B236 B242-B246 B247-B252 B71-B73

Shoulder & slot milling cutters

* [illegible]







d_1 [mm]	Type, description	l_2 [mm]	d_A [mm]	d_G [mm]	a [mm]		z	
16	* [illegible] 5 [illegible]	27	8.5	8	8		2	AP.. 1003..
20	* [illegible] 5 [illegible]	33	10.5	10	8		3	
25	* [illegible] 5 [illegible]	35	12.5	12	8		4	
32	* [illegible] 5 [illegible]	35	17	16	8		5	

2 UGHUQJ H[DP SOH SLHFH * [illegible] 5 [illegible]

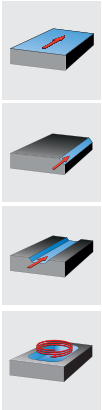
Supply details: cutter body and insert clamping screws

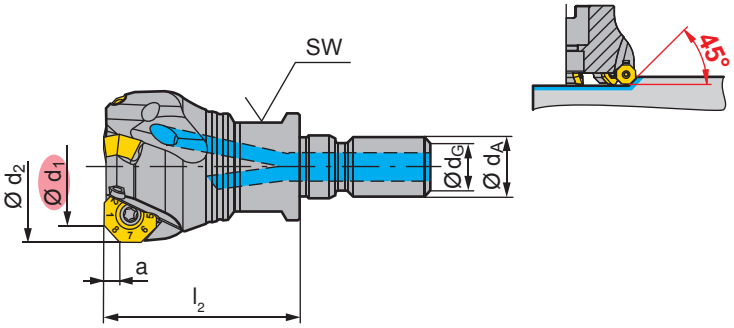
	d_1 [mm]			
AP.. 1003..	**16 - 20**	7883204/M2,5X5/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08
AP.. 1003..	**25 - 32**	7815101/M2,5X6,0/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08

B190-B193 B204-B218 B236 B242-B246 B46

Face milling cutters

* [illegible] 2) [illegible]





d_1 [mm]	Type, description	d_2 [mm]	l_2 [mm]	a [mm]	d_A [mm]	d_G [mm]	n_{max} [min^{-1}]	z	
20	* [illegible] 5 [illegible]	25.6	35	2.5	12.5	12	42600	3	OF.. 0403..
25	* [illegible] 5 [illegible]	30.6	35	2.5	12.5	12	37200	4	
32	* [illegible] 5 [illegible]	37.7	35	2.5	17.0	16	32200	5	

2 UGHUQ HDP SOI SLHFH * [illegible] 5 [illegible]

Supply details: cutter body and insert clamping screws

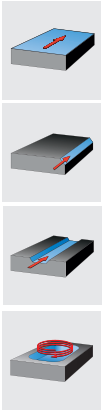
n_{max} = depends on the overhang and number of interfaces in the complete tool

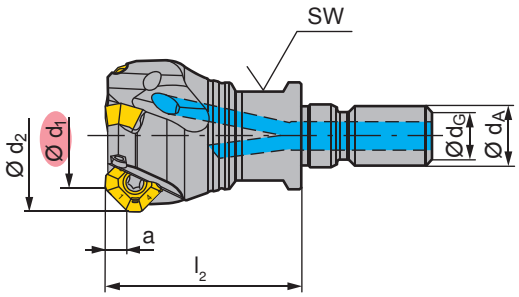
	d_1 [mm]			
OF.. 0403..	**20 - 32**	10007562/M2,5X7,6/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP

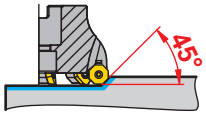
B190-B193 B204-B218 B242-B246 B57

Face milling cutters

* [illegible]6) [illegible]







d_1 [mm]	Type, description	d_2 [mm]	l_2 [mm]	a [mm]	d_A [mm]	d_G [mm]	n_{max} [min^{-1}]	z	
18.9	* [illegible]5[illegible]	27.4	35.7	3.8	12.5	12	42600	3	SF.. 0903..
23.8	* [illegible]5[illegible]	32.5	35.7	3.8	12.5	12	37200	4	
30.7	* [illegible]5[illegible]	39.5	35.7	3.8	17.0	16	32200	5	

2 UGHUQ[illegible]H[DP SGD[illegible]SLHFH[illegible]* [illegible]5[illegible]

Supply details: cutter body and insert clamping screws

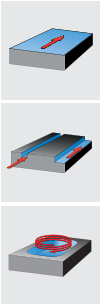
n_{max} = depends on the overhang and number of interfaces in the complete tool

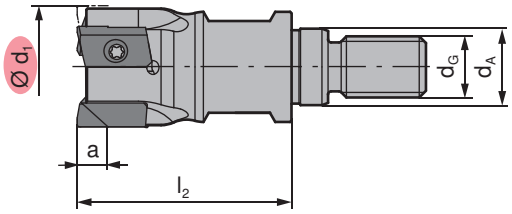
	d_1 [mm]			
OF.. 0403..	**20 - 32**	10007562/M2,5X7,6/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP

B190-B193 B204-B218 B242-B246 B57

Shoulder & slot milling cutters

* +3&





d_1 [mm]	Type, description	l_2 [mm]	d_A [mm]	d_G [mm]	a [mm]	n_{max} [min^{-1}]	z	
20	* +3&5	35	10.5	10	4	52000	3	ZNHW 04T3..
25	* +3&5	35	12.5	12	4	45000	4	
32	* +3&5	35	17	16	4	38000	5	
40	* +3&5	35	17	16	4	34000	6	

2 UGHUQJ HDP SOH SLHFH * +3&5

Supply details: cutter body and insert clamping screws

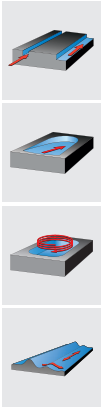
n_{max} = depends on the overhang and number of interfaces in the complete tool

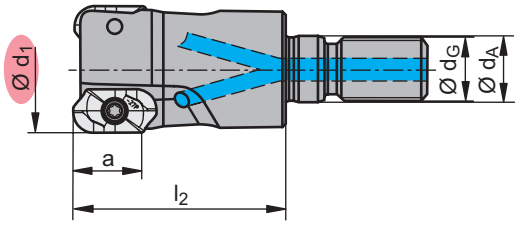
	d_1 [mm]		
ZNHW 04T3..	**20 - 40**	10000125/M2,5X7,3/08TP	DMSD 1,6Nm/SORT 08IP

B190-B193 B204-B218 B242-B246 B76

Shoulder & slot milling cutters

* +6&





d_1 [mm]	Type, description	l_2 [mm]	d_A [mm]	d_G [mm]	a [mm]	n_{max} [min^{-1}]	z	
16	* +6&5	27	8.5	8	10	56200	2	XD.. 11..
18	* +6&5	27	8.5	8	10	53000	2	
20	* +6&5	33	10.5	10	10	50300	2	
25	* +6&5	35	12.5	12	10	45000	3	
32	* +6&5	35	17	16	10	39800	3	
40	* +6&5	35	17	16	10	35500	3	
25	* +6&5	45	12.5	12	18	34400	2	XD.T 19..
32	* +6&5	52	17	16	18	29100	3	
40	* +6&5	52	17	16	18	24900	3	

2 UGHUQ HDP SOD SLHFH * +6&5

Supply details: cutter body and insert clamping screws

n_{max} = depends on the overhang and number of interfaces in the complete tool

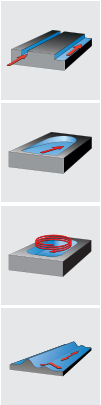
	d_1 [mm]			
XD.. 11..	**16 - 25**	10000126/M2,5X5,6/08TP	10000276/TORX 08IP	DMSD 1,8Nm/SORT 08IP
XD.. 11..	**32 - 40**	10000125/M2,5X7,3/08TP	10000276/TORX 08IP	DMSD 1,8Nm/SORT 08IP
XD.T 19..	**25**	7818430/M4,0X7,0/T15	7724103/TORX T15	DMSD 6,0Nm/SORT T15
XD.T 19..	**32 - 40**	7818428/M4,0X8,5/T15	7724103/TORX T15	DMSD 6,0Nm/SORT T15

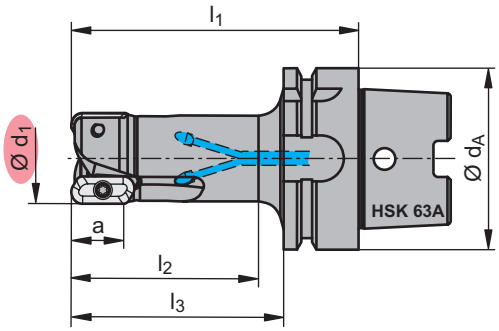
B190-B193 B204-B218 B227-B234 B236 B242-B246 B73-B74

CERATIZIT hard material matters

Shoulder & slot milling cutters

MHSC-11/-19





HSC High Speed Cutting

d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	l_3 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
25	MHSC.25.R.03-11-H63A-50	90	50	64	63	10	45000	3	XD.. 11..
	MHSC.25.R.03-11-H63A-63	100	63	74	63	10	42000	3	
32	MHSC.32.R.03-11-H63A-63	100	63	74	63	10	39700	3	
	MHSC.32.R.03-11-H63A-80	120	80	94	63	10	37200	3	
40	MHSC.40.R.04-11-H63A-63	100	63	74	63	10	35500	4	
	MHSC.40.R.04-11-H63A-80	120	80	94	63	10	35500	4	
50	MHSC.50.R.04-11-H63A-63	100	63	74	63	10	31800	4	
	MHSC.50.R.04-11-H63A-100	140	100	114	63	10	31800	4	
25	MHSC.25.R.02-19-H63A-50	90	50	64	63	18	35000	2	XD.T 19..
	MHSC.25.R.02-19-H63A-63	100	63	74	63	18	32700	2	
32	MHSC.32.R.02-19-H63A-63	100	63	74	63	18	29100	2	
	MHSC.32.R.02-19-H63A-80	120	80	94	63	18	27200	2	
	MHSC.32.R.03-19-H63A-63	100	63	74	63	18	29100	3	
	MHSC.32.R.03-19-H63A-80	120	80	94	63	18	27200	3	
40	MHSC.40.R.03-19-H63A-63	100	63	74	63	18	24900	3	
	MHSC.40.R.03-19-H63A-80	120	80	94	63	18	24900	3	
50	MHSC.50.R.03-19-H63A-100	140	100	114	63	18	21600	3	

Ordering example: 1 piece MHSC.25.R.03-11-H63A-50

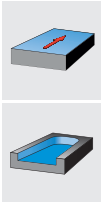
Supply details: cutter body and insert clamping screws

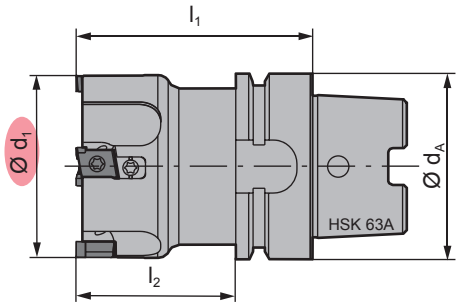
	d_1 [mm]			
XD.. 11..	**25**	10000126/M2,5X5,6/08TP	10000276/TORX 08IP	DMSD 1,8Nm/SORT 08IP
XD.. 11..	**32 - 50**	10000125/M2,5X7,3/08TP	10000276/TORX 08IP	DMSD 1,8Nm/SORT 08IP
XD.T 19..	**25**	7818430/M4,0X7,0/T15	7724103/TORX T15	DMSD 6,0Nm/SORT T15
XD.T 19..	**32 - 40**	7818428/M4,0X8,5/T15	7724103/TORX T15	DMSD 6,0Nm/SORT T15
XD.T 19..	**50**	7818429/M4,0X11/T15	7724103/TORX T15	DMSD 6,0Nm/SORT T15

B190-B193 B204-B218 B227-B234 B236 B242-B246 B73-B74

Shoulder & slot milling cutters

MHPC-12





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	n_{max} [min^{-1}]	z	
40	MHPC.40.R.04-12-H63A-70	70	44	63	32000	4	ZNHW 1205..
50	MHPC.50.R.04-12-H63A-80	80	54	63	32000	4	
50	MHPC.50.R.05-12-H63A-80	80	54	63	32000	5	
63	MHPC.63.R.04-12-H63A-80	80	54	63	29000	4	
63	MHPC.63.R.07-12-H63A-80	80	54	63	29000	7	
80	MHPC.80.R.05-12-H63A-90	90		63	26000	5	
80	MHPC.80.R.09-12-H63A-90	90		63	26000	9	
100	MHPC.100.R.06-12-H63A-90	90		63	24000	6	
100	MHPC.100.R.12-12-H63A-90	90		63	24000	12	
125	MHPC.125.R.08-12-H63A-123	123		63	22000	8	
160	MHPC.160.R.10-12-H63A-123	123		63	18000	10	

Ordering example: 1 piece MHPC.40.R.04-12-H63A-70

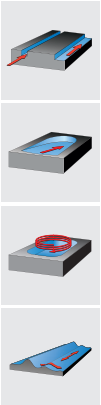
Supply details: cutter body, insert clamping screws, wedges, clamping key, edge protecting ring
‘ assembled version, adapter + shell mill

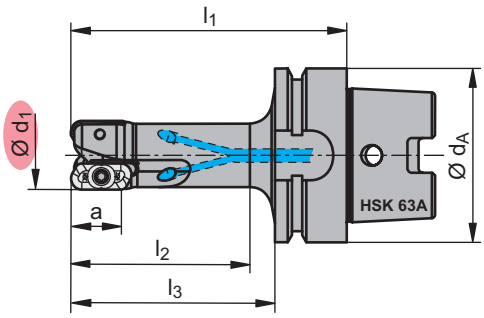
	d_1 [mm]				
ZNHW 1205..	**40 - 160**	7818429/M4,0X11/T15	DMSD 5,0Nm/SORT T15	10002113-0/AW-RH	10002362-0/WS-L T15

B190-B193 B227-B234 B237 B242-B246 B76

Shoulder & slot milling cutters

MHPC-19





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	l_3 [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
25	MHPC.25.R.02-19-H63A-50	90	50	64	63	18	45200	2	XD.X 19..
25	MHPC.25.R.02-19-H63A-63	100	63	74	63	18	42300	2	
25	MHPC.25.R.02-19-H63A-80	120	80	94	63	18	38400	2	
25	MHPC.25.R.02-19-H63A-100	140	100	114	63	18	33900	2	
32	MHPC.32.R.02-19-H63A-63	100	63	74	63	18	40000	2	
32	MHPC.32.R.02-19-H63A-80	120	80	94	63	18	37500	2	
32	MHPC.32.R.02-19-H63A-100	140	100	114	63	18	34300	2	
32	MHPC.32.R.03-19-H63A-63	100	63	74	63	18	40000	3	
32	MHPC.32.R.03-19-H63A-80	120	80	94	63	18	37500	3	
40	MHPC.40.R.03-19-H63A-63	100	63	74	63	18	35700	3	
40	MHPC.40.R.03-19-H63A-80	120	80	94	63	18	35700	3	
40	MHPC.40.R.03-19-H63A-100	140	100	114	63	18	33500	3	
50	MHPC.50.R.03-19-H63A-63	100	63	74	63	18	31900	3	
50	MHPC.50.R.03-19-H63A-80	120	80	94	63	18	31900	3	
50	MHPC.50.R.03-19-H63A-100	140	100	114	63	18	31900	3	

Ordering example: 1 piece MHPC.25.R.02-19-H63A-50

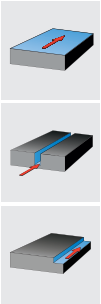
Supply details: cutter body and insert clamping screws

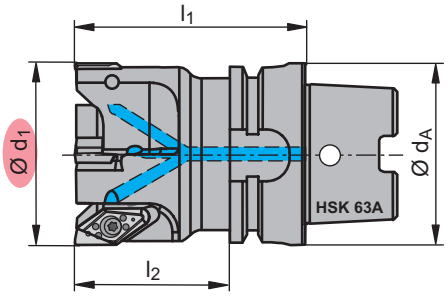
	d_1 [mm]			
XD.X 19..	**25**	7818430/M4,0X7,0/T15	7724103/TORX T15	DMSD 5,0Nm/SORT T15
XD.X 19..	**32 - 40**	7818428/M4,0X8,5/T15	7724103/TORX T15	DMSD 5,0Nm/SORT T15
XD.X 19..	**50**	7818429/M4,0X11/T15	7724103/TORX T15	DMSD 5,0Nm/SORT T15

B190-B193 B204-B218 B227-B234 B236 B242-B246 B74

Shoulder & slot milling cutters

MHSV-22





d_1 [mm]	Type, description	l_1 [mm]	l_2 [mm]	d_A [mm]	n_{max} [min^{-1}]	z	
50	MHSV.50.R.03-22-H63A-80	80	54	63	24000	3	VC.. 2205..
63	MHSV.63.R.04-22-H63A-80	80	54	63	21000	4	
80	MHSV.80.R.05-22-H63A-90	90		63	18000	5	
100	MHSV.100.R.06-22-H63A-90	90		63	15000	6	
125	MHSV.125.R.07-22-H63A-123	123		63	12000	7	

Ordering example: 1 piece MHSV.50.R.03-22-H63A-80

Supply details: cutter body and insert clamping screws

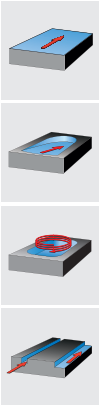
	d_1 [mm]		
VC.. 2205..	**50 - 125**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20

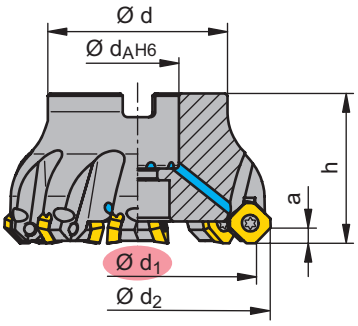
B190-B193 B227-B234 B242-B246 B69

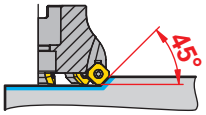
CERATIZIT hard material matters

Face milling cutters

A270-09







d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	z	
32	A270.32.R.03-09	40.4	40	34	16	4	3	SD/XD.. 0903..
	A270.32.R.05-09	40.4	40	34	16	4	5	
40	A270.40.R.04-09	48.4	40	38	16	4	4	
	A270.40.R.06-09	48.4	40	38	16	4	6	
50	A270.50.R.06-09	58.4	40	43	22	4	6	
	A270.50.R.08-09	58.4	40	43	22	4	8	
63	A270.63.R.05-09	71.4	40	48	22	4	5	
	A270.63.R.08-09	71.4	40	48	22	4	8	
	A270.63.R.10-09	71.4	40	48	22	4	10	
80	A270.80.R.06-09	88.4	50	58	27	4	6	
	A270.80.R.10-09	88.4	50	58	27	4	10	
	A270.80.R.12-09	88.4	50	58	27	4	12	
100	A270.100.R.07-09	108.4	50	78	32	4	7	
	A270.100.R.12-09	108.4	50	78	32	4	12	
	A270.100.R.14-09	108.4	50	78	32	4	14	
125	A270.125.R.10-09	133.4	63	88	40	4	10	
	A270.125.R.12-09	133.4	63	88	40	4	12	
160	A270.160.R.12-09	168.4	63	93.4	40	4	12	

Ordering example: 1 piece A270.32.R.03-09

Supply details: cutter body and insert clamping screws

	d_1 [mm]			
SD/XD.. 0903..	**32 - 160**	7883203/M3,0X7,3/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08

B190-B193

B204-B218

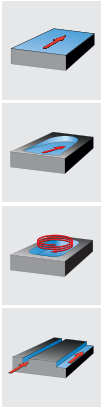
B242-B246

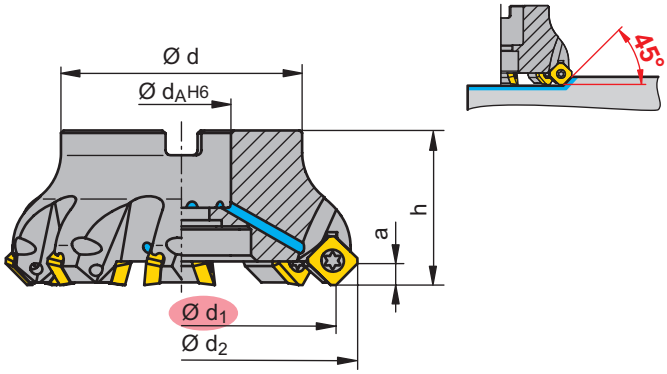
B64

B78

Face milling cutters

A270-12





d1 [mm]	Type, description	d2 [mm]	h [mm]	d [mm]	dA [mm]	a [mm]	z	
32	A270.32.R.03-12	46	40	32	16	6	3	SD/XD.. 1204..
40	A270.40.R.03-12	54	40	38	16	6	3	
	A270.40.R.04-12	54	40	38	16	6	4	
50	A270.50.R.04-12	64	40	43	22	6	4	
	A270.50.R.05-12	64	40	43	22	6	5	
63	A270.63.R.04-12	77	40	48	22	6	4	
	A270.63.R.06-12	77	40	48	22	6	6	
80	A270.80.R.05-12	94	50	58	27	6	5	
	A270.80.R.08-12	94	50	58	27	6	8	
100	A270.100.R.06-12	114	50	78	32	6	6	
	A270.100.R.10-12	114	50	78	32	6	10	
125	A270.125.R.07-12	139	63	88	40	6	7	
	A270.125.R.12-12	139	63	88	40	6	12	
160	A270.160.R.08-12	174	63	93.4	40	6	8	

Ordering example: 1 piece A270.32.R.03-12

Supply details: cutter body and insert clamping screws

	d1 [mm]				
SD/XD.. 1204..	**32 - 40**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20	7818267/M8,0x30,0	S4/SW4
SD/XD.. 1204..	**40 - 160**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20		

7724104/TORX T20		
7724104/TORX T20		

B190-B193

B204-B218

B235

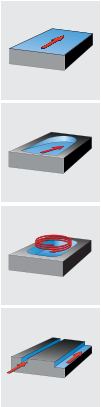
B242-B246

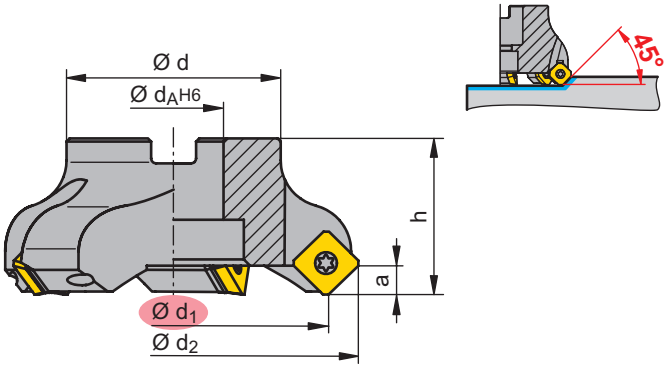
B64

B78

Face milling cutters

A270-15





d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	z	
80	A270.80.R.04-15	98.4	50	58.8	27	9	4	SD.. 1504..
100	A270.100.R.05-15	118.4	50	68.6	32	9	5	
125	A270.125.R.06-15	143.4	63	81.35	40	9	6	
160	A270.160.R.07-15	178.5	63	104	40	9	7	

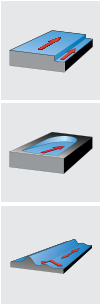
Ordering example: 1 piece A270.80.R.04-15

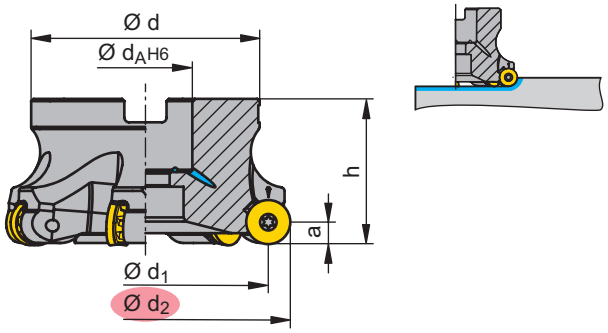
Supply details: cutter body and insert clamping screws

	d_1 [mm]				
SD.. 1504..	**80 - 125**	7883216/M4,5X13/T20	7818121/KOMBI T20/SW4,5	DMSD 5,0Nm/SORT T20	7818120/HM-U
SD.. 1504..	**160**	7822114/M4,5X10,5/T20	7818121/KOMBI T20/SW4,5	DMSD 5,0Nm/SORT T20	7818120/HM-U

7883101/B M 4,5		
7883101/B M 4,5		

B190-B193 B242-B246 B64





to be discontinued

d_2 [mm]	Type, description	d_1 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
42	A251.42.R.06-10	32	40	38	16	5	15150	6	RP.. 10T3..
50	A251.50.R.06-10	40	40	43	22	5	12700	6	
40	A251.40.R.04-12-R	28	40	38	16	6	15900	4	RP.. 1204..
100	A251.100.R.07-16	84	50	78	32	8	6350	7	RP.. 1605..
100	A251.100.R.06-20	80	63	78	32	10	6350	6	RP.. 2006..

Ordering example: 1 piece A251.42.R.06-10

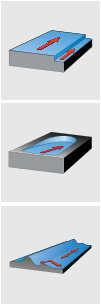
Supply details: cutter body and insert clamping screws

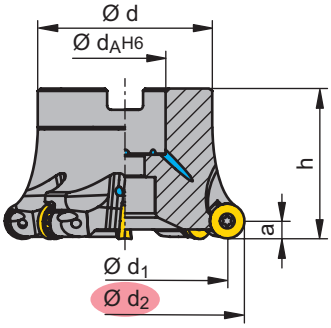
	d_2 [mm]				
RP.. 10T3..	**42**	10007085/M3,0X7,3/T10	DMSD 2,0Nm/SORT T10	7883306/TORX T10	7818267/M8,0x30,0
RP.. 10T3..	**50**	10007085/M3,0X7,3/T10	DMSD 2,0Nm/SORT T10	7883306/TORX T10	
RP.. 1204..	**40**	7883209/M3,5X8,6/T15	DMSD 3,2Nm/SORT T15	7724103/TORX T15	7818267/M8,0x30,0
RP.. 1605..	**100**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20	7724104/TORX T20	
RP.. 2006..	**100**	10000155/M5,0X14/T20	DMSD 5,0Nm/SORT T20	7724104/TORX T20	

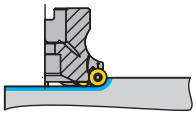
B190-B193 B204-B218 B235 B242-B246 B247-B252 B58

Button insert cutters

A251-RS







d_2 [mm]	Type, description	d_1 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
40	A251.40.R.05-10-RS	30	40	38	16	5	15900	5	RP.. 10T3..
	A251.40.R.03-10-RS	30	40	38	16	5	15900	3	
42	A251.42.R.06-10-RS	32	40	38	16	5	15150	6	
50	A251.50.R.04-10-RS	40	40	43	22	5	12700	4	
	A251.50.R.06-10-RS	40	40	43	22	5	12700	6	
52	A251.52.R.06-10-RS	42	40	43	22	5	12200	6	
40	A251.40.R.04-12-RS	28	40	38	16	6	15900	4	RP.. 1204..
50	A251.50.R.04-12-RS	38	40	43	22	6	12700	4	
	A251.50.R.05-12-RS	38	40	43	22	6	12700	5	
52	A251.52.R.05-12-RS	40	40	43	22	6	12200	5	
63	A251.63.R.06-12-RS	51	40	48	22	6	10100	6	
66	A251.66.R.07-12-RS	54	40	48	22	6	9650	7	
80	A251.80.R.05-12-RS	68	50	58	27	6	7950	5	
	A251.80.R.07-12-RS	68	50	58	27	6	7950	7	
100	A251.100.R.06-12-RS	88	50	78	32	6	6350	6	
	A251.100.R.10-12-RS	88	50	78	32	6	6350	10	
50	A251.50.R.04-16-RS	34	40	48	22	8	12700	4	RP.. 1605..
63	A251.63.R.05-16-RS	47	40	48	22	8	10100	5	
80	A251.80.R.06-16-RS	64	50	58	27	8	7950	6	
100	A251.100.R.07-16-RS	84	50	78	32	8	6350	7	
80	A251.80.R.05-20-RS	60	50	58	27	10	7950	5	RP.. 2006..
100	A251.100.R.06-20-RS	80	50	78	32	10	6350	6	
125	A251.125.R.06-20-RS	105	63	88	40	10	5050	6	

Ordering example: 1 piece A251.40.R.05-10-RS

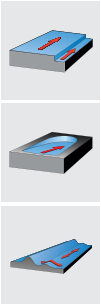
Supply details: cutter body and insert clamping screws

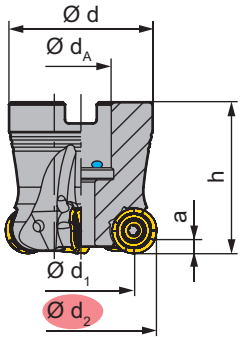
	d_2 [mm]				
RP.. 10T3..	**40**	10007085/M3,0X7,3/T10	DMSD 2,0Nm/SORT T10	7883306/TORX T10	7818267/M8,0x30,0
RP.. 10T3..	**40 - 52**	10007085/M3,0X7,3/T10	DMSD 2,0Nm/SORT T10	7883306/TORX T10	
RP.. 1204..	**40 - 100**	7883209/M3,5X8,6/T15	DMSD 3,2Nm/SORT T15	7724103/TORX T15	
RP.. 1605..	**50**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20	7724103/TORX T15	7818268/M10,0X31,0
RP.. 1605..	**63 - 100**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20	7724104/TORX T20	
RP.. 2006..	**80**	10000155/M5,0X14/T20	DMSD 5,0Nm/SORT T20	7724104/TORX T20	
RP.. 2006..	**100 - 125**	10000155/M5,0X14/T20		7724104/TORX T20	

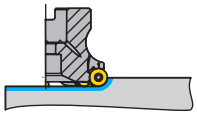
B190-B193 B204-B218 B235 B242-B246 B247-B252 B58

Button insert cutters

A252







d_2 [mm]	Type, description	d_1 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
40	A252.40.R.05-10	30	40	38	16	2.5	15900	5	RN.. 1004..
42	A252.42.R.05-10	32	40	38	16	2.5	15150	5	
50	A252.50.R.06-10	40	40	43	22	2.5	12700	6	
52	A252.52.R.07-10	42	40	43	22	2.5	12200	7	
40	A252.40.R.04-12	28	40	38	16	3.0	15900	4	RN.. 1205..
50	A252.50.R.05-12	38	40	43	22	3.0	12700	5	
52	A252.52.R.05-12	40	40	43	22	3.0	12200	5	
63	A252.63.R.06-12	51	40	48	22	3.0	10100	6	
66	A252.66.R.07-12	54	40	48	22	3.0	9650	7	
80	A252.80.R.08-12	68	50	58	27	3.0	7950	8	

Ordering example: 1 piece A252.40.R.05-10

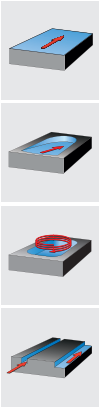
Supply details: cutter body and insert clamping screws

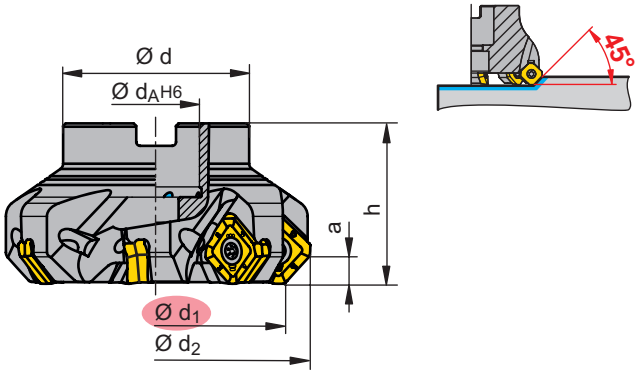
	d_2 [mm]			
RN.. 1004..	**40 - 52**	10009229/M3X7,5/10IP	DMSD 2,0Nm/SORT 10IP	
RN.. 1205..	**40**	M3,5X8,6-15IP/10008749	DMSD 3,2Nm/SORT 15IP	7818267/M8,0x30,0
RN.. 1205..	**50 - 80**	M3,5X8,6-15IP/10008749	DMSD 3,2Nm/SORT 15IP	

B190-B193 B204-B218 B235 B242-B246 B247-B252 B60

Face milling cutters

A271





d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
50	A271.50.R.04-17	66.1	40	43	22	8.4	14500	4	SAKU 1706..
63	A271.63.R.06-17	79.1	40	48	22	8.4	13000	6	
80	A271.80.R.07-17	96.1	50	58	27	8.4	11200	7	
100	A271.100.R.08-17	116.1	50	78	32	8.4	9900	8	
125	A271.125.R.10-17	141.1	63	88	40	8.4	8800	10	
160	A271.160.R.12-17	176.1	63	104	40	8.4	7700	12	
200	A271.200.R.13-17	216.1	63	134	60	8.4	6900	13	
250	A271.250.R.15-17	266.1	63	134	60	8.4	6100	15	

Ordering example: 1 piece A271.50.R.04-17

Supply details: cutter body and insert clamping screws

	d_1 [mm]			
SAKU 1706..	**50**	10000155/M5,0X14/T20	DMSD 5,0Nm/SORT T20	7818268/M10,0X31,0
SAKU 1706..	**63 - 250**	10000155/M5,0X14/T20	DMSD 5,0Nm/SORT T20	

B190-B193

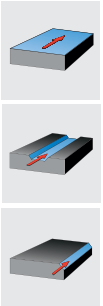
B235

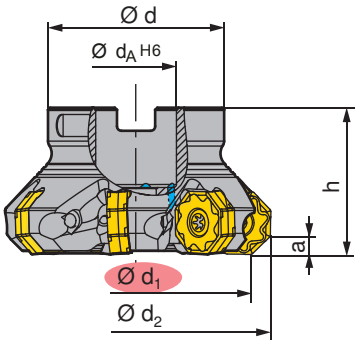
B242-B246

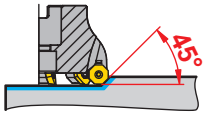
B62

Face milling cutters

A273-06







d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]		z	
40	A273.40.R.03-06	50.2	40	38	16	3.5		3	OAKU 06..
	A273.40.R.04-06	50.2	40	38	16	3.5		4	
50	A273.50.R.05-06	60.2	40	48	22	3.5		5	
63	A273.63.R.07-06	73.2	40	48	22	3.5		7	
80	A273.80.R.08-06	90.2	50	58	27	3.5		8	
100	A273.100.R.10-06	110.2	50	78	32	3.5		10	
125	A273.125.L.12-06	135.2	63	88	40	3.5		12	
	A273.125.R.12-06	135.2	63	88	40	3.5		12	
160	A273.160.L.14-06	170.2	63	100	40	3.5		14	
	A273.160.R.14-06	170.2	63	100	40	3.5		14	

Ordering example: 1 piece A273.40.R.03-06

Supply details: cutter body and insert clamping screws

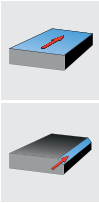
	d_1 [mm]				
OAKU 06..	**40**	10000155/M5,0X14/T20	7724104/TORX T20	7818267/M8,0x30,0	S4/SW4
OAKU 06..	**50**	10000155/M5,0X14/T20	7724104/TORX T20	7818268/M10,0X31,0	7812301/SW 5
OAKU 06..	**63 - 160**	10000155/M5,0X14/T20	7724104/TORX T20		

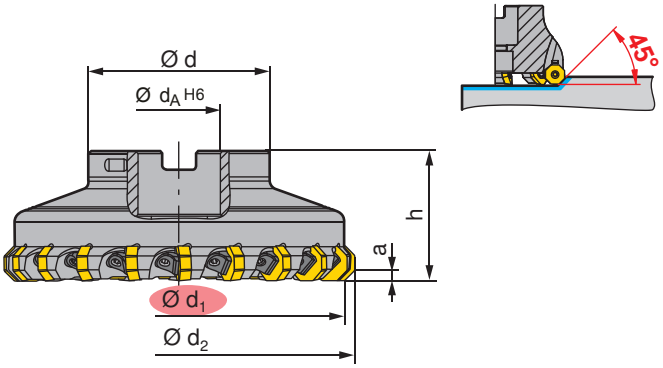
DMSD 5,0Nm/SORT T20		
DMSD 5,0Nm/SORT T20		
DMSD 5,0Nm/SORT T20		

B190-B193 B235 B242-B246 B56 B78

Face milling cutters

A273-06





d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]		z	
80	A273.80.R.10-06	90.2	50	58	27	3.5		10	OAKU 06..
100	A273.100.R.14-06	110.3	50	78	32	3.5		14	
125	A273.125.R.17-06	135.2	63	88	40	3.5		17	
160	A273.160.R.20-06	170.2	63	100	40	3.5		20	
200	A273.200.R.25-06	210.2	63	153	60	3.5		25	
250	A273.250.R.31-06	260.2	63	153	60	3.5		31	
315	A273.315.R.40-06	325.2	63	226	60	3.5		40	

Ordering example: 1 piece A273.80.R.10-06

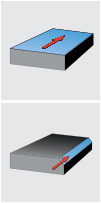
Supply details: cutter body, insert clamping screws

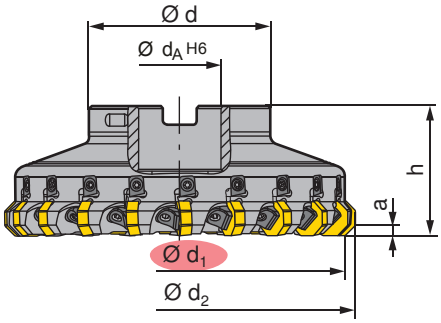
	d_1 [mm]				
OAKU 06..	**80 - 315**	7724103/TORX T15	DMSD 4,0Nm/SORT T15	S-10007860/M6,0X21,0/T15	K-10007861/11,8X12,5

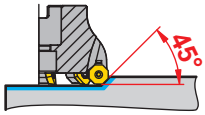
B190-B193 B242-B246 B56 B78

Face milling cutters

AHEC-11 adjustable (A)







d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]		z	
80	A273.80.R.10A10-06	90.2	50	58	27	3.5		10	OAKU 06..
100	A273.100.R.14A14-06	110.3	50	78	32	3.5		14	
125	A273.125.R.17A17-06	135.2	63	88	40	3.5		17	
160	A273.160.R.20A20-06	170.2	63	88	40	3.5		20	
200	A273.200.R.25A25-06	210.2	63	132	60	3.5		25	
250	A273.250.R.31A31-06	260.2	63	132	60	3.5		31	
315	A273.315.R.40A40-06	325.2	63	226	60	3.5		40	

Ordering example: 1 piece A273.80.R.10A10-06

Supply details: cutter body, insert clamping screws, adjustment wedge set, Torx key

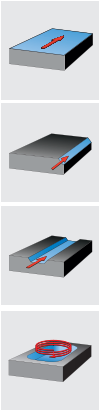
	d_1 [mm]				
OAKU 06..	**80 - 315**	7724103/TORX T15	DMSD 1,0Nm/SORT T15	DMSD 4,0Nm/SORT T15	S-10007860/M6,0X21,0/T15

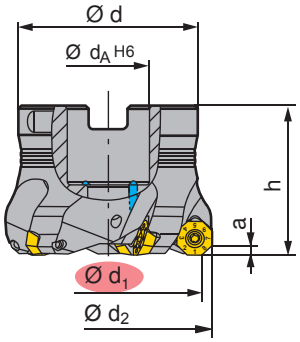
K-10007861/11,8X12,5	10002113-0/AW-RH	10002362-0/WS-L T15

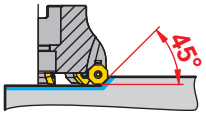
B190-B193 B237 B242-B246 B56 B78

Face milling cutters

A274-09 OF..







d_1 [mm]	Type, description	d_2 [mm]	h [mm]	a [mm]	d [mm]	d_A [mm]	n_{max} [min^{-1}]	z	
32	A274.32.R.05-09	37.7	40	2.5	38	16	32200	5	OF.. 0403..
40	A274.40.R.04-09	45.7	40	2.5	38	16	28400	4	
	A274.40.R.06-09	45.7	40	2.5	38	16	28400	6	
50	A274.50.R.05-09	55.7	40	2.5	48	22	25200	5	
	A274.50.R.07-09	55.7	40	2.5	48	22	25200	7	
63	A274.63.R.06-09	68.7	40	2.5	48	22	22300	6	
	A274.63.R.09-09	68.7	40	2.5	48	22	22300	9	
80	A274.80.R.07-09	85.7	50	2.5	58	27	19600	7	
	A274.80.R.11-09	85.7	50	2.5	58	27	19600	11	
100	A274.100.R.09-09	105.7	50	2.5	78	32	17500	9	
	A274.100.R.13-09	105.7	50	2.5	78	32	17500	13	
125	A274.125.R.12-09	130.7	63	2.5	88	40	15600	12	

Ordering example: 1 piece A274.32.R.05-09

Supply details: cutter body and insert clamping screws

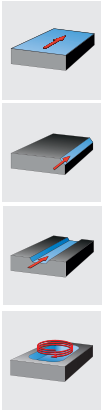
	d_1 [mm]				
OF.. 0403..	**32 - 40**	10007562/M2,5X7,6/08TP	10000276/TORX 08IP	7818267/M8,0x30,0	S4/SW4
OF.. 0403..	**50 - 125**	10007562/M2,5X7,6/08TP	10000276/TORX 08IP		

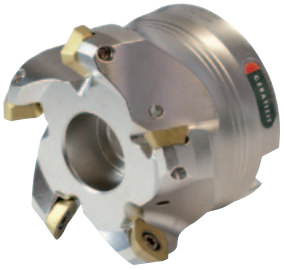
DMSD 1,6Nm/SORT 08IP		
DMSD 1,6Nm/SORT 08IP		

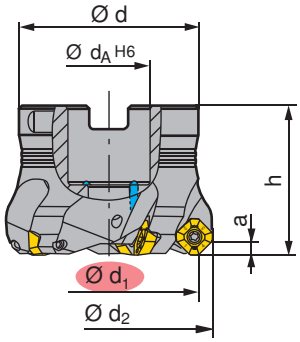
B190-B193 B235 B242-B246 B57

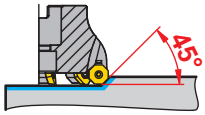
Face milling cutters

A274-09 SF..









d_1 [mm]	Type, description	d_2 [mm]	h [mm]	a [mm]	d [mm]	d_A [mm]	n_{max} [min^{-1}]	z	
30.7	A274.32.R.05-09	39.2	40.7	3.8	38	16	32200	5	SF.. 0903..
38.7	A274.40.R.04-09	47.6	40.7	3.8	38	16	28400	4	
	A274.40.R.06-09	47.6	40.7	3.8	38	16	28400	6	
48.7	A274.50.R.05-09	57.6	40.7	3.8	48	22	25200	5	
	A274.50.R.07-09	57.6	40.7	3.8	48	22	25200	7	
61.7	A274.63.R.06-09	70.5	40.7	3.8	48	22	22300	6	
	A274.63.R.09-09	70.5	40.7	3.8	48	22	22300	9	
78.7	A274.80.R.07-09	87.5	50.7	3.8	58	27	19600	7	
	A274.80.R.11-09	87.5	50.7	3.8	58	27	19600	11	
98.7	A274.100.R.09-09	107.5	50.7	3.8	78	32	17500	9	
	A274.100.R.13-09	107.5	50.7	3.8	78	32	17500	13	
123.7	A274.125.R.12-09	132.5	63.7	3.8	88	40	15600	12	

Ordering example: 1 piece A274.32.R.05-09

Supply details: cutter body and insert clamping screws

	d_1 [mm]				
SF.. 0903..	**30.7 - 38.7**	10007562/M2,5X7,6/08TP	10000276/TORX 08IP	7818267/M8,0x30,0	S4/SW4
SF.. 0903..	**48.7 - 123.7**	10007562/M2,5X7,6/08TP	10000276/TORX 08IP		

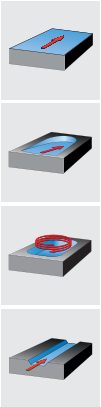
DMSD 1,6Nm/SORT 08IP		
DMSD 1,6Nm/SORT 08IP		

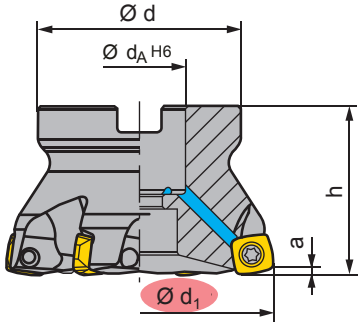
B190-B193 B235 B242-B246 B57

CERATIZIT hard material matters

Face milling cutters

AHFC-09/-12





HFC high feed cutting

d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
32	AHFC.32.R.03-09	40	38	16	1	27000	3	XD.. 09..
35	AHFC.35.R.04-09	40	38	16	1	26700	4	
40	AHFC.40.R.04-09	40	38	16	1	26400	4	
42	AHFC.42.R.05-09	40	38	16	1	26100	5	
50	AHFC.50.R.05-09	40	43	22	1	23500	5	
52	AHFC.52.R.06-09	40	43	22	1	23000	6	
63	AHFC.63.R.06-09	40	48	22	1	20500	6	
66	AHFC.66.R.07-09	40	48	22	1	20000	7	
40	AHFC.40.R.03-12	40	38	16	2	21120	3	XO.. 12..
42	AHFC.42.R.04-12	40	38	16	2	20880	4	
50	AHFC.50.R.04-12	40	43	22	2	18800	4	
52	AHFC.52.R.05-12	40	43	22	2	18400	5	
63	AHFC.63.R.05-12	40	48	22	2	16400	5	
66	AHFC.66.R.06-12	40	48	22	2	16000	6	
80	AHFC.80.R.07-12	50	58	27	2	14000	7	
100	AHFC.100.R.08-12	50	78	32	2	12000	8	

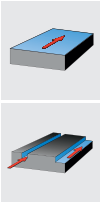
Ordering example: 1 piece AHFC.32.R.03-09

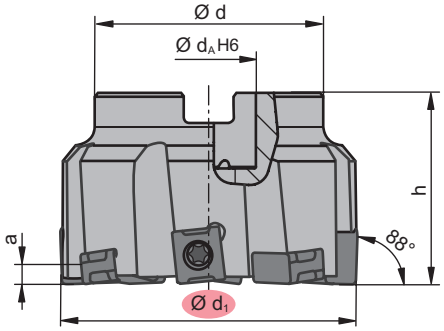
Supply details: cutter body and insert clamping screws

	d_1 [mm]				
XD.. 09..	**32 - 42**	7883209/M3,5X8,6/T15	7724103/TORX T15	7818267/M8,0x30,0	S4/SW4
XD.. 09..	**50 - 63**	7883209/M3,5X8,6/T15	7724103/TORX T15		
XO.. 12..	**40 - 42**	7822114/M4,5X10,5/T20	7724104/TORX T20	7818267/M8,0x30,0	S4/SW4
XO.. 12..	**50 - 100**	7822114/M4,5X10,5/T20	7724104/TORX T20		

DMSD 3,2Nm/SORT T15		
DMSD 3,2Nm/SORT T15		
DMSD 5,0Nm/SORT T20		
DMSD 5,0Nm/SORT T20		

B190-B193 B204-B218 B235 B242-B246 B247-B252 B75





d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
50	AHEC.50.R.06-11	40	48	22	4	12700	6	LN.X 1106
	AHEC.50.R.04B-11	40	48	22	4	12700	4	
63	AHEC.63.R.08-11	40	48	22	4	10100	8	
	AHEC.63.R.06B-11	40	48	22	4	10100	6	
80	AHEC.80.R.10-11	50	58	27	4	8000	10	
	AHEC.80.R.08B-11	50	58	27	4	8000	8	
100	AHEC.100.R.12-11	50	78	32	4	6400	12	
	AHEC.100.R.10B-11	50	78	32	4	6400	10	
125	AHEC.125.R.12-11	63	88	40	4	5100	12	
	AHEC.125.R.12B-11	63	88	40	4	5100	12	
	AHEC.125.R.16-11	63	88	40	4	5100	16	
160	AHEC.160.R.20-11	63	100	40	4	4000	20	
	AHEC.160.R.14B-11	63	100	40	4	4000	14	

Ordering example: 1 piece AHEC.50.R.06-11

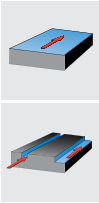
Supply details: cutter body and insert clamping screws

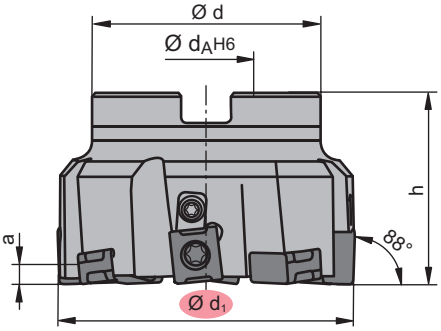
	d_1 [mm]				
LN.X 1106	**50 - 63**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	10006791/KMR22
LN.X 1106	**80**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	10006792/KMR27
LN.X 1106	**100**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	10006793/KMR32
LN.X 1106	**125**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	10006794/KMR40
LN.X 1106	**160**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	

B190-B193 B242-B246 B53

Shoulder & face milling cutters

AHEC-11 adjustable (A)





d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
50	AHEC.50.R.06A03-11	40	48	22	4	12700	6	LN.X 1106
63	AHEC.63.R.08A04-11	40	48	22	4	10100	8	
80	AHEC.80.R.10A05-11	50	58	27	4	8000	10	
100	AHEC.100.R.12A06-11	50	78	32	4	6400	12	
125	AHEC.125.R.16A08-11	63	88	40	4	5100	16	
160	AHEC.160.R.20A10-11	63	100	40	4	4000	20	

Ordering example: 1 piece AHEC.50.R.06A03-11

Supply details: cutter body, insert clamping screws, adjustment wedge set

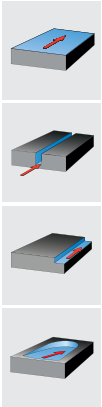
	d_1 [mm]				
LN.X 1106	**50 - 63**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	
LN.X 1106	**80**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	
LN.X 1106	**100**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	
LN.X 1106	**125**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	
LN.X 1106	**160**	7815102/M3,5X11,0/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	

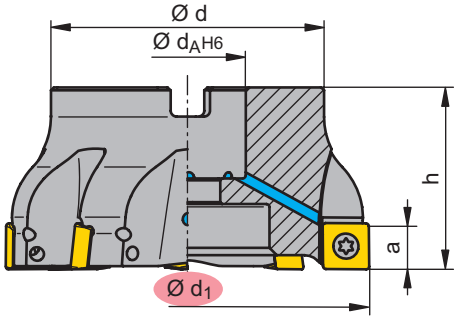
10002113-0/AW-RH	10002362-0/WS-L T15	10006791/KMR22
10002113-0/AW-RH	10002362-0/WS-L T15	10006792/KMR27
10002113-0/AW-RH	10002362-0/WS-L T15	10006793/KMR32
10002113-0/AW-RH	10002362-0/WS-L T15	10006794/KMR40
10002113-0/AW-RH	10002362-0/WS-L T15	

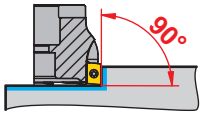
B190-B193 B237 B242-B246 B53

Shoulder & slot milling cutters

A490-09/-12







d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
40	A490.40.R.05-09	40	38	16	8	17000	5	SD.. 09T3..
42	A490.42.R.06-09	40	38	16	8	16500	6	
50	A490.50.R.06-09	40	43	22	8	14800	6	
52	A490.52.R.07-09	40	43	22	8	14450	7	
63	A490.63.R.07-09	40	48	22	8	12850	7	
66	A490.66.R.08-09	40	48	22	8	12550	8	
80	A490.80.R.09-09	50	58	27	8	11250	9	
100	A490.100.R.10-09	50	78	32	8	9900	10	
40	A490.40.R.04-12	40	38	16	12	17000	4	SD.. 1205..
50	A490.50.R.05-12	40	43	22	12	14800	5	
63	A490.63.R.06-12	40	48	22	12	12850	6	
80	A490.80.R.07-12	50	58	27	12	11250	7	
100	A490.100.R.08-12	50	78	32	12	9900	8	
125	A490.125.R.10-12	63	88	40	12	5500	10	

Ordering example: 1 piece A490.40.R.05-09

Supply details: cutter body and insert clamping screws

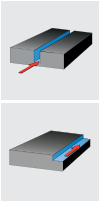
	d_1 [mm]				
SD.. 09T3..	**40 - 42**	7722111/M3,5X7,2/T15	DMSD 3,2Nm/SORT T15	7818267/M8,0x30,0	S4/SW4
SD.. 09T3..	**50 - 100**	7722111/M3,5X7,2/T15	DMSD 3,2Nm/SORT T15		
SD.. 1205..	**40**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20	7818267/M8,0x30,0	S4/SW4
SD.. 1205..	**50**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20	7818268/M10,0X31,0	7812301/SW 5
SD.. 1205..	**63 - 125**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20		

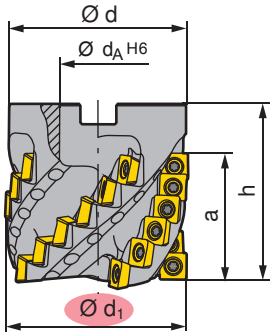
7724103/TORX T15		
7724103/TORX T15		
7724104/TORX T20		
7724104/TORX T20		
7724104/TORX T20		

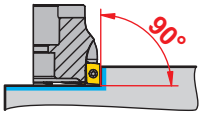
B190-B193 B204-B218 B235 B242-B246 B247-B252 B63

Shoulder & slot milling cutters

A490-09K







d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	n	
40	A490.40.R.03K6-09	55	38.2	16	41	8000	3	18	SD.. 09T3..
50	A490.50.R.04K6-09	55	48	22	41	7500	4	24	
63	A490.63.R.05K6-09	60	61	27	41	6500	5	30	

Ordering example: 1 piece A490.40.R.03K6-09

Supply details: cutter body, insert clamping screws, screw for cutter body

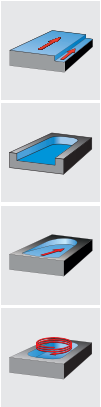
n = number of inserts

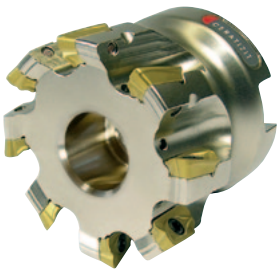
	d_1 [mm]			
SD.. 09T3..	**40 - 63**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15

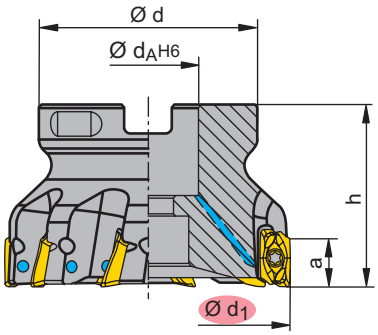
B190-B193 B204-B218 B242-B246 B247-B252 B63

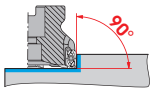
Shoulder & slot milling cutters

A211-07/-11









d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
32	A211.32.R.06-07	40	38	16	6	36240	6	XD.. 07..
	A211.32.R.08-07	40	38	16	6	36240	8	
40	A211.40.R.10-07	40	38	16	6	33240	10	
	A211.40.R.08-07	40	38	16	6	33240	8	
50	A211.50.R.10-07	40	43	22	6	30480	10	
	A211.50.R.12-07	40	43	22	6	30480	12	
40	A211.40.R.04-11	40	38	16	10	27700	4	XD.. 11..
	A211.40.R.06-11	40	38	16	10	27700	6	
50	A211.50.R.05-11	40	43	22	10	25400	5	
	A211.50.R.08-11	40	43	22	10	25400	8	
63	A211.63.R.06-11	40	48	22	10	23300	6	
	A211.63.R.10-11	40	48	22	10	23300	10	
80	A211.80.R.07-11	50	58	27	10	21300	7	
	A211.80.R.10-11	50	58	27	10	21300	10	
	A211.80.R.12-11	50	58	27	10	21300	12	
100	A211.100.R.08-11	50	78	32	10	19600	8	
	A211.100.R.14-11	50	78	32	10	19600	14	
125	A211.125.R.10-11	63	88	40	10	17900	10	
160	A211.160.R.13-11	63	98	40	10	16500	13	

Ordering example: 1 piece A211.32.R.06-07

Supply details: cutter body and insert clamping screws

	d_1 [mm]				
XD.. 07..	**32**	10006888/M2,2X4,2/07IP	DMSD 1,0Nm/SORT 07IP	7818267/M8,0x30,0	S4/SW4
XD.. 07..	**40 - 50**	10006888/M2,2X4,2/07IP	DMSD 1,0Nm/SORT 07IP		
XD.. 11..	**40**	10000125/M2,5X7,3/08TP	DMSD 1,6Nm/SORT 08IP	7818267/M8,0x30,0	S4/SW4
XD.. 11..	**50**	10000125/M2,5X7,3/08TP	DMSD 1,6Nm/SORT 08IP	7818268/M10,0X31,0	7812301/SW 5
XD.. 11..	**63 - 160**	10000125/M2,5X7,3/08TP	DMSD 1,6Nm/SORT 08IP		

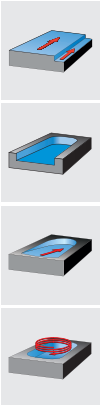
10006918/TORX 07IP		
10006918/TORX 07IP		
10000276/TORX 08IP		
10000276/TORX 08IP		
10000276/TORX 08IP		

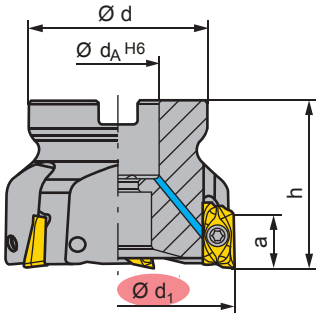
B190-B193 B204-B218 B235 B236 B242-B246 B247-B252 B71-B73

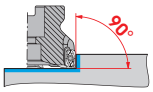
CERATIZIT hard material matters

Shoulder & slot milling cutters

A211-15/-20







d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
40	A211.40.R.03-15	40	38	16	14	22160	3	XD.. 15..
	A211.40.R.04-15	40	38	16	14	22160	4	
50	A211.50.R.03-15	40	43	22	14	20320	3	
	A211.50.R.05-15	40	43	22	14	20320	5	
63	A211.63.R.04-15	45	48	22	14	18640	4	
	A211.63.R.06-15	45	48	22	14	18640	6	
80	A211.80.R.05-15	50	58	27	14	17040	5	
	A211.80.R.08-15	50	58	27	14	17040	8	
100	A211.100.R.06-15	50	78	32	14	15680	6	
	A211.100.R.10-15	50	78	32	14	15680	10	
125	A211.125.R.07-15	63	88	40	14	14320	7	
	A211.125.R.11-15	63	88	40	14	14320	11	
160	A211.160.R.08-15	63	93	40	14	13200	8	
	A211.160.R.12-15	63	93	40	14	13200	12	
63	A211.63.R.05-20	45	48	22	19	14400	5	XD.. 20..
80	A211.80.R.06-20	50	58	27	19	12400	6	
100	A211.100.R.07-20	50	78	32	19	10900	7	

Ordering example: 1 piece A211.40.R.03-15

Supply details: cutter body and insert clamping screws

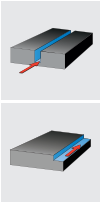
	d_1 [mm]				
XD.. 15..	**40**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP	7818267/M8,0x30,0	S4/SW4
XD.. 15..	**50**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP	7818268/M10,0X31,0	7812301/SW 5
XD.. 15..	**63 - 160**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP		
XD.. 20..	**63 - 100**	7822114/M4,5X10,5/T20	7724104/TORX T20		

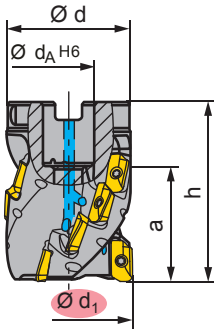
DMSD 3,2Nm/SORT 15IP		
DMSD 3,2Nm/SORT 15IP		
DMSD 3,2Nm/SORT 15IP		
DMSD 5,0Nm/SORT T20		

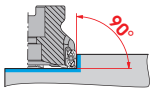
B190-B193 B204-B218 B235 B236 B242-B246 B247-B252 B71+B73

Shoulder & slot milling cutters

A211K-11/-15/-20







d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	n	
40	A211.40.R.03K4-11	56	38	16	37	18500	3	12	XD.. 11..
	A211.40.R.04K4-11	55	38	16	37	18500	4	16	
	A211.40.R.04K5-11	65	38	16	45.5	18500	4	20	
50	A211.50.R.04K5-11	65	43	22	45.5	17000	4	20	
	A211.50.R.05K5-11	65	43	22	45.5	17000	5	25	
	A211.50.R.05K6-11	74	43	22	54.5	17000	5	30	
	A211.50.R.03K5-15	88	43	22	63.0	13600	3	15	XD.. 15..
	A211.50.R.03K4-15	74	43	22	50.5	13600	3	12	
80	A211.80.R.04K5-15	88	78	32	63.0	11360	4	20	
	A211.80.R.05K6-15	102	78	32	75.5	11360	5	30	
63	A211.63.R.03K4-15	74	58	27	51	12500	3	12	
	A211.63.R.04K6-15	102	58	27	75.5	12500	4	24	
	A211.63.R.04K4-20	92	58	27	68	14400	4	16	XD.. 20..
80	A211.80.R.05K4-20	92	76	32	68	12400	5	20	

Ordering example: 1 piece A211.40.R.03K4-11

Supply details: cutter body, insert clamping screws, screw for cutter body

n = number of inserts

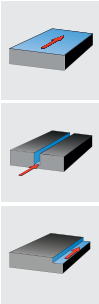
For the second and subsequent rows of teeth, use corner radius ≤ 0.8 mm to ensure adequate overlap of inserts.

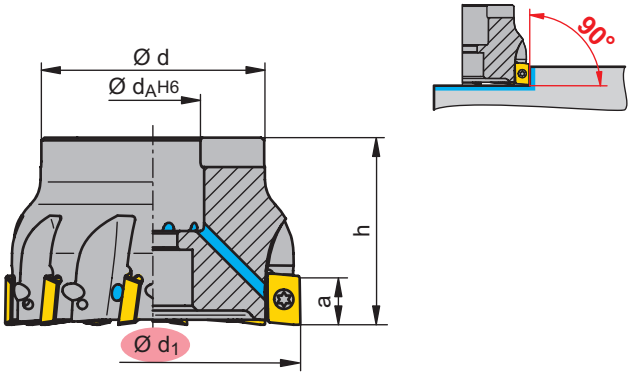
	d_1 [mm]				
XD.. 11..	**40**	10000125/M2,5X7,3/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP	S-10007790/M16,0X6,0/SW06
XD.. 11..	**50**	10000125/M2,5X7,3/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP	S-10007791/M20,0X7,0/SW08
XD.. 15..	**50**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP	DMSD 3,2Nm/SORT 15IP	S-10007791/M20,0X7,0/SW08
XD.. 15..	**63**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP	DMSD 3,2Nm/SORT 15IP	S-10007821/M24,0X9,0/SW10
XD.. 15..	**80**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP	DMSD 3,2Nm/SORT 15IP	S-10007822/M30,0X9,0/SW14
XD.. 20..	**63**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20	S-10007821/M24,0X9,0/SW10
XD.. 20..	**80**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20	S-10007822/M30,0X9,0/SW14

B190-B193 B204-B218 B235 B236 B242-B246 B247-B252 B71-B73

Shoulder & slot milling cutters

A210





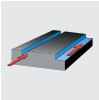
d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	z	
40	A210.40.R.06	40	38	22	8	6	AP.. 1003..
50	A210.50.R.05	40	43	22	8	5	
	A210.50.R.08	40	43	22	8	8	
63	A210.63.R.06	40	48	22	8	6	
	A210.63.R.10	40	48	22	8	10	
80	A210.80.R.12	40	58	27	8	12	
100	A210.100.R.14	50	78	32	8	14	
125	A210.125.R.15	63	88	40	8	15	

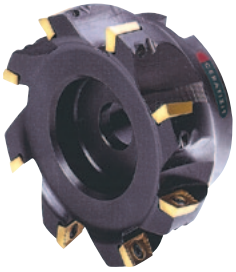
Ordering example: 1 piece A210.40.R.06

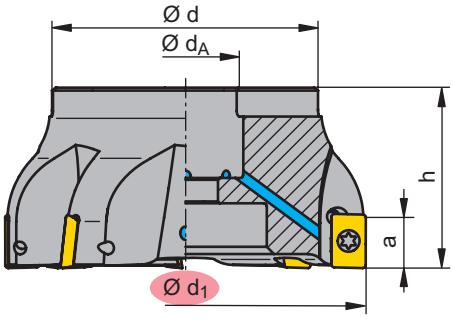
Supply details: cutter body and insert clamping screws

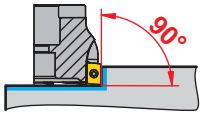
	d_1 [mm]			
AP.. 1003..	**40 - 125**	7815101/M2,5X6,0/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08

B190-B193 B204-B218 B236 B242-B246 B46









to be discontinued

d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	z	
40	A241.40.R.04	40	33	16	13	4	LD.. 1504..
50	A241.50.R.05	40	33	22	13	5	
63	A241.63.R.06	40	48	22	13	6	
80	A241.80.R.07	50	78	27	13	7	
100	A241.100.R.08	50	75	32	13	8	
125	A241.125.R.10	63	88	40	13	10	

Ordering example: 1 piece A241.40.R.04

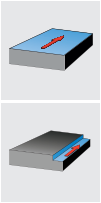
Supply details: cutter body and insert clamping screws

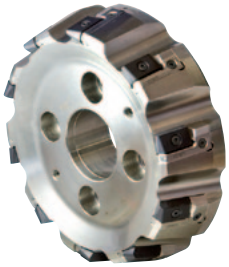
	d_1 [mm]			
LD.. 1504..	**40 - 125**	7883209/M3,5X8,6/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15

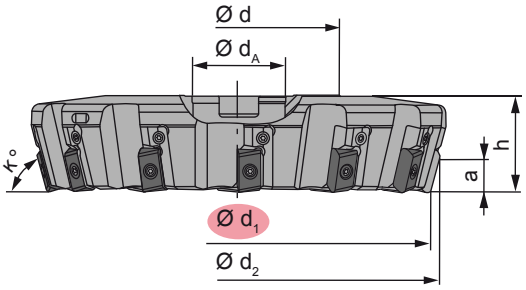
B190-B193 B204-B218 B242-B246 B51

Face milling cutters

AHDM







d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	K [°]	z	
160	AHDM.160.R.08-75-22	160.2	63	110	40	20	75	8	LNUC 22..
200	AHDM.200.R.10-75-22	200.2	63	131	60	20	75	10	
250	AHDM.250.R.12-75-22	250.2	63	174	60	20	75	12	
315	AHDM.315.R.14-75-22	315.2	80	226	60	20	75	14	

Ordering example: 1 piece AHDM.160.R.08-75-22

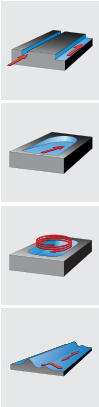
Supply details: cutter body and insert clamping screws

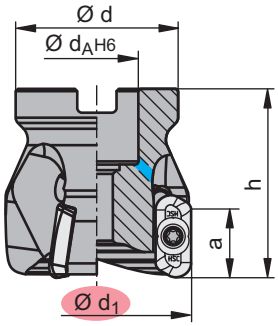
	d_1 [mm]			
LNUC 22..	**160 - 315**	10006216/M5,0X18/T15	7724103/TORX T15	CA HDM-22-R

B190-B193 B204-B218 B242-B246 B54

Shoulder & slot milling cutters

AHSC-11/-19





d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
40	AHSC.40.R.04-11	50	38	16	10	35500	4	XD.. 11..
50	AHSC.50.R.04-11	50	43	22	10	31800	4	
63	AHSC.63.R.05-11	50	48	22	10	28300	5	
80	AHSC.80.R.05-11	50	58	27	10	25100	5	
100	AHSC.100.R.05-11	50	78	32	10	22500	5	
40	AHSC.40.R.03-19	50	38	16	18	24900	3	XD.T 19..
50	AHSC.50.R.04-19	50	43	22	18	21600	4	
63	AHSC.63.R.04-19	50	48	22	18	18800	4	
	AHSC.63.R.05-19	50	48	22	18	18800	5	
80	AHSC.80.R.04-19	50	58	27	18	16400	4	
	AHSC.80.R.05-19	50	58	27	18	16400	5	
100	AHSC.100.R.04-19	50	78	32	18	14500	4	
	AHSC.100.R.05-19	50	78	32	18	14500	5	
125	AHSC.125.R.05-19	63	88	40	18	12800	5	
	AHSC.125.R.06-19	63	88	40	18	12800	6	

Ordering example: 1 piece AHSC.40.R.04-11

Supply details: cutter body and insert clamping screws

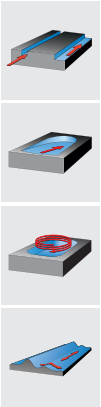
	d_1 [mm]				
XD.. 11..	**40**	10000125/M2,5X7,3/08TP	DMSD 1,8Nm/SORT 08IP	7818267/M8,0x30,0	S4/SW4
XD.. 11..	**50 - 63**	10000125/M2,5X7,3/08TP	DMSD 1,8Nm/SORT 08IP	7818268/M10,0X31,0	7812301/SW 5
XD.. 11..	**80 - 100**	10000125/M2,5X7,3/08TP	DMSD 1,8Nm/SORT 08IP		
XD.T 19..	**40**	7818428/M4,0X8,5/T15	DMSD 6,0Nm/SORT T15	7818267/M8,0x30,0	S4/SW4
XD.T 19..	**50 - 63**	7818429/M4,0X11/T15	DMSD 6,0Nm/SORT T15	7818268/M10,0X31,0	7812301/SW 5
XD.T 19..	**80 - 125**	7818429/M4,0X11/T15	DMSD 6,0Nm/SORT T15		

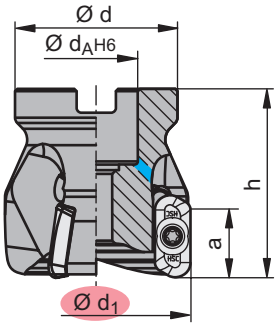
10000276/TORX 08IP		
10000276/TORX 08IP		
10000276/TORX 08IP		
7724103/TORX T15		
7724103/TORX T15		
7724103/TORX T15		

B190-B193 B204-B218 B227-B234 B235 B236 B242-B246 B73-B74

Shoulder & slot milling cutters

AHPC-19





d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
40	AHPC.40.R.03-19	50	38	16	18	35700	3	XD.X 19..
50	AHPC.50.R.03-19	50	43	22	18	31900	3	
63	AHPC.63.R.03-19	50	48	22	18	28500	3	
	AHPC.63.R.04-19	50	48	22	18	28500	4	

Ordering example: 1 piece AHPC.40.R.03-19

Supply details: cutter body and insert clamping screws

	d_1 [mm]				
XD.X 19..	**40**	7818428/M4,0X8,5/T15	7724103/TORX T15	DMSD 5,0Nm/SORT T15	7818267/M8,0x30,0
XD.X 19..	**50 - 63**	7818429/M4,0X11/T15	7724103/TORX T15	DMSD 5,0Nm/SORT T15	7818268/M10,0X31,0

S4/SW4		
7812301/SW 5		

B190-B193

B204-B218

B227-B234

B235

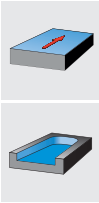
B236

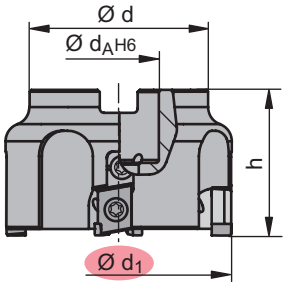
B242-B246

B74

Face milling cutters

AHPC-12





d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	n_{max} [min^{-1}]		z	
40	AHPC.40.R.04-12	40	34	16	32000		4	ZNHW 1205..
50	AHPC.50.R.04-12	40	49	22	32000		4	
	AHPC.50.R.05-12	40	49	22	32000		5	
63	AHPC.63.R.04-12	40	49	22	29000		4	
	AHPC.63.R.07-12	40	49	22	29000		7	
80	AHPC.80.R.05-12	50	60	27	26000		5	
	AHPC.80.R.09-12	50	60	27	26000		9	
100	AHPC.100.R.06-12	50	70	32	24000		6	
	AHPC.100.R.12-12	50	70	32	24000		12	
125	AHPC.125.R.08-12	63	72	40	22000		8	
	AHPC.125.R.14-12	63	72	40	22000		14	
160	AHPC.160.R.10-12	63	72	40	18000		10	
	AHPC.160.R.16-12	63	118	40	18000		16	
200	AHPC.200.R.12-12	63	153	60	16000		12	
250	AHPC.250.R.14-12	63	200	60	14000		14	
315	AHPC.315.R.18-12	80	265	60	12000		18	

Ordering example: 1 piece AHPC.40.R.04-12

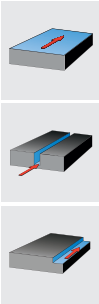
Supply details: cutter body, insert clamping screws, wedges, clamping key, edge protecting ring

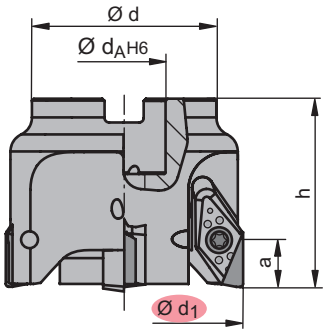
	d_1 [mm]				
ZNHW 1205..	**40 - 63**	7818429/M4,0X11/T15	DMSD 5,0Nm/SORT T15	10002113-0/AW-RH	10002362-0/WS-L T15
ZNHW 1205..	**80 - 315**	7883216/M4,5X13/T20	DMSD 5,0Nm/SORT T15	10002113-0/AW-RH	10002362-0/WS-L T15

B190-B193 B227-B234 B237 B242-B246 B76

Shoulder & slot milling cutters

AHSV-22





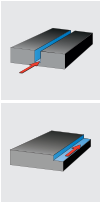
d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	n_{max} [min^{-1}]	z	
50	AHSV.50.R.03-22	50	49	22	15	24000	3	VC.. 2205..
63	AHSV.63.R.04-22	50	49	22	15	21000	4	
80	AHSV.80.R.05-22	50	60	27	15	18000	5	
100	AHSV.100.R.06-22	63	70	32	15	15000	6	
125	AHSV.125.R.07-22	63	72	40	15	12000	7	

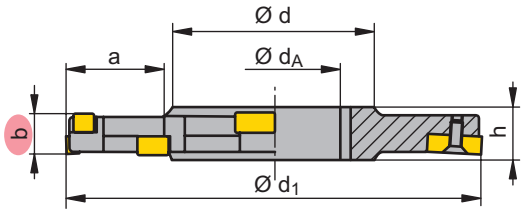
Ordering example: 1 piece AHSV.50.R.03-22

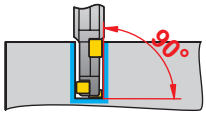
Supply details: cutter body and insert clamping screws

	d_1 [mm]		
VC.. 2205..	**50 - 125**	7822114/M4,5X10,5/T20	DMSD 5,0Nm/SORT T20

B190-B193 B227-B234 B242-B246 B69







to be discontinued

b [mm]	Type, description	d_1 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	z	n	
6-7	80F08N-S90LN12N06	80	12	44	27	18	4	8	LNE. 1235.. / 1240..
	80Y08R-S90LN12N06		50	42	22	19	4	8	
	▯▯▯ * ▯▯ 1▯6▯▯ / 1▯▯ 1▯▯	100	12	52	32	24	5	10	
	100Y10R-S90LN12N06		50	50	27	25	5	10	
	125H12N-S90LN12N06	125	12	63	40	31	6	12	
	125Y12R-S90LN12N06		50	70	40	27.5	6	12	
8-9	80F08N-S90LN12N08	80	12	44	27	18	4	8	LNE. 1245.. / 1250..
	80Y08R-S90LN12N08		50	42	22	19	4	8	
	▯▯▯ * ▯▯ 1▯6▯▯ / 1▯▯ 1▯▯	100	12	52	32	24	5	10	
	100Y10R-S90LN12N08		50	50	27	25	5	10	
	125Y12R-S90LN12N08	125	50	70	40	27.5	6	12	

Ordering example: 1 piece 80F08N-S90LN12N06

Supply details: cutter body and insert clamping screws

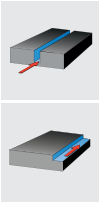
z = effective number of teeth for the calculation of the feed rate
n = number of inserts

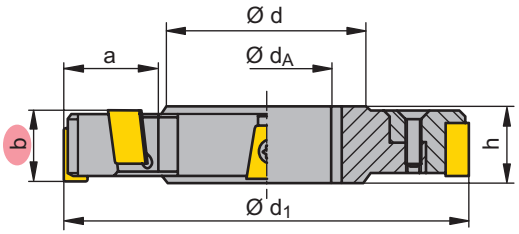
	d_1 [mm]		
LNE. 1235.. / 1240..	**80 - 125**	MS 1280/M4X5	
LNE. 1245.. / 1250..	**80 - 125**	MS 1282/M4X6,8	

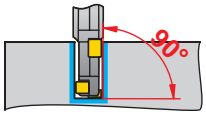
B190-B193 B240 B241 B52

Side and face milling cutters

90CN







to be discontinued

b [mm]	Type, description	d_1 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	z	n	
14-18	125H08N-S90CN10N14	125	18	60	40	32.5	4	8	CN.. 1005..
	125Y08R-S90CN10N14		50	60	32	32.5	4	8	
	160H10N-S90CN10N14	160	18	63	40	48.5	5	10	
	160Y10R-S90CN10N14		50	70	40	45	5	10	
	200Y12R-S90CN10N14	200	50	90	40	55	6	12	
18-22	125H08N-S90CN12N18	125	22	60	40	32.5	4	8	CN.. 1205..
	125Y08R-S90CN12N18		50	60	32	32.5	4	8	
	160H10N-S90CN12N18	160	22	63	40	48.5	5	10	
	160Y10R-S90CN12N18		50	70	40	45	5	10	
	200J12N-S90CN12N18	200	22	75	50	62.5	6	12	
	200Y12R-S90CN12N18		50	90	40	55	6	12	

Ordering example: 1 piece 125H08N-S90CN10N14

Supply details: cutter body and insert clamping screws

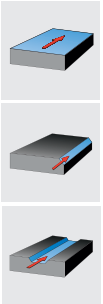
z = effective number of teeth for the calculation of the feed rate
n = number of inserts

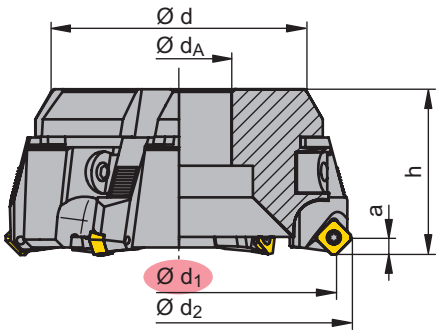
	d_1 [mm]			
CN.. 1005..	**125 - 200**	MS 1273/M4X11,5	MS 1308/M5X11,7	K-CN1014-L/K
CN.. 1205..	**125 - 200**	MS 1273/M4X11,5	MS 1309/M5X15,8	K-CN1218-L/K

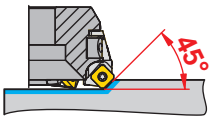
B190-B193 B240 B241 B47

Face milling cutters

A260-031/-041







d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	[kg]	z	
80	A260.08.R.05/041	88.4	52	66	27	4	1.33	5	SD/XD.. 0903..
100	A260.10.R.06/041	108.4	52	86	32	4	1.94	6	
123	A260.12.R.07/041	131.4	63	95	40	4	3.49	7	
158	A260.16.R.10/041	166.4	63	130	40	4	6.04	10	
198	A260.20.R.12/041	206.4	63	172	60	4	9.91	12	
248	A260.25.R.14/041	256.4	63	222	60	4	16.74	14	
313	A260.31.R.18/041	321.4	80	280	60	4	31.51	18	
398	A260.40.R.22/041	406.4	80	365	60	4	67.57	22	
80	A260.08.R.05/031	94.5	52	66	27	6	1.31	5	SD/XD.. 1204..
100	A260.10.R.06/031	114.5	52	86	32	6	1.93	6	
123	A260.12.R.07/031	137.5	63	95	40	6	3.47	7	
158	A260.16.R.10/031	172.5	63	130	40	6	6.02	10	
198	A260.20.R.12/031	212.5	63	172	60	6	9.88	12	
248	A260.25.R.14/031	262.5	63	222	60	6	16.71	14	
313	A260.31.R.18/031	327.5	80	280	60	6	31.45	18	
398	A260.40.R.22/031	412.5	80	365	60	6	67.51	22	

Ordering example: 1 piece A260.08.R.05/041

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

	d_1 [mm]				
SD/XD.. 0903..	**80 - 398**	7883203/M3,0X7,3/T08	7818044/M8X21/R-L	7818043/K	DMSD 1,2Nm/SORT T08
SD/XD.. 1204..	**80 - 398**	7822114/M4,5X10,5/T20	7818044/M8X21/R-L	7818043/K	DMSD 4,0Nm/SORT T20

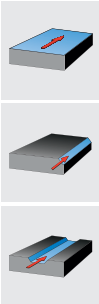
7724106/TORX T08	S4/SW4	7818048/EXZS
7724104/TORX T20	S4/SW4	7818048/EXZS

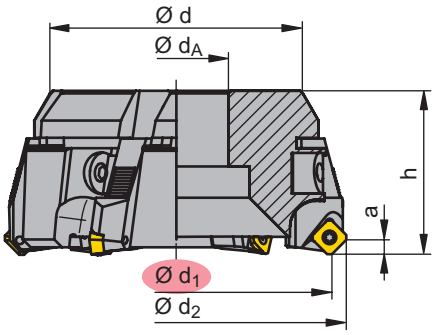
B190-B193 B238 B242-B246 B64 B78 7818.../KA B169

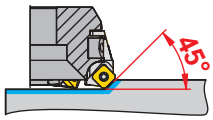
CERATIZIT hard material matters

Face milling cutters

A260-029/-032







d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	[kg]	z	
80	A260.08.R.05/029	93	52	66	27	6	1.30	5	SE.. 1204..
100	A260.10.R.06/029	113	52	86	32	6	1.91	6	
123	A260.12.R.07/029	136	63	95	40	6	3.46	7	
158	A260.16.R.10/029	171	63	130	40	6	5.99	10	
198	A260.20.R.12/029	211	63	172	60	6	9.85	12	
248	A260.25.R.14/029	261	63	222	60	6	16.67	14	
313	A260.31.R.18/029	326	80	280	60	6	31.41	18	
398	A260.40.R.22/029	411	80	365	60	6	67.45	22	
75	A260.08.R.05/032	94	52	66	27	9	1.31	5	SD.. 1504..
95	A260.10.R.06/032	114	52	86	32	9	1.77	6	
118	A260.12.R.07/032	137	63	95	40	9	3.37	7	
153	A260.16.R.10/032	172	63	130	40	9	5.83	10	
193	A260.20.R.12/032	212	63	172	60	9	12.67	12	
243	A260.25.R.14/032	262	63	222	60	9	16.35	14	
308	A260.31.R.18/032	327	80	280	60	9	32.15	18	
393	A260.40.R.22/032	412	80	365	60	9	52.07	22	

Ordering example: 1 piece A260.08.R.05/029

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

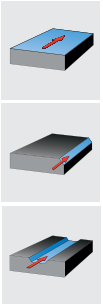
	d_1 [mm]				
SE.. 1204..	**80 - 398**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 4,0Nm/SORT T20	7818044/M8X21/R-L
SD.. 1504..	**75 - 393**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 4,0Nm/SORT T20	7818044/M8X21/R-L

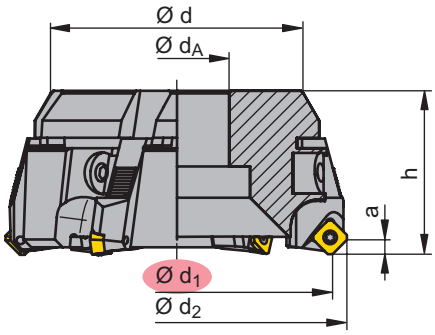
S4/SW4	7818043/K	7818048/EXZS
S4/SW4	7818043/K	7818048/EXZS

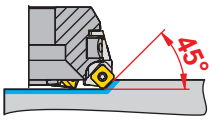
B190-B193 B238 B242-B246 B62 7818.../KA B169

Face milling cutters

A260-058







d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	[kg]	z	
77	A260.08.R.05/058	93	56	66	27	8.4	1.39	5	SAKU 1706..
97	A260.10.R.06/058	113	56	86	32	8.4	2.01	6	
120	A260.12.R.07/058	136	67	95	40	8.4	3.55	7	
155	A260.16.R.10/058	171	67	130	40	8.4	6.09	10	
195	A260.20.R.12/058	211	67	172	60	8.4	9.96	12	
245	A260.25.R.14/058	261	67	222	60	8.4	16.79	14	
310	A260.31.R.18/058	326	84	280	60	8.4	31.53	18	
395	A260.40.R.22/058	411	84	365	60	8.4	67.98	22	

Ordering example: 1 piece A260.08.R.05/058

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

	d_1 [mm]				
SAKU 1706..	**77 - 395**	10000155/M5,0X14/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20	S4/SW4

7818048/EXZS	7818043/K	7818044/M8X21/R-L

B190-B193

B238

B242-B246

B62

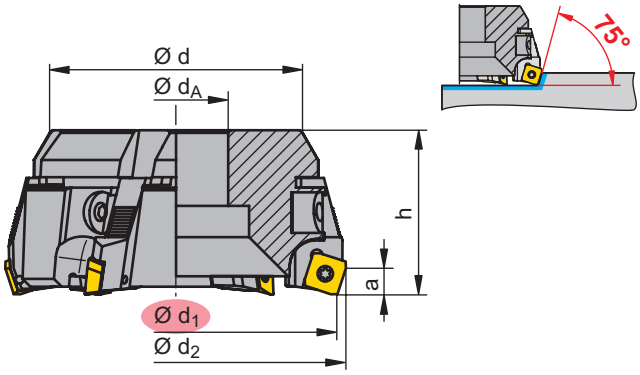
7818.../KA

B169

CERATIZIT hard material matters

Face milling cutters

A260-018



d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	[kg]	z	
82	A260.08.R.05/018	88	52	66	27	9	1.31	5	SP.. 1204..
102	A260.10.R.06/018	108	52	86	32	9	1.92	6	
125	A260.12.R.07/018	131	63	95	40	9	3.47	7	
160	A260.16.R.10/018	166	63	130	40	9	6.01	10	
200	A260.20.R.12/018	206	63	172	60	9	9.87	12	
250	A260.25.R.14/018	256	63	222	60	9	16.69	14	
315	A260.31.R.18/018	321	80	280	60	9	31.44	18	
400	A260.40.R.22/018	406	80	365	60	9	67.49	22	

Ordering example: 1 piece A260.08.R.05/018

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

	d_1 [mm]				
SP.. 1204..	**82 - 400**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 4,0Nm/SORT T20	7818044/M8X21/R-L

S4/SW4	7818043/K	7818048/EXZS

B190-B193

B238

B242-B246

B66

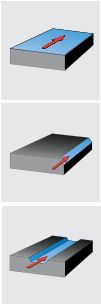
B78

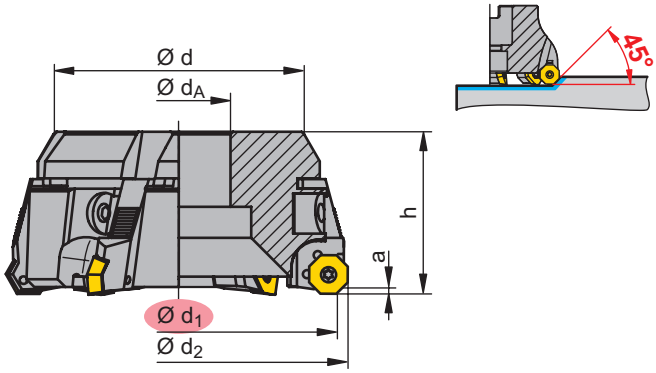
7818.../KA

B169

Face milling cutters

A260-057





d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	[kg]	z	
82	A260.08.R.05/057	92.2	54	66	27	3.5	1.52	5	OAKU 06..
102	A260.10.R.06/057	112.2	54	86	32	3.5	1.90	6	
125	A260.12.R.07/057	135.2	65	95	40	3.5	3.48	7	
160	A260.16.R.10/057	170.2	65	130	40	3.5	5.98	10	
200	A260.20.R.12/057	210.2	65	172	60	3.5	9.75	12	
250	A260.25.R.14/057	260.2	65	222	60	3.5	15.69	14	
315	A260.31.R.18/057	325.2	82	280	60	3.5	31.38	18	
400	A260.40.R.22/057	410.2	82	365	60	3.5	67.33	22	

Ordering example: 1 piece A260.08.R.05/057

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

	d_1 [mm]				
OAKU 06..	**82 - 400**	10000155/M5,0X14/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20	S4/SW4

7818044/M8X21/R-L	7818043/K	7818048/EXZS

B190-B193

B238

B242-B246

B56

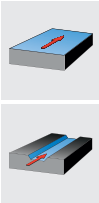
B78

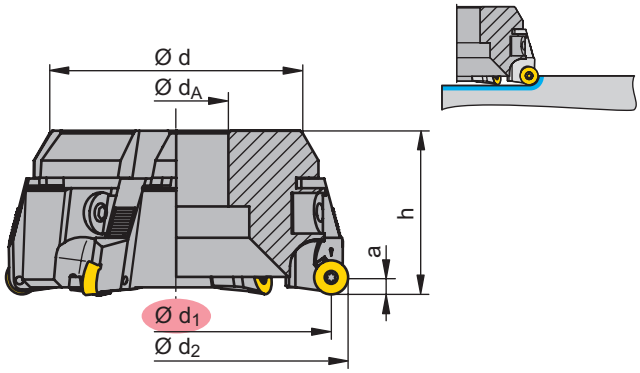
7818.../KA

B169

Button insert cutters

A260-052/-053





d_1 [mm]	Type, description	d_2 [mm]	h [mm]	d [mm]	d_A [mm]	a [mm]	[kg]	z	
80	A260.08.R.05/052	92	52	66	27	6	1.33	5	RP.. 1204..
100	A260.10.R.06/052	112	52	86	32	6	1.94	6	
123	A260.12.R.07/052	134	63	95	40	6	3.49	7	
158	A260.16.R.10/052	170	63	130	40	6	6.04	10	
198	A260.20.R.12/052	210	63	172	60	6	9.91	12	
248	A260.25.R.14/052	260	63	222	60	6	16.74	14	
313	A260.31.R.18/052	325	80	280	60	6	31.51	18	
398	A260.40.R.22/052	410	80	365	60	6	67.56	22	
80	A260.08.R.05/053	96	52	66	27	8	1.30	5	RP.. 1605..
100	A260.10.R.06/053	116	52	86	32	8	1.92	6	
123	A260.12.R.07/053	139	63	95	40	8	3.46	7	
158	A260.16.R.10/053	174	63	130	40	8	6.00	10	
198	A260.20.R.12/053	214	63	172	60	8	9.86	12	
248	A260.25.R.14/053	264	63	222	60	8	16.68	14	
313	A260.31.R.18/053	329	80	280	60	8	31.43	18	
398	A260.40.R.22/053	414	80	365	60	8	67.47	22	

Ordering example: 1 piece A260.08.R.05/052

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

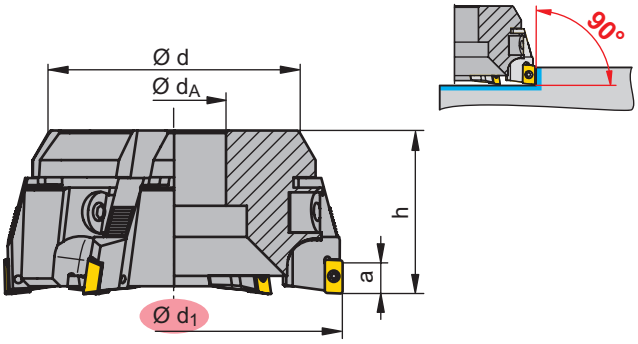
	d_1 [mm]				
RP.. 1204..	**80 - 398**	7883209/M3,5X8,6/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	7818044/M8X21/R-L
RP.. 1605..	**80 - 398**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 4,0Nm/SORT T20	7818044/M8X21/R-L

S4/SW4	7818043/K	7818048/EXZS
S4/SW4	7818043/K	7818048/EXZS

B190-B193 B238 B242-B246 B58 **7818.../KA** B169

Shoulder & slot milling cutters

A260-054/-056



d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]		[kg]	z	
89	A260.08.R.05/054	52	66	27	10		1.33	5	XD.. 11..
109	A260.10.R.06/054	52	89	32	10		1.95	6	
132	A260.12.R.07/054	63	95	40	10		3.50	7	
167	A260.16.R.10/054	63	130	40	10		6.05	10	
207	A260.20.R.12/054	63	172	60	10		9.92	12	
257	A260.25.R.14/054	63	222	60	10		16.76	14	
322	A260.31.R.18/054	80	280	60	10		31.53	18	
407	A260.40.R.22/054	80	365	60	10		67.59	22	
89	A260.08.R.05/056	52	66	27	14		1.33	5	XD.. 15..
109	A260.10.R.06/056	52	89	32	14		1.95	6	
132	A260.12.R.07/056	63	95	40	14		3.50	7	
167	A260.16.R.10/056	63	130	40	14		6.05	10	
207	A260.20.R.12/056	63	172	60	14		9.92	12	
257	A260.25.R.14/056	63	222	60	14		16.76	14	
322	A260.31.R.18/056	80	280	60	14		31.53	18	
407	A260.40.R.22/056	80	365	60	14		67.59	22	

Ordering example: 1 piece A260.08.R.05/054

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

	d_1 [mm]				
XD.. 11..	**89 - 407**	10000125/M2,5X7,3/08TP	10000276/TORX 08IP	DMSD 1,6Nm/SORT 08IP	7818044/M8X21/R-L
XD.. 15..	**89 - 407**	10006887/M3,5X8,6/15IP	10006919/TORX 15IP	DMSD 3,2Nm/SORT 15IP	7818044/M8X21/R-L

S4/SW4	7818043/K	7818048/EXZS
S4/SW4	7818043/K	7818048/EXZS

B190-B193

B236

B238

B242-B246

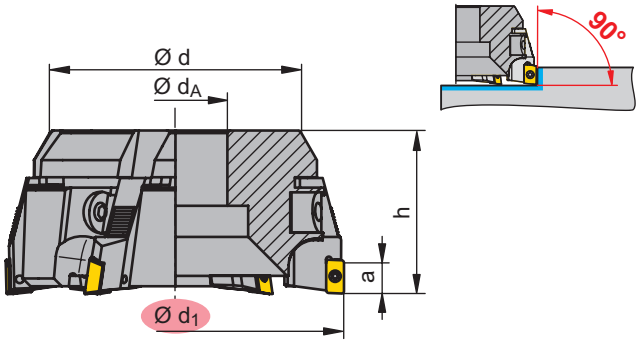
B71-B73

7818.../KA

B169

Shoulder & slot milling cutters

A260-042/-051



d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]		[kg]	z	
89	A260.08.R.05/042	52	66	27	8		1.33	5	AP.. 1003..
109	A260.10.R.06/042	52	86	32	8		1.94	6	
132	A260.12.R.07/042	63	95	40	8		3.49	7	
167	A260.16.R.10/042	63	130	40	8		6.04	10	
207	A260.20.R.12/042	63	172	60	8		9.91	12	
257	A260.25.R.14/042	63	222	60	8		16.74	14	
322	A260.31.R.18/042	80	280	60	8		31.50	18	
407	A260.40.R.22/042	80	365	60	8		67.56	22	
89	A260.08.R.05/051	52	66	27	14		1.32	5	LD.. 1504..
109	A260.10.R.06/051	52	86	32	14		1.94	6	
132	A260.12.R.07/051	63	95	40	14		3.49	7	
167	A260.16.R.10/051	63	130	40	14		6.04	10	
207	A260.20.R.12/051	63	172	60	14		9.90	12	
257	A260.25.R.14/051	63	222	60	14		16.74	14	
322	A260.31.R.18/051	80	280	60	14		31.50	18	
407	A260.40.R.22/051	80	365	60	14		67.56	22	

Ordering example: 1 piece A260.08.R.05/042

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

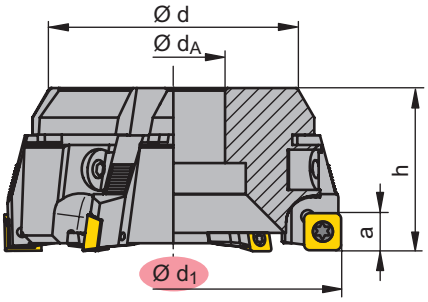
	d_1 [mm]				
AP.. 1003..	**89 - 407**	7815101/M2,5X6,0/T08	7724106/TORX T08	DMSD 1,2Nm/SORT T08	7818044/M8X21/R-L
LD.. 1504..	**89 - 407**	7883209/M3,5X8,6/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	7818044/M8X21/R-L

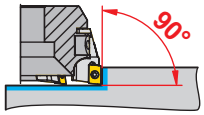
S4/SW4	7818043/K	7818048/EXZS
S4/SW4	7818043/K	7818048/EXZS

B190-B193 B236 B238 B242-B246 B46+B51 7818.../KA B169

Shoulder & slot milling cutters

A260-039/-055





d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]		[kg]	z	
89	A260.08.R.05/055	52	66	27	8		1.34	5	SD.. 09T3..
109	A260.10.R.06/055	52	86	32	8		1.96	6	
132	A260.12.R.07/055	63	95	40	8		3.51	7	
167	A260.16.R.10/055	63	130	40	8		6.07	10	
207	A260.20.R.12/055	63	172	60	8		9.94	12	
257	A260.25.R.14/055	63	222	60	8		16.78	14	
322	A260.31.R.18/055	80	280	60	8		31.55	18	
407	A260.40.R.22/055	80	365	60	8		67.62	22	
89	A260.08.R.05/039	52	66	27	12		1.32	5	SD.. 1205..
109	A260.10.R.06/039	52	86	32	12		1.94	6	
132	A260.12.R.07/039	63	95	40	12		3.48	7	
167	A260.16.R.10/039	63	130	40	12		6.03	10	
207	A260.20.R.12/039	63	172	60	12		9.89	12	
257	A260.25.R.14/039	63	222	60	12		16.73	14	
322	A260.31.R.18/039	80	280	60	12		31.49	18	
407	A260.40.R.22/039	80	365	60	12		67.54	22	

Ordering example: 1 piece A260.08.R.05/055

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

	d_1 [mm]				
SD.. 09T3..	**89 - 407**	7722111/M3,5X7,2/T15	7724103/TORX T15	DMSD 3,2Nm/SORT T15	7818044/M8X21/R-L
SD.. 1205..	**89 - 407**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 4,0Nm/SORT T20	7818044/M8X21/R-L

S4/SW4	7818043/K	7818048/EXZS
S4/SW4	7818043/K	7818048/EXZS

B190-B193

B238

B242-B246

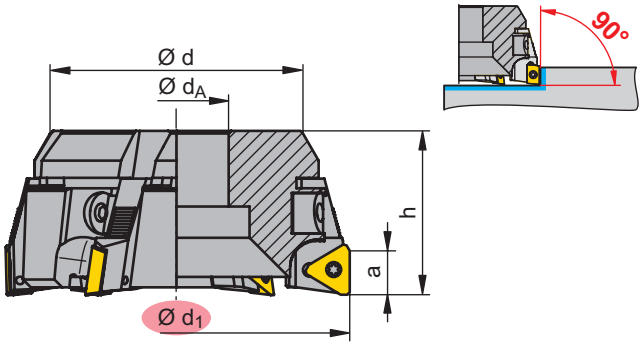
B63

7818.../KA

B169

Shoulder & slot milling cutters

A260-025



d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]		[kg]	z	
89	A260.08.R.05/025	52	66	27	18		1.31	5	TP.. 2204..
109	A260.10.R.06/025	52	86	32	18		1.93	6	
132	A260.12.R.07/025	63	95	40	18		3.47	7	
167	A260.16.R.10/025	63	130	40	18		6.02	10	
207	A260.20.R.12/025	63	172	60	18		9.88	12	
257	A260.25.R.14/025	63	222	60	18		16.71	14	
322	A260.31.R.18/025	80	280	60	18		31.46	18	
407	A260.40.R.22/025	80	365	60	18		67.51	22	

Ordering example: 1 piece A260.08.R.05/025

Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

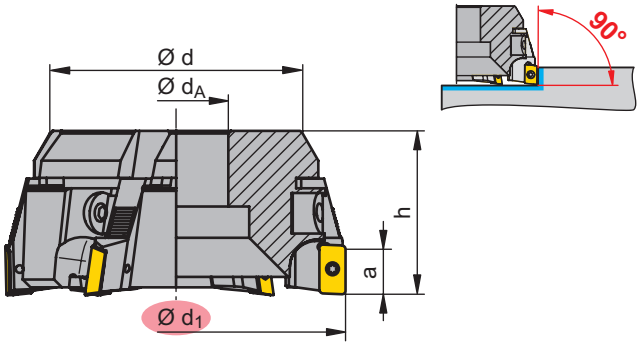
	d_1 [mm]				
TP.. 2204..	**89 - 407**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 4,0Nm/SORT T20	7818044/M8X21/R-L

S4/SW4	7818043/K	7818048/EXZS

B190-B193 B238 B242-B246 B68 **7818.../KA** B169

Shoulder & slot milling cutters

A260-026



d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]		[kg]	z	
89	A260.08.R.05/026	52	66	27	18		1.31	5	LP.. 2004..
109	A260.10.R.06/026	52	86	32	18		1.93	6	
132	A260.12.R.07/026	63	95	40	18		3.47	7	
167	A260.16.R.10/026	63	130	40	18		6.02	10	
207	A260.20.R.12/026	63	172	60	18		9.88	12	
257	A260.25.R.14/026	63	222	60	18		16.71	14	
322	A260.31.R.18/026	80	280	60	18		31.46	18	
407	A260.40.R.22/026	80	365	60	18		67.51	22	

Ordering example: 1 piece A260.08.R.05/026

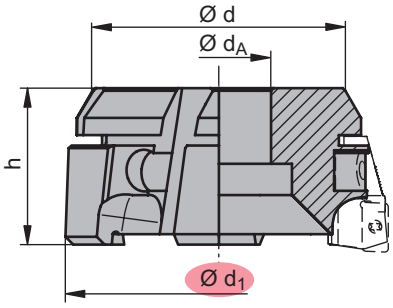
Supply details: cutter body, cassettes, clamping screws, wedges, insert clamping screws, S4 clamping key, eccentric key

	d_1 [mm]				
LP.. 2004..	**89 - 407**	7822114/M4,5X10,5/T20	7724104/TORX T20	DMSD 4,0Nm/SORT T20	7818044/M8X21/R-L

S4/SW4	7818043/K	7818048/EXZS

B190-B193 B238 B242-B246 B55 7818.../KA B169

Cutter bodies



d_1 [mm]	Type, description	d [mm]	h [mm]	d_A [mm]			[kg]		
80	A260.08.R.05	66	49	27			0.97		
98	A260.10.R.06	86	49	32			1.52		
119	A260.12.R.07	95	60	40			2.99		
154	A260.16.R.10	130	60	40			5.33		
194	A260.20.R.12	172	60	60			9.05		
244	A260.25.R.14	222	60	60			15.75		
309	A260.31.R.18	280	77	60			30.23		
394	A260.40.R.22	365	77	60			66.00		

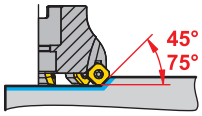
Ordering example: 1 piece A260.08.R.05

Supply details: cutter body, clamping screws, wedges, S4 clamping key, eccentric key.
Without inserts and cassettes.

	d_1 [mm]				
78180..	**80 - 394**	7818044/M8X21/R-L	7818043/K	7818048/EXZS	S4/SW4

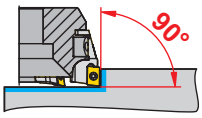
Cassettes for system 260

Cassettes for face milling



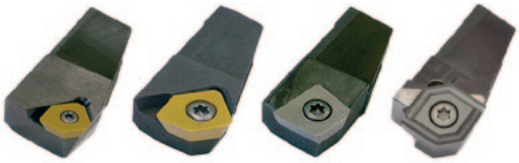
7818... 041 031 029 032 018 052 053 057 058

Cassettes for shoulder milling



7818... 054 056 055 039 051 025 026

Cassettes for finishing



7818... 041 031 018 057

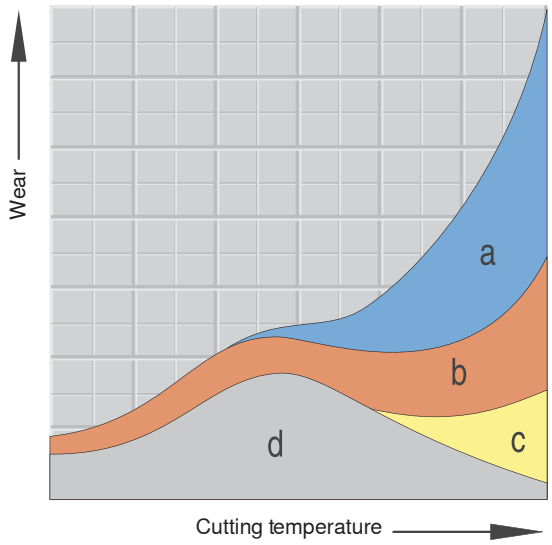
B177

Type, description	Assembled cutter	Diameter range		
7818041/KA	270-09	80-398	SD.. 0903..	B157
7818031/KA	270-12	80-398	SD.. 1204..	B157
7818029/KA	x	80-398	SE.. 1204..	B158
7818032/KA	270-15	75-393	SD.. 1504..	B158
7818018/KA	x	82-400	SP.. 1204..	B160
7818052/KA	251-12	82-398	RP.. 1204..	B162
7818053/KA	251-16	76-394	RP.. 1605..	B162
7818054/KA	211-11/HSC-11	89-407	XD_T 11T3	B163
7818039/KA	490-12	89-407	SD.. 1205..	B165
7818055/KA	490-09	89-407	SD.. 09T3..	B165
7818051/KA	241-15	89-407	LD.. 1504..	B164
7818025/KA	x	89-407	TPKW 2204..	B166
7818026/KA	x	89-407	LPH.. 2004..	B167
7818056/KA	211-15	89-407	XD_T 1505	B163
7818057/KA	273-06	80-398	OAKU 06..	B161
7818058/KA	271-17	77-395	SAKU 17..	B159

Causes of wear

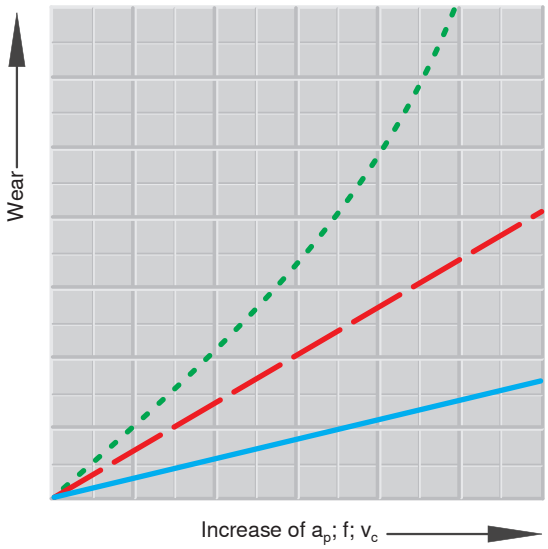
Wear is caused through simultaneous mechanical and thermal stress of the cutting edge.
The most common causes are:

> Mechanical abrasion
> Damage due to built-up edge (BUE)
> Oxidation processes
> Diffusion



a = diffusion
b = mechanical abrasion
c = oxidation
d = damage due to built-up edge (BUE)

With increasing cutting temperature the thermally caused wear types of oxidation and diffusion prevail.



Cutting speed
Feed rate
Cutting depth

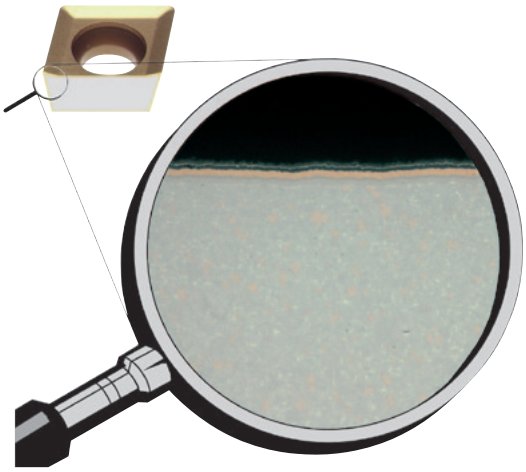
Cutting temperature and wear depend decisively upon the machining conditions.

Benefits of hard material coatings

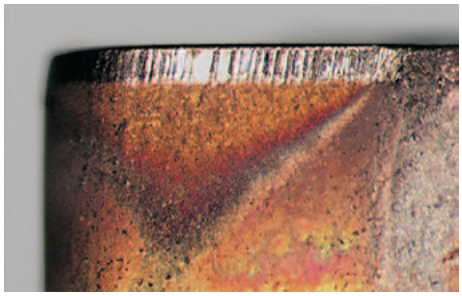
Depositing hard material layers on carbide tools positively influences wear characteristics.

The advantages of hard material layers consist in the reduction of:

> Friction
> Temperature changes
> Oxidation
> Diffusion



Flank wear



Abrasion on flank, normal wear after a certain machining time.

Reasons:
> Cutting speed too high
> Carbide grade with insufficient wear resistance
> Incorrect feed rate

Remedies:
> Reduce cutting speed
> Select more wear resistant carbide grade
> Adapt feed rate to cutting speed and cutting depth (increase feed rate)

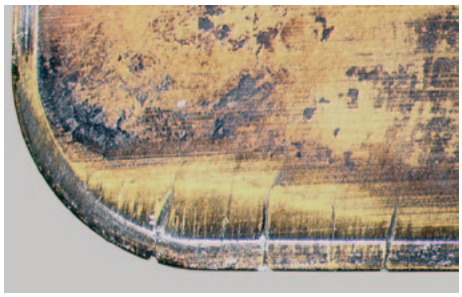
Edge chipping

Through excessive mechanical stress at the cutting edge fracture and chipping can occur.

Reasons:
> * UDGHZLWKWRKLJKZHDUUHVLVWDQFH
> Vibration
> Feed rate too high or too large cutting depth
> Built-up edge, chip clogging
> Cutting edge geometry too positive

Remedies:
> Use tougher grade
> Use negative cutting edge geometry with chip groove
> Improve stability (tool, work piece)
> Increase cutting speed
> Reduce feed rate

Thermal cracking



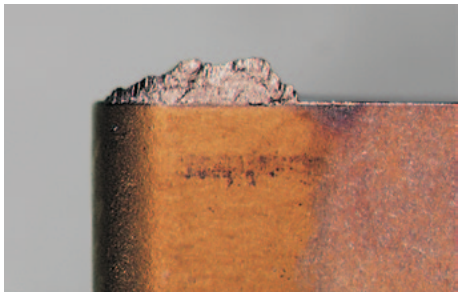
6 P DQFUDFNVDWV VWRFXWQJHGJH

Reasons:
> Varying temperature of cutting edge, thermal shock
> Incorrect cooling
> High tensile materials
> Cutting speed too high

Remedies:
> Use grade that is resistant to thermal cracking
> Apply cooling lubricant abundantly or use dry milling
> Reduce cutting speed
> Decrease feed rate

Types of wear

Built-up edge



Built-up edge occurs when the chip is not evacuated properly due to insufficient cutting temperature.

Reasons:
> Too low cutting speed
> Too small rake angle
> Wrong cutting material
> Lack of cooling / lubrication

Remedies:
> Increase cutting speed
> Enlarge rake angle
> Apply TiN-coating
> Use emulsion with higher concentration

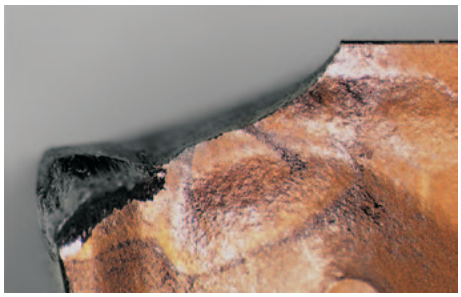
Notching

Notch at the maximum cutting depth.

Reasons:
> Cold work hardening materials (e.g. super alloys)
> Cast and forging skin
> Formation of burrs

Remedies:
> Decrease cutting speed
> Climb milling
> Change working orientation of the milling cutter
> Reduce approach angle

Insert breakage



Excessive stress of the insert causes breakage.

Reasons:
> Excessive stress of the carbide grade
> Lack of stability
> Corner angle too small
> Excessive notching
> Sudden changes of cutting forces

Remedies:
> Use tougher cutting material
> Use protective edge chamfer
> Increase edge hone
> Use more stable geometry
> Reduce feed rate

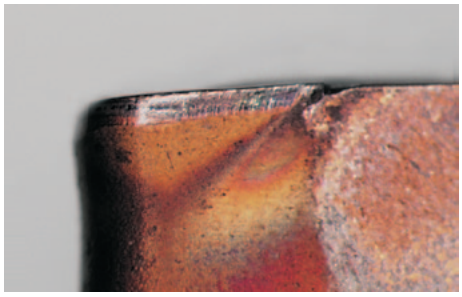
Cratering

The hot chip which is being evacuated causes cratering at the rake face of the cutting edge.

Reasons:
> Cutting speed and / or feed rate too high
> Rake angle too shallow
> * UDGHZ LWKGRZ ZHDUUHVLVWDQFH
> Insufficient coolant supply

Remedies:
> Reduce cutting speed and / or feed rate
> Increase coolant quantity and / or pressure, optimize coolant supply
> Use grade with higher resistance to cratering

Plastic deformation



High machining temperature and simultaneous mechanical stress can lead to plastic deformation.

Reasons:
> Too high machining temperature, resulting in softening of substrate
> Damaged coatings

Remedies:
> Reduce cutting speed
> Choose carbide grade with higher wear resistance
> Provide cooling

CERATIZIT hard material matters

Measures for milling problems

Type of problem													Corrective measures
Flank wear	Edge chipping	Thermal cracks	Built-up edge	Notching	Insert breakage, edge chipping	Cratering	Deformation of cutting edge	Bad work piece surface	Chattering, vibration	Chip formation, chip jamming	Edge chipping on the work piece	Overstress of the machine	
↓	↑	↓	↑	↓		↓	↓	↑	~			↓	Cutting speed
↑	↓	↓	↑	↓	↓	↓	↓	↓	~		↓	↓	Feed rate per tooth
	↑	~		↑	↑								Toughness of cutting material
↑				~		↑	↑ ~						Wear resistance of cutting material
		↓	~	↓					↓	~	↓	↓	Approach angle
	~		↑ ~	~	~		↑ ~		↑	~			Rake angle
	↑		~	↑				↓			↓		Cutting edge facet
	↑				↑			↑	↑				Stability
								↑	↑		~		Precision of axial & radial run-out
~	~				~		~	~			~		Wear of cutting edge
					~			~	~		~		Positioning of the milling tool
		↑	↑	↑		↑	~	~		~			Cooling, chip removal
					~			~	~				Insert, cassette clamping
	~			~	~			~	~		↓	↓	Depth of cut

↑ raise, increase

↓ lower, decrease

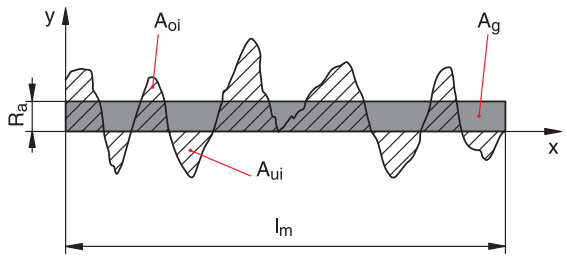
~ check, optimize

Definition of measured variables for surface quality

The surface quality of milled work pieces is influenced through
> the machine tool (condition, stability)
> the milling tool (cutting edge geometry, construction)
> the application data (v_f, v_c, f_z)
> the work piece (geometry, material, clamping)

The *average roughness value* R_a is the arithmetical mean of the roughness profile within the entire measured length l_m.

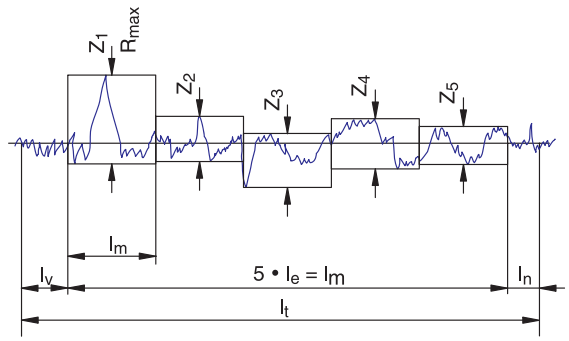
$$R_a = \frac{1}{l_m} \int_{x=0}^{x=l_m} |y| \, dx$$



Average roughness value R_a

Average roughness depth R_z is the arithmetic mean resulting from the single roughness depths Z_i of five successive single measured lengths.

$$R_z = \frac{\sum_{i=1}^{5} Z_i}{5}$$



Determination of the average roughness depth R_z from the roughness profile

Maximum roughness depth R_{max} is the largest single roughness depth Z_i on the measured length l_m.

In order to produce an excellent surface finish with insert milling cutters, inserts with wiper facets are employed.

Maximum profile depth P_t

f [mm]	l_1 [mm]				
	1,0	1,4	1,6	2,5	9,0
0,3	0,5	0,5	0,5	0,5	0,5
0,45	0,8	0,8	0,8	0,8	0,8
0,6	1,0	1,0	1,0	1,0	1,0
0,75	1,3	1,3	1,3	1,3	1,3
1,0	1,7	1,7	1,7	1,7	1,7
1,5	20,0	5,0	2,7	2,7	2,7
2,0	30,0	19,0	13,0	4,0	4,0
2,5	37,0	27,0	23,0	6,4	4,4
3,0	40,0	33,0	29,0	12,0	5,0

f [mm]	l_1 [mm]				
	1,0	1,4	1,6	2,5	9,0
3,5	44,0	37,0	34,0	19,0	6,0
5,0	49,0	44,0	42,0	32,0	8,7
7,5	53,0	50,0	48,0	42,0	13,0
12,0	56,0	54,0	53,0	50,0	23,0
20,0	58,0	57,0	56,0	55,0	41,0
30,0	59,0	58,0	58,0	57,0	50,0
40,0	59,0	59,0	59,0	58,0	54,0
50,0	59,0	59,0	59,0	59,0	57,0
60,0	60,0	60,0	60,0	59,0	60,0

Calculation example:

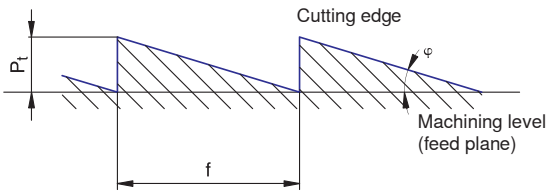
Type of cutter: A260.12.R.07
Insert: SPKW 1504AE
Cutter diameter d_1: 125 mm
Number of teeth z: 7
Feed per tooth f_z: .125 mm
Feed per revolution f: .875 mm
Facet length l_1: ≈ 2.5 mm

$f = f_z \cdot z = 0{,}125 \cdot 7 = 0.875$ mm

Maximum profile depth Pt ≈ 1.6 µm

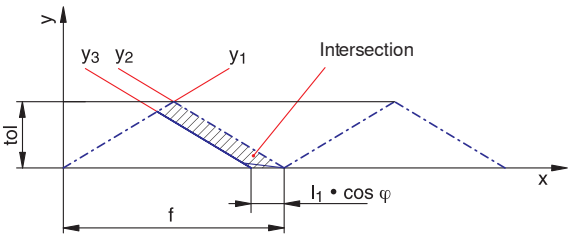
$f < l_1$:
Profile is produced by the deepest cutting edge axially.

$$P_t = f \cdot \tan(\varphi)$$



$f > l_1$:
Several cutting edges produce the surface

$$P_t = tol + l_1\left(\frac{\sin\varphi}{z} - \frac{\cos\varphi \cdot tol}{f}\right)$$



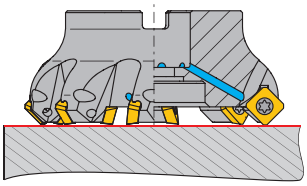
E.g.:
tol ≈ axial run-out of cutter (.04 mm) + adapter run-out (.02 mm) = .06 mm (φ ≈ 6' or .1°)

E.g.:
P_t [µm] tol* = .04 mm + .02 mm
Tool clamping
Tool clamping

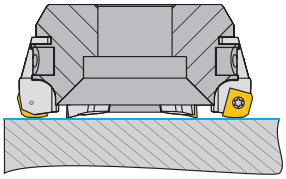
*) In most cases considerably more accurate axial run-out values will result. With .06 mm an excessive tolerance condition is assumed. If the cutting edges are precisely adjusted, the axial run-out will be negligible.

Conventional

1) Roughing

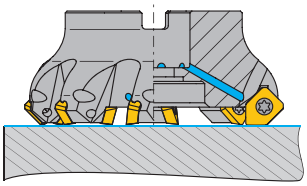


2) Finishing

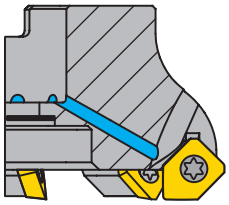
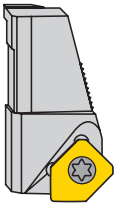
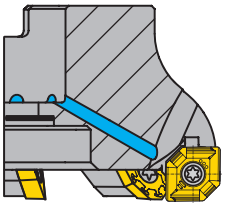
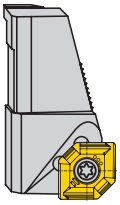
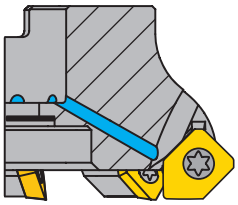
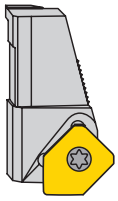


CERATIZIT MasterFinish

Roughing and finishing in a single operation

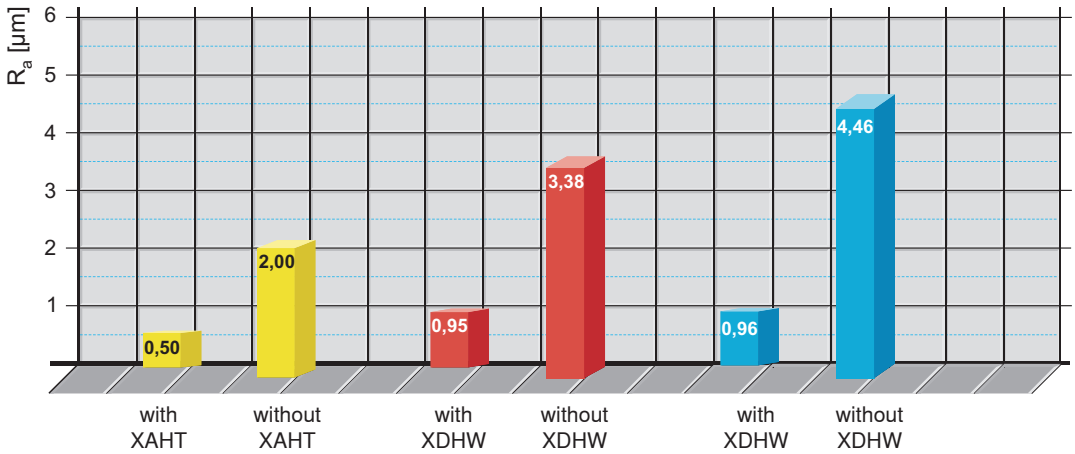


Application in the following CERATIZIT milling systems:

270-09	260-41	273-06	260-57	270-12	260-31
					
Ø 32 - 160	Ø 80 - 400	Ø 40 - 315	Ø 80 - 398	Ø 32 - 160	Ø 80 - 400
B128	B157	B135-B137	B161	B129	B157

Examples for economic application:

Finish milling with XDHW



A273.125.R.17-06
OAKU 060508SR-M50 CTP2235
XAHT 060508SR-F50 CTP2235
1.4571 (stainless, tempered steel)
X6CrNiMoTi 17 12 2
a_e = 80 mm
a_p = .5 mm
f_z = .25 mm
v_c = 200 m/min

A270.125.R.12-12
SDHT 1204AESN-R SR226+
XDHW 1204AESN SR226+
1.7225 (non alloyed, tempered steel)
42CrMo4
a_e = 96 mm
a_p = .5 mm
f_z = .25 mm
v_c = 350 m/min

A270.125.R.12-12
SDHT 1204AESN-R SR226+
XDHW 1204AESN SR226+
1.7225 (non alloyed tempered steel)
42CrMo4
a_e = 96 mm
a_p = .5 mm
f_z = .25 mm
v_c = 400 m/min

www.ceratizit.com

The CERATIZIT formula collection

Cutting speed [m/min]

$$v_c = \frac{d_1 \bullet \pi \bullet n}{1000}$$

Revolutions of spindle [min^{-1}]

$$n = \frac{v_c \bullet 1000}{d_1 \bullet \pi}$$

Feed per tooth [mm]

$$f_z = \frac{v_f}{n \bullet z}$$

Feed rate [mm/min]

$$v_f = f_z \bullet n \bullet z$$

Feed per revolution [mm]

$$f = f_z \bullet z$$

Metal removal rate [cm^3/min]

$$Q = \frac{a_p \bullet a_e \bullet v_f}{1000}$$

Perpendicular rake angle [°]

$$\gamma_0 = \arctan[\cos(\kappa_r) \bullet \tan(\gamma_p) + \sin(\kappa_r) \bullet \tan(\gamma_f)]$$

Medium chip thickness [mm]:

$$h_m = \frac{\sin(\kappa) \bullet 180 \bullet a_e \bullet f_z}{\pi \bullet d_1 \bullet \arcsin\left(\frac{a_e}{d_1}\right)}$$

Specific cutting force:

$$k_c = h_m^{-mc} \bullet k_{c1.1}$$

Power consumption [kW]:

$$P_{mot} = \frac{a_p \bullet a_e \bullet v_f}{60 \bullet 10^6 \bullet \eta_m} \bullet k_c$$

Material designations & dimensions

a_e Cutting width [mm]

a_p Depth of cut [mm]

d_1 Cutter diameter [mm]

D_w Work piece diameter [mm]

f_z Feed per tooth [mm]

h_m Medium chip thickness [mm]

k Number of insert rows

k_c Specific cutting force [N/mm^2]

$k_{c1.1}$ Specific cutting force for 1 mm^2 chip cross section [N/mm^2]

l_1 Length of wiper facet [mm]

m_c Increase of specific cutting force

n Revolutions of spindle [min^{-1}]

P_{mot} Power consumption [kW]

Q Metal removal rate [cm^3]

v_c Cutting speed [m/min]

v_f Feed rate [mm/min]

z Effective numer of edges [pcs.]

η_m Mechanical efficiency [%]

γ_0 Perpendicular rake angle (effective rake angle) > @

γ_f Lateral rake angle (radial rake anglel) > @

γ_p Tool back clearance (axial rake angle) > @

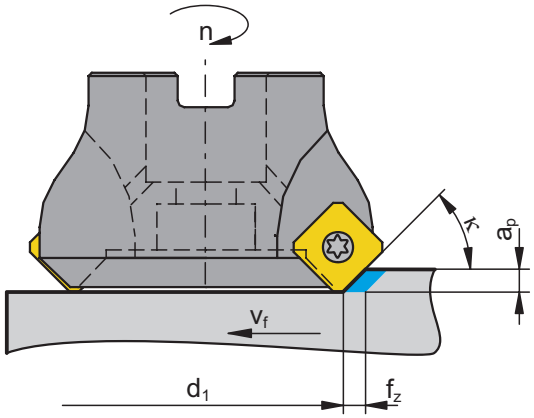
γ_w Rake angle of the insert > @

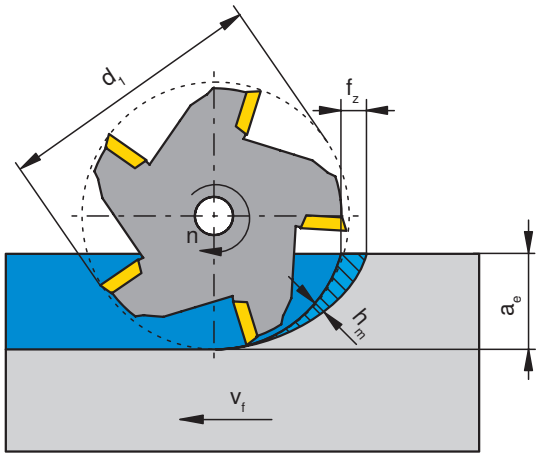
κ Cutting edge angle (approach angle) [°]

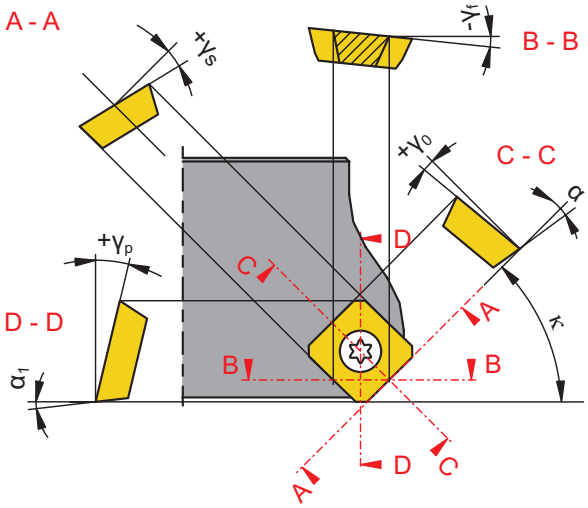
λ_s Inclination angle > @

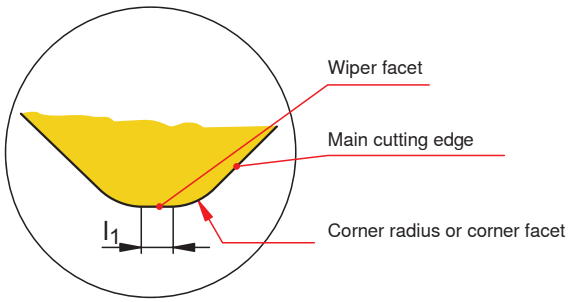
a Clearance angle > @

a_1 Clearance angle of the corner facet > @









Calculation example:

Cutter type: ... A270.40.R.04
Insert: ... SDMT 1204AESN-29R
Cutter diameter: ... 40 mm
Effective number of teeth: ... 4
Depth of cut a_p: ... 2 mm
Cutting width a_e: ... 28 mm
Approach angle κ: ... 45°
Axial rake angle γ_p
Radial rake angle γ_f

Selected cutting speed
v_c: ... 225 m/min

Calculation of rev number:

$$n = \frac{225 \cdot 1000}{40 \cdot \pi} = 1790\ \text{min}^{-1}$$

Selected feed per tooth ... 0.15 mm

Calculation of feed rate:

$$v_f = 0{,}15 \cdot 1790 \cdot 4 = 1074\ \text{mm/min}$$

Calculation of chip removal rate:

$$Q = \frac{2 \cdot 28 \cdot 1074}{1000} = 60\ \text{cm}^3/\text{min}$$

Calculation of the perpendicular rake angle:

$$\gamma_0 = \arctan \begin{bmatrix} \cos(90°) \cdot \tan(13°) \\ + \sin(90°) \cdot \tan(-6°) \end{bmatrix} = -6°$$

Medium chip thickness [mm]:

$$h_m = \frac{\sin(90°) \cdot 180 \cdot 28 \cdot 0{,}15}{\pi \cdot 40 \cdot \arcsin\left(\frac{28}{40}\right)} = 0{,}13\ \text{mm}$$

Specific cutting force:

$$k_c = 0{,}13^{-0{,}24} \cdot 1700 = 2774\ \text{N/mm}^2$$

Power consumption [kW]:

$$P_{mot} = \frac{2 \cdot 28 \cdot 1074}{60 \cdot 10^6 \cdot 0{,}80} \cdot 1700 = 2{,}13\ \text{kW}$$

Formulas

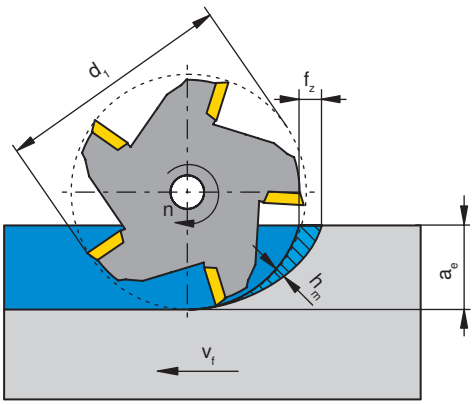
Formulas - medium chip thickness

The following equations give approximate figures in the proportion of a_e/d_1 (a_p/d_1)!

Peripheral milling cutters, side and face milling cutters

$$f_z \approx h_m \bullet \sqrt{\frac{d_1}{a_e}}$$

$$h_m \approx f_z \bullet \sqrt{\frac{a_e}{d_1}}$$



Calculation example:

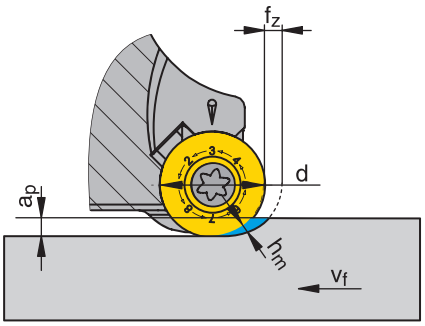
Cutter type: ... C244.25.R.02
Cutter diameter d_1: ... 25 mm
Width of cut a_e: ... 10 mm
Medium chip thickness h_m ... 0.15 mm

$$f_z \approx 0{,}15 \bullet \sqrt{\frac{25}{10}} \approx 0{,}24 \text{ mm}$$

Button insert cutters

$$f_z \approx h_m \bullet \sqrt{\frac{d}{a_p}}$$

$$h_m \approx f_z \bullet \sqrt{\frac{a_p}{d}}$$



Calculation example:

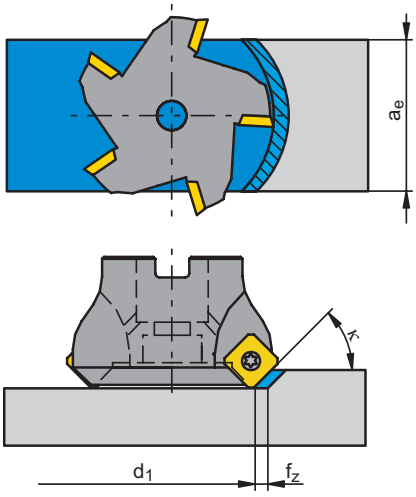
Cutter type: ... A251.63.R.06
Insert: ... RPHX 1204M0SN CTP1235
Insert diameter d: ... 12 mm
Depth of cut a_p: ... 2 mm
Requested medium chip thickness
h_m ... 0.15 mm

$$f_z \approx 0{,}15 \bullet \sqrt{\frac{12}{2}} \approx 0{,}37 \text{ mm}$$

Face milling cutter on centre above work piece

$$h_m = \frac{\sin(\kappa) \bullet 180 \bullet a_e \bullet f_z}{\pi \bullet d_1 \bullet \arcsin\left(\frac{a_e}{d_1}\right)}$$

$$f_z = \frac{h_m \bullet \pi \bullet d_1 \cdot \arcsin\left(\frac{a_e}{d_1}\right)}{\sin(\kappa) \bullet 180 \bullet a_e}$$



Calculation example:

Cutter type: ... A260.08.R.05/018
Cutter diameter d_1: ... 82 mm
Approach angle κ: ... 75°
Cutting width a_e: ... 70 mm
Medium chip thickness h_m ... 0.2 mm

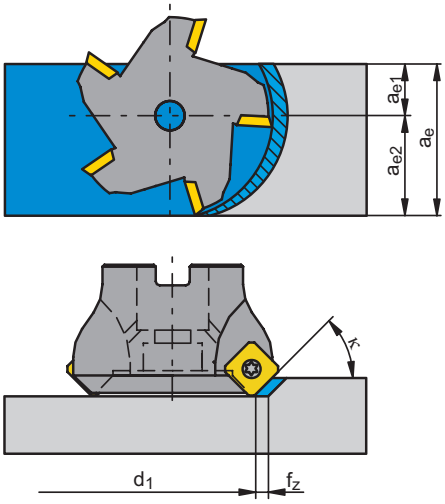
$$f_z = \frac{0{,}2 \bullet \pi \bullet 82 \bullet \arcsin\left(\frac{70}{82}\right)}{\sin(75) \cdot 180 \cdot 70}$$

f_z = 0,25 mm

Face milling cutter - off-centre above work piece

$$h_m = \frac{\sin(\kappa) \bullet 360 \bullet a_e \bullet f_z}{\pi \bullet d_1 \bullet \left[\arcsin\left(\frac{2 \bullet a_{e1}}{d_1}\right) + \arcsin\left(\frac{2 \bullet a_{e2}}{d_1}\right)\right]}$$

$$f_z = \frac{h_m \bullet \pi \bullet d_1 \bullet \left[\arcsin\left(\frac{2 \bullet a_{e1}}{d_1}\right) + \arcsin\left(\frac{2 \bullet a_{e2}}{d_1}\right)\right]}{\sin(\kappa) \bullet 360 \bullet a_e}$$



Calculation example:

Cutter type: ... A270.10.R.06/018
Cutter diameter d_1: ... 102 mm
Approach angle κ: ... 75°
Width of cut a_e: ... 70 mm
Width of cut a_{e1}: ... 20 mm
Width of cut a_{e2}: ... 50 mm
Medium chip thickness h_m ... 0.2 mm

$$f_z = \frac{0{,}2 \bullet \pi \bullet 102 \bullet \left[\arcsin\left(\frac{2 \bullet 20}{102}\right) + \arcsin\left(\frac{2 \bullet 50}{102}\right)\right]}{\sin(75°) \cdot 360 \cdot 70}$$

f_z = 0,27 mm

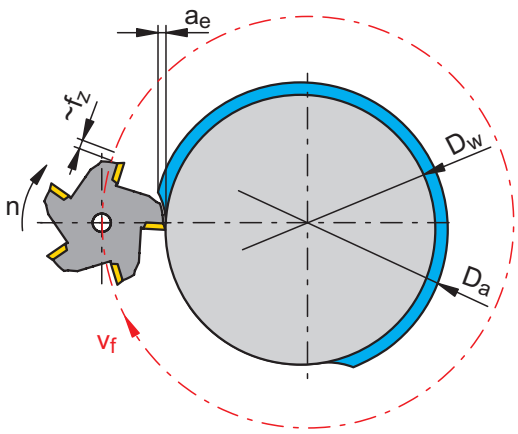
Helical milling - external

Feed rate (speed at centre of milling cutter)

$$v_f = (1+\frac{d_1}{D_w})\, n \cdot f_z \cdot z$$

Actual depth of cut

$$a_e = \frac{D_a^2 - D_w^2}{4 \bullet (D_w + d_1)}$$



Calculation example:

Cutter type: ... C210.25.R.04
Cutter diameter d_1: ... 25 mm
Number of teeth z: ... 4
Machined diameter D_w: ... 45 mm
Blank diameter D_a: ... 50 mm
Rev number n: ... 2500 rpm
Feed per tooth f_z: ... 0.05 mm

Feed rate:

$$v_f = (1+\frac{25}{45})\, 2500 \bullet 0{,}05 \bullet 4 = 777 \text{ mm/min}$$

Radial depth of cut:

(50 - 45)/2 = 2,5 mm

Effective radial depth of cut:

$$a_e = \frac{50^2 - 45^2}{4 \bullet (45 + 25)} = 1{,}7 \text{ mm}$$

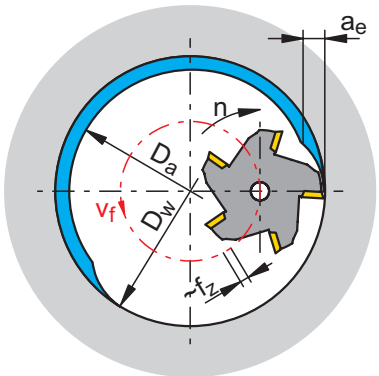
Helical milling - internal

Feed rate (speed at centre of milling cutter)

$$v_f = (1-\frac{d_1}{D_w})\, n \cdot f_z \cdot z$$

Actual depth of cut

$$a_e = \frac{D_w^2 - D_a^2}{4 \bullet (D_w + d_1)}$$



Calculation example:

Cutter type: ... C210.25.R.04
Milling cutter diameter d_1: ... 25 mm
Number of teeth z: ... 4
Machined diameter D_w: ... 50 mm
Blank diameter D_a: ... 45 mm
Rev number n: ... 2500 rpm
Feed per tooth f_z: ... 0.05 mm

Feed rate:

$$v_f = (1-\frac{25}{50})\, 2500 \bullet 0{,}05 \bullet 4 = 250 \text{ mm/min}$$

Radial depth of cut:

(50 - 45)/2 = 2,5 mm

Effective radial depth of cut:

$$a_e = \frac{50^2 - 45^2}{4 \bullet (50 - 25)} = 4{,}75 \text{ mm}$$

Hardness values

Comparison table

Tensile strength 1 P P	Vickers HV	Brinell HB	Rockwell HRC	Shore C
575	180	171		
595	185	176		
610	190	181		
625	195	185		
640	200	190	12,0	
660	205	195	13,0	
675	210	199	14,0	
690	215	204	15,0	
705	220	209	15,5	28
720	225	214	16,0	
740	230	219	17,0	29
755	235	223	18,0	
770	240	228	20,3	30
785	245	233	21,3	
800	250	238	22,2	31
820	255	242	23,1	32
835	260	247	24,0	33
850	265	252	24,8	
865	270	257	25,6	
880	275	261	26,4	34
900	280	268	27,1	
915	285	271	27,8	35
930	290	276	28,5	
950	295	280	29,2	36
965	300	285	29,8	37
995	310	295	31,0	38
1030	320	304	32,2	39
1060	330	314	33,3	40
1095	340	323	34,3	41
1125	350	333	35,5	42
1155	360	342	36,6	43
1190	370	352	37,7	44
1220	380	361	38,8	45
1255	390	371	39,8	46
1290	400	380	40,8	47
1320	410	390	41,8	48
1350	420	399	42,7	
1385	430	409	43,6	49
1420	440	418	44,5	
1455	450	428	45,3	51
1485	460	437	46,1	52
1520	470	447	46,9	53
1555	480	465	47,7	54
1595	490	466	48,4	
1630	500	475	49,1	57
1665	510	485	49,8	58
1700	520	494	50,5	59
1740	530	504	51,1	60

Tensile strength 1 P P	Vickers HV	Brinell HB	Rockwell HRC	Shore C
1775	540	513	51,7	61
1810	550	523	52,3	62
1845	560	532	53,0	63
1880	570	542	53,6	64
1920	580	551	54,1	65
1955	590	561	54,7	66
1995	600	570	55,2	67
2030	610	580	55,7	68
2070	620	589	56,3	69
2105	630	599	56,8	70
2145	640	608	57,3	71
2180	650	618	57,8	72
2210	660	628	58,3	73
2240	665	633	58,8	74
2280	670	638	59,3	
2310	675	643	59,8	75
2350	680	648	60,3	76
2380	685	653	61,1	77
2410	690	658	61,3	78
2450	695	663	61,7	79
2480	710	668	62,2	80
2520	720	678	62,6	81
2550	730	683	63,1	82
2590	740	693	63,5	
2630	750	703	63,9	83
2660	760	708	64,3	84
2700	770	718	64,7	85
2730	780	723	65,1	
2770	790	733	65,5	86
2800	800	738	65,9	
2840	810	748	66,3	87
2870	820	753	66,7	88
2910	830	763	67,0	
2940	840	768	67,4	89
2980	850		67,7	
3010	860		68,1	90
3050	870		68,4	
3080	880		68,7	91
3120	890		69,0	
3150	900		69,3	92
3190	910		69,6	
3220	920		69,9	
3260	930		70,1	

The figures given are approximate according to DIN EN ISO18265 (02-2004)

CERATIZIT hard material matters

Comparison of materials

Germany DIN	Mat. no.	United Kingdom BS	France AFNOR	Sweden SS	United States AISI	Japan JIS	$K_{c1.1}$ N/mm²	m_c	VDI 3323 group
10 SPb 20	1.0722		10 PbF 2		11 L 08		1350	.21	1
100 Cr 6	1.2067	BL 3	Y 100 C 6		L 3	SUJ2	1775	.24	6/9
105 WCr 6	1.2419		105 WC 13			SKS31	1775	.24	6/9
12 CrMo 9 10	1.7380	[illegible]* [illegible]	10 CD 9.10	2218	A 182-F22	SPVA,SCMV4	1675	.24	6/7
12 Ni 19	1.5680		Z 18 N 5		2515		2450	.23	10/11
13 CrMo 4 4	1.7335	[illegible]* [illegible]	15 CD 3.5	2216	A 182-F11; F12	SPVAF12	1675	.24	6/7
14 MoV 6 3	1.7715	1503-660-440					1675	.24	6/7
14 Ni 6	1.5622		16 N 6		A 350-LF 5		1675	.24	6/7
14 NiCr 10	1.5732		14 NC 11		3415	SNC415(H)	1675	.24	6/7
14 NiCr 14	1.5752	655 M 13	12 NC 15		3310; 9314	SNC815(H)	1675	.24	6/7
14 NiCrMo 13 4	1.6657						1675	.24	6/7
15 Cr 3	1.7015	523 M 15	12 C 3		5015		1675	.24	6/7
15 CrMo 5	1.7262		12 CD 4			SCM415(H)	1675	.24	6/7
15 Mo 3	1.5415	1501-240	15 D 3	2912	[illegible]* [illegible]		1675	.24	6/7
16 MnCr 5	1.7131	527 M 17	16 MC 5	2511	5115	SCR415	1675	.24	6/7
16 Mo 5	1.5423	1503-245-420			4520	SB450M	1675	.24	6/7
17 CrNiMo 6	1.6587	820 A 16	18 NCD 6				1675	.24	6/7
21 NiCrMo 2	1.6523	805 M 20	20 NCD 2	2506	8620	SNCM220(H)	1725	.24	6/8
25 CrMo 4	1.7218	1717 CDS 110	25 CD 4 S	2225	4130	SM420;SCM430	1725	.24	6/8
28 Mn 6	1.1170	150 M 28	20 M 5		1330		1500	.22	2
32 CrMo 12	1.7361	722 M 24	30 CD 12	2240			1775	.24	6/9
34 Cr 4	1.7033	530 A 32	32 C 4		5132	SCR430(H)	1725	.24	6/8
34 CrMo 4	1.7220	708 A 37	35 CD 4	2234	4135; 4137	SCM432;SCCRM3	1775	.24	6/9
34 CrNiMo 6	1.6582	817 M 40	35 NCD 6	2541	4340	SNCM447	1775	.24	6/9
35 S 20	1.0726	212 M 36	35 MF 4	1957	1140		1525	.22	2/3
36 CrNiMo 4	1.6511	816 M 40	40 NCD 3		9840	SNCM447	1775	.24	6/9
36 Mn 5	1.1167						1525	.22	2/3
36 NiCr 6	1.5710	640 A 35	35 NC 6		3135	SNC236	1800	.24	3/9
38 MnSi 4	1.5120						1800	.24	3/9
39 CrMoV 13 9	1.8523	897 M 39					1775	.24	6/9
40 Mn 4	1.1157	150 M 36	35 M 5		1039		1525	.22	2/3
40 NiCrMo 2 2	1.6546	311-Type 7	40 NCD 2		8740	SNCM240	1775	.24	6/9
41 Cr 4	1.7035	530 M 40	42 C 4		5140	SCR440(H)	1775	.24	6/9
41 CrAlMo 7	1.8509	905 M 39	40 CAD 6.12	2940	A 355 Cl. A	SACM645	1775	.24	6/9
41 CrMo 4	1.7223	708 M 40	42 CD 4 TS	2244	4142; 4140	SCM440	1775	.24	6/9
42 Cr 4	1.7045	530 A 40	42 C 4 TS	2245	5140	SCr440	1775	.24	6/9
42 CrMo 4	1.7225	708 M 40	42 CD 4	2244	4142; 4140	SCM440(H)	1775	.24	6/9
45 WCrV 7	1.2542	BS 1		2710	S 1		1775	.24	6/9
50 CrV 4	1.8159	735 A 50	50 CV 4	2230	6150	SUP10	1775	.24	6/9
55 Cr 3	1.7176	527 A 60	55 C 3	2253	5155	SUP9(A)	1775	.24	6/9
55 NiCrMoV 6	1.2713		55 NCDV 7		L 6	SKH1;SKT4	1775	.24	6/9
55 Si 7	1.0904	250 A 53	55 S 7	2085; 2090	9255		1775	.24	6/9
58 CrV 4	1.8161						1775	.24	6/9
60 SiCr 7	1.0961		60 SC 7		9262		1775	.24	6/9
9 SMn 28	1.0715	230 M 07	S 250	1912	1213	SUM22	1350	.21	1
9 SMn 36	1.0736	240 M 07	S 300		1215		1350	.21	1
9 SMnPb 28	1.0718		S 250 Pb	1914	12 L 13	SUM22L	1350	.21	1
9 SMnPb 36	1.0737		S 300 Pb	1926	12 L 14		1350	.21	1
Al99	3.0205						700	.25	21
AlCuMg1	3.1325						700	.25	22

Germany DIN	Mat. no.	United Kingdom BS	France AFNOR	Sweden SS	United States AISI	Japan JIS	$K_{c1.1}$ N/mm²	m_c	VDI 3323 group
AlMg1	3.3315						700	.25	21
AlMgSi1	3.2315						700	.25	22
C 105 W1	1.1545		Y1 105	1880	W 110	SK3	1675	.24	3
C 125 W	1.1663		Y2 120		W 112		1675	.24	3
C 15	1.0401	080 M 15	AF3 7 C 12; XC 18	1350	1015	S15C	1350	.21	1
C 22	1.0402	050 A 20	AF 42 C 20	1450	1020	S20C, S22C	1350	.21	1
C 35	1.0501	060 A 35	AF 55 C 35	1550	1035	S35C	1525	.22	2/3
C 45	1.0503	080 M 46	AF 65 C 45	1650	1045	S45C	1525	.22	2/3
C 55	1.0535	070 M 55		1655	1055	S55C	1675	.24	3
C 60	1.0601	080 A 62	CC 55		1060	S60C	1675	.24	3
Cf 35	1.1183					S35C	1525	.22	2/3
Cf 53	1.1213					S50C	1525	.22	2/3
Ck 101	1.1274	060 A 96		1870	1095		1675	.24	3
Ck 15	1.1141	080 M 15	XC 15; XC 18	1370	1015	S15C	1350	.21	1
Ck 55	1.1203	070 M 55	XC 55		1055	S55C	1675	.24	3
Ck 60	1.1221	080 A 62	XC 60	1665; 1678	1060	S58C	1675	.24	3
CoCr20W15Ni	2.4764						3300	.24	35
CuZn15	2.0240						700	.27	27
CuZn36Pb3	2.0375						700	.27	26
E-Cu57	2.0060						700	.27	28
* [illegible] 0 J	3.2381						700	.25	24
* [illegible]	3.2581						700	.25	23
* [illegible]	3.2163						700	.25	23
* [illegible]	2.1096						700	.27	26
* [illegible]	2.0590						700	.27	28
* [illegible]	1.3401	Z 120 M 12	Z 120 M 12		A 128 (A)		3300	.24	35
* [illegible]	1.4027	420 C 29	Z 20 C 13 M			SCS2	1875	.21	12/13
* [illegible]	1.4865	330 C 40					2600	.24	31
* [illegible]	1.4718	401 S 45	Z 45 CS 9		HNV 3		2450	.23	10/11
* [illegible]	1.4313	425 C 11	Z 5 CN 13.4	2385	CA 6-NM		1875	.21	12/13
* [illegible]	1.4581	318 C 17	Z 4 CNDNb 18.12 M				2150	.2	14
* [illegible]	1.4308	304 C 15	Z 6 CN 18.10 M	2333	CF-8		2150	.2	14
* [illegible]	1.4408						2150	.2	14
* [illegible]	1.4001						1875	.21	12/13
* * [illegible]	.6010		Ft 10 D	01 10-00	A48-20 B	FC100	1150	.2	15
* * [illegible]	.6015	* [illegible]	Ft 15 D	01 15-00	A48-25 B	FC150	1150	.2	15
* * [illegible]	.6020	* [illegible]	Ft 20 D	01 20-00	A48-30 B	FC200	1150	.2	15
* * [illegible]	.6025	* [illegible]	Ft 25 D	01 25-00	A48-40 B	FC250	1250	.24	15/16
* * [illegible]	.6030	* [illegible]	Ft 30 D	01 30-00	A48-45 B	FC300	1350	.28	16
* * [illegible]	.6035	* [illegible]	Ft 35 D	01 35-00	A48-50 B	FC350	1350	.28	16
* * [illegible]	.6040	* [illegible]	Ft 40 D	01 40-00	A48-60 B	FC400	1350	.28	16
* * * [illegible]	.7033					FCD350	1225	.25	17
* * * [illegible]	.7040	61 * [illegible]	) * 6[illegible]	0717-02	60-40-18	FCD400	1225	.25	17
* * * [illegible]	.7043	61 * [illegible]	) * 6[illegible]	0717-15		FCD400	1225	.25	17
* * * [illegible]	.7050	61 * [illegible]	) * 6[illegible]	0727-02	65-45-12	FCD500	1350	.28	18
* * * [illegible]	.7060	61 * [illegible]	) * 6[illegible]	0732-03	80-55-06	FCD600	1350	.28	18
* * * [illegible]	.7070	61 * [illegible]	) * 6[illegible]	0737-01	100-70-03	FCD700	1350	.28	18
* * * [illegible]	.7660	S-NiCr 20 2	S-NC 20 2		A 439 Type D-2		1350	.28	18
* * * [illegible]	.7652	S-NiMn 13 7	S-NM 13 7				1350	.28	18
* 6[illegible]	1.1191	080 M 46	XC 42	1672	1045	S45C	1525	.22	2/3

CERATIZIT hard material matters

Comparison of materials

Germany DIN	Mat. no.	United Kingdom BS	France AFNOR	Sweden SS	United States AISI	Japan JIS	$K_{c1.1}$ N/mm²	m_c	VDI 3323 group
* 76□□ □ □□ □	.8135	B 340/12	MN 35-10				1225	.25	19
* 76□□ □ □□ □	.8145	P 440/7					1420	.3	20
* 76□□ □ □□ □	.8155	P 510/4	MP 50-5				1420	.3	20
* 76□□ □ □□ □	.8165	P 570/3	MP 60-3				1420	.3	20
* 76□□ □ □□ □	.8170	P 690/2	IP 70-2				1420	.3	20
NiCr20TiAl	2.4631	HR 401; 601	Nimonic 80 A				3300	.24	33
NiCr22Mo9Nb	2.4856		Inconel 625				3300	.24	33
NiCu30Al	2.4375		Monel K 500				3300	.24	34
NiFe25Cr20NbTi	2.4955						3300	.24	34
S 18-0-1	1.3355	BT 1	Z 80 WCV 18-04-01		T 1		2450	.23	10/11
S 18-1-2-5	1.3255	BT 4	Z 80 WKCV 18-05-04-0		T 4		2450	.23	10/11
S 2-9-2	1.3348		Z 100 DCWV 09-04-02-	2782	M 7		2450	.23	10/11
S 6-5-2	1.3343	BM 2	Z 85 WDCV 06-05-04-0	2722	M 2	SKH9; SKH51	2450	.23	10/11
S 6-5-2-5	1.3243		Z 85 WDKCV 06-05-05-	2723		SKH55	2450	.23	10/11
TiAl6V4	3.7165	TA 10 bis TA 13	T-A 6 V				2110	.22	37
X 10 Cr 13	1.4006	410 S 21	Z 12 C 13	2302	410; CA-15	SUS410	1875	.21	12/13
X 10 CrNiMoNb 18 12	1.4583				318		2150	.2	14
X 10 CrNiS 18 9	1.4305	303 S 21	Z 10 CNF 18.09	2346	303		2150	.2	14
X 100 CrMoV 5 1	1.2363	BA 2	Z 100 CDV 5	2260	A 2		2450	.23	10/11
X 12 CrMoS 17	1.4104		Z 10 CF 17	2383	430 F	SUS430F	1875	.21	12/13
X 12 CrNi 17 7	1.4310	301 S 21	Z 12 CN 17.07		301		2150	.2	14
X 12 CrNi 22 12	1.4829					SUS301	1350	.28	16
X 12 CrNi 25 21	1.4845	310 S24	Z 12 CN 25.20	2361	310 S	SUH310; SUS310S	2150	.2	14
X 12 CrNiTi 18 9	1.4878	321 S 20	Z 6 CNT 18.12 (B)	2337	321		2150	.2	14
X 12 NiCrSi 36 16	1.4864	NA 17	Z 12 NCS 37.18		330	SUH330	2600	.24	31
X 15 CrNiSi 20 12	1.4828	309 S 24	Z 15 CNS 20.12		309	SUH309	1350	.28	16
X 165 CrMoV 12	1.2601			2310			2450	.23	10/11
X 2 CrNiMo 18 13	1.4440						2150	.2	14
X 2 CrNiMoN 17 13 3	1.4429	316 S 62	Z 2 CND 17.13 Az	2375	316 LN	SUS316LN	2150	.2	14
X 2 CrNiN 18 10	1.4311	304 S 62	Z 2 CN 18 .10	2371	304 LN	SUS304LN	2150	.2	14
X 20 CrNi 17 2	1.4057	431 S 29	Z 15 CN 16.02	2321	431	SUS431	1875	.21	12/13
X 210 Cr 12	1.2080	BD 3	Z 200 C 12		D 3		2450	.23	10/11
X 210 CrW 12	1.2436			2312			2450	.23	10/11
X 30 WCrV 9 3	1.2581	BH 21	Z 30 WCV 9		H 21	SKD5	2450	.23	10/11
X 40 CrMoV 5 1	1.2344	BH 13	Z 40 CDV 5	2242	H 13	SKD61	2450	.23	10/11
X 46 Cr 13	1.4034	420 S 45	Z 40 C 14				1875	.21	12/13
X 5 CrNi 18 9	1.4301	304 S 15	Z 6 CN 18.09	2332; 2333	304; 304 H	SUS304	2150	.2	14
X 5 CrNiMo 17 13 3	1.4436	316 S 16	Z 6 CND 17.12	2343	316	SUS316	2150	.2	14
X 5 CrNiMo 18 10	1.4401	316 S 16	Z 6 CND 17.11	2347	316	SUS316	2150	.2	14
X 53 CrMnNiN 21 9	1.4871	349 S 54	Z 52 CMN 21.09		EV 8		1875	.21	12/13
X 6 Cr 13	1.4000	403 S 17	Z 6 C 13	2301	403	SUS403	1875	.21	12/13
X 6 Cr 17	1.4016	430 S 15	Z 8 C 17	2320	430	SUS430	1875	.21	12/13
X 6 CrMo 17	1.4113	434 S 17	Z 8 CD 17.01	2325	434	SUS434	1875	.21	12/13
X 6 CrNiMoTi 17 12 2	1.4571	320 S 31	Z 6 CNT 17.12	2350	316 Ti		2150	.2	14
X 6 CrNiNb 18 10	1.4550	347 S 17	Z 6 CNNb 18.10	2338	347		2150	.2	14
X 6 CrNiTi 18 10	1.4541	321 S 12	Z 6 CNT 18.10	2337	321		2150	.2	14
X2 CrNi 18-8	1.4317						2150	.2	14

$k_{c1.1}$ value = specific cutting force at a cutting rake angle of 0 degrees. For positive rake angles the $k_{c1.1}$ value has to be reduced (increased for negative rake angles) by 1% per degree of rake angle. The m_c value is the exponent for the conversion of the $k_{c1.1}$ value.

Aluminium cast alloys

Alloy group	DIN 1725-2		DIN EN 1706	
	Material		Alloy designation	
	Short designation	Number	Numeric	Chem. symbol
AlCu	* G-X 7 J	3.1371	EN AC-21000	EN AC-Al Cu4MgTi
	* G-X 7L	3.1841	EN AC-21100	EN AC-Al Cu4Ti
AlSiMgTi	2	2	EN AC-4100	EN AC-Al Si2MgTi
AlSi7Mg	2	2	EN AC-42000	EN AC-Al Si7Mg
	* G-L 0 J	3.2371	EN AC-42100	EN AC-Al Si7Mg0,3
	2	2	EN AC-42200	EN AC-Al Si7Mg0,6
AlSi10Mg	* G-L 0 J	3.2381	EN AC-43000	EN AC-Al Si10Mg/a)
	2	2	EN AC-43100	EN AC-Al Si10Mg(b)
	* G-L 0 J &X	3.2383	EN AC-43200	EN AC-Al Si10Mg(Cu)
	* G-L 0 J	3.2373	EN AC-43300	EN AC-Al Si9Mg
	* ' G-L 0 J	3.2382	EN AC-43400	EN AC-Al Si10Mg(Fe)
AlSi	* G-L	3.2211	EN AC-44000	EN AC-Al Si11
	2	2	EN AC-44100	EN AC-Al Si12(b)
	* G-L	3.2581	EN AC-44200	EN AC-Al Si12(a)
	* ' G-L	3.2582	EN AC-44300	EN AC-Al Si12(Fe)
	2	2	EN AC-44400	EN AC-Al Si9
AlSi5Cu	* G-L &X	3.2151	EN AC-45000	EN AC-Al Si6Cu4
	2	2	EN AC-45100	EN AC-Al Si5Cu3Mg
	2	2	EN AC-45200	EN AC-Al Si5Cu3Mn
	2	2	EN AC-45300	EN AC-Al Si5Cu1Mg
	2	2	EN AC-45400	EN AC-Al Si5Cu3
AlSi9Cu	* ' G-L &X	3.2163	EN AC-46000	EN AC-Al Si9Cu3(Fe)
	2	2	EN AC-46100	EN AC-Al Si11Cu2(Fe)
	* G-L &X	3.2163	EN AC-46200	EN AC-Al Si8Cu3
	2	2	EN AC-46300	EN AC-Al Si7Cu3Mg
	2	2	EN AC-46400	EN AC-Al Si9Cu1Mg
	2	2	EN AC-46500	EN AC-Al Si9Cu3(Fe)(Zn)
	2	2	EN AC-46600	EN AC-Al Si7Cu2
AlSi(Cu)	* G-L &X	3.2583	EN AC-47000	EN AC-Al Si12(Cu)
	* ' G-L &X	3.2982	EN AC-47100	EN AC-AlSi12Cu1(Fe)
AlSiCuNiMg	2	2	EN AC-48000	EN AC-Al Si12CuNiMg
AlMg	2	2	EN AC-51000	EN AC-Al Mg3(b)
	* O J	3.3541	EN AC-51100	EN AC-AlMg3(a)
	* ' O J	3.3292	EN AC-51200	EN AC-Al Mg9
	* O J	3.3561	EN AC-51300	EN AC-Al Mg5
	* O J 6 L	3.3261	EN AC-51400	EN AC-Al Mg5 (Si)
AlZnMg	2	2	EN AC-7100	EN AC-Al Zn5Mg

Aluminium - standard materials

Aluminium wrought alloys - bar, sheet

Aluminuim wrought alloys - bar

DIN 1725-1/DIN 1712-3		DIN EN 573-3	
Material		Alloy designation	
Short designation	Number	Numeric	Chem. symbol
AlCuMgPb	3.1645	EN AW-2007	EN AW-Al Cu4PbMgM
AlCuBiPb	3.1655	EN AW-2011	EN AW-Al Cu6BiPb
2	2	EN AW-2030	EN AW-Al Cu4PbMg
AlMgSiPb	3.0615	EN AW-6012	EN AW-Al MgSiPb
2	2	EN AW-6262	EN AW-Al Mg1SiPb
AlMgSi0,5	3.3206	EN AW-6060	EN AW-Al MgSi
2	2	EN AW-6063	EN AW-Al Mg0,7Si
AlMgSi1	3.2315	EN AW-6082	EN AW-Al Si1MgMn
AlCuSiMn	3.1255	EN AW-2014	EN AW-Al Cu4SiMg
AlCuMg1	3.1325	EN AW-2017A	EN AW-Al Cu4MgSi(A)
AlCuMg2	3.1355	EN AW-2024	EN AW-Al Cu4Mg1
AlZn4,5Mg1	3.4335	EN AW-7020	EN AW-Al Zn4,5Mg1
AlZnMgCu0,5	3.4345	EN AW-7022	EN AW-Al Zn5Mg3Cu
AlZnMgCu1,5	3.4365	EN AW-7075	EN AW-Al Zn5,5MgCu
Al99,5	3.0255	EN AW-1050A	EN AW-Al 99,5
E-Al	3.0257	EN AW-1350	EN AW-Eal 99,5
AlMg3	3.3535	EN AW-5754	EN AW-Al Mg3
AlMg5	3.3555	EN AW-5019	EN AW-Al Mg5
AlMg4,5Mn	3.3547	EN AW-5083	EN AW-Al Mg4,5Mn0,7

Aluminium wrought alloys - sheet

DIN 1725-1/DIN 1712-3		DIN EN 573-3	
Material		Alloy designation	
Short designation	Number	Numeric	Chem. symbol
Al99,5	3.0255	EN AW-1050A	EN AW-Al 99,5
AlMg3	3.3535	EN AW-5754	EN AW-Al Mg3
AlMg4,5Mn	3.3547	EN AW-5083	EN AW-Al Mg4,5Mn0,7
AlMg1SiCu	3.3211	EN AW-6061	EN AW-Al Mg1SiCu
AlMgSi1	3.2315	EN AW-6082	EN AW-Al Si1MgMn
AlCuMg1	3.1325	EN AW-2017A	EN AW-Al Cu4MgSi(A)
AlCuMg2	3.1355	EN AW-2024	EN AW-Al Cu4Mg1
AlZn4,5Mg1	3.4335	EN AW-7020	EN AW-Al Zn4,5Mg1
AlZnMgCu0,5	3.4345	EN AW-7022	EN AW-Al Zn5Mg3Cu
AlZnMgCu1,5	3.4365	EN AW-7075	EN AW-Al Zn5,5MgCu

= hardened materials

= naturally hard materials

Relative machinability of aluminium alloys

It depends on the type of alloy whether aluminium materials are easy to machine or not.
From the easily machined aluminium alloy to the problematic pure aluminium all levels of machinability can be found.

Group		Alloy type	Relative machinability
Pure Al		Al 99,9	5
Wrought alloys	**non hardened**	Al Mn	4 - 5
		Al Mg	3 - 5
		Al Mg Mn	3 - 4
	hardened	Al Mg Si	3 - 4
		Machining alloy stock	1 - 2
		Al Cu Mg	2 - 3
		Al Cu Si Mg	3
		Al Zn Mg Cu	2
Cast alloys		* [illegible] 06 L	3
		* [illegible] 06 L 0 J	2 - 3
		* [illegible] 06 L & X	2
		* [illegible] 00 J	2
		* [illegible] 00 J 6 L	2
		* [illegible] 02 & X 7 L	2
		* [illegible] 06 L & X 0 J 1 L	2 - 3

1 = very good machinability

5 = bad machinability

Machinability can be defined as the degree of difficulty that a material creates when being machined. In order to assess the machinability of a material basically four parameters have to be taken into consideration:

> Cutting force
> Tool life
> Surface quality
> Chip formation

Cutting data

Tool, material

	v_c (m/min)	f_z (mm)	a_p (mm)	v_c (m/min)	f_z (mm)	a_p (mm)	v_c (m/min)	f_z (mm)	a_p (mm)
MaxiMill 211-07				**211-11 / 260-054**			**211-11K**		
▼	300 - 60	0,03 - 0,10	0,20 - 6,0	350 - 60	0,05 - 0,20	0,20 - 10	300 - 100	0,05 - 0,20	≤ a
▼	220 - 40	0,03 - 0,10	0,20 - 6,0	250 - 40	0,05 - 0,20	0,20 - 10	200 - 80	0,05 - 0,20	≤ a
▼	3000 - 70	0,03 - 0,10	0,20 - 6,0	350 - 70	0,05 - 0,20	0,20 - 10	300 - 110	0,05 - 0,20	≤ a
▼	2	2	2	3000 - 200	0,10 - 0,25	0,20 - 10	2000 - 300	0,10 - 0,25	≤ a
▼	100 - 30	0,03 - 0,08	0,20 - 4,0	100 - 20	0,05 - 0,15	2,0 - 4,0	80 - 40	0,05 - 0,15	≤ a
▽	2	2	2	60 - 30	0,05 - 0,10	0,5 - 4,0	50 - 30	0,05 - 0,10	≤ a
MaxiMill 211-15 / 260-056				**MaxiMill 211-15K**			**MaxiMill 211-20**		
▼	350 - 100	0,08 - 0,35	1,0 - 14,0	300 - 120	0,08 - 0,35	≤ a	300 - 150	0,12 - 0,4	≤ a
▼	250 - 150	0,08 - 0,35	1,0 - 14,0	200 - 150	0,08 - 0,35	≤ a	250 - 150	0,12 - 0,35	≤ a
▼	350 - 110	0,08 - 0,35	1,0 - 14,0	300 - 130	0,08 - 0,35	≤ a	2	2	2
▼	3000 - 300	0,12 - 0,40	1,0 - 14,0	2500 - 400	0,12 - 0,40	≤ a	2	2	2
▼	90 - 25	0,08 - 0,20	1,0 - 8,0	80 - 25	0,08 - 0,20	≤ a	80 - 25	0,12 - 0,3	≤ a
MaxiMill 210 / 260-042				**244**			**212**		
▼	350 - 100	0,05 - 0,20	0,1 - 8,0	180 - 60	0,08 - 0,20	< a	180 - 60	0,08 - 0,25	< 19
▼	250 - 170	0,05 - 0,20	0,1 - 8,0	180 - 60	0,08 - 0,20	< a	180 - 60	0,08 - 0,25	< 19
▼	300 - 100	0,05 - 0,20	0,1 - 8,0	180 - 60	0,10 - 0,20	< a	180 - 60	0,08 - 0,25	< 19
▼	< 2000	0,05 - 0,20	0,1 - 8,0	< 2000	0,10 - 0,20	< a	< 2000	0,10 - 0,25	< 19
▼	75 - 25	0,08 - 0,15	0,2 - 4,0	2	2	2	2	2	2
▽	500 - 150	0,04 - 0,09	0,2 - 0,6	2	2	2	2	2	2
MaxiMill 141 / 241 / 260-051				**MaxiMill 274 (SF..)**			**MaxiMill 274 (OF..)**		
▼	350 - 80	0,05 - 0,35	0,05 - 14	350 - 80	0,1 - 0,4	0,1 - 3,8	350 - 80	0,1 - 0,35	0,1 - 2,5
▼	250 - 80	0,05 - 0,35	0,05 - 14	200 - 80	0,05 - 0,35	0,05 - 3,8	200 - 80	0,05 - 0,25	0,05 - 2,5
▼	350 - 80	0,05 - 0,35	0,05 - 14	350 - 80	0,15 - 0,3	0,15 - 3,8	2	2	2
▼	< 2000	0,05 - 0,35	0,05 - 14	< 2000	0,05 - 0,4	0,05 - 3,8	< 2000	0,05 - 0,4	0,05 - 2,5
▼	2	2	2	80 - 25	0,05 - 0,25	0,05 - 3,8	80 - 25	0,05 - 0,2	0,05 - 2,5
MaxiMill 490-09 / 260-055				**490-09K**			**490-12 / 260-039**		
▼	350 - 80	0,05 - 0,25	0,1 - 4,0	300 - 120	0,05 - 0,25	≤ a	350 - 90	0,10 - 0,40	1,0 - 6,0
▼	280 - 80	0,05 - 0,25	0,1 - 4,0	220 - 120	0,05 - 0,25	≤ a	250 - 90	0,10 - 0,40	1,0 - 6,0
▼	280 - 120	0,05 - 0,25	0,1 - 4,0	230 - 150	0,05 - 0,25	≤ a	280 - 90	0,10 - 0,40	1,0 - 6,0
▼	< 2000	0,05 - 0,30	0,1 - 4,0	< 2000	0,05 - 0,30	≤ a	< 2000	0,10 - 0,40	1,0 - 6,0
▼	110 - 15	0,05 - 0,15	0,1 - 4,0	80 - 35	0,05 - 0,15	≤ a	180 - 25	0,10 - 0,40	1,0 - 6,0
HSC-11 / 260-54				**HSC-19**			**HPC-19**		
▼	3000 - 300	0,05 - 0,25	0,05 - 10,0	2000-300	0,05 - 0,25	0,3 - 18	5000-300	0,05 - 0,4	0,3 - 18

	v_c (m/min)	f_z (mm)	a_p (mm)	v_c (m/min)	f_z (mm)	a_p (mm)	v_c (m/min)	f_z (mm)	a_p (mm)
MaxiMill 280 / 260-037									
▼	350 - 80	0,08 - 0,2	0,1 - 5,0						
▼	270 - 80	0,08 - 0,20	0,1 - 5,0						
▼	350 - 80	0,05 - 0,20	0,1 - 5,0						
▼	< 2000	0,05 - 0,20	0,1 - 5,0						
▼	75 - 25	0,1 - 0,2	2 - 5						
MaxiMill HPC-04				**HPC-12**			**HSV-22**		
▼	2	2	2	2	2	2	2	2	2
▼	2	2	2	2	2	2	2	2	2
▼	< 1000	0,05 - 0,15	0,1 - 2,0	< 1000	0,05 - 0,15	0,1 - 2,0	2	2	2
▼	< 5000	0,05 - 0,20	0,1 - 4,0	< 5000	0,05 - 0,40	0,1 - 11,0	< 3500	0,05 - 0,30	0,1 - 15
▼	2	2	2	2	2	2	2	2	2
▽	360 - 110	0,05 - 0,15	0,1 - 0,3	360 - 110	0,05 - 0,15	0,1 - 0,3	2	2	2
MaxiMill 251-05				**251-08**			**251-10**		
▼	350 - 180	0,10 - 0,35	0,25 - 1,0	350 - 180	0,15 - 0,40	0,5 - 1,5	350 - 180	0,15 - 0,50	0,5 - 2,5
▼	250 - 80	0,05 - 0,15	0,25 - 1,0	250 - 80	0,08 - 0,20	0,5 - 1,5	250 - 80	0,10 - 0,30	0,5 - 2,5
▼	350 - 100	0,05 - 0,20	0,25 - 1,0	350 - 100	0,08 - 0,25	0,5 - 1,5	350 - 100	0,10 - 0,30	0,5 - 2,5
▼	< 2000	0,10 - 0,20	0,25 - 1,0	< 2000	0,10 - 0,30	0,5 - 1,5	< 2000	0,10 - 0,40	0,5 - 2,5
▼	75 - 25	0,05 - 0,15	0,25 - 1,0	75 - 25	0,05 - 0,15	0,5 - 1,5	75 - 25	0,08 - 0,25	0,5 - 2,5
MaxiMill 251-12 / 260-052				**251-16 / 260-053**			**251-20**		
▼	350 - 180	0,2 - 0,80	0,5 - 3,0	350 - 180	0,25 - 0,80	1,5 - 4,0	350 - 180	0,25 - 0,80	1,5 - 4,0
▼	250 - 80	0,1 - 0,45	0,5 - 3,0	250 - 80	0,20 - 0,60	1,5 - 4,0	250 - 80	0,20 - 0,60	1,5 - 4,0
▼	350 - 100	0,1 - 0,45	0,5 - 3,0	350 - 100	0,20 - 0,60	1,5 - 4,0	350 - 100	0,20 - 0,60	1,5 - 4,0
▼	< 2000	0,1 - 0,45	0,5 - 3,0	< 2000	0,20 - 0,60	1,5 - 4,0	75 - 25	0,15 - 0,35	1,5 - 4,0
▼	75 - 25	0,1 - 0,3	0,5 - 3,0	75 - 25	0,15 - 0,35	1,5 - 4,0	75 - 25	0,1 - 0,3	0,5 - 3,0
MaxiMill 270-09 / 260-041				+			**272-09**		
▼	350 - 80	0,05 - 0,25	0,1 - 4,0	305 - 150	0,05 - 0,25	0,1 - 2,0	200 - 80	0,05 - 0,15	0,1 - 4
▼	200 - 80	0,05 - 0,25	0,1 - 4,0	200 - 110	0,05 - 0,25	0,1 - 2,0	180 - 80	0,05 - 0,15	0,1 - 4
▼	280 - 80	0,05 - 0,25	0,1 - 4,0	280 - 150	0,05 - 0,25	0,1 - 2,0	200 - 80	0,05 - 0,15	0,1 - 4
▼	< 2000	0,05 - 0,25	0,1 - 4,0	< 2000	0,05 - 0,25	0,1 - 2,0	< 2000	0,05 - 0,20	0,1 - 4
▼	75 - 25	0,05 - 0,25	0,1 - 4,0	2	2	2	60 - 25	0,10 - 0,10	0,1 - 4
MaxiMill 270-12 / 260-031				+			**MaxiMill 260-029**		
▼	350 - 60	0,05 - 0,35	0,1 - 6,0	350 - 80	0,1 - 0,45	0,1 - 4,0	350 - 60	0,05 - 0,35	0,1 - 6,0
▼	280 - 60	0,05 - 0,35	0,1 - 6,0	280 - 40	0,1 - 0,45	0,1 - 4,0	280 - 60	0,05 - 0,35	0,1 - 6,0
▼	280 - 180	0,05 - 0,35	0,1 - 6,0	280 - 80	0,1 - 0,45	0,1 - 4,0	280 - 180	0,05 - 0,35	0,1 - 6,0
▼	< 2000	0,05 - 0,35	0,1 - 6,0	< 2000	0,1 - 0,45	0,1 - 4,0	< 2000	0,05 - 0,35	0,1 - 6,0
▼	75 - 25	0,1 - 0,25	0,1 - 6,0	2	2	2	75 - 25	0,1 - 0,25	0,1 - 6,0

CERATIZIT hard material matters

Cutting data

Tool, material

	v_c (m/min)	f_z (mm)	a_p (mm)	v_c (m/min)	f_z (mm)	a_p (mm)	v_c (m/min)	f_z (mm)	a_p (mm)
MaxiMill 252-10				**252-12**					
▼	250 - 80	0,05 - 0,2	0,5 - 1,5	250 - 80	0,1 - 0,45	0,5 - 3			
▼	75 - 25	0,1 - 0,15	0,5 - 1,5	75 - 25	0,1 - 0,3	0,5 - 3			
MaxiMill 270-12 / 260-031				**MaxiMill 271-17**					
▼	350 - 60	0,1 - 0,5	0,1 - 6,0	350 - 60	0,1 - 0,5	0,1 - 6,0			
▼	200 - 60	0,1 - 0,35	0,1 - 6,0	200 - 60	0,1 - 0,35	0,1 - 6,0			
▼	300 - 60	0,1 - 0,4	0,1 - 6,0	300 - 60	0,1 - 0,4	0,1 - 6,0			
▼	75 - 25	0,1 - 0,25	0,1 - 6,0	75 - 25	0,1 - 0,25	0,1 - 6,0			
MaxiMill 270-15 / 260-032				**273-06 / 260-057**					
▼	200 - 60	0,10 - 0,4	1 - 9	350 - 60	0,05 - 0,6	0,2 - 3,5	350 - 100	0,05 - 0,6	0,2 - 3,5
▼	200 - 60	0,10 - 0,4	1 - 9	250 - 40	0,05 - 0,4	0,2 - 3,5	250 - 60	0,05 - 0,4	0,2 - 3,5
▼	200 - 60	0,10 - 0,4	1 - 9	280 - 70	0,05 - 0,4	0,2 - 3,5	280 - 100	0,05 - 0,4	0,2 - 3,5
▼	< 2000	0,10 - 0,4	1 - 9	[2]	[2]	[2]	[2]	[2]	[2]
▼	75 - 25	0,10 - 0,25	1 - 9	100 - 10	0,05 - 0,15	0,2 - 3,5	100 - 40	0,05 - 0,15	0,2 - 3,5
MaxiMill HFC-06				**HFC-09**			**HFC-12**		
▼	280 - 100	0,1 - 1,5	0,1 - 0,8	280 - 100	0,1 - 2,5	0,1 - 1,0	280 - 100	0,1 - 3,0	0,1 - 2,0
▼	260 - 140	0,1 - 1,5	0,1 - 0,8	260 - 140	0,1 - 2,5	0,1 - 1,0	260 - 140	0,1 - 3,0	0,1 - 2,0
▼				230 - 110	0,1 - 2,5	0,1 - 1,0	230 - 110	0,1 - 3,0	0,1 - 2,0
▼	75 - 25	0,1 - 0,5	0,1 - 0,8	75 - 25	0,1 - 0,8	0,1 - 0,8	75 - 25	0,1 - 1,0	0,1 - 1,0
HEC-11									
▼ CTC3215	500 - 150	0,05 - 0,30	0,1 - 4,0						
▼ CTP3220	350 - 100	0,05 - 0,30	0,1 - 4,0						
▼ CTN3105	1500 - 300	0,05 - 0,30	0,1 - 4,0						
▼ CTL3215	1000 - 350	0,05 - 0,20	0,1 - 1,0						
▽ CTL3215	360 - 110	0,05 - 0,15	0,1 - 0,3						
▼ TCC410	300 - 100	0,05 - 0,25	0,1 - 4,0						
▼ TCC410	500 - 150	0,05 - 0,30	0,1 - 4,0						
MaxiMill AHDM									
▼	200 - 60	0,2 - 0,90	- 20						
▼	140 - 40	0,15 - 0,50	- 20						
▼	320 - 100	0,2 - 0,85	- 20						
MaxiMill C KF				**C NF**			**C ZF**		
▼	180 - 80	[2]	< a	160 - 80	0,10 - 0,25	[2]	120 - 60	0,03 - 0,08	[2]
▼	180 - 80	[2]	< a	140 - 70	0,10 - 0,25	[2]	120 - 60	0,03 - 0,08	[2]
▼	[2]	[2]	[2]	150 - 80	0,15 - 0,25	[2]	120 - 60	0,03 - 0,08	[2]
▼	[2]	[2]	[2]	< 350	0,15 - 0,25	[2]	< 300	0,03 - 0,08	[2]

	v_c (m/min)	f_z (mm)	a_p (mm)	v_c (m/min)	f_z (mm)	a_p (mm)	v_c (m/min)	f_z (mm)	a_p (mm)
MaxiMill 260-018				**260-040**					
▼	220 - 80	0,08 - 0,35	0,1 - 9,0	200 - 80	0,1 - 0,4	1 - 14			
▼	200 - 90	0,08 - 0,35	0,1 - 9,0	200 - 80	0,1 - 0,4	< 12			
▼	280 - 120	0,08 - 0,35	0,1 - 9,0	2	2	2			
▼	< 2000	0,05 - 0,1	0,1 - 2,0	2	2	2			
MaxiMill 260-023				**260-026**			**260-025**		
▼	2	2	2	180 - 60	0,1 - 0,35	2 - 18	180 - 60	0,1 - 0,35	2 - 18
▼	2	2	2	180 - 60	0,1 - 0,35	2 - 18	180 - 60	0,1 - 0,35	2 - 18
▼	350 - 80	0,08 - 0,4	0,1 - 7,0	250 - 80	0,1 - 0,35	2 - 18	180 - 80	0,1 - 0,35	2 - 18

CERATIZIT hard material matters

Cutting data

* UDGHMP DWUDO

Work piece material		Type of treatment / alloy		VDI 3323 group	Hard-ness HB
A	Non alloyed steel	annealed	≤ .15% C	1	125
		annealed	.15% - .45% C	2	150 - 250
		tempered	≥ .45% C	3	300
	Low alloyed steel	annealed		6	180
		tempered		7 / 8	250 - 300
		tempered		9	350
	High alloyed steel	annealed		10	200
		tempered		11	350
	Corrosion resistant steel	annealed	ferritic	12	200
		tempered	martensitic	13	325
R	Stainless steel	annealed	ferritic / martensitic	14	200
		quenched	austenitic	14	180
		quenched	duplex	14	230 - 260
		hardened	martensitic / austenitic	14	330
F	* UH FDVWLUQ		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	2
	Malleable cast iron		ferritic	19	130
			pearlitic	20	230
N	Aluminium wrought alloys	non hardened		21	60
		hardened		22	100
	Aluminium cast alloys	non hardened	< 12% Si	23	80
		hardened	< 12% Si	24	90
		non hardened	> 12% Si	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	2
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	29	100
	Non-metallic materials		thermosetting plastics	29	2
			fibre-reinforced plastics	29	2
			hard rubber	30	2
S	Heat resistant alloys	annealed	Fe-base	31	200
		hardened	Fe-base	32	280
		annealed	Ni or Co-base	33	250
		hardened	Ni or Co-base 30 - 58 HRC	34	2
		cast	1 LRU&RIEDVHI 1 P P	35	2
	Titanium alloys		pure titanium	36	R_m 440*
			alpha + beta alloys	37	R_m 1050*
H	Tempered steel	hardened and tempered		38	55 HRC
		hardened and tempered		39	60 HRC
	Chilled castings	cast		40	400
	Tempered cast iron	hardened and tempered		40	55 HRC

* R_m = ultimate tensile strength, measured in MPa

Uncoated carbide					
CTW4615		H216T		S26T	
☐	☒	☐	☒	☒	☒
v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]
–	–	–	–	160 - 220	100 - 160
–	–	–	–	140 - 100	90 - 150
–	–	–	–	120 - 180	80 - 140
–	–	–	–	120 - 180	80 - 140
–	–	–	–	110 - 170	80 - 140
–	–	–	–	100 - 160	70 - 110
–	–	–	–	100 - 160	60 - 100
–	–	–	–	90 - 150	60 - 100
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
90 - 160	90 - 160	90 - 160	90 - 160	–	–
80 - 130	80 - 130	80 - 130	80 - 130	–	–
100 - 160	100 - 160	100 - 160	100 - 160	–	–
90 - 150	90 - 150	90 - 150	90 - 150	–	–
100 - 160	100 - 160	100 - 160	100 - 160	–	–
70 - 150	90 - 150	70 - 150	90 - 150	–	–
–	200 - 5800	–	200 - 5800	–	–
–	200 - 2000	–	200 - 2000	–	–
–	200 - 2000	–	200 - 2000	–	–
–	200 - 1800	–	200 - 1800	–	–
–	200 - 1000	–	200 - 1000	–	–
–	200 - 600	–	200 - 600	–	–
250 - 1000	250 - 1000	250 - 1000	250 - 1000	–	–
–	150 - 400	–	150 - 400	–	–
–	300 - 800	–	300 - 800	–	–
80 - 1000	80 - 1000	80 - 1000	80 - 1000	–	–
70 - 500	70 - 500	70 - 500	70 - 500	–	–
80 - 300	80 - 300	80 - 300	80 - 300	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–

☒ Recommended application ☐ Possible application

CERATIZIT hard material matters

Cutting data

* UDGHVWLP DWHULDO

Work piece material		Type of treatment / alloy		VDI 3323 group	Hard-ness HB
A	Non alloyed steel	annealed	≤ .15% C	1	125
		annealed	.15% - .45% C	2	150 - 250
		tempered	≥ .45% C	3	300
	Low alloyed steel	annealed		6	180
		tempered		7 / 8	250 - 300
		tempered		9	350
	High alloyed steel	annealed		10	200
		tempered		11	350
	Corrosion resistant steel	annealed	ferritic	12	200
		tempered	martensitic	13	325
R	Stainless steel	annealed	ferritic / martensitic	14	200
		quenched	austenitic	14	180
		quenched	duplex	14	230 - 260
		hardened	martensitic / austenitic	14	330
F	* UH FDVWLUR		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	2
	Malleable cast iron		ferritic	19	130
			pearlitic	20	230
N	Aluminium wrought alloys	non hardened		21	60
		hardened		22	100
	Aluminium cast alloys	non hardened	< 12% Si	23	80
		hardened	< 12% Si	24	90
		non hardened	> 12% Si	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	2
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	29	100
	Non-metallic materials		thermosetting plastics	29	2
			fibre-reinforced plastics	29	2
			hard rubber	30	2
S	Heat resistant alloys	annealed	Fe-base	31	200
		hardened	Fe-base	32	280
		annealed	Ni or Co-base	33	250
		hardened	Ni or Co-base 30 - 58 HRC	34	2
		cast	1 LRU&RIEDVH 1 P P	35	2
	Titanium alloys		pure titanium	36	R_m 440*
			alpha + beta alloys	37	R_m 1050*
H	Tempered steel	hardened and tempered		38	55 HRC
		hardened and tempered		39	60 HRC
	Chilled castings	cast		40	400
	Tempered cast iron	hardened and tempered		40	55 HRC

* R_m = ultimate tensile strength, measured in MPa

Coated carbide									
AMZ		CTC3215		CTP3220		SR216		CTP6215	
☒	☒	☐	☒	☒	☒	☐	☒	☒	☒
v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
180 - 220	2	180 - 350	180 - 350	120 - 300	120 - 300	180 - 350	180 - 350	180 - 350	180 - 350
140 - 180	2	140 - 280	140 - 280	130 - 280	130 - 280	140 - 280	140 - 280	140 - 280	140 - 280
150 - 220	2	130 - 250	130 - 250	120 - 210	120 - 210	130 - 250	130 - 250	130 - 250	130 - 250
120 - 180	2	100 - 200	100 - 200	110 - 200	110 - 200	100 - 200	100 - 200	100 - 200	100 - 200
180 - 220	2	150 - 320	150 - 320	200 - 340	200 - 340	150 - 320	150 - 320	150 - 320	150 - 320
150 - 200	2	120 - 250	120 - 250	160 - 280	160 - 280	120 - 250	120 - 250	120 - 250	120 - 250
2	300 - 3200	2	2	2	2	2	2	2	2
2	200 - 2800	2	2	2	2	2	2	2	2
2	400 - 2000	2	2	2	2	2	2	2	2
2	400 - 2000	2	2	2	2	2	2	2	2
2	200 - 1200	2	2	2	2	2	2	2	2
2	250 - 1000	2	2	2	2	2	2	2	2
200 - 1000	200 - 1000	2	2	2	2	2	2	2	2
2	150 - 800	2	2	2	2	2	2	2	2
2	150 - 500	2	2	2	2	2	2	2	2
2	80 - 200	2	2	2	2	2	2	2	2
2	80 - 220	2	2	2	2	2	2	2	2
2	100 - 320	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	40 - 60	2
2	2	2	2	2	2	2	2	30 - 50	2
2	2	2	2	2	2	2	2	80 - 100	2
2	2	2	2	2	2	2	2	30 - 60	2

☒ Recommended application ☐ Possible application

CERATIZIT hard material matters

Cutting data

* UDGHVIP DWUDO

	Work piece material	Type of treatment / alloy		VDI 3323 group	Hard-ness HB
A	Non alloyed steel	annealed	≤ .15% C	1	125
		annealed	.15% - .45% C	2	150 - 250
		tempered	≥ .45% C	3	300
	Low alloyed steel	annealed		6	180
		tempered		7 / 8	250 - 300
		tempered		9	350
	High alloyed steel	annealed		10	200
		tempered		11	350
	Corrosion resistant steel	annealed	ferritic	12	200
		tempered	martensitic	13	325
R	Stainless steel	annealed	ferritic / martensitic	14	200
		quenched	austenitic	14	180
		quenched	duplex	14	230 - 260
		hardened	martensitic / austenitic	14	330
F	* UH FDVWLUQ		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	2
	Malleable cast iron		ferritic	19	130
			pearlitic	20	230
N	Aluminium wrought alloys	non hardened		21	60
		hardened		22	100
	Aluminium cast alloys	non hardened	< 12% Si	23	80
		hardened	< 12% Si	24	90
		non hardened	> 12% Si	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	2
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	29	100
	Non-metallic materials		thermosetting plastics	29	2
			fibre-reinforced plastics	29	2
			hard rubber	30	2
S	Heat resistant alloys	annealed	Fe-base	31	200
		hardened	Fe-base	32	280
		annealed	Ni or Co-base	33	250
		hardened	Ni or Co-base 30 - 58 HRC	34	2
		cast	1 LRU&RIEDVHI 1 P P	35	2
	Titanium alloys		pure titanium	36	R_m 440*
			alpha + beta alloys	37	R_m 1050*
H	Tempered steel	hardened and tempered		38	55 HRC
		hardened and tempered		39	60 HRC
	Chilled castings	cast		40	400
	Tempered cast iron	hardened and tempered		40	55 HRC

* R_m = ultimate tensile strength, measured in MPa

Coated carbide							
SR226+		CTP1625		CTP1235		GM43+	
☒	☐	☒	☒	☐	☒	☒	☒
v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]
210 - 350	130 - 200	90 - 130	170 - 200	100-220	70-180	200 - 280	130 - 210
170 - 320	110 - 180	90 - 130	140 - 160	100-220	70-180	170 - 250	110 - 180
150 - 280	90 - 150	90 - 130	130 - 150	100-220	70-180	150 - 220	90 - 150
150 - 250	80 - 140	90 - 130	150 - 180	80-220	70-170	140 - 200	80 - 140
140 - 210	60 - 120	90 - 130	130 - 160	80-220	70-170	130 - 180	60 - 130
100 - 180	60 - 110	90 - 130	120 - 150	80-220	70-170	100 - 160	60 - 110
140 - 210	60 - 110	70 - 90	100 - 120	80-180	60-140	100 - 160	60 - 110
100 - 170	60 - 100	70 - 90	90 - 110	80-180	60-140	90 - 140	60 - 100
140 - 190	80 - 140	90 - 130	130 - 160	70-180	60-140	130 - 180	80 - 140
100 - 170	70 - 120	90 - 130	110 - 150	70-180	60-140	90 - 150	70 - 130
110 - 200	2	90 - 130	140 - 180	60-200	40-140	2	70 - 140
120 - 210	2	90 - 130	110 - 130	60-200	40-140	2	70 - 130
2	2	2	2	60-200	40-140	2	60 - 110
80 - 140	2	70 - 90	90 - 110	60-200	40-140	2	70 - 130
160 - 220	120 - 180	160 - 220	120 - 180	2	2	2	2
100 - 170	80 - 150	100 - 170	80 - 150	2	2	2	2
100 - 200	80 - 170	100 - 200	80 - 170	2	2	2	2
90 - 180	70 - 140	90 - 180	70 - 140	2	2	2	2
90 - 180	70 - 140	90 - 180	70 - 140	2	2	2	2
80 - 160	70 - 130	80 - 160	70 - 130	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	60 - 90	2	2	2	2	2	60 - 100
2	60 - 90	2	2	2	2	2	60 - 100
2	2	2	2	2	2	2	50 - 80
2	2	2	2	2	2	2	40 - 75
2	2	50 - 90	2	2	2	2	45 - 75
2	2	35 - 50	2	2	2	2	20 - 40
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
70 - 130	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2

☒ Recommended application ☐ Possible application

CERATIZIT hard material matters

Cutting data

* UDGHVWDQGDUG

	Work piece material	Type of treatment / alloy		VDI 3323 group	Hard-ness HB
A	Non alloyed steel	annealed	≤ .15% C	1	125
		annealed	.15% - .45% C	2	150 - 250
		tempered	≥ .45% C	3	300
	Low alloyed steel	annealed		6	180
		tempered		7 / 8	250 - 300
		tempered		9	350
	High alloyed steel	annealed		10	200
		tempered		11	350
	Corrosion resistant steel	annealed	ferritic	12	200
		tempered	martensitic	13	325
R	Stainless steel	annealed	ferritic / martensitic	14	200
		quenched	austenitic	14	180
		quenched	duplex	14	230 - 260
		hardened	martensitic / austenitic	14	330
F	* UHI FDVWLUQ		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	2
	Malleable cast iron		ferritic	19	130
			pearlitic	20	230
N	Aluminium wrought alloys	non hardened		21	60
		hardened		22	100
	Aluminium cast alloys	non hardened	< 12% Si	23	80
		hardened	< 12% Si	24	90
		non hardened	> 12% Si	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	2
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	29	100
	Non-metallic materials		thermosetting plastics	29	2
			fibre-reinforced plastics	29	2
			hard rubber	30	2
S	Heat resistant alloys	annealed	Fe-base	31	200
		hardened	Fe-base	32	280
		annealed	Ni or Co-base	33	250
		hardened	Ni or Co-base 30 - 58 HRC	34	2
		cast	1 LRU&RIEDVHI 1 P P	35	2
	Titanium alloys		pure titanium	36	R_m 440*
			alpha + beta alloys	37	R_m 1050*
H	Tempered steel	hardened and tempered		38	55 HRC
		hardened and tempered		39	60 HRC
	Chilled castings	cast		40	400
	Tempered cast iron	hardened and tempered		40	55 HRC

* R_m = ultimate tensile strength, measured in MPa

Coated carbide								Cermet	
CTC5235		CTC5240		CTP2235		GM246		TCM10	
v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]
150 - 260	90 - 180	2	2	150-260	90-180	160 - 260	140 - 180	150 - 400	2
150 - 260	90 - 180	2	2	150-260	90-180	130 - 220	110 - 150	150 - 350	2
150 - 260	90 - 180	2	2	150-260	90-180	90 - 160	70 - 130	150 - 320	2
80 - 220	70 - 160	2	2	80-220	70-160	150 - 220	110 - 170	120 - 380	2
80 - 220	70 - 160	2	2	80-220	70-160	110 - 190	80 - 150	120 - 360	2
80 - 220	70 - 160	2	2	80-220	70-160	90 - 160	70 - 130	120 - 340	2
90 - 180	70 - 140	2	2	90-180	70-140	120 - 200	100 - 150	120 - 380	2
90 - 180	70 - 140	2	2	90-180	70-140	90 - 140	70 - 110	120 - 320	2
70 - 180	60 - 140	2	2	70-180	60-140	110 - 220	90 - 140	120 - 340	2
70 - 180	60 - 140	2	2	70-180	60-140	90 - 180	80 - 110	120 - 300	2
220 - 350	2	2	2	60-200	60-140	90 - 250	60 - 140	120-300	2
150 - 240	2	2	2	60-200	60-140	100 - 160	60 - 120	120 - 360	2
80 - 160	60 - 140	2	2	60-200	60-140	50 - 100	50 - 90	100 - 280	2
80 - 200	60 - 180	2	2	60-200	60-140	60 - 180	50 - 140	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	100 - 480	2
2	2	2	2	2	2	2	2	100 - 420	2
2	2	2	2	2	2	2	2	100 - 600	2
2	2	2	2	2	2	2	2	100 - 500	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
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2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	30 - 250	2	30 - 250	2	20-60	20 - 50	20 - 50	2	2
2	10 - 60	2	10 - 60	2	20-60	20 - 40	20 - 40	2	2
2	20 - 60	2	20 - 60	2	20-60	25 - 40	25 - 40	2	2
2	10 - 50	2	10 - 50	2	20-30	15 - 35	15 - 35	2	2
2	10 - 40	2	10 - 40	2	20-30	20 - 35	20 - 35	2	2
2	2	2	60 - 120	2	40-70	50 - 110	50 - 110	2	2
2	2	2	40 - 80	2	20-40	30 - 50	30 - 50	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2

☒ Recommended application ☐ Possible application

CERATIZIT hard material matters

Cutting data

* UDGHVWLP DWHULDO

	Work piece material	Type of treatment / alloy		VDI 3323 group	Hard-ness HB
A	Non alloyed steel	annealed	≤ .15% C	1	125
		annealed	.15% - .45% C	2	150 - 250
		tempered	≥ .45% C	3	300
	Low alloyed steel	annealed		6	180
		tempered		7 / 8	250 - 300
		tempered		9	350
	High alloyed steel	annealed		10	200
		tempered		11	350
	Corrosion resistant steel	annealed	ferritic	12	200
		tempered	martensitic	13	325
R	Stainless steel	annealed	ferritic / martensitic	14	200
		quenched	austenitic	14	180
		quenched	duplex	14	230 - 260
		hardened	martensitic / austenitic	14	330
F	* UH FDVWLUQ		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	2
	Malleable cast iron		ferritic	19	130
			pearlitic	20	230
N	Aluminium wrought alloys	non hardened		21	60
		hardened		22	100
	Aluminium cast alloys	non hardened	< 12% Si	23	80
		hardened	< 12% Si	24	90
		non hardened	> 12% Si	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	2
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	29	100
	Non-metallic materials		thermosetting plastics	29	2
			fibre-reinforced plastics	29	2
			hard rubber	30	2
S	Heat resistant alloys	annealed	Fe-base	31	200
		hardened	Fe-base	32	280
		annealed	Ni or Co-base	33	250
		hardened	Ni or Co-base 30 - 58 HRC	34	2
		cast	1 LRU&RIEDVHI 1 P P	35	2
	Titanium alloys		pure titanium	36	R_m 440*
			alpha + beta alloys	37	R_m 1050*
H	Tempered steel	hardened and tempered		38	55 HRC
		hardened and tempered		39	60 HRC
	Chilled castings	cast		40	400
	Tempered cast iron	hardened and tempered		40	55 HRC

* R_m = ultimate tensile strength, measured in MPa

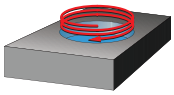
PCD		CBN				Si_3N_4	
CTD4205		CTL3215		TA201		CTN3105	
☐	☒	☒	☐	☒	☐	☒	☐
v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	500 - 1000	2	2	2	400 - 1500	2
2	2	500 - 1000	2	2	2	300 - 800	2
2	2	2	2	2	2	2	2
2	2	350 - 650	2	200 - 700**	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	300 - 4000	2	2	2	2	2	2
2	300 - 1500	2	2	2	2	2	2
2	300 - 5000	2	2	2	2	2	2
2	300 - 3000	2	2	2	2	2	2
2	300 - 1000	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	100 - 700	2	2	2	2	2	2
2	100 - 1500	2	2	2	2	2	2
2	300 - 3000	2	2	2	2	2	2
2	80 - 300	2	2	2	2	2	2
2	80 - 300	2	2	2	2	2	2
2	80 - 300	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	100 - 250	2	2	2
2	2	2	2	100 - 250	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2
2	2	2	2	70 - 250	2	2	2
2	2	110 - 190	2	70 - 150	2	2	2
2	2	210 - 360	2	2	2	2	2
2	2	2	2	2	2	2	2

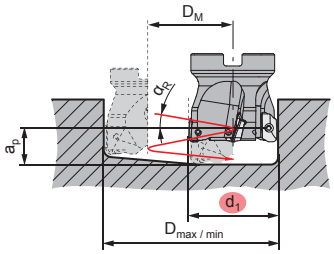
☒ Recommended application ☐ Possible application **) UPP VSKHUHGDFDVWLQJ * * * RQ

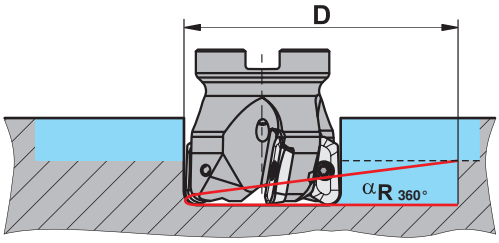
Application data

HSC-11

Helical plunge milling







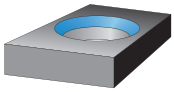
D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

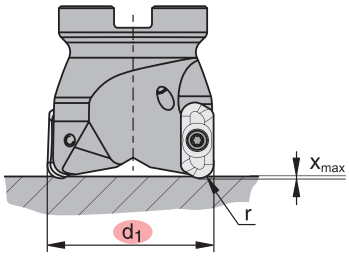
d_1 [mm]	D_{max} [mm]	D_{min} [mm]	α_{Rmax} [°]
16	30	20	10,0
18	34	24	9,1
19	36	26	8,6
20	38	28	8,2
22	42	32	7,4
25	48	38	6,5
32	62	53	4,7
40	78	69	3,3
50	98	89	2,4
63	124	115	1,7
80	158	150	1,1
100	198	189	0,9

a_p [mm] = $D_M \times \pi \times \tan \alpha_R$

d_1 [mm]	D [mm]	$\alpha_{R\ max}$ 360° [°]
16	20	10,0
18	24	9,1
19	26	8,6
20	28	8,2
22	32	7,4
25	38	6,5
32	53	4,7
40	69	3,3
50	89	2,4
63	115	1,7
80	150	1,1
100	189	0,9

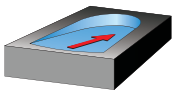
Axial plunging

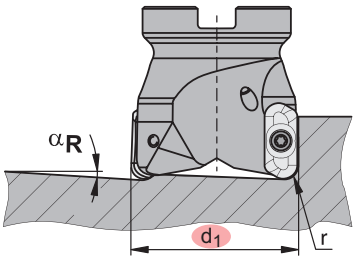




d_1 [mm]	r 0,2 - 4,0 X_{max} [mm]
16	1,7
18	2,11
19	2,24
20	2,39
22	2,70
25	2,55
32	2,40
40	2,28
50	2,26
63	2,10
80	1,75
100	1,79

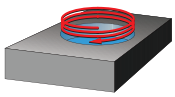
Angled ramping

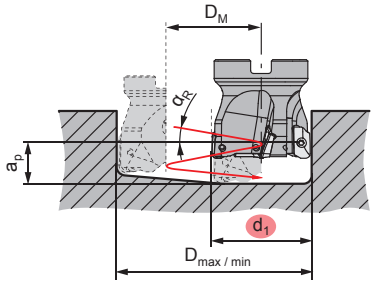


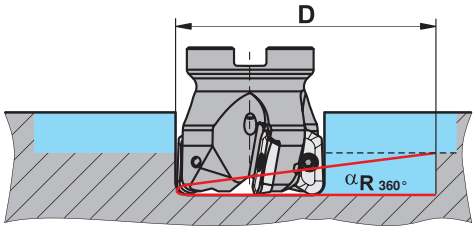


d_1 [mm]	r 0,2 - 4,0 α_R [°]
16	[illegible]
18	[illegible]
19	[illegible]
20	[illegible]
22	[illegible]
25	[illegible]
32	[illegible]
40	[illegible]
50	[illegible]
63	[illegible]
80	[illegible]
100	[illegible]

Helical plunge milling







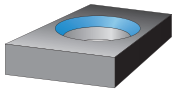
D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

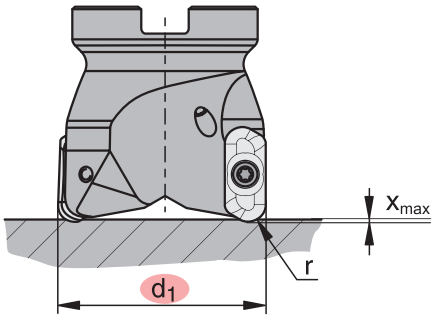
d_1 [mm]	D_{max} [mm]	D_{min} [mm]	$\alpha_{R\ max}$ 360° [°]
22	33	32	1,4
25	39	32	6,8
32	53	46	3,9
40	69	62	3,3
50	89	81	2,2
63	115	107	1,8

a_p [mm] = D_M x π x tan α_R

d_1 [mm]	D [mm]	$\alpha_{R\ max}$ 360° [°]
22	32	1,4
25	32	6,8
32	46	3,9
40	62	3,3
50	81	2,2
63	107	1,8

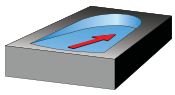
Axial plunging

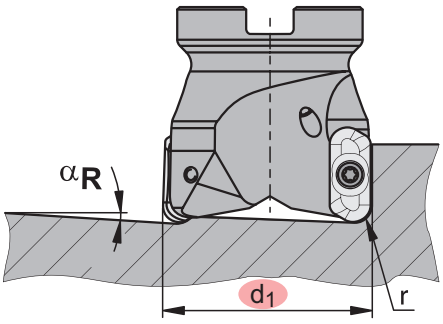




d_1 [mm]	r 0,2 - 4,0 X_{max} [mm]	r 5,0 X_{max} [mm]
22	0,70	0,28
25	2,23	1,45
32	2,12	1,39
40	2,38	1,53
50	2,54	1,57
63	2,61	1,86

Angled ramping



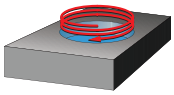


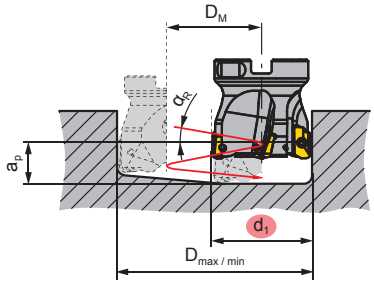
d_1 [mmh]	r 0,2 - 4,0 α_R [°]	r 5,0 α_R [°]
22	3,5	1,8
25	11,0	7,5
32	6,8	4,5
40	5,3	3,5
50	4,0	2,8
63	3,0	2,3

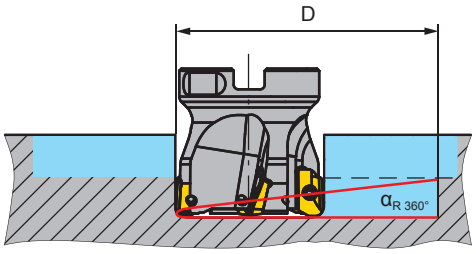
Application data

MaxiMill 211-07

Helical plunge milling







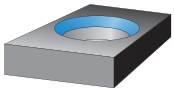
D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

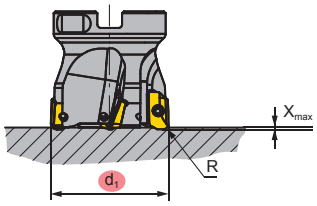
d_1 [mm]	D_{max} / r 0,4 [mm]	D_{min} [mm]	$\alpha_{R\ max}$ [°]
10	19	13	5,5
12	23	17	6,0
16	31	25	3,0
20	39	33	2,0
25	49	43	1,5
32	63	57	1,2
40	79	73	0,8
50	99	93	0,7

a_p [mm] = D_M x π x tan α_R

d_1 [mm]	D [mm]	$\alpha_{R\ max\ 360°}$ [°]
10	13	5,5
12	17	6,0
16	25	3,0
20	33	2,0
25	43	1,5
32	57	1,2
40	73	0,8
50	93	0,7

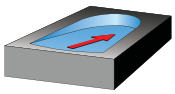
Axial plunging

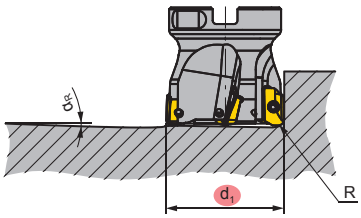




d_1 [mm]	X_{max} [mm]
10	0,8
12	0,8
16	0,8
20	0,8
25	0,8
32	0,8
40	0,8
50	0,8

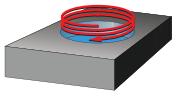
Angled ramping

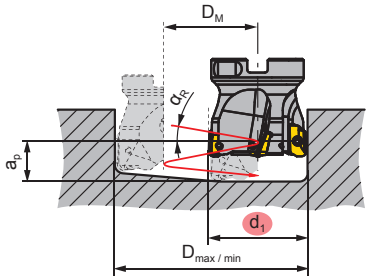


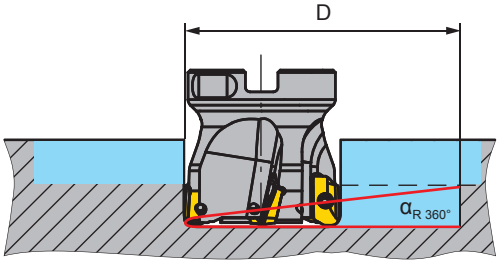


d_1 [mm]	αR [°]
10	11,0
12	7,9
16	4,3
20	3,0
25	2,5
32	1,6
40	1,2
50	1,0

Helical plunge milling







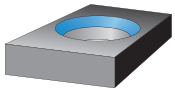
D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

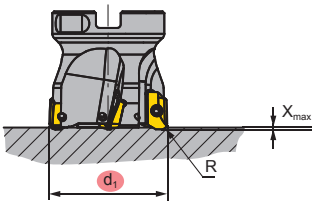
d_1 [mm]	D_{max} / r 0,8 [mm]	D_{min} [mm]	$\alpha_{R\ max}$ [°]
12	21	14	16,0
16	29	18	9,5
20	37	30	7,0
25	47	40	4,5
32	61	53	3,2
40	77	72	2,2
50	98	93	1,7
63	123	118	1,5
80	157	152	1,0
100	197	191	0,8
125	247	242	0,6
160	317	312	0,4

a_p [mm] = D_M x π x tan α_R

d_1 [mm]	D [mm]	$\alpha_{R\ max\ 360°}$ [°]
12	14	16,0
16	18	9,5
20	30	7,0
25	40	4,5
32	53	3,2
40	72	2,2
50	93	1,7
63	118	1,5
80	152	1,0
100	191	0,8
125	242	0,6
160	312	0,4

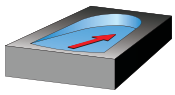
Axial plunging

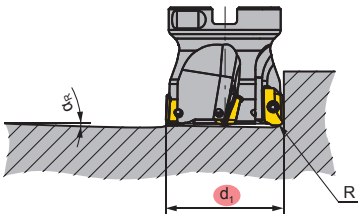




d_1 [mm]	X_{max} [mm]
12	1,3
16	1,5
20	2,0
25	2,0
32	1,8
40	1,6
50	1,6
63	1,6
80	1,6
100	1,6
125	1,6
160	1,6

Angled ramping



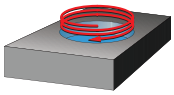


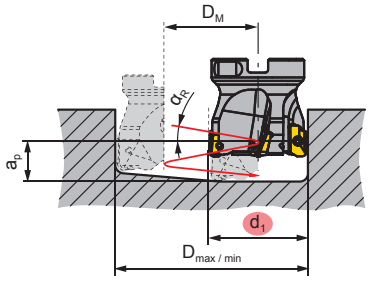
d_1 [mm]	α_R [°]
12	18,0
16	10,8
20	9,8
25	7,5
32	4,8
40	2,9
50	2,2
63	1,8
80	1,4
100	1,1
125	0,8
160	0,65

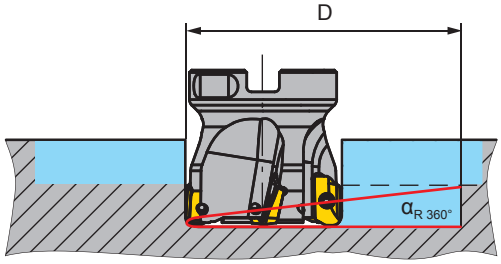
Application data

MaxiMill 211-15 / -15K

Helical plunge milling







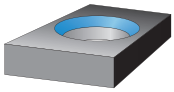
D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

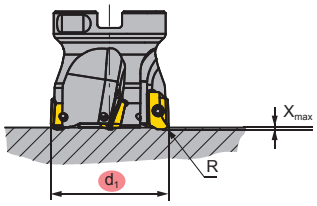
d_1 [mm]	D_{max} / r 0,8 [mm]	D_{min} [mm]	$\alpha_{R\ max}$ [°]
25	48	37	7,5
32	62	47	5,0
40	78	63	3,2
50	98	86	2,5
63	124	111	1,5
80	158	147	1,3
100	198	190	1,1
125	248	240	0,9
160	318	310	0,6

a_p [mm] = D_M x π x tan α_R

d_1 [mm]	D [mm]	$\alpha_{R\ max\ 360°}$ [°]
25	37	7,5
32	47	5,0
40	63	3,2
50	86	2,5
63	111	1,5
80	147	1,3
100	190	1,1
125	240	0,9
160	310	0,6

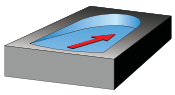
Axial plunging

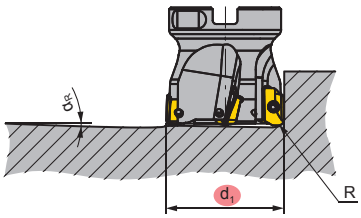




d_1 [mm]	X_{max} [mm]
25	2,7
32	2,5
40	2,5
50	2,5
63	2,5
80	2,5
100	2,5
125	2,5
160	2,5

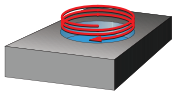
Angled ramping

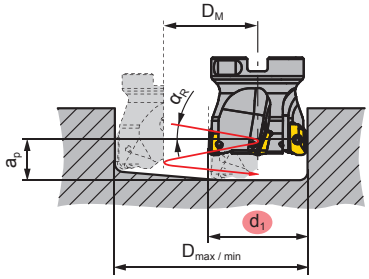




d_1 [mm]	α_R [°]
25	9,5
32	6,8
40	5,1
50	2,5
63	2,5
80	2,0
100	1,5
125	0,9
160	0,7

Helical plunge milling



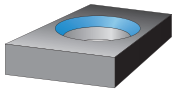


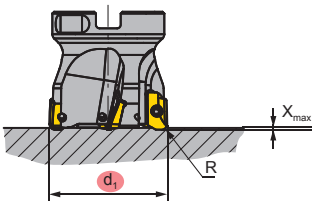
D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

d_1 [mm]	D_{max} / r 0,8 [mm]	D_{min} [mm]	$\alpha_{R\ max}$ [°]
63	124	107	2,2
80	158	143	1,7
100	198	183	1,3

a_p [mm] = D_M x π x tan α_R

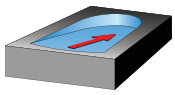
Axial plunging

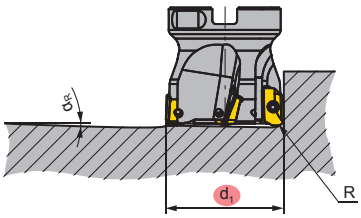




d_1 [mm]	X_{max} [mm]
63	2,0
80	2,0
100	2,0

Angled ramping



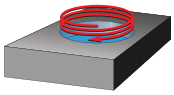


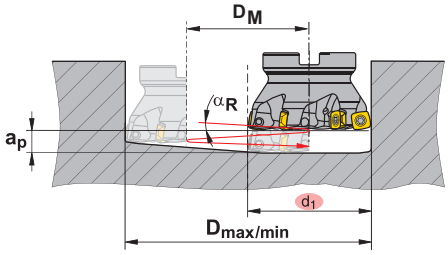
d_1 [mm]	α_R [°]
63	2,2
80	1,7
100	1,3

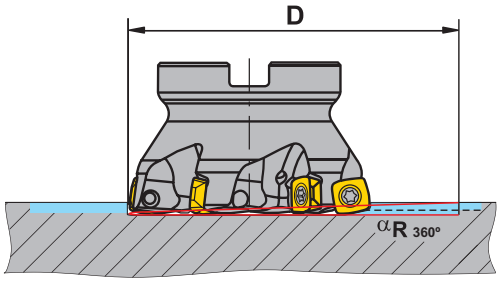
Application data

HFC-06

Helical plunge milling





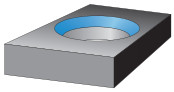


D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

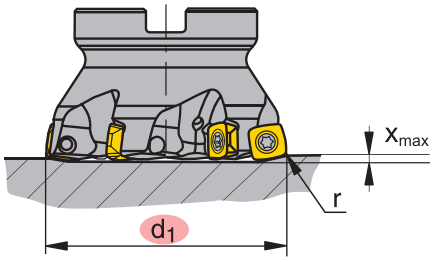
d_1 [mm]	D_{max} [mm]	D_{min} [mm]	$\alpha_{R\,max}$ [°]
16	31	22	4,5
20	39	30	2,3
25	49	40	1,3
32	63	54	0,9

a_p [mm] = $D_M \times \pi \times \tan \alpha_R$

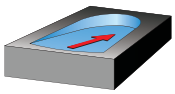
Axial plunging



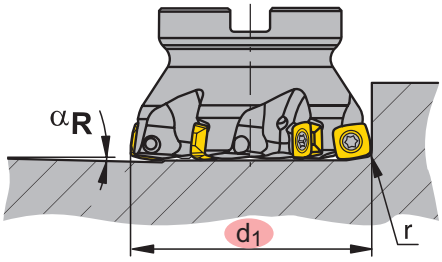
d_1 [mm]	X_{max} [mm]
16 - 32	0,5



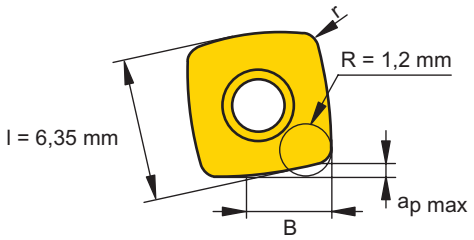
Angled ramping



d_1 [mm]	$\alpha_{R\,max}$ [°]
16	5,9
20	3,2
25	2,0
32	1,3

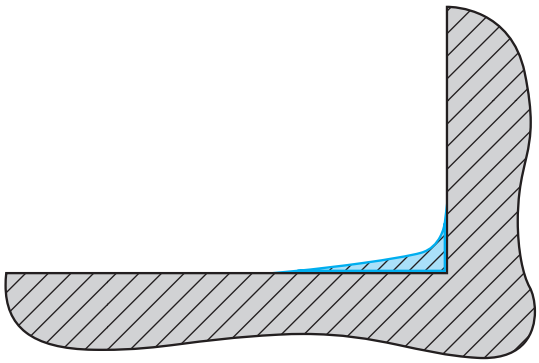


Helical plunge milling



l [mm]	B [mm]	r [mm]	$a_{p\,max}$ [mm]
6,35	4,3	0,5	0,8

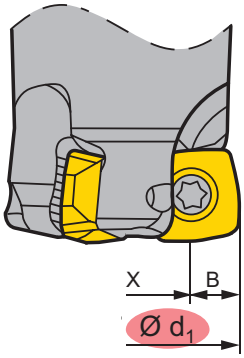
D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$



$f_z \geq 0.5$ / tooth

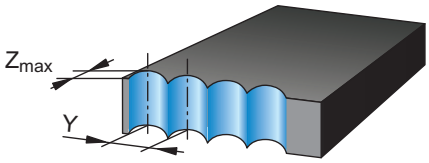
recommended

Axial plunging

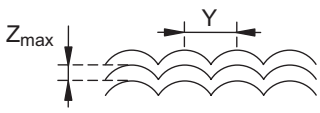


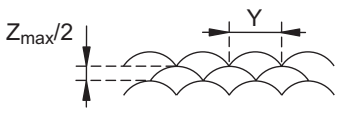
d_1 [mm]	X [mm]	B [mm]
16 - 32	d_1-(2 x B)	4,3

Angled ramping



Z_{max} [mm]	f_z initial [mm]	f_z min [mm]	f_z max [mm]	Y_{max} [mm]
5,3	0,10	0,08	0,15	< 0,7 x d_1

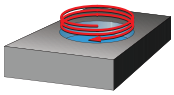


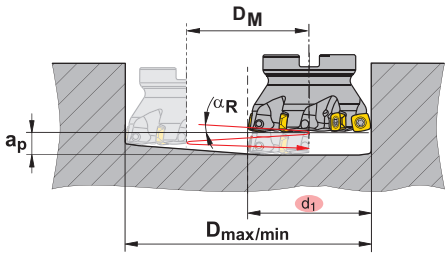


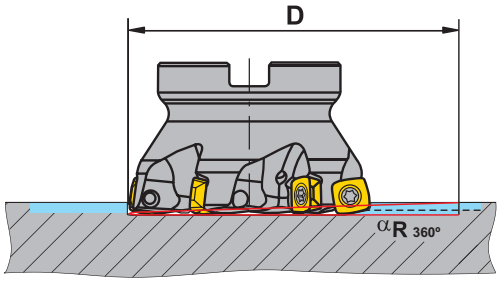
Application data

HFC-09

Helical plunge milling







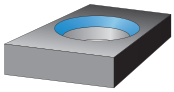
D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

d_1 [mm]	D_{max} [mm]	D_{min} [mm]	$\alpha_{R\,max}$ [°]
25	48	35	3,1
32	62	49	1,7
35	68	55	1,4
40	78	65	1,0
42	82	69	0,9
50	98	85	0,8
52	102	89	0,7
63	124	111	0,7
66	130	117	0,6

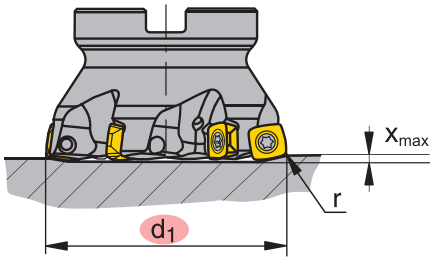
a_p [mm] = D_M x π x tan α_R

d_1 [mm]	D [mm]	$\alpha_{R\,max}$ 360° [°]
25	35	3,1
32	49	1,7
35	55	1,4
40	65	1,0
42	69	0,9
50	85	0,8
52	89	0,7
63	111	0,7
66	117	0,6

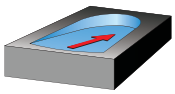
Axial plunging



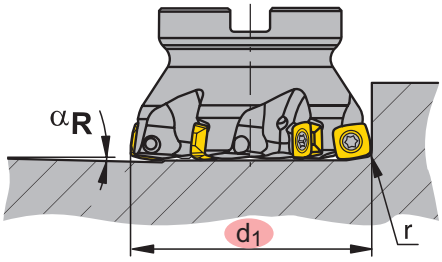
d_1 [mm]	X_{max} [mm]
25 - 66	0,75



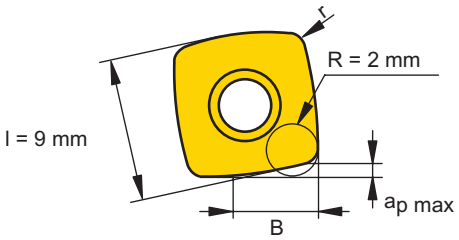
Angled ramping



d_1 [mm]	$\alpha_{R\,max}$ [°]
25	3,6
32	2,0
35	1,6
40	1,2
42	1,1
50	0,9
52	0,8
63	0,8
66	0,7



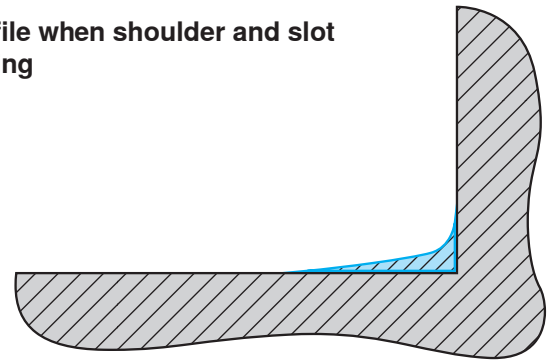
Depth of cut and remaining material



l [mm]	B [mm]	r [mm]	$a_{p\,max}$ [mm]
9	5,9	0,8	1

R = programmed radius

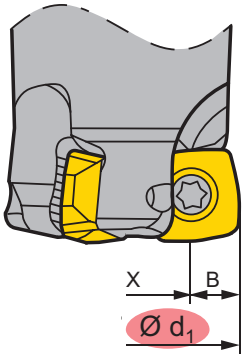
Profile when shoulder and slot milling



$f_z \geq 0.5$ / tooth

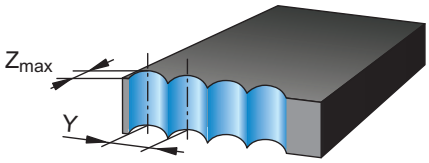
recommended

Width of cut for flat surfaces



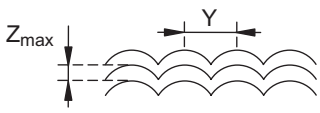
d_1 [mm]	X [mm]	B [mm]
25-66	d_1-(2 x B)	5,9

Engagement data when plunge milling

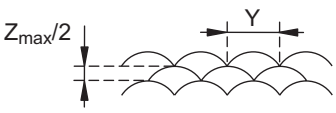


Z_{max} [mm]	f_z initial [mm]	f_z min [mm]	f_z max [mm]	Y_{max} [mm]
7,5	0,10	0,08	0,15	< 0,7 x d_1

Tool offset with optimum overlap



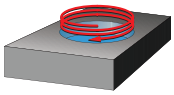
Tool offset for unstable conditions

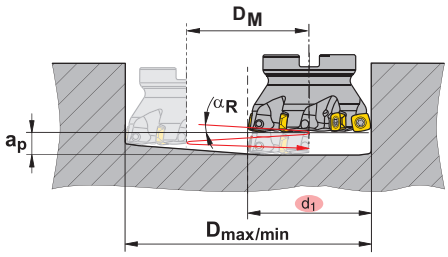


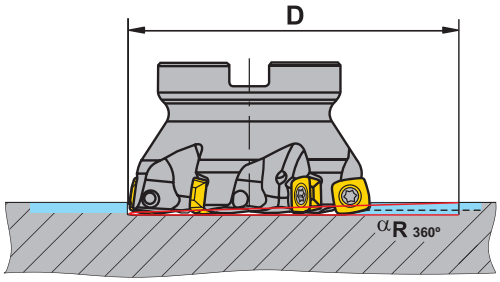
Application data

HFC-12

Helical plunge milling







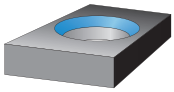
D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

d_1 [mm]	D_{max} [mm]	D_{min} [mm]	$\alpha_{R\,max}$ [°]
32	62	44	6,1
35	68	50	3,7
40	78	60	2,5
42	82	64	2,3
50	98	80	1,3
52	102	84	1,3
63	124	106	0,9
66	130	112	0,9
80	158	140	1,1
100	198	180	0,6

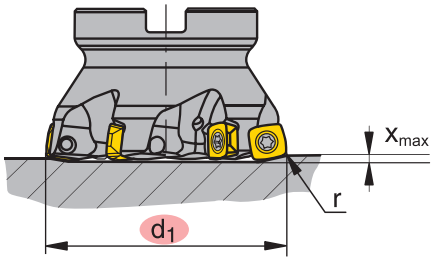
a_p [mm] = D_M x π x tan α_R

d_1 [mm]	D [mm]	$\alpha_{R\,max}$ 360° [°]
32	44	6,1
35	50	3,7
40	60	2,5
42	64	2,3
50	80	1,3
52	84	1,3
63	106	0,9
66	112	0,9
80	140	1,1
100	180	0,6

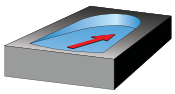
Axial plunging

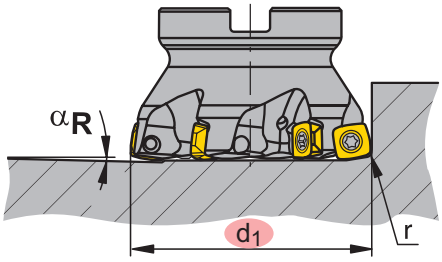


d_1 [mm]	X_{max} [mm]
32 - 100	1,15



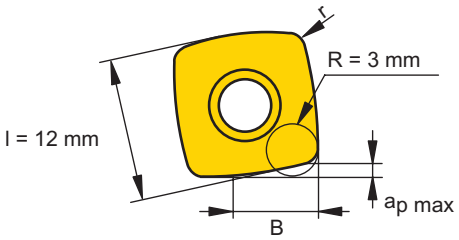
Angled ramping





d_1 [mm]	$\alpha_{R\,max}$ [°]
32	7,2
35	4,4
40	2,9
42	2,7
50	1,5
52	1,5
63	1,1
66	1,1
80	1,3
100	0,7

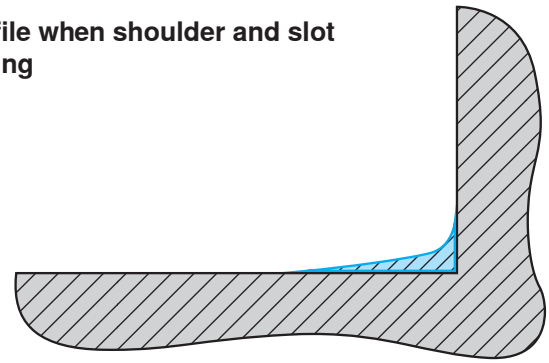
Depth of cut and remaining material



l [mm]	B [mm]	r [mm]	$a_{p\,max}$ [mm]
12	8,3	1,0	2

R = programmed radius

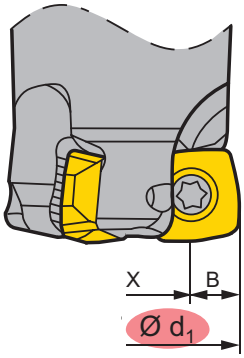
Profile when shoulder and slot milling



$f_z \geq 0.5$ / tooth

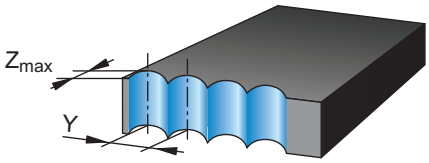
recommended

Width of cut for flat surfaces



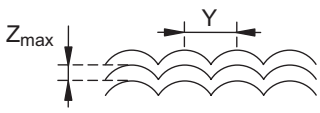
d_1 [mm]	X [mm]	B [mm]
32 - 100	d_1-(2 x B)	8,3

Engagement data when plunge milling

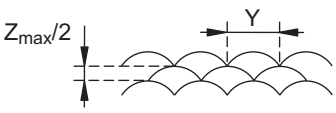


Z_{max} [mm]	f_z initial [mm]	f_z min [mm]	f_z max [mm]	Y_{max} [mm]
10	0,15	0,10	0,20	< 0,7 x d_1

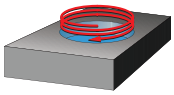
Tool offset with optimum overlap

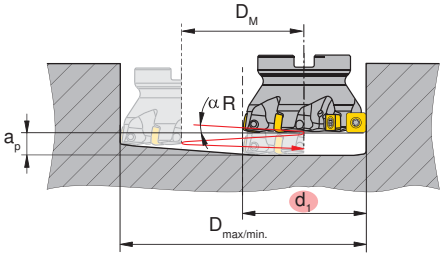


Tool offset for unstable conditions



Helical plunge milling





D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

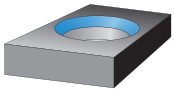
MaxiMill 490-09

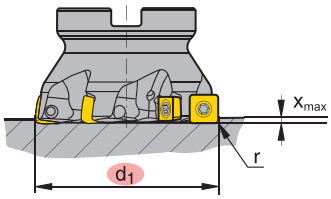
d_1 [mm]	D_{max} [mm]	D_{min} [mm]	$\alpha_{R\ max}$ [°]
25	48	37	4,4
32	62	47	2,2
40	78	63	0,75
50	98	83	0,5
63	124	109	0,35
80	158	143	0,25
100	198	183	0,2

MaxiMill 490-12

d_1 [mm]	D_{max} [mm]	D_{min} [mm]	$\alpha_{R\ max\ 360°}$ [°]
32	62	41	2,0
40	78	57	2,0
50	98	77	1,2
63	124	103	0,7
80	158	137	0,6
100	198	177	0,4
125	248	227	0,3

Axial plunging





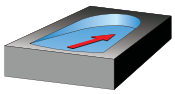
MaxiMill 490-09

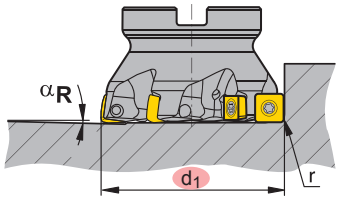
d_1 [mm]	X_{max} [mm]
25	0,5
32	0,5
40	0,3
50	0,3
63	0,3
80	0,3
100	0,3

MaxiMill 490-12

d_1 [mm]	X_{max} [mm]
32	0,3
40	0,5
50	0,5
63	0,5
80	0,5
100	0,5
125	0,5

Angled ramping





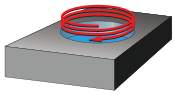
MaxiMill 490-09

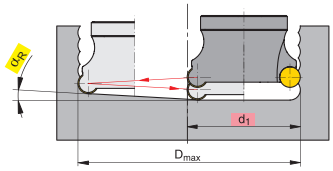
d_1 [mm]	α_R [°]
25	4,4
32	2,2
40	0,75
50	0,5
63	0,35
80	0,25
100	0,2

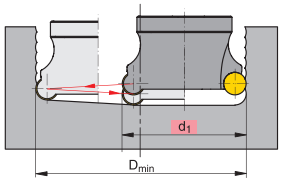
MaxiMill 490-12

d_1 [mm]	α_R [°]
32	2,0
40	2,0
50	1,2
63	0,7
80	0,6
100	0,4
125	0,3

Helical plunge milling





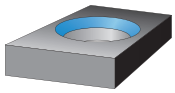


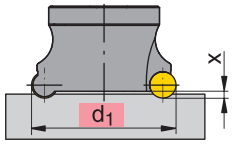
d_1 [mm]	D [mm]	5 [mm]	5 α_R [°]	8 [mm]	8 α_R [°]	10 [mm]	10 α_R [°]	12 [mm]	12 α_R [°]	16 [mm]	16 α_R [°]	20 [mm]	20 α_R [°]
10	D_{min}	12	2,5	2		2		2		2		2	
	D_{max}	15		2		2		2		2		2	
12	D_{min}	16	2,1	2		2		2		2		2	
	D_{max}	19		2		2		2		2		2	
16	D_{min}	24	1,5	21	2,4	2		2		2		2	
	D_{max}	27		24		2		2		2		2	
20	D_{min}	32	1,2	27	1,9	26	1,3	2		2		2	
	D_{max}	35		32		30		2		2		2	
25	D_{min}	42	1,0	37	1,5	37	1,8	31	2,2	2		2	
	D_{max}	45		42		40		38		2		2	
32	D_{min}	56	0,7	51	1,2	50	1,5	46	1,7	2		2	
	D_{max}	59		56		54		52		2		2	
40	D_{min}	2		2		64	1,1	62	1,4	2		2	
	D_{max}	2		2		70		68		2		2	
42	D_{min}	2		2		68	1,1	2		2		2	
	D_{max}	2		2		74		2		2		2	
50	D_{min}	2		2		84	0,9	81	1,1	75	1,5	2	
	D_{max}	2		2		90		88		84		2	
52	D_{min}	2		2		88	0,9	86	1,0	2		2	
	D_{max}	2		2		94		92		2		2	
63	D_{min}	2		2		2		107	0,9	101	1,1	2	
	D_{max}	2		2		2		114		110		2	
66	D_{min}	2		2		2		113	0,8	2		2	
	D_{max}	2		2		2		120		2		2	
80	D_{min}	2		2		2		142	0,7	135	0,9	128	1,1
	D_{max}	2		2		2		148		144		140	
100	D_{min}	2		2		2		181	0,5	175	0,7	168	0,9
	D_{max}	2		2		2		188		184		180	
125	D_{min}	2		2		2		2		2		218	0,7
	D_{max}	2		2		2		2		2		230	

D_{max} [mm] = maximum diameter for flat bottom ground
D_{min} [mm] = minimum hole diameter
$D_M = D_{max} - d_1$ or $D_{min} - d_1$

⚠ Maximum possible hole diameter
$r = 2 \times d_1 - 1$ mm

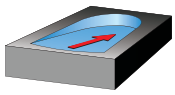
Axial plunging

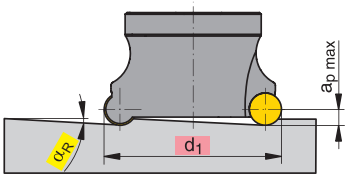




‘ [mm]	d_1 [mm]	X_{max} [mm]
05	10	0,5
	12-32	1,3
08	16	0,5
	20-32	2,7
10	20	0,2
	25	0,4
	32	0,8
	40_52	1,5
12	25	1,0
	32	1,1
	40	1,2
	50-100	1,5
16	50-100	2,0
20	80-125	3,0

Angled ramping

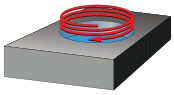


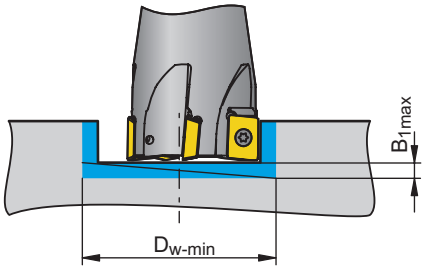


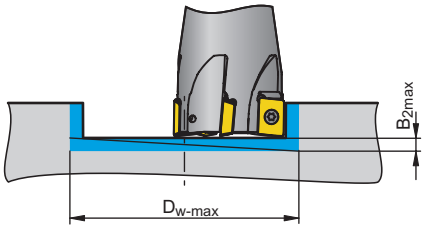
d_1 [mm]	5 α_R [°]	8 α_R [°]	10 α_R [°]	12 α_R [°]	16 α_R [°]	20 α_R [°]
10	3,4					
12	16,0	2	2	2	2	2
16	8,0	5,0	2	2	2	2
20	5,5	20,0	1,3	2	2	2
25	4,0	13,0	2,0	6,0	2	2
32	3,0	8,0	3,0	4,0	2	2
40	2	2	3,3	2,8	2	2
42	2	2	3,1	2	2	2
50	2	2	2,4	2,6	4,0	2
52	2	2	2,2	2,3	2	2
63	2	2	2	1,9	2,8	2
66	2	2	2	1,6	2	2
80	2	2	2	1,3	2,0	3,2
100	2	2	2	1,0	1,5	2,3
125	2	2	2	2	2	1,7

Application data

MaxiMill HSV / 210 / 270 / 141







α
Ramp angle

B
Calculated pitch / $D_w > D_{w\text{-}min}$ and $D_w < D_{w\text{-}max}$

B_{1max}
Max. pitch when plunging with minimum hole diameter

B_{2max}
Max. when plunging with maximum diameter

d_1
Milling cutter diameter

D_w
Diameter of hole

$D_{w\text{-}max}$
Largest hole diameter (without formation of pip)

$D_{w\text{-}min}$
Minimum hole diameter

$$B = (D_w - d_1) \cdot \pi \cdot \tan \alpha$$

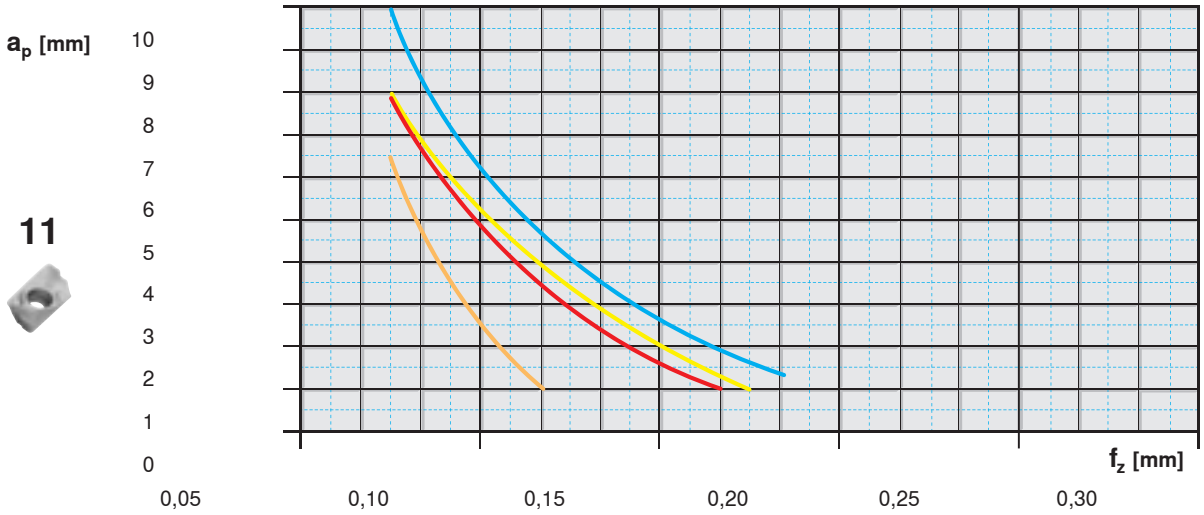
D [mm]	[mm] $D_{w\text{-}min}$	$B_{1\text{-}max}$	$D_{w\text{-}max}$	$B_{2\text{-}max}$	α
HSV					
[illegible]	58,0	8,0	74,0	15,0	[illegible]
[illegible]	78,2	9,0	94,0	15,0	[illegible]
[illegible]	104,0	10,5	120,0	15,0	[illegible]
[illegible]	138,0	11,8	154,0	15,0	[illegible]
210					
[illegible]	22,0	1,4	30,0	2,9	[illegible]
[illegible]	30,0	1,5	38,0	2,6	[illegible]
[illegible]	40,0	1,6	48,0	2,3	[illegible]
[illegible]	54,0	1,6	62,0	2,2	[illegible]
[illegible]	70,0	1,7	78,0	2,1	[illegible]
[illegible]	90,0	1,6	98,0	1,9	[illegible]
[illegible]	116,0	1,6	124,0	1,8	[illegible]
[illegible]	150,0	1,5	158,0	1,7	[illegible]
[illegible]	190,0	1,5	198,0	1,7	[illegible]
[illegible]	240,0	1,5	248,0	1,7	[illegible]
270-09					
[illegible]	14,4	1,5	19,0	1,5	[illegible]
[illegible]	28,5	1,5	31,0	1,5	[illegible]
[illegible]	36,5	1,5	39,0	1,5	[illegible]
[illegible]	44,5	1,5	47,0	1,5	[illegible]
[illegible]	54,5	1,5	57,0	1,5	[illegible]
[illegible]	68,5	1,5	71,0	1,5	[illegible]
[illegible]	84,5	1,5	87,0	1,5	[illegible]
[illegible]	104,5	1,5	107,0	1,5	[illegible]
[illegible]	130,5	1,5	133,0	1,5	[illegible]
[illegible]	164,5	1,5	167,0	1,5	[illegible]
[illegible]	204,5	1,5	207,0	1,5	[illegible]
[illegible]	254,5	1,5	257,0	1,5	[illegible]
[illegible]	324,5	1,5	327,0	1,5	[illegible]
270-12					
[illegible]	74,5	1,5	78,0	1,5	14,9
[illegible]	90,5	1,5	94,0	1,5	11,1
[illegible]	110,5	1,5	114,0	1,5	8,4
[illegible]	136,5	1,5	140,0	1,5	6,4
[illegible]	170,5	1,5	174,0	1,5	4,9
[illegible]	210,5	1,5	214,0	1,5	3,8
[illegible]	260,5	1,5	264,0	1,5	3,0
[illegible]	330,5	1,5	334,0	1,5	2,3
141					
[illegible]	20,0	0,4	30,0	1,5	[illegible]
[illegible]	24,0	0,4	38,0	1,9	[illegible]
[illegible]	34,0	0,9	48,0	2,5	[illegible]
[illegible]	48,0	1,7	62,0	3,2	[illegible]
[illegible]	64,0	1,9	78,0	3,1	[illegible]
241					
[illegible]	64,0	1,9	78,0	3,1	[illegible]
[illegible]	84,0	1,8	98,0	2,6	[illegible]
[illegible]	110,0	1,2	124,0	1,6	[illegible]
[illegible]	144,0	1,4	158,0	1,7	[illegible]
[illegible]	184,0	1,3	198,0	1,6	[illegible]
[illegible]	234,0	1,2	248,0	1,3	[illegible]

MaxiMill 211 - starting parameters

for example materials

	Example materials			
▼	High alloyed steel	1.000 N/mm²	1.2312	40CrMnMoS 8-6
▼	Stainless steel, austenitic	600 N/mm²	1.4571	X6CrNiMoTi 1712 2
▼	* UH FDVWLURQ SHDOOHIHUUHF	HB 180	EN-JL-1040	EN-GJL-250 * *
▼	Super alloys, Ni-base, hardened	1.450 N/mm²	2.4856	Inconel 625

If a_e < 50% use correction list B222



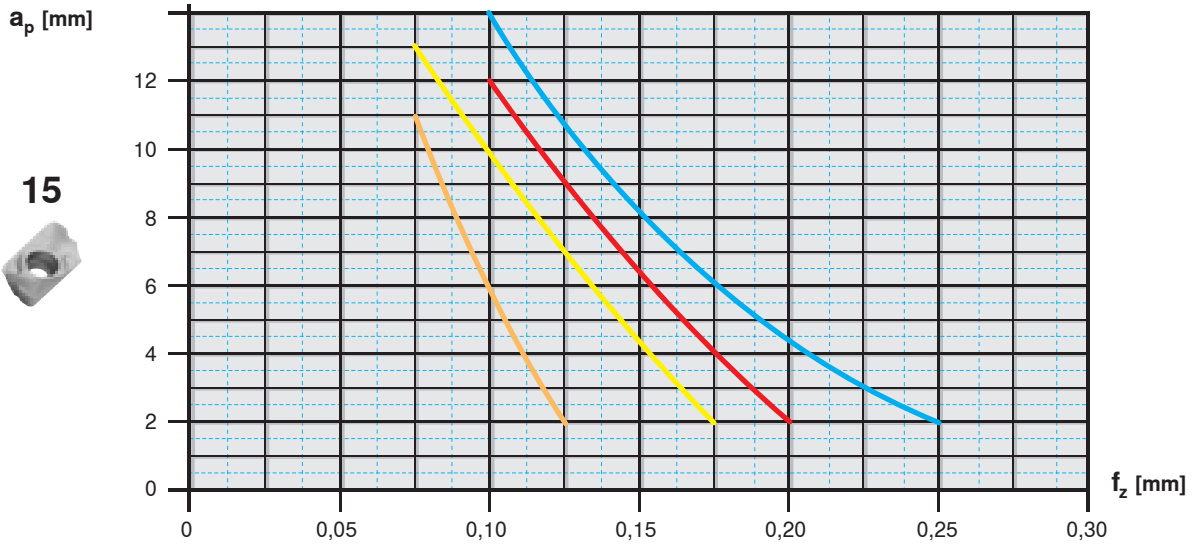
MaxiMill 211 - starting parameters

for example materials

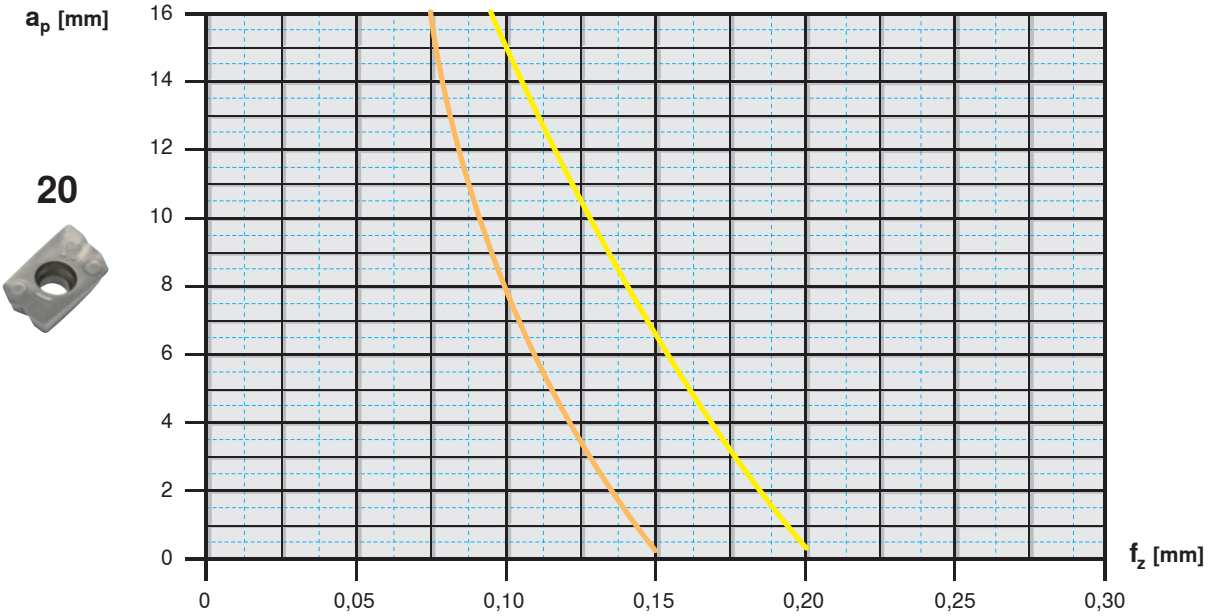
	Example materials			
▼	High alloyed steel	1.000 N/mm²	1.2312	40CrMnMoS 8-6
▼	Stainless steel, austenitic	600 N/mm²	1.4571	X6CrNiMoTi 1712 2
▼	* UH FDVWLQJ SHDUOLWH LUQ	HB 180	EN-JL-1040	EN-GJL-250 * *
▼	Super alloys, Ni-base, hardened	1.450 N/mm²	2.4856	Inconel 625

If a_e < 50% use correction list B222

15



20



MaxiMill 490 - starting parameters

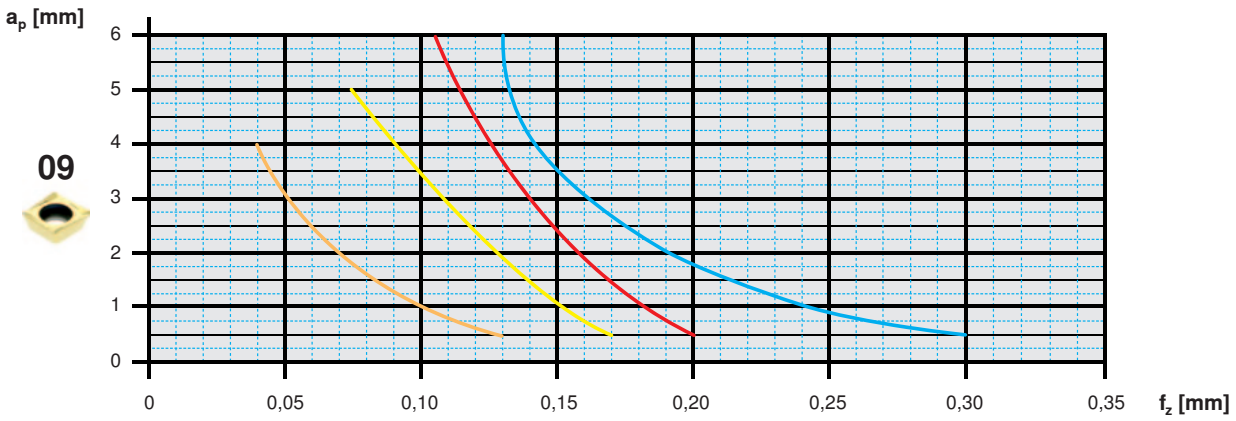
for example materials

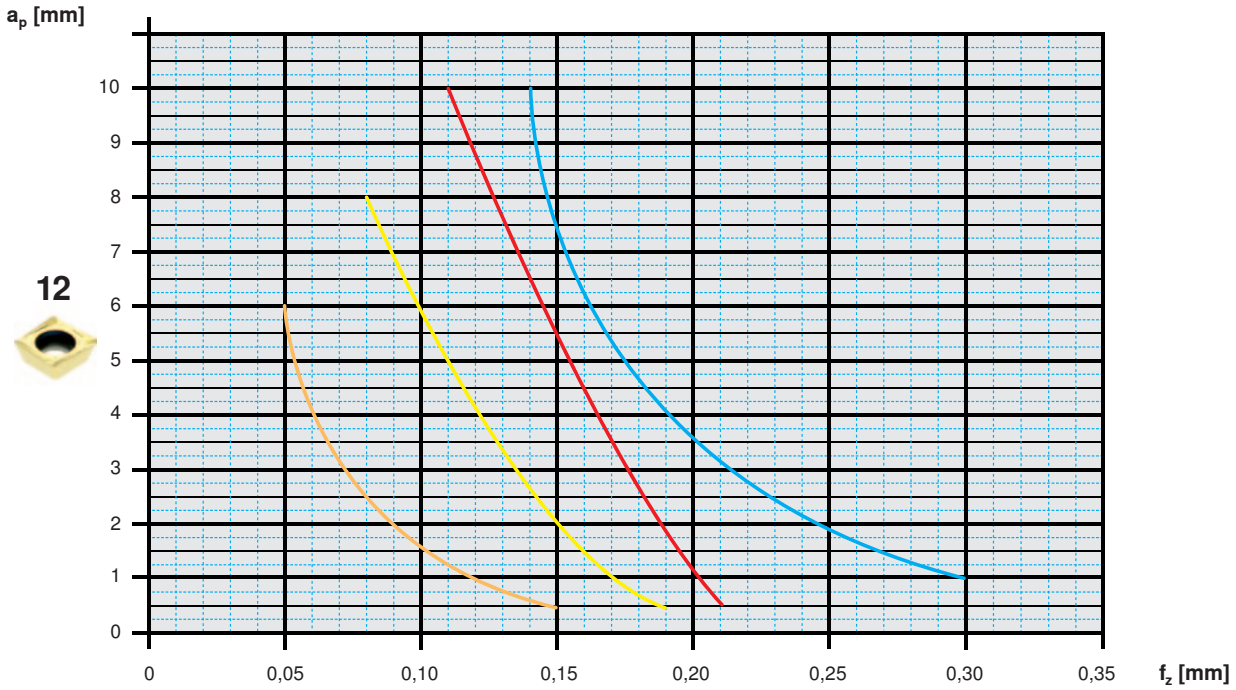
	Example materials			
▼	High alloyed steel	1.000 N/mm²	1.2312	40CrMnMoS 8-6
▼	Stainless steel, austenitic	600 N/mm²	1.4571	X6CrNiMoTi 1712 2
▼	* UH FDVWLQ pearlitic, ferritic	HB 180	EN-JL-1040	EN-GJL-250 * *
▼	Super alloys, Ni-base, hardened	1.450 N/mm²	2.4856	Inconel 625

If a_e < 50% use correction list

B222

490-09/-12



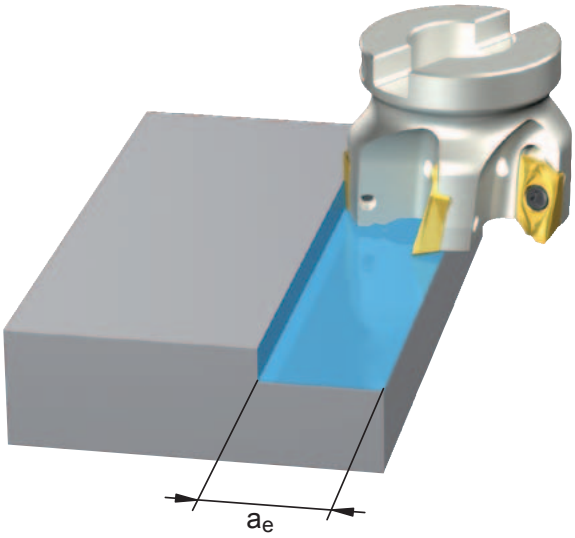


Application data for shoulder milling

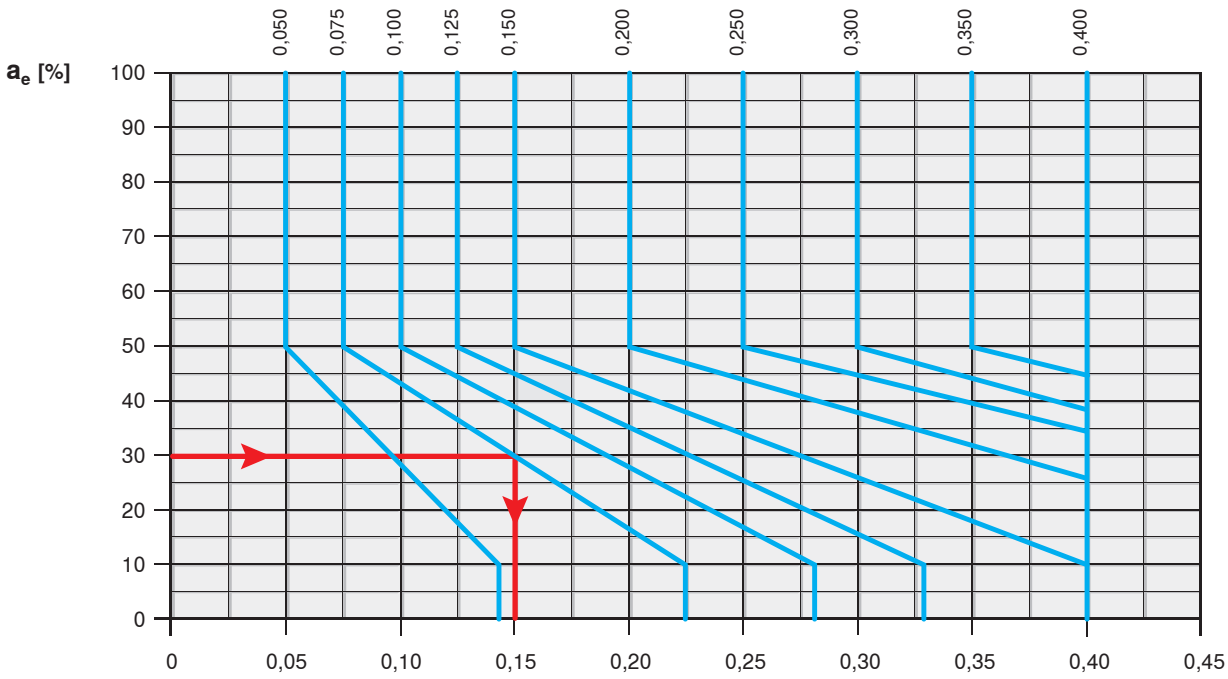
Correction of feed rate f_z

MaxiMill 211 / MaxiMill 490

These parameters apply for cutting width (a_e) below 50%



Starting values f_z [mm] from starting parameter diagram



Corrected values f_z [mm]

Example:
Starting value [f_z] = 0,075 mm
a_e = 30%
Corrected value [f_z] = 0,15 mm

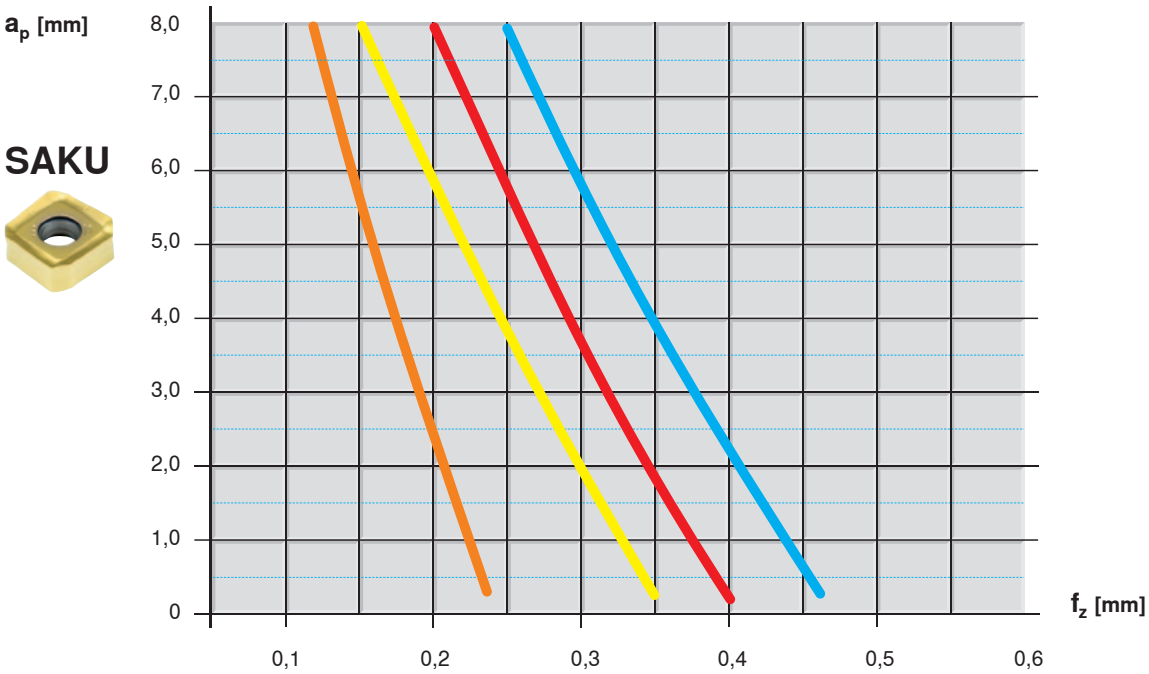
MaxiMill 273 / -274 - starting parameters

for example material

	Example materials			
	High alloyed steel	1.000 N/mm²	1.2312	40CrMnMoS 8-6
	Stainless steel, austenitic	600 N/mm²	1.4571	X6CrNiMoTi 1712 2
	* UH FDVWLURQ SHDOOHIHUUHF	HB 180	EN-JL-1040	EN-GJL-250
	Super alloys, Ni-base, hardened	1.450 N/mm²	2.4856	Inconel 625

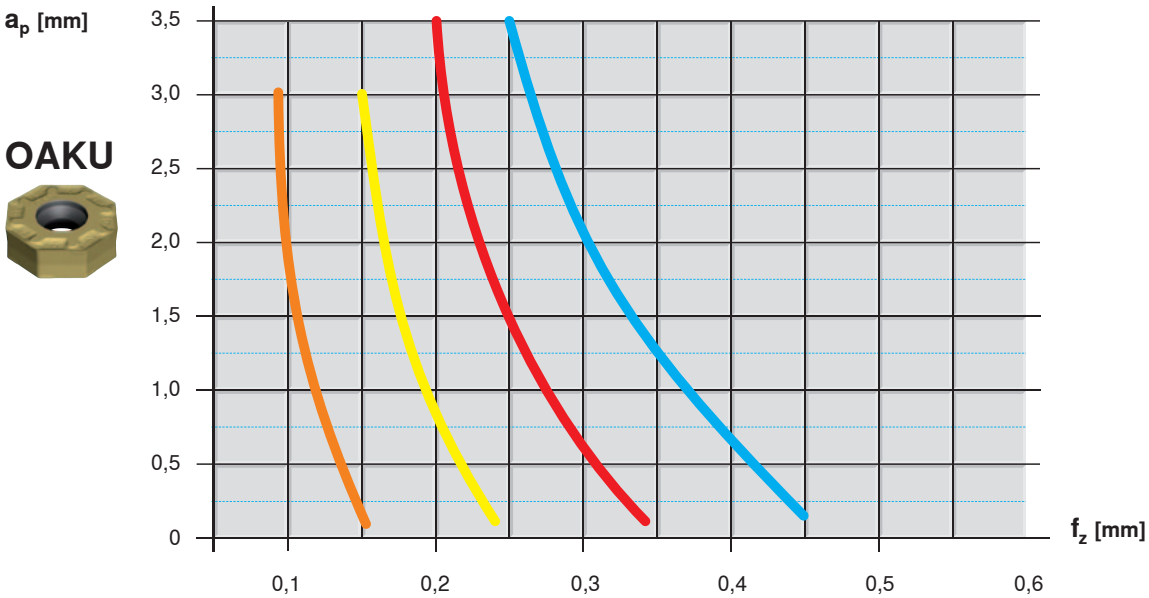
MaxiMill 271

SAKU



MaxiMill 273

OAKU

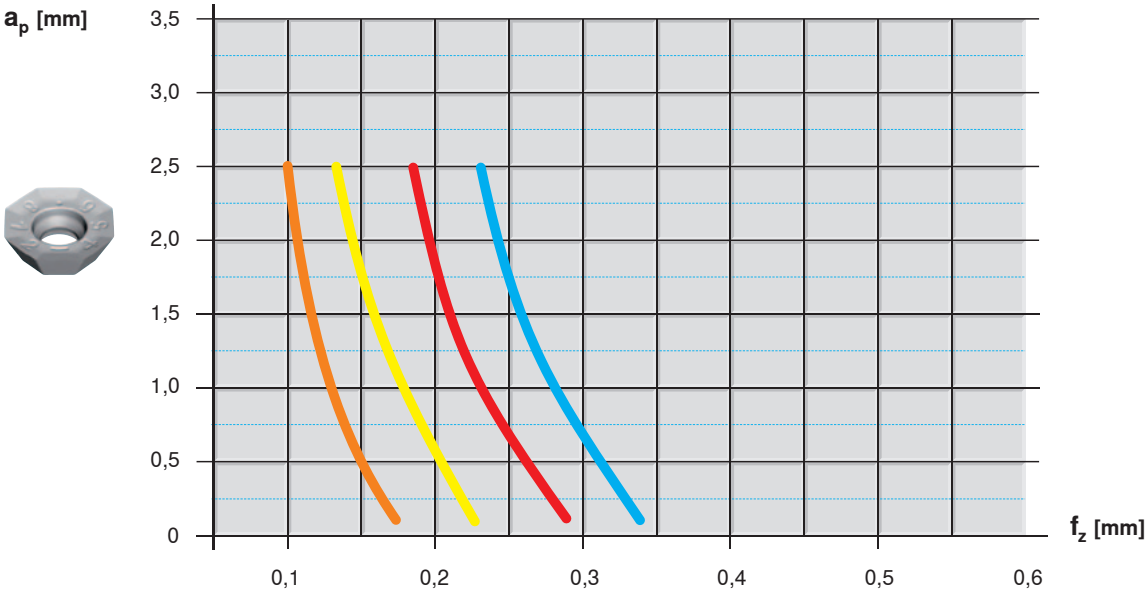


MaxiMill 273 / -274 - starting parameters

for example material

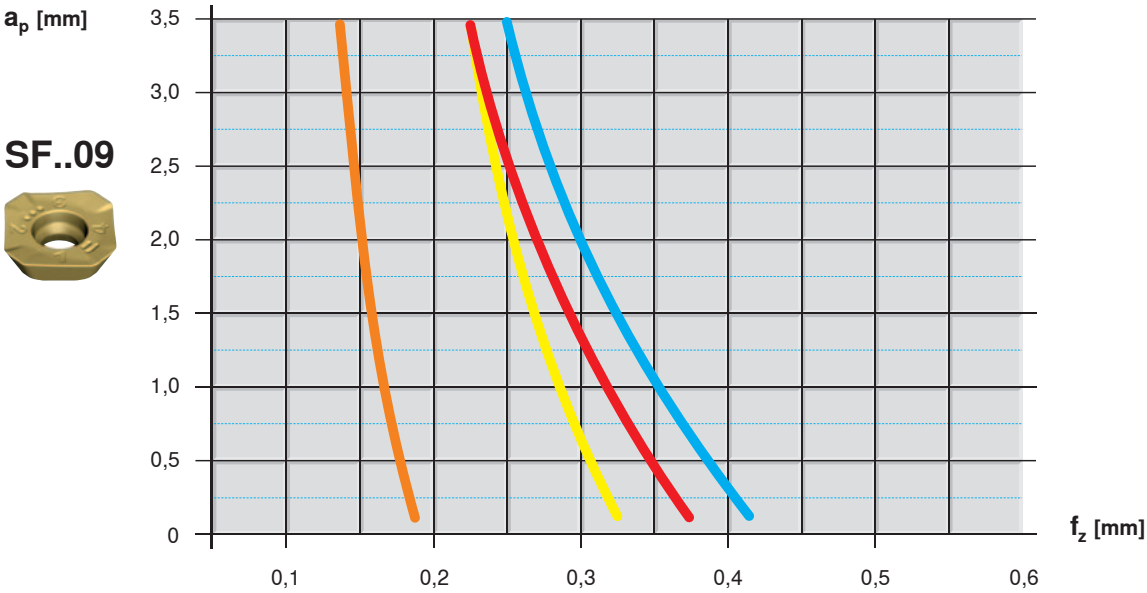
	Example materials			
	High alloyed steel	1.000 N/mm²	1.2312	40CrMnMoS 8-6
	Stainless steel, austenitic	600 N/mm²	1.4571	X6CrNiMoTi 1712 2
	* UH FDVWLQJ SHDUOLWH IHUULWH	HB 180	EN-JL-1040	EN-GJL-250 * *
	Super alloys, Ni-base, hardened	1.450 N/mm²	2.4856	Inconel 625

MaxiMill 274



MaxiMill 274

SF..09



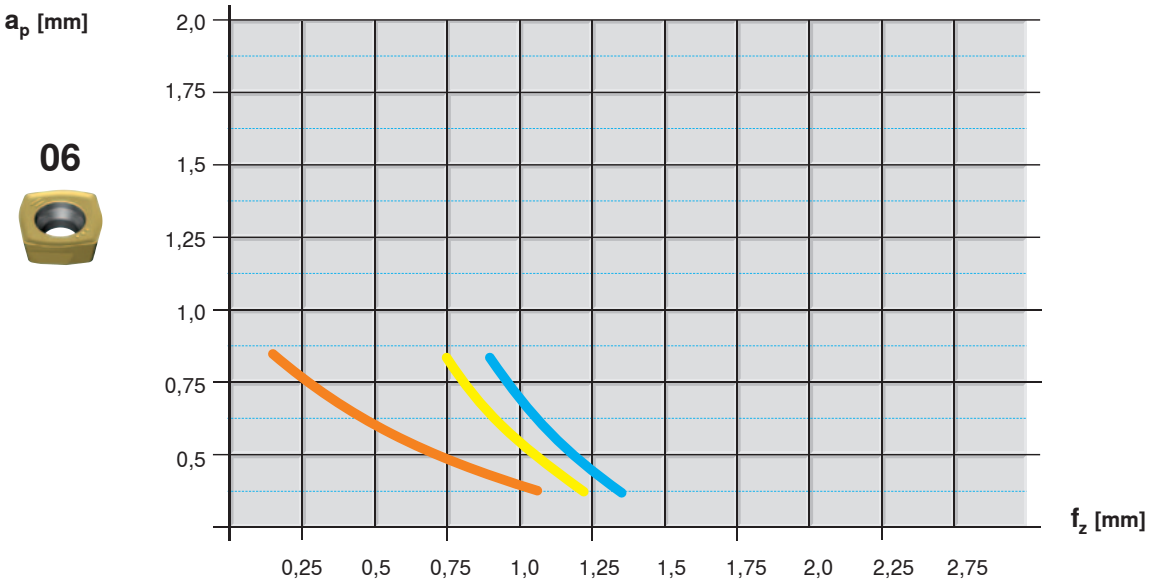
MaxiMill HFC starting parameters

for example material

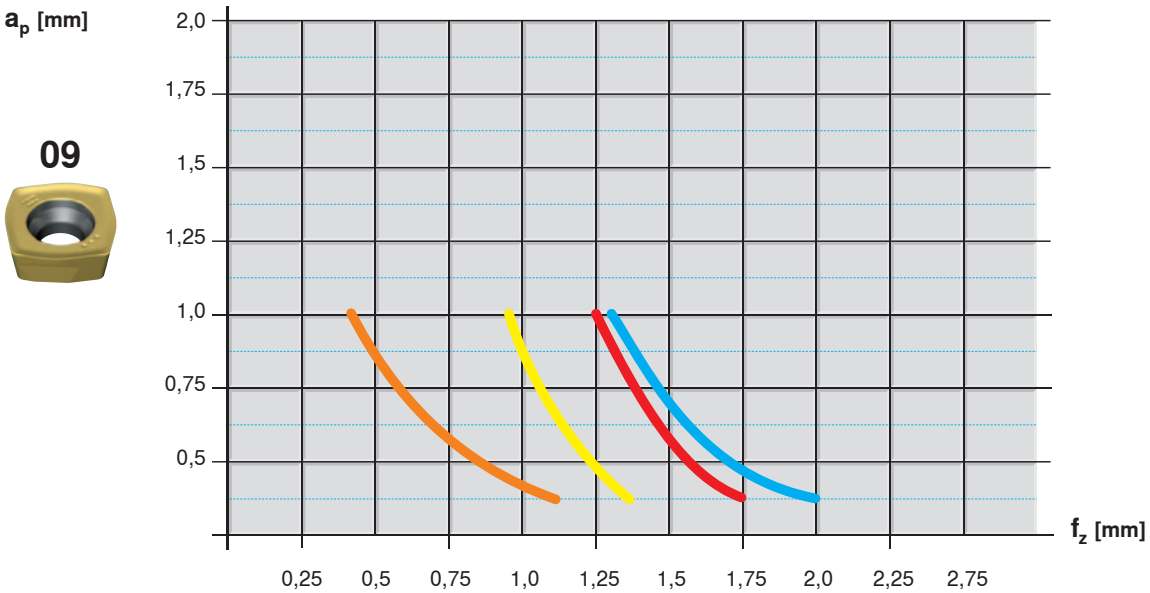
	Example materials			
▼	High alloyed steel	1.000 N/mm²	1.2312	40CrMnMoS 8-6
▼	Stainless steel, austenitic	600 N/mm²	1.4571	X6CrNiMoTi 1712 2
▼	* UH FDVWLQJ SHDUOLWH IHUULWH	HB 180	EN-JL-1040	EN-GJL-250
▼	Super alloys, Ni-base, hardened	1.450 N/mm²	2.4856	Inconel 625

XPLX

06



09

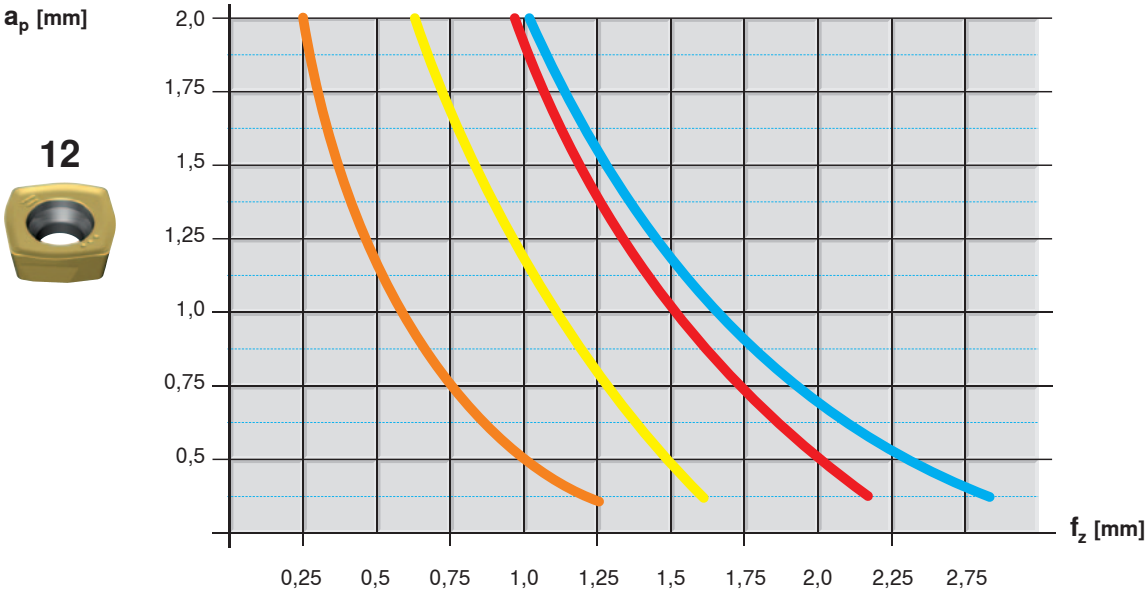


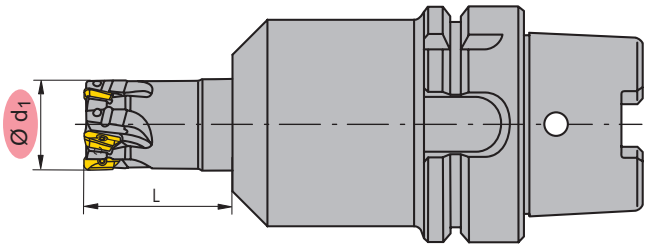
MaxiMill HFC starting parameters

HFC-12

	Example materials			
	High alloyed steel	1.000 N/mm²	1.2312	40CrMnMoS 8-6
	Stainless steel, austenitic	600 N/mm²	1.4571	X6CrNiMoTi 1712 2
	* UH FDVWLQJ SHDUOLWH IHUULWH	HB 180	EN-JL-1040	EN-GJL-250 * *
	Super alloys, Ni-base, hardened	1.450 N/mm²	2.4856	Inconel 625

XOLX





Maximum RPM in relation to overhang length L.

The revolution number must be adapted according to the machining situation and the selected tool shank.

211-11

	211-07			211-11			211-15		
	n_{max} [min^{-1}]			n_{max} [min^{-1}]			n_{max} [min^{-1}]		
d_1 mm	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	72.000	58.000	46.000	–	–	–		–	–
12	67.000	54.000	38.000	56.000	45.000	32.000	–	–	–
16	50.000	41.000	29.000	42.000	34.000	24.000	–	–	–
20	44.000	34.000	23.000	37.000	29.000	20.000	–	–	–
25	40.000	29.000	18.000	33.000	24.000	15.000	27.000	20.000	12.000
32	36.000	25.000	14.000	30.000	21.000	12.000	24.000	17.000	10.000
40	33.000	22.000	11.000	28.000	18.000	9.000	22.000	14.000	7.000
50	30.000	18.000	7.000	25.000	15.000	6.000	20.000	12.000	5.000
63	–	–	–	23.000	13.000	4.000	19.000	10.000	3.000
80	–	–	–	21.000	11.000	–	17.000	8.000	–
100	–	–	–	20.000	8.000	–	16.000	7.000	–
125	–	–	–	18.000	–	–	14.000	–	–
160	–	–	–	17.000	–	–	13.000	–	–

HSC/HPC

	HSC-11			HSC-19			HPC-19		
	n_{max} [min^{-1}]			n_{max} [min^{-1}]			n_{max} [min^{-1}]		
d_1 mm	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	56.000	49.000	35.000	–	–	–		–	–
18	53.000	47.000	33.000	–	–	–	–	–	–
19	52.000	45.000	32.000	–	–	–	–	–	–
20	50.000	44.000	31.000	–	–	–	–	–	–
22	48.000	42.000	30.000	–	–	–	45.000	42.000	32.000
25	45.000	39.000	28.000	35.000	31.000	22.000	45.000	40.000	28.000
32	40.000	35.000	25.000	29.000	25.000	18.000	40.000	35.000	25.000
40	36.000	31.000	22.000	25.000	22.000	16.000	36.000	31.000	22.000
50	32.000	28.000	20.000	22.000	19.000	14.000	32.000	28.000	20.000
63	28.000	25.000	18.000	19.000	17.000	–	29.000	25.000	–
80	25.000	22.000	[2]	16.000	14.000	–	25.000	22.000	–
100	22.000	20.000	[2]	15.000	–	–	23.000	–	–
125	–	–	–	13.000	–	–	20.000	–	–

Forces in the tooling system

F_a = axial force

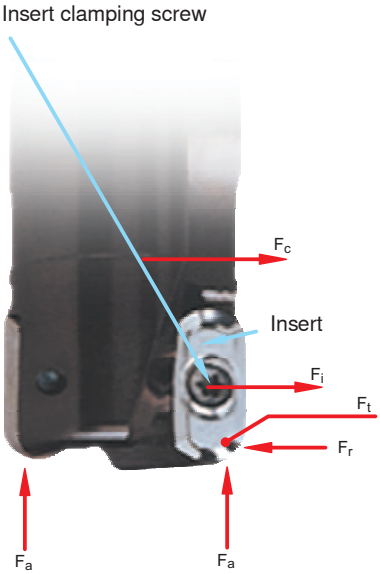
F_r = radial force

F_t = tangential force

F_c = centrifugal force (tool body)

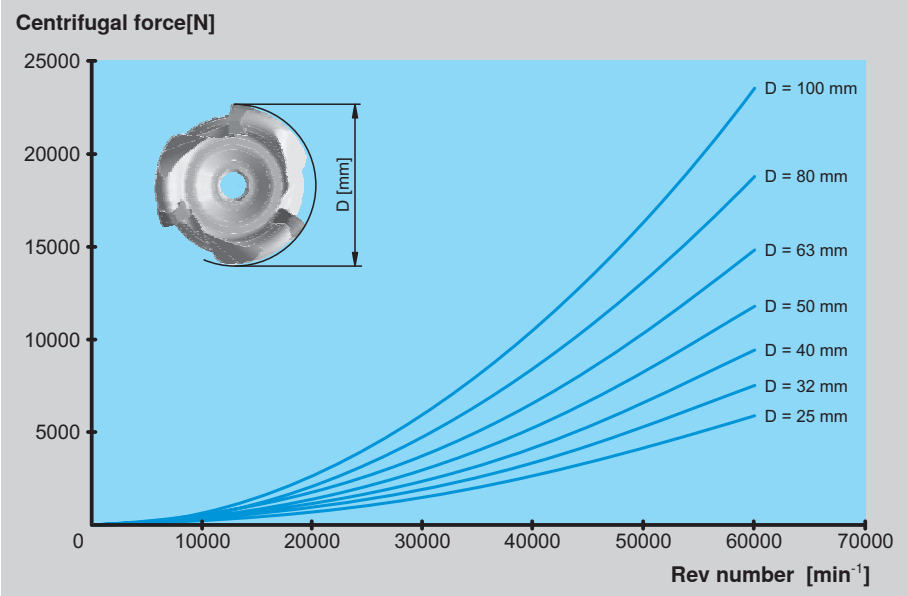
F_i = centrifugal force (insert)

Forces present in the HSC milling cutter during machining. With HSC machining, the centrifugal forces produce considerably more stress on the tool than the cutting forces.



Note safety rules enclosed to the tool.

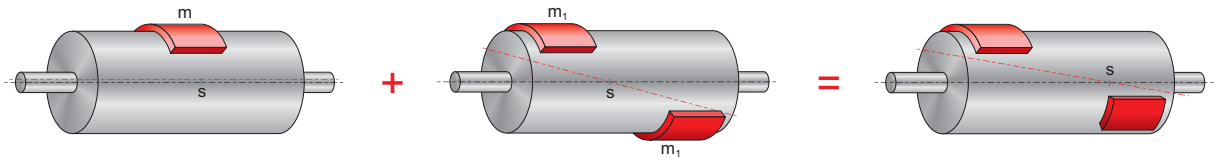
See also permissible residual unbalance: DIN 1940



Centrifugal forces generated are dependant upon tool diameter and rotational speed (rpm), example: indexable insert of 12g.

Revolutions per minute increase times two = centrifugal force increase times four

Balance types:



Static unbalance

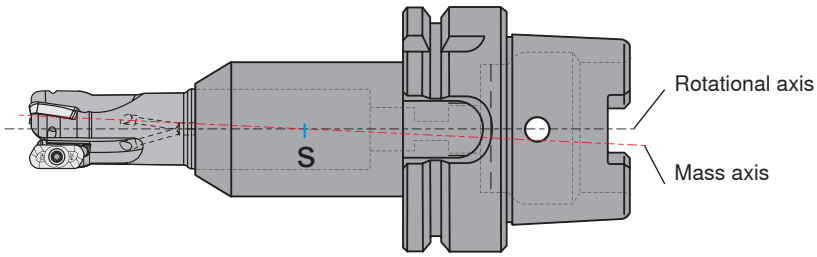
Moment unbalance

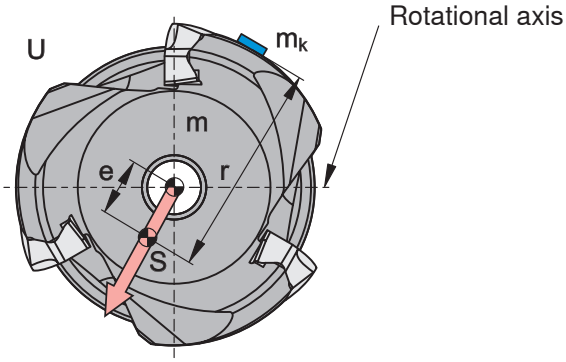
Dynamic unbalance is the sum of static unbalance and moment unbalance.

Unbalance

is the state of a rotor in which the mass axis does not coincide with the rotational axis.

$U = m \cdot e$ [gmm]





Unbalance is produced by a centrifugal force F which rotates with the rotor.

$$F = u \cdot \omega^2 = m \cdot e \cdot \omega^2 = \frac{m \cdot e\,(2 \cdot x \cdot n)^2}{60^2} \quad [N]$$

$$m_k = \frac{m \cdot e}{r} \quad [g]$$

m = mass [g]
e = radius of gravity centre [mm]
S = mass axis
m_k = counterweight

U = unbalance
ω = angular velocity [s^{-1}]

Reasons for unsymmetric mass distribution regarding the rotational axis

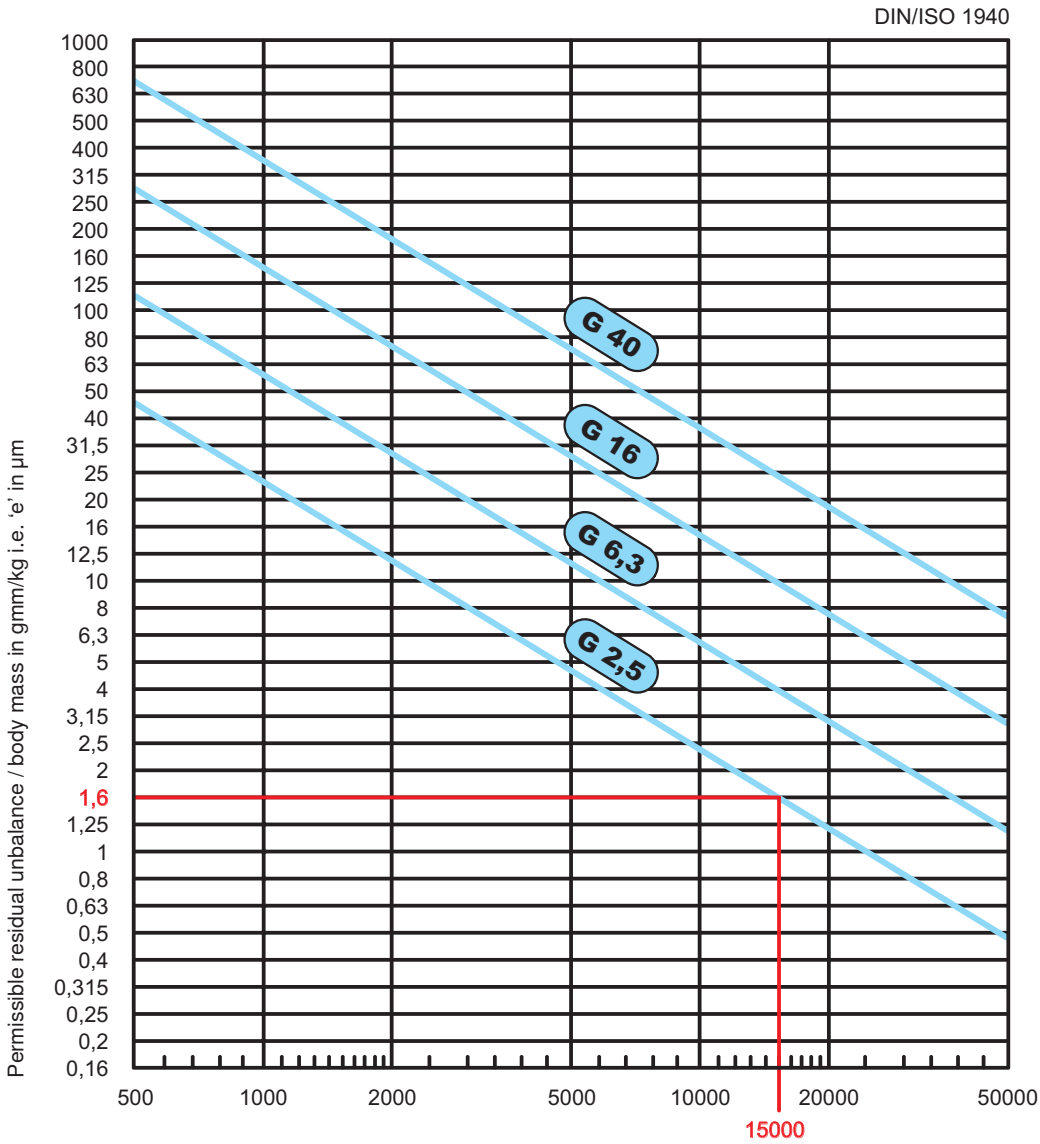
> Manufacturing tolerance (tool and adapter)
> Driving grooves on the SK/BT flange
> Unprocessed ground of the groove
> Driving grooves at HSK A, B, C, D
> Position of radial clamping screw (Weldon, Whistle Notch)
> Collet chuck (radial position of slots)
> Collet and nut
> Shank detail with Weldon and Whistle Notch
> Differential pitch of milling cutter

What is a quality class? - Permissible residual unbalance

Quality class means the permissible speed of the gravity centre

* = speed of gravity centre [mm/s]
e = radius of gravity centre [mm]
ω = angular velocity [s^{-1}]

$$G = e \cdot \omega \text{ [mm/s]}$$



The specific residual unbalance 'e' in µm results from the operating speed and the desired quality class.

e.g.:
m = 2 kg
n = 15,000 min^{-1}
* = 2.5 results in
e = 1.6 µm
U_{tol} [illegible] P [illegible] NJ [illegible] JP P

As a standard, monobloc tools with HSK connection are precision balanced corresponding to quality class G6.3.

All monobloc tools with direct HSK connection are delivered with a test report.

Qualitätszertifikat
Quality certificate

CERATIZIT

Bezeichnung:
Designation: / Désignation :
Denominazione: / Designación: .....

Auftrags-Nr.:
Order no.: / Ordre n° :
Numero d'ordine: / Encargo n°: .....

Protokoll-Nr.:
Report no.: / Protocole n° :
No. protocollo: / Protocolo n°: .....

Gewuchtet nach DIN/ISO 1940
Balanced according to DIN/ISO 1940 / Équilibrage suivant DIN/ISO 1940
Equilibratura secondo DIN/ISO 1940 / Equilibrado según DIN/ISO 1940

Wuchtgüte Quality class / Classe d'équilibrage Classe di equilibratura / Clase de equilibrado	☐ ≤ G 2.5 ☐ ≤ G 6.3
Bezugsdrehzahl n [min^{-1}] Ref. number of revolutions / Vitesse de rotation de référence Numero di giri di riferimento / Número de revoluciones de referencia	☐ n = 20.000 ☐ n_{max}= .....

Datum: .....
Date: / Date :
Data: / Fecha:

Prüfer: .....
Reporting person: / Vérificateur :
Collaudatore: / Verificador:

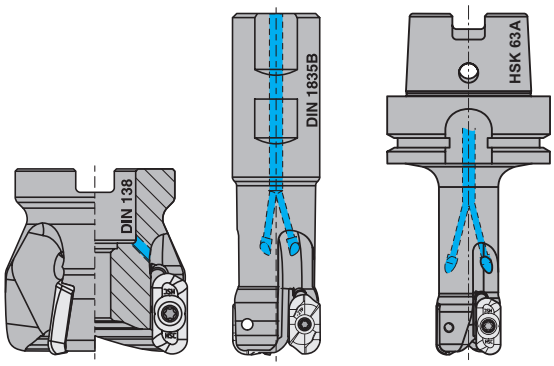
227/2

hard material matters

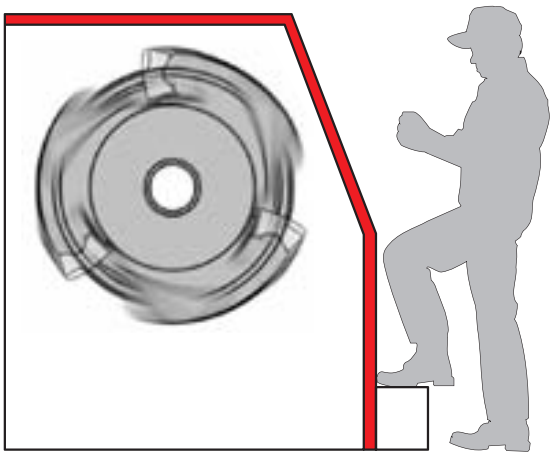
11169618

1. Suitability of the tool for HSC machining:

HSC tools from CERATIZIT have been especially developed for this machining strategy and guarantee maximum machining safety. They are clearly marked as HSC or HPC tools.



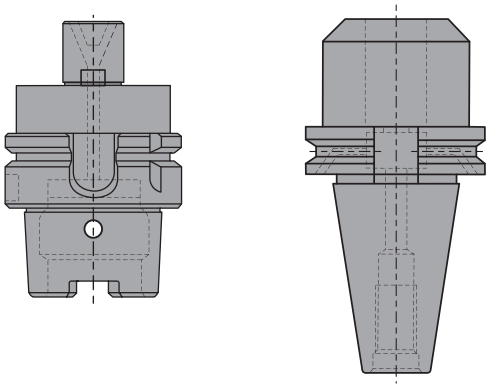
2. Observation of safety precautions of the machine manufacturer:



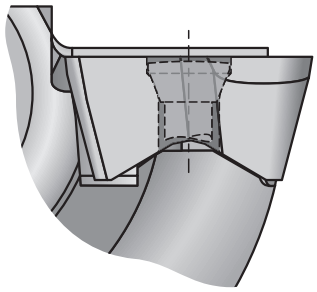
Make sure that all safety precautions of the machine manufacturers are observed (e.g.: enclosed machining units).

3. Suitability of tool adapters for HSC machining:

For fast-rotating milling applications it is necessary to balance tool and tool adapter together dynamically (see directives ISO 1940).



4. Mounting the indexable insert with the centrifugal force protection:

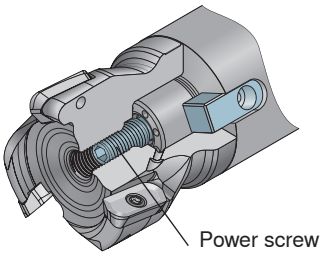


Insert clamping: EURO-patent EP 1083017A1
Make sure that the insert pocket is cleaned and the threaded bore for the clamping screw is in a top state.
Check the axial and radial contact points of the insert in the pocket.

Torque moments and torque keys
B242-B243

5. Optimum fixation of HSC cutters (d_1 [illegible] RQ HQG P LOODGDSWUV E [illegible] means of power screw:

The ‘power screw’ guarantees a stable connection of tool and milling adapter and is easy to use.



6. Maximum permissible number of revolutions:

Note the maximum permissible number of revolutions stated on the tool. This number is exclusively valid for the specific tool and must be adapted according to the selected tool shank, overhang length and the respective machining situation.

Maximum rpm determined in centrifugal force tests!

Rev numbers
B227

7. Optimum application area of the tool (a_e, a_p, f_z, n):

In order to guarantee productive milling, please observe the recommendations regarding the cutting parameters.

(YHU [illegible]+ 6 &[illegible]+ 3 &[illegible] VWRO V SUYLGHG Z LWK DQ LQ RUP DWRQ VKHHW 6 DIHW SUHFDXWRQV [illegible]
Non observation of these safety precautions results automatically in exclusion of &(5 7,=,7 V QDEOLW

Mounting procedure

HSC inserts

How to clamp the insert

Load milling cutter in presetting device or mounting base. Remove clamping screw of the insert.

Clean insert seat and check for damage.

Clean location and contact faces of the insert.

HSC (high speed cutting system): when mounting a new insert replace clamping screw with a new one!

Put insert into cleaned insert seat and press onto location face using two fingers.

Tighten clamping screw while holding the insert in place.

Clamp insert using recommended torque.

MaxiMill 274 – clamping the insert

Place the screw into the hole of the insert.

Push insert and screw into the insert pocket. Tighten the screw slightly.

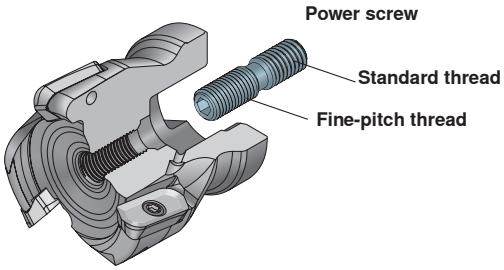
Align the face of the tool with the clearance face of the insert.

Tighten the screw. Position the screwdriver along the centreline of the screw.

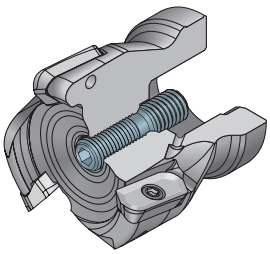
Use a torque screwdriver with 1.6 Nm/14.2 in.lbs.: DMSD 1,6Nm/SORT 08IP

+ RZ VR XVH WKH SRZ HUVFUHZ

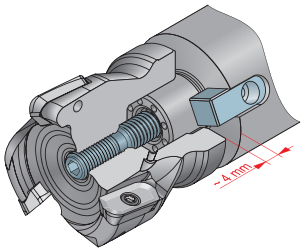
Power screw:
> 3 x clamping force of a standard cap-head screw.
> Stronger cutter body thanks to no counter-bore for cap-head screw.
> The use of a torque screwdriver is recommended!



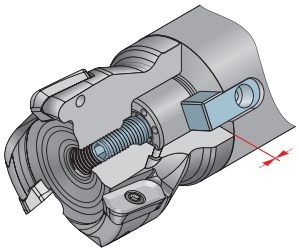
1 The fine-pitch part of the power screw is threaded into the milling cutter.



2 Turn the power screw carefully until the stop (as screw was delivered).



3 In order to guarantee an optimum connection of tool and shank, a gap of 4 mm is required between cutter body and adapter prior to final clamping.



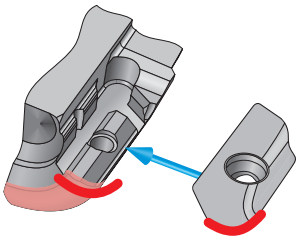
4 Turn power screw.
Torque moment:
M8.0 x 30.0 > 15 Nm!
M10.0 x 31.0 > 20 Nm!

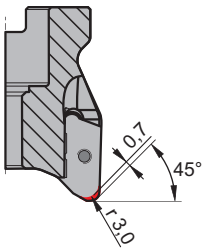
Mounting procedure MaxiMill

Modification of cutter bodies

HSC-11

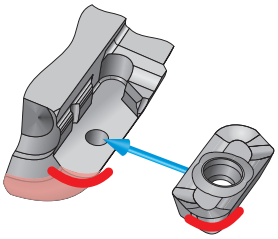
For insert radius r > 3.2 mm

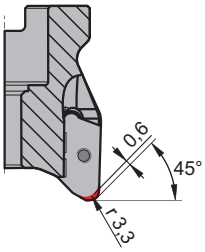




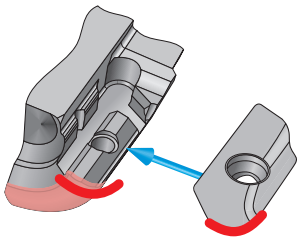
HSC/HPC-19

For insert radius r > 4.0 mm

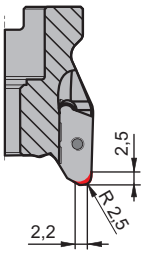




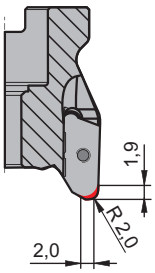
211-11 / -15



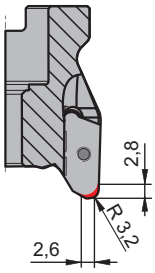
211-11
> r 1,6



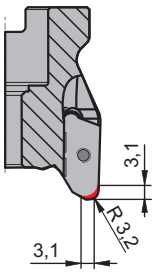
211-15
> r 2,5



211-15
> r 4,0



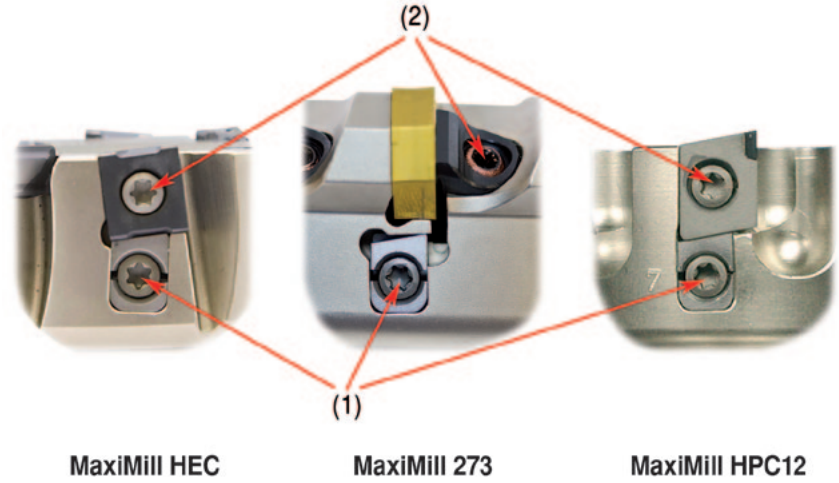
211-15
> r 5,0



210

For insert radius r > 1.6 mm

Precision setting procedure



1. Mount the setting wedges in the cutter (as supplied) and tighten the setting screw (1), to lightly hold the wedge without deforming it.

2. Mount inserts and tighten clamping screws (2) with 1.0 Nm.

3. Mark ‘highest cutting edge’ using a presetting device.

4. Change position of PCD insert by .02 mm turning the setting screw (1) clockwise. For this purpose use the TORX key!

5. Set the other cutting edges to this level, maximum deviation of .005 mm.

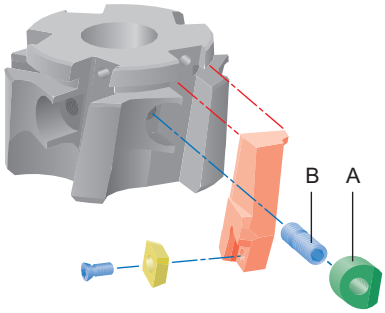
Maximum adjustment = .10 mm.

6. Tighten all clamping screws (2):
273-06 with 4.0 Nm
HPC-12 with 5.0 Nm
HEC-11 with 3.2 Nm.

7. Check axial run-out of all inserts
→ target < .005 mm.

When changing the insert, first remove the setting screw (1), turning it counter-clockwise. After the mounting procedure is completed, the setting procedure starts again at point 1.

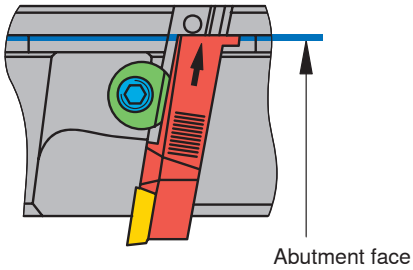
Correct assembly and disassembly of the cassettes



The special construction of the clamping wedge connection ensures that there is no axial movement of the cassette during clamping.

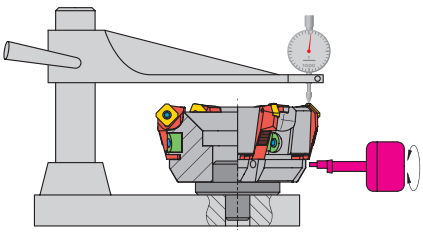
1 Clean the milling tool.
2 Loosen clamping wedge (A) by turning the clamping screw (B) anti-clockwise until the cassette can be removed radially. Screw and wedge remain on the cutter body.
3 Clean all surfaces of both cassette and cutter body.
4 Mount cassette and ease it into the desired position along the groove (e.g. circlip groove).
5 Clamp cassette with wedge.
Screw torque setting: 10 Nm.
Correct assembly of clamping wedge: turn screw once into the clamping wedge with left-handed thread. Screw wedge into cutter body with help of S4 key. Take care to avoid turning of wedge before it is fully engaged with the cutter body.

Setting of axial run-out for roughing



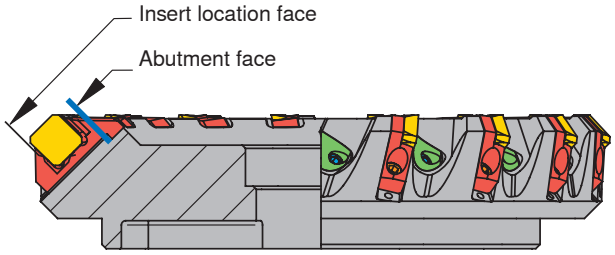
For assembly, simply push cassettes to the ground abutment face. The total axial run-out will be a maximum of .03 mm measured to a master insert (as delivered).

Setting of axial run-out with eccentric key and clock gauge or optical pre-setting equipment



Exact setting of axial run-out up to .002 mm
1 Clean milling tool.
2 Mount cutter on appropriate setting equipment.
3 Loosen clamping wedge, push cassette to abutment and tighten wedge lightly.
4 Insert eccentric key into hole and turn until cassette is in desired position.
5 Keep eccentric key permanently in contact with the cassette so that it remains in position. Tighten clamping wedge (torque moment 10 Nm).

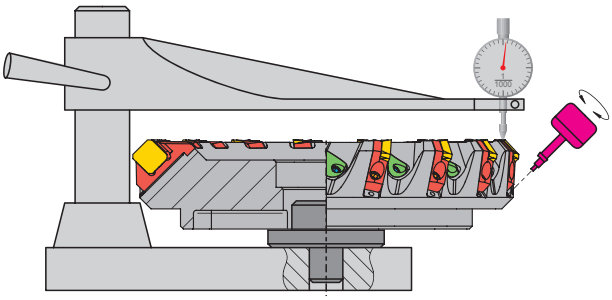
Setting of axial run-out for roughing and finishing



> **Quick and easy setting - precision of axial run-out .03mm**
> **Milling tool can remain in clamped position**

1 Clean the milling tool.
2 For assembly push cassettes to the abutment face of the radial groove, subsequently tighten with screw.
3 Mount insert and clamp with wedge (10 Nm).
4 The total axial run-out will be a maximum of .03 mm measured to a master insert (as delivered).
5 For change of insert, only the clamping wedge has to be loosened.

Setting of run-out with eccentric key and clock gauge or optical presetting equipment



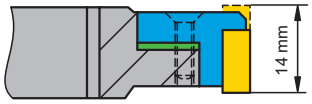
> **Exact setting of radial run-out**

1 Clean the milling tool.
2 Mount cutter body on appropriate setting equipment.
3 Loosen clamping wedge and screw, push cassette to abutment face of radial groove.
4 Press cassette carefully onto abutment face and lightly clamp. Mount insert and fasten gently with wedge.
5 Insert eccentric key into hole and turn until cassette is in desired position.
6 Keep eccentric key permanently in contact with the cassette so that it remains in position. Tighten clamping wedge (torque moment 10 Nm).

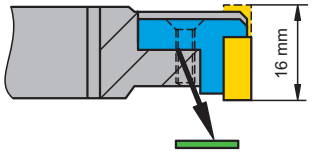
90CN change of cutting width

The special cassette design permits a change of the cutting width by max. 4 mm. The integrated precision shims allow modification steps of 2 mm (e.g. 14 mm - 16 mm - 18 mm). Deviating dimensions can be obtained easily through corrections (grinding) of the shims.

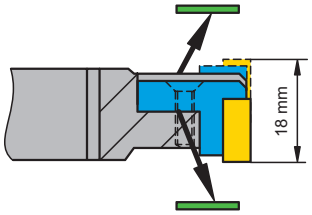
Tool example: 125H08N-S90CN12N14 (groove width = 14 - 18 mm)



When assembled (cassettes including precision shims) the nominal width amounts to 14 mm.



If the shims under the cassettes are removed on one side, a nominal width of 16 mm results.

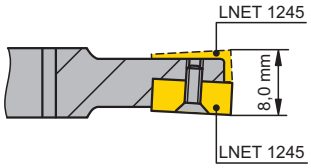


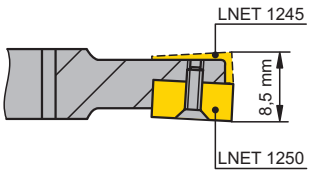
The maximum cutting width is achieved by mounting all the cassettes without shims. The nominal width then is 18 mm.

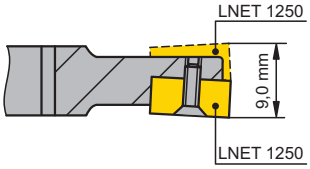
90LN change of cutting width

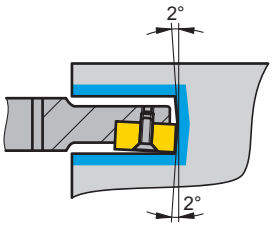
The nominal width of side and face milling cutters can be changed replacing the inserts, in modification steps of .5 mm, by maximally 1.0 mm.
Note: always use the screw that is appropriate for the insert!

Tool example: 125H12N-S90LN12N08 (slot width = 8 - 9 mm)





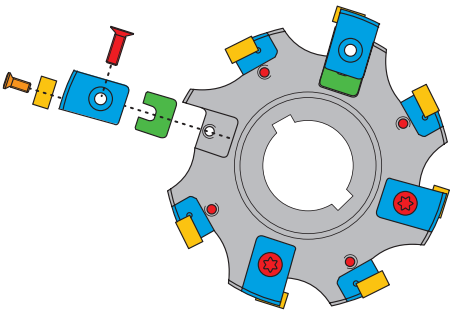




Note: [illegible]

MaxiMill 90CN

	Set 10 pcs. clamping screws	Screw driver	Cassette	Clamping screw	Screwdriver	Shim
125H08N-S90CN10N14 **160H10N-S90CN10N14** **200J12N-S90CN10N14**	MS 1273 (M4x11,5)	7724103 (T15)	K-CN1014-R K-CN1014-L	MS-1308 (M5x11,7)	7883304 Torx T25T	KS 1273
125H08N-S90CN12N18 **160H10N-S90CN12N18** **200J12N-S90CN12N18**			K-CN1218-R K-CN1218-L	MS-1309 (M5x15,8)		
125Y08R-S90CN10N14 **160Y10R-S90CN10N14** **200Y12R-S90CN10N14**			K-CN1014-R K-CN1014-L	MS-1308 (M5x11,7)		
125Y08R-S90CN12N18 **160Y10R-S90CN12N18** **200Y12R-S90CN12N18**			K-CN1218-R K-CN1218-L	MS-1309 (M5x15,8)		



MaxiMill 90LN

	Set 10 pcs.				
80F08N-S90LN12N06 **100G10N-S90LN12N06** **125H12N-S90LN12N06**	MS 1280 (M4x5) MS 1281 (M4x5,5)	→ →	LNE . 1235 LNE . 1240	6 mm 7 mm	77 24 103 (T15)
80F08N-S90LN12N08 **100G10N-S90LN12N08** **125H12N-S90LN12N08**	MS 1282 (M4x6,8) MS 1283 (M4x8)	→ →	LNE . 1245 LNE . 1250	8 mm 9 mm	
80Y08R-S90LN12N06 **100Y10R-S90LN12N06** **125Y12R-S90LN12N06**	MS 1280 (M4x5) MS 1281 (M4x5,5)	→ →	LNE . 1235 LNE . 1240	6 mm 7 mm	
80Y08R-S90LN12N08 **100Y10R-S90LN12N08** **125Y12R-S90LN12N08**	MS 1282 (M4x6,8) MS 1283 (M4x8)	→ →	LNE . 1245 LNE . 1250	8 mm 9 mm	

Note: when mounting inserts with different thicknesses, use appropriate clamping screws.

Spare parts - torque moments

Spare parts for tools

System	‘ ▷P P		Nm	in.lbs.		
270-09	6-12	7883214 (M3,0x5,7)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
270-09	16-100	7883203 (M3,0x7,3)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
270-12	32-160	7822114 M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
270-15	80-125	7883216 (M4,5x13,0)	5,0	44,3	7818121(T20/SW4,5)	DMSD 5,0Nm/SORT T20
270-15	160	7822114 (M4,5x10,5)	5,0	44,3	7818121(T20/SW4,5)	DMSD 5,0Nm/SORT T20
273-06	32-160	10000155 (M5,0x14)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
274-09	20-125	10007562 (M2,5x7,6)	1,6	14,2	10000276(08IP)	DMSD 1,6Nm/SORT 8IP
251-05	10-20	7801175 (M2,0x3,3)	0,7	6,2	7883305(T06)	DMSD 0,7Nm/SORT T06
251-08	16-32	7883204 (M2,5x5,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
251-10	20-52	10007085 (M3,0x7,3)	1,0	17,8	7883306(T10)	DMSD 2,0Nm/SORT T10
251-12	40-100	7883209 (M3,5x8,6)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
251-16	50-125	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
251-20	80-125	10000155/M5,0x14,0)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
260/041	80-398	7883203 (M3,0x7,3)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
260/031	80-398	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
260/029	80-398	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
260/032	75-393	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
260/018	82-400	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
260/052	80-398	7883209 (M3,5x8,6)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
260/053	76-394	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
260/057	82-400	10000155 (M5,0x14)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
260/042	89-407	7815101 (M2,5x6,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
260/054	89-407	10000125 (M2,5x7,3)	1,6	14,2	10000276(08IP)	DMSD 1,6Nm/SORT 8IP
260/056	89-407	10006887 (M3,5x8,6)	3,2	28,3	10006919(15IP)	DMSD 3,2Nm/SORT 15IP
260/055	89-407	7722111 (M3,5x7,2)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
260/036	88-406	7883203 (M3,0x7,3)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
260/039	89-407	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
260/051	89-407	7883209 (M3,5x8,6)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
260/040	89-407	7883209 (M3,5x8,6)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
260/025	89-407	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
260/026	89-407	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
211-07	10-50	10006888 (M2,2x4,2)	1,0	8,9	10006918(07IP)	DMSD 1,0Nm/SORT 07IP
211-11	12	10005892 (M2,5x5,0)	1,6	14,2	10000276(08IP)	DMSD 1,6Nm/SORT 8IP
211-11	16-32	10000126 (M2,5x5,6)	1,6	14,2	10000276(08IP)	DMSD 1,6Nm/SORT 8IP
211-11	40-160	10000125 (M2,5x7,3)	1,6	14,2	10000276(08IP)	DMSD 1,6Nm/SORT 8IP
211-15	25-160	10006887 (M3,5x8,6)	3,2	28,3	10006919(15IP)	DMSD 3,2Nm/SORT 15IP
HFC-09	20-66	7883209 (M3,5x8,6)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
HFC-12	32-100	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
210	15,7-20	7883204 (M2,5x5,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
210	24,7-125	7815101 (M2,5x6,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
244	20-63	7815101 (M2,5x6,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
212	20-25	7815101 (M2,5x6,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
141	16	7801177 (M3,5x6,7)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
141	20-40	7722111 (M3,5x7,2)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
241	40-125	7883209 (M3,5x8,6)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
280	40-125	7883203 (M3,0x7,3)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
490-09	25-100	7722111 (M3,5x7,2)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
490-12	50-125	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
C BF	10	7883215 (M2,2x4,0)	1,0	8,9	7724105(T07)	DMSD 1,0Nm/SORT T07
C BF	12	7883212 (M2,5x4,2)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
C BF	16-18	7722113 (M2,2x5,0)	1,0	8,9	7724105(T07)	DMSD 1,0Nm/SORT T07
C BF	20	7883204 (M2,5x5,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08

Spare parts for tools

System	‘ ▯>P P		Nm	in.lbs.		
C KF	12	7883212 (M2,5x4,2)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
C KF	16	7883213 (M3,0x5,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
C KF	20	7883204 (M2,5x5,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
C KF	25	7883203 (M3,0x7,3)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
C KF	32	7722111 (M3,5x7,2)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
C NF	17,5	7883204 (M2,5x5,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
C NF	20,5-31	7815101 (M2,5x6,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
C NF	37,5-48	7722111 (M3,5x7,2)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
C ZF	25	7815101 (M2,5x6,0)	1,2	10,6	7724106(T08)	DMSD 1,2Nm/SORT T08
C ZF	16	7883209 (M3,5x8,6)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
HSV-22	50-125	7822114 (M4,5x10,5)	5,0	44,3	7724104(T20)	DMSD 5,0Nm/SORT T20
HPC-12	40-315	7818429 (M4,0x11,0)	5,0	44,3	7724103(T15)	DMSD 5,0Nm/SORT T15
HPC-04	20-40	10000125(M2,5X7,3)	1,8	15,9		DMSD 1,6Nm/SORT 08IP
HEC-11	50-125	7815102 (M3,5x11,0)	3,2	28,3	7724103(T15)	DMSD 3,2Nm/SORT T15
HSC-11	16-25	10000126 (M2,5x5,5)	1,8	15,9	10000276(08IP)	DMSD 1,8Nm/SORT 8IP
HSC-11	32-100	10000125 (M2,5x7,3)	1,8	15,9	10000276(08IP)	DMSD 1,8Nm/SORT 8IP
HSC-19	22-25	7818430 (M4,0x7,0)	6,0	53,1	7724103(T15)	DMSD 6,0Nm/SORT T15
HSC-19	32-40	7818428 (M4,0x8,5)	6,0	53,1	7724103(T15)	DMSD 6,0Nm/SORT T15
HSC-19	50-100	7818429 (M4,0x11,0)	6,0	53,1	7724103(T15)	DMSD 6,0Nm/SORT T15
HPC-19	22-25	7818430 (M4,0x7,0)	5,0	44,3	7724103(T15)	DMSD 5,0Nm/SORT T15
HPC-19	32-40	7818428 (M4,0x8,5)	5,0	44,3	7724103(T15)	DMSD 5,0Nm/SORT T15
HPC-19	50-63	7818429 (M4,0x11,0)	5,0	44,3	7724103(T15)	DMSD 5,0Nm/SORT T15
HDM	160-315	10006216 (M5,0x18,0)	5,0	44,3	7724103(T15)	DMSD 5,0Nm/SORT T15

Clamping screws for milling adapters

Maximum torque moments - revolution numbers

Power screw		‘ ▯G_I	‘ ▯G_A	Torque moments Nm	ft.lbs.	RPM [1000 min^{-1}]
7818267/M8,0x30,0		32-42	2	15	11,1	16,0
7818268/M10,0x31,0		50-52	2	20	14,8	12,5
Hexagonal screw (DIN 912)						
7818123/M8x25 DIN912 12.9		32	16	30	22,1	16,0
7818123/M8x25 DIN912 12.9		35	16	30	22,1	16,0
7818123/M8x25 DIN912 12.9		40	16	30	22,1	16,0
7818123/M8x25 DIN912 12.9		42	16	30	22,1	16,0
7818124/M10x25 DIN912 12.9		50	22	50	36,9	12,5
7818124/M10x25 DIN912 12.9		52	22	50	36,9	12,5
7818124/M10x25 DIN912 12.9		63	22	50	36,9	10,0
7818124/M10x25 DIN912 12.9		66	22	50	36,9	9,0
7818125/M12x30 DIN912 12.9		80	27	80	59,0	8,0
10001632/M16x30 DIN912 12.9		100	32	110	81,1	6,5
10002601/M20x30 DIN912 12.9		125	40	120	88,5	5,0
M12x50 (4x per milling cutter)		160	40	80	59,0	3,0
Cross recess screw (DIN 6367)						
83 367 040/M20x30-12.9		125	40	2	2	5,0
83 367 040/M20x30-12.9		160	40	2	2	3,0
AHPC-12 special screw						
10002611-0/M20x30 12.9		125	40	120	88,5	2
10002611-0/M20x30 12.9		160	40	120	88,5	2

Spare parts

* HQHUDO

Clamping screws for inserts

7801175	M2,0 x 3,3	T06	
7883215	M2,2 x 4,0	T07	
10006888	M2,2 x 4,2	07IP	
7722113	M2,2 x 5,0	T07	Torx Plus
7883212	M2,5 x 4,2	T08	
7883204	M2,5 x 5,0	T08	
7815101	M2,5 x 6,0	T08	
10005892	M2,5 x 5,0	08TP	Torx Plus
10000126	M2,5 x 5,6	08TP	Torx Plus
10000125	M2,5 x 7,3	08TP	Torx Plus
7883213	M3,0 x 5,0	T08	
7883214	M3,0 x 5,7	T08	
7883203	M3,0 x 7,3	T08	
10007085	M3,0 x 7,3	T10	

7801177	M3,5 x 6,7	T15	
7722111	M3,5 x 7,2	T15	
7883209	M3,5 x 8,6	T15	
10006887	M3,5 x 8,6	15IP	Torx Plus
7818430	M4,0 x 7,0	T15	
7818428	M4,0 x 8,5	T15	
7818429	M4,0 x 11,0	T15	
7822114	M4,5 x 10,5	T20	
7883216	M4,5 x 13	T20	
10000155	M5,0 x 14,0	T20	

* 5 (6 (

Clamping screws for cutter bodies and tool components

400	M8	L/R-threaded
7818044	M8 x 21	L/R-threaded
7818319	M5 x 15	for A2000

7818316	M8 x 1 x 24	L/R-threaded
7818267	M8 x 30	Power screw
7818268	M10 x 31	Power screw

Spare parts

7718120 Shim A270-15

7883101 Threaded bush A270-15

7818043 Clamping wedge A260

7818317 Clamping wedge A2000

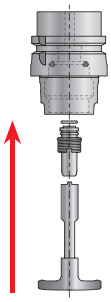
7818318 Cassette A2000

HSK accessories

KRS04.HSK63 Special key for coolant set

KMS.HSK63 Coolant set with 2 O-rings

Information on mounting



Spare parts
* HQHUDO&&&

Spare parts

HPC-12 / HSV-22

MaxiMill HSV-22

Ø 50	7818124/M10X25 DIN912 - 12.9	7722141/SSR D=50	7822114/M4.5X10.5/T20
Ø 63	7818124/M10X25 DIN912 - 12.9	7722142/SSR D=63	7822114/M4.5X10.5/T20
Ø 80	7818125/M12X30 DIN912 - 12.9	7722130/SSR D=8	7822114/M4.5X10.5/T20
‘ □□□	10001632/M16X30 DIN912 - 12.9	7722131/SSR D=100	7822114/M4.5X10.5/T20
‘ □□□	10002601/M20X30 DIN912 - 12.9	7722132/SSR D=125	7822114/M4.5X10.5/T20

MaxiMill HPC-12

Ø 40	7818123/M8X25 DIN912 12.9	7722140/SSR D=40	7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15
Ø 50	7818124/M10X25 DIN912 - 12.9	7722141/SSR D=50	7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15
Ø 63	7818124/M10X25 DIN912 - 12.9	7722142/SSR D=63	7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15
Ø 80	7818125/M12X30 DIN912 - 12.9	7722130/SSR D=80	7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15
‘ □□□	10001632/M16X30 DIN912 - 12.9	7722131/SSR D=100	7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15
‘ □□□	10002611-0/M20 X 30 12.9	7722132/SSR D=125	7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15
‘ □□□	10002611-0/M20 X 30 12.9	7722133/SSR D=160	7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15
‘ □□□		7722134/SSR D=200	7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15
‘ □□□			7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15
‘ □□□			7818429/M4.0X11/T15	10002113-0/AW-ZNHW12	10002362-0/WS-L T15

Assembly devices

	KMS.HSK63 Coolant set for HSK63A	**MHSV-22** **MHPC-12**			DMSD 1-5Nm/SORT Torque screwdriver Set: tool holder and handle	**HSV-22** **HPC-12**
	KRS04.HSK63 Special key for coolant set	**MHSV-22** **MHPC-12**			DMSD 1,0Nm/SORT T15 Set: tool holder + handle + 5 inserts	**273-06** **HEC-11** **HPC-12**
	7724104/TORX T20	**HSV-22**			DMSD-H Tool holder	**HSV-22** **HPC-12**
					DMSD-B T20-50mm	**HSV-22**
					DMSD-B T15-50mm	**HPC-12**

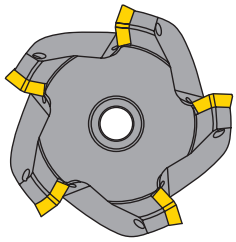
Optimize tool life of cutting edge

In most cases the following applies to carbide inserts:

Pitch

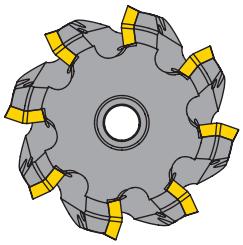
Coarse or normal pitch

- For aluminium alloys
- Non ferrous metals
- Plastic materials
- Low power machines
- Unstable working conditions



Close pitch

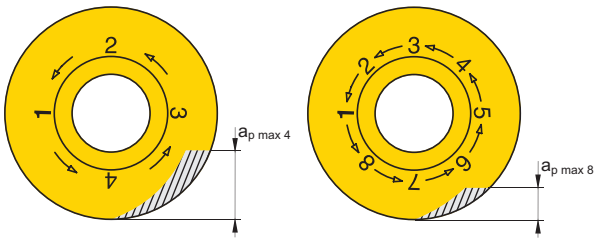
- Steel and cast iron
- High-power machines
- Stable work holding
- Stable conditions
- Maximum chip removal rates



251 - recommended depth of cut

‘ [mm]	4 times a_p [mm]	4 times $a_{p\,max}$ [mm]	8 times $a_{p\,max}$ [mm]
5	1,25	2,0	0,7
8	2,0	3,5	1,1
10	2,5	4,5	1,4
12	3,0	5,5	1,7
16	4,0	7,5	2,3
20	5,0	9,5	2,9
	⚠ recommended!		

Depth of cut to achieve with 4 or 8 indexes of the insert



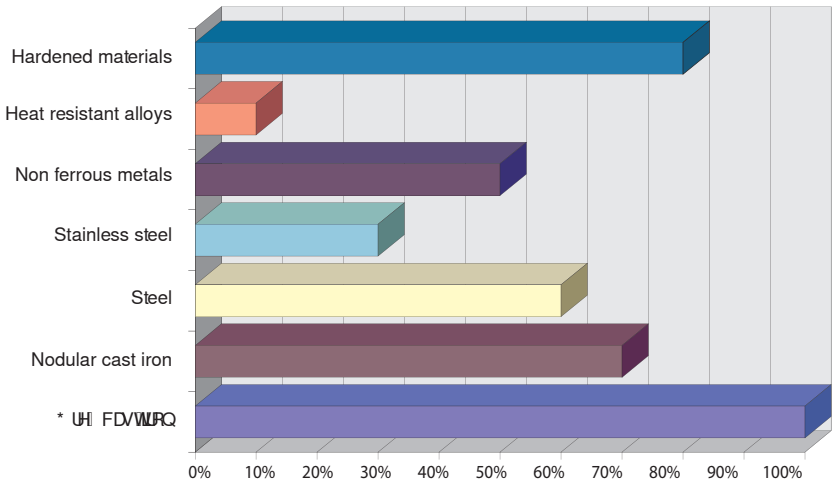
Dry machining

Dry machining is suitable for virtually all modern cutting materials.

Advantages compared to conventional cooling:
- Thanks to the reduced temperature shock when the cutting edge exits the work piece, higher cutting speeds are possible.
- Reduction in manufacturing costs.
- Production of dry swarf.

Suitable for single pieces, small and large batches

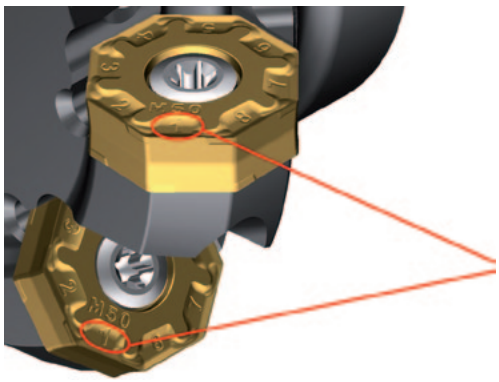
Suitability with regard to the material:



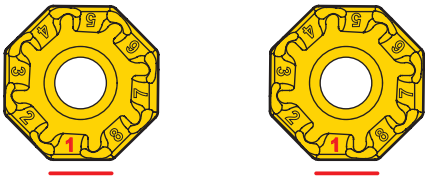
- Mixed ceramic, CBN (cubic boron nitride)
- Carbide, HMC (coated carbide)
- Fine grain carbide, PCD (polycrystalline diamond), carbide diamond coated
- Carbide, HMC (coated carbide)
- Al_2O_3-coated carbide, cermet
- HMC (coated carbide), coated cermet
- Ceramic

Source: Plansee Seminar, article by D. Arnold

MaxiMill 273-06 - position of cutting edge

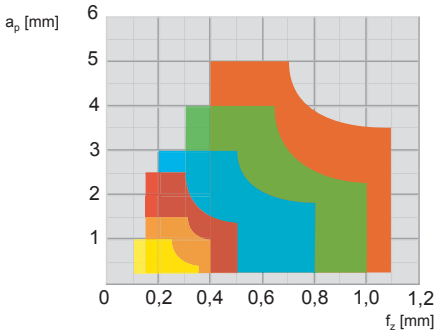


For **optimal surface finish:** place the inserts in their seats in a way that all cutting edges which are in cutting position show the same number.



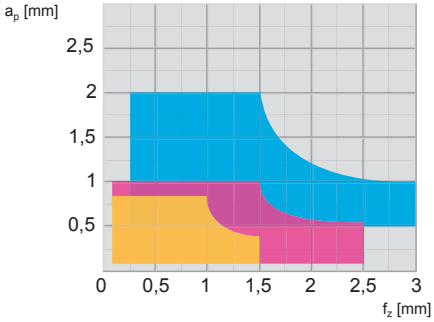
Recommendations for economic milling

251/252



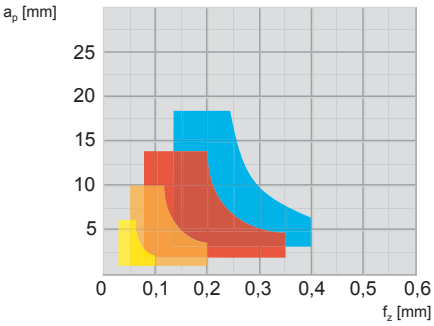
Ø [mm]	a_p	f_z
05	0,25 - 1	0,35 - 0,10
08	0,25 - 1,5	0,40 - 0,15
10	0,25 - 2,5	0,50 - 0,15
12	0,25 - 3	0,80 - 0,20
16	0,25 - 4	1,00 - 0,30
20	0,25 - 5	1,10 - 0,40

HFC



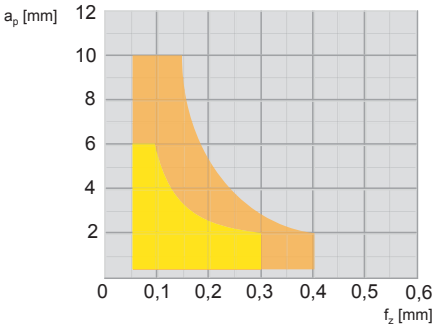
l [mm]	a_p	f_z
06	0,1 - 0,8	**0,1 - 1,50**
09	0,1 - 1	**2,5 - 0,10**
12	0,3 - 2	**3,0 - 0,25**

211



l [mm]	a_p	f_z
07	0,1 - 7	0,10 - 0,03
11	0,2 - 10	0,20 - 0,05
15	1,0 - 14	0,30 - 0,08
20	2,5 - 17	0,40 - 0,12

490

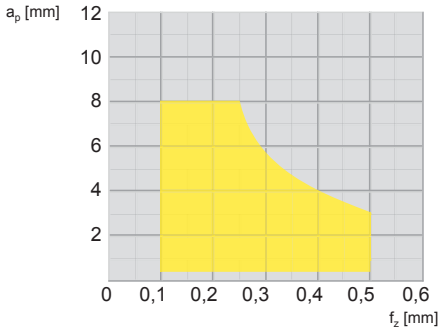


l [mm]	a_p	f_z
09	0,1 - 8	0,3 - 0,05
12	0,1 - 11	0,4 - 0,10

Tip

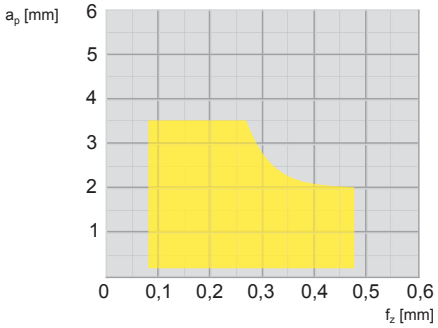
Recommendations for economic milling

271



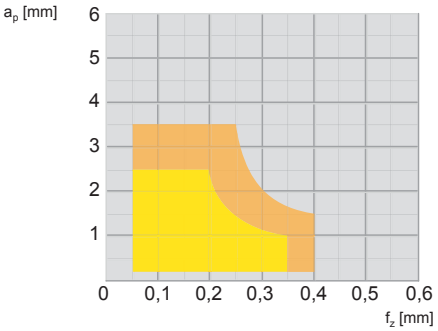
l [mm]	a_p	f_z
17	0,1 - 1,6	0,5 - 0,1

273



l [mm]	a_p	f_z
06	0,1 - 3,5	0,45 - 0,05

274

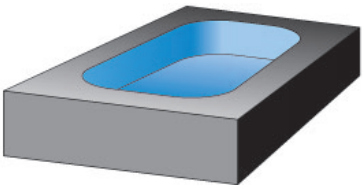


OFH..04

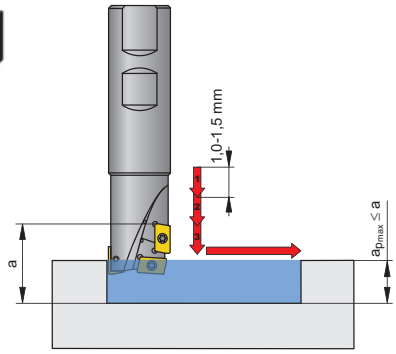
SF..T.09

l [mm]	a_p	f_z
04	0,1 - 3,5	0,45 - 0,05
09	0,1 - 4,0	0,41 - 0,19

212 - drill and slot cutters

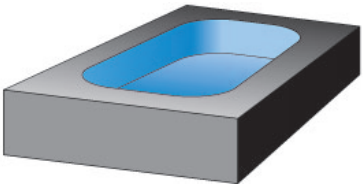


Pocket milling

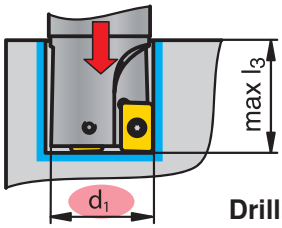


For long chipping materials drilling steps of 1.0 - 1.5 mm are recommended!

C BF - drill and slot cutters



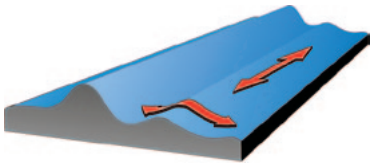
Pocket milling



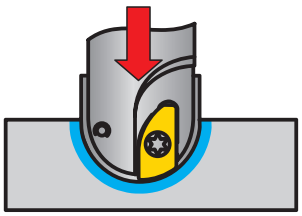
Drilling
l_3 = max.

d_1 [mm]	l_3 [mm]
10	21
12	24
16	25
18	28
20	30

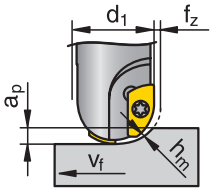
C KF - ball nose milling cutters



Profile milling



Capable of drilling



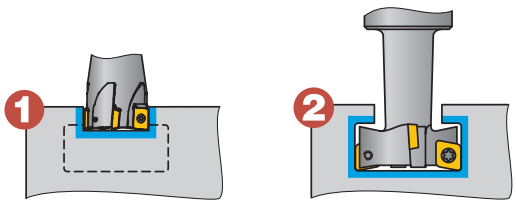
$$f_z = h_m \cdot \sqrt{\frac{d_1}{a_p}} \quad \text{(mm)}$$

$$h_m = f_z \cdot \sqrt{\frac{a_p}{d_1}} \quad \text{(mm)}$$

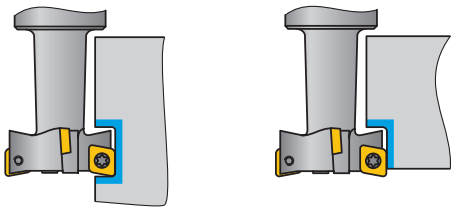
$h_{m\,min}$ = 0,03 mm
$h_{m\,max}$ = 0,08 mm

R112/R114 - ball nose milling cutters

Milling of standard T-slots

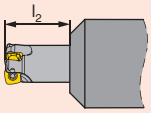
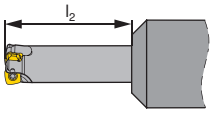
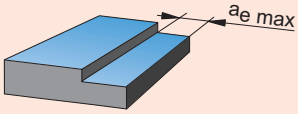
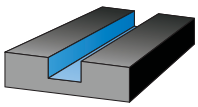
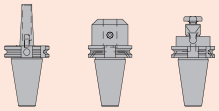
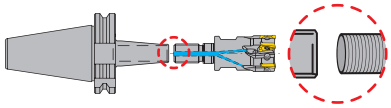


Extended application



1 Rough milling with end mill 211, 210 or 141
2 Finishing of T-slot with C NF

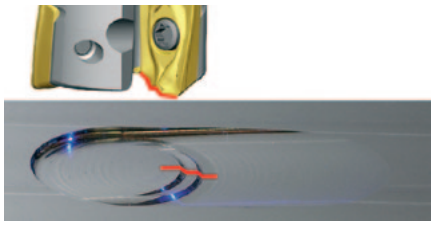
Milling of hard materials (≥ 45 HRC)

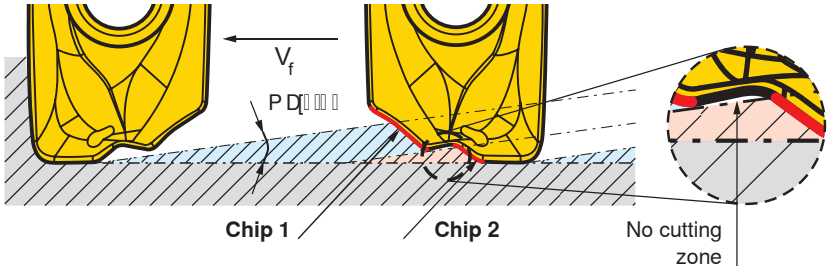
Recommendations for machining		
l_2		
z		
$a_{e\ max}$ = 75%		
Adapter		
Cooling		
Plunging	α_R [illegible]	
Starting values	f_z = 0,05 mm V_c = 30 - 60 m/min a_p = 0,5 - 2,5 mm	

MaxiMill 211-11

5 DGLDOI RUFH FRP SHQVDWRQ WKURXJ K WKH QRWFK Z KHQ KHOLFDOSOXQJ LQJ RUUDP SLQJ U P P

Radial force compensation
- The notch provides additional stability when plunging.
- Reduced machining noise and vibration are therefore guaranteed.



The ADVANTAGE for cutting tool experts:
- Increased cutting performance
- Improved surface quality when machining pockets and slots

Swarf control
- Low cutting pressure
- Low power consumption
- Optimum chip evacuation
- Minimum vibration
- Very good chip formation