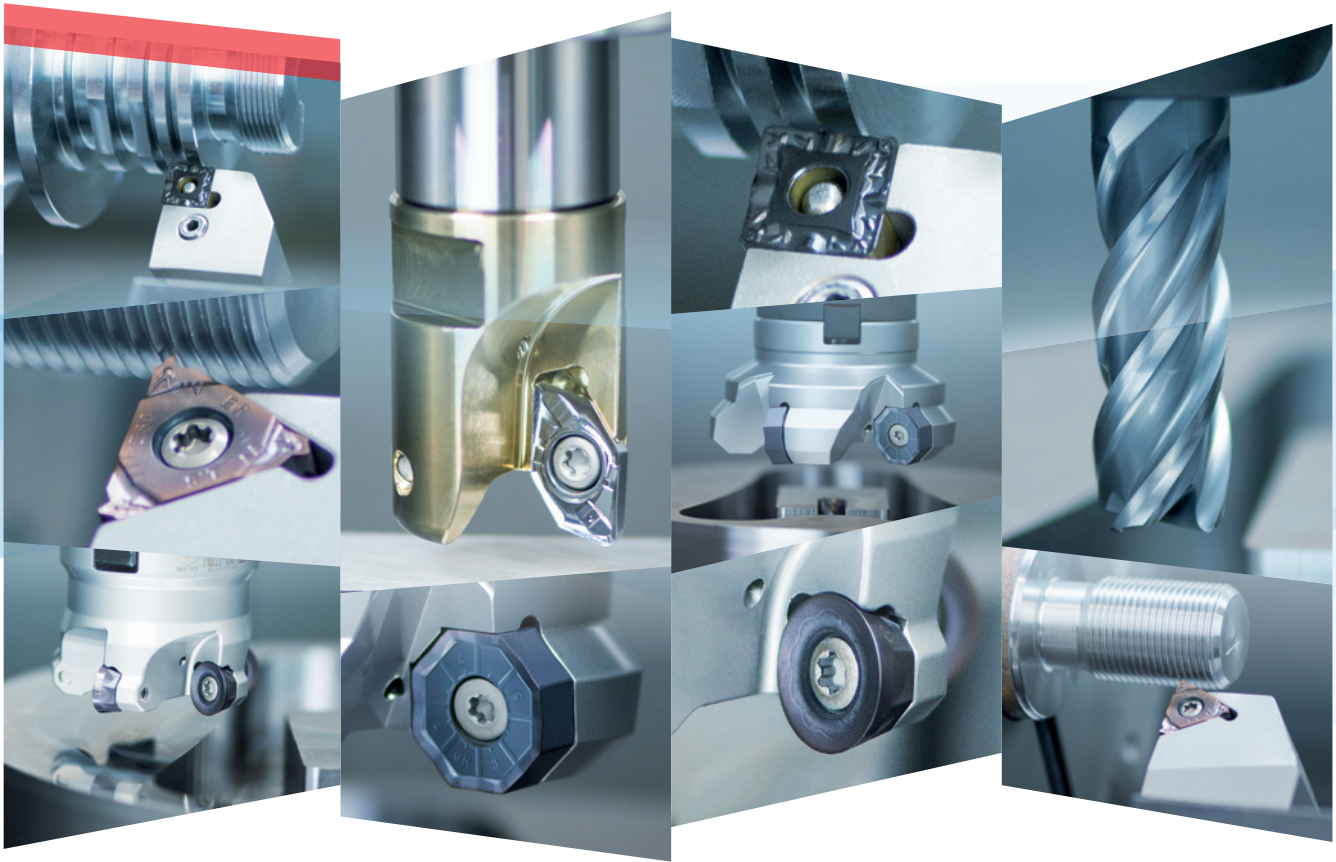




ZCC Cutting Tools
Europe GmbH



Product Innovations 09/2022

XMH chip breaker – zType threading inserts – EMP14 aluminium milling system
FMA12 face milling system – FMR11 round insert milling cutter – VPM solid carbide milling cutters

– EN –

The Company

Zhuzhou Cemented Carbide Cutting Tools Co., Ltd. (ZCC-CT), based in Zhuzhou, China, is the largest Chinese manufacturer of carbide tools. It is also a key company of China Tungsten High-Tech Material Co. Ltd. part of the China Minmetals Corporation.

Since its founding in 1953, ZCC Cutting Tools Co., Ltd. has grown to become one of the world's leading carbide manufacturers with more than 2,000 employees by using the latest technologies and employing highly skilled personnel. The company continuously modernises production technologies and expands its production capacities to enable the company's ongoing growth. As part of Minmetals Corporation, ZCC-CT is able to cover the entire value chain of modern carbide tool production itself, from raw material extraction through to the coated end product and all associated intermediate steps.

By drawing on the latest in European production technology, the company offers products that consistently meet the highest quality standards. Our extensive product range includes carbide/solid carbide, cermet, CBN, PCD and ceramic inserts, carbide tools, tool holders, milling bodies and the accompanying tool systems. All products are consistently produced to accepted international standards, including ISO, DIN, ANSI, JIS and BSI. In addition, ZCC-CT offers customised solutions and special carbide products built to individual specifications.

ZCC-CT invests heavily in research and development. The associated investments go beyond that of most competitors. ZCC Cutting Tools' excellently trained engineers, scientists and a competent, international team, research the necessary fundamentals. These form the basis for the ongoing development of new products and the improvement of existing ones.

The company continuously introduces improvements in quality to meet the customers' ever-increasing demands for new and innovative products and to maximise the benefit of each individual

customer. Both production and administration in China are subject to the ISO 9001:2008 standard, while environmental management is subject to the requirements set out in ISO 14001:2004.

The foundation of the European headquarters of ZCC-CT, ZCC Cutting Tools Europe GmbH and the European central warehouse, both located in Düsseldorf (Germany), dates back to 2003. Today, all European countries as well as the adjacent markets are served from there.

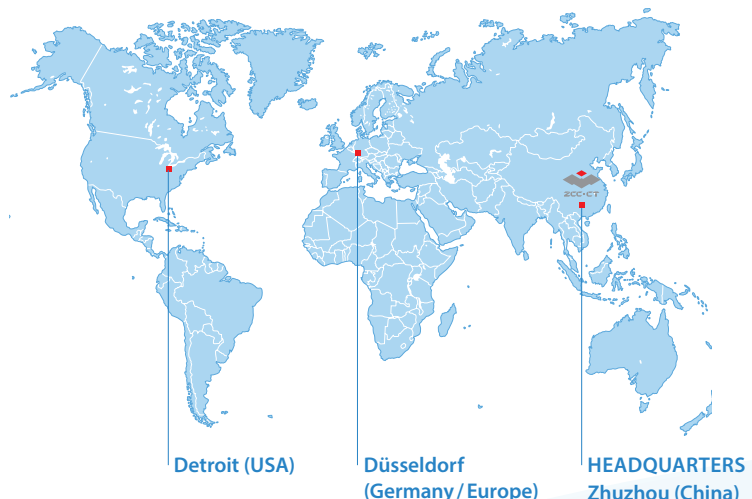
The quality management system of ZCC Cutting Tools Europe GmbH is certified in the area of 'distribution and logistics of metal-working tools' in accordance with ISO 9001:2008.

The Test and Demonstration Centre is available for optimizing customer processes according to individual requirements.

External sales staff and distribution partners in Europe work hand in hand to support customers across the region. Our friendly ZCC-CT application engineers are also available to support you with their expertise and experience by phone, e-mail or in person at your production facility.

The entire field and office sales force is available to answer enquiries from clients across Europe in their native language. Together with employees from the logistics team and with the help of a sophisticated service system, they ensure that all orders are delivered as quickly as possible to you. Branch offices in France and Great Britain add to additional regional proximity to customers.

ZCC Cutting Tools Europe GmbH and all of our employees are there for you and have your back as a competent partner for all matters concerning machining production. This is how we define 'your partner – your value'.



This brochure will be presenting the following new products:

Product Innovations 09 / 2022

GENERAL TURNING

Page



XMH chip breaker – Semi-finishing made easy

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THREADING

Page



zType threading inserts – New series for high-quality results in threading operations

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INDEXABLE MILLING

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FMA12 face milling system – Now available in new ONHU09T5 insert size

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EMP14 aluminium milling system – Precisely 90° for shoulder milling operations

B34



FMR11 round insert milling cutter – Maximum cutting performance

B42

SOLID CARBIDE MILLING

Page



VPM series – Now also available as a torus milling cutter/with Weldon clamping surface

B67



A glimpse inside: Highlights from previous Product Innovations brochures

Product Innovations 05 / 2022

GENERAL TURNING

miniTURN – New YPG202 grade for enhanced performance

INDEXABLE MILLING

YBG205H grade – Optimal for high-temperature applications

FMP06 – High-performance hard machining with 88° approach angle

FMA17 – Versatile milling system for efficient facing operations

FMP17 – Efficient universal tool for machining end faces and contours

FMR04 – Extension: Now with new inserts and chip breakers

SOLID CARBIDE MILLING

TM series – Expanded line with compact torus milling cutters from Ø1.0 mm

VPM series – High-speed full-slot milling

SOLID CARBIDE DRILLING

UD series – Extension: Now available in diameters from 1.0 mm with internal cooling



[Go to PDF online](#)

Product Innovations 11 / 2021

GENERAL TURNING

XF chip breaker – For maximum control

XM chip breaker – High-performance all-round tool

YBC grade – For unrivalled productivity and reliability

RF / RH chip breaker – Specialised chip breakers for rail applications

LNIX inserts – Specialised inserts for rail applications

CNMM / CNMG inserts – Specialised inserts for rail applications

External tool holders for rail applications

ZNEX compact boring system – Specialised tool for cutting hard metals

PARTING & GROOVING

zFlex – Extension: now also available for deep parting off operations

SOLID CARBIDE MILLING

UM series – Extension: end mills with five cutting edges and neck

UMC series – Short chips despite long cutting edges



[Go to PDF online](#)

Product Innovations 05 / 2021

PARTING & GROOVING

zFlex – Modular grooving system

INDEXABLE MILLING

FMA04 – Ideal choice when working under unstable conditions or on thin components

FMWX – Maximum precision and ultra-high surface qualities

EMP09 – Extension: GL chip breaker for LNKT inserts

SOLID CARBIDE MILLING

ALP / ALG series – Extension: single-edged tools (for full-slot machining and profiling)

SOLID CARBIDE DRILLS

GD series – Extension: Now also available in 3xD with Weldon surface



[Go to PDF online](#)

Product Innovations 09 / 2020

GENERAL TURNING

zRay – Extension: now available with dual coolant supply

INDEXABLE MILLING

FMA12 – Extension: GL/GH/W chip breakers now available in combination with YB9320 grade (for ONHU/ONMU)

QCH series – Indexable interchangeable head milling cutters

SOLID CARBIDE MILLING

HPC series – Extension: KMG406 grade

INDEXABLE DRILLS

ZSD series – For optimum surface quality

SOLID CARBIDE DRILLS

UD series – Solid carbide drills for difficult-to-machine materials

GD series – Solid carbide drills for high feeds



[Go to PDF online](#)

Product Innovations 03 / 2020

GENERAL TURNING

zRay – 100% chip control

YBC103 grade – Maximum productivity

XM chip breaker – High-performance all-rounder

YB7305 grade – Maximum performance for cast iron materials

TK chip breaker – The universal tool for cast iron materials

YBS103 grade – High-performance PVD grade for nickel-based alloys

YBS203 grade – Universal PVD grade for turning and milling operations

PARTING & GROOVING

Precision monoblock tool holder – Extension: Now available with internal cooling

INDEXABLE MILLING

YBS203 grade – High-performance PVD grade for nickel-based alloys

YBS303 grade – Universal PVD grade for titanium alloys with an interrupted cut

NM chip breaker – For reliable machining operations

XR chip breaker – Universal high-feed geometry

SOLID CARBIDE MILLING

PM series – Program extension in the field of micro-machining

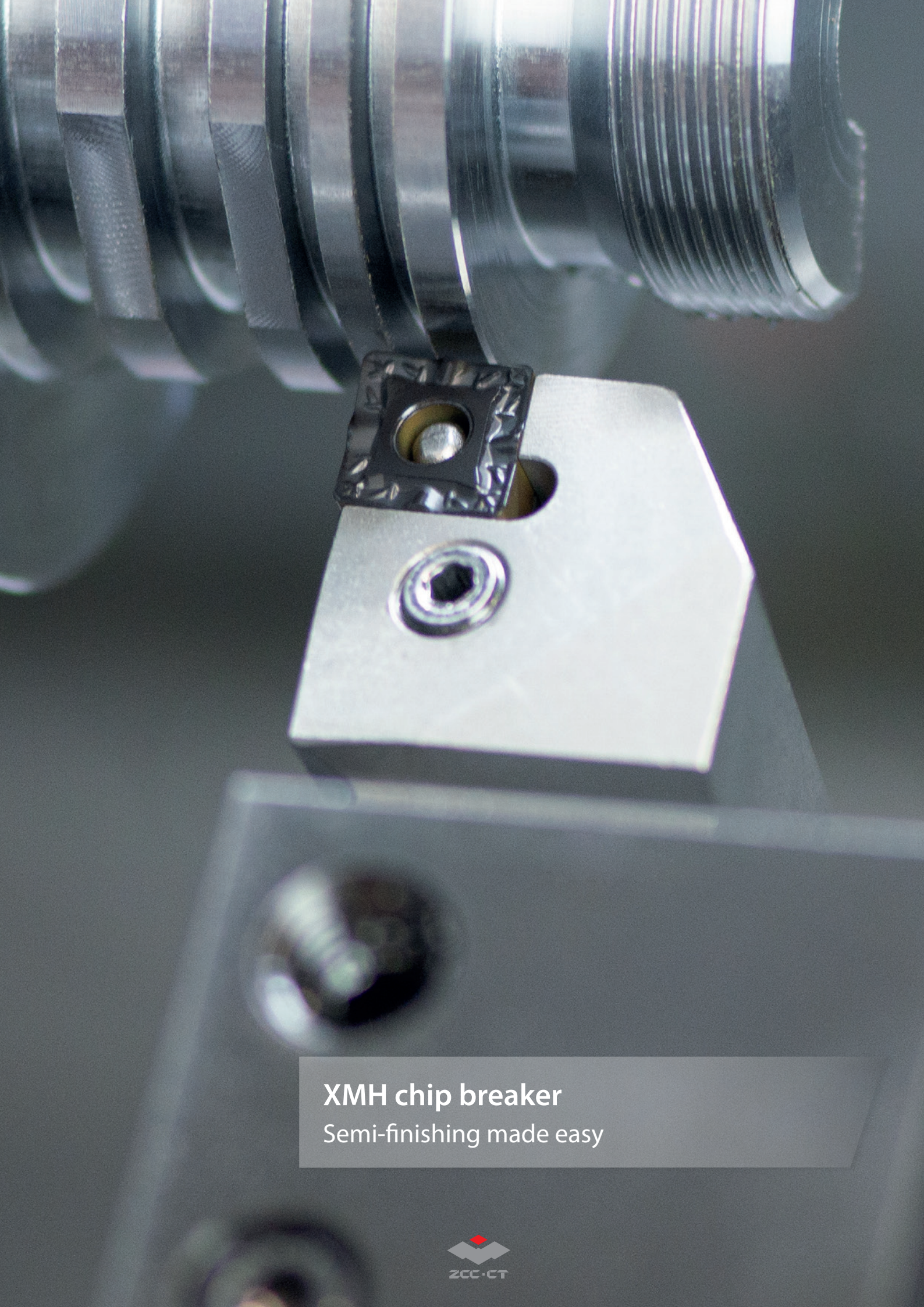
TM series – For machining titanium and superalloys

QCH series – Solid carbide interchangeable head milling cutters

FM series – Extension: 120° deburring cutter



[Go to PDF online](#)



XMH chip breaker
Semi-finishing made easy

General turning

XMH chip breaker

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XMH chip breaker

Semi-finishing made easy

YOUR BENEFITS

- Positive geometry **for low cutting forces at high feed rates**
- Recommended for low-power machines
- Excellent chip control even at low cutting depths thanks to optimum positioning of chip-forming elements

Positive rake angle for reduced cutting forces and vibration

Positive cutting edge for higher feed rates at lower cutting forces

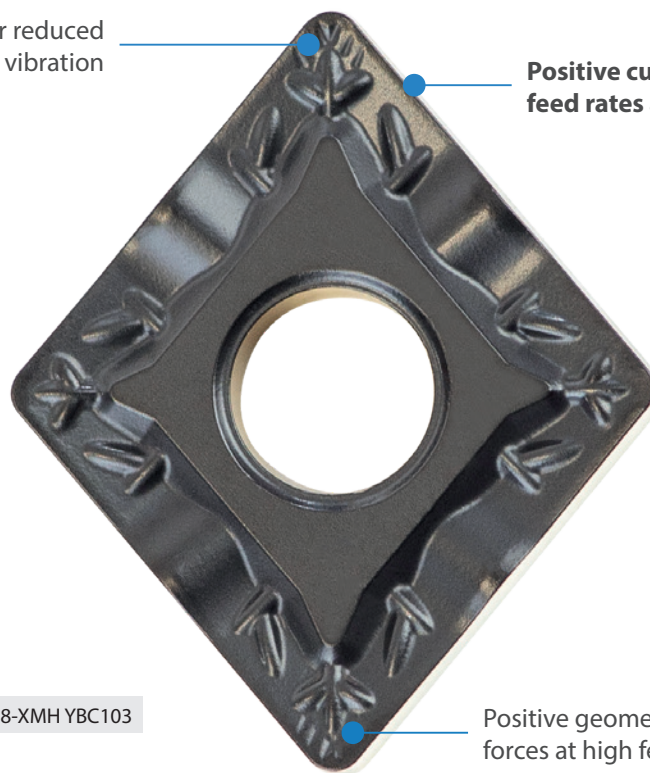


Fig.: CNMG120408-XMH YBC103

Positive geometry for low cutting forces at high feed rates

Articles available at launch of new XMH chip breaker:

Article	r [mm]	ap [mm]	f [mm/U]	YBC103	YBC203
CNMG120408-XMH	0,8	1,0-4,2	0,2-0,4	●	●
CNMG120412-XMH	1,2	1,0-4,2	0,2-0,6	●	●
CNMG160608-XMH	0,8	1,0-5,6	0,2-0,4	○	○
CNMG160612-XMH	1,2	1,0-5,6	0,2-0,6	●	●
CNMG160616-XMH	1,6	1,0-5,6	0,2-0,8	●	●
WNMG060408-XMH	0,8	1,0-2,1	0,2-0,4	●	●
WNMG060412-XMH	1,2	1,0-2,1	0,2-0,6	●	○
WNMG080408-XMH	0,8	1,0-2,8	0,2-0,4	●	○
WNMG080412-XMH	1,2	1,0-2,8	0,2-0,6	●	●
WNMG080416-XMH	1,6	1,0-2,8	0,2-0,8	●	○

● Ex stock ○ On demand

Threading

System code – inserts

A10

zType threading inserts

A11–A22

Recommended cutting data

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Z 16 ER 1.5 ISO PP

1 2 3 4 5 6

A

Turning

Product line

Insert size [mm]	
Code	I.C
11	6,35
16	9,252
22	12,70

Application	
Code	Description
ER	External thread right
IR	Internal thread right
EL	External thread left
IL	Internal thread left

1

2

3

B

Milling

Pitch		
Code	Pitch range (part profile)	
A	0,5 – 1,5 mm	48 – 16 (TPI)
AG	0,5 – 3,0 mm	48 – 8 (TPI)
G	1,75 – 3,0 mm	14 – 8 (TPI)
N	3,5 – 5,0 mm	7 – 5 (TPI)

Pitch range [mm] (full profile)				
0.5	0.75	1.0	1.25	1.5
1.75	2.0	2.5	3.0	3.5
4.0	4.5	5.0	5.5	6.0

Pitch range (TPI) (full profile)				
4	5	6	8	
10	11	11.5	12	
14	16	18	19	
20	24	27	28	

4

Thread profile	
Code	Description
ISO	ISO metric coarse thread 60°
60	Partial profile 60°
55	Partial profile 55°
W	Whitworth
UN	Unified conventional thread
BSPT	Whitworth taper pipe thread
NPT	American taper pipe thread
RD	API round thread
R	Knuckle thread 30°
TR	Metrical trapezoidal thread 30°

5

C

Drilling

D

Technical Information

Chip breaker

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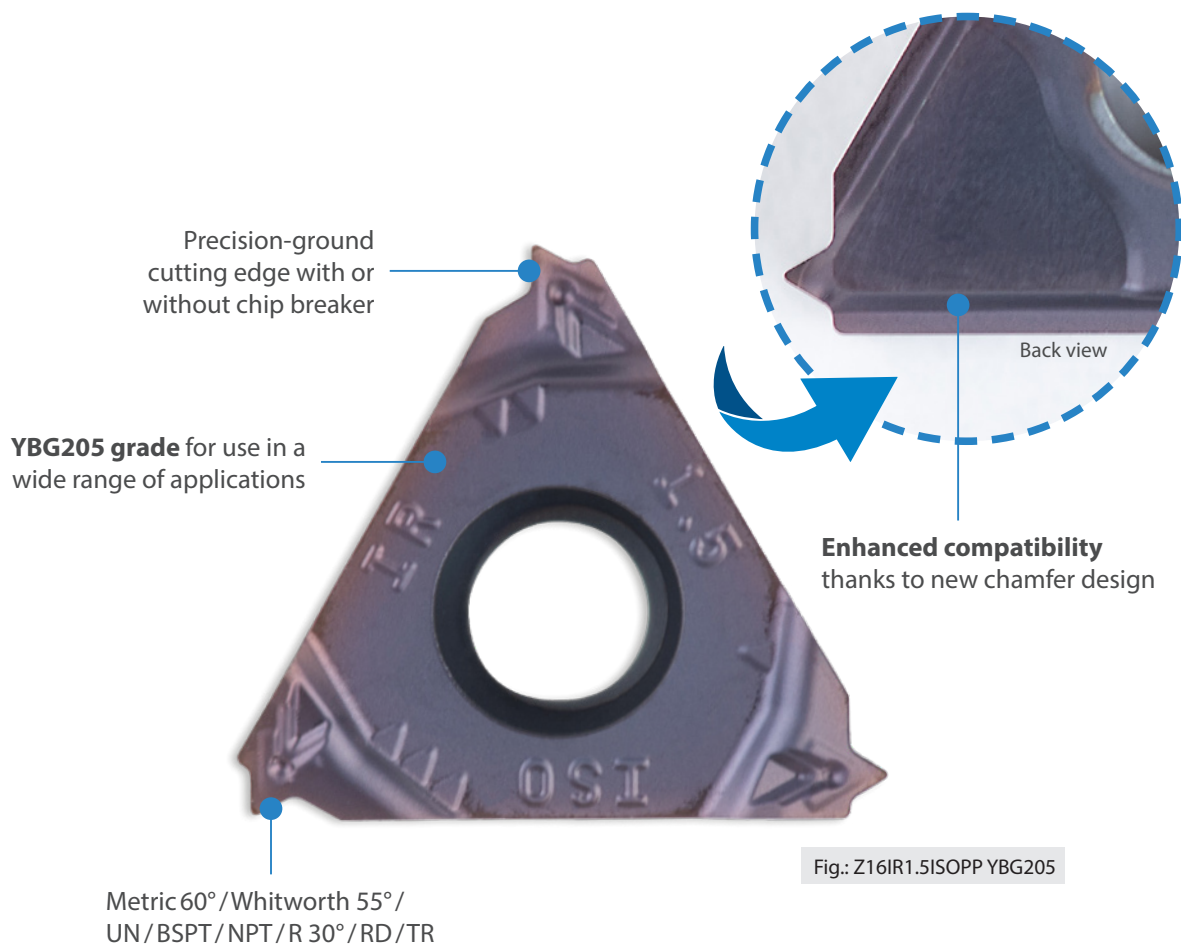
Index

zType threading inserts

New series for high-quality results in threading operations

YOUR BENEFITS

- **Highly compatible with commercially available systems**
- Tried-and-tested YBG205 grade for use in a wide range of applications
- **Wide assortment of thread types**
- Available with or without chip breaker
- Lower carbide content to conserve resources and save money



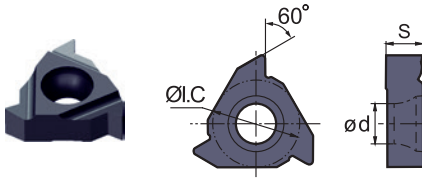
A

zType threading inserts

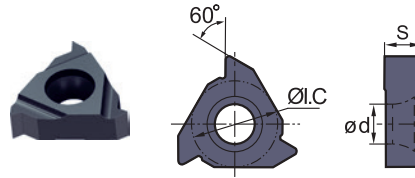
Z	I.C	S	d
11	6,35	3,05	3,2
16	9,525	3,52	4,0

Turning

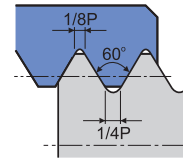
ISO metric coarse thread 60°



External right hand
Internal left hand



Internal right hand
External left hand



ISO 965-1980 DIN 13
GB-T 197-2003 Tolerance: 6g/6H

B

Milling

C

Drilling

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ISO	Pitch [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
11	1	-						Z11IR1.0ISO	●				
		-						Z11IL1.0ISO	●				
	1,25	-						Z11IR1.25ISO	●				
		-						Z11IL1.25ISO	●				
	1,5	-						Z11IR1.5ISO	●				
		-						Z11IL1.5ISO	●				
	2	-						Z11IR2.0ISO	●				
		-						Z11IL2.0ISO	●				
16	1	Z16ER1.0ISO	●					Z16IR1.0ISO	●				
		Z16ER1.0ISOPP	●					Z16IR1.0ISOPP	●				
		Z16EL1.0ISO	●					Z16IL10ISO	●				
		Z16EL1.0ISOPP	○					-					
	1,25	Z16ER1.25ISO	●					Z16IR1.25ISO	●				
		Z16ER1.25ISOPP	●					Z16IR1.25ISOPP	●				
		Z16EL1.25ISO	●					Z16IL1.25ISO	●				
	1,5	Z16ER1.5ISO	●					Z16IR1.5ISO	●				
		Z16ER1.5ISOPP	●					Z16IR1.5ISOPP	●				
		Z16EL1.5ISO	●					Z16IL1.5ISO	●				
		Z16EL1.5ISOPP	●					Z16IL1.5ISOPP	●				
	1,75	Z16ER1.75ISO	●					Z16IR1.75ISO	●				
		Z16ER1.75ISOPP	●					Z16IR1.75ISOPP	●				
		Z16EL1.75ISO	●					Z16IL1.75ISO	●				
	2	Z16ER2.0ISO	●					Z16IR2.0ISO	●				
		Z16ER2.0ISOPP	●					Z16IR2.0ISOPP	●				
Z16EL2.0ISO		●					Z16IL2.0ISO	●					

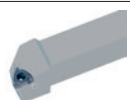
● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

SWR/L

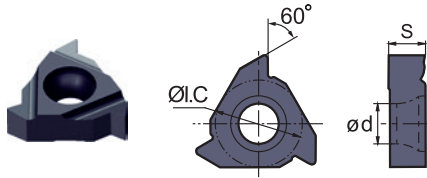
SNR/L



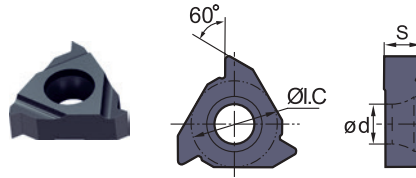
zType threading inserts

Z	I.C	S	d
16	9,525	3,52	4,0
22	12,7	4,65	5,0

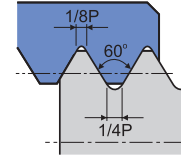
ISO metric coarse thread 60°



External right hand
Internal left hand



Internal right hand
External left hand



ISO 965-1980 DIN 13
GB-T 197-2003 Tolerance: 6g/6H

ISO	Pitch [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	2,5	Z16ER2.5ISO	●					Z16IR2.5ISO	●				
		Z16ER2.5ISOPP	●					Z16IR2.5ISOPP	●				
		Z16EL2.5ISO	●					Z16IL2.5ISO	●				
	3	Z16ER3.0ISO	●					Z16IR3.0ISO	●				
		Z16ER3.0ISOPP	●					Z16IR3.0ISOPP	●				
		Z16EL3.0ISO	●					Z16IL3.0ISO	●				
22	3,5	Z22ER3.5ISO	●					Z22IR3.5ISO	●				
		Z22EL3.5ISO	●					Z22IL3.5ISO	○				
	4	Z22ER4.0ISO	●					Z22IR4.0ISO	●				
		Z22EL4.0ISO	○					Z22IL4.0ISO	○				
	4,5	Z22ER4.5ISO	●					Z22IR4.5ISO	●				
		Z22EL4.5ISO	○					Z22IL4.5ISO	○				
	5	Z22ER5.0ISO	●					Z22IR5.0ISO	●				
		Z22EL5.0ISO	●					Z22IL5.0ISO	●				
	5,5	Z22ER5.5ISO	●					Z22IR5.5ISO	●				
		Z22EL5.5ISO	●					Z22IL5.5ISO	●				
	6	Z22ER6.0ISO	●					Z22IR6.0ISO	●				
		Z22EL6.0ISO	○					Z22IL6.0ISO	●				

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

SWR/L	SNR/L

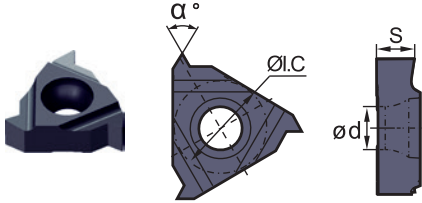
A

Z	I.C	S	d
11	6,35	3,05	3,2
16	9,525	3,52	4,0
22	12,7	4,65	5,0

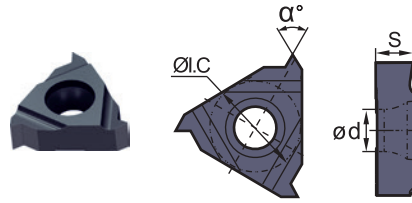
zType threading inserts

Turning

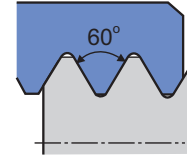
Partial profile 60°



External right hand
Internal left hand



Internal right hand
External left hand



B

Milling

ISO	Pitch [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)					
			YBG205							YBG205				
11	0,50–1,50	-						Z11IRA60	●					
		-						Z11ILA60	●					
16	0,50–1,50	Z16ERA60	●					Z16IRA60	●					
		Z16ERA60PP	●					Z16IRA60PP	●					
		Z16ELA60	●					Z16ILA60	●					
	0,50–3,00	Z16ERAG60	●					Z16IRAG60	●					
		Z16ERAG60PP	●					Z16IRAG60PP	●					
		Z16ELAG60	●					Z16ILAG60	●					
	1,75–3,00	Z16ERG60	●					Z16IRG60	●					
		Z16ERG60PP	●					Z16IRG60PP	●					
		Z16ELG60	●					Z16ILG60	●					
22	3,5–5,00	Z22ERN60	●				Z22IRN60	●						

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

C

Drilling

D

Technical Information

Tool holders

SWR/L	SNR/L

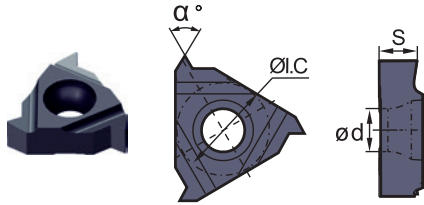
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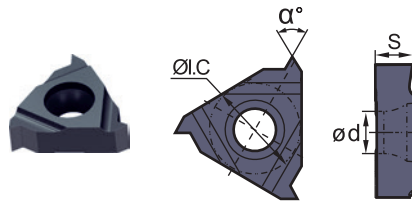
Z	I.C	S	d
11	6,35	3,05	3,2
16	9,525	3,52	4,0
22	12,7	4,65	5,0

zType threading inserts

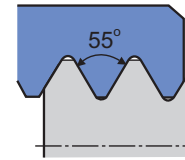
Partial profile 55°



External right hand
Internal left hand



Internal right hand
External left hand



ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
11	48-16	-						Z11IRA55	●				
		-						Z11ILA55	●				
16	48-16	Z16ERA55	○					Z16IRA55	●				
		Z16ERA55PP	●					Z16IRA55PP	●				
		Z16ELA55	●					Z16ILA55	●				
	48-8	Z16ERAG55	●					Z16IRAG55	●				
		Z16ERAG55PP	●					Z16IRAG55PP	●				
		Z16ELAG55	●					Z16ILAG55	●				
	14-8	Z16ERG55	●					Z16IRG55	●				
		Z16ERG55PP	●					Z16IRG55PP	●				
		Z16ELG55	●					Z16ILG55	●				
22	7-5	Z22ERN55	●				Z22IRN55	●					

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

SWR/L	SNR/L

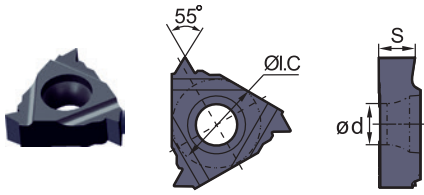
A

zType threading inserts

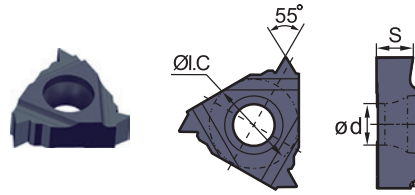
Z	I.C	S	d
16	9,525	3,52	4,0

Turning

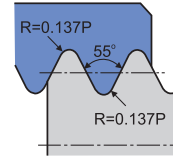
Whitworth



External right hand
Internal left hand



Internal right hand
External left hand



ISO 965-1980 DIN 13
GB-T 197-2003 Tolerance: medium class A

B

Milling

C

Drilling

D

Technical Information

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)					
			YBG205						YBG205					
16	8	Z16ER8W	●					Z16IR8W	●					
	9	Z16ER9W	●					Z16IR9W	●					
	10	Z16ER10W	●					Z16IR10W	●					
		Z16EL10W	●					Z16IL10W	●					
	11	Z16ER11W	●					Z16IR11W	●					
		Z16ER11WPP	●					Z16IR11WPP	●					
		Z16EL11W	●					Z16IL11W	●					
	12	Z16ER12W	●					Z16IR12W	●					
		Z16EL12W	●					Z16IL12W	●					
	14	Z16ER14W	●					Z16IR14W	●					
		Z16ER14WPP	●					Z16IR14WPP	●					
		Z16EL14W	●					Z16IL14W	●					
	16	Z16ER16W	●					Z16IR16W	●					
		Z16EL16W	●					Z16IL16W	●					
	18	Z16ER18W	●					Z16IR18W	●					
		Z16EL18W	●					Z16IL18W	●					
	19	Z16ER19W	●					Z16IR19W	●					
		Z16ER19WPP	●					Z16IR19WPP	●					
Z16EL19W		●					Z16IL19W	●						

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

SWR/L

SNR/L



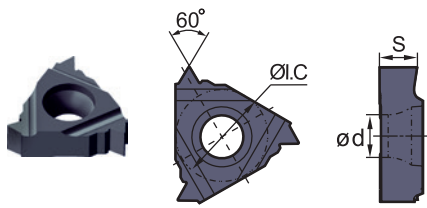
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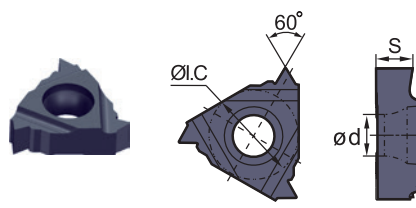
zType threading inserts

Z	I.C	S	d
16	9,525	3,52	4,0

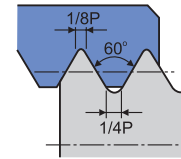
Unified conventional thread UN



External right hand
Internal left hand



Internal right hand
External left hand



ASME B1.1-1989
Tolerance: 2A/2B

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)					
			YBG205						YBG205					
16	8	Z16ER8UN	●					Z16IR8UN	●					
		Z16EL8UN	●					Z16IL8UN	○					
	10	Z16ER10UN	●					Z16IR10UN	●					
		Z16EL10UN	●					Z16IL10UN	○					
	12	Z16ER12UN	●					Z16IR12UN	●					
		Z16ER12UNPP	●					Z16IR12UNPP	●					
	14	Z16EL12UN	●					Z16IL12UN	●					
		Z16ER14UN	●					Z16IR14UN	●					
	16	Z16ER14UNPP	●					Z16IR14UNPP	●					
		Z16EL14UN	●					Z16IL14UN	○					
	18	Z16ER16UN	●					Z16IR16UN	●					
		Z16ER16UNPP	●					Z16IR16UNPP	●					
	20	Z16EL16UN	●					Z16IL16UN	●					
		Z16ER18UN	●					Z16IR18UN	●					
	24	Z16EL18UN	●					Z16IL18UN	●					
		Z16ER20UN	●					Z16IR20UN	●					
	24	Z16EL20UN	●					Z16IL20UN	●					
		Z16ER24UN	●					Z16IR24UN	●					
		Z16EL24UN	●				Z16IL24UN	○						

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

SWR/L	SNR/L

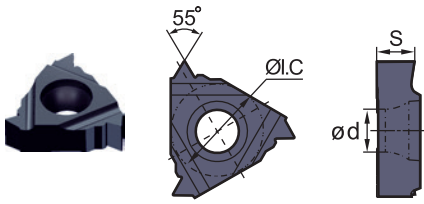
A

zType threading inserts

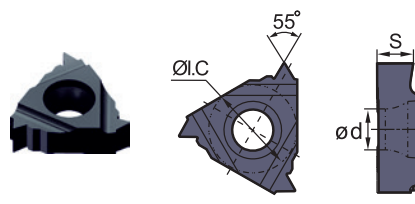
Z	I.C	S	d
16	9,525	3,52	4,0

Turning

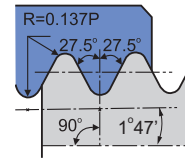
Whitworth taper pipe thread BSPT



External right hand
Internal left hand



Internal right hand
External left hand



ASME B1.1-1989
Tolerance: 2A/2B

B

Milling

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	11	Z16ER11BSPT	●					Z16IR11BSPT	●				
		Z16ER11BSPTPP	●					Z16IR11BSPTPP	●				
		Z16EL11BSPT	●					-					
	14	Z16ER14BSPT	●					Z16IR14BSPT	●				
		Z16ER14BSPTPP	●					Z16IR14BSPTPP	●				
		Z16EL14BSPT	●					-					
	19	Z16ER19BSPT	●					Z16IR19BSPT	●				
		Z16ER19BSPTPP	●					Z16IR19BSPTPP	●				
		Z16EL19BSPT	●					Z16IL19BSPT	●				
	28	Z16ER28BSPT	●					Z16IR28BSPT	●				
		Z16EL28BSPT	●					-					

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

C

Drilling

D

Technical Information

Tool holders

SWR/L

SNR/L



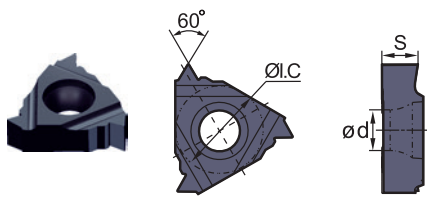
E

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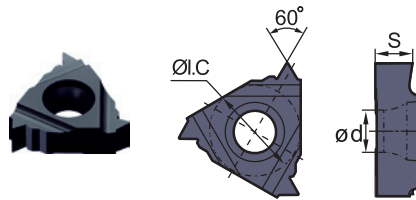
zType threading inserts

Z	I.C	S	d
16	9,525	3,52	4,0

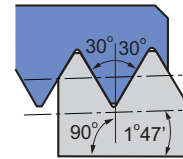
American taper pipe thread NPT



External right hand
Internal left hand



Internal right hand
External left hand



ASME B1.20.1-1983
Standard NPT

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)					
			YBG205						YBG205					
16	8	Z16ER8NPT	●					Z16IR8NPT	○					
		Z16EL8NPT	●					-						
	11,5	Z16ER11.5NPT	●					Z16IR11.5NPT	●					
		Z16ER11.5NPTPP	●					Z16IR11.5NPTPP	●					
		Z16EL11.5NPT	●					-						
	14	Z16ER14NPT	●					Z16IR14NPT	●					
		Z16ER14NPTPP	●					Z16IR14NPTPP	●					
		Z16EL14NPT	●					-						
	18	Z16ER18NPT	●					Z16IR18NPT	●					
		Z16ER18NPTPP	●					Z16IR18NPTPP	●					
		Z16EL18NPT	●					Z16IL18NPT	●					
	27	Z16ER27NPT	●					Z16IR27NPT	●					
Z16EL27NPT		●					-							

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

SWR/L	SNR/L

A

Turning

B

Milling

C

Drilling

D

Technical Information

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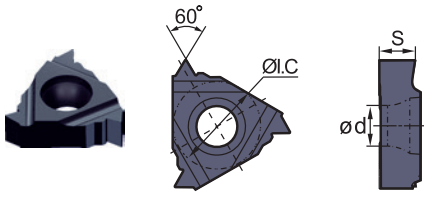
A

zType threading inserts

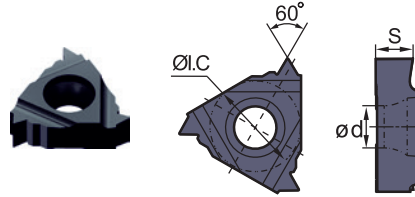
Z	I.C	S	d
16	9,525	3,52	4,0

Turning

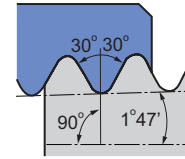
API round thread



External right hand
Internal left hand



Internal right hand
External left hand



API spec.5B
Tolerance: API RD

B

Milling

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	8	Z16ER8RD	●					Z16IR8RD	●				
	10	Z16ER10RD	●					Z16IR10RD	●				

● Ex stock ○ On demand

HC¹ Coated cemented carbide

C

Drilling

Tool holders

SWR/L

SNR/L



D

Technical Information

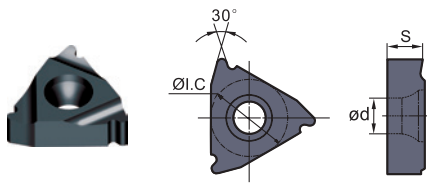
E

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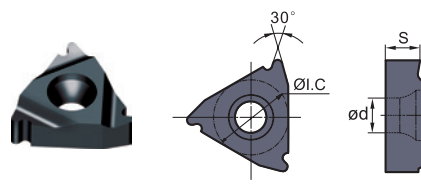
zType threading inserts

Z	I.C	S	d
16	9,525	3,52	4,0

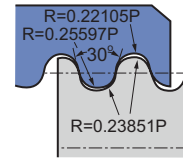
Knuckle thread 30°



External right hand
Internal left hand



Internal right hand
External left hand





DIN 405
Tolerance: 7

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)						Internal machining	HC ¹ (PVD)						
			YBG205							YBG205						
16	8	Z16ER8R	●						-							
	10	Z16ER10R	●						-							

● Ex stock ○ On demand

HC¹ Coated cemented carbide

Tool holders

SWR/L	SNR/L
	

A

Turning

B

Milling

C

Drilling

D

Technical Information

E

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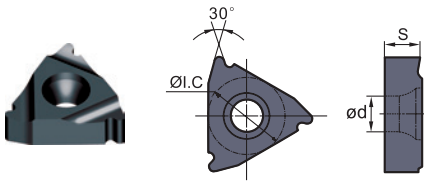
A

zType threading inserts

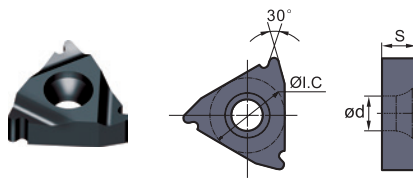
Z	I.C	S	d
16	9,525	3,52	4,0

Turning

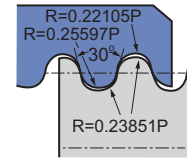
Metrical trapezoidal thread 30°



External right hand
Internal left hand



Internal right hand
External left hand



DIN 405
Tolerance: 7

B

Milling

ISO	Pitch [mm]	External machining	HC ¹ (PVD)		Internal machining	HC ¹ (PVD)	
			YBG205			YBG205	
16	2	Z16ER2.0TR	●		-		

● Ex stock ○ On demand

HC¹ Coated cemented carbide

C

Drilling

Tool holders

SWR/L

SNR/L



D

Technical Information

E

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Threading inserts

Material group	Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]				
					HC (PVD)				
					YBG205				
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	190			
		approx. 0,45 % C	annealed	190	2	175			
		approx. 0,45 % C	tempered	250	3	145			
		approx. 0,75 % C	annealed	270	4	140			
		approx. 0,75 % C	tempered	300	5	135			
	Low-alloyed steel		annealed	180	6	170			
			tempered	275	7	125			
			tempered	300	8	115			
			tempered	350	9	105			
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	125			
		hardened and tempered	325	11	95				
M	Stainless steel	ferritic/martensitic	annealed	200	12	165			
		martensitic	tempered	240	13	135			
		austenitic	quench hardened	180	14	155			
		austenitic-ferritic		230	15	135			
K	Grey cast iron	perlite/ferritic		180	16	240			
		perlite (martensitic)		260	17	185			
	Cast iron with spheroidal graphite	ferritic		160	18	220			
		perlite		250	19	165			
	Malleable cast iron	ferritic		130	20	175			
		perlite		230	21	165			
N	Aluminium wrought alloys	cannot be hardened		60	22	800			
		hardenable	hardened	100	23	600			
	Cast aluminium alloys	$\leq 12\%$ Si, cannot be hardened		75	24	320			
		$\leq 12\%$ Si, hardenable	hardened	90	25	240			
		$> 12\%$ Si, cannot be hardened		130	26	160			
	Copper and copper alloys (bronze/brass)	machining steel, PB > 1%			110	27	160		
		CuZn, CuSnZn			90	28	600		
CuSn, Pb-free copper, electrolytic copper			100	29	200				
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30	95			
			hardened	280	31	50			
		Ni or Co base	annealed	250	32	80			
			hardened	350	33	70			
			cast	320	34	70			
	Titanium alloys	pure titanium		R _m 400	35	145			
α and β alloys		hardened	R _m 1050	36	50				
H	Hardened steel		hardened and tempered	55 HRC	37				
			hardened and tempered	60 HRC	38				
	Hard cast iron		cast	400	39				
	Hardened cast iron		hardened and tempered	55 HRC	40				
X	Non-metallic materials	Thermoplasts			41				
		Thermosetting plastics			42				
		Plastic, glass-fibre reinforced GFRP			43				
		Plastic, carbon fibre reinforced CFRP			44				
		Graphite			45				
		Wood			46				

Note: The given cutting values are guide values, which were determined under ideal conditions. The values have to be adapted in individual cases. For examples of material for cutting tool groups view page D11.

HC Coated carbide

A

Turning

B

Milling

C

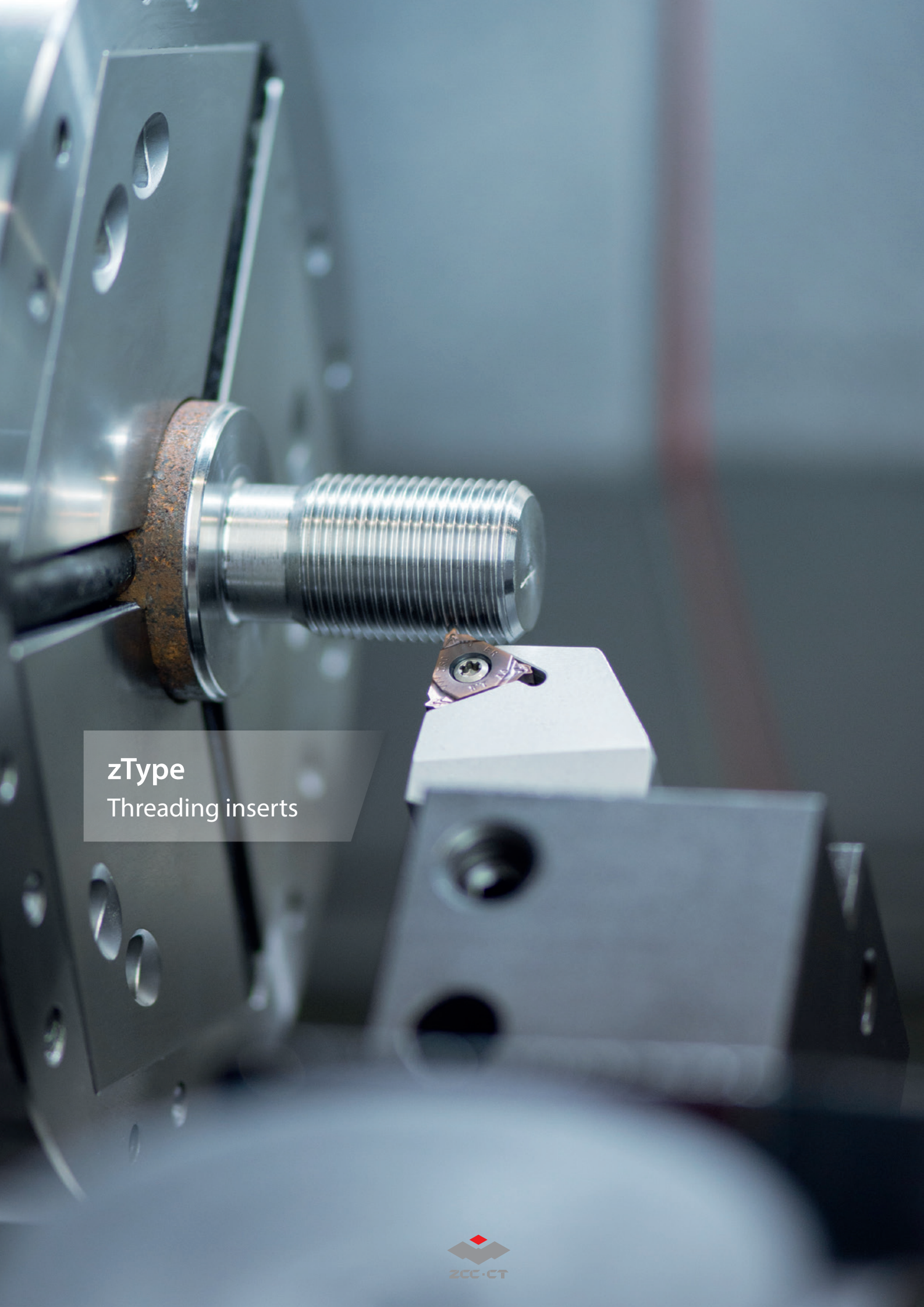
Drilling

D

Technical Information

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zType
Threading inserts

Indexable milling

System code – milling bodies	B26–B27
ISO-Code – inserts	B28–B29
FMA12	B30–B33
EMP14	B34–B41
FMR11	B42–B49
Recommended cutting data	B50–B63

B

A

Turning

B

Milling

C

Drilling

D

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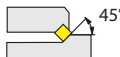
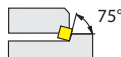
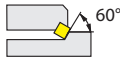
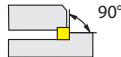

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FM A 12 050 – A22 O – N 06 – 04 (L) (C)

1 2 3 4 5 6 7 8 9 10 11

Type	
Code	Description
BM	Profile milling
CM	Chamfer milling
EM	Square shoulder milling
FM	Face milling
HM	Helical milling
SM	Slot milling
TM	T-slot milling
XM	Special

1

Entering angle	
A	
E	
D	
P	
R	

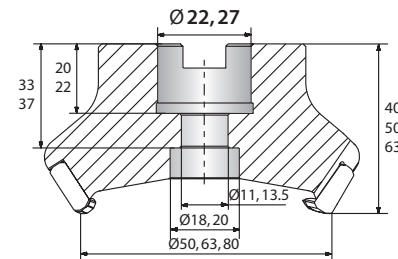
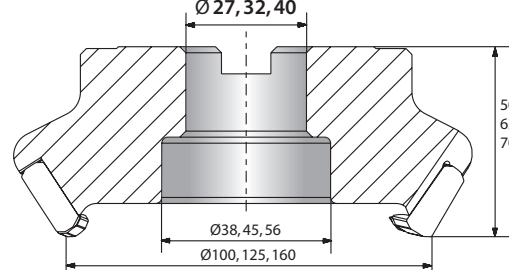
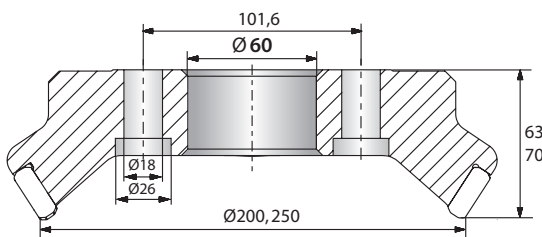
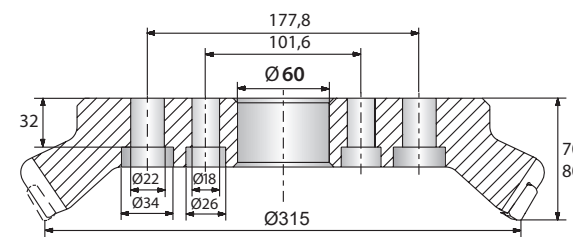
2

Serial number

3

Nominal diameter [mm]	
Code	Description
025	25
050	50
160	160
315	315
...	

4

Type and size of tool holders			
Code	Type	Code	Type
A	<p>Nominal diameter $\varnothing 50 - 80$ mm</p> 	B	<p>Nominal diameter $\varnothing 100 - 160$ mm</p> 
C	<p>Nominal diameter $\varnothing 200 - 250$ mm</p> 	D	<p>Nominal diameter $\varnothing 315$ mm</p> 
G	Straight shank	XP	Weldon shank
K	Bore with keyway		

5

With respect to mounting please adhere to the information provided by the tool holder manufacturer.

Insert shape	
A	C
H	L
M	O
P	R
S	T
W	X Special
Z Special	

6

Clearance angle	
B	C
D	E
F	N
P	

7

Cutting edge length l [mm]	
Insert shape	
A	C, M
H, O, P	L
R	S
T	W

8

Number of teeth

9

Cutting direction	
Code	Description
L	Left

10

With inner cooling

11



Tools with B coupling and inner coolant supply require the following spare parts:



Coolant clamp screw



Coolant shower plate



Spare parts (B coupling with inner coolant supply)

		B27	B32	B40	B40
	∅	80	100	125	160
	Coolant clamp screw	LDB27C	LDB32C	LDB40C	LDB40C
	Coolant shower plate	B27-002-CP	B32-002-CP	B40-002-CP	B40-003-CP

When purchasing tools with inner coolant supply and B coupling these spare parts are included in delivery.

A

Turning

B

Milling

C

Drilling

D

Technical Information

E

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S P K N 12 04 ED T21K R – DM

1 2 3 4 5 6 7 8 9 10

A

Turning

B

Milling

C












Drilling








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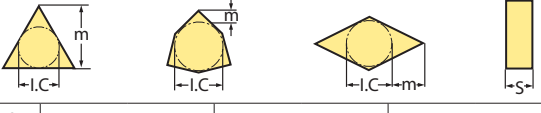
Technical Information

E

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Insert shape	
A 	C 
H 	L 
M 	O 
P 	R 
S 	T 
W 	X Special
Z Special	















Clearance angle	
B 	C 
D 	E 
F 	N 
P 	









Tolerance class			
			
Code	I.C [mm]	m [mm]	S [mm]
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	±0,130
H	±0,013	±0,013	±0,025
J	±0,05-0,13	±0,005	±0,025
K	±0,05-0,13	±0,013	±0,025
L	±0,05-0,13	±0,025	±0,025
M	±0,05-0,13	±0,08-0,18	±0,130
N	±0,05-0,13	±0,08-0,18	±0,025
U	±0,08-0,25	±0,13-0,38	±0,130

1

2

3

Fastening features (metric)	
Insert shape	
A 	B 
C 	F 
G 	H 
J 	M 
N 	Q 
R 	T 
U 	W 
X Special	

Cutting edge length l [mm]	
Insert shape	
	
A	C, M
	
H, O, P	L
	
R	S
	
T	W

4

5

Insert thickness S [mm]			
Code	S	Code	S
00	0,79	05	5,56
T0	0,99	T5	5,95
01	1,59	06	6,35
T1	1,98	T6	6,75
02	2,38	07	7,94
T2	2,58	09	9,52
03	3,18	T9	9,72
T3	3,97	11	11,11
04	4,76	12	12,70
T4	4,96		

6

Angle			
Code	Kr	Code	an
A	45°	A	3°
D	60°	B	5°
E	75°	C	7°
F	85°	D	15°
P	90°	E	20°
Z	Special	F	25°
		G	30°
		N	0°
		P	11°
		Z	Special

7

Chamfer							
Code	Type	Code	Angle	Code	Width [mm]	Code	Position
F		0	5°	0	0,10	K	
E		1	10°	1	0,15	P	
T		2	15°	2	0,20	W	
S		3	20°	3	0,25	-	
		4	25°	4	0,30		
		5	30°	5	0,35		
				6	0,40		
				7	0,45		

8

Cutting direction	
Code	Description
R	Right
L	Left
N	Right and left

9

Chip breakers

10

A

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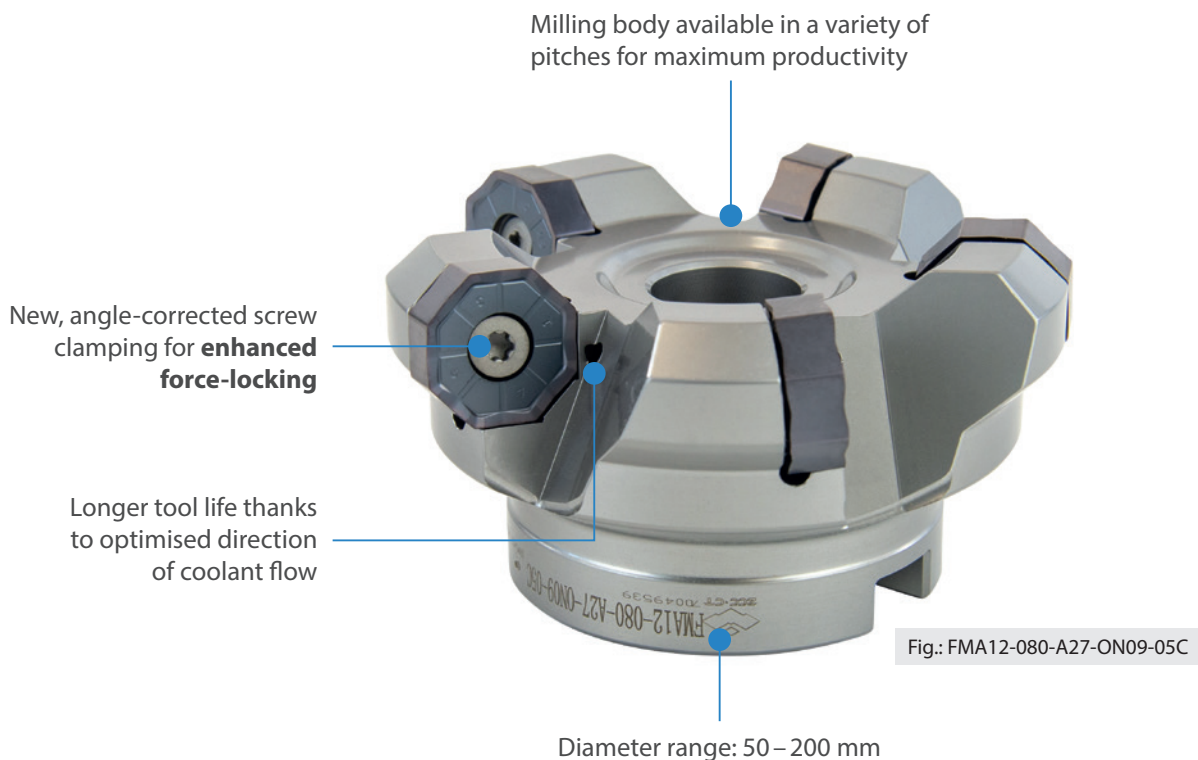
FMA12 face milling system

Wide assortment and maximum efficiency

Now available in new ONHU09T5 insert size **New**

YOUR BENEFITS

- **Highly economical thanks to 16 cutting edges**
- The 45° milling system with negative inserts ensures a stable cutting edge
- Available for a wide range of finishing and roughing applications
- The newly developed chip breakers feature a positive insert geometry and generate lower cutting forces



Insert grades

YBG205H

PVD
P10-P30
M20-M40

YBG205

PVD
P10-P30
M20-M40

YB9320

PVD
P10-P30
M10-M25

YBM253

CVD
P20-P40
M15-M35

YBD152

CVD
K10-K25

YBD252

CVD
K20-K35

Chip breaker

-GM



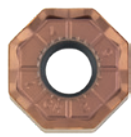
General machining

-GL



General machining

-GH



Soft cutting geometry

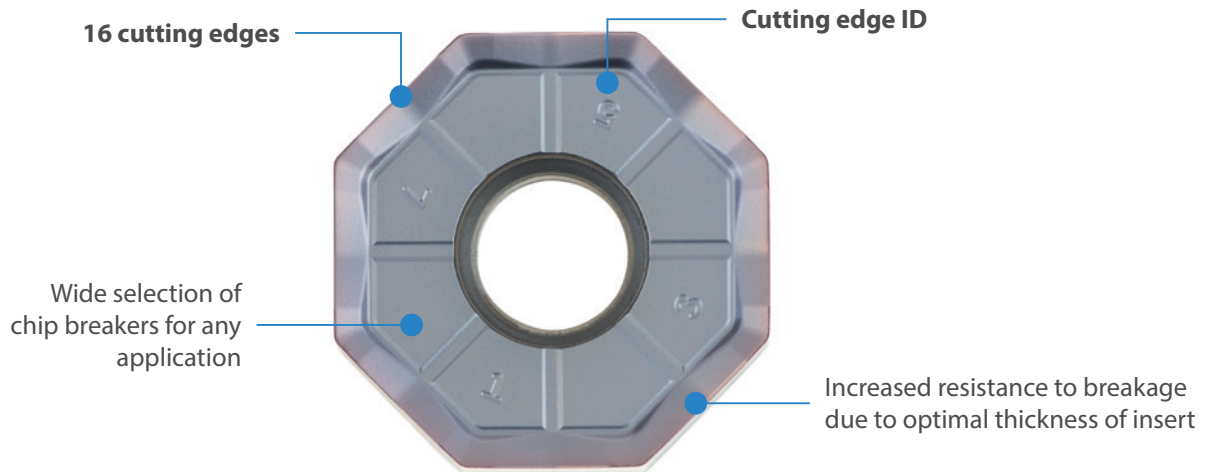
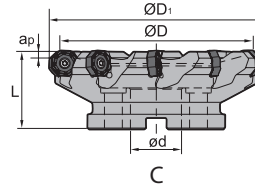
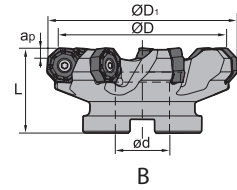
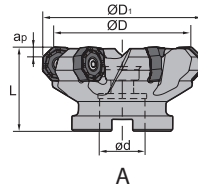
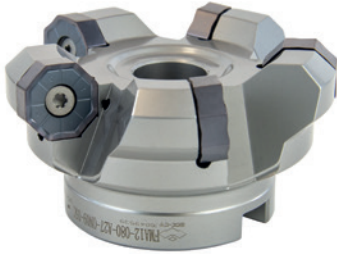


Fig.: ONHU09T508ANN-GM YBG205H

Face mill

FMA12 Kr: 45°







Article	*	Stock	Dimensions [mm]					Teeth	Coupling	kg	Insert
			ØD	ØD ₁	ød	L	a _{p max}				
FMA12-050-A22-ON06-04C	*	●	50	62	22	40	4	4	A	0,3	ONHU0604 ONMU0604
FMA12-050-A22-ON06-05C	*	●	50	62	22	40	4	5	A	0,3	
FMA12-063-A27-ON06-05C	*	●	63	75	27	40	4	5	A	0,5	
FMA12-063-A27-ON06-07C	*	●	63	75	27	40	4	7	A	0,5	
FMA12-080-A27-ON06-07C	*	●	80	92	27	50	4	6	A	1	
FMA12-080-A27-ON06-09C	*	●	80	92	27	50	4	9	A	1	
FMA12-100-A32-ON06-08C	*	●	100	112	32	63	4	8	A	1,9	
FMA12-100-A32-ON06-11C	*	●	100	112	32	63	4	11	A	1,9	
FMA12-125-B40-ON06-10		●	125	137	40	63	4	10	B	3,5	
FMA12-125-B40-ON06-14		●	125	137	40	63	4	14	B	3,5	
FMA12-160-C40-ON06-12		●	160	172	40	63	4	12	C	4,3	
FMA12-160-C40-ON06-18		●	160	172	40	63	4	18	C	4,3	
FMA12-200-C60-ON06-14		○	200	212	60	63	4	14	C	6,4	
FMA12-200-C60-ON06-22		○	200	212	60	63	4	22	C	6,4	
FMA12-063-A27-ON09-04C	*	○	63	76	27	50	5,5	4	A	0,7	ONHU09T5 ONMU09T5
FMA12-063-A27-ON09-06C	*	●	63	76	27	50	5,5	6	A	0,84	
FMA12-080-A27-ON09-05C	*	○	80	93	27	50	5,5	5	A	1,1	
FMA12-080-A27-ON09-07C	*	●	80	93	27	50	5,5	7	A	1,24	
FMA12-100-A32-ON09-06C	*	○	100	113	32	63	5,5	6	A	1,6	
FMA12-100-A32-ON09-10C	*	●	100	113	32	63	5,5	10	A	1,809	
FMA12-125-B40-ON09-08		○	125	138	40	63	5,5	8	B	3,1	
FMA12-125-B40-ON09-12C	*	●	125	138	40	63	5,5	12	B	3,648	
FMA12-160-C40-ON09-10		○	160	173	40	63	5,5	10	C	3,982	
FMA12-160-C40-ON09-15		○	160	173	40	63	5,5	15	C	4,303	
FMA12-200-C60-ON09-12		○	200	303	60	63	5,5	12	C	4,987	
FMA12-200-C60-ON09-18		○	200	303	60	63	5,5	18	C	5,754	




● Ex stock ○ On demand

* With internal cooling

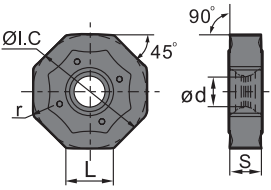



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 B Milling
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Spare parts		ON*U0604**	ONHU08T6	ON*U09T5	
Inserts	ØD	50-200	63-200	63-200	
	Screw (insert)	IRM4*10 (3,4Nm)	I60M5x13 (5,0Nm)	I60M5x13 (5,0Nm)	
	Wrench (insert)	WT15IP	WT20IS	WT20IS	
	Wrench (insert)	WT15IS WT15IT	WT20IT	WT20IT	

Milling insert

-  Ideal machining conditions
-  Normal machining conditions
-  Unfavourable machining conditions

ON*U	L	I.C	S	d
06 04	6,15	15,80	5,54	6,00
08 T6	6,38	20,20	6,30	5,30
09 T5	8,00	20,20	5,80	7,00

ON** milling insert			HC ¹ (CVD)		HC ¹ (PVD)			HT	HC ²	HW
										
ISO		r	YBM253	YBD152 YBD252	YBG205 YB9320	YBS303				
	ONHU060408ANN-GH	0,8	●	● ●	● ● ○					
	ONHU09T508ANN-GH <small>New</small>	0,8	●	●	○					
	ONMU09T512-GH <small>New</small>	1,2	○	○	○					
	ONHU060404ANN-GL	0,4	●	○	● ● ○					
	ONHU09T508ANN-GL <small>New</small>	0,8	○	○	●					
	ONHU060408ANN-GM	0,8	●	●	● ●					
	ONHU08T624R-GM	2,4	○	○	○					
	ONHU09T508ANN-GM <small>New</small>	0,8	○	●	●					
	ONMU09T512-GM <small>New</small>	1,2	○	○	○					

● Ex stock ○ On demand

HC¹ Coated carbide
 HT Uncoated cermet
 HC² Coated cermet
 HW Uncoated carbide

A

Turning

B

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EMP14 aluminium milling system

Precisely 90° for shoulder milling operations

YOUR BENEFITS

- **Shoulder milling at precisely 90°**
- Wide assortment of nose radii available to choose from (0.2–5.0 mm)
- Ideal choice for the aerospace industry
- Highly polished, precision-ground inserts for top-quality surfaces
- New chip space design for optimum chip removal



Insert grades

YD101

-
N05–N20

Chip breaker

-LP



Aluminium machining

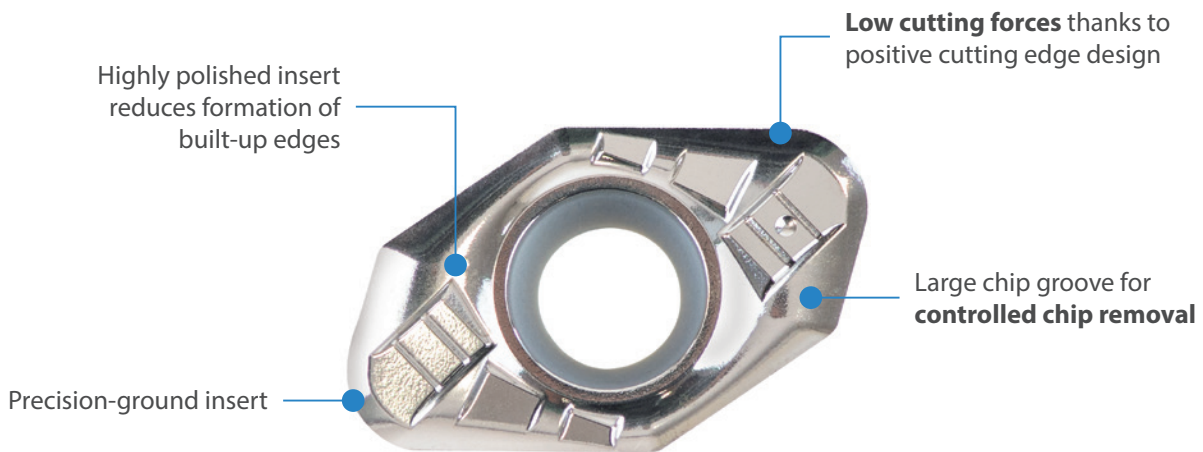


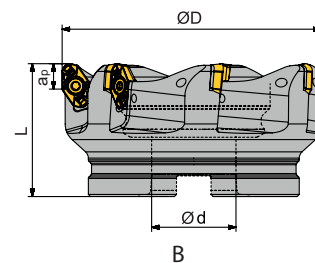
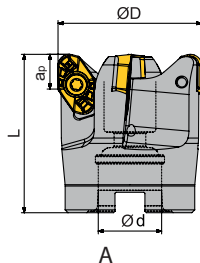
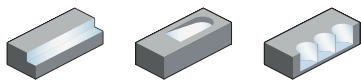
Fig.: VPGT220530-LP YD101

Recommended cutting data

ISO group	Material	Cutting speed v_c (m/min)	Feed f_z [mm]
N	Aluminium wrought alloys	800–3500	0,05–0,3
N	Cast aluminium alloys >12% Si	400–1000	0,05–0,3
N	Copper and copper alloys (bronze/brass)	700–1200	0,10–0,3
X	Plastic, graphite, CFRP / GFRP	200–1000	0,10–0,3
X	Epoxy resin	900–1500	0,18–0,5
X	Wood composites	2000–5000	0,05–1,0

Square shoulder mill

EMP14 Kr: 90°




Article	*	Stock	Dimensions [mm]				Teeth	Coupling	kg	Insert
			ØD	ød	L	$a_{p \max}$				
EMP14-040-A16-VP22-03CA	*	●	40	16	55	10	3	A	0,24	VPGT220502 – VPGT220532
EMP14-042-A16-VP22-03CA	*	●	42	16	55	10	3	A	0,27	
EMP14-050-A22-VP22-03CA	*	○	50	22	55	10	3	A	0,34	
EMP14-050-A22-VP22-04CA	*	●	50	22	55	10	4	A	0,34	
EMP14-052-A22-VP22-04CA	*	●	52	22	55	10	4	A	0,37	
EMP14-063-A27-VP22-04CA	*	●	63	27	55	10	4	A	0,54	
EMP14-066-A27-VP22-05CA	*	○	66	27	55	10	5	A	0,60	
EMP14-080-A27-VP22-05CA	*	●	80	27	55	10	5	A	0,86	
EMP14-100-B32-VP22-05CA	*	●	100	32	55	10	5	B	1,47	
EMP14-100-B32-VP22-06CA	*	○	100	32	55	10	6	B	1,47	
EMP14-125-B40-VP22-05CA	*	○	125	40	63	10	5	B	2,85	
EMP14-125-B40-VP22-07CA	*	●	125	40	63	10	7	B	2,85	
EMP14-040-A16-VP22-03C	*	●	40	16	55	10	3	A	0,28	
EMP14-042-A16-VP22-03C	*	●	42	16	55	10	3	A	0,31	
EMP14-050-A22-VP22-03C	*	○	50	22	55	10	3	A	0,39	
EMP14-050-A22-VP22-04C	*	●	50	22	55	10	4	A	0,39	
EMP14-052-A22-VP22-04C	*	●	52	22	55	10	4	A	0,43	
EMP14-063-A27-VP22-04C	*	●	63	27	55	10	4	A	0,61	
EMP14-066-A27-VP22-05C	*	○	66	27	55	10	5	A	0,68	
EMP14-080-A27-VP22-05C	*	●	80	27	55	10	5	A	0,99	
EMP14-100-B32-VP22-05C	*	●	100	32	55	10	5	B	1,58	
EMP14-100-B32-VP22-06C	*	○	100	32	55	10	6	B	1,58	
EMP14-125-B40-VP22-05C	*	○	125	40	63	10	5	B	3,07	
EMP14-125-B40-VP22-07C	*	●	125	40	63	10	7	B	3,07	

● Ex stock ○ On demand

* With internal cooling

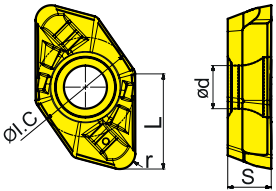

Spare parts		
	Insert	VPGT2205**
	ØD	32-125
	Screw (Insert)	I60M5*11 (5,0 Nm)
	Wrench (Insert)	WT20IT



Milling insert

- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

VPGT	L	I.C	S	d
22 05	12,00	12,70	5,56	5,50

VPGT milling insert			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	HW
	P						
	M						
	K						
	N						
	S						
	H						
	ISO	r				YD101	
	VPGT220502-LP	0,20					○
	VPGT220505-LP	0,50					●
	VPGT220508-LP	0,80					●
	VPGT220510-LP	1,00					●
	VPGT220515-LP	1,50					●
	VPGT220520-LP	2,00					●
	VPGT220525-LP	2,50					●
	VPGT220530-LP	3,00					●
	VPGT220532-LP	3,20					●
	VPGT220540-LP	4,00					●
	VPGT220550-LP	5,00					○
	VPGT220560-LP	6,00					○

● Ex stock ○ On demand

HC¹ Coated carbide
 HT Uncoated cermet
 HC² Coated cermet
 HW Uncoated carbide

A

Turning

B

Milling

C

Drilling

D

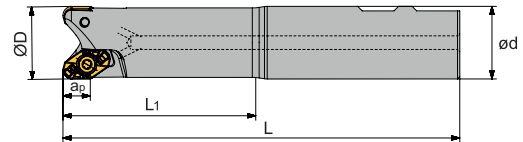
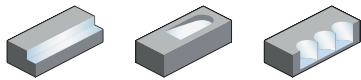
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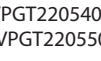
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Square shoulder mill

EMP14 Kr: 90°



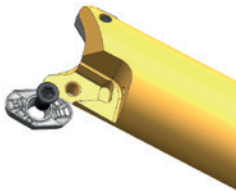


Straight shank

Article	*	Stock	Dimensions [mm]					Teeth	kg	Insert
			ØD	ød	L ₁	L	a _p max			
EMP14-032-XP32-VP22-02CA-L1-100-L-200	*	○	32	32	100	200	10	2	1,06	 VPGT220502 – VPGT220532
EMP14-032-XP32-VP22-02CA	*	●	32	32	30	125	10	2	0,65	
EMP14-032-XP32-VP22-02CA-L1-85-L-175	*	●	32	32	85	175	10	2	0,92	
EMP14-032-XP32-VP22-02CA-L1-150-L-250	*	○	32	32	150	250	10	2	1,34	 VPGT220540 – VPGT220550
EMP14-032-XP32-VP22-02C-L1-100-L-200	*	○	32	32	100	200	10	2	1,06	
EMP14-032-XP32-VP22-02C	*	●	32	32	30	125	10	2	0,64	
EMP14-032-XP32-VP22-02C-L1-85-L-175	*	●	32	32	85	175	10	2	0,92	
EMP14-032-XP32-VP22-02C-L1-150-L-250	*	○	32	32	150	250	10	2	1,34	




● Ex stock ○ On demand

* With internal cooling

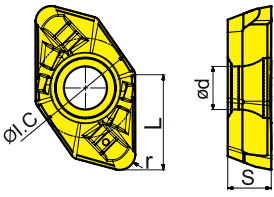


Spare parts

	Insert	VPGT2205**	
	ØD	32-125	
	Screw (Insert)	I60M5*11 (5,0 Nm)	
	Wrench (Insert)	WT20IT	

Milling insert

-  Ideal machining conditions
-  Normal machining conditions
-  Unfavourable machining conditions

VPGT	L	I.C	S	d
22 05	12,00	12,70	5,56	5,50

VPGT milling insert			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	HW
	P						
	M						
	K						
	N						
	S						
	H						
ISO		r				YD101	
	VPGT220502-LP	0,20				○	
	VPGT220505-LP	0,50				●	
	VPGT220508-LP	0,80				●	
	VPGT220510-LP	1,00				●	
	VPGT220515-LP	1,50				●	
	VPGT220520-LP	2,00				●	
	VPGT220525-LP	2,50				●	
	VPGT220530-LP	3,00				●	
	VPGT220532-LP	3,20				●	
	VPGT220540-LP	4,00				●	
	VPGT220550-LP	5,00				○	
	VPGT220560-LP	6,00				○	

● Ex stock ○ On demand

HC¹ Coated carbide
 HT Uncoated cermet
 HC² Coated cermet
 HW Uncoated carbide

A

Turning

B

Milling

C

Drilling

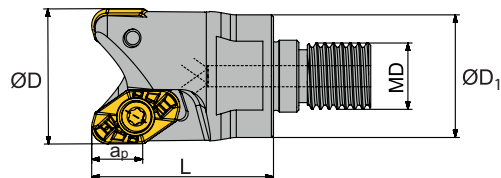
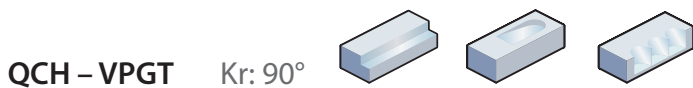
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Square shoulder milling cutter – QCH series



Article	*	Stock	Dimensions [mm]					Teeth	kg	Insert
			ØD	ØD ₁	L	MD	a _{p max}			
QCH-32-VP22-M16-02CA	*	●	32	30	43	M16	10	2	0,18	VPGT220502 – VPGT220532
QCH-32-VP22-M16-02C	*	●	32	30	43	M16	10	2	0,18	VPGT220540 – VPGT220550

● Ex stock ○ On demand

* With internal cooling

Spare parts		
	Insert	VPGT2205**
	ØD	32–125
	Screw (Insert)	I60M5*11 (5,0 Nm)
	Wrench (Insert)	WT20IT

A

Turning

B

Milling

C

Drilling




D

Technical Information

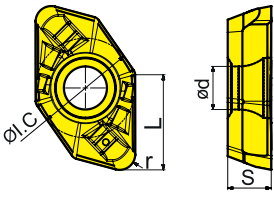


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Milling insert

-  Ideal machining conditions
-  Normal machining conditions
-  Unfavourable machining conditions

VPGT	L	I.C	S	d
22 05	12,00	12,70	5,56	5,50

VPGT milling insert			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	HW
	P						
	M						
	K						
	N						
	S						
	H						
ISO		r				YD101	
	VPGT220502-LP	0,20				○	
	VPGT220505-LP	0,50				●	
	VPGT220508-LP	0,80				●	
	VPGT220510-LP	1,00				●	
	VPGT220515-LP	1,50				●	
	VPGT220520-LP	2,00				●	
	VPGT220525-LP	2,50				●	
	VPGT220530-LP	3,00				●	
	VPGT220532-LP	3,20				●	
	VPGT220540-LP	4,00				●	
	VPGT220550-LP	5,00				○	
	VPGT220560-LP	6,00				○	

● Ex stock ○ On demand

HC¹ Coated carbide
 HT Uncoated cermet
 HC² Coated cermet
 HW Uncoated carbide

A

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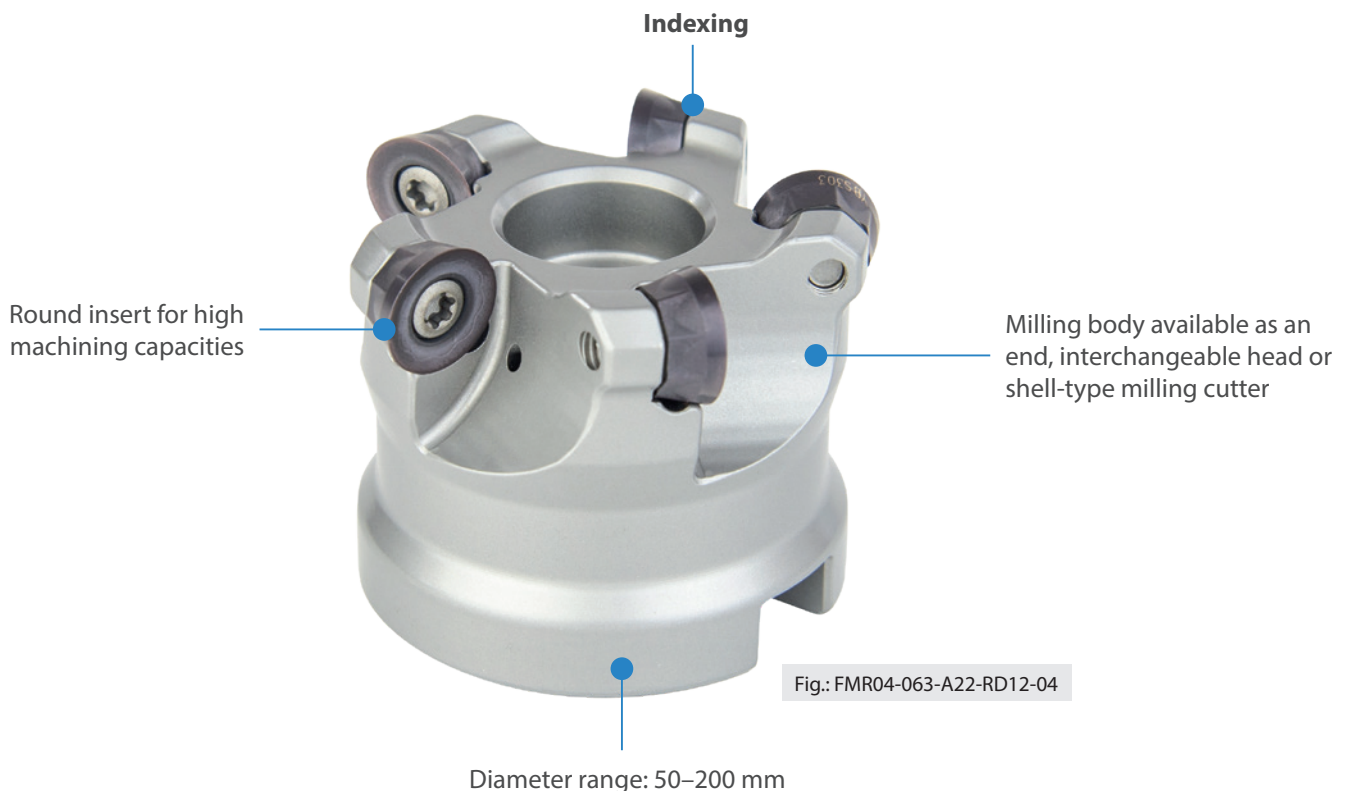
Index

FMR11 round insert milling cutter

Maximum cutting performance

YOUR BENEFITS

- **Indexing for optimum use of cutting edge**
- Heavy-duty round insert mill for a wide range of applications
- Well suited for die and mould making
- Round insert for high feed rates and machining capacities
- Optimal chip removal because chip pocket free of interfering contours
- Safe and easy to use thanks to screw clamping



Insert grades

YBG205H

PVD
P10-P30
M20-M40

YB9320

PVD
P10-P30
M10-M25

YBS303

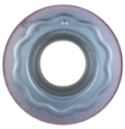
PVD
S25-S35

YBD252

CVD
K20-K35

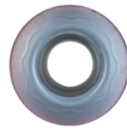
Chip breaker

RDMT-M
RPMT-M



General machining

RDMT-MM
RPMT-MM



Soft cutting geometry

RDMW-H
RPMW-H



Roughing

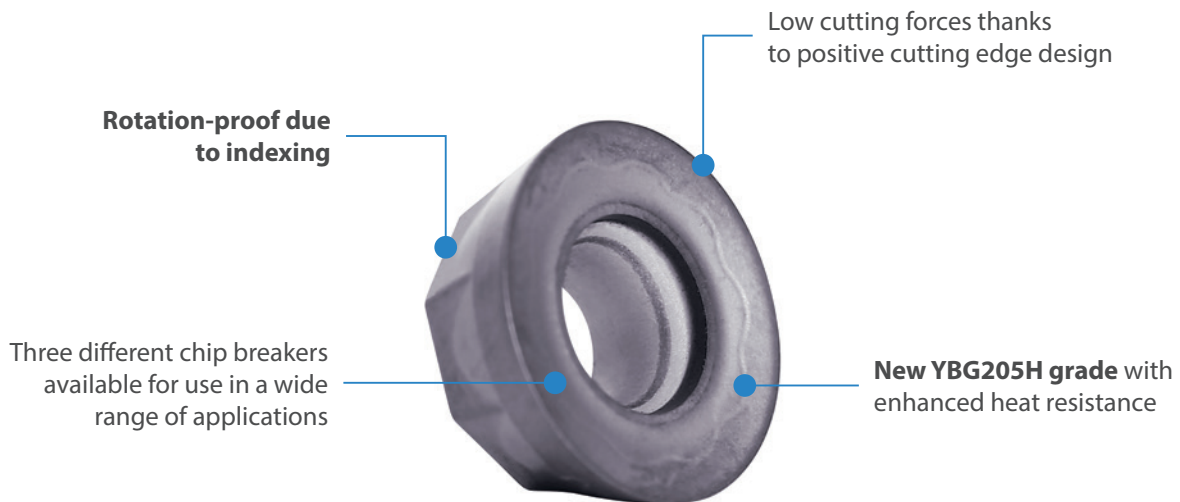
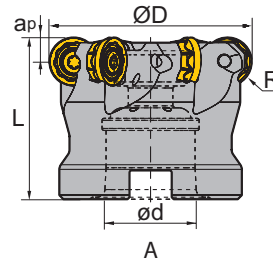
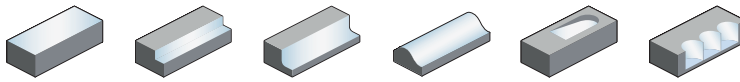


Fig.: RDMT1204-MO-M YBG205H

Face mill

FMR11



Article	*	Stock	Dimensions [mm]					Teeth	Coupling	kg	Insert
			R	ØD	ød	L	a _{p max}				
FMR11-040-A16-RD10-06C	*	○	5	40	16	40	5	6	A	–	RD**10T3
FMR11-050-A22-RD10-07C	*	●	5	50	22	40	5	7	A	0,30	
FMR11-052-A22-RD10-07C	*	●	5	52	22	40	5	7	A	0,28	
FMR11-063-A22-RD10-08C	*	●	5	63	22	40	5	8	A	0,50	
FMR11-066-A22-RD10-08C	*	●	5	66	22	40	5	8	A	0,46	
FMR11-080-A27-RD10-09C	*	●	5	80	27	50	5	9	A	0,82	
FMR11-040-A16-RD12-05C	*	●	6	40	16	40	6	5	A	0,18	RD**1204
FMR11-050-A22-RD12-05C	*	●	6	50	22	40	6	5	A	0,27	
FMR11-050-A22-RD12-06C	*	●	6	50	22	40	6	6	A	0,27	
FMR11-052-A22-RD12-06C	*	●	6	52	22	40	6	6	A	0,27	
FMR11-063-A27-RD12-07C	*	●	6	63	27	40	6	7	A	0,39	
FMR11-066-A27-RD12-07C	*	●	6	66	27	40	6	7	A	0,40	
FMR11-080-A27-RD12-08C	*	●	6	80	27	50	6	8	A	1,00	
FMR11-040-A16-RP10-06C	*	●	5	40	16	40	5	6	A	0,19	RP**10T3
FMR11-050-A22-RP10-07C	*	●	5	50	22	40	5	7	A	0,29	
FMR11-052-A22-RP10-07C	*	●	5	52	22	40	5	7	A	0,29	
FMR11-063-A22-RP10-08C	*	●	5	63	22	40	5	8	A	0,48	
FMR11-066-A22-RP10-08C	*	●	5	66	22	40	5	8	A	0,49	
FMR11-080-A27-RP10-09C	*	●	5	80	27	50	5	9	A	0,93	
FMR11-040-A16-RP12-05C	*	●	6	40	16	40	6	5	A	0,16	RP**1204
FMR11-050-A22-RP12-06C	*	●	6	50	22	40	6	6	A	0,27	
FMR11-052-A22-RP12-06C	*	●	6	52	22	40	6	6	A	0,28	
FMR11-063-A27-RP12-07C	*	●	6	63	27	40	6	7	A	0,40	
FMR11-066-A27-RP12-07C	*	●	6	66	27	40	6	7	A	0,43	
FMR11-080-A27-RP12-08C	*	●	6	80	27	50	6	8	A	1,00	

● Ex stock ○ On demand

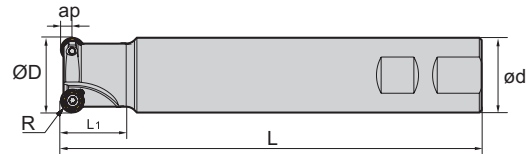
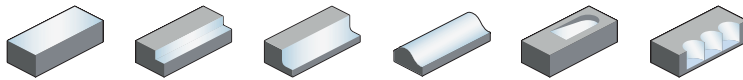
* With internal cooling

Spare parts

		RD**10T3	RD**1204	RP**10T3	RP**1204
		20 – 66	20 – 66	80	80
	Screw (insert)	I60M3,5*8 (2,7Nm)	I60M3,5*8 (2,7Nm)	I60M4*8,4 (3,4Nm)	I60M4*8,4 (3,4Nm)
	Wrench (insert)	WT15IP	WT15IP	WT15IS	WT15IS

Face mill

FMR11



Straight shank

Article	*	Stock	Dimensions [mm]						Teeth	kg	Insert
			R	ØD	ød	L ₁	L	a _{p,max}			
FMR11-032-XP32-RD10-03C	*	○	5	32	32	35	120	5	3	-	RD**10T3
FMR11-040-XP32-RD10-04C	*	○	5	40	32	40	120	5	4	-	
FMR11-032-XP32-RD10-03C	*	●	5	32	32	30	180	5	3	0,98	
FMR11-040-XP32-RD10-04C	*	●	5	40	32	30	200	5	4	1,2	
FMR11-032-XP32-RD12-03C	*	○	6	32	32	35	120	6	3	-	RD**1204
FMR11-040-XP32-RD12-04C	*	○	6	40	32	40	120	6	4	-	
FMR11-032-XP32-RD12-03C	*	●	6	32	32	30	180	6	3	0,97	
FMR11-040-XP32-RD12-04C	*	●	6	40	32	30	200	6	4	1,15	
FMR11-032-XP32-RP10-03C	*	○	5	32	32	35	120	5	3	-	RP**10T3
FMR11-040-XP32-RP10-04C	*	○	5	40	32	40	120	5	4	-	
FMR11-032-XP32-RP10-03C	*	●	5	32	32	30	180	5	3	0,98	
FMR11-040-XP32-RP10-04C	*	●	5	40	32	30	200	5	4	1,17	
FMR11-032-XP32-RP12-03C	*	○	6	32	32	35	120	6	3	-	RP**1204
FMR11-040-XP32-RP12-04C	*	○	6	40	32	40	120	6	4	-	
FMR11-032-XP32-RP12-03C	*	●	6	32	32	30	180	6	3	0,98	
FMR11-040-XP32-RP12-04C	*	●	6	40	32	30	200	6	4	1,16	

● Ex stock ○ On demand

* With internal cooling

Spare parts					
	Insert	RD**10T3	RD**1204	RP**10T3	RP**1204
	ØD	20 – 66	20 – 66	80	80
	Screw (insert)	I60M3,5*8 (2,7Nm)	I60M3,5*8 (2,7Nm)	I60M4*8,4 (3,4Nm)	I60M4*8,4 (3,4Nm)
	Wrench (insert)	WT15IP	WT15IP	WT15IS	WT15IS

A

Turning

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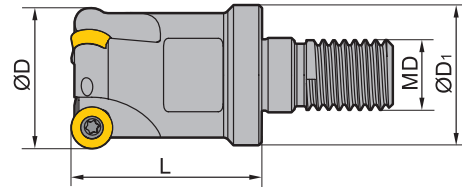
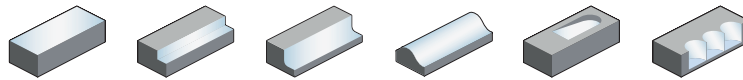
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Face mill – QCH series

QCH – R***



Article	*	Stock	Dimensions [mm]				Teeth	kg	Insert	
			R	ØD	ØD ₁	L				MD
QCH-20-RD10-M10-02-FMR11	*	○	5	20	18	30	10	2	–	RD**10T3
QCH-25-RD10-M12-03-FMR11	*	●	5	25	21	35	12	3	0,08	
QCH-32-RD10-M16-03-FMR11	*	●	5	32	30	45	16	3	0,21	
QCH-42-RD10-M16-05-FMR11	*	●	5	42	40	45	16	5	0,29	RD**1204
QCH-20-RD12-M10-02-FMR11	*	○	6	20	18	30	10	2	–	
QCH-25-RD12-M12-03-FMR11	*	●	6	25	21	35	12	3	–	
QCH-32-RD12-M16-03-FMR11	*	●	6	32	30	45	16	3	0,20	
QCH-42-RD12-M16-05-FMR11	*	●	6	42	40	45	16	5	0,27	RP**10T3
QCH-20-RP10-M10-02-FMR11		○	5	20	18	30	10	2	–	
QCH-25-RP10-M12-03-FMR11		○	5	25	21	35	12	3	–	
QCH-32-RP10-M16-03-FMR11		○	5	32	30	45	16	3	–	
QCH-42-RP10-M16-05-FMR11		○	5	42	40	45	16	5	–	RP**1204
QCH-20-RP12-M10-02-FMR11		○	6	20	18	30	10	2	–	
QCH-25-RP12-M12-03-FMR11		○	6	25	21	35	12	3	–	
QCH-32-RP12-M16-03-FMR11		○	6	32	30	45	16	3	–	
QCH-42-RP12-M16-05-FMR11		○	6	42	40	45	16	5	–	




● Ex stock ○ On demand

* With internal cooling

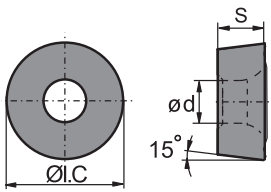











Spare parts

	Insert	RD**10T3	RD**1204	RP**10T3	RP**1204	
	ØD	20 – 66	20 – 66	80	80	
	Screw (insert)	I60M3,5*8 (2,7Nm)	I60M3,5*8 (2,7Nm)	I60M4*8,4 (3,4Nm)	I60M4*8,4 (3,4Nm)	
	Wrench (insert)	WT15IP	WT15IP	WT15IS	WT15IS	

Milling insert

-  Ideal machining conditions
-  Normal machining conditions
-  Unfavourable machining conditions




RDMT	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

RD** milling insert			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	HW
	P			 			
	M			 			
	K						
	N						
	S			  			
	H						
ISO		YBD252		YBG205H YB9320 YBS303			
	RDMT10T3MO-M	●		● ○ ●			
	RDMT1204MO-M	●		● ○ ●			
	RDMT10T3MO-MM			● ○ ●			
	RDMT1204MO-MM			● ○ ●			

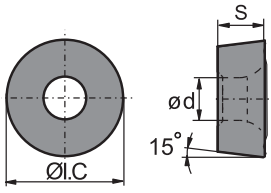





● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Milling insert

-  Ideal machining conditions
-  Normal machining conditions
-  Unfavourable machining conditions

RDMW	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

RD** milling insert			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	HW
	P			 			
	M						
	K						
	N						
	S						
	H						
ISO		YBD252		YBG205H YB9320			
	RDMW10T3MO-H	●		● ○			
	RDMW1204MO-H	●		● ○			

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

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Indexable milling Face milling

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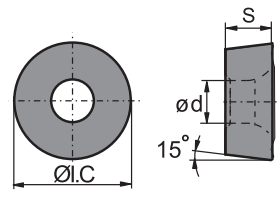











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-  Ideal machining conditions
-  Normal machining conditions
-  Unfavourable machining conditions




RPMT	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

Milling insert

RP** milling insert			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	HW
	P			 			
	M			 			
	K						
	N						
	S				  		
	H						
ISO			YBD252	YBG205H YB9320 YBS303			
	RPMT10T3MO-M		●	● ○ ●			
	RPMT1204MO-M		●	● ○ ●			
	RPMT10T3MO-MM			● ○ ●			
	RPMT1204MO-MM			● ○ ●			

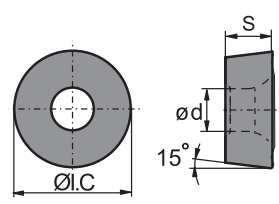





● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

-  Ideal machining conditions
-  Normal machining conditions
-  Unfavourable machining conditions

RPMW	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

Milling insert

RP** milling insert			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	HW
	P			 			
	M						
	K						
	N						
	S						
	H						
ISO			YBD252	YBG205H YB9320			
	RPMW10T3MO-H		●	● ○ ●			
	RPMW1204MO-H		●	● ○ ●			

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide



FMR11

Round insert milling cutter

Indexable milling – group 1 (FMA07/11/12/17, FMP12/17, FMD02, EMP09/13)

	Material group	Composition / structure / heat treatment		Machining group	Starting values for cutting speed v_c [m/min]								
					HC (CVD)								
					YBC302		YBC401		YBD152		YBD252		
					a_e / D		a_e / D		a_e / D		a_e / D		
		1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5				
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	225	260				
		approx. 0,45 % C	annealed	190	2	225	255	195	225				
		approx. 0,45 % C	tempered	250	3	210	240	180	210				
		approx. 0,75 % C	annealed	270	4	185	210	160	185				
		approx. 0,75 % C	tempered	300	5	170	195	150	170				
P	Low-alloyed steel		annealed	180	6	225	255	195	225				
			tempered	275	7	185	210	160	185				
			tempered	300	8	170	195	150	170				
			tempered	350	9	145	165	125	145				
P	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	115	130				
			hardened and tempered	325	11	95	105	80	95				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
			martensitic	tempered	240	13							
			austenitic	quench hardened	180	14							
			austenitic-ferritic		230	15							
K	Grey cast iron	perlitic/ferritic		180	16				370	430	320	370	
			perlitic (martensitic)	260	17				220	255	190	220	
	Cast iron with spheroidal graphite	ferritic		160	18				255	295	220	255	
			perlitic	250	19				170	200	145	170	
K	Malleable cast iron	ferritic		130	20				305	355	265	305	
			perlitic	230	21				205	240	175	205	
N	Aluminium wrought alloys	cannot be hardened		60	22								
			hardenable	hardened	100	23							
	Cast aluminium alloys	$\leq 12\% \text{ Si}$, cannot be hardened		75	24								
			$\leq 12\% \text{ Si}$, hardenable	hardened	90	25							
			$> 12\% \text{ Si}$, cannot be hardened		130	26							
	Copper and copper alloys (bronze/brass)	machining steel, PB > 1%		110	27								
		CuZn, CuSnZn	90	28									
		CuSn, Pb-free copper, electrolytic copper	100	29									
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
				hardened	280	31							
		Ni or Co base	annealed	250	32								
				hardened	350	33							
		cast	320	34									
Titanium alloys	pure titanium		R_m 400	35									
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel	hardened and tempered		55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron	cast		400	39								
	Hardened cast iron	hardened and tempered		55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
 The values have to be adapted in individual cases.
 Feed rate recommendations on page B38–B43.

Starting values for cutting speed v_c [m/min]																			
HC (CVD)		HC (PVD)												HW					
YBM253		YBG102		YB9320		YBG205		YBG205H		YBG252		YBG302		YB5303		YD101		YD201	
a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D	
1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5
260	300	270	315	245	285	235	275	235	275	230	265	225	260						
225	255	230	270	210	245	200	235	200	235	200	230	195	225						
210	240	220	255	200	230	190	220	190	220	185	215	180	210						
185	210	190	225	175	200	165	195	165	195	165	190	160	185						
170	195	180	205	160	190	155	180	155	180	150	175	150	170						
225	255	230	270	210	245	200	235	200	235	200	230	195	225						
185	210	190	225	175	200	165	195	165	195	165	190	160	185						
170	195	180	205	160	190	155	180	155	180	150	175	150	170						
145	165	150	175	135	160	130	155	130	155	130	150	125	145						
130	150	135	160	125	145	120	140	120	140	115	135	115	130						
95	105	95	115	90	100	85	100	85	100	85	95	80	95						
130	150	135	160	125	145	120	140			115	135	115	130	140	185				
110	130	115	135	105	120	100	120			100	115	95	110	120	155				
140	160	145	170	130	155	125	150			125	145	120	140	150	195				
110	130	115	135	105	120	100	120			100	115	95	110	120	155				
		300	345	270	315	260	300	270	315	255	295	250	290						
		180	205	160	190	155	180	160	190	150	175	150	170						
		205	240	185	215	180	210	185	215	175	200	170	195						
		135	160	125	145	120	140	125	145	115	135	115	130						
		245	285	225	260	215	250	225	260	210	240	205	235						
		165	190	150	175	145	165	150	175	140	160	135	160						
																1505	1735	1450	1670
																1225	1420	1180	1370
																540	620	515	600
																435	505	420	485
																220	255	215	250
																170	195	160	190
																210	245	205	235
																385	445	370	430
								90	150										
								80	120										
										90	120								

HC Coated carbide
 HT Uncoated carbide, primary component (TiC) or (TiN), cermet
 HW Uncoated carbide, primary component (WC)
 BL Cubic boron nitride with low BN content
 BH Cubic boron nitride with high BN content
 CN Si3N4 ceramic
 CM Mixed ceramic
 HC₁ Coated cermet
 BC CBN with coating
 CC Coated cutting ceramic
 CR Cutting ceramic, primary component aluminium oxide (Al₂O₃), reinforced
 DP Polycrystalline diamond

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Indexable milling – group 2 (FMA01/02/03/04, FME01/02, EMP01/02/03/04/14)

	Material group	Composition / structure / heat treatment		Machining group	Starting values for cutting speed v_c [m/min]								
					HC (CVD)								
					YBC302		YBC401		YBD152		YBD252		
					a_e / D		a_e / D		a_e / D		a_e / D		
					1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	245	285	210	245				
		approx. 0,45 % C	annealed	190	2	210	245	180	210				
		approx. 0,45 % C	tempered	250	3	200	230	170	200				
		approx. 0,75 % C	annealed	270	4	175	200	150	175				
		approx. 0,75 % C	tempered	300	5	160	190	140	160				
P	Low-alloyed steel		annealed	180	6	210	245	180	210				
			tempered	275	7	175	200	150	175				
			tempered	300	8	160	190	140	160				
			tempered	350	9	135	160	120	135				
P	High-alloyed steel and high-alloyed tool steel		annealed	200	10	125	145	105	125				
			hardened and tempered	325	11	90	100	75	90				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
			martensitic	tempered	240	13							
			austenitic	quench hardened	180	14							
			austenitic-ferritic		230	15							
K	Grey cast iron	perlitic/ferritic		180	16				315	365	270	315	
			perlitic (martensitic)	260	17				185	215	160	190	
	Cast iron with spheroidal graphite	ferritic		160	18				215	250	185	215	
			perlitic	250	19				145	170	125	145	
K	Malleable cast iron	ferritic		130	20				260	300	225	260	
			perlitic	230	21				175	205	150	175	
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	$\leq 12\% \text{ Si}$, cannot be hardened		75	24								
		$\leq 12\% \text{ Si}$, hardenable	hardened	90	25								
		$> 12\% \text{ Si}$, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB > 1%		110	27								
CuZn, CuSnZn		90	28										
CuSn, Pb-free copper, electrolytic copper		100	29										
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co base	annealed	250	32								
			hardened	350	33								
		cast	320	34									
Titanium alloys	pure titanium		R_m 400	35									
	α and β alloys		hardened	R_m 1050	36								
H	Hardened steel	hardened and tempered		55 HRC	37								
		hardened and tempered		60 HRC	38								
	Hard cast iron	cast		400	39								
X	Non-metallic materials	hardened and tempered		55 HRC	40								
		Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
	Plastic, carbon fibre reinforced CFRP			44									
	Graphite			45									
	Wood			46									

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

Starting values for cutting speed v_c [m/min]																					
HC (CVD)		HC (PVD)														HW				HT	
YBM253		YBG101		YBG102		YBG152		YB9320		YBG205		YBG252		YBG302		YD101		YD201		YNG151	
a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D	
1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5	1/1 3/4	1/5
245	285			255	295	240	280	230	265	220	255	215	250	210	245					270	315
210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270
200	230			205	240	195	225	185	215	180	205	175	200	170	200					220	255
175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220
160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210
210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270
175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220
160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210
135	160			145	165	135	155	130	150	125	145	120	140	120	135					150	180
125	145			130	150	120	140	115	135	110	130	110	125	105	125					140	160
90	100			90	105	85	100	85	95	80	90	80	90	75	90					100	110
125	145			130	150	120	140	115	135	110	130	110	125	105	125					135	160
105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135
130	155			140	160	130	150	125	145	120	140	115	135	115	130					145	170
105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135
				285	330	265	305	255	295	245	285	240	280	235	275						
				170	195	160	185	150	175	145	170	140	165	140	160						
				195	225	180	210	175	200	165	195	165	190	160	185						
				130	150	120	140	115	135	110	130	110	125	105	125						
				230	270	220	255	210	240	200	230	195	225	190	225						
				155	180	145	170	140	160	135	155	130	150	130	150						
		1505	1735													1205	1390	1040	1200		
		1225	1420													980	1140	850	980		
		540	620													435	500	375	435		
		435	505													350	405	300	350		
		220	255													180	205	155	180		
		170	195													140	160	120	140		
		210	245													170	200	150	170		
		385	445													310	360	265	310		
				75	85	70	80	65	75	65	75	65	75	60	70						
				50	55	50	55	45	50	45	50	45	50	40	45						
				60	70	55	65	55	65	50	55	50	55	50	55						
				35	40	35	40	30	35	30	35	30	35	30	35						
				45	50	45	50	40	45	40	45	40	45	40	45						
				75	85	70	80	65	75	65	75	65	75	60	70						
				75	85	70	80	65	75	65	75	65	75	60	70						

- HC Coated carbide
- HT Uncoated carbide, primary component (TiC) or (TiN), cermet
- HW Uncoated carbide, primary component (WC)
- BL Cubic boron nitride with low BN content
- BH Cubic boron nitride with high BN content
- CN Si3N4 ceramic
- CM Mixed ceramic
- HC₁ Coated cermet
- BC CBN with coating
- CC Coated cutting ceramic
- CR Cutting ceramic, primary component aluminium oxide (Al₂O₃), reinforced
- DP Polycrystalline diamond

Indexable milling – group 3 (FMR01/02/03/04/11)

	Material group	Composition / structure / heat treatment		Machining group	Starting values for cutting speed v_c [m/min]									
					HC (PVD)									
					YBG205H			YBG212						
					a_e / D			a_e / D						
					1/1 3/4	1/5	1/20	1/1 3/4	1/5	1/20				
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	235	275		240	280	365			
		approx. 0,45 % C	annealed	190	2	200	235		205	240	315			
		approx. 0,45 % C	tempered	250	3	190	220		195	225	295			
		approx. 0,75 % C	annealed	270	4	165	195		170	200	260			
		approx. 0,75 % C	tempered	300	5	155	180		160	185	245			
	Low-alloyed steel		annealed	180	6	200	235		205	240	315			
			tempered	275	7	165	195		170	200	260			
			tempered	300	8	155	180		160	185	245			
			tempered	350	9	130	155		135	155	205			
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	120	140		120	140	185			
		hardened and tempered	325	11	85	100		85	100	130				
M	Stainless steel	ferritic/martensitic	annealed	200	12				120	140	185			
			martensitic	tempered	240	13			105	120	155			
			austenitic	quench hardened	180	14			130	150	195			
			austenitic-ferritic		230	15			105	120	155			
K	Grey cast iron	perlitic/ferritic		180	16	270	315		265	305	400			
			perlitic (martensitic)	260	17	160	190		160	185	245			
	Cast iron with spheroidal graphite	ferritic		160	18	185	215		180	210	275			
			perlitic	250	19	125	145		120	140	185			
	Malleable cast iron	ferritic		130	20	225	260		220	255	335			
			perlitic	230	21	150	175		145	170	225			
N	Aluminium wrought alloys	cannot be hardened		60	22									
		hardenable	hardened	100	23									
	Cast aluminium alloys	$\leq 12\% \text{ Si}$, cannot be hardened		75	24									
		$\leq 12\% \text{ Si}$, hardenable	hardened	90	25									
		$> 12\% \text{ Si}$, cannot be hardened		130	26									
	Copper and copper alloys (bronze/brass)	machining steel, PB > 1%		110	27									
		CuZn, CuSnZn		90	28									
CuSn, Pb-free copper, electrolytic copper		100	29											
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30									
				hardened	280	31								
		Ni or Co base	annealed	250	32									
				hardened	350	33								
		cast	320	34										
Titanium alloys	pure titanium		R_m 400	35										
	α and β alloys	hardened		R_m 1050	36									
H	Hardened steel		hardened and tempered	55 HRC	37	90	150							
			hardened and tempered	60 HRC	38	80	120							
	Hard cast iron		cast	400	39									
	Hardened cast iron		hardened and tempered	55 HRC	40	90	120							
X	Non-metallic materials	Thermoplasts			41									
		Thermosetting plastics			42									
		Plastic, glass-fibre reinforced GFRP			43									
		Plastic, carbon fibre reinforced CFRP			44									
		Graphite			45									
		Wood			46									

Note: The given cutting values are guide values, which were determined under ideal conditions.
 The values have to be adapted in individual cases.
 Feed rate recommendations on page B38–B43.

Starting values for cutting speed v_c [m/min]														
HC (PVD)												HW		
YBG252			YBG302			YBS303			YD101		YD201			
a_e / D			a_e / D			a_e / D			a_e / D		a_e / D			
1/1 3/4	1/5	1/20	1/1 3/4	1/5	1/20	1/1 3/4	1/5	1/20	1/1 3/4	1/5	1/1 3/4	1/5		
230	265	345	225	260	340									
200	230	300	195	225	295									
185	215	280	180	210	275									
165	190	250	160	185	245									
150	175	230	150	170	225									
200	230	300	195	225	295									
165	190	250	160	185	245									
150	175	230	150	170	225									
130	150	195	125	145	190									
115	135	180	115	130	170									
85	95	125	80	95	125									
115	135	175	115	130	170	140	185							
100	115	145	95	110	145	120	155							
125	145	185	120	140	185	150	195							
100	115	145	95	110	145	120	155							
255	295	385	250	290	380									
150	175	230	150	170	225									
175	200	260	170	195	255									
115	135	180	115	130	170									
210	240	315	205	235	310									
140	160	210	135	160	210									
									1505	1735	1450	1670		
									1225	1420	1180	1370		
									540	620	515	600		
									435	505	420	485		
									220	255	215	250		
									170	195	160	190		
									210	245	205	235		
									385	445	370	430		

- HC Coated carbide
- HT Uncoated carbide, primary component (TiC) or (TiN), cermet
- HW Uncoated carbide, primary component (WC)
- BL Cubic boron nitride with low BN content
- BH Cubic boron nitride with high BN content
- CN Si3N4 ceramic
- CM Mixed ceramic
- HC₁ Coated cermet
- BC CBN with coating
- CC Coated cutting ceramic
- CR Cutting ceramic, primary component aluminium oxide (Al₂O₃), reinforced
- DP Polycrystalline diamond

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Recommended feed rate

Indexable milling – group1 (FMA07/11/12/17, FMP12/17, FMD02, EMP09/13)

Material group	Feed rate per cutting edge [mm]																		
	EMP09			EMP09			EMP13			EMP13			FMA07			FMA07			
	LNKT08/12			LNKT16			ANGX11			ANGX15			ONHU06			ONHU08			
	Application																		
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	
P Unalloyed steel		0,25	0,50		0,28	0,55		0,23			0,25			0,19	0,23		0,19	0,23	
	Low-alloyed steel		0,23	0,47		0,26	0,51		0,22			0,23			0,17	0,22		0,17	0,22
	High-alloyed steel and high-alloyed tool steel		0,22	0,44		0,24	0,48		0,20			0,22			0,16	0,20		0,16	0,20
M Stainless steel		0,18	0,35		0,19	0,39		0,16			0,18								
K Grey cast iron		0,28	0,55		0,30	0,61		0,26			0,28			0,20	0,26		0,20	0,26	
	Cast iron with spheroidal graphite		0,25	0,50		0,28	0,55		0,23			0,25			0,19	0,23		0,19	0,23
	Malleable cast iron		0,25	0,50		0,28	0,55		0,23			0,25			0,19	0,23		0,19	0,23
N Aluminum wrought alloys								0,20			0,21								
	Aluminum cast alloys								0,20			0,21							
	Copper and copper alloys (bronze/brass)								0,18			0,19							
S Heat-resistant alloys																			
	Titanium alloys																		
H Hardened steel																			
	Hard cast iron																		
	Hardened cast iron																		
X Non-metallic materials																			

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Recommended feed rate

Indexable milling – group1 (FMA07/11/12/17, FMP12/17, FMD02, EMP09/13)

Material group	Feed rate per cutting edge [mm]													
	FMD02			FMP12			FMP12			FMP17				
	HNEX09			WNHU06			WNHU08			SNGX12				
	Application													
	F	M	R	F	M	R	F	M	R	F	M	R		
P Unalloyed steel					0,23			0,25			0,23			
	Low-alloyed steel					0,22			0,23			0,22		
	High-alloyed steel and high-alloyed tool steel					0,20			0,22			0,20		
M Stainless steel					0,16			0,18			0,16			
K Grey cast iron		0,17	0,22	0,33		0,26			0,28			0,26		
	Cast iron with spheroidal graphite		0,15	0,20	0,30		0,23			0,25			0,23	
	Malleable cast iron		0,15	0,20	0,30		0,23			0,25			0,23	
N Aluminum wrought alloys											0,20			
	Aluminum cast alloys											0,20		
	Copper and copper alloys (bronze/brass)											0,18		
S Heat-resistant alloys														
	Titanium alloys													
H Hardened steel														
	Hard cast iron													
	Hardened cast iron													
X Non-metallic materials														

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Recommended feed rate

Indexable milling – group 2 (FMA01/02/03/04, FME01/02, EMP01/02/03/04/14)

Material group		Feed rate per cutting edge [mm]																	
		FMA01 FMA02			FMA03			FMA03			FMA04			FMA04			FMA04		
		SEET12			SEKN12			SEKN15			OFKT05			OFKR07			ODHT06		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel	0,15	0,20	0,25		0,18		0,20			0,20	0,25		0,20	0,25		0,20	0,25	
	Low-alloyed steel	0,14	0,19	0,23		0,17		0,19			0,19	0,23		0,19	0,23		0,19	0,23	
	High-alloyed steel and high-alloyed tool steel	0,13	0,18	0,22		0,16		0,18			0,18	0,22		0,18	0,22		0,18	0,22	
M	Stainless steel	0,11	0,14	0,18		0,13		0,14			0,14	0,18		0,14	0,18		0,14	0,18	
K	Grey cast iron	0,17	0,22	0,28		0,20		0,22			0,22	0,28		0,22	0,28		0,22	0,28	
	Cast iron with spheroidal graphite	0,15	0,20	0,25		0,18		0,20			0,20	0,25		0,20	0,25		0,20	0,25	
	Malleable cast iron	0,15	0,20	0,25		0,18		0,20			0,20	0,25		0,20	0,25		0,20	0,25	
N	Aluminium wrought alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
	Aluminum cast alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
	Copper and copper alloys (bronze/brass)	0,11	0,15	0,19							0,15	0,19		0,15	0,19		0,15	0,19	
S	Heat-resistant alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
	Titanium alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Indexable milling – group 2 (FMA01/02/03/04, FME01/02, EMP01/02/03/04/14)

Material group		Feed rate per cutting edge [mm]																	
		EMP14																	
		VPGT22																	
		Application																	
		F	M	R															
P	Unalloyed steel																		
	Low-alloyed steel																		
	High-alloyed steel and high-alloyed tool steel																		
M	Stainless steel																		
K	Grey cast iron																		
	Cast iron with spheroidal graphite																		
	Malleable cast iron																		
N	Aluminium wrought alloys	0,05	0,2	0,3															
	Aluminum cast alloys	0,05	0,2	0,3															
	Copper and copper alloys (bronze/brass)	0,05	0,2	0,3															
S	Heat-resistant alloys																		
	Titanium alloys																		
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Recommended feed rate

Indexable milling – group 3 (FMR01/02/03/04/11) Face milling

Material group		Feed rate per cutting edge [mm]																	
		FMR01			FMR01			FMR02			FMR02			FMR02			FMR03		
		RCKT10			RC*12			RC*12			RCKT16			RCKT20			RDKW07		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
	Low-alloyed steel		0,19	0,23		0,19	0,23		0,19	0,23		0,21	0,27		0,25	0,31		0,16	
	High-alloyed steel and high-alloyed tool steel		0,18	0,22		0,18	0,22		0,18	0,22		0,20	0,25		0,23	0,29		0,15	
M	Stainless steel		0,14	0,18		0,14	0,18		0,14	0,18		0,16	0,20		0,19	0,23		0,12	
K	Grey cast iron		0,22	0,28		0,22	0,28		0,22	0,28		0,25	0,32		0,29	0,36		0,19	
	Cast iron with spheroidal graphite		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
	Malleable cast iron		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
N	Aluminum wrought alloys					0,17	0,21		0,17	0,21									
	Aluminum cast alloys					0,17	0,21		0,17	0,21									
	Copper and copper alloys (bronze/brass)					0,15	0,19		0,15	0,19									
S	Heat-resistant alloys																		
	Titanium alloys																		
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Indexable milling – group 3 (FMR01/02/03/04/11) Face milling

Material group		Feed rate per cutting edge [mm]																	
		FMR11			FMR11			FMR11											
		RP**10			RD**12			RP**12											
		Application																	
		F	M	R	F	M	R	F	M	R									
P	Unalloyed steel		0,20		0,15	0,20	0,25	0,15	0,20	0,25									
	Low-alloyed steel		0,19		0,14	0,19	0,23	0,14	0,19	0,23									
	High-alloyed steel and high-alloyed tool steel		0,18		0,13	0,18	0,22	0,13	0,18	0,22									
M	Stainless steel		0,14		0,11	0,14	0,18	0,11	0,14	0,18									
K	Grey cast iron		0,22		0,17	0,22	0,28	0,17	0,22	0,28									
	Cast iron with spheroidal graphite		0,20		0,15	0,20	0,25	0,15	0,20	0,25									
	Malleable cast iron		0,20		0,15	0,20	0,25	0,15	0,20	0,25									
N	Aluminum wrought alloys		0,17		0,13	0,17	0,21	0,13	0,17	0,21									
	Aluminum cast alloys		0,17		0,13	0,17	0,21	0,13	0,17	0,21									
	Copper and copper alloys (bronze/brass)		0,15		0,11	0,15	0,19	0,11	0,15	0,19									
S	Heat-resistant alloys																		
	Titanium alloys																		
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Recommended feed rate

Indexable milling – group 3 (FMR01/02/03/04/11) Circular milling

Material group		Feed rate per cutting edge [mm]							
		FMR01	FMR01	FMR02	FMR02	FMR02	FMR03		
		RCKT10	RC*12	RC*12	RCKT16	RCKT20	RDKW07		
		Tool diameter [mm]							
		25-32	40-50	50-100	63-125	160-200	80-125	160-250	15
P	Unalloyed steel	0,12	0,16	0,18	0,24	0,32	0,26	0,35	0,07
	Low-alloyed steel	0,11	0,14	0,16	0,21	0,28	0,23	0,31	0,06
	High-alloyed steel and high-alloyed tool steel	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
M	Stainless steel	0,07	0,09	0,10	0,14	0,18	0,15	0,20	0,04
K	Grey cast iron	0,11	0,14	0,16	0,22	0,29	0,23	0,32	0,06
	Cast iron with spheroidal graphite	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
	Malleable cast iron	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
N	Aluminium wrought alloys								
	Aluminum cast alloys								
	Copper and copper alloys (bronze/brass)								
S	Heat-resistant alloys								
	Titanium alloys								
H	Hardened steel								
	Hard cast iron								
	Hardened cast iron								
X	Non-metallic materials								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Indexable milling – group 3 (FMR01/02/03/04/11) Circular milling

Material group		Feed rate per cutting edge [mm]					
		FMR11	FMR11	FMR11			
		RP**10	RD**12	RP**12			
		Tool diameter [mm]					
		32-40	40-80	40-80			
P	Unalloyed steel	0,12	0,17	0,17			
	Low-alloyed steel	0,11	0,15	0,15			
	High-alloyed steel and high-alloyed tool steel	0,10	0,14	0,14			
M	Stainless steel	0,07	0,10	0,10			
K	Grey cast iron	0,11	0,15	0,15			
	Cast iron with spheroidal graphite	0,10	0,14	0,14			
	Malleable cast iron	0,10	0,14	0,14			
N	Aluminium wrought alloys	0,10	0,11	0,11			
	Aluminum cast alloys	0,10	0,11	0,11			
	Copper and copper alloys (bronze/brass)	0,10	0,11	0,11			
S	Heat-resistant alloys						
	Titanium alloys						
H	Hardened steel						
	Hard cast iron						
	Hardened cast iron						
X	Non-metallic materials						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.



EMP14
Aluminium milling system

Solid carbide milling

System code – JIS

B66

VPM series

B67–B73

Recommended cutting data

B74–B78

B

A

Turning

B

Milling

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GM – 2 E L P – D12 R0.5 – M08

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Technical Information

E

Index

Application	
Code	Description
GR	General roughing
GM	Semi-finishing
GF	Finishing
PM	High-performance machining
EPM	«Ecoline» – High-performance machining
VPM	Full-slot applications
HM	Hard machining
NM	General machining of non-ferrous metals
AL	General machining of Al and Al alloys
ALP	High-performance machining of Al and Al alloys
ALG	General machining of Al and Al alloys
UM	HSC/HPC machining
UMC	HSC machining with chip splitter geometry
VSM	General machining of heat-resistant alloys
TM	General machining of heat-resistant alloys

Number of teeth

1

2

Cutting edge type	
Code	Description
E	Square shoulder mill with protective chamfer
F	Square shoulder mill with sharp cutting edges
B	Ball nose cutter
R	Torus mill
W	Ripper
H	High-feed mill

Cutting edge length	
Code	Description
L	Long
X	Extra long
F	Short

Type	
Code	Description
S	Mini diameter
P	Ground neck
C	Conical neck

3

4

5

Diameter [mm]	
Code	Description
D3.0	3,0
D20.0	20,0
...	

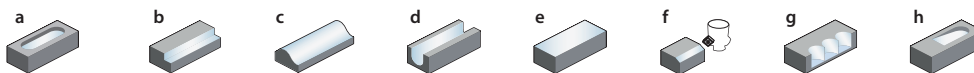
Radius [mm]	
Code	Description
R0.5	0,5
R3.0	3,0
...	

Features	
Code	Description
G	Spiral angle 30°
M	Neck length [mm]
S	Thin shank
AIR	For aerospace industry

6

7

8



a Groove milling b Square shoulder milling c Profile milling d Slot milling e Face milling f Chamfer milling g Plunge milling
h Circular milling/Ramping

VPM series

High-speed full-slot milling

Now also available as a torus milling cutter/with Weldon clamping surface New

YOUR BENEFITS

- Well suited for **full-slot milling** and applications involving **large contact widths**
- **Short machining times** thanks to high stock removal rate
- Low-vibration machining even under extreme conditions
- Optionally available as a QCH (**Quick-Change Head**) replaceable head milling cutter with Q interface for added flexibility in your applications

Excellent ramping properties
thanks to large side clearance angle

New geometry for
increased chip volume
with no loss of stability

Grade KMG406
AlCrN PVD coating well
suited for steel and cast
iron

Now optionally available
with Weldon clamping
surface



Fig.: VPM-4E-D12.0 KMG406

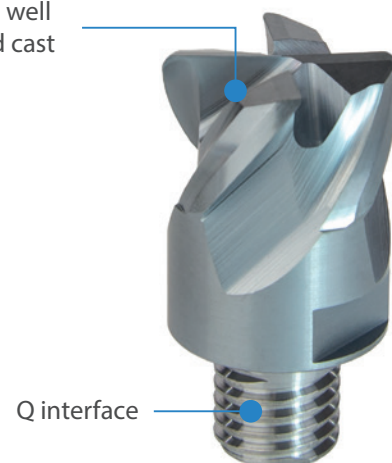
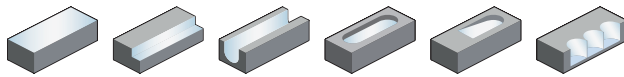


Fig.: Q14-VPM-4E-D25.0 KMG406

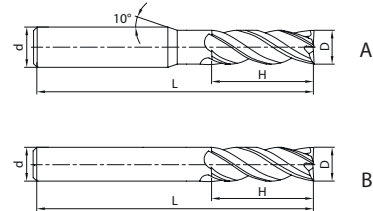
A

End mill High-performance machining

VPM-4E



- Factory standard
- Centre cutting
- Helix angle 36°/38°



Turning

B

Milling

Article	*	Dimensions [mm]				Teeth	Geometry	Grade
		D	d (h6)	H	L			KMG406
VPM-4E-D3.0		3	6	8	50	4	A	●
VPM-4E-D4.0		4	6	11	50	4	A	●
VPM-4E-D5.0		5	6	13	50	4	A	●
VPM-4E-D6.0		6	6	16	50	4	B	●
VPM-4E-D7.0		7	8	20	60	4	A	●
VPM-4E-D8.0		8	8	20	60	4	B	●
VPM-4E-D9.0		9	10	22	75	4	A	●
VPM-4E-D10.0		10	10	25	75	4	B	●
VPM-4E-D11.0		11	12	26	75	4	A	●
VPM-4E-D12.0		12	12	30	75	4	B	●
VPM-4E-D14.0		14	14	32	75	4	B	●
VPM-4E-D16.0		16	16	45	100	4	B	●
VPM-4E-D18.0		18	18	45	100	4	B	●
VPM-4E-D20.0		20	20	45	100	4	B	●

● Ex stock ○ On demand

* With internal cooling

C

Drilling

D

Technical Information

Application field

P	M	K	N	S	H
✓	✓	✓			✓

✓ Very suitable

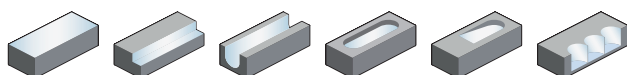
✓ Suitable

E

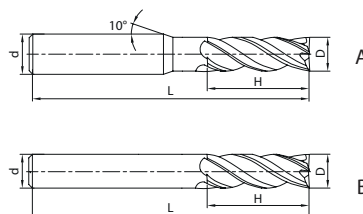
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End mill **High-performance machining**

VPM-4E-W



- Factory standard
- Centre cutting
- Helix angle 36°/38°



Article	*	Dimensions [mm]				Teeth	Geometry	Grade
		D	d (h6)	H	L			KMG406
VPM-4E-D5.0-W KMG406		5	6	13	50	4	A	○
VPM-4E-D6.0-W KMG406		6	6	16	50	4	B	●
VPM-4E-D7.0-W KMG406		7	8	20	60	4	A	○
VPM-4E-D8.0-W KMG406		8	8	20	60	4	B	●
VPM-4E-D9.0-W KMG406		9	10	22	75	4	A	○
VPM-4E-D10.0-W KMG406		10	10	25	75	4	B	●
VPM-4E-D11.0-W KMG406		11	12	26	75	4	A	○
VPM-4E-D12.0-W KMG406		12	12	30	75	4	B	●
VPM-4E-D14.0-W KMG406		14	14	32	75	4	B	●
VPM-4E-D16.0-W KMG406		16	16	45	100	4	B	●
VPM-4E-D18.0-W KMG406		18	18	45	100	4	B	●
VPM-4E-D20.0-W KMG406		20	20	45	100	4	B	●

● Ex stock ○ On demand

* With internal cooling

Application field

P	M	K	N	S	H
✓	✓	✓			✓

✓ Very suitable

✓ Suitable

A

Turning

B

Milling

C

Drilling

D

Technical Information

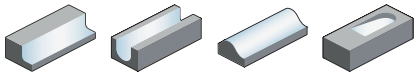
E

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A

End mill High-performance machining

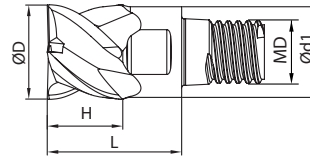
VPM-4E



- Centre cutting
- Helix angle 36°/38°

Turning

B



Milling

Article	*	Dimensions [mm]					Geometry	Grade
		D	d1	H	L	MD		KMG406
Q08-VPM-4E-D12.0		12	11,5	7	17	8	4	●
Q10-VPM-4E-D16.0		16	15,2	9	21,5	10	4	●
Q12-VPM-4E-D20.0		20	19	11	25,5	12	4	●
Q14-VPM-4E-D25.0		25	24	13,5	31,5	14	4	●

● Ex stock ○ On demand

* With internal cooling

C

Application field

P	M	K	N	S	H
✓	✓	✓			✓

✓ Very suitable

✓ Suitable

Drilling

D

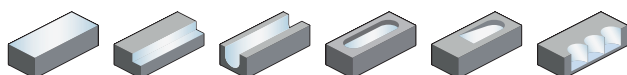
Technical Information

E

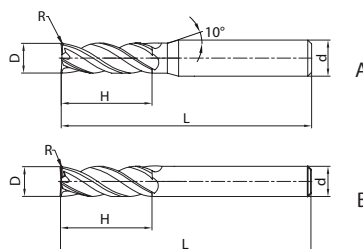
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Torus mill High-performance machining

VPM-4R



- Factory standard
- Centre cutting
- Helix angle 36°/38°



Article	*	Dimensions [mm]					Teeth	Geometry	Grade
		R	D	d (h6)	H	L			KMG406
VPM-4R-D3.0R0.2 KMG406		0,2	3	6	8	50	4	A	●
VPM-4R-D3.0R0.3 KMG406		0,3	3	6	8	50	4	A	○
VPM-4R-D3.0R0.5 KMG406		0,5	3	6	8	50	4	A	●
VPM-4R-D4.0R0.2 KMG406		0,2	4	6	10	50	4	A	●
VPM-4R-D4.0R0.3 KMG406		0,3	4	6	10	50	4	A	○
VPM-4R-D4.0R0.5 KMG406		0,5	4	6	10	50	4	A	●
VPM-4R-D5.0R0.3 KMG406		0,3	5	6	13	50	4	A	○
VPM-4R-D5.0R0.5 KMG406		0,5	5	6	13	50	4	A	●
VPM-4R-D5.0R1.0 KMG406		1	5	6	13	50	4	A	●
VPM-4R-D6.0R0.1 KMG406		0,1	6	6	16	50	4	B	○
VPM-4R-D6.0R0.2 KMG406		0,2	6	6	16	50	4	B	○
VPM-4R-D6.0R0.3 KMG406		0,3	6	6	16	50	4	B	○
VPM-4R-D6.0R0.5 KMG406		0,5	6	6	16	50	4	B	●
VPM-4R-D6.0R1.0 KMG406		1	6	6	16	50	4	B	●
VPM-4R-D6.0R1.4 KMG406		1,4	6	6	16	50	4	B	○
VPM-4R-D6.0R1.5 KMG406		1,5	6	6	16	50	4	B	○
VPM-4R-D8.0R0.3 KMG406		0,3	8	8	20	60	4	B	○
VPM-4R-D8.0R0.5 KMG406		0,5	8	8	20	60	4	B	●
VPM-4R-D8.0R1.0 KMG406		1	8	8	20	60	4	B	●
VPM-4R-D10.0R0.3 KMG406		0,3	10	10	25	75	4	B	○
VPM-4R-D10.0R0.5 KMG406		0,5	10	10	25	75	4	B	●
VPM-4R-D10.0R1.0 KMG406		1	10	10	25	75	4	B	●
VPM-4R-D10.0R1.5 KMG406		1,5	10	10	25	75	4	B	○
VPM-4R-D10.0R2.0 KMG406		2	10	10	25	75	4	B	●
VPM-4R-D12.0R0.3 KMG406		0,3	12	12	30	75	4	B	○
VPM-4R-D12.0R0.5 KMG406		0,5	12	12	30	75	4	B	○
VPM-4R-D12.0R1.0 KMG406		1	12	12	30	75	4	B	●
VPM-4R-D12.0R1.5 KMG406		1,5	12	12	30	75	4	B	○
VPM-4R-D12.0R2.0 KMG406		2	12	12	30	75	4	B	●
VPM-4R-D16.0R1.0 KMG406		1	16	16	45	100	4	B	○

● Ex stock ○ On demand

* With internal cooling

Application field					
P	M	K	N	S	H
✓	✓	✓			✓

✓ Very suitable

✓ Suitable

A

Turning

B

Milling

C

Drilling

D

Technical Information

E

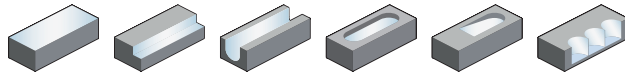
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A

Torus mill **High-performance machining**

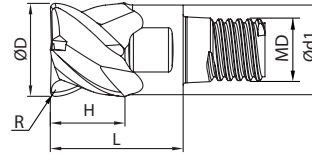
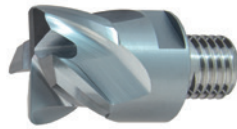
Turning

VPM-4R



- Centre cutting
- Helix angle 36°/38°

B



Milling

Article	*	Dimensions [mm]					MD	Teeth	Grade
		R	D	d (h6)	H	L			KMG406
Q08-VPM-4R-D12.0R0.3 KMG406		0,3	12	11,5	7	17	8	4	○
Q08-VPM-4R-D12.0R0.5 KMG406		0,5	12	11,5	7	17	8	4	●
Q08-VPM-4R-D12.0R1.5 KMG406		1,5	12	11,5	7	17	8	4	○
Q08-VPM-4R-D12.0R2.0 KMG406		2	12	11,5	7	17	8	4	●
Q10-VPM-4R-D16.0R0.5 KMG406		0,5	16	15,2	9	21,5	10	4	○
Q10-VPM-4R-D16.0R1.0 KMG406		1	16	15,2	9	21,5	10	4	●
Q10-VPM-4R-D16.0R1.5 KMG406		1,5	16	15,2	9	21,5	10	4	○
Q10-VPM-4R-D16.0R2.0 KMG406		2	16	15,2	9	21,5	10	4	●
Q10-VPM-4R-D16.0R3.0 KMG406		3	16	15,2	9	21,5	10	4	●
Q12-VPM-4R-D20.0R1.0 KMG406		1	20	19	11	25,5	12	4	●
Q12-VPM-4R-D20.0R1.5 KMG406		1,5	20	19	11	25,5	12	4	○
Q12-VPM-4R-D20.0R2.0 KMG406		2	20	19	11	25,5	12	4	●
Q12-VPM-4R-D20.0R3.0 KMG406		3	20	19	11	25,5	12	4	●
Q14-VPM-4R-D25.0R1.5 KMG406		1,5	25	24	13,5	31,5	14	4	○
Q14-VPM-4R-D25.0R2.0 KMG406		2	25	24	13,5	31,5	14	4	●
Q14-VPM-4R-D25.0R2.5 KMG406		2,5	25	24	13,5	31,5	14	4	○
Q14-VPM-4R-D25.0R3.0 KMG406		3	25	24	13,5	31,5	14	4	●
Q18-VPM-4R-D32.0R2.0 KMG406		2	32	30	17	36	18	4	○
Q18-VPM-4R-D32.0R2.5 KMG406		2,5	32	30	17	36	18	4	○
Q18-VPM-4R-D32.0R4.0 KMG406		4	32	30	17	36	18	4	○

● Ex stock ○ On demand

* With internal cooling

C

Drilling

D

Technical Information

Application field

P	M	K	N	S	H
✓	✓	✓			✓

✓ Very suitable

✓ Suitable

E

Index



VPM series

High-speed full-slot milling

End mill – PM series, VPM series

Material group	Composition / structure / heat treatment	Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]									
				PM-2R PM-4R					PM-4RL				
				Slot milling		Shoulder milling			Slot milling		Shoulder milling		
				\varnothing [mm]	$a_{p,max}$	\varnothing [mm]	$a_{e,max}$	f [mm]	\varnothing [mm]	$a_{p,max}$	\varnothing [mm]	$a_{e,max}$	f [mm]
				$0 < x < 3$	$0,15 \times D$	$0 < x \leq 20$	$0,15 \times D$	$0 < x < 3$	$0,15 \times D$	$0 < x \leq 20$	$0,15 \times D$		
P Unalloyed steel	approx. 0,15 % C	annealed	125	1	165	220	300	1	150	200	265	1	
	approx. 0,45 % C	annealed	190	2	160	210	285	1	145	190	255	1	
	approx. 0,45 % C	tempered	250	3	120	155	210	1	105	140	190	1	
	approx. 0,75 % C	annealed	270	4	100	135	180	1	90	120	160	1	
	approx. 0,75 % C	tempered	300	5	95	125	165	1	85	110	150	1	
	Low-alloyed steel	annealed	180	6	125	165	225	1	115	150	200	1	
		tempered	275	7	100	135	180	1	90	120	160	1	
		tempered	300	8	95	125	165	1	85	110	150	1	
		tempered	350	9	90	115	160	1	80	105	140	1	
	High-alloyed steel and high-alloyed tool steel	annealed	200	10	120	155	210	1	105	140	190	1	
hardened and tempered		325	11	90	120	160	1	80	110	145	1		
M Stainless steel	ferritic/martensitic	annealed	200	12	55	75	100	1	50	65	85	1	
	martensitic	tempered	240	13	50	65	85	1	45	60	75	1	
	austenitic	quench hardened	180	14	60	75	105	1	55	70	95	1	
	austenitic-ferritic		230	15	50	65	85	1	45	60	75	1	
K Grey cast iron	perlitic/ferritic		180	16	125	165	220	1	110	150	195	1	
	perlitic (martensitic)		260	17	100	135	180	1	90	120	160	1	
	Cast iron with spheroidal graphite	ferritic		160	18	150	200	270	1	135	180	240	1
		perlitic		250	19	120	155	210	1	105	140	190	1
	Malleable cast iron	ferritic		130	20	165	220	300	1	150	200	265	1
perlitic			230	21	135	180	240	1	120	160	215	1	
N Aluminium wrought alloys	cannot be hardened		60	22									
	hardenable	hardened	100	23									
	Cast aluminium alloys	$\leq 12\% \text{ Si}$, cannot be hardened		75	24								
		$\leq 12\% \text{ Si}$, hardenable	hardened	90	25								
		$> 12\% \text{ Si}$, cannot be hardened		130	26								
Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27									
	CuZn, CuSnZn		90	28									
	CuSn, Pb-free copper, electrolytic copper		100	29									
S Heat-resistant alloys	Fe-based alloys	annealed	200	30									
		hardened	280	31									
	Ni or Co bass	annealed	250	32									
		hardened	350	33									
		cast	320	34									
	Titanium alloys	pure titanium	R_m 400	35									
α and β alloys		hardened	R_m 1050	36									
H Hardened steel	Hardened steel	hardened and tempered	55 HRC	37	85	110	145	1	70	95	125	1	
		hardened and tempered	60 HRC	38	-	-	-	-	-	-	-	-	
	Hard cast iron	cast	400	39	115	145	190	1	95	125	165	1	
Hardened cast iron	hardened and tempered	55 HRC	40	-	-	-	-	-	-	-	-		
X Non-metallic materials	Thermoplasts			41									
	Thermosetting plastics			42									
	Plastic, glass-fibre reinforced GFRP			43									
	Plastic, carbon fibre reinforced CFRP			44									
	Graphite			45									
	Wood			46									

Note: The given cutting values are guide values, which were determined under ideal conditions. The values have to be adapted in individual cases. Feed rate recommendations on page B76.

End mill – QCH series

Material group	Composition / structure / heat treatment	Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]									
				Q**-PM-4E Q**-PM-4R Q**-VPM-4E Q**-VPM-4R					Q**PM-2B Q**PM-4B				
				Slot milling		Shoulder milling							
				\emptyset [mm]	$a_{p\max}$	\emptyset [mm]	$a_{e\max}$						
				$0 < x < 3$	$0,3 \times D$	$0 < x < 20$	$0,15 \times D$						
P Unalloyed steel	approx. 0,15 % C	annealed	125	1	165	220	300	1		270	300	5	
	approx. 0,45 % C	annealed	190	2	160	210	285	1		260	285	5	
	approx. 0,45 % C	tempered	250	3	120	155	210	1		190	210	5	
	approx. 0,75 % C	annealed	270	4	100	135	180	1		165	180	5	
	approx. 0,75 % C	tempered	300	5	95	125	165	1		150	165	5	
	Low-alloyed steel		annealed	180	6	125	165	225	1		205	225	5
			tempered	275	7	100	135	180	1		165	180	5
			tempered	300	8	95	125	165	1		150	165	5
			tempered	350	9	90	115	160	1		145	160	5
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	120	155	210	1		190	210	5
		hardened and tempered	325	11	90	120	160	1		145	160	5	
M Stainless steel	ferritic/martensitic	annealed	200	12	55	75	100	1		90	100	5	
	martensitic	tempered	240	13	50	65	85	1		80	85	5	
	austenitic	quench hardened	180	14	60	75	105	1		95	105	5	
	austenitic-ferritic		230	15	50	65	85	1		80	85	5	
K Grey cast iron	perlitic/ferritic		180	16	125	165	220	1		200	220	5	
	perlitic (martensitic)		260	17	100	135	180	1		165	180	5	
	Cast iron with spheroidal graphite	ferritic		160	18	150	200	270	1		245	270	5
		perlitic		250	19	120	155	210	1		190	210	5
	Malleable cast iron	ferritic		130	20	165	220	300	1		270	300	5
perlitic			230	21	135	180	240	1		220	240	5	
N Aluminium wrought alloys	cannot be hardened		60	22									
	hardenable	hardened	100	23									
	Cast aluminium alloys	$\leq 12\% \text{ Si}$, cannot be hardened		75	24								
		$\leq 12\% \text{ Si}$, hardenable	hardened	90	25								
		$> 12\% \text{ Si}$, cannot be hardened		130	26								
Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27									
	CuZn, CuSnZn		90	28									
	CuSn, Pb-free copper, electrolytic copper		100	29									
S Heat-resistant alloys	Fe-based alloys	annealed	200	30									
		hardened	280	31									
	Ni or Co bass	annealed	250	32									
		hardened	350	33									
		cast	320	34									
	Titanium alloys	pure titanium	R_m 400	35									
α and β alloys		hardened	R_m 1050	36									
H Hardened steel		hardened and tempered	55 HRC	37	80	105	140	1					
		hardened and tempered	60 HRC	38	-	-	-	-					
	Hard cast iron	cast	400	39	105	140	185	1					
	Hardened cast iron	hardened and tempered	55 HRC	40	-	-	-	-					
X Non-metallic materials	Thermoplasts			41									
	Thermosetting plastics			42									
	Plastic, glass-fibre reinforced GFRP			43									
	Plastic, carbon fibre reinforced CFRP			44									
	Graphite			45									
	Wood			46									

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B76.

Recommended feed rate

Solid carbide milling group 1 – Square shoulder mills PM series, QCH series, EPM series

	a _e / D	Feed rate per cutting edge (f _z) [mm]															
		Ø0,5	Ø0,8	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20	
P	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,05	0,07	0,08	0,08	0,09	0,09	0,10	
	1/2	0,01	0,03	0,03	0,03	0,03	0,03	0,04	0,04	0,06	0,09	0,10	0,10	0,12	0,12	0,13	
	1/10	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,20	
M	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,04	0,05	0,06	0,06	0,07	0,07	0,08	
	1/2	0,01	0,02	0,02	0,02	0,02	0,02	0,04	0,04	0,05	0,07	0,08	0,08	0,10	0,10	0,11	
	1/10	0,02	0,04	0,04	0,04	0,04	0,04	0,05	0,05	0,07	0,11	0,13	0,13	0,15	0,15	0,16	
K	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,05	0,07	0,08	0,08	0,09	0,09	0,10	
	1/2	0,01	0,03	0,03	0,03	0,03	0,03	0,04	0,04	0,06	0,09	0,10	0,10	0,12	0,12	0,13	
	1/10	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,20	
H	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,04	0,05	0,06	0,06	0,07	0,07	0,08	
	1/2	0,01	0,02	0,02	0,02	0,02	0,02	0,04	0,04	0,05	0,07	0,08	0,08	0,10	0,10	0,11	
	1/10	0,02	0,04	0,04	0,04	0,04	0,04	0,05	0,05	0,07	0,11	0,13	0,13	0,15	0,15	0,16	

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Solid carbide milling group 9 – Square shoulder mills UM/UMC series, VPM series HSC/HPC

	a _e / D	Feed rate per cutting edge (f _z) [mm]									
		Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20
P	1/1	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08
	1/2	0,08	0,08	0,08	0,09	0,09	0,09	0,09	0,10	0,10	0,10
	1/10	0,14	0,14	0,16	0,18	0,22	0,25	0,27	0,3	0,32	0,36
M	1/1	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,06	0,06	0,06
	1/2	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08
	1/10	0,10	0,10	0,10	0,12	0,12	0,14	0,16	0,16	0,18	0,18
K	1/1	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08
	1/2	0,08	0,08	0,08	0,09	0,09	0,09	0,09	0,10	0,10	0,10
	1/10	0,14	0,14	0,16	0,18	0,22	0,25	0,27	0,3	0,32	0,36
H	1/1	0,045	0,045	0,045	0,053	0,053	0,053	0,053	0,06	0,06	0,06
	1/2	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08
	1/10	0,10	0,10	0,10	0,12	0,12	0,14	0,16	0,16	0,18	0,18

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

A

Turning

B

Milling

C

Drilling

D

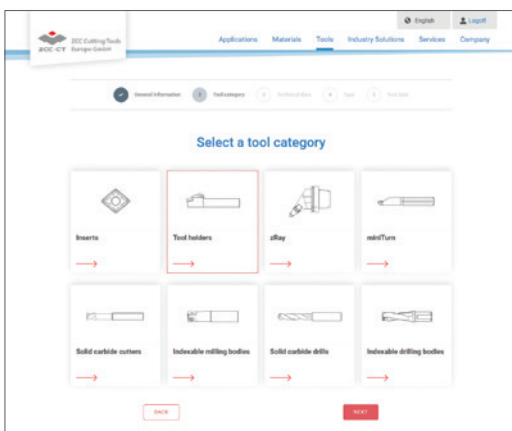
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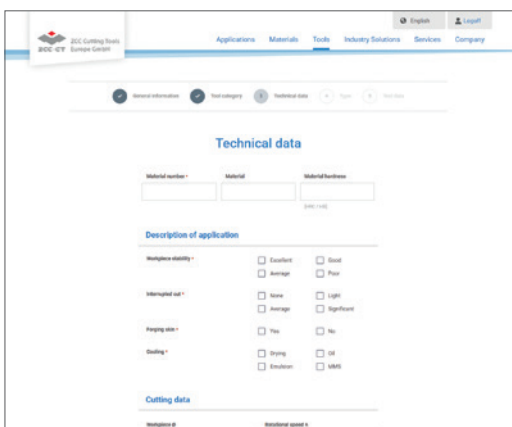
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