Round Tool Materials

2024 EN

Premium line

Photo: Lake Plansee, Reutte region

CERATIZIT GROUP

CERATIZIT is a high-technology engineering group specialised in cutting tools and hard material solutions.

Tooling a Sustainable Future

ceratizit.com

The cover picture of this new catalogue is very different from the previous one: it shows Lake Plansee, which is only a few kilometres from CERATIZIT Austria GmbH. In this beautiful part of Austria, we research, develop and produce for you – in the best possible quality. #madeinReutte. It is no coincidence that we are located there: in 1921, Lake Plansee was the main reason that the founder, Paul Schwarzkopf, established the company in Breitenwang near Reutte. In fact, the hydroelectric power plant there ensured the complete power supply at that time.

Lake Plansee thus lent its name to the Plansee Group, of which the CERATIZIT Group is part as well. At the same time, Lake Plansee is a symbol of the company's more than 100-year history and its production which has been sustainable from the beginning.

We would like to thank Stefan Gruber (employee of PLANSEE/ CERATIZIT) for the beautiful picture.

CERATIZIT – Tooling a Sustainable Future

If you want to keep up with trends and innovations, you need a partner you can rely on. We at CERATIZIT offer you comprehensive knowledge of the industry, decades of expertise and can thus support you with valuable advice.

In addition, sustainability is at the top of our agenda. We therefore make every effort to achieve even ambitious goals: we strive to be a pioneer in terms of sustainability. Innovative developments such as our sustainable CT-GS20Y carbide grade provide you, as our customer, with the benefit of a lower CO_2 footprint.

Premium carbide grades, the basis of high-performance cutting tools

Depending on their specific requirements, tool manufacturers can choose from three different product lines. The Premium Line offers the largest selection of grades and finishes for high-performance tools in every application area.

Our Premium Line line products are exclusively manufactured using carbide grades which are produced at our company site in Reutte, Austria. You can choose from 13 standard grades, ranging from ultra-fine to submicron and fine grain, as well as cermet grades. With over 1,400 stock products in 25 different variants, we offer you the largest stock range worldwide for manufacturers of solid carbide tools. Of course, we can also supply you with individual near net shape preforms and semi-finished tools based on your drawings, with timely deliveries guaranteed.

Our latest contribution to a CO_2-reduced future is our CT-GS20Y grade. This carbide grade consists of more than 99% recycled carbide offering maximum performance. Thanks to CT-GS20Y, we are able to guarantee better price stability and reduced supply risks.

CERATIZIT Group

For over **100 years**, CERATIZIT has been a pioneer developing exceptional hard material products for cutting tools and wear protection.

The privately owned company, based in Mamer, Luxembourg, develops and manufactures highly specialised carbide cutting tools, inserts and rods made of hard materials as well as wear parts.

The CERATIZIT Group is the **global market leader** in several application segments for wear parts and rods and successfully develops new carbide, cermet and ceramic grades, for example, in wood, metal and stone working.

Facts & figures

1 headquarters
Mamer, **Luxembourg**

30 **production sites**

7 000 **employees**

80 **countries in which we are active**

1 00 000 **different products**

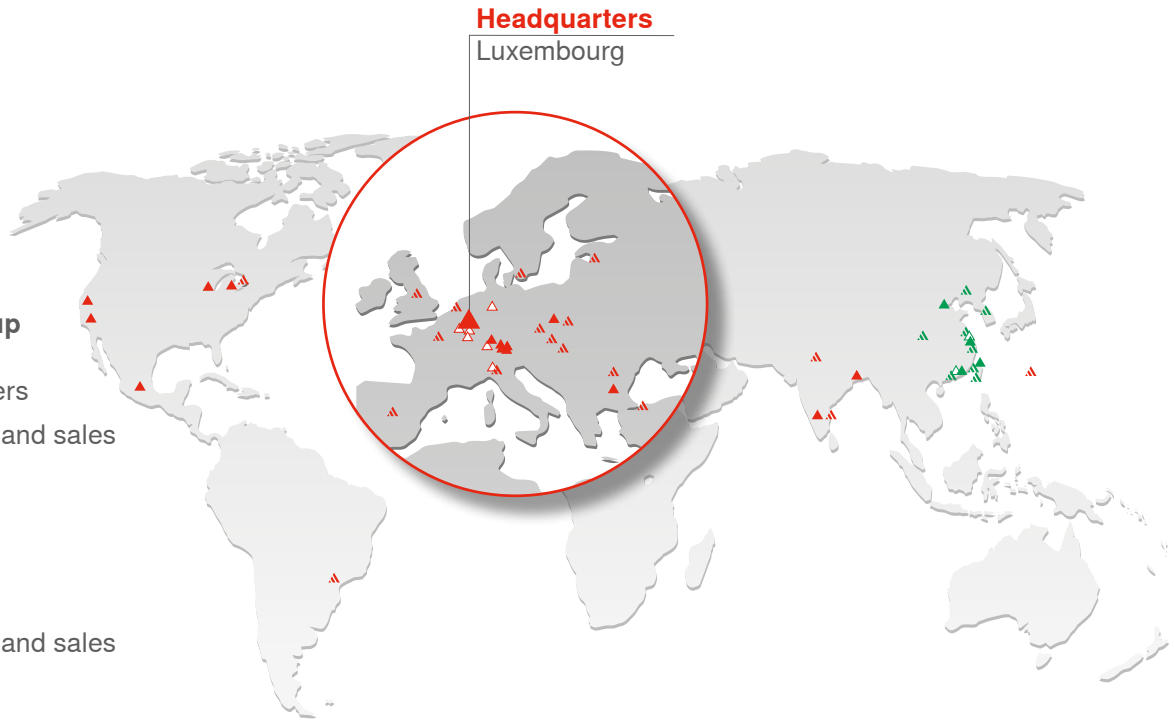
1 000 **patents and utility models**

2 00 **employees in R&D**

30 % of products **developed in the last 5 years**

25 **innovation awards**

Operating globally for you



CERATIZIT Group

- Headquarters
- Production and sales
- Production
- Sales

CB-CERATIZIT

- Production and sales
- Production
- Sales

Production site

The CERATIZIT centre of excellence for cutting tool products, rods and preforms is located at the Breitenwang/Reutte site in Austria. CERATIZIT Austria GmbH is certified to ISO 9001. The company currently has around 850 employees and is thus the second-largest site of the CERATIZIT Group.
From powder preparation to the production of rods and preforms to the recycling of carbide, all production processes are located in Reutte. The CERATIZIT Group has expanded the successful production site and its production space in the years 2013, 2017 and 2018 by a total of more than 10,500 square metres.
A new dimension has been reached with the extension of the production halls in Kreckelmoos. The entire additional production space amounts to around 18,000 square metres, 5,000 square metres of which are exclusively dedicated to rod finishing.

Sustainability is not a goal, it‘s a mission.

Together for Sustainability

Facing change

Leader in terms of sustainability by 2025

Based on the 17 UN "Sustainable Development Goals", we have defined the four most important areas for the Plansee Group and CERATIZIT as part of a top-down and bottom-up process. In the first step we will devote a greater focus to those aspects that have the greatest impact: climate neutrality and the circular economy.

Mission #1:
Climate neutral by 2025

- Greater focus on recycling and process optimisation to achieve carbon neutrality by 2025.
- By 2030: combined reduction by 60%
- By 2040: net zero, reduction of emissions by 75%

Mission #2:
Minimise the use of virgin raw materials

- Reduce mining of virgin raw materials
- Increase the raw materials remaining in the carbide production chain to over 95% by 2030

Read more about our sustainability approach on our website.
www.ceratizit.com/int/en/sustainability

Recycled carbide

Tungsten carbide contains cobalt (Co) and tungsten (W), which are in great demand. Extracting these two elements from ore is very costly and energy intensive. This makes it more important to recover secondary raw materials in the form of recycled carbide cutting tools throughout the product life cycle. To reduce the extraction of new raw materials, we have set ourselves the goal of increasing the share of raw materials remaining in the carbide production chain to over 95% by 2030 (based on the scrap recycling share of sintered products).

Green hydrogen works

Reducing CO_2 emissions

Carbide production requires large quantities of hydrogen. Through future innovative investments, we plan to halve the current CO_2 emissions at the Reutte production site by 2025. Additionally, we aim to supply the site completely with carbon-free hydrogen by 2030.

We use energy from sustainable sources

Solar power and renewable energy

Many of our locations are already equipped with high-performance photovoltaic systems to cover a large part of our energy requirements. Of course, we obtain the additional energy we need from renewable sources.

BEST OF INDUSTRY AWARD

Best of Industry Award 2022 for our sustainable grade CT-GS20Y

High-performance premium carbide with reduced CO_2 footprint

upGRADE
Recycled carbide grades

Sustainability combined with maximum quality

In CERATIZIT's corporate approach sustainability is an established pillar: CT-GS20Y represents the first cemented carbide on the market which combines the performance of a premium carbide grade with a deliberately sustainable production process.

Over 99% of the new carbide grade CT-GS20Y – our upGRADE – consists of high-quality secondary raw materials – that is to say, recycled carbide recovered from decommissioned milling cutters, drills and solid carbide tools. In addition, we guarantee CO_2-reduced manufacturing by using low-emission production rocesses and energy sources as well as short transport routes throughout the entire process chain. The result is an unprecedented low CO_2 footprint for a premium carbide grade with maximum performance.

By using this carbide for your cutting tools, you, as a CERATIZIT customer, can significantly reduce your products' carbon footprint. As we use recycled carbide, you will also benefit from more price stability and reliability of supply – without losing even a micron of performance or repeatability.

> Do you want to contribute to the closed-loop recycling process without compromising on quality or performance?

> Do you want to quantify and reduce the CO_2 footprint of your products?

> Do you want more price stability and fewer political and logistical risks?

Our 'upGRADE' carbide grade CT-GS20Y offers you the perfect solution!

Our CT-GS20Y

- Consists of over 99% high-quality secondary raw materials
- Thanks to the secondary raw materials in combination with low-emission production processes, we reach an unprecedented low CO_2 footprint.
- By using our upGRADE, you can significantly reduce your cutting tools' carbon footprint.
- You will benefit from more price stability and higher reliability of supply through recycled carbide.

Product Carbon Footprint

Similar to other evaluation systems, the carbon footprint of a product should be identifiable and comparable at a glance.

We have adopted the alphabetic PCF classification (Product Carbon Footprint) in every product data sheet or quote. Since September 2023 the PCF rating for the assessed products has been visible to all customers.

CERATIZIT GROUP

Product Carbon Footprint classification

in kg CO_2e/kg product

A	0-5
B	5-15
C	15-25
D	25-35
E	35-50
F	>50

Environmentally friendly, sustainable and cost-effective

For us, recycling means the responsible handling of resources. To reduce the depletion of scarce primary raw materials, we are continually increasing the proportion of recycled carbide in our products. Currently, we are at around 83%, but we want to exceed 95% by 2030. That also means that we are continuing to develop our recycling partnerships with you, our customers. New customers, collection of larger quantities of hard scrap, soft scrap and other metals are handled by our cooperation partner Stadler Metalle GmbH & Co. KG. Stadler Metalle is an expert in the recycling and sales of secondary raw materials. With a network of worldwide partners and its own fleet of vehicles, the company can respond flexibly and quickly to your requirements.

Become part of our sustainable material cycle!

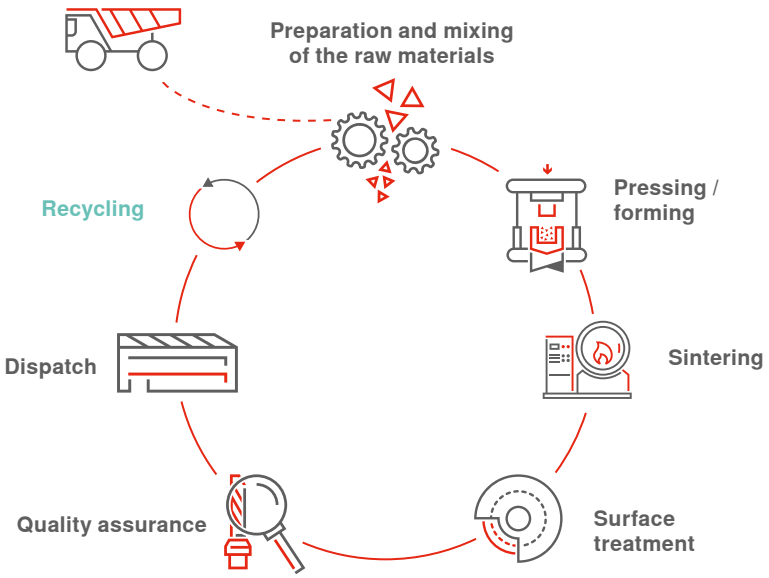
It couldn't be simpler – we organise every step of the process for you: we buy your worn carbide tools and scrap based on the current market price and provide you with quantity-specific containers and transport solutions free of charge.
Our optimised recycling processes guarantee increased output rates of the secondary raw materials.

METALLE · Handel & Aufbereitung
STADLER
CERATIZIT GROUP

The CERATIZIT Group manages the entire production process from the powder to recycling

Becoming more flexible and resilient in recent years and making sustainability a focus of our strategy has already proven to be an effective decision.
As a company, we have emerged stronger from the international crises. We are better prepared than ever to support our customers in the best possible way, even under difficult conditions.

We are committed to the highest standards of ethical business conduct and expect the same from our suppliers. For this reason, we have established a code of conduct for all our suppliers and their subcontractors.



Responsible packaging

Packaging should also contribute to a low CO_2 footprint. We have therefore developed an innovative packaging system, which is ideal for heavy carbide rods in terms of product safety and handling.
Environmentally friendly cardboard is the optimum solution for product safety and can be recycled without any problems.

What about availability? Better every day.

Do you need standard products on demand? Then we have good news for you, as most of them are available from stock. Thanks to our new state-of-the-art logistics centre in Kempten, orders are processed very fast, all over the world.
Ordering is particularly easy thanks to the straightforward E-Techstore.

The online shop for your cemented carbide products around the clock

The benefits for you:

- ▲ Worldwide availability check in real time
- ▲ Track and trace your orders and shipments
- ▲ Immediate order confirmation
- ▲ Complete product information: product and technical details (including CAD data)
- ▲ Full document history: invoices, history of both online and offline orders etc.
- ▲ Order a standard item or configure your tailormade solution

E-TECHSTORE

The new CERATIZIT logistics centre is the most technologically advanced and modern in the industry worldwide

Sustainability is also a relevant issue in logistics: our logistics centre is energy-efficient to the highest standards, and we cover almost all our energy needs with solar energy.
We are continuously working on environmentally friendly solutions, for example, when it comes to packaging. Our partner transport companies are committed to optimising their processes and systems sustainably. Together we are striving to achieve an environmentally friendly inventory management and resource-efficient logistics processes.

Cemented carbide – a composite material with valuable properties

Cemented carbides are composite materials consisting of a hard component and a comparatively soft binder metal, such as cobalt. The application range of carbide is primarily determined by hardness, transverse rupture strength and fracture toughness. Important parameters for the optimisation of the characteristics are the cobalt content and the grain size of the hard material phase.

The tungsten carbide grains have an average size of less than 0.2 nanometres to several micrometres (µm). The cobalt fills the gaps between the carbide grains. On the one hand, when extremely high toughness is required, the cobalt content can amount up to 30%. On the other, for maximum wear resistance, the cobalt content is reduced, and the grain size decreased to the nano-crystalline range (< 200 Nm).

CERATIZIT produces far more than 100 different carbide grades particularly for wear parts and cutting tools, thus offering a customised solution for every application.

How cemented carbide is produced

CERATIZIT has produced cemented carbide since 1929. Last but not least, thanks to long-standing experience CERATIZIT handles the entire process chain, from the raw material to the dispatching of the finished products to customers. The production process of powder-metallurgical products basically involves the four steps of powder preparation, forming, sintering and finishing.

Tungsten carbide production

The APT (ammonium para-tungstate) is calcined into tungsten oxide under high temperature. Subsequently the oxide is reduced to tungsten metal in a hydrogen atmosphere. The metal powder is then mixed with carbon and carburised under inert atmosphere at high temperatures. The production parameters are decisive for the WC grain size in the sintered carbide.

Powder preparation

The tungsten carbide is intensely mixed with the binder metal cobalt, nickel or iron, various grain growth inhibitors and special alloys as well as materials, which promote compaction, by wet grinding so that a homogeneous suspension is created. Afterwards, the suspension is dried in a spray tower to produce a granulate with good flow characteristics. This granulate represents the basis for all forming processes.

APT (ammonium para-tungstate)

Yellow tungsten oxide

Blue tungsten oxide

Forming cemented carbide

In the forming process the granulate is inserted into moulds to be pressed into a definite shape, using a wide range of different pressing methods. The resulting workpieces sometimes have to be finished mechanically.

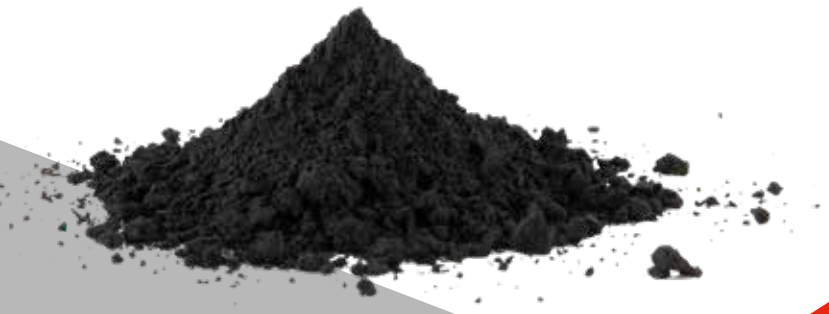
1 Carbide rods are most commonly produced by extrusion pressing. For this process the carbide powder is plasticised by adding organic compounds (e.g. paraffin). This makes it possible for the mixture to be forced through appropriately designed cemented carbide nozzles. (After the forming process is complete, the added plasticiser is removed by thermal treatment.)

2 In order to produce preforms, pre-sintered compacts (green compacts) are machined mechanically before the sintering process (turning, milling, drilling). This machining process of the compacts, which are characterised by a strength similar to chalk, is exclusively carried out with diamond tools on conventional machines.

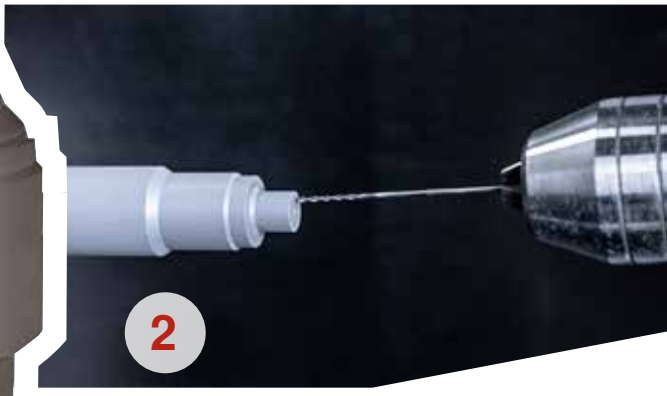
3 The sintering process converts the blank into a homogeneous and dense cemented carbide with a high level of hardness. The material is sintered at temperatures between 1,300 and 1,500°C (liquid phase sintering) and sometimes also at high pressure (up to 100 bar).

4 **5** During the sintering process the blanks shrink, their dimensions being reduced between 20 and 25%, depending on the grain size and cobalt content.

6 **7** In order to achieve the final requirements of surface finish, tolerances, etc., carbide parts can undergo a series of finishing processes (e.g. grinding, polishing, spark erosion and coating). The most important grinding procedure for carbide rods is centreless grinding. When producing tool blanks, minimum diameter tolerances and excellent surface quality represent an optimal quality characteristic.



Tungsten carbide



1 Extrusion pressing

2 Mechanical machining of presintered compacts

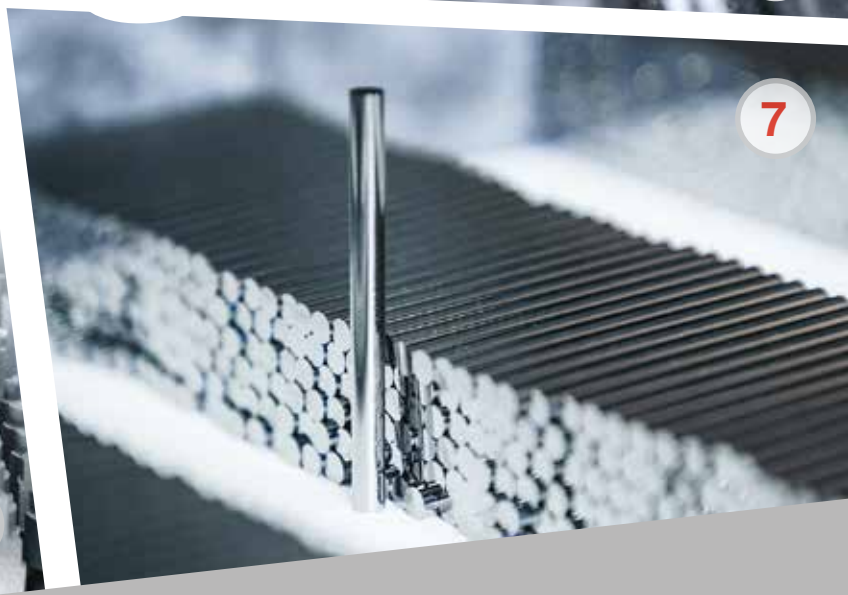
3 Sintering process

4 Sinter shrinkage – green compact compared to sintered part

5 Sintered rods and preforms

6 Centreless grinding

7 Ground end mill blanks



Contents

Grades: composition and properties

Ultrafine grades

Grade	ISO code*	Binder [m %]	Density [g/cm³]	Hardness [HV30]	Hardness [HRA]	Transverse rupture strength [MPa]	KIC** (Shetty) [MPa·m$^{1/2}$]	Modulus of elasticity [GPa]	Poisson's ratio [-]
CTU08L	K10	4.2	15.05	2200	95.2	3700	8.4	646	0.202
TSF22	K10 – K20	8.2	14.55	1930	93.7	4400	9.2	596	0.210
TSF44	K10 – K20	12.0	14.10	1730	92.7	4600	9.8	547	0.218

Submicron grades

Grade	ISO code*	Binder [m %]	Density [g/cm³]	Hardness [HV30]	Hardness [HRA]	Transverse rupture strength [MPa]	KIC** (Shetty) [MPa·m$^{1/2}$]	Modulus of elasticity [GPa]	Poisson's ratio [-]
CTS12D	K05 – K10	6.0	14.80	1820	93.1	3600	9.3	624	0.205
CTS15D	K10 – K30	7.5	14.70	1750	92.8	3700	9.5	605	0.208
CTS18D	K20 – K40	9.0	14.55	1590	91.9	3650	10.7	586	0.211
CTS20D	K20 – K40	10.0	14.38	1600	91.9	4000	10.4	570	0.214
CT-GS20Y	K20 – K40	10.0	14.44	1580	91.8	3800	10.6	577	0.213
CTS24Z	K20 – K40	12.0	14.10	1570	91.7	4000	11.3	549	0.217
CTS30D	K30 – K40	15.0	13.84	1400	90.4	4300	13.2	512	0.223

Fine grades

Grade	ISO code*	Binder [m %]	Density [g/cm³]	Hardness [HV30]	Hardness [HRA]	Transverse rupture strength [MPa]	KIC** (Shetty) [MPa·m$^{1/2}$]	Modulus of elasticity [GPa]	Poisson's ratio [-]
CTF12E	K15	6.0	14.95	1620	92.1	3000	9.9	624	0.205
CTF25E	K30 – K40	12.5	14.15	1300	89.5	3500	15.0	543	0.218

Cermet grade

Grade	ISO code*	Binder [m %]	Density [g/cm³]	Hardness [HV30]	Hardness [HRA]	Transverse rupture strength [MPa]	KIC** (Shetty) [MPa·m$^{1/2}$]	Modulus of elasticity [GPa]	Poisson's ratio [-]
CTF24T	K10	12.2	6.57	1620	92,0	1900	8,0	547	0.218

Grain size classification		CERATIZIT code
Average grain size [µm]	Classification	
< 0.2	nano	N
0.2 – < 0.5	ultrafine	U
0.5 – < 0.8	submicron	S
0.8 – < 1.3	fine	F
1.3 – < 2.5	medium	M
2.5 – < 6.0	coarse	C
> 6.0	extra-coarse	E

Comment:
The data in this table are typical material parameters. We reserve the right to modify the data due to technical progress or further development within our company.

*) The classification of carbides according to grain size corresponds to the recommendations of the Powder Metallurgy Association. The standard ISO codes for carbides which were developed for fine to medium grain sizes no longer correspond to today's state of the art. Only the application data are relevant for the correct grade selection. K_{IC}**: The measured critical tension intensity factors (K_{IC}) depend to a high degree on the sample geometry and sample preparation. A direct comparison with parameters which have been determined by means of a different method is therefore not admissible.

Carbide grades for biocompatible tools

in accordance with ISO 10993-5 for the medical and dental industry

The biocompatibility requirement for medical products increases patient safety. For tools that come into short-term direct contact with body tissue, cell tolerance must be guaranteed. Testing for in-vitro cytotoxicity in accordance with DIN EN ISO 10993-5 was carried out by the accredited testing laboratory Creamedix GmbH. The following carbide grades were successfully tested for their cell tolerance:

- ▲ TSF22
- ▲ TSF44
- ▲ CTS12D
- ▲ CTS15D
- ▲ CTS18D
- ▲ CTS20D
- ▲ CTS24Z

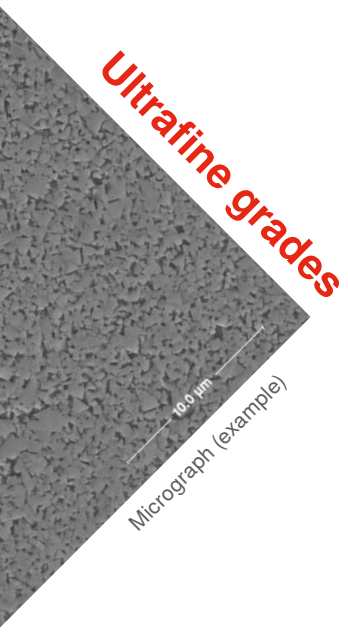
creamedix BIOLAB
A Tentamus Company

Certified biological testing of the in-vitro cytotoxicity in accordance with

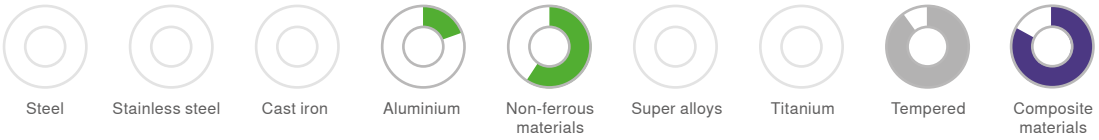
DIN EN ISO 10993-5
by
Creamedix GmbH

Accreditation number
D-PL-19876-01

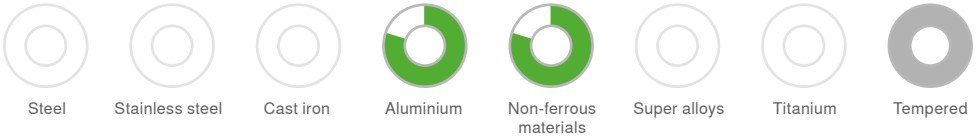
Application recommendations



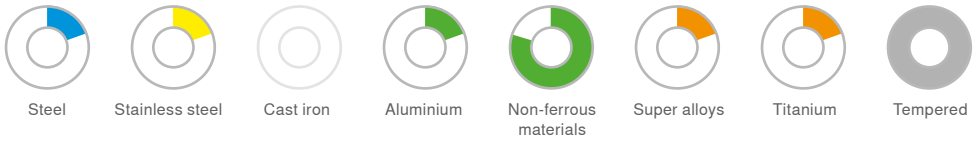
CTU08L: carbide grade with a typical grain size of 0.2 µm for the machining of materials with a hardness > 65 HRC. Thanks to the high wear resistance also excellent suitability for abrasive fibre composite materials.



TSF22: ultrafine carbide grade for HSC machining of tempered steels with a hardness of >60 HRC and abrasive aluminium alloys.

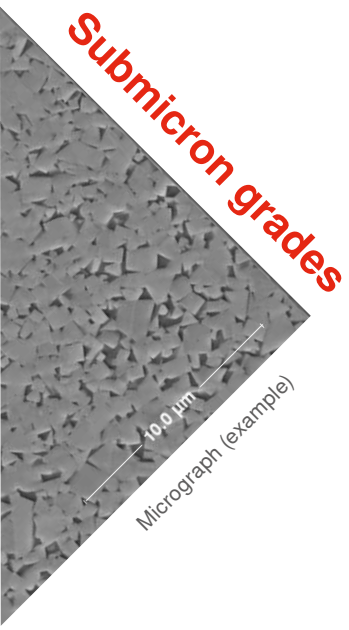


TSF44 ultrafine carbide grade for HSC machining of tempered steels up to 60 HRC, suitable for micro-tools and finishing tools and for a variety of materials.



The illustration for the selection of the carbide grade is a general recommendation based on the material. In addition to the material, there are numerous other determining factors. Machining methods, cutting parameters, coating, macro and micro geometry are important as well. All these factors in turn influence one another, which makes it difficult to precisely predict the performance during a machining process. The colour scheme of the diagrams is based on the application groups according to ISO 513. The degree to which the circle is filled indicates the suitability for the respective material. Aluminium and titanium alloys are shown in separate diagrams due to their importance. In addition, the purple diagram indicates special characteristics of the respective carbide grades.

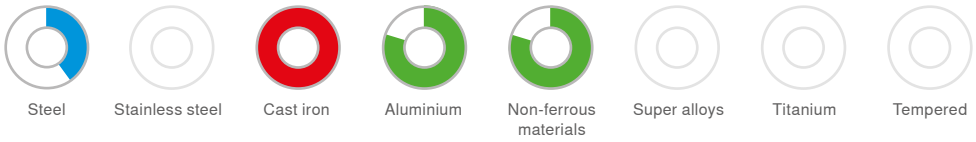
Submicron grades



Micrograph (example)

CTS12D for machining aluminium alloys, fibre-reinforced plastics (carbon-fibre and glass-fibre reinforced), composite materials, graphite; particularly suitable for diamond coating.

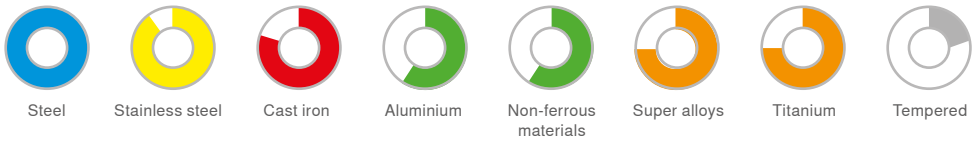
CTS15D for machining grey cast iron, tempered cast iron, non-alloyed steel, non-ferrous metals and plastics.



CTS18D for high-performance machining of steel, stainless steel and the machining of difficult materials.

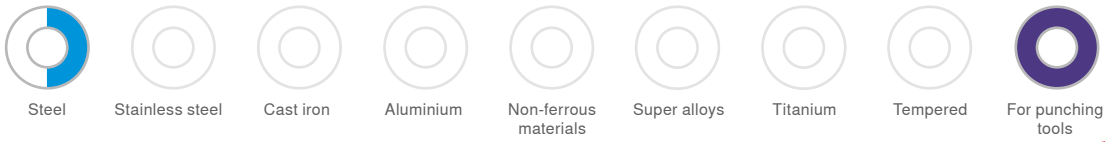
CTS20D for universal machining of alloyed and non-alloyed steels. In view of its balanced properties, it can be used for a variety of cutting operations on different materials. Improved toughness values ensure a low breakage risk on the cutting edges.

CT-GS20Y consists of over 99% high-quality secondary raw materials. In addition, it is produced using low-emission production processes to keep the CO_2 footprint as low as possible. CT-GS20Y represents the first cemented carbide on the market which combines the performance of a premium carbide grade with a deliberately sustainable production process. The application range is the same as for grade CTS20D.

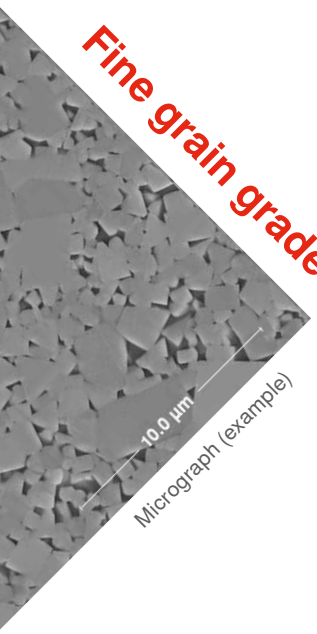


CTS24Z, the special high-performance grade for the roughing of titanium and heat-resistant alloys. Even higher fracture toughness than CTS18D and CTS20D with approximately the same hardness.

CTS30D with extremely high fracture toughness for particularly unstable and difficult applications. A good choice when switching from HSS to cemented carbide.



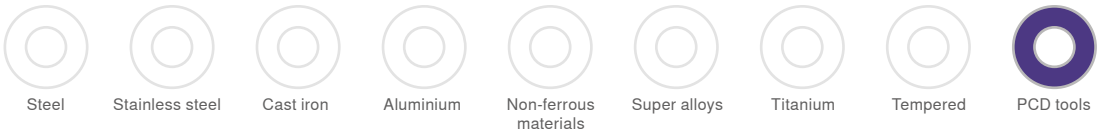
Fine grain grades



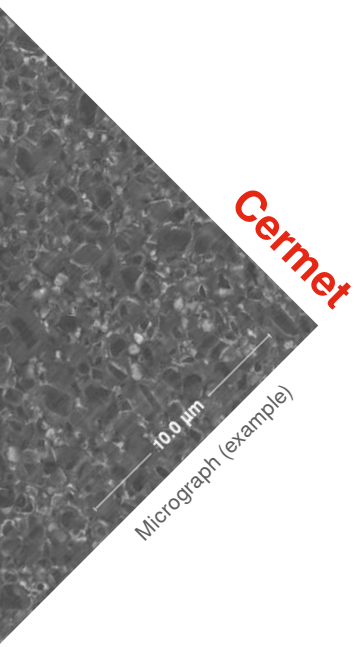
Micrograph (example)

CTF12E: for gun drills with an adapted relation between hardness and toughness. Suitable also for diamond-coated solid carbide tools.

CTF25E: for the production of PCD tools and tool shanks. The increased cobalt content and the coarser grain improve brazability while increasing fracture toughness.

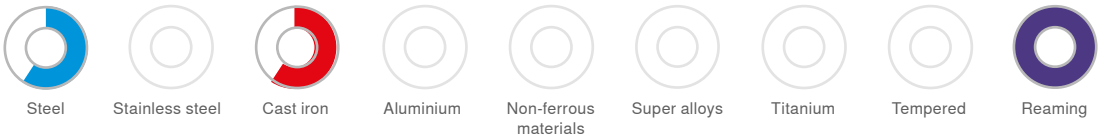


Cermet



Micrograph (example)

CTF24T especially for the finishing of steel materials. Thanks to its high oxidation resistance and low tendency to adhesion, cermet is particularly suited for the production of uncoated reamers.



Stock range at a glance

The product map below provides you with a quick overview of the grades and rods which are available in stock.
Other products are available upon request.

		Ultra-fine grades			Submicron grades							Fine grades	Cermet	
		CTU08L	TSF22	TSF44	CTS12D	CTS15D	CTS18D	CTS20D	CT-GS20Y	CTS24Z	CTS30D	CTF12E	CTF24T	starting page
Solid carbide rods, as sintered	RR	▢	▢	▢	▢	▢	▢	▢	▢	▢	▢	▢	▢	31
Solid carbide rods, ground, metric	RGM		▢	▢	▢	▢	▢	▢	▢	▢	▢	▢	▢	35
Solid carbide rods, inch	RGI							▢						38
End mill blanks, metric	RGMC	▢	▢	▢			▢	▢	▢	▢				41
End mill blanks with Weldon shank, metric	RGMCW							▢						45
End mill blanks with through coolant, metric	RGMCY							▢						46
End mill blanks, inch	RGIC							▢						48
Drill blanks with through coolant	..MB2							▢						51
Drill blanks for micro-drills with through coolant	..G2							▢						53
Rods, as sintered, with two helical coolant holes	..R2				▢			▢		▢				55
Rods, as sintered, with three helical coolant holes	..R3							▢						61
Rods, as sintered, with four helical coolant holes	..R4							▢						62
Rods, ground, with two helical coolant holes	..G2							▢						63
Rods, ground, with three helical coolant holes	..G3							▢						65
Rods, as sintered, with central coolant hole	00R1			▢		▢		▢					▢	67
Rods, as sintered, with two straight coolant holes	00R2					▢		▢						70
Rods, ground, with central coolant hole	00G1					▢								73
Rods, ground, with two straight coolant holes	00G2					▢								74
Rods for gun drills with kidney-shaped coolant holes	GDRK							▢				▢		77
Profiled rods for gun drills with kidney-shaped coolant holes	GDVK							▢				▢		79
Profiled rods for gun drills with two coolant holes	GDV2											▢		81
Profiled tips for gun drills with two coolant holes	GDV2P											▢		83
Flat and square strips	FR and SR							▢						85
Brazing tips to DIN 8011	DIN 8011				▢								▢	87

Designation system

RR	Sintered rods		
RGM	Ground rods, metric		
		C	with chamfer
		Y	with radial coolant exit holes
		W	with Weldon shank
RGI	Ground rods, inch		
		C	with chamfer
00 **30** **40**	Helix angle of coolant hole rods	**R**	coolant hole rods, as sintered
		G	coolant hole rods, ground
		MB	Drill blanks, ground mat
GD	Blanks for gun drills	**RK**	round rods with kidney-shaped coolant holes
		VK	profiled rods with kidney-shaped coolant holes
		V2	profiled rods with two coolant holes
		V2P	profiled tips with two coolant holes
FR	Flat strips		
SR	Square strips		

1 = 

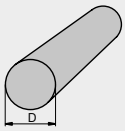
2 = 

3 = 

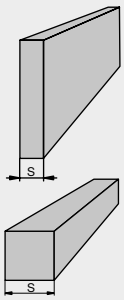
4 = 

Number of coolant holes

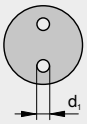
30 G B 2



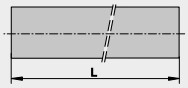
Outside diameter [1/100 mm]



Thickness [1/100 mm]



Diameter of the coolant holes [mm]

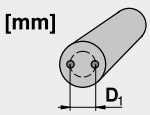


Rod length [mm]

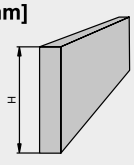
Diameter tolerance

1000 / 4,8 / 1,3 / 54,4-104 CTS20D h5

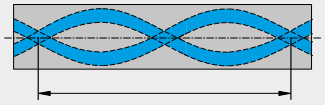
Pitch circle of the coolant holes [mm]



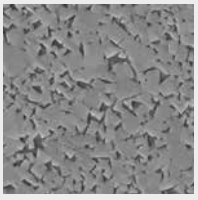
Height [mm]



Nominal pitch of the coolant holes [mm]



Grade



Solid carbide rods

A comprehensive standard range of sintered and ground solid carbide rods in various dimensions is available from stock. Furthermore, you can choose from carbide grades with the most varied characteristics for every application area: from ultrafine grades for the machining of hardened materials, by way of submicron grades for universal application to our cermet grade for the finish machining of ferrous materials.
Of course, we can also produce carbide rods in other dimensions and grades to order – simply get in touch with your contact person at CERATIZIT.
Detailed technical data for our solid carbide rods can be found in the ‘Specifications’ section.

As sintered
Ultrafine grades

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTU08L	TSF22	TSF44
3.25	330	RR 0325-330	-0/+0.20	●	●	●
4.20	330	RR 0420-330	-0/+0.20	●	●	●
5.20	330	RR 0520-330	-0/+0.25	●	●	●
6.20	330	RR 0620-330	-0/+0.25	●	●	●
8.20	330	RR 0820-330	-0/+0.30	●	●	●
10.20	330	RR 1020-330	-0/+0.30	●	●	●
12.20	330	RR 1220-330	-0/+0.30	●	●	●
14.20	330	RR 1420-330	-0/+0.30		●	●
16.20	330	RR 1620-330	-0/+0.45		●	●
18.20	330	RR 1820-330	-0/+0.45		●	○
20.20	330	RR 2020-330	-0/+0.45		●	●
25.20	330	RR 2520-330	-0/+0.65		●	●
32.20	330	RR 3220-330	-0/+0.65			●

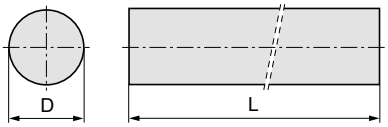
As sintered
Submicron grades

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTS12D	CTS15D	CTS18D	CTS20D	CT-GS20Y	CTS24Z	CTS30D
1.15	330	RR 0115-330	-0/+0.15				●			
1.65	330	RR 0165-330	-0/+0.15	●			●			
1.80	330	RR 0180-330	-0/+0.15				●			
2.20	330	RR 0220-330	-0/+0.20	●			●			
2.70	330	RR 0270-330	-0/+0.20				●			

→ For further information go to page 106.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
Submicron grades



D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTS12D	CTS15D	CTS18D	CTS20D	CT-GS20Y	CTS24Z	CTS30D
3.25	330	RR 0325-330	-0/+0.20	●	●	●	●		●	
3.70	330	RR 0370-330	-0/+0.20				●			
4.20	330	RR 0420-330	-0/+0.20	●	●	●	●		●	
4.70	330	RR 0470-330	-0/+0.20				●			
5.20	330	RR 0520-330	-0/+0.25	●	●		●			
5.70	330	RR 0570-330	-0/+0.25				●			
6.20	330	RR 0620-330	-0/+0.25	●	●	●	●	▲	●	●
6.55	330	RR 0655-330	-0/+0.25				●			
6.70	330	RR 0670-330	-0/+0.25		○		●			
7.20	330	RR 0720-330	-0/+0.30				●			
7.70	330	RR 0770-330	-0/+0.30				●			
8.20	330	RR 0820-330	-0/+0.30	●	●	●	●	▲	●	●
8.70	330	RR 0870-330	-0/+0.30				●			
9.20	330	RR 0920-330	-0/+0.30				●			
9.70	330	RR 0970-330	-0/+0.30				●			
10.20	330	RR 1020-330	-0/+0.30	●	●	●	●	▲	●	●
10.70	330	RR 1070-330	-0/+0.30				●			
11.20	330	RR 1120-330	-0/+0.30				●			
11.70	330	RR 1170-330	-0/+0.30				●			
12.20	330	RR 1220-330	-0/+0.30	●	●	●	●	▲	●	●
12.70	330	RR 1270-330	-0/+0.30		○		●			
13.00	330	RR 1300-330	-0/+0.30				○			
13.20	330	RR 1320-330	-0/+0.30				●			
14.20	330	RR 1420-330	-0/+0.30	●	●	○	●	▲	●	
14.70	330	RR 1470-330	-0/+0.30				●			
15.20	330	RR 1520-330	-0/+0.30				●			
16.20	330	RR 1620-330	-0/+0.45	●	●	●	●	▲	●	●
17.20	330	RR 1720-330	-0/+0.45				●			
18.20	330	RR 1820-330	-0/+0.45	●	●		●	▲	●	
19.20	330	RR 1920-330	-0/+0.45				●			

→ For further information go to page 106.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

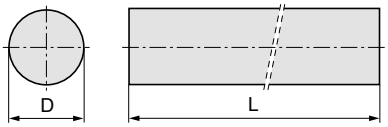
As sintered
Submicron grades

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTS12D	CTS15D	CTS18D	CTS20D	CT-GS20Y	CTS24Z	CTS30D
20.20	330	RR 2020-330	-0/+0.45	●	●	●	●	▲	●	●
21.20	330	RR 2120-330	-0/+0.55				●			
22.20	330	RR 2220-330	-0/+0.55				●			
23.20	330	RR 2320-330	-0/+0.55				●			
24.20	330	RR 2420-330	-0/+0.55				●			
25.20	330	RR 2520-330	-0/+0.65		●	●	●	▲	●	
25.80	330	RR 2580-330	-0/+0.65				○			
26.20	330	RR 2620-330	-0/+0.65				●			
28.20	330	RR 2820-330	-0/+0.65				●			
30.20	330	RR 3020-330	-0/+0.65				●			
32.20	330	RR 3220-330	-0/+0.65			○	●			
34.20	330	RR 3420-330	-0/+0.65				●			
36.20	330	RR 3620-330	-0/+0.65				●			
38.20	330	RR 3820-330	-0/+0.70				○			
40.20	330	RR 4020-330	-0/+0.70				●			
42.20	330	RR 4220-330	-0/+0.70				●			
46.20	330	RR 4620-330	-0/+0.70				●			

→ For further information go to page 106.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

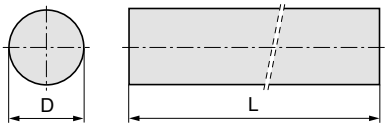
As sintered
Fine grades



D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTF12E	CTF12E
3.25	330	RR 0325-330	-0/+0.20	○	
4.20	330	RR 0420-330	-0/+0.20	○	
5.20	330	RR 0520-330	-0/+0.25	●	
6.20	330	RR 0620-330	-0/+0.25	●	
8.20	330	RR 0820-330	-0/+0.30	●	
10.20	330	RR 1020-330	-0/+0.30	●	
12.20	330	RR 1220-330	-0/+0.30	●	
14.20	330	RR 1420-330	-0/+0.30	○	
16.20	330	RR 1620-330	-0/+0.45	●	○
18.20	330	RR 1820-330	-0/+0.45	○	
25.20	330	RR 2520-330	-0/+0.65		○

1

As sintered
Cermet

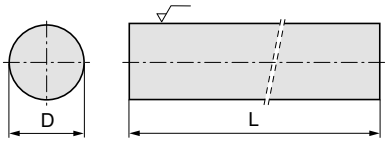


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTF24T
3.40	330	RR 0340-330	-0/+0.20	○
4.40	330	RR 0440-330	-0/+0.20	○
6.40	330	RR 0640-330	-0/+0.25	○
8.40	330	RR 0840-330	-0/+0.30	○
10.40	330	RR 1040-330	-0/+0.30	○
12.40	330	RR 1240-330	-0/+0.30	○

→ For further information go to page 106.

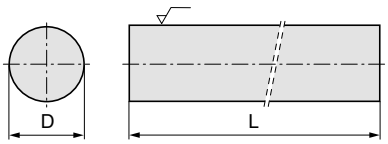
○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Ground, metric
Ultrafine grades



D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	TSF22	TSF44
2.00	330	RGM 0200-330	+0/-0.004	h5		●
3.00	330	RGM 0300-330	+0/-0.004	h5	●	●
4.00	330	RGM 0400-330	+0/-0.005	h5	●	●
5.00	330	RGM 0500-330	+0/-0.005	h5	●	●
6.00	330	RGM 0600-330	+0/-0.005	h5	●	●
8.00	330	RGM 0800-330	+0/-0.006	h5	●	●
10.00	330	RGM 1000-330	+0/-0.006	h5	●	●
12.00	330	RGM 1200-330	+0/-0.008	h5	●	●
14.00	330	RGM 1400-330	+0/-0.008	h5	○	●
16.00	330	RGM 1600-330	+0/-0.008	h5	●	●
20.00	330	RGM 2000-330	+0/-0.009	h5	●	●
25.00	330	RGM 2500-330	+0/-0.009	h5	●	●

Ground, metric
Submicron grades

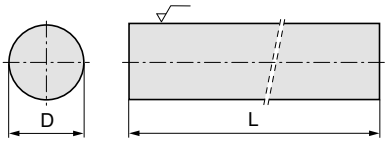


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	CTS12D	CTS15D	CTS18D	CTS20D	CT-GS20Y	CTS24Z	CTS30D
1.00	330	RGM 0100-330	+0/-0.006	h6				●			
1.50	330	RGM 0150-330	+0/-0.006	h6				●			
2.00	330	RGM 0200-330	+0/-0.006	h6				●			
2.50	330	RGM 0250-330	+0/-0.006	h6		●		●			
3.00	330	RGM 0300-330	+0/-0.006	h6	●	▲		●		▲	

→ For further information go to page 106.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Ground, metric
Submicron grades

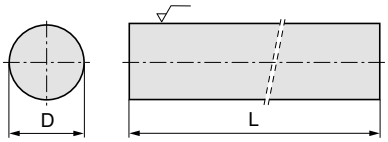


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	CTS12D	CTS15D	CTS18D	CTS20D	CT-GS20Y	CTS24Z	CTS30D
3.50	330	RGM 0350-330	+0/-0.008	h6				●			
4.00	330	RGM 0400-330	+0/-0.008	h6	●	▲		●		▲	
4.50	330	RGM 0450-330	+0/-0.008	h6				●			
5.00	330	RGM 0500-330	+0/-0.008	h6				●			
5.50	330	RGM 0550-330	+0/-0.008	h6				●			
6.00	330	RGM 0600-330	+0/-0.008	h6	●	●	●	●	▲	●	○
6.50	330	RGM 0650-330	+0/-0.009	h6				●			
7.00	330	RGM 0700-330	+0/-0.009	h6				●			
7.50	330	RGM 0750-330	+0/-0.009	h6				●			
8.00	330	RGM 0800-330	+0/-0.009	h6	●	●	●	●	▲	●	○
8.50	330	RGM 0850-330	+0/-0.009	h6				●			
9.00	330	RGM 0900-330	+0/-0.009	h6				●			
9.50	330	RGM 0950-330	+0/-0.009	h6				●			
10.00	330	RGM 1000-330	+0/-0.009	h6	●	●	●	●	▲	●	○
11.00	330	RGM 1100-330	+0/-0.011	h6				●			
12.00	330	RGM 1200-330	+0/-0.008	h5	●	●	●	●	▲	●	○
13.00	330	RGM 1300-330	+0/-0.011	h6				●			
14.00	330	RGM 1400-330	+0/-0.008	h5	●			●	▲		
15.00	330	RGM 1500-330	+0/-0.011	h6				●			
16.00	330	RGM 1600-330	+0/-0.011	h6	●	●	●	●	▲	●	○
18.00	330	RGM 1800-330	+0/-0.011	h6		●		●	▲		
19.00	330	RGM 1900-330	+0/-0.013	h6				●			
20.00	330	RGM 2000-330	+0/-0.009	h5	●	●	●	●	▲	●	○
22.00	330	RGM 2200-330	+0/-0.013	h6				●			
24.00	330	RGM 2400-330	+0/-0.013	h6				●			
25.00	330	RGM 2500-330	+0/-0.013	h6			●	●	▲	●	○
28.00	330	RGM 2800-330	+0/-0.013	h6				●			
30.00	330	RGM 3000-330	+0/-0.013	h6				●			
32.00	330	RGM 3200-330	+0/-0.016	h6			●	●			
40.00	330	RGM 4000-330	+0/-0.016	h6				●			

→ For further information go to page 106.

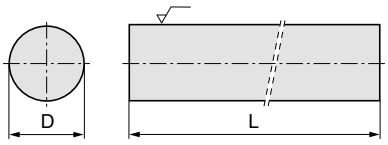
○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Ground, metric
Fine grades



D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	CTF12E
3.00	330	RGM 0300-330	+0/-0.004	h6	○
4.00	330	RGM 0400-330	+0/-0.008	h6	●
6.00	330	RGM 0600-330	+0/-0.008	h6	●
8.00	330	RGM 0800-330	+0/-0.009	h6	●
10.00	330	RGM 1000-330	+0/-0.009	h6	●
12.00	330	RGM 1200-330	+0/-0.011	h6	●
14.00	330	RGM 1400-330	+0/-0.011	h6	○
16.00	330	RGM 1600-330	+0/-0.011	h6	○

Ground, metric
Cermet

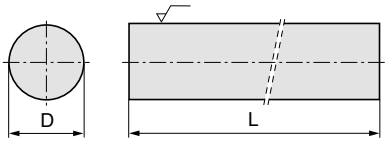


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	CTF24T
3.00	330	RGM 0300-330	+0/-0.004	h6	○
4.00	330	RGM 0400-330	+0/-0.008	h6	○
6.00	330	RGM 0600-330	+0/-0.008	h6	○
8.00	330	RGM 0800-330	+0/-0.009	h6	○
10.00	330	RGM 1000-330	+0/-0.009	h6	○
12.00	330	RGM 1200-330	+0/-0.011	h6	○

→ For further information go to page 106.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Ground, inch
Submicron grades



D [°]	L [inch]	Type, description	Dia. tol. [mm]	ISO 286	CTS20D
1/8	13.000	RGI 1/8-13.00	+0/-0.008	h6	●
3/16	13.000	RGI 3/16-13.00	+0/-0.008	h6	●
1/4	13.000	RGI 1/4-13.00	+0/-0.009	h6	●
5/16	13.000	RGI 5/16-13.00	+0/-0.009	h6	●
3/8	13.000	RGI 3/8-13.00	+0/-0.009	h6	●
7/16	13.000	RGI 7/16-13.00	+0/-0.011	h6	●
1/2	13.000	RGI 1/2-13.00	+0/-0.011	h6	●
5/8	13.000	RGI 5/8-13.00	+0/-0.011	h6	●
3/4	13.000	RGI 3/4-13.00	+0/-0.013	h6	●
1	13.000	RGI 1-13.00	+0/-0.013	h6	●

1

→ For further information go to page 106.

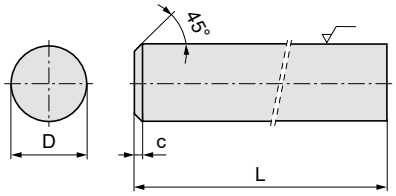
○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request


CERATIZIT

End mill blanks

In addition to DIN dimensions, we can also supply our high-precision end mill blanks in extra-long sizes. End mill blanks in the most popular inch dimensions have now been added to the range. Whether in standard execution, with Weldon shanks or radial coolant exit holes, you can be sure of finding the product you need.
Our end mill blanks are now also available in the new high-performance grade CTS24Z for the machining of difficult materials like titanium or Inconel. Having virtually the same hardness, CTS24Z is even tougher than our proven CTS18D and CTS20D grades. This extreme toughness offers maximum protection against breakage and ensures consistent performance of your tools.
Of course, we can also produce carbide rods in other dimensions and grades to order – simply get in touch with your contact person at CERATIZIT.
Detailed specifications for our end mill blanks can be found in the ‘Information’ section.

Metric
Ultrafine grades

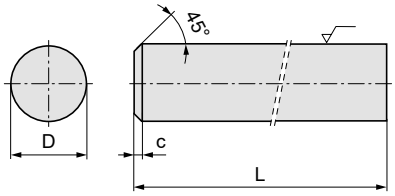


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	c [mm]	DIN 6527	CTU08L	TSF22	TSF44
3.00	39	RGMC 0300-039	+0/-0.004	h5	0.30	x	○	●	●
3.00	40	RGMC 0300-040	+0/-0.004	h5	0.30			●	
3.00	50	RGMC 0300-050	+0/-0.004	h5	0.30			●	●
3.00	60	RGMC 0300-060	+0/-0.004	h5	0.30			●	
4.00	51	RGMC 0400-051	+0/-0.005	h5	0.40	x	●	●	●
4.00	60	RGMC 0400-060	+0/-0.005	h5	0.40			●	
4.00	75	RGMC 0400-075	+0/-0.005	h5	0.40			●	
5.00	51	RGMC 0500-051	+0/-0.005	h5	0.40	x			○
6.00	51	RGMC 0600-051	+0/-0.005	h5	0.40	x		●	●
6.00	58	RGMC 0600-058	+0/-0.005	h5	0.40	x	●	●	●
6.00	60	RGMC 0600-060	+0/-0.005	h5	0.40			●	
6.00	65	RGMC 0600-065	+0/-0.005	h5	0.40			●	
6.00	70	RGMC 0600-070	+0/-0.005	h5	0.40			●	
6.00	75	RGMC 0600-075	+0/-0.005	h5	0.40			●	
6.00	80	RGMC 0600-080	+0/-0.005	h5	0.40			●	
6.00	100	RGMC 0600-100	+0/-0.005	h5	0.40			●	●
8.00	64	RGMC 0800-064	+0/-0.006	h5	0.60	x	●	●	●
8.00	70	RGMC 0800-070	+0/-0.006	h5	0.60			●	
8.00	75	RGMC 0800-075	+0/-0.006	h5	0.60			●	
8.00	100	RGMC 0800-100	+0/-0.006	h5	0.60			●	●
8.00	120	RGMC 0800-120	+0/-0.006	h5	0.60			●	●
10.00	67	RGMC 1000-067	+0/-0.006	h5	0.80	x			●
10.00	73	RGMC 1000-073	+0/-0.006	h5	0.80	x	●	●	●
10.00	75	RGMC 1000-075	+0/-0.006	h5	0.80			●	
10.00	80	RGMC 1000-080	+0/-0.006	h5	0.80			●	
10.00	100	RGMC 1000-100	+0/-0.006	h5	0.80			●	●
10.00	120	RGMC 1000-120	+0/-0.006	h5	0.80			●	●
12.00	84	RGMC 1200-084	+0/-0.008	h6	0.80	x		●	●

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

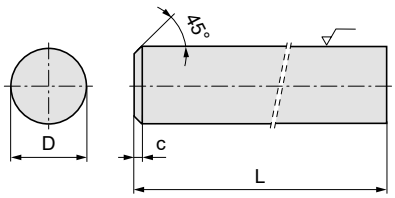
Metric
Ultrafine grades



D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	c [mm]	DIN 6527	CTU08L	TSF22	TSF44
12.00	100	RGMC 1200-100	+0/-0.008	h5	0.80			●	●
12.00	120	RGMC 1200-120	+0/-0.008	h5	0.80			●	●
16.00	93	RGMC 1600-093	+0/-0.008	h5	0.80	x		●	●
16.00	110	RGMC 1600-110	+0/-0.008	h5	0.80			●	
16.00	120	RGMC 1600-120	+0/-0.008	h5	0.80				○
16.00	130	RGMC 1600-130	+0/-0.008	h5	0.80				○
16.00	150	RGMC 1600-150	+0/-0.008	h5	0.80				●
20.00	105	RGMC 2000-105	+0/-0.009	h5	1.00	x			●
20.00	125	RGMC 2000-125	+0/-0.009	h5	1.00			●	○
20.00	150	RGMC 2000-150	+0/-0.009	h5	1.00				●

2

Metric
Submicron grades

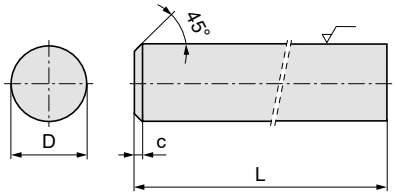


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	c [mm]	DIN 6527	CTS18D	CTS20D	CT-GS20Y	CTS24Z
3.00	39	RGMC 0300-039	+0/-0.006	h6	0.30	x		●		
3.00	40	RGMC 0300-040	+0/-0.004	h5	0.30			●		
3.00	50	RGMC 0300-050	+0/-0.004	h5	0.30			●		
3.00	60	RGMC 0300-060	+0/-0.004	h5	0.30			●		
4.00	51	RGMC 0400-051	+0/-0.008	h6	0.40	x		●		
4.00	60	RGMC 0400-060	+0/-0.005	h5	0.40			●		

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Metric
Submicron grades

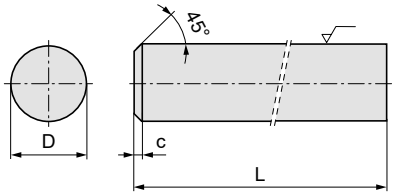


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	c [mm]	DIN 6527	CTS18D	CTS20D	CT-GS20Y	CTS24Z
4.00	75	RGMC 0400-075	+0/-0.005	h5	0.40			●		
5.00	51	RGMC 0500-051	+0/-0.008	h6	0.40	x		●		
6.00	51	RGMC 0600-051	+0/-0.005	h6	0.40	x		●	▲	
6.00	55	RGMC 0600-055	+0/-0.005	h6	0.40	x		●	▲	●
6.00	58	RGMC 0600-058	+0/-0.005	h6	0.40	x	●	●	▲	●
6.00	60	RGMC 0600-060	+0/-0.005	h5	0.40			●	▲	
6.00	65	RGMC 0600-065	+0/-0.005	h5	0.40			●		
6.00	70	RGMC 0600-070	+0/-0.005	h5	0.40			●		
6.00	75	RGMC 0600-075	+0/-0.005	h5	0.40			●		
6.00	80	RGMC 0600-080	+0/-0.005	h5	0.40			●		
6.00	100	RGMC 0600-100	+0/-0.005	h5	0.40			●	▲	
8.00	59	RGMC 0800-059	+0/-0.006	h6	0.60	x		●	▲	●
8.00	64	RGMC 0800-064	+0/-0.006	h6	0.60	x	●	●	▲	●
8.00	70	RGMC 0800-070	+0/-0.006	h5	0.60			●	▲	
8.00	75	RGMC 0800-075	+0/-0.006	h5	0.60			●		
8.00	80	RGMC 0800-080	+0/-0.006	h5	0.60			●		
8.00	100	RGMC 0800-100	+0/-0.006	h5	0.60			●	▲	●
8.00	120	RGMC 0800-120	+0/-0.006	h5	0.60			●		
10.00	67	RGMC 1000-067	+0/-0.006	h6	0.80	x		●	▲	●
10.00	73	RGMC 1000-073	+0/-0.006	h6	0.80	x	●	●	▲	●
10.00	75	RGMC 1000-075	+0/-0.006	h5	0.80			●		
10.00	80	RGMC 1000-080	+0/-0.006	h5	0.80			●		
10.00	90	RGMC 1000-090	+0/-0.006	h5	0.80			●		
10.00	100	RGMC 1000-100	+0/-0.006	h5	0.80			●	▲	●
10.00	120	RGMC 1000-120	+0/-0.006	h5	0.80			●		
12.00	74	RGMC 1200-074	+0/-0.008	h6	0.80	x		●	▲	●
12.00	84	RGMC 1200-084	+0/-0.008	h6	0.80	x	●	●	▲	●
12.00	100	RGMC 1200-100	+0/-0.008	h5	0.80			●	▲	●

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Metric
Submicron grades

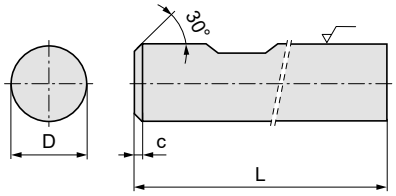


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	c [mm]	DIN 6527	CTS18D	CTS20D	CT-GS20Y	CTS24Z
12.00	120	RGMC 1200-120	+0/-0.008	h5	0.80			●		
14.00	76	RGMC 1400-076	+0/-0.008	h6	0.80	x		●	▲	
14.00	84	RGMC 1400-084	+0/-0.008	h6	0.80	x		●	▲	●
16.00	83	RGMC 1600-083	+0/-0.008	h6	0.80	x		●	▲	
16.00	93	RGMC 1600-093	+0/-0.008	h6	0.80	x	●	●	▲	●
16.00	110	RGMC 1600-110	+0/-0.008	h5	0.80			●		
16.00	120	RGMC 1600-120	+0/-0.008	h5	0.80			●		●
16.00	130	RGMC 1600-130	+0/-0.008	h5	0.80			●		
16.00	150	RGMC 1600-150	+0/-0.008	h5	0.80			●		
18.00	93	RGMC 1800-093	+0/-0.008	h6	1.00	x		●	▲	
20.00	93	RGMC 2000-093	+0/-0.009	h6	1.00	x		●	▲	
20.00	105	RGMC 2000-105	+0/-0.009	h6	1.00	x	●	●	▲	●
20.00	125	RGMC 2000-125	+0/-0.009	h5	1.00			●	▲	●
20.00	150	RGMC 2000-150	+0/-0.009	h5	1.00			●		
25.00	125	RGMC 2500-125	+0/-0.009	h5	1.00			●	▲	
25.00	150	RGMC 2500-150	+0/-0.009	h5	1.00			●		

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Metric with Weldon
Submicron grades



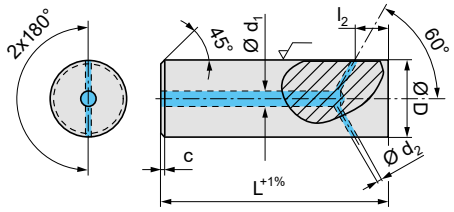
D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	c [mm]	DIN 6527	CTS20D
6.00	51	RGMCW 0600-051	+0/-0.008	h6	0.40	x	●
6.00	55	RGMCW 0600-055	+0/-0.008	h6	0.40	x	○
6.00	58	RGMCW 0600-058	+0/-0.008	h6	0.40	x	●
8.00	64	RGMCW 0800-064	+0/-0.009	h6	0.60	x	●
10.00	67	RGMCW 1000-067	+0/-0.009	h6	0.80	x	●
10.00	73	RGMCW 1000-073	+0/-0.009	h6	0.80	x	●
12.00	74	RGMCW 1200-074	+0/-0.011	h6	0.80	x	●
12.00	84	RGMCW 1200-084	+0/-0.011	h6	0.80	x	●
16.00	93	RGMCW 1600-093	+0/-0.011	h6	0.80	x	●
20.00	93	RGMCW 2000-093	+0/-0.013	h6	1.00	x	○
20.00	105	RGMCW 2000-105	+0/-0.013	h6	1.00	x	●

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Metric with through coolant, 2x 180°

Submicron grades

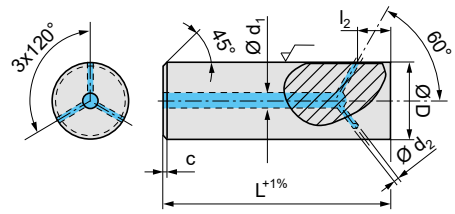


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	d1 [mm]	d2 [mm]	l2 [mm]	c [mm]	CTS20D
6.00	58	RGMCY2 0600-058	+0/-0.008	h6	1.20	0.80	3.00	0.40	○
8.00	64	RGMCY2 0800-064	+0/-0.009	h6	1.60	1.10	4.00	0.60	○
10.00	73	RGMCY2 1000-073	+0/-0.009	h6	2.00	1.40	5.00	0.80	○
12.00	84	RGMCY2 1200-084	+0/-0.011	h6	2.20	1.60	6.00	0.80	○
14.00	84	RGMCY2 1400-084	+0/-0.011	h6	2.40	1.70	7.00	0.80	○
16.00	93	RGMCY2 1600-093	+0/-0.011	h6	2.60	1.90	8.00	0.80	○
18.00	93	RGMCY2 1800-093	+0/-0.011	h6	2.80	2.00	9.00	1.00	○
20.00	105	RGMCY2 2000-105	+0/-0.013	h6	3.00	2.10	10.00	1.00	○
25.00	125	RGMCY2 2500-125	+0/-0.013	h6	3.20	2.30	12.50	1.00	○

2

Metric with through coolant, 3x 120°

Submicron grades



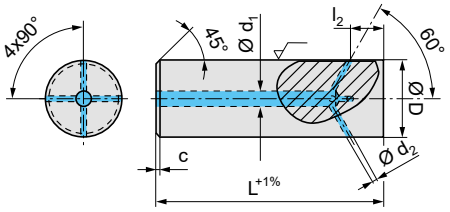
D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	d1 [mm]	d2 [mm]	l2 [mm]	c [mm]	CTS20D
6.00	58	RGMCY3 0600-058	+0/-0.008	h6	1.20	0.70	3.00	0.40	●
8.00	64	RGMCY3 0800-064	+0/-0.009	h6	1.60	0.90	4.00	0.60	●
10.00	73	RGMCY3 1000-073	+0/-0.009	h6	2.00	1.20	5.00	0.80	●
12.00	84	RGMCY3 1200-084	+0/-0.011	h6	2.20	1.30	6.00	0.80	●
14.00	84	RGMCY3 1400-084	+0/-0.011	h6	2.40	1.40	7.00	0.80	●
16.00	93	RGMCY3 1600-093	+0/-0.011	h6	2.60	1.50	8.00	0.80	●
18.00	93	RGMCY3 1800-093	+0/-0.011	h6	2.80	1.60	9.00	1.00	●
20.00	105	RGMCY3 2000-105	+0/-0.013	h6	3.00	1.70	10.00	1.00	●
25.00	125	RGMCY3 2500-125	+0/-0.013	h6	3.20	1.80	12.50	1.00	●

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Metric with through coolant, 4x 90°

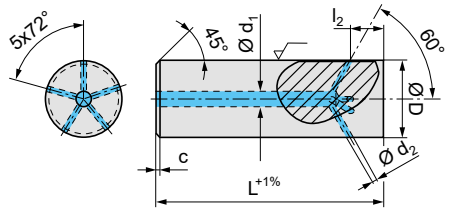
Submicron grades



D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	d1 [mm]	d2 [mm]	l2 [mm]	c [mm]	CTS20D
6.00	58	RGMCY4 0600-058	+0/-0.008	h6	1.20	0.60	3.00	0.40	●
8.00	64	RGMCY4 0800-064	+0/-0.009	h6	1.60	0.80	4.00	0.60	●
10.00	73	RGMCY4 1000-073	+0/-0.009	h6	2.00	1.00	5.00	0.80	●
12.00	84	RGMCY4 1200-084	+0/-0.011	h6	2.20	1.10	6.00	0.80	●
14.00	84	RGMCY4 1400-084	+0/-0.011	h6	2.40	1.20	7.00	0.80	●
16.00	93	RGMCY4 1600-093	+0/-0.011	h6	2.60	1.30	8.00	0.80	●
18.00	93	RGMCY4 1800-093	+0/-0.011	h6	2.80	1.40	9.00	1.00	●
20.00	105	RGMCY4 2000-105	+0/-0.013	h6	3.00	1.50	10.00	1.00	●
25.00	125	RGMCY4 2500-125	+0/-0.013	h6	3.20	1.60	12.50	1.00	●

Metric with through coolant, 5x 72°

Submicron grades

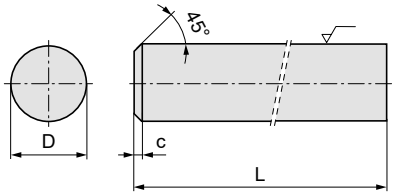


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	d1 [mm]	d2 [mm]	l2 [mm]	c [mm]	CTS20D
6.00	58	RGMCY5 0600-058	+0/-0.008	h6	1.20	0.50	3.00	0.40	○
8.00	64	RGMCY5 0800-064	+0/-0.009	h6	1.60	0.70	4.00	0.60	○
10.00	73	RGMCY5 1000-073	+0/-0.009	h6	2.00	0.90	5.00	0.80	○
12.00	84	RGMCY5 1200-084	+0/-0.011	h6	2.20	1.00	6.00	0.80	○
14.00	84	RGMCY5 1400-084	+0/-0.011	h6	2.40	1.10	7.00	0.80	○
16.00	93	RGMCY5 1600-093	+0/-0.011	h6	2.60	1.20	8.00	0.80	○
18.00	93	RGMCY5 1800-093	+0/-0.011	h6	2.80	1.30	9.00	1.00	○
20.00	105	RGMCY5 2000-105	+0/-0.013	h6	3.00	1.40	10.00	1.00	○
25.00	125	RGMCY5 2500-125	+0/-0.013	h6	3.20	1.50	12.50	1.00	○

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Inch
Submicron grades



D [°]	L [inch]	Type, description	Dia. tol. [inch]	ISO 286	c [inch]	CTS20D
1/8	1.500	RGIC 1/8-1.50	+0/-0.0003	h6	0.015	●
3/16	2.000	RGIC 3/16-2.00	+0/-0.0003	h6	0.015	●
1/4	2.000	RGIC 1/4-2.00	+0/-0.0004	h6	0.015	●
1/4	3.000	RGIC 1/4-3.00	+0/-0.0004	h6	0.015	●
5/16	2.500	RGIC 5/16-2.50	+0/-0.0004	h6	0.015	●
3/8	2.500	RGIC 3/8-2.50	+0/-0.0004	h6	0.015	●
3/8	3.000	RGIC 3/8-3.00	+0/-0.0004	h6	0.015	●
1/2	3.000	RGIC 1/2-3.00	+0/-0.0004	h6	0.031	●
1/2	4.000	RGIC 1/2-4.00	+0/-0.0004	h6	0.031	●
5/8	3.500	RGIC 5/8-3.50	+0/-0.0004	h6	0.031	●
3/4	4.000	RGIC 3/4-4.00	+0/-0.0005	h6	0.031	●
1	4.000	RGIC 1-4.00	+0/-0.0005	h6	0.031	●
1	6.000	RGIC 1-6.00	+0/-0.0005	h6	0.031	●

→ For further information go to page 112.

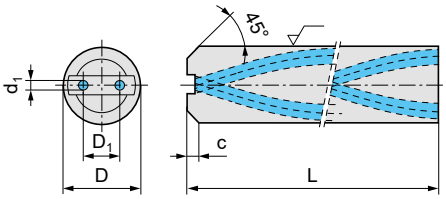
○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Drill blanks

In addition to their geometrical precision thanks to a special grinding surface, our drill blanks are also notable for the improved pull-out resistance of the tool shank. The shank end corresponds to DIN 69090-3 and therefore complies with the standard for cutting tools which are suitable for MQL.
Of course we can also produce carbide rods in other dimensions and grades to order – just get in touch with your contact person at CERATIZIT.
Detailed technical data for our drill blanks can be found in the 'Information' section.

3xD, 5xD with through coolant

Drill blanks

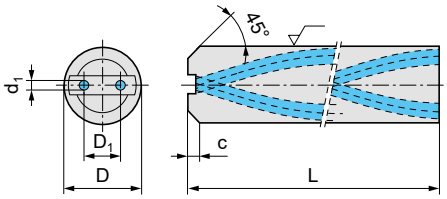


xD factor	D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	Nominal pitch [mm]	[°]	c [mm]	D_1 [mm]	d_1 [mm]	CTS20D
3	6.00	63	40MB2 0600/1,9/0,7/22,5-063 h5	+0/-0.005	h5	22.50	40.0	0.95	1.90	0.70	●
3	6.00	63	46MB2 0600/1,6/0,5/18,0-063 h5	+0/-0.005	h5	18.00	46.3	0.95	1.60	0.50	●
3	6.00	67	30MB2 0600/2,7/0,8/32,7-067 h5	+0/-0.005	h5	32.70	30.0	0.95	2.70	0.80	●
3	6.00	67	33MB2 0600/2,2/0,9/29,0-067 h5	+0/-0.005	h5	29.00	33.0	0.95	2.20	0.90	●
3	8.00	80	30MB2 0800/3,4/1,0/43,5-080 H5	+0/-0.006	h5	43.50	30.0	1.25	3.40	1.00	●
3	10.00	90	30MB2 1000/4,8/1,3/54,0-090 h5	+0/-0.006	h5	54.40	30.0	1.35	4.80	1.30	●
3	12.00	103	30MB2 1200/6,3/1,7/65,3-103 h5	+0/-0.008	h5	65.30	30.0	1.75	6.30	1.70	●
3	14.00	108	30MB2 1400/6,7/1,8/76,2-108 h5	+0/-0.008	h5	76.20	30.0	1.95	6.70	1.80	●
3	16.00	116	30MB2 1600/8,0/2,0/87,1-116 h5	+0/-0.008	h5	87.10	30.0	2.45	8.00	2.00	●
3	18.00	124	30MB2 1800/9,0/2,3/98,0-124 h5	+0/-0.008	h5	98.00	30.0	2.75	9.00	2.30	●
3	20.00	132	30MB2 2000/10,0/2,5/108,8-132 h5	+0/-0.009	h5	108.80	30.0	3.25	10.00	2.50	○
5	6.00	67	46MB2 0600/1,6/0,5/18,0-067 h5	+0/-0.005	h5	18.00	46.3	0.95	1.60	0.50	●
5	6.00	67	40MB2 0600/1,9/0,7/22,5-067 h5	+0/-0.005	h5	22.50	40.0	0.95	1.90	0.70	●
5	6.00	75	33MB2 0600/2,2/0,9/29,0-075 h5	+0/-0.005	h5	29.00	33.0	0.95	2.20	0.90	●
5	6.00	75	40MB2 0600/1,9/0,7/22,5-075 h5	+0/-0.005	h5	22.50	40.0	0.95	1.90	0.70	●
5	6.00	83	30MB2 0600/2,7/0,8/32,7-083 h5	+0/-0.005	h5	32.70	30.0	0.95	2.70	0.80	●
5	8.00	92	30MB2 0800/3,4/1,0/43,5-092 h5	+0/-0.006	h5	43.50	30.0	1.25	3.40	1.00	●
5	10.00	104	30MB2 1000/4,8/1,3/54,0-104 h5	+0/-0.006	h5	54.40	30.0	1.35	4.80	1.30	●
5	12.00	119	30MB2 1200/6,3/1,7/65,3-119 h5	+0/-0.008	h5	65.30	30.0	1.75	6.30	1.70	●
5	14.00	125	30MB2 1400/6,7/1,8/76,2-125 h5	+0/-0.008	h5	76.20	30.0	1.95	6.70	1.80	●
5	16.00	134	30MB2 1600/8,0/2,0/87,1-134 h5	+0/-0.008	h5	87.10	30.0	2.45	8.00	2.00	●
5	18.00	144	30MB2 1800/9,0/2,3/98,0-144 h5	+0/-0.008	h5	98.00	30.0	2.75	9.00	2.30	●
5	20.00	154	30MB2 2000/10,0/2,5/108,8-154 h5	+0/-0.009	h5	108.80	30.0	3.25	10.00	2.50	○

→ For further information go to page 108.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

8xD, 12xD with through coolant
Drill blanks



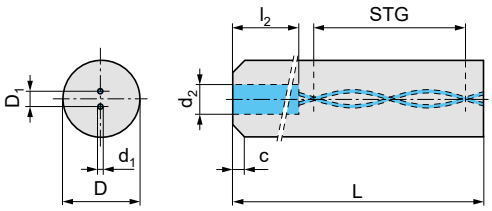
xD factor	D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	Nominal pitch [mm]	[°]	c [mm]	D_1 [mm]	d_1 [mm]	CTS20D
8	6.00	73	46MB2 0600/1,6/0,5/18,0-073 h5	+0/-0.005	h5	18.00	46.3	0.95	1.60	0.50	●
8	6.00	73	40MB2 0600/1,9/0,7/22,5-073 h5	+0/-0.005	h5	22.50	40.0	0.95	1.90	0.70	●
8	6.00	82	33MB2 0600/2,2/0,9/29,0-082 h5	+0/-0.005	h5	29.00	33.0	0.95	2.20	0.90	●
8	6.00	82	40MB2 0600/1,9/0,7/22,5-082 h5	+0/-0.005	h5	22.50	40.0	0.95	1.90	0.70	●
8	6.00	96	30MB2 0600/2,7/0,8/32,7-096 h5	+0/-0.005	h5	32.70	30.0	0.95	2.70	0.80	●
8	8.00	115	30MB2 0800/3,4/1,0/43,5-115 h5	+0/-0.006	h5	43.50	30.0	1.25	3.40	1.00	●
8	10.00	143	30MB2 1000/4,8/1,3/54,0-143 h5	+0/-0.006	h5	54.40	30.0	1.35	4.80	1.30	●
8	12.00	163	30MB2 1200/6,3/1,7/65,3-163 h5	+0/-0.008	h5	65.30	30.0	1.75	6.30	1.70	●
8	14.00	179	30MB2 1400/6,7/1,8/76,2-179 h5	+0/-0.008	h5	76.20	30.0	1.95	6.70	1.80	●
8	16.00	204	30MB2 1600/8,0/2,0/87,1-204 h5	+0/-0.008	h5	87.10	30.0	2.45	8.00	2.00	●
8	18.00	223	30MB2 1800/9,0/2,3/98,0-223 h5	+0/-0.008	h5	98.00	30.0	2.75	9.00	2.30	●
8	20.00	244	30MB2 2000/10,0/2,5/108,8-244 h5	+0/-0.009	h5	108.80	30.0	3.25	10.00	2.50	○
12	6.00	93	40MB2 0600/1,9/0,7/22,5-093 h5	+0/-0.005	h5	22.50	40.0	0.95	1.90	0.70	○
12	6.00	93	46MB2 0600/1,6/0,5/18,0-093 h5	+0/-0.005	h5	18.00	46.3	0.95	1.60	0.50	○
12	6.00	103	40MB2 0600/1,9/0,7/22,5-103 h5	+0/-0.005	h5	22.50	40.0	0.95	1.90	0.70	○
12	6.00	103	33MB2 0600/2,2/0,9/29,0-103 h5	+0/-0.005	h5	29.00	33.0	0.95	2.20	0.90	○
12	6.00	117	30MB2 0600/2,7/0,8/32,7-117 h5	+0/-0.005	h5	32.70	30.0	0.95	2.70	0.80	○
12	8.00	147	30MB2 0800/3,4/1,0/43,5-147 h5	+0/-0.006	h5	43.50	30.0	1.25	3.40	1.00	○
12	10.00	163	30MB2 1000/4,8/1,3/54,0-163 h5	+0/-0.006	h5	54.40	30.0	1.35	4.80	1.30	○
12	12.00	205	30MB2 1200/6,3/1,7/65,3-205 h5	+0/-0.008	h5	65.30	30.0	1.75	6.30	1.70	○
12	14.00	231	30MB2 1400/6,7/1,8/76,2-231 h5	+0/-0.008	h5	76.20	30.0	1.95	6.70	1.80	○
12	16.00	261	30MB2 1600/8,0/2,0/87,1-261 h5	+0/-0.008	h5	87.10	30.0	2.45	8.00	2.00	○
12	18.00	286	30MB2 1800/9,0/2,3/98,0-286 h5	+0/-0.008	h5	98.00	30.0	2.75	9.00	2.30	○
12	20.00	311	30MB2 2000/10,0/2,5/108,8-311 h5	+0/-0.009	h5	108.80	30.0	3.25	10.00	2.50	○

→ For further information go to page 108.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

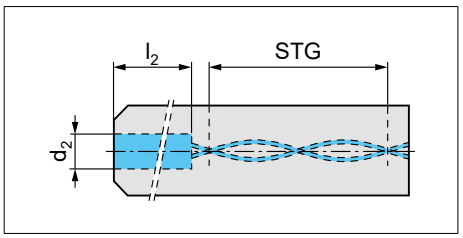
For micro-drills with through coolant

Blanks for micro-drills

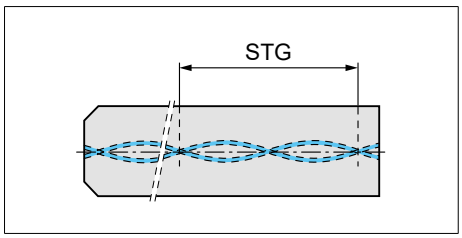


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	Nominal pitch [mm]	[°]	c [mm]	D_1 [mm]	d_1 [mm]	d_2 [mm]	l_2 [mm]	CTS20D
3.00	55	71G2 0300/0,29/0,05/3,2-055 PK	+0/-0.004	h5	3.20	71.2	0.20	0.29	0.05	0.70	25	○
3.00	60	67G2 0300/0,37/0,07/4,0-060 PK	+0/-0.004	h5	4.00	67.0	0.20	0.37	0.07	0.90	25	●
3.00	65	62G2 0300/0,47/0,10/5,0-065 PK	+0/-0.004	h5	5.00	62.1	0.20	0.47	0.10	1.20	25	●
3.00	75	58G2 0300/0,60/0,13/6,0-075 PK	+0/-0.004	h5	6.00	57.5	0.20	0.60	0.13	1.50	25	●
3.00	85	53G2 0300/0,75/0,16/7,2-085 PK	+0/-0.004	h5	7.20	52.6	0.20	0.75	0.16	1.70	25	●
3.00	95	46G2 0300/0,90/0,20/9,0-095 SO	+0/-0.004	h5	9.00	46.3	0.20	0.90	0.20			●
3.00	105	42G2 0300/1,05/0,25/10,6-105 SO	+0/-0.004	h5	10.60	41.6	0.20	1.05	0.25			●
3.00	120	37G2 0300/1,25/0,30/12,5-120 SO	+0/-0.004	h5	12.50	37.0	0.20	1.25	0.30			●
3.00	140	33G2 0300/1,50/0,35/14,5-140 SO	+0/-0.004	h5	14.50	33.0	0.20	1.50	0.35			●
4.00	55	76G2 0400/0,29/0,05/3,2-055 PK	+0/-0.005	h5	3.20	75.7	0.30	0.29	0.05	0.70	25	○
4.00	60	72G2 0400/0,37/0,07/4,0-060 PK	+0/-0.005	h5	4.00	72.3	0.30	0.37	0.07	0.90	25	○
4.00	65	68G2 0400/0,47/0,10/5,0-065 PK	+0/-0.005	h5	5.00	68.3	0.30	0.47	0.10	1.20	25	●
4.00	75	64G2 0400/0,60/0,13/6,0-075 PK	+0/-0.005	h5	6.00	64.5	0.30	0.60	0.13	1.50	25	●
4.00	85	60G2 0400/0,75/0,16/7,2-085 PK	+0/-0.005	h5	7.20	60.2	0.30	0.75	0.16	2.00	25	●
4.00	95	54G2 0400/0,90/0,20/9,0-095 PK	+0/-0.005	h5	9.00	54.4	0.30	0.90	0.20	2.50	25	●
4.00	105	50G2 0400/1,05/0,25/10,6-105 SO	+0/-0.005	h5	10.60	49.9	0.30	1.05	0.25			●
4.00	120	46G2 0400/1,25/0,30/12,0-120 SO	+0/-0.005	h5	12.00	46.3	0.30	1.25	0.30			●
4.00	140	38G2 0400/1,50/0,35/16,2-140 SO	+0/-0.004	h5	16.20	37.8	0.30	1.50	0.35			●
4.00	160	35G2 0400/1,70/0,40/18,0-160 SO	+0/-0.004	h5	18.00	34.9	0.30	1.70	0.40			●
4.00	180	30G2 0400/2,00/0,45/21,8-180 SO	+0/-0.004	h5	21.80	30.0	0.30	2.00	0.45			○

with power chamber



without power chamber



→ For further information go to page 108.

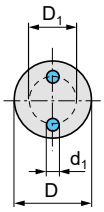
○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

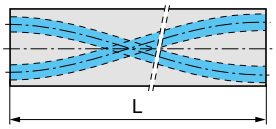
3

Rods with helical coolant holes

Our range of sintered and ground rods with helical coolant holes supports the production of drills in a diameter range from 3 mm to 35 mm. Our rods with helical coolant holes are available in the proven CTS20D grade for the universal machining of steel, stainless steel or heat-resistant alloys, and now also in CTS12D and the new high-performance grade CTS24Z for the machining of difficult materials like titanium or Inconel. Having virtually the same hardness, CTS24Z is even tougher than our proven CTS18D and CTS20D grades. This extreme toughness offers maximum protection against breakage and ensures consistent performance of your tools.
Of course we can also produce carbide rods in other dimensions and grades to order – just get in touch with your contact person at CERATIZIT.
Detailed technical data for our rods with helical coolant holes can be found in the 'Information' section.

As sintered
With two coolant holes, ≤ 22°



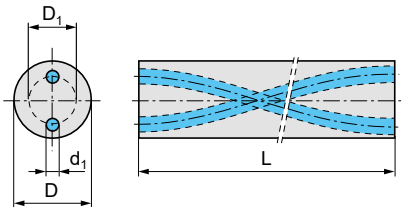


D [mm]	L [mm]	Type, description	Nominal pitch [mm]	Nominal pitch [°]	D_1 [mm]	d_1 [mm]	CTS12D	CTS20D
6.30	330	15R2 0630/2,6/0,7/70,35-330	70.35	15.0	2.60	0.70	○	●
6.30	415	22R2 0630/1,9/0,6/46,9-415	46.90	21.9	1.90	0.60		●
6.30	415	15R2 0630/2,6/0,7/70,35-415	70.35	15.0	2.60	0.70		●
8.30	330	15R2 0830/3,6/1,25/93,8-330	93.80	15.0	3.60	1.25	○	●
8.30	415	20R2 0830/3,3/1,0/70,34-415	70.34	19.7	3.30	1.00		●
8.30	415	15R2 0830/3,6/1,25/93,8-415	93.80	15.0	3.60	1.25		●
10.30	330	15R2 1030/4,80/1,40/117,25-330	117.25	15.0	4.80	1.40	○	●
10.30	415	19R2 1030/4,40/1,20/93,80-415	93.80	18.5	4.40	1.20		○
10.30	415	15R2 1030/4,80/1,40/117,25-415	117.25	15.0	4.80	1.40		●
12.30	330	15R2 1230/6,25/1,55/140,70-330	140.70	15.0	6.25	1.55	○	●
12.30	415	18R2 1230/5,40/1,50/117,25-415	117.25	17.8	5.40	1.50		●
12.30	415	15R2 1230/6,25/1,55/140,70-415	140.70	15.0	6.25	1.55		●
14.30	330	15R2 1430/6,70/1,90/164,14-330	164.14	15.0	6.70	1.90	○	●
14.30	415	15R2 1430/6,70/1,90/164,14-415	164.14	15.0	6.70	1.90		●
16.30	330	15R2 1630/8,0/2,10/187,59-330	187.59	15.0	8.00	2.10	○	●
18.30	330	15R2 1830/9,0/2,3/211,0-330	211.00	15.0	9.00	2.30	○	●
20.30	330	15R2 2030/10,0/2,50/234,49-330	234.49	15.0	10.00	2.50	○	●
22.30	330	15R2 2230/12,0/2,5/257,94-330	257.94	15.0	12.00	2.50		○

→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With two coolant holes, 23° – 49°

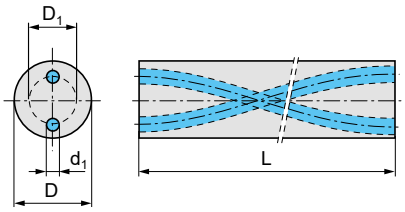


D	L	Type, description	Nominal pitch		D_1	d_1			
[mm]	[mm]		[mm]	[°]	[mm]	[mm]	CTS12D	CTS20D	CTS24Z
3.30	330	49R2 0330/0,55/0,20/8,2-330	8.20	49.0	0.55	0.20		●	
3.30	330	40R2 0330/0,3/0,15/11,2-330	11.20	40.1	0.30	0.15		●	
3.30	330	39R2 0330/0,8/0,23/11,5-330	11.50	39.3	0.80	0.23		●	
3.30	330	34R2 0330/1,1/0,35/14,0-330	14.00	34.0	1.10	0.35		●	
3.30	330	30R2 0330/1,4/0,35/16,32-330	16.32	30.0	1.40	0.35		●	
4.30	330	46R2 0430/1,0/0,3/12,0-330	12.00	46.3	1.00	0.30		●	
4.30	330	38R2 0430/1,2/0,35/16,2-330	16.20	37.8	1.20	0.35		●	
4.30	330	35R2 0430/1,6/0,45/18,0-330	18.00	34.9	1.60	0.45		●	
4.30	330	30R2 0430/2,1/0,45/21,8-330	21.80	30.0	2.10	0.45		●	
5.30	330	33R2 0530/2,2/0,6/24,5-330	24.50	32.7	2.20	0.60		●	
6.30	330	46R2 0630/1,6/0,5/18,0-330	18.00	46.0	1.60	0.50	●	●	●
6.30	330	40R2 0630/1,9/0,7/22,5-330	22.50	40.0	1.90	0.70	●	●	●
6.30	330	35R2 0630/2,3/0,7/27,2-330	27.20	34.6	2.30	0.70		▲	
6.30	330	33R2 0630/2,4/0,7/29,0-330	29.00	32.7	2.40	0.70		▲	
6.30	330	30R2 0630/2,7/0,8/32,7-330	32.70	30.0	2.70	0.80	○	●	●
6.30	330	30R2 0630/2,2/0,7/32,7-330	32.70	30.0	2.20	0.70		●	
6.30	330	30R2 0630/3,0/0,9/32,7-330	32.70	30.0	3.00	0.90		●	
6.30	330	30R2 0630/2,0/0,9/32,7-330	32.70	30.0	2.00	0.90		●	
6.30	350	46R2 0630/1,6/0,5/18,0-350	18.00	46.3	1.60	0.50		●	
6.30	350	40R2 0630/1,9/0,7/22,5-350	22.50	40.0	1.90	0.70		●	
6.30	350	30R2 0630/2,2/0,7/32,7-350	32.70	30.0	2.20	0.70		●	
6.80	330	30R2 0680/2,7/0,8/35,4-330	35.40	28.0	2.70	0.80	○		
6.80	330	30R2 0680/3,3/0,9/35,4-330	35.40	28.0	3.30	0.90		○	
7.30	330	30R2 0730/3,5/1,0/38,1-330	38.10	30.0	3.50	1.00		●	
8.30	330	43R2 0830/2,3/0,7/27,2-330	27.20	42.7	2.30	0.70		●	
8.30	330	40R2 0830/2,9/0,7/30,0-330	30.00	40.0	2.90	0.70	●	●	●
8.30	330	36R2 0830/3,3/1,0/35,0-330	35.00	35.7	3.30	1.00		●	
8.30	330	30R2 0830/3,4/1,0/43,5-330	43.50	30.0	3.40	1.00	●	●	●
8.30	330	30R2 0830/4,1/1,2/43,5-330	43.50	30.0	4.10	1.20		●	
8.30	350	36R2 0830/3,3/1,0/35,0-350	35.00	35.7	3.30	1.00		●	

→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With two coolant holes, 23° – 49°

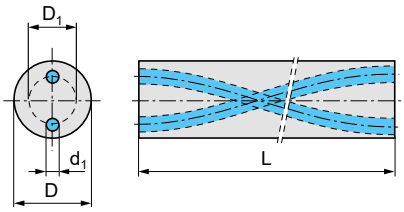


D	L	Type, description	Nominal pitch		D_1	d_1			
[mm]	[mm]		[mm]	[°]	[mm]	[mm]	CTS12D	CTS20D	CTS24Z
8.30	350	30R2 0830/3,4/1,0/43,5-350	43.50	30.0	3.40	1.00		●	
9.30	330	30R2 0930/4,35/1,0/49,0-330	49.00	30.0	4.35	1.00		●	
9.80	330	30R2 0980/4,8/1,3/51,7-330	51.70	28.7	4.80	1.30		○	
10.30	330	40R2 1030/2,7/0,8/37,0-330	37.00	40.3	2.70	0.80	●	●	●
10.30	330	34R2 1030/3,9/1,1/46,0-330	46.00	34.3	3.90	1.10		●	
10.30	330	34R2 1030/4,4/1,15/46,0-330	46.00	34.3	4.40	1.15		●	
10.30	330	33R2 1030/5,0/1,2/49,0-330	49.00	32.7	5.00	1.20		●	
10.30	330	30R2 1030/4,8/1,3/54,4-330	54.40	30.2	4.80	1.30	●	●	●
11.30	330	40R2 1130/3,2/0,8/41,2-330	41.20	40.0	3.20	0.80		●	
11.30	330	30R2 1130/5,5/1,5/59,9-330	59.90	30.0	5.50	1.50		●	
11.80	330	30R2 1180/5,5/1,5/62,6-330	62.60	28.9	5.50	1.50		○	
12.30	250	33R2 1230/5,4/1,5/57,0-250	57.00	33.5	5.40	1.50		●	
12.30	250	30R2 1230/6,3/1,7/65,3-250	65.30	30.0	6.30	1.70		●	
12.30	330	40R2 1230/4,0/0,9/44,9-330	44.90	40.0	4.00	0.90	●	●	●
12.30	330	39R2 1230/3,5/1,0/46,3-330	46.30	39.2	3.50	1.00		●	
12.30	330	33R2 1230/5,0/1,35/57,0-330	57.00	33.5	5.00	1.35		●	
12.30	330	33R2 1230/5,4/1,5/57,0-330	57.00	33.5	5.40	1.50		●	
12.30	330	32R2 1230/6,0/1,5/59,9-330	59.90	32.2	6.00	1.50		●	
12.30	330	30R2 1230/6,3/1,7/65,3-330	65.30	30.0	6.30	1.70	●	●	●
13.30	330	40R2 1330/4,4/1,0/48,7-330	48.70	40.0	4.40	1.00		○	
13.30	330	30R2 1330/6,5/1,6/70,7-330	70.70	30.0	6.50	1.60		●	
14.30	330	40R2 1430/4,6/1,3/52,4-330	52.40	40.0	4.60	1.30	●	●	●
14.30	330	34R2 1430/6,0/1,6/65,0-330	65.00	34.1	6.00	1.60		●	
14.30	330	30R2 1430/6,7/1,8/76,2-330	76.20	30.0	6.70	1.80	●	●	●
14.30	330	30R2 1430/7,6/2,0/76,2-330	76.20	30.0	7.60	2.00		●	
14.30	330	30R2 1430/7,0/2,0/76,2-330	76.20	30.0	7.00	2.00		●	
15.30	330	30R2 1530/7,6/2,0/81,6-330	81.60	30.0	7.60	2.00		●	
16.30	280	30R2 1630/8,0/2,0/87,1-280	87.10	30.0	8.00	2.00		●	
16.30	330	40R2 1630/5,5/1,2/59,9-330	59.90	40.0	5.50	1.20	●	●	○
16.30	330	35R2 1630/7,0/2,0/73,0-330	73.00	34.6	7.00	2.00		●	

→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With two coolant holes, 23° – 49°

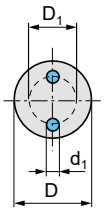


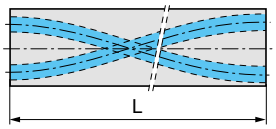
D	L	Type, description	Nominal pitch		D_1	d_1			
[mm]	[mm]		[mm]	[°]	[mm]	[mm]	CTS12D	CTS20D	CTS24Z
16.30	330	32R2 1630/8,4/2,0/81,6-330	81.60	31.6	8.40	2.00		●	
16.30	330	30R2 1630/8,0/2,0/87,1-330	87.10	30.0	8.00	2.00	●	●	●
16.30	330	30R2 1630/8,6/2,5/87,1-330	87.10	30.0	8.60	2.50		●	
17.30	330	40R2 1730/5,75/1,3/63,6-330	63.60	40.0	5.75	1.30		○	
17.30	330	30R2 1730/8,9/2,5/92,5-330	92.50	30.0	8.90	2.50		○	
18.30	330	40R2 1830/6,3/1,7/68,0-330	68.00	39.7	6.30	1.70		●	
18.30	330	40R2 1830/5,6/1,6/68,0-330	68.00	39.7	5.60	1.60	●	●	○
18.30	330	35R2 1830/7,75/2,2/82,0-330	82.00	34.6	7.75	2.20		●	
18.30	330	30R2 1830/9,3/2,7/98,0-330	98.00	30.0	9.30	2.70	●	●	●
19.80	330	30R2 1980/9,6/2,4/106,1-330	106.10	29.4	9.60	2.40		○	
20.30	330	40R2 2030/7,1/1,5/74,9-330	74.90	40.0	7.10	1.50	○	●	○
20.30	330	37R2 2030/6,5/1,7/84,3-330	84.30	36.7	6.50	1.70		●	
20.30	330	30R2 2030/10,0/2,5/108,8-330	108.80	30.0	10.00	2.50	○	●	○
20.30	330	30R2 2030/10,7/3,2/108,8-330	108.80	30.0	10.70	3.20		●	
21.30	330	30R2 2130/10,65/2,0/114,2-330	114.20	30.0	10.65	2.00		●	
21.30	330	30R2 2130/11,5/3,2/114,2-330	114.20	30.0	11.50	3.20		●	
22.30	330	40R2 2230/7,7/1,7/82,4-330	82.40	40.0	7.70	1.70		●	
22.30	330	33R2 2230/10,0/2,50/108,0-330	108.00	32.6	10.00	2.50		●	
22.30	330	30R2 2230/11,5/3,4/119,7-330	119.70	30.0	11.50	3.40		●	
22.30	330	30R2 2230/11,3/2,0/119,7-330	119.70	30.0	11.30	2.00		●	
25.30	330	40R2 2530/7,7/1,75/93,6-330	93.60	40.0	7.70	1.75		●	○
25.30	330	33R2 2530/12,0/3,2/119,0-330	119.00	33.0	12.00	3.20		●	○
28.30	330	39R2 2830/9,0/2,0/107,7-330	107.70	39.2	9.00	2.00		●	
28.30	330	29R2 2830/14,8/2,5/159,0-330	159.00	29.0	14.80	2.50		●	
30.30	330	39R2 3030/10,0/2,0/116,0-330	116.00	39.1	10.00	2.00		●	
30.30	330	29R2 3030/16,0/2,5/172,0-330	172.00	28.7	16.00	2.50		●	
32.30	330	40R2 3230/11,0/2,0/119,8-330	119.80	40.0	11.00	2.00		●	
32.30	330	29R2 3230/17,0/3,0/177,8-330	177.80	29.5	17.00	3.00		●	
35.30	330	30R2 3530/18,0/3,0/189,5-330	189.50	30.0	18.00	3.00		●	

→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With two coolant holes, extra-long, 23° – 49°



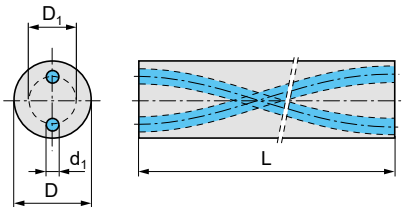


D [mm]	L [mm]	Type, description	Nominal pitch [mm]	Nominal pitch [°]	D_1 [mm]	d_1 [mm]	CTS20D
6.30	430	46R2 0630/1,6/0,5/18,0-430	18.00	46.3	1.60	0.50	●
6.30	430	40R2 0630/1,9/0,7/22,5-430	22.50	40.0	1.90	0.70	●
6.30	430	30R2 0630/2,2/0,7/32,7-430	32.70	30.0	2.20	0.70	●
6.30	430	30R2 0630/3,0/0,9/32,7-430	32.70	30.0	3.00	0.90	●
8.30	430	30R2 0830/3,4/1,0/43,5-430	43.50	30.0	3.40	1.00	●
10.30	430	30R2 1030/4,8/1,3/54,4-430	54.40	30.0	4.80	1.30	●
10.30	530	30R2 1030/4,8/1,3/54,4-530	54.40	30.0	4.80	1.30	●
12.30	430	30R2 1230/6,3/1,7/65,3-430	65.30	30.0	6.30	1.70	●
12.30	530	30R2 1230/6,3/1,7/65,3-530	65.30	30.0	6.30	1.70	●
14.30	430	30R2 1430/6,7/1,8/76,2-430	76.20	30.0	6.70	1.80	●
14.30	530	30R2 1430/6,7/1,8/76,2-530	76.20	30.0	6.70	1.80	●
16.30	430	30R2 1630/8,0/2,0/87,1-430	87.10	30.0	8.00	2.00	●
16.30	530	30R2 1630/8,0/2,0/87,1-530	87.10	30.0	8.00	2.00	●
18.30	430	30R2 1830/9,3/2,7/98,0-430	98.00	30.0	9.30	2.70	●
18.30	530	30R2 1830/9,3/2,7/98,0-530	98.00	30.0	9.30	2.70	○
20.30	430	30R2 2030/10,0/2,5/108,8-430	108.80	30.0	10.00	2.50	●
20.30	530	30R2 2030/10,0/2,5/108,8-530	108.80	30.0	10.00	2.50	●
25.30	430	33R2 2530/12,0/3,2/119,0-430	119.00	33.4	12.00	3.20	●
25.30	530	33R2 2530/12,0/3,2/119,0-530	119.00	33.4	12.00	3.20	●

→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With two coolant holes, ≥ 50°



D [mm]	L [mm]	Type, description	Nominal pitch [mm]	Nominal pitch [°]	D_1 [mm]	d_1 [mm]	CTS20D
10.30	330	50R2 1030/2,3/0,7/26,0-330	26.00	50.4	2.30	0.70	●
12.30	330	51R2 1230/2,3/0,7/30,1-330	30.10	51.4	2.30	0.70	●
13.30	330	50R2 1330/2,6/0,7/34,0-330	34.00	50.2	2.60	0.70	●
16.30	330	50R2 1630/3,7/1,0/42,0-330	42.00	50.1	3.70	1.00	●
20.30	330	50R2 2030/4,4/1,2/52,7-330	52.70	50.0	4.40	1.20	●

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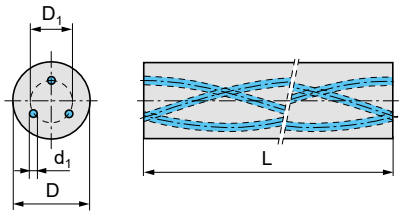
→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With three coolant holes

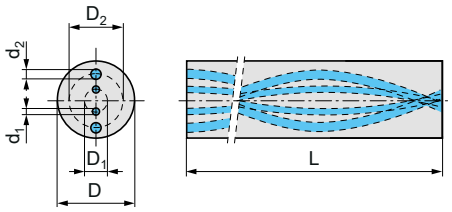


D [mm]	L [mm]	Type, description	Nominal pitch [mm]	Nominal pitch [°]	D_1 [mm]	d_1 [mm]	CTS20D
6.30	330	30R3 0630/3,0/0,6/32,7-330	32.70	31.2	3.00	0.60	●
8.30	330	40R3 0830/2,9/0,7/30,0-330	30.00	40.0	2.90	0.70	●
8.30	330	30R3 0830/4,0/0,75/43,5-330	43.50	30.0	4.00	0.75	●
10.30	330	40R3 1030/3,5/0,75/37,0-330	37.00	40.3	3.50	0.75	●
10.30	330	30R3 1030/4,9/1,0/54,4-330	54.40	30.0	4.90	1.00	●
12.30	330	40R3 1230/4,0/0,9/44,9-330	44.90	40.0	4.00	0.90	●
12.30	330	30R3 1230/6,0/1,1/65,3-330	65.30	30.0	6.00	1.10	●
14.30	330	40R3 1430/4,65/1,2/52,4-330	52.40	40.0	4.65	1.20	●
14.30	330	30R3 1430/7,1/1,3/76,2-330	76.20	30.0	7.10	1.30	●
16.30	330	40R3 1630/5,5/1,2/59,9-330	59.90	40.0	5.50	1.20	●
16.30	330	30R3 1630/8,3/1,5/87,0-330	87.00	30.0	8.30	1.50	●
18.30	330	40R3 1830/6,25/1,5/67,4-330	67.40	40.0	6.25	1.50	●
18.30	330	30R3 1830/9,6/1,7/98,0-330	98.00	30.0	9.60	1.70	●
20.30	330	40R3 2030/7,1/1,5/74,9-330	74.90	40.0	7.10	1.50	●
20.30	330	30R3 2030/10,4/2,0/108,8-330	108.80	30.0	10.40	2.00	●
22.30	330	40R3 2230/7,7/1,7/82,4-330	82.40	40.0	7.70	1.70	●
22.30	330	30R3 2230/10,7/2,0/119,7-330	119.70	30.0	10.70	2.00	●
25.30	330	40R3 2530/8,1/1,7/93,6-330	93.60	40.0	8.10	1.70	●
25.30	330	33R3 2530/11,5/2,2/119,0-330	119.00	33.4	11.50	2.20	●

→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With four coolant holes

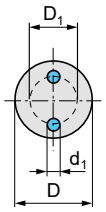


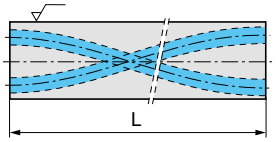
D [mm]	L [mm]	Type, description	Nominal pitch [mm]	[°]	D_1 [mm]	d_1 [mm]	D_2 [mm]	d_2 [mm]	CTS20D
8.30	330	33R4 0830/1,9/3,9/0,4/0,8/38-330	38.10	33.4	1.90	0.40	3.90	0.80	●
8.30	330	30R4 0830/2,2/4,5/0,45/0,9/44-330	43.50	29.7	2.20	0.45	4.50	0.90	○
10.30	330	33R4 1030/2,5/5,1/0,5/1,0/49-330	49.00	32.7	2.50	0.50	5.10	1.00	●
10.30	330	30R4 1030/2,8/5,7/0,6/1,1/54-330	54.40	30.0	2.80	0.60	5.70	1.10	●
12.30	330	32R4 1230/3,1/6,3/0,7/1,2/60-330	59.90	32.2	3.10	0.70	6.30	1.20	●
12.30	330	30R4 1230/3,4/6,9/0,7/1,4/65-330	65.30	30.0	3.40	0.70	6.90	1.40	●
14.30	330	32R4 1430/3,6/7,5/0,8/1,5/71-330	70.70	31.9	3.60	0.80	7.50	1.50	●
14.30	330	30R4 1430/3,9/8,1/0,8/1,6/76-330	76.20	30.0	3.90	0.80	8.10	1.60	●
16.30	330	30R4 1630/4,4/9,0/0,9/1,8/87-330	87.10	30.0	4.40	0.90	9.00	1.80	●
18.30	330	30R4 1830/5,0/10,2/1,0/2,0/98-330	98.00	30.0	5.00	1.00	10.20	2.00	●
20.30	330	30R4 203/5,6/11,4/1,2/2,3/109-330	108.80	30.0	5.60	1.20	11.40	2.30	●
22.30	330	30R4 223/6,1/12,6/1,2/2,5/120-330	119.70	30.0	6.10	1.20	12.60	2.50	○
25.30	330	29R4 253/6,9/14,1/1,4/2,8/139-330	139.30	29.4	6.90	1.40	14.10	2.80	●

→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Ground
With two coolant holes, ≤ 22°



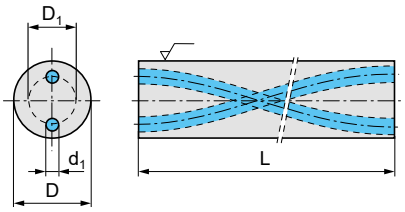


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	Nominal pitch [mm]	[°]	D_1 [mm]	d_1 [mm]	CTS20D
6.00	330	15G2 0600/2,6/0,7/70,35-330	+0/-0.008	h6	70.35	15.0	2.60	0.70	●
8.00	330	15G2 0800/3,6/1,25/93,8-330	+0/-0.009	h6	93.80	15.0	3.60	1.25	●
10.00	330	15G2 1000/4,80/1,40/117,25-330	+0/-0.009	h6	117.25	15.0	4.80	1.40	●
12.00	330	15G2 1200/6,25/1,55/140,70-330	+0/-0.011	h6	140.70	15.0	6.25	1.55	●
14.00	330	15G2 1400/6,70/1,90/164,14-330	+0/-0.011	h6	164.14	15.0	6.70	1.90	●
16.00	330	15G2 1600/8,0/2,10/187,59-330	+0/-0.011	h6	187.59	15.0	8.00	2.10	●
18.00	330	15G2 1800/9,0/2,3/211,0-330	+0/-0.011	h6	211.00	15.0	9.00	2.30	●
20.00	330	15G2 2000/10,0/2,50/234,49-330	+0/-0.013	h6	234.49	15.0	10.00	2.50	●

→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Ground
With two coolant holes, 23° – 49°

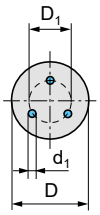


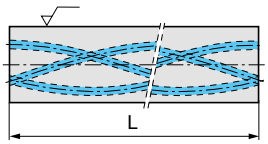
D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	Nominal pitch [mm]	[°]	D_1 [mm]	d_1 [mm]	CTS20D
6.00	330	40G2 0600/1,9/0,7/22,5-330	+0/-0.008	h6	22.50	40.0	1.90	0.70	●
6.00	330	30G2 0600/3,0/0,9/32,7-330	+0/-0.008	h6	32.70	30.0	3.00	0.90	●
8.00	330	43G2 0800/2,3/0,7/27,2-330	+0/-0.009	h6	27.20	42.7	2.30	0.70	●
8.00	330	30G2 0800/3,4/1,0/43,5-330	+0/-0.009	h6	43.50	30.0	3.40	1.00	●
10.00	330	40G2 1000/2,7/0,8/37,0-330	+0/-0.009	h6	37.00	40.0	2.70	0.80	●
10.00	330	30G2 1000/4,8/1,3/54,4-330	+0/-0.009	h6	54.40	30.0	4.80	1.30	●
12.00	330	39G2 1200/3,5/1,0/46,3-330	+0/-0.011	h6	46.30	39.0	3.50	1.00	●
12.00	330	30G2 1200/6,3/1,7/65,3-330	+0/-0.011	h6	65.30	30.0	6.30	1.70	●
14.00	330	40G2 1400/4,6/1,3/52,4-330	+0/-0.011	h6	52.40	40.0	4.60	1.30	●
14.00	330	30G2 1400/6,7/1,8/76,2-330	+0/-0.011	h6	76.20	30.0	6.70	1.80	●
16.00	330	40G2 1600/5,5/1,2/59,9-330	+0/-0.011	h6	59.90	40.0	5.50	1.20	●
16.00	330	30G2 1600/8,0/2,0/87,1-330	+0/-0.011	h6	87.10	30.0	8.00	2.00	●
18.00	330	40G2 1800/6,3/1,7/68,0-330	+0/-0.011	h6	68.00	39.7	6.30	1.70	●
18.00	330	30G2 1800/9,3/2,7/98,0-330	+0/-0.011	h6	98.00	30.0	9.30	2.70	●
20.00	330	40G2 2000/7,1/1,5/74,9-330	+0/-0.013	h6	74.90	40.0	7.10	1.50	●
20.00	330	30G2 2000/10,0/2,5/108,8-330	+0/-0.013	h6	108.80	30.0	10.00	2.50	●
25.00	330	40G2 2500/7,7/1,75/93,6-330	+0/-0.013	h6	93.60	40.0	7.70	1.75	●
25.00	330	33G2 2500/12,0/3,2/119,0-330	+0/-0.013	h6	119.00	33.4	12.0	3.20	●
32.00	330	40G2 3200/11,0/2,0/119,8-330	+0/-0.016	h6	119.80	40.0	11.00	2.00	○
32.00	330	29G2 3200/17,0/3,0/177,8-330	+0/-0.016	h6	177.80	29.5	17.00	3.00	○

→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Ground
With three coolant holes





D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	Nominal pitch [mm]	[°]	D_1 [mm]	d_1 [mm]	CTS20D
6.00	330	30G3 0600/3,0/0,6/32,7-330	+0/-0.008	h6	32.70	30.0	3.00	0.60	●
8.00	330	30G3 0800/4,0/0,75/43,5-330	+0/-0.009	h6	43.50	30.0	4.00	0.75	●
10.00	330	30G3 1000/4,9/1,0/54,4-330	+0/-0.009	h6	54.40	30.0	4.90	1.00	●
12.00	330	30G3 1200/6,0/1,1/65,3-330	+0/-0.011	h6	65.30	30.0	6.00	1.10	●
14.00	330	30G3 1400/7,1/1,3/76,2-330	+0/-0.011	h6	76.20	30.0	7.10	1.30	●
16.00	330	30G3 1600/8,3/1,5/87,0-330	+0/-0.011	h6	87.00	30.0	8.30	1.50	●
18.00	330	30G3 1800/9,6/1,7/98,0-330	+0/-0.011	h6	98.00	30.0	9.60	1.70	●
20.00	330	30G3 2000/10,4/2,0/108,8-330	+0/-0.013	h6	108.80	30.0	10.40	2.00	●
25.00	330	33G3 2500/11,5/2,2/119,0-330	+0/-0.013	h6	119.00	33.0	11.50	2.20	●

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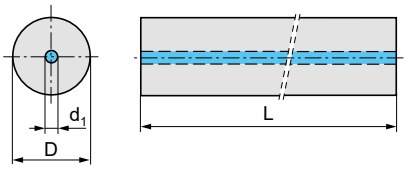
→ For further information go to page 110.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Rods with straight coolant holes

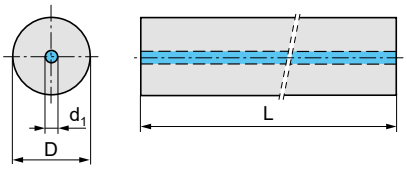
Our standard range includes sintered and ground rods with one central or two straight coolant holes. In addition to our established carbide grades, we offer a selection of dimensions in the cermet grade CTF24T, which has been specially developed for the finish machining of steel.
Of course we can also produce carbide rods in other dimensions and grades to order – just get in touch with your contact person at CERATIZIT.
Detailed technical data for our rods with straight coolant holes can be found in the 'Information' section.

As sintered
With central coolant hole, ultra-fine grades



D [mm]	L [mm]	Type, description	d1 [mm]	TSF44
6.45	330	00R1 0645/1,0-330	1.00	●
8.55	330	00R1 0855/1,3-330	1.30	●
10.55	330	00R1 1055/1,3-330	1.30	●
10.55	330	00R1 1055/2,0-330	2.00	●
12.55	330	00R1 1255/2,0-330	2.00	●
14.70	330	00R1 1470/2,0-330	2.00	●
16.70	330	00R1 1670/2,0-330	2.00	●
20.70	330	00R1 2070/3,0-330	3.00	●

As sintered
With central coolant hole, submicron grades

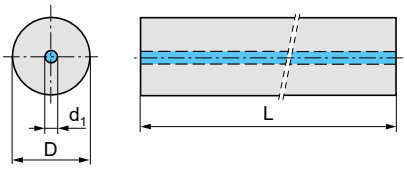


D [mm]	L [mm]	Type, description	d1 [mm]	CTS15D	CTS20D
4.95	330	00R1 0495/0,6-330	0.60	●	
6.30	330	00R1 0630/1,0-330	1.00		●
6.45	330	00R1 0645/1,0-330	1.00	●	
8.30	330	00R1 0830/1,3-330	1.30		●
8.55	330	00R1 0855/2,0-330	2.00	●	
8.55	330	00R1 0855/1,3-330	1.30	●	
10.30	330	00R1 1030/2,0-330	2.00		○
10.55	330	00R1 1055/1,3-330	1.30	●	
10.55	330	00R1 1055/2,0-330	2.00	●	
11.30	330	00R1 1130/2,0-330	2.00		○

→ For further information go to page 112.

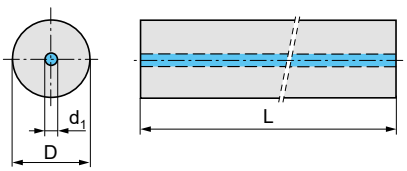
○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With central coolant hole, submicron grades



D [mm]	L [mm]	Type, description	d1 [mm]	CTS15D	CTS20D
12.30	330	00R1 1230/2,0-330	2.00		●
12.55	330	00R1 1255/2,0-330	2.00	●	
13.30	330	00R1 1330/2,0-330	2.00		●
14.30	330	00R1 1430/2,0-330	2.00		●
14.70	330	00R1 1470/2,0-330	2.00	●	
16.30	330	00R1 1630/2,0-330	2.00		●
16.70	330	00R1 1670/2,0-330	2.00	●	
18.30	330	00R1 1830/3,0-330	3.00		●
18.70	330	00R1 1870/3,0-330	3.00	●	
20.30	330	00R1 2030/3,0-330	3.00		●
20.70	330	00R1 2070/3,0-330	3.00	●	
25.30	330	00R1 2530/3,0-330	3.00		●
28.30	330	00R1 2830/4,0-330	4.00		●
30.30	330	00R1 3030/5,0-330	5.00		●
32.30	330	00R1 3230/5,0-330	5.00		●

As sintered
With central coolant hole, cermet

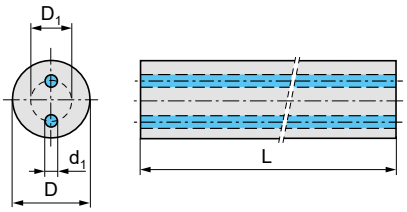


D [mm]	L [mm]	Type, description	d1 [mm]	CTF24T
6.45	330	00R1 0645/1,0-330	1.00	○
8.55	330	00R1 0855/1,3-330	1.30	○
10.55	330	00R1 1055/2,0-330	2.00	○
12.55	330	00R1 1255/2,0-330	2.00	○

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With two straight coolant holes, submicron grades

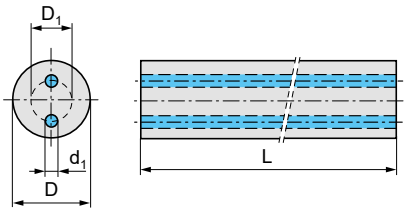


D [mm]	L [mm]	Type, description	D1 [mm]	d1 [mm]	CTS15D	CTS20D
3.30	330	00R2 0330/1,1/0,425-330	1.10	0.43	●	
4.20	330	00R2 0420/1,1/0,45-330	1.10	0.45	●	
5.20	330	00R2 0520/2,0/0,9-330	2.00	0.90	○	○
6.20	330	00R2 0620/1,1/0,5-330	1.10	0.50	●	
6.20	330	00R2 0620/1,5/0,9-330	1.50	0.90	●	
6.20	330	00R2 0620/1,7/0,6-330	1.70	0.60	●	●
6.20	330	00R2 0620/2,0/0,9-330	2.00	0.90	●	●
6.20	330	00R2 0620/2,3/0,9-330	2.30	0.90	●	
6.20	330	00R2 0620/2,6/0,9-330	2.60	0.90		●
6.20	330	00R2 0620/3,0/1,2-330	3.00	1.20	●	
7.20	330	00R2 0720/2,0/0,9-330	2.00	0.90	○	○
7.20	330	00R2 0720/3,0/0,9-330	3.00	0.90		●
8.20	330	00R2 0820/2,0/0,9-330	2.00	0.90	●	●
8.20	330	00R2 0820/2,6/0,9-330	2.60	0.90	●	
8.20	330	00R2 0820/2,6/1,2-330	2.60	1.20		●
8.20	330	00R2 0820/3,4/1,0-330	3.40	1.00		●
8.20	330	00R2 0820/3,5/1,5-330	3.50	1.50	●	
8.20	330	00R2 0820/4,0/0,9-330	4.00	0.90	●	●
9.20	330	00R2 0920/2,6/1,2-330	2.60	1.20		○
9.20	330	00R2 0920/3,5/1,5-330	3.50	1.50	○	
9.20	330	00R2 0920/3,8/1,2-330	3.80	1.20		●
9.20	330	00R2 0920/4,0/1,3-330	4.00	1.30	○	
10.20	330	00R2 1020/2,0/1,0-330	2.00	1.00	●	
10.20	330	00R2 1020/2,6/1,2-330	2.60	1.20		●
10.20	330	00R2 1020/2,8/1,0-330	2.80	1.00	●	
10.20	330	00R2 1020/3,5/1,5-330	3.50	1.50	●	
10.20	330	00R2 1020/4,2/1,4-330	4.20	1.40	●	●
10.20	330	00R2 1020/5,0/1,2-330	5.00	1.20	●	
10.20	330	00R2 1020/5,2/1,4-330	5.20	1.40	●	
12.20	330	00R2 1220/2,6/1,2-330	2.60	1.20	●	

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With two straight coolant holes, submicron grades

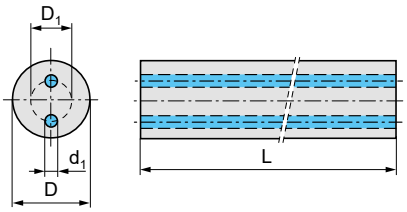


D [mm]	L [mm]	Type, description	D1 [mm]	d1 [mm]	CTS15D	CTS20D
12.20	330	00R2 1220/3,5/1,5-330	3.50	1.50	●	●
12.20	330	00R2 1220/4,8/1,5-330	4.80	1.50	●	
12.20	330	00R2 1220/5,0/2,0-330	5.00	2.00	●	●
12.20	330	00R2 1220/6,0/1,5-330	6.00	1.50	●	
13.20	330	00R2 1320/5,4/2,0-330	5.40	2.00		●
14.20	330	00R2 1420/3,5/1,5-330	3.50	1.50		●
14.20	330	00R2 1420/5,0/1,7-330	5.00	1.70	●	
14.20	330	00R2 1420/5,0/2,0-330	5.00	2.00	●	●
14.20	330	00R2 1420/5,8/2,0-330	5.80	2.00		●
14.20	330	00R2 1420/7,0/2,0-330	7.00	2.00	●	
15.20	330	00R2 1520/5,0/2,0-330	5.00	2.00	○	
16.20	330	00R2 1620/3,5/1,5-330	3.50	1.50	●	
16.20	330	00R2 1620/5,0/1,5-330	5.00	1.50	●	
16.20	330	00R2 1620/5,0/2,0-330	5.00	2.00	●	●
16.20	400	00R2 1620/6,2/2,0-400	6.20	2.00	●	
16.20	330	00R2 1620/6,6/2,5-330	6.60	2.50		●
16.20	330	00R2 1620/8,0/2,0-330	8.00	2.00	●	
16.20	415	00R2 1620/8,0/2,0-415	8.00	2.00	●	
18.20	330	00R2 1820/5,0/2,0-330	5.00	2.00	●	
18.20	330	00R2 1820/6,0/2,0-330	6.00	2.00	●	●
18.20	330	00R2 1820/7,5/2,5-330	7.50	2.50		●
18.20	330	00R2 1820/9,0/2,0-330	9.00	2.00	●	●
20.20	330	00R2 2020/3,5/1,5-330	3.50	1.50	●	
20.20	330	00R2 2020/6,0/2,0-330	6.00	2.00		●
20.20	330	00R2 2020/6,2/2,0-330	6.20	2.00	●	
20.20	330	00R2 2020/8,2/2,5-330	8.20	2.50	●	
20.20	330	00R2 2020/10,0/2,5-330	10.00	2.50	●	
21.20	330	00R2 2120/7,0/2,3-330	7.00	2.30		●
22.20	330	00R2 2220/7,0/2,3-330	7.00	2.30		●
22.20	330	00R2 2220/10,5/3,0-330	10.50	3.00		●

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

As sintered
With two straight coolant holes, submicron grades



D [mm]	L [mm]	Type, description	D1 [mm]	d1 [mm]	CTS15D	CTS20D
25.30	330	00R2 2530/6,2/2,0-330	6.20	2.00	●	●
25.30	330	00R2 2530/8,0/2,0-330	8.00	2.00	●	
25.30	330	00R2 2530/10,0/2,5-330	10.00	2.50	●	
25.30	330	00R2 2530/12,0/3,0-330	12.00	3.00	●	●
26.30	330	00R2 2630/7,5/2,0-330	7.50	2.00		●
26.30	330	00R2 2630/12,0/3,0-330	12.00	3.00		●
28.30	330	00R2 2830/13,0/3,0-330	13.00	3.00		●
30.30	330	00R2 3030/13,0/3,0-330	13.00	3.00		●
32.30	330	00R2 3230/9,0/2,2-330	9.00	2.20		●
32.30	330	00R2 3230/13,8/3,0-330	13.80	3.00		●
34.30	330	00R2 3430/13,8/3,0-330	13.80	3.00		●

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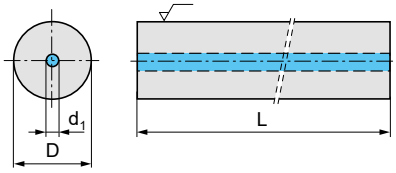
→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Ground
With central coolant hole, submicron grades

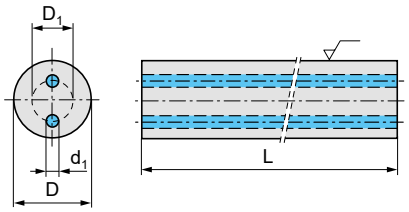


D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	d1 [mm]	CTS15D
6.00	330	00G1 0600/1,0-330	+0/-0.008	h6	1.00	●
8.00	330	00G1 0800/1,3-330	+0/-0.009	h6	1.30	●
10.00	330	00G1 1000/2,0-330	+0/-0.009	h6	2.00	●
12.00	330	00G1 1200/2,0-330	+0/-0.011	h6	2.00	●
14.00	330	00G1 1400/2,0-330	+0/-0.011	h6	2.00	●
16.00	330	00G1 1600/2,0-330	+0/-0.011	h6	2.00	●
16.00	330	00G1 1600/3,0-330	+0/-0.011	h6	3.00	●
20.00	330	00G1 2000/3,0-330	+0/-0.013	h6	3.00	●
25.00	330	00G1 2500/3,0-330	+0/-0.013	h6	3.00	●
32.00	330	00G1 3200/5,0-330	+0/-0.016	h6	5.00	●

→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Ground
With two coolant holes, submicron grades



D [mm]	L [mm]	Type, description	Dia. tol. [mm]	ISO 286	D1 [mm]	d1 [mm]	CTS15D
6.00	330	00G2 0600/1,5/0,9-330	+0/-0.008	h6	1.50	0.90	●
6.00	330	00G2 0600/3,0/1,2-330	+0/-0.008	h6	3.00	1.20	●
8.00	330	00G2 0800/2,0/0,9-330	+0/-0.009	h6	2.00	0.90	●
8.00	330	00G2 0800/4,0/0,9-330	+0/-0.009	h6	4.00	0.90	●
10.00	330	00G2 1000/2,8/1,0-330	+0/-0.009	h6	2.80	1.00	●
10.00	330	00G2 1000/5,2/1,4-330	+0/-0.009	h6	5.20	1.40	●
12.00	330	00G2 1200/3,5/1,5-330	+0/-0.011	h6	3.50	1.50	●
12.00	330	00G2 1200/6,0/1,5-330	+0/-0.011	h6	6.00	1.50	●
14.00	330	00G2 1400/5,0/1,7-330	+0/-0.011	h6	5.00	1.70	●
14.00	330	00G2 1400/7,0/2,0-330	+0/-0.011	h6	7.00	2.00	●
16.00	330	00G2 1600/5,0/1,5-330	+0/-0.011	h6	5.00	1.50	●
16.00	330	00G2 1600/8,0/2,0-330	+0/-0.011	h6	8.00	2.00	●
18.00	330	00G2 1800/6,0/2,0-330	+0/-0.011	h6	6.00	2.00	●
18.00	330	00G2 1800/9,0/2,0-330	+0/-0.011	h6	9.00	2.00	●
20.00	330	00G2 2000/6,2/2,0-330	+0/-0.013	h6	6.20	2.00	●
20.00	330	00G2 2000/10,0/2,5-330	+0/-0.013	h6	10.00	2.50	●
25.00	330	00G2 2500/6,2/2,0-330	+0/-0.013	h6	6.20	2.00	●
25.00	330	00G2 2500/8,0/2,0-330	+0/-0.013	h6	8.00	2.00	●
25.00	330	00G2 2500/12,0/3,0-330	+0/-0.013	h6	12.00	3.00	●

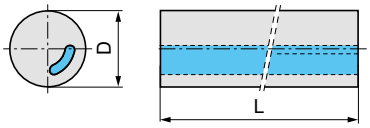
→ For further information go to page 112.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Blanks for gun drills

We offer a complete stock range of rods and tips for the production of solid carbide or brazed gun drills. These include rods with a kidney-shaped coolant hole, profiled rods with one or two coolant holes and profiled tips with two coolant holes.
Our blanks for gun drills are available in the proven CTS20D grade for the universal machining of steel, stainless steel or heat-resistant alloys: some dimensions can also be ordered in grade CTF12E, a fine-grain grade specifically for gun drills with an optimised balance between hardness and toughness.
Of course we can also produce carbide rods in other dimensions and grades to order – just get in touch with your contact person at CERATIZIT.
Detailed technical data for our gun drill blanks can be found in the 'Information' section.

Rods
Rods with kidney-shaped coolant holes, submicron grades

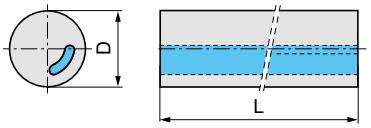


Technical drawings upon request

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTS20D
2.40	310	GDRK 0240-310	±0.15	○
2.60	310	GDRK 0260-310	±0.15	○
2.90	310	GDRK 0290-310	±0.15	○
3.15	310	GDRK 0315-310	±0.15	○
3.45	310	GDRK 0345-310	±0.15	○
3.50	310	GDRK 0350-310	±0.15	○
3.90	310	GDRK 0390-310	±0.15	○
4.40	310	GDRK 0440-310	±0.15	○
4.90	310	GDRK 0490-310	±0.15	○
5.50	310	GDRK 0550-310	±0.15	○
6.00	310	GDRK 0600-310	±0.15	○
6.50	310	GDRK 0650-310	±0.15	○
7.10	310	GDRK 0710-310	±0.15	○
7.60	310	GDRK 0760-310	±0.15	○
8.10	310	GDRK 0810-310	±0.15	○
8.30	310	GDRK 0830-310	±0.15	○
8.70	310	GDRK 0870-310	±0.15	○
9.20	310	GDRK 0920-310	±0.15	○
10.60	310	GDRK 1060-310	±0.15	○
11.30	310	GDRK 1130-310	±0.15	○

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Rods
Rods with kidney-shaped coolant hole, fine grain grades

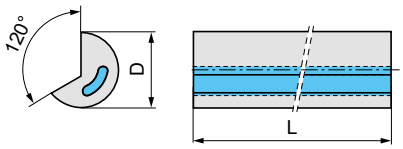


Technical drawings upon request

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTF12E
2.40	310	GDRK 0240-310	±0.15	○
2.60	310	GDRK 0260-310	±0.15	○
2.90	310	GDRK 0290-310	±0.15	○
3.15	310	GDRK 0315-310	±0.15	○
3.45	310	GDRK 0345-310	±0.15	○
3.50	310	GDRK 0350-310	±0.15	○
3.90	310	GDRK 0390-310	±0.15	○
4.40	310	GDRK 0440-310	±0.15	○
4.90	310	GDRK 0490-310	±0.15	○
5.50	310	GDRK 0550-310	±0.15	○
6.00	310	GDRK 0600-310	±0.15	○
6.50	310	GDRK 0650-310	±0.15	○
7.10	310	GDRK 0710-310	±0.15	○
7.60	310	GDRK 0760-310	±0.15	○
8.10	310	GDRK 0810-310	±0.15	○
8.30	310	GDRK 0830-310	±0.15	○
8.70	310	GDRK 0870-310	±0.15	○
9.20	310	GDRK 0920-310	±0.15	○
10.60	310	GDRK 1060-310	±0.15	○
11.30	310	GDRK 1130-310	±0.15	○

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Rods
Profiled rods with kidney-shaped coolant hole, 120°, submicron grades

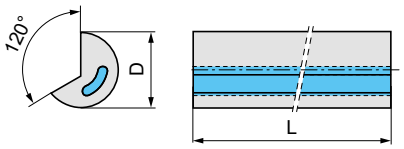


Technical drawings upon request

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTS20D
2.90	310	GDVK 0290-310	±0.15	○
3.15	310	GDVK 0315-310	±0.15	○
3.45	310	GDVK 0345-310	±0.15	○
3.90	310	GDVK 0390-310	±0.15	○
4.40	310	GDVK 0440-310	±0.15	●
4.90	310	GDVK 0490-310	±0.15	●
5.50	310	GDVK 0550-310	±0.15	●
6.00	310	GDVK 0600-310	±0.15	●
6.50	310	GDVK 0650-310	±0.15	●
7.10	310	GDVK 0710-310	±0.15	●
7.60	310	GDVK 0760-310	±0.15	○
8.10	310	GDVK 0810-310	±0.15	○
8.70	310	GDVK 0870-310	±0.15	●
9.20	310	GDVK 0920-310	±0.15	○

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Rods
Profiled rods with kidney-shaped coolant hole, 120°, fine grain grades

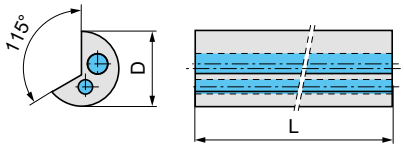


Technical drawings upon request

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTF12E
2.40	310	GDVK 0240-310	±0.15	●
2.60	310	GDVK 0260-310	±0.15	○
2.90	310	GDVK 0290-310	±0.15	●
3.15	310	GDVK 0315-310	±0.15	●
3.45	310	GDVK 0345-310	±0.15	●
3.90	310	GDVK 0390-310	±0.15	●
4.40	310	GDVK 0440-310	±0.15	●
4.90	310	GDVK 0490-310	±0.15	●
5.50	310	GDVK 0550-310	±0.15	●
6.00	310	GDVK 0600-310	±0.15	●
6.50	310	GDVK 0650-310	±0.15	●
7.10	310	GDVK 0710-310	±0.15	●
7.60	310	GDVK 0760-310	±0.15	●
8.10	310	GDVK 0810-310	±0.15	●
8.70	310	GDVK 0870-310	±0.15	●
9.20	310	GDVK 0920-310	±0.15	●

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

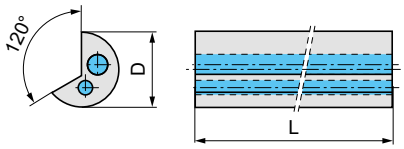
Rods
Profiled rods with two coolant holes, 115°, fine grain grades



Technical drawings upon request

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTF12E
13.50	310	GDV2 1350/115-310	±0.20	○
13.90	310	GDV2 1390/115-310	±0.20	○
14.50	310	GDV2 1450/115-310	±0.20	●
15.50	310	GDV2 1550/115-310	±0.20	●
16.50	310	GDV2 1650/115-310	±0.20	●
17.50	310	GDV2 1750/115-310	±0.20	○
18.60	310	GDV2 1860/115-310	±0.20	○
19.60	310	GDV2 1960/115-310	±0.25	●
20.60	310	GDV2 2060/115-310	±0.25	○
21.60	310	GDV2 2160/115-310	±0.25	●

Rods
Profiled rods with two coolant holes, 120°, fine grain grades

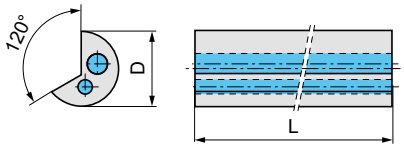


Technical drawings upon request

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTF12E
5.50	310	GDV2 0550-310	±0.15	○
6.00	310	GDV2 0600-310	±0.15	○
6.50	310	GDV2 0650-310	±0.15	●
7.10	310	GDV2 0710-310	±0.15	●

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Rods
Profiled rods with two coolant holes, 120°, fine grain grades

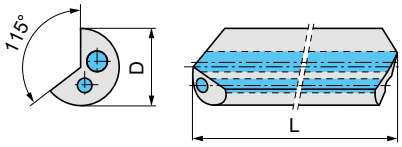


Technical drawings upon request

D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTF12E
7.60	310	GDV2 0760-310	±0.15	●
8.10	310	GDV2 0810-310	±0.15	●
8.70	310	GDV2 0870-310	±0.15	●
9.20	310	GDV2 0920-310	±0.15	●
9.70	310	GDV2 0970-310	±0.15	●
10.80	310	GDV2 1080-310	±0.15	●
11.30	310	GDV2 1130-310	±0.15	○
11.80	310	GDV2 1180-310	±0.15	●
12.30	310	GDV2 1230-310	±0.15	●
12.80	310	GDV2 1280-310	±0.15	●

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Tips
Profiled tips with two coolant holes, 115°, fine grain grades



Technical drawings upon request

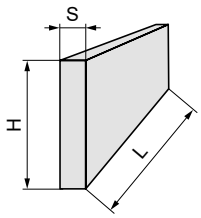
D [mm]	L [mm]	Type, description	Dia. tol. [mm]	CTF12E
13.50	40	GDV2P 1350-040	±0.20	●
14.50	40	GDV2P 1450-040	±0.20	●
15.50	40	GDV2P 1550-040	±0.20	●
16.50	40	GDV2P 1650-040	±0.20	●
17.50	40	GDV2P 1750-040	±0.20	●
18.60	40	GDV2P 1860-040	±0.25	●
19.60	45	GDV2P 1960-045	±0.25	●
20.60	45	GDV2P 2060-045	±0.25	●
21.60	45	GDV2P 2160-045	±0.25	●
22.60	50	GDV2P 2260-050	±0.25	●
23.60	50	GDV2P 2360-050	±0.25	●
24.60	55	GDV2P 2460-055	±0.25	●
25.60	55	GDV2P 2560-055	±0.25	●
26.60	55	GDV2P 2660-055	±0.25	●
27.20	55	GDV2P 2720-055	±0.25	○
28.70	65	GDV2P 2870-065	±0.25	●
30.80	65	GDV2P 3080-065	±0.25	●
33.10	65	GDV2P 3310-065	±0.25	●
36.10	75	GDV2P 3610-075	±0.25	●
39.10	75	GDV2P 3910-075	±0.25	○
40.00	80	GDV2P 4000-080	±0.30	○
42.00	80	GDV2P 4200-080	±0.30	○

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Flat and square strips, brazing tips

Our square and rectangular strips, in the proven CTS20D grade and in a wide variety of dimensions, are available directly from stock. Our brazing tips are characterised by very good brazability and can be supplied upon request in the most common DIN dimensions. Specifically adapted for the finish machining of steels, our stock range includes brazing tips to DIN 8011 in grade CTS12D as well as the cermet grade CTF24T+. The “+” in the grade description stands for the galvanised surface.
Of course, we can also produce carbide rods in other dimensions and grades to order – simply get in touch with your contact person at CERATIZIT.
Detailed specifications for our square and rectangular strips can be found in the ‘Information’ section.

Flat strips
Submicron grade

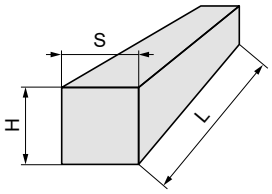


Type, description	h [mm]	S [mm]	L [mm]	CTS20D
FR 0230/0530-330	5.30	2.30	330	●
FR 0230/0630-330	6.30	2.30	330	●
FR 0230/0830-330	8.30	2.30	330	●
FR 0230/1030-330	10.30	2.30	330	●
FR 0230/1630-330	16.30	2.30	330	●
FR 0330/0430-330	4.30	3.30	330	●
FR 0330/0530-330	5.30	3.30	330	●
FR 0330/0630-330	6.30	3.30	330	●
FR 0330/0830-330	8.30	3.30	330	●
FR 0330/1030-330	10.30	3.30	330	●
FR 0330/1230-330	12.30	3.30	330	●
FR 0330/1630-330	16.30	3.30	330	●
FR 0330/2030-330	20.30	3.30	330	●
FR 0430/0630-330	6.30	4.30	330	●
FR 0430/0830-330	8.30	4.30	330	●
FR 0430/1030-330	10.30	4.30	330	●
FR 0430/1330-330	13.30	4.30	330	●
FR 0430/1630-330	16.30	4.30	330	●
FR 0430/2030-330	20.30	4.30	330	●
FR 0530/1030-330	10.30	5.30	330	●
FR 0530/1330-330	13.30	5.30	330	●
FR 0630/1030-330	10.30	6.30	330	●
FR 0630/1330-330	13.30	6.30	330	●
FR 0830/1230-330	12.30	8.30	330	●
FR 0830/1630-330	16.30	8.30	330	●
FR 1030/1630-330	16.30	10.30	330	●

→ For further information go to page 114.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Square strips
Submicron grade



Type, description	h [mm]	S [mm]	L [mm]	CTS20D
SR 0330-330	3.30	3.30	330	●
SR 0430-330	4.30	4.30	330	●
SR 0530-330	5.30	5.30	330	●
SR 0830-330	8.30	8.30	330	●
SR 1030-330	10.30	10.30	330	●

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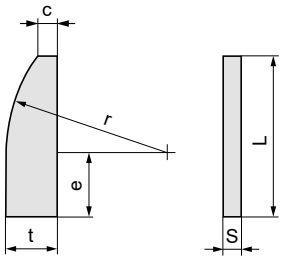
→ For further information go to page 114.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

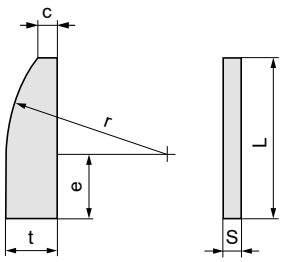
Brazing tips to DIN 8011
Form R

CTF24T+ cermet brazing tips for efficient reaming
Are you looking for reaming inserts suitable for steel and cast iron and want to rely on excellent performance? Then our CTF24T+ cermet brazing tips are the ideal solution. They are galvanised to achieve improved adhesion during brazing and to increase the corrosion resistance of the tips. We have added a "+" in the grade designation, so you can recognise at a glance glance which tips are galvanised.



Type, description	L [mm]	e [mm]	S [mm]	r [mm]	c [mm]	t [mm]	CTF24T+	CTS12D
DIN 8011 R 12	12	5.00	0.80	25.00	0.80	2.00	▲	○
DIN 8011 R 16	16	7.10	1.20	25.00	1.00	2.50	▲	●
DIN 8011 R 19	19	9.00	1.40	25.00	1.00	3.00	▲	●
DIN 8011 R 22	22	11.20	1.80	25.00	1.40	3.50	▲	●
DIN 8011 R 25	25	15.00	2.20	25.00	1.40	4.00	▲	●
DIN 8011 R 30	30	18.00	2.80	25.00	1.40	5.00	▲	●

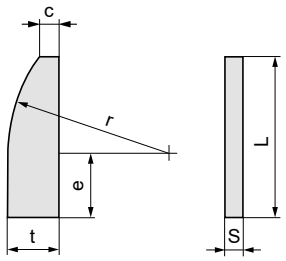
Brazing tips to DIN 8011
Form T



Type, description	L [mm]	e [mm]	S [mm]	r [mm]	c [mm]	t [mm]	CTS12D
DIN 8011 T 12	12	4.50	1.20	15.00	1.00	3.00	○
DIN 8011 T 16	16	7.50	1.60	15.00	1.00	3.50	○
DIN 8011 T 19	19	7.50	2.00	25.00	1.80	4.50	●
DIN 8011 T 22	22	9.50	2.50	25.00	2.50	5.60	●
DIN 8011 T 25	25	10.00	2.80	25.00	3.00	8.00	●

→ For further information go to page 114.
○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Brazing tips to DIN 8011
Form U



Type, description	L [mm]	e [mm]	S [mm]	r [mm]	c [mm]	t [mm]	CTS12D
DIN 8011 U 12	12	1.40	1.20	15.00	1.00	5.60	○
DIN 8011 U 16	16	4.00	1.60	15.00	1.00	6.70	○
DIN 8011 U 19	19	2.50	2.00	25.00	1.80	8.00	●
DIN 8011 U 22	22	2.80	2.50	25.00	2.50	11.20	●
DIN 8011 U 25	25	4.00	2.80	25.00	3.00	14.00	●

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→ For further information go to page 114.

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Exchangeable head system (EHS) – the innovative solution for your application

The unique exchangeable head system is characterised by maximum efficiency and economy in terms of the tool connection. Four different blank diameters in three finishes each are part of the standard range, offering you countless possibilities for the design of your individual exchangeable head system. The advantages of the innovative connection technology include:

Precision
High radial and axial run-out precision for long tool life

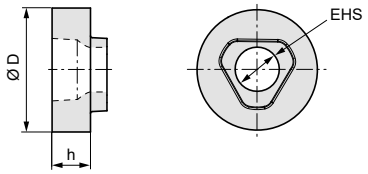
Stability and process reliability
Short and stable interface with face contact

Very attractive price-performance ratio
Highly economical due to the new technology of the connection. Resource-efficient thanks to smaller quantity of cemented carbide in the connection area

Resource-efficient
Smaller quantity of cemented carbide in the connection area

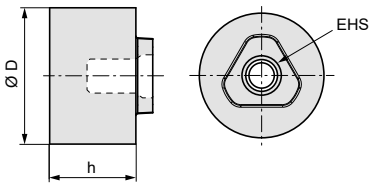
Can be used for any application
Thanks to the threaded-end adapters, it is possible to use the system with all threaded-end shanks commonly available on the market.

As sintered – for applications without cutting edge in the centre
Product range – blanks



D [mm]	h [mm]	Type, description	EHS Size	CTS20D
13.30	4.20	EHS12.E13,3-4,2	12	▲
13.30	6.20	EHS12.E13,3-6,2	12	▲
18.60	5.70	EHS16.E18,6-5,7	16	▲
18.60	8.20	EHS16.E18,6-8,2	16	▲
22.60	6.70	EHS20.E22,6-6,7	20	▲
22.60	9.20	EHS20.E22,6-9,2	20	▲
26.00	10.20	EHS25.E26-10,2	25	▲
26.00	7.20	EHS25.E26-7,2	25	▲

As sintered – for applications with cutting edge in the centre



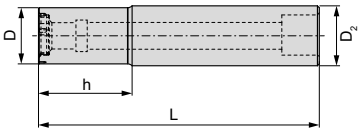
D [mm]	h [mm]	Type, description	EHS Size	CTS20D
13.30	9.20	EHS12.B13,3-9,2	12	▲
18.60	13.70	EHS16.B18,6-13,7	16	▲
22.60	16.70	EHS20.B22,6-16,7	20	▲
26.00	19.20	EHS25.B26-19,2	25	▲

8

○ limited stock ● stock item ▲ new stock item Other grades and dimensions upon request

Shank – ground shank

Product range – shanks and spare parts



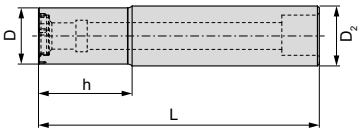
D [mm]	D_2 [mm]	h [mm]	L [mm]	Type, description	EHS Size
11.00	12	20.00	66.00	EHS12-A-A12-20-MFR	12
15.00	16	25.00	75.00	EHS16-A-A16-25-MFR	16
19.00	20	25.00	77.00	EHS20-A-A20-25-MFR	20
24.00	25	30.00	87.00	EHS25-A-A25-30-MFR	25

Spare parts

			EHS Size
14584515	14584516	14584517	12
14584518	14584520	14584523	16
14584518	14584520	14584523	20
14584524	14584525	14584527	25

8

Shank – standard shank



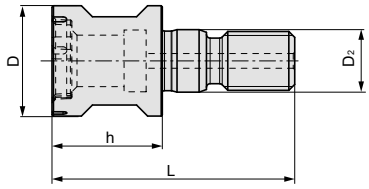
D [mm]	D_2 [mm]	h [mm]	L [mm]	Type, description	EHS Size
11.00	12	20.00	66.00	EHS12-A-A12-20	12
15.00	16	25.00	75.00	EHS16-A-A16-25	16
19.00	20	25.00	77.00	EHS20-A-A20-25	20
24.00	25	30.00	87.00	EHS25-A-A25-30	25

Spare parts

			EHS Size
14584515	14584516	14584517	12
14584518	14584520	14584523	16
14584518	14584520	14584523	20
14584524	14584525	14584527	25

Product range – shanks and spare parts

Adapter with threaded end – type A

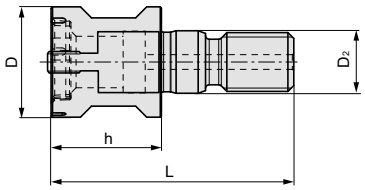


D [mm]	D_2 [mm]	h [mm]	L [mm]	Type, description	EHS Size
11.00	6.50	13.00	28.00	EHS12-A-G12-A	12
15.00	8.50	14.00	33.00	EHS16-A-G16-A	16
19.00	10.50	18.00	37.00	EHS20-A-G20-A	20
24.00	12.50	20.00	42.00	EHS25-A-G25-A	25

Spare parts

		EHS Size
14584515	14584517	12
14584518	14584523	16
14584518	14584523	20
14584524	14584527	25

Adapter with threaded end – type B (set)



D [mm]	D_2 [mm]	h [mm]	L [mm]	Type, description	EHS Size
11.00	6.50	13.00	28.00	EHS12-A-G12-B	12
15.00	8.50	14.00	33.00	EHS16-A-G16-B	16
19.00	10.50	18.00	37.00	EHS20-A-G20-B	20
25.00	12.50	20.00	42.00	EHS25-A-G25-B	25

Spare parts

	 [mm]	 [inch]	EHS Size
14570428	14570445	14687311	12
14570434	14570450	14687313	16
14570437	14570453	14687314	20
14570440	14570455	14687316	25

Special products

In addition to our standard range we also offer individual solutions for our rods. Thanks to our comprehensive manufacturing possibilities we can also implement your most demanding requirements. Whether special coolant hole profiles, large helix angles or other customised versions, see for yourself and benefit from our expertise.
In our up-to-date grinding department we also produce semi-finished ground articles, in high volumes as well as in small batches.

Available types

▲ Broad selection of diameters and grades starting at 0.40 mm, e.g. for erosion electrodes up to 80 mm for special tools. For semi-finished tools bigger than that we offer customised preforms.

▲ Solid rods or rods with coolant holes up to one metre in length are no problem for us. The most advanced technologies allow us to produce even extremely small coolant holes with maximum precision.

▲ Increasingly, tool producers rely on prefabricated semi-finished products. In this context we offer ground cut-to-lengths in a variety of versions. For example steps, tapers, cones, male or female centres, ball noses, chamfers, recesses, ground holes and many others.

▲ Thanks to our modern extrusion processes we can offer you a variety of coolant hole profiles.

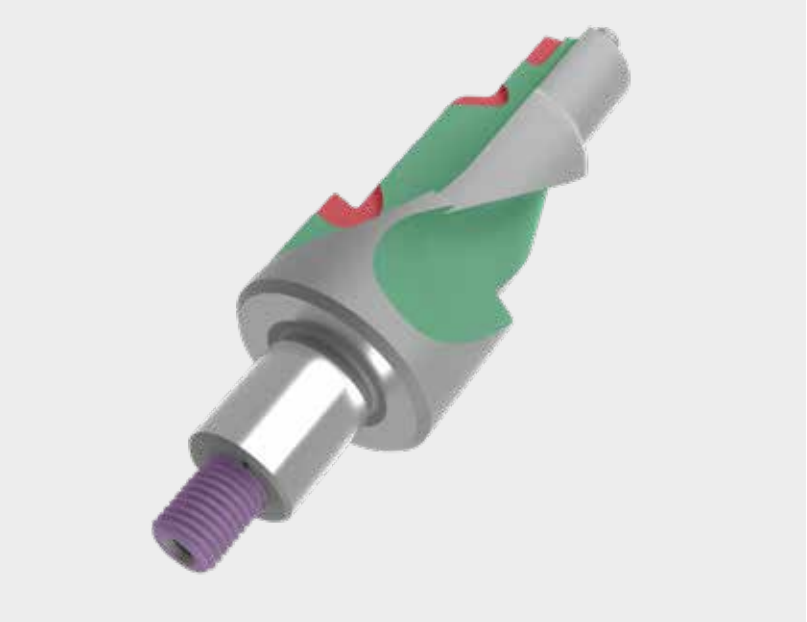
Preforms

In addition to our comprehensive range of rods we also offer various types of preforms for rotary cutting tools. The products include both blanks and semi-finished tools for solid carbide and PCD tools, exchangeable head systems and tool shanks. Years of experience in the field of blank machining combined with a state-of-the-art production plant make it possible for us to produce the most complex, near net shape geometries with short delivery times. In particular for tool shanks and PCD tool bodies we have developed the new grade CTF25E which is ideal even for the most sophisticated tool versions with narrow shapes and critical transitions.

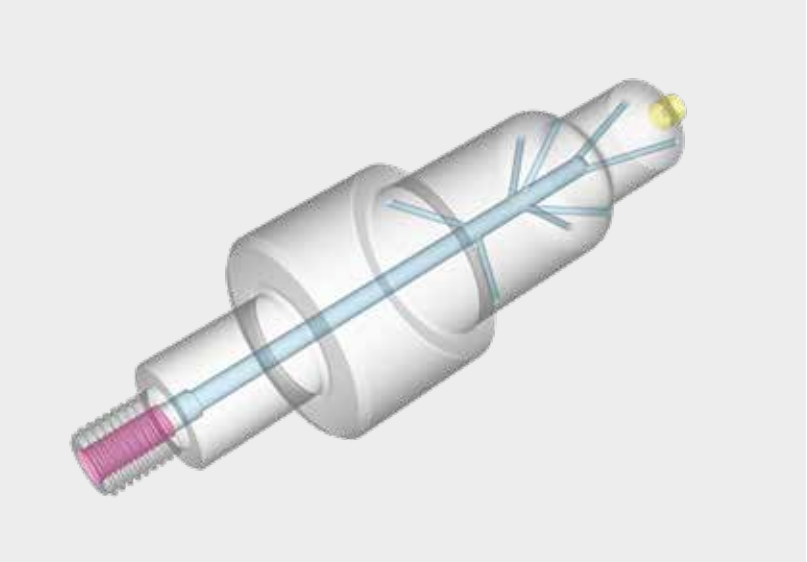
Available types

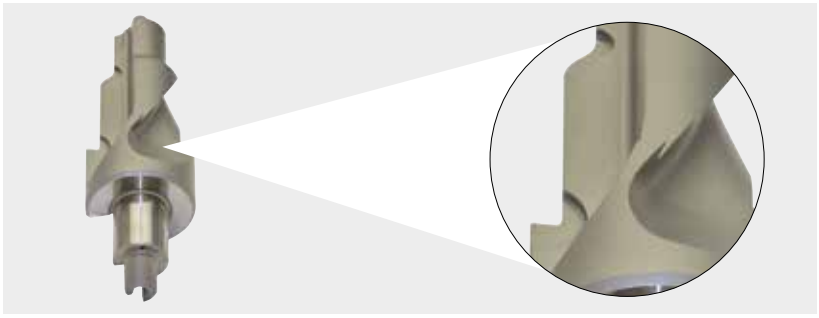
Based on your drawings of blanks or finished parts, we are able to produce outside diameters of up to approx. 300 mm and lengths of approx. 500 mm. Ideally, you should provide us with digital drawings or 3-D models (.stp, .prt,….).

- Preformed seats for PCD inserts
- Straight and helical chip flutes
- External thread
- Shank, ground



- Coolant holes
- As sintered male or female centres
- Internal thread





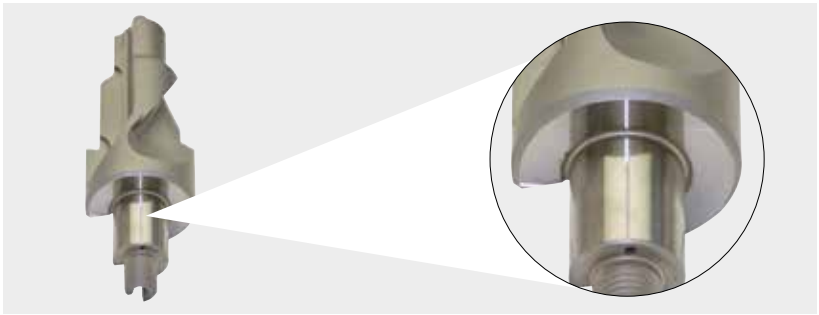
Our preformed chip flutes and insert seats with optimised machining allowance make it possible to save production costs thanks to reduced grinding times in tool production.

Individually designed coolant exit holes can be formed into the blank.

- ▲ Axial holes from Ø 0.65 mm
- ▲ Radial exit holes from Ø 0.5 mm and greater
- ▲ Smaller holes available depending on the depth and upon request

- ▲ Outside and inside threads
- ▲ Metric ISO threads, as sintered, tolerance class 8H
- ▲ UN threads, as sintered
- ▲ Special threads upon request
- ▲ Ground threads are possible upon request

- ▲ Female and male centres
- ▲ Female centres to DIN 332
- ▲ As sintered centres (form 'R' preferred)
- ▲ Upon request ground version also available



- ▲ Upon request ground version also available, for example ground shank to h6

Do not hesitate to contact us with questions about possible variations. We will be pleased to help you design blanks for cost-efficient production of precision tools.

Grades: composition and properties

An extensive stock of the most important grades makes shortest delivery times for customised blanks possible.

Submicron grade

Grade	ISO code*	Binder [m %]	Density [g/cm³]	Hardness [HV30]	Hardness [HRA]	Transverse rupture strength [MPa]	KIC** (Shetty) [MPa·m$^{1/2}$]	Modulus of elasticity GPa	Poisson's ratio [-]
CTS12D	K05 – K10	6.0	14.80	1820	93.1	3600	9.3	624	0.205
CTS15D	K10 – K30	7.5	14.70	1750	92.8	3700	9.5	605	0.208
CTS20D	K20 – K40	10.0	14.38	1600	91.9	4000	10.4	570	0.214

Fine grain grade

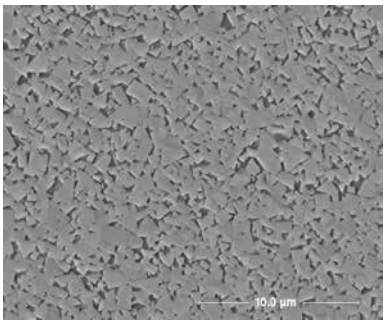
Grade	ISO code*	Binder [m %]	Density [g/cm³]	Hardness [HV30]	Hardness [HRA]	Transverse rupture strength [MPa]	KIC** (Shetty) [MPa·m$^{1/2}$]	Modulus of elasticity GPa	Poisson's ratio [-]
CTF25E	K30 – K40	12.5	14.15	1300	89.5	3500	15.0	543	0.218

Our CTF25E fine-grain grade has been specially designed for PCD tools and tool shanks. The coarser grain structure combined with higher cobalt content provides this grade with increased resistance to breakage and excellent brazability.

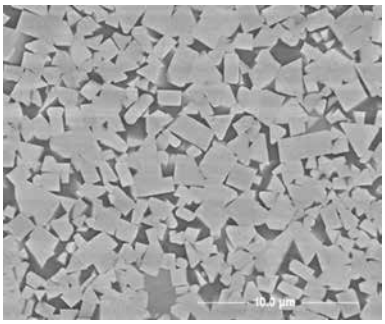
CTF25E vs. CTS20D

	CTS20D	CTF25E
▲ Grain size:	submicron	fine grain
▲ Cobalt content:	10.0%	12.5%
▲ Additives:	1.15%	1.2%
▲ Hardness:	1600 HV30	1300 HV30
▲ Transverse rupture strength:	4000 MPa	3500 MPa
▲ Fracture toughness KIC:	10.4 MPa·m^{0,5}	15 MPa·m^{0,5}

CTS20D



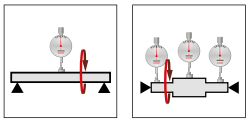
CTF25E



Of course, we also offer preforms in all other Premium line grades upon request.

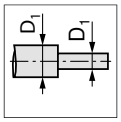
Specifications

Straightness



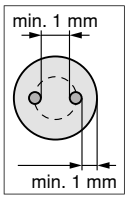
max. deflection [inch]
.012

Diameter steps



Different diameters, dia. steps
$D_1 - D_2 \geq .039$ inch

Wall thicknesses



Min. wall thicknesses and hole distances
≥ .039 inch

10

Tolerance table for preforms

Diameters

Nominal Ø [inch]	Blank tolerance incl. grinding allowance [inch]	Sintering tolerance [±]
< .787	.022	±0.15
> .787 – 1.378	.024	±0.20
> 1.378 – 1.772	.026	±0.25
> 1.772 – 2.165	.028	±0.30
> 2.165 – 2.756	.033	±0.35
> 2.756 – 3.937	.035	±0.40
> 3.937 – 5.906	.039	±0.50

Example of a finished diameter 22 mm with grinding allowance:

Finished dimension Ø 22.00 mm
Grinding allowance +0.60 mm
Blank dimensions Ø 22.60 ±0.20 mm

Length

[inch]	Blank tolerance incl. grinding allowance [inch]	Sintering tolerance [±]
L	0.5% L + .016	±0.5% L

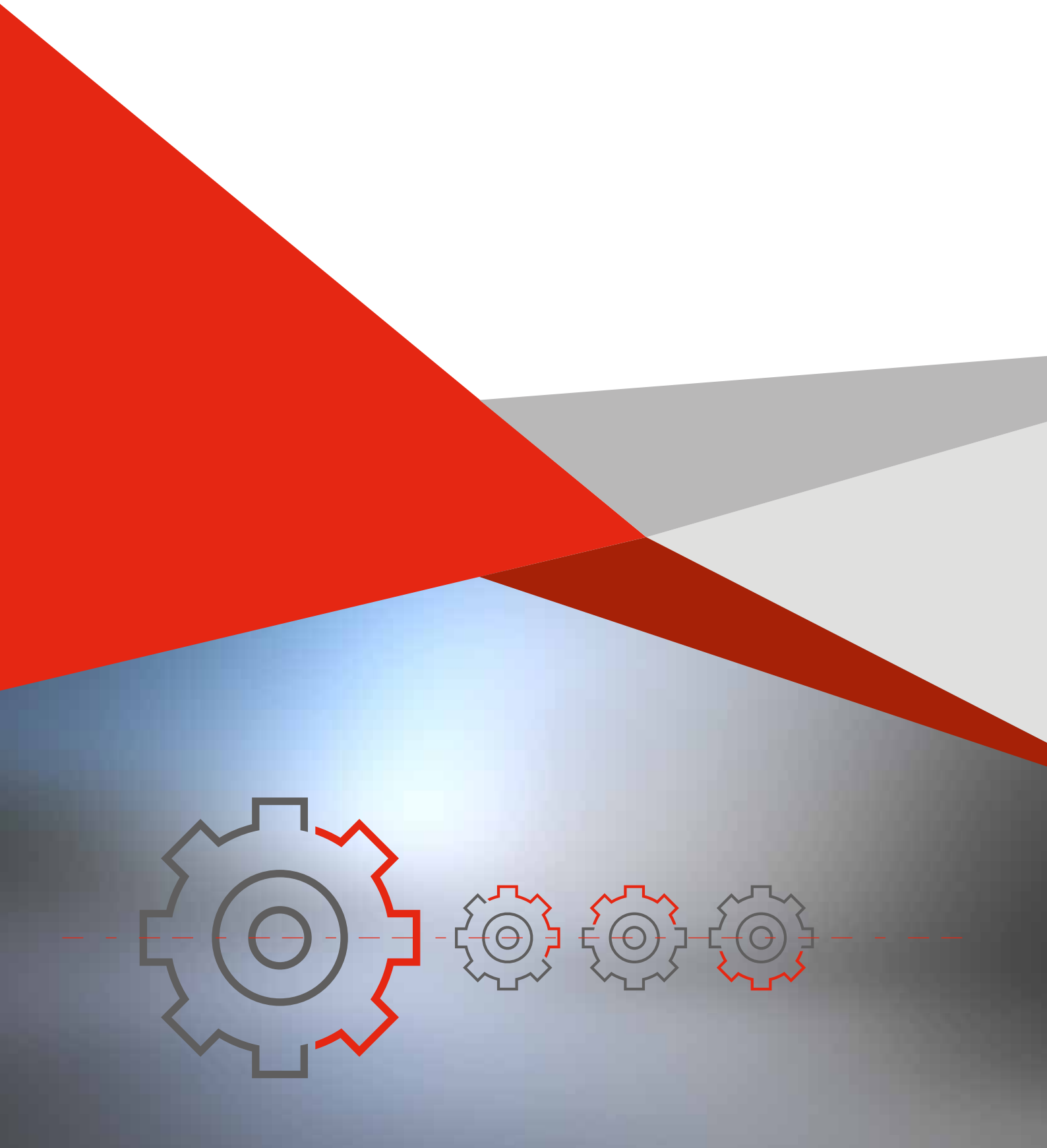
Example of a finished length 150 mm with grinding allowance:

Finished dimension 150 mm
Grinding allowance +1.15 mm
Blank dimensions 151.15 ±0.75 mm


DMG MORI
CELOS

Information

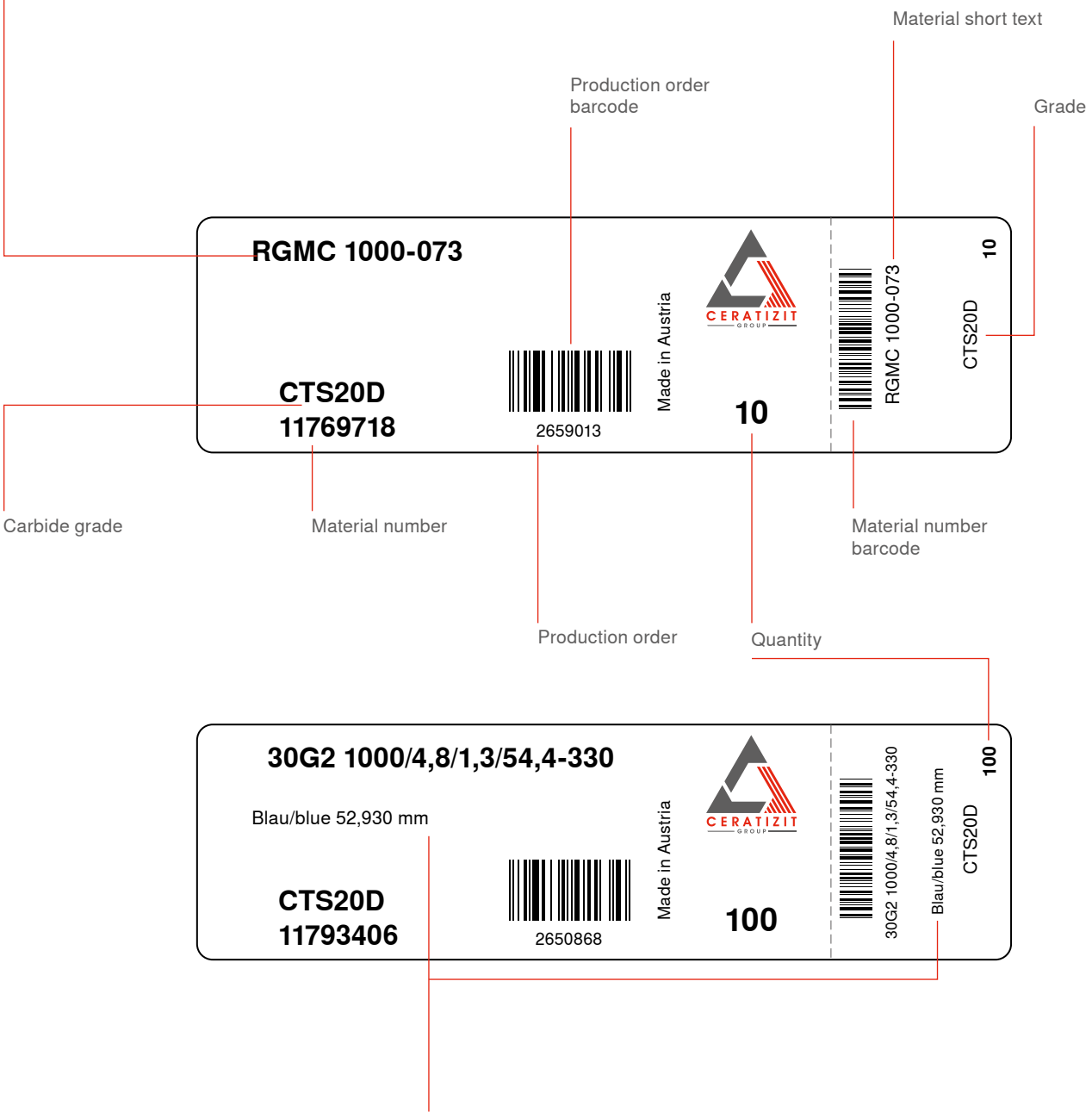
In this section you can find additional information on product labelling, technical product specifications and carbide properties. Specifications for preforms can be found at the end of the 'Preforms' section.



Product labelling

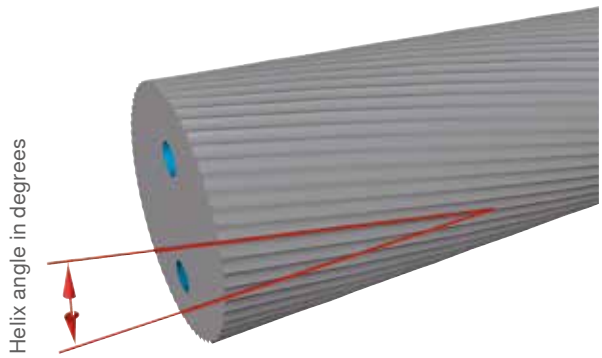
Material short text:

The material short text describes the article in terms of the most important geometrical specifications.
A guide to the designation system can be found in the catalogue on page 28.



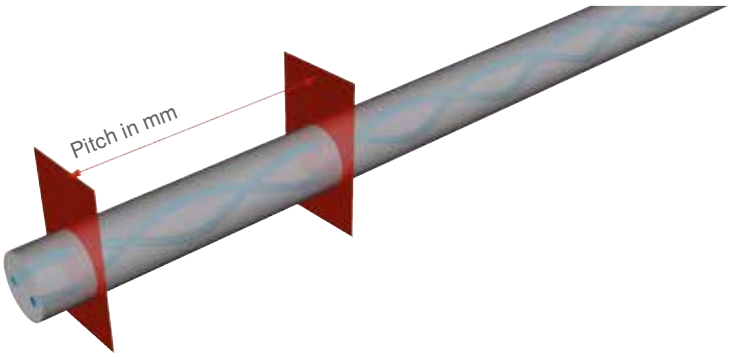
Pitch information:
(for rods with helical coolant holes)

The pitch class and its average value are stated here. This value is used as the adjustment value for flute grinding.
More information on the pitch classification for rods with helical coolant holes can be found in the catalogue on page 104.



Definition of the helix angle

The helix angle indicates the torsion of the coolant holes in relation to the nominal diameter. In this context it has to be taken into account that the angle decreases depending on the diameter steps. For this reason, rods with 40° coolant holes are used for step drills in order to achieve an optimal spiral flute helix angle of 25 to 30°.



Definition of pitch

The pitch is the length of a complete 360° rotation of the coolant holes. This value is independent of the diameter or the diameter steps. The CERATIZIT designation system for coolant hole rods includes both the helix angle in degrees and the pitch of the helix in millimetres.

Conversion helix angle/pitch:

11

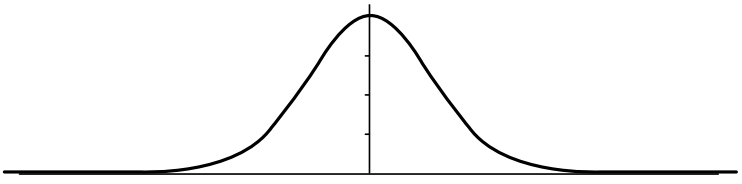
Conversion pitch to angle:

$$\alpha = \tan^{-1} \frac{d \times \pi}{Stg}$$

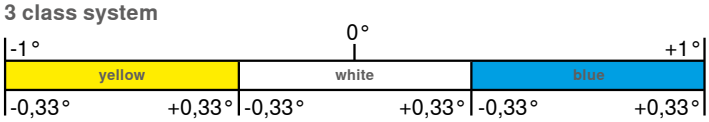
Conversion angle to pitch:

$$Stg = \frac{d \times \pi}{\tan \alpha}$$

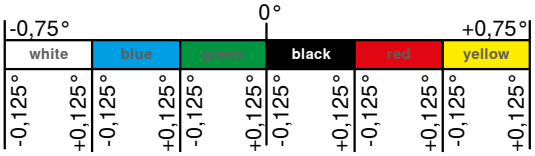
Stg. pitch
d nominal diameter
α helix angle



3 class system



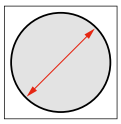
6 class system



Pitch classification

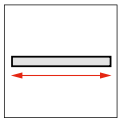
In order to guarantee closest pitch tolerances our carbide rods with helical coolant holes are divided into tolerance classes. For this purpose all rods are measured and assigned to the respective class, which is indicated on the product label. For details of our pitch classification see page 110.

Outside diameter



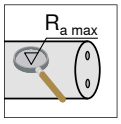
Measured outside diameter of the round rod. In case of helical coolant hole rods the 'outside diameter' means the OD (addendum diameter) including the helical tooling grooves.

Length



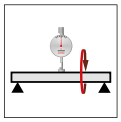
Measured length of the round rod.

Surface



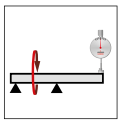
The surface quality describes the state of the surface. For ground rods the surface value is indicated as maximum average roughness value Ra (DIN EN ISO 4287:1998).

Straightness



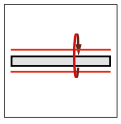
Maximum deflection of a rotating rod which lies on two contact points, measured in the middle of the rod. The distance between the two contact points is 300 mm. When the rod is longer or shorter than 330 mm the contact width corresponds to the rod length minus 10 mm.

Concentricity



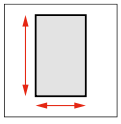
Maximum deflection of a rod. Contact point A is 5 mm before the chamfer. Contact point B is in the middle of the rod. The measurement is carried out 2 mm from the end.

Cylindricity



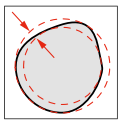
The cylindricity describes the tolerance field of an ideal cylinder inside which the skin surface of the rod should be.

Width, height



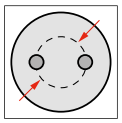
Lateral length of flat and square strips

Roundness



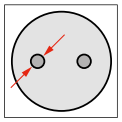
Roundness is the radial distance of two concentric circles which include the circumference line of the round rod's section. (DIN ISO 1101).

Pitch circle diameter



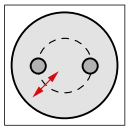
The pitch circle is defined as the circle which goes through two or three centre points of coolant holes.

Hole diameter



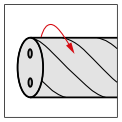
The hole diameter is the diameter of the coolant holes inside the rod.

Eccentricity



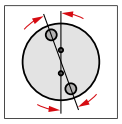
Excentricity means the deviation of the pitch circle centre point or, in case of a coolant hole, the deviation of the coolant hole centre point from the centre point of the rod.

Helix angle



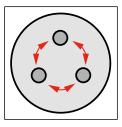
The helix angle is the angle between the longitudinal axis and the helix line.

Torsion



Maximum difference of the angle of the two imaginary lines which go through the centre point of the coolant holes which are on the pitch circle.

Pitch error

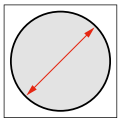


For rods with three helical coolant holes the section surface is divided into three circle sectors which go through the centre point of the coolant holes. The pitch error is the difference of the angles between the circle sectors.

Solid carbide rods

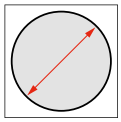
Outside diameter

as sintered



Outside diameter [mm]	Tolerance [mm]
0.8 – 2.1	+0/+0.15
2.2 – 4.7	+0/+0.20
4.8 – 6.7	+0/+0.25
6.8 – 15.2	+0/+0.30
15.3 – 20.2	+0/+0.45
20.3 – 24.2	+0/+0.55
24.3 – 36.2	+0/+0.65
36.3 – 46.2	+0/+0.70

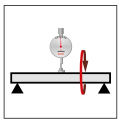
ground



Outside diameter [mm]	Tolerance h6 [mm]	Tolerance h5 [mm]
1.0 – 3.0	+0/-0.006	+0/-0.004
3.1 – 6.0	+0/-0.008	+0/-0.005
6.1 – 10.0	+0/-0.009	+0/-0.006
10.1 – 18.0	+0/-0.011	+0/-0.008
18.1– 30.0	+0/-0.013	+0/-0.009
30.1 – 40.0	+0/-0.016	+0/-0.011

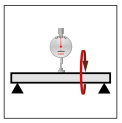
Straightness

as sintered



Outside diameter [mm]	max. deflection [mm]
0.8 – 3.2	1.2
3.25 – 46.2	0.5

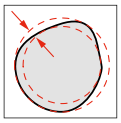
ground



Outside diameter [mm]	max. deflection [mm]
1.0 – 2.9	1.20
3.0 – 5.9	0.15
6.0 – 7.9	0.12
8.0 – 9.9	0.10
10.0 – 11.9	0.08
12.0 – 19.9	0.05
20.0 – 40.0	< 0.05

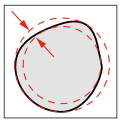
Roundness

as sintered



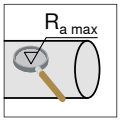
Outside diameter [mm]	Tolerance [mm]
0.8 – 5.7	0.05
5.8 – 7.7	0.08
7.8 – 12.7	0.10
12.8 – 30.2	0.13
30.3 – 46.2	0.16

ground



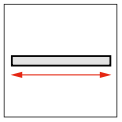
Outside diameter [mm]	Tolerance h6 [mm]	Tolerance h5 [mm]
1.0 – 3.0	+0/+0.003	+0/+0.003
3.1 – 6.0	+0/+0.004	+0/+0.003
6.1 – 10.0	+0/+0.005	+0/+0.003
10.1 – 30.0	+0/+0.006	+0/+0.004
30.1 – 40.0	+0/+0.007	+0/+0.005
30.1 – 40.0	+0/+0.008	+0/+0.006

Surface finish



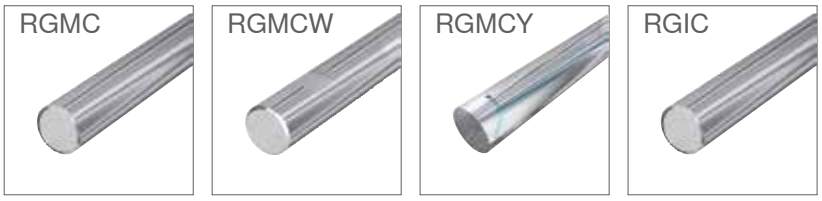
Executions	Ra_{max} [µm]
as sintered	as sintered
ground	0.05

Length

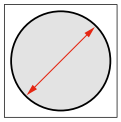


Tolerance [mm]
+0/+10

End mill blanks

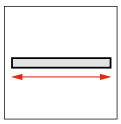


Outside diameter



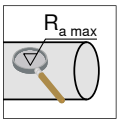
Outside diameter [mm]	Tolerance h6 [mm]	Tolerance h5 [mm]
1.0 – 3.0	+0/-0.006	+0/-0.004
3.1 – 6.0	+0/-0.008	+0/-0.005
6.1 – 10.0	+0/-0.009	+0/-0.006
10.1 – 18.0	+0/-0.011	+0/-0.008
18.1 – 30.0	+0/-0.013	+0/-0.009
30.1 – 40.0	+0/-0.016	+0/-0.011

Length



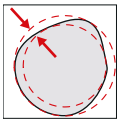
Type	Total length tolerance [mm]
RGMC	+1%
RGIC	+1%

Surface finish



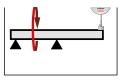
Ra_{max} [µm]
0.05

Roundness



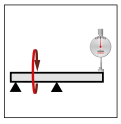
Outside diameter [mm]	Tolerance h6 [mm]	Tolerance h5 [mm]
1.0 – 3.0	+0/+0.003	+0/+0.003
3.1 – 6.0	+0/+0.004	+0/+0.003
6.1 – 10.0	+0/+0.005	+0/+0.003
10.1 – 25.0	+0/+0.006	+0/+0.004
18.1 – 25.0	+0/+0.007	+0/+0.005

Run-out



Outside diameter [mm]	max. concentricity [µm] starting length [mm] 30	40	50	60	70	80	90	100	110	120	130	140	150
3.0 – 3.999	4	4	5	7	–	–	–	–	–	–	–	–	–
4.0 – 5.999	4	4	5	5	7	8	–	–	–	–	–	–	–
6.0 – 7.999	3	4	5	5	6	7	8	8	9	–	–	–	–
8.0 – 9.999	3	4	4	4	5	5	6	6	7	7	7	–	–
10.0 – 11.999	3	3	4	4	5	5	6	6	7	7	7	–	–
12.0 – 15.999	3	3	3	3	4	5	5	5	6	6	7	7	7
16.0 – 17,999	3	3	3	3	4	4	5	5	5	5	5	6	6
18.0 – 24.999	3	3	3	3	4	4	5	5	5	5	5	6	6
25.0 – 40.000	3	3	3	3	4	4	5	5	5	5	5	6	6

Run-out RGIC

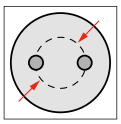


Outside diameter [inch]	maximum concentricity [µm] starting length [inch] 1.500 – 2.500	2.501 – 3.500	3.501 – 8.000
$^1/_8$ – $^3/_{16}$	5	7,6	–
$^1/_4$ – 1	5	7,6	10

11

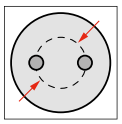
Drill blanks

Pitch circle diameter of DIN drill blanks



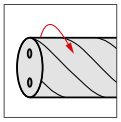
Pitch circle diameter [mm]	Tolerance [mm]
1.6 – 6.3	+/-0.20
6.7 – 8.0	+/-0.25
9.0 – 10.0	+/-0.30

Pitch circle diameter for micro-drill blanks



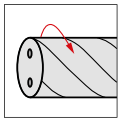
Pitch circle diameter [mm]	Tolerance [mm]
0.29	+/-0.03
0.30 – 1.05	+/-0.05
1.06 – 2.0	+/-0.08

Helix angle for DIN drill blanks



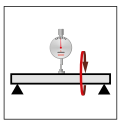
Total tolerance class [°]	Number of classes	Tolerance class [°]
+/-1	3	+/-0.33

Helix angle for micro-drill blanks



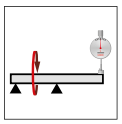
Total tolerance class [°]	Number of classes	Tolerance class [°]
+/-0.75	6	+/-0.125

Straightness of DIN drill blanks



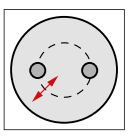
Outside diameter [mm]	Deflection [µm] with length [mm] 63–66	67–81	82–114	115–133	134–162	163–310
6.0	10	15	30	40	–	–
8.0	–	15	20	40	40	–
10.0	–	–	20	30	40	50
12.0	–	–	20	30	30	50
14.0	–	–	20	30	30	50
16.0	–	–	–	20	30	50
18.0	–	–	–	20	30	50
20.0	–	–	–	20	30	50

Run-out of micro-drill blanks



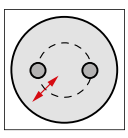
Outside diameter [mm]	Deflection [µm] with length [mm] 55–65	66–85	86–105	106–180
3.0	5	8	20	20
4.0	–	8	15	20

Excentricity of DIN drill blanks



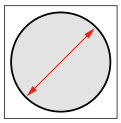
Pitch circle diameter [mm]	max. excentricity [mm]
1.6 – 3.4	0.10
4.8	0.15
6.3 – 6.7	0.18
8.0 – 10.0	0.20

Excentricity of micro-drill blanks



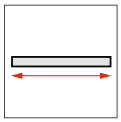
Pitch circle diameter [mm]	max. excentricity [mm]
0.29	0.025
0.30 – 0.59	0.035
0.6 – 1.5	0.040
1.51 – 2.00	0.050

Outside diameter



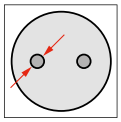
Outside diameter [mm]	Tolerance h5 [mm]
3.0	+0/-0.004
3.1 – 6.0	+0/-0.005
6.1 – 10.0	+0/-0.006
10.1 – 18.0	+0/-0.008
18.1 – 30.0	+0/-0.009

Length



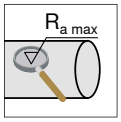
Tolerance
+0%/+1%

Hole diameter



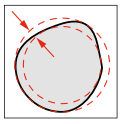
Hole diameter [mm]	Tolerance [mm]
0.05	+/-0.010
0.06 – 0.20	+/-0.015
0.21 – 0.45	+/-0.030
0.5 – 1.3	+/-0.050
1.31 – 2.50	+/-0.075

Surface finish



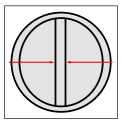
Product	Ra_{max} [µm]
DIN drill blanks	Ground mat, 0.05 - 0.1
Micro-drill blanks	0.05

Roundness



Outside diameter [mm]	Tolerance [mm]
3.0 – 6.0	0.002
8.0 – 10.0	0.003
12.0 – 18.0	0.004
20.0	0.005

Cross groove profile for DIN drill blanks

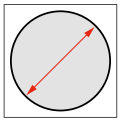


Outside diameter [mm]	Cross groove width [mm]		Cross groove depth [mm]	
6	1.5	+/-0.1	0.30	+/-0.05
8	1.5	+/-0.1	0.40	+/-0.05
10	2.0	+/-0.1	0.50	+/-0.10
12	2.0	+/-0.1	0.60	+/-0.10
14	2.5	+/-0.1	0.80	+/-0.10
16	2.5	+/-0.1	1.10	+/-0.10
18	3.0	+/-0.1	1.30	+/-0.10
20	3.0	+/-0.1	1.60	+/-0.10

Rods with helical coolant holes

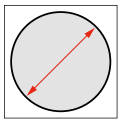
Outside diameter

as sintered



Outside diameter [mm]	Tolerance core diameter [mm]	Tolerance outside diameter [mm]
3.3 – 4.3	+0.10/+0.20	+0.20/+0.60
4.4 – 8.3	+0.10/+0.30	+0.20/+0.70
8.4 – 10.3	+0.10/+0.35	+0.20/+0.75
10.4 – 12.3	+0.10/+0.40	+0.25/+0.80
12.4 – 14.3	+0.10/+0.40	+0.30/+0.80
14.4 – 16.3	+0.10/+0.45	+0.35/+0.95
16.4 – 18.3	+0.10/+0.50	+0.40/+1.00
18.4 – 20.3	+0.10/+0.55	+0.40/+1.05
20.4 – 22.3	+0.10/+0.60	+0.45/+1.10
22.4 – 35.3	+0.10/+0.60	+0.50/+1.10

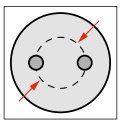
ground



Outside diameter [mm]	Tolerance [mm]
6.0	+0/-0.008
6.1 – 10.0	+0/-0.009
10.1 – 18.0	+0/-0.011
18.1 – 30.0	+0/-0.013
30.1 – 32.0	+0/-0.016

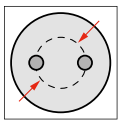
Pitch circle diameter

as sintered



Outside diameter [mm]	Tolerance [mm]
3.3	+/-0.10
3.4 – 4.3	+/-0.15
4.4 – 12.3	+/-0.20
12.4 – 18.3	+/-0.25
18.4 – 35.3	+/-0.30

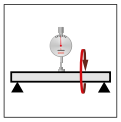
ground



Outside diameter [mm]	Tolerance [mm]
6.0 – 12.0	+/-0.20
12.1 – 18.0	+/-0.25
18.1 – 32.0	+/-0.30

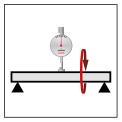
Straightness

as sintered



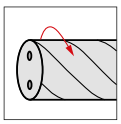
Length [mm]	max. deflection [mm]
250 – 280	0.40
> 280	0.50

ground



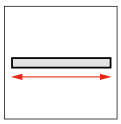
Outside diameter [mm]	max. deflection [mm]
6.0 – 7.9	0.12
8.0 – 9.9	0.10
10.0 – 11.9	0.08
12.0 – 19.9	0.05
20.0 – 32.0	< 0.05

Helix angle



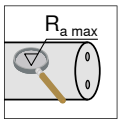
Product group	Total tolerance class [°]	Number of classes	Tolerance class [°]
Standard	+/-1	3	+/-0.333
Ø 3.3 – 4.3	+/-0,75	6	+/-0.125
extra-long, 3 holes	+/-0.75	6	+/-0.125
As sintered, with two coolant holes ≥ 50°	+/-0.75	6	+/-0.125

Length



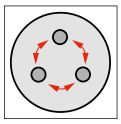
Total length tolerance [mm]
+0/+10

Surface finish



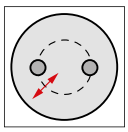
Executions	$R_{a\ max.}$ [µm]
as sintered	as sintered
ground	0.05

Pitch error



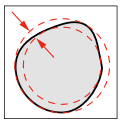
max. pitch error with ..R3 [°]
+/-3.0

Excentricity



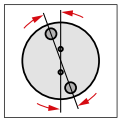
Outside diameter [mm]	Tolerance [mm]
3.3	0.04
3.4 – 4.3	0.05
4.4 – 8.3	0.10
8.4 – 10.3	0.15
10.4 – 14.3	0.18
14.4 – 35.3	0.20

Roundness
ground



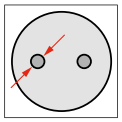
Outside diameter [mm]	Tolerance [mm]
6.0	0.004
6.1 – 10.0	0.005
10.1 – 30.0	0.006
30.1 – 32.0	0.008

Torsion
as sintered



max. torsion with ..R4 [°]
2.0

Hole diameter

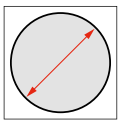


Outside diameter [mm]	Hole diameter [mm]	Tolerance [mm]
3.3 – 4.3	≤ 1.00	+/-0.030
3.3 – 4.3	≥ 1.01	+/-0.050
4.4 – 35.3	0.40 – 1.30	+/-0.050
4.4 – 35.3	1.31 – 2.50	+/-0.075
4.4 – 35.3	2.51 – 5.00	+/-0.100

Rods with straight coolant holes

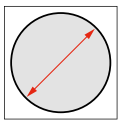
Outside diameter

as sintered



Outside diameter [mm]	Tolerance [mm]
3.3	+0/+0.20
3.4 – 5.0	+0/+0.30
5.1 – 6.5	+0/+0.35
6.6 – 15.2	+0/+0.40
15.3 – 20.7	+0/+0.55
20.8 – 22.2	+0/+0.65
22.3 – 34.3	+0/+0.75

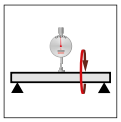
ground



Outside diameter [mm]	Tolerance [mm]
4.0 – 6.0	+0/-0.008
6.1 – 10.0	+0/-0.009
10.1 – 18.0	+0/-0.011
18.1 – 30.0	+0/-0.013
30.1 – 32.0	+0/-0.016

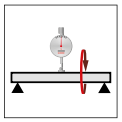
Straightness

as sintered



max. deflection [mm]
0.50

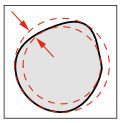
ground



Outside diameter [mm]	max. deflection [mm]
4.0 – 5.9	0.15
6.0 – 7.9	0.12
8.0 – 9.9	0.10
10.0 – 11.9	0.08
12.0 – 19.9	0.05
20.0 – 32.0	< 0.05

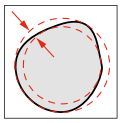
Roundness

as sintered



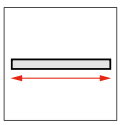
Outside diameter [mm]	Tolerance [mm]
3.3 – 5.7	0.05
6.2 – 7.7	0.08
8.2 – 12.7	0.10
13.2 – 30.2	0.13
30.3 – 34.3	0.16

ground



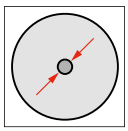
Outside diameter [mm]	Tolerance [mm]
4.0 – 6.0	0.004
6.1 – 10.0	0.005
10.1 – 30.0	0.006
30.1 – 32.0	0.008

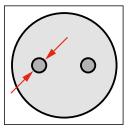
Length



Total length tolerance [mm]
+0/+10

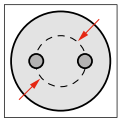
Hole diameter





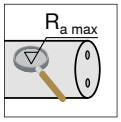
Product group	Hole diameter [mm]	Tolerance [mm]
central coolant hole	0.10 – 0.50	+0.05
	0.51 – 1.30	+0.10
	1.31 – 2.50	+0.15
	2.51 – 5.00	+0.20
two coolant holes	0.10 – 0.50	+/-0.025
	0.51 – 1.30	+/-0.050
	1.31 – 2.50	+/-0.075
	2.51 – 5.00	+/-0.100

Pitch circle diameter



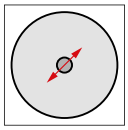
Outside diameter [mm]	Tolerance [mm]
3.3 – 3.9	+/-0.05
4.0 – 5.9	+/-0.10
6.0 – 14.9	+/-0.20
15.0 – 20.9	+/-0.25
21.0 – 34.3	+/-0.30

Surface finish

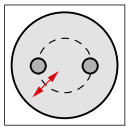


Executions	$R_{a\ max.}$ [µm]
as sintered	as sintered
ground	0.05

Excentricity

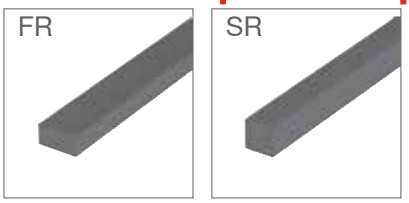


Outside diameter [mm]	Tolerance [mm]
3.3 – 3.9	0.025
4.0 – 5.9	0.050
6.0 – 7.9	0.100
8.0 – 10.9	0.120
11.0 – 24.9	0.150
25.0 – 34.3	0.200

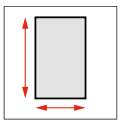


Outside diameter [mm]	Tolerance [mm]
3.3 – 3.9	0.025
4.0 – 5.9	0.050
6.0 – 7.9	0.100
8.0 – 10.9	0.120
11.0 – 24.9	0.150
25.0 – 34.3	0.200

Flat and square strips

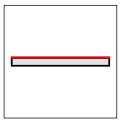


Width, height



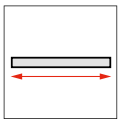
Width, height [mm]	Tolerance [mm]
2.3 – 4.3	+0/+0.20
4.4 – 6.3	+0/+0.25
6.4 – 10.3	+0/+0.30
10.4 – 14.3	+0/+0.35
14.4 – 16.3	+0/+0.40
16.4 – 20.3	+0/+0.50

Levelness



Levelness [mm]
max. 0.4

Length



Total length tolerance [mm]
+0/+10

Exchangeable head system (EHS)

Application instructions for mounting

Assembly instructions for cylinder shanks

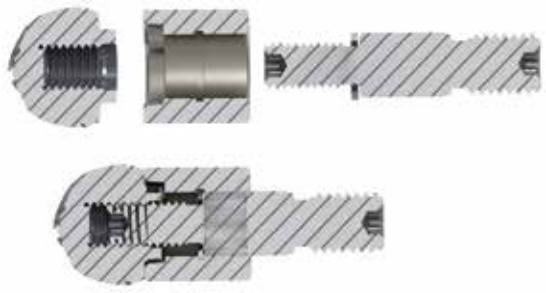
Cylinder shanks are suitable for any application. This means that blanks with a through-hole are fixed by means of a threaded bush and a clamping screw from the front.

Blanks with an internal thread are fixed from behind using a cylinder screw. For this type of blanks, the threaded bush has to be eliminated.

Assembly instructions for cylinder shanks

Type A

Type B



Threaded-end adapters can be used with all commonly available threaded-end shanks. As there are different types of blanks, two types of adapters are required.

The threaded-end adapter, type A, is used for blanks with a through-hole. These blanks are clamped from the front using a threaded bush and a clamping screw.

The threaded-end adapter, type B, is suitable for blanks with internal thread. This adapter consists of two parts. The blank is clamped in the seat by means of the screw. Subsequently, the assembled adapter including the blank is fixed with another screw.

Radial and axial run-out

Achievable radial and axial run-out tolerances for an assembled, finish-ground tool (shank and head):

Radial run-out: max. 0.020 mm

Axial run-out: max. 0.015 mm

All connections have to be cleaned and free of burrs before mounting.

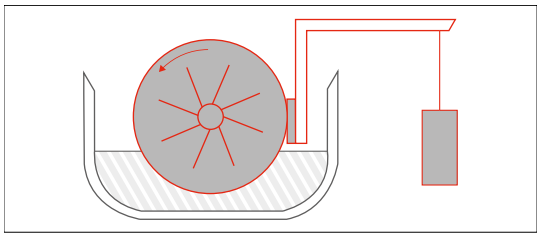


Figure 1: test assembly for the determination of wear resistance according to ASTM B611-85

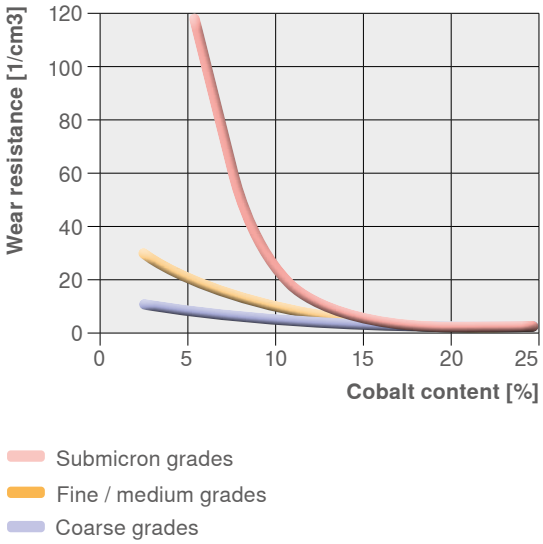


Figure 2: wear resistance in relation to the cobalt content and grain size

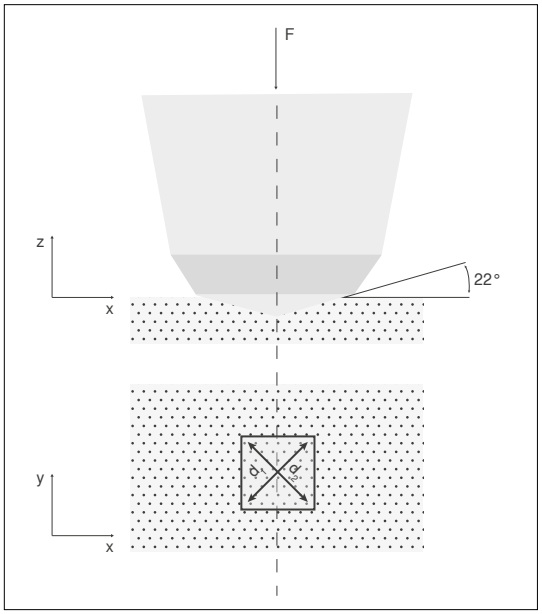


Figure 3: Vickers hardness test according to ISO 3878

Mechanical properties of carbide

Wear resistance

The most important property of carbide is wear resistance. This property - or, to be precise, this combination of properties - refers to the surface of the component. When two surfaces rub against each other, material is removed from both of them. Under low stress the material removed consists of single grains or particles. This phenomenon is called 'scoring'. In cases of high stress the material removed consists of grain clusters and is called 'abrasion'. The concept of wear is very complex and depends on many variables. Wear resistance is mainly tested using the ASTM B611-85 method. In this method a carbide piece is pressed onto a rotating steel disk using a lever. The rotating steel disk is the carrier for the abrasive material, which together with the material that is subject to analysis is transported from a tank below the container directly to the contact zone (see figure 1). The abrasive material consists of water and aluminium oxide (corundum).

Wear resistance is determined by measuring the volume of material removed from the carbide piece while the revolution number, test time and the force applied at 90° on the steel disk are held at consistent levels. A gravimetric evaluation is carried out, with the volume removal indicated in mm^3. As shown in figure 2, wear resistance increases the finer the grain and the lower the cobalt content.

Formula 1: calculation of the Vickers hardness (ISO 3878)

$$HV = \frac{0.102 \times 2 \times F \times \sin\frac{136°}{2}}{d^2} \approx 0.1891 \frac{F}{d^2}$$

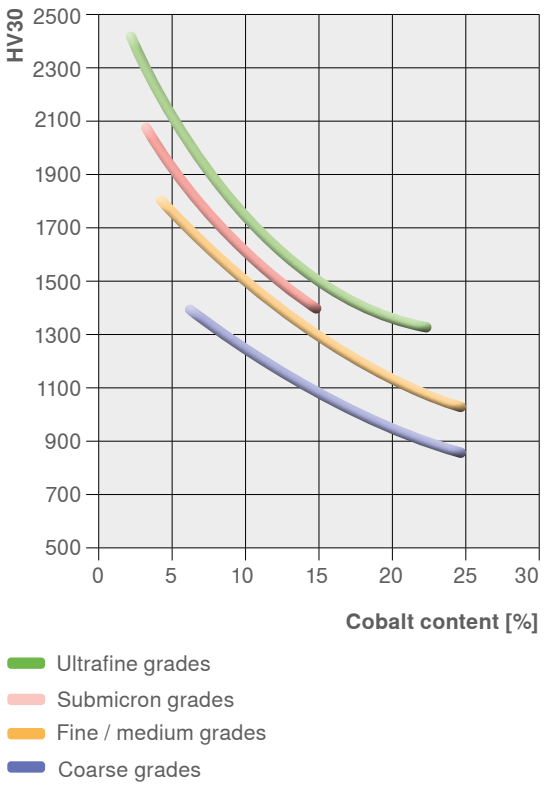


Figure 4: hardness in relation to the cobalt content and grain size

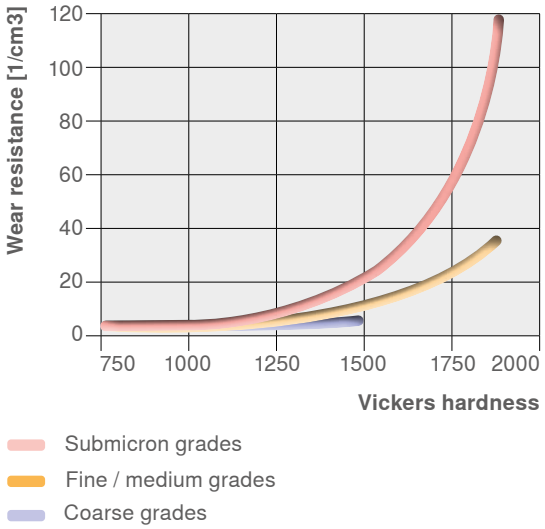


Figure 5: wear resistance in function of hardness with different grain sizes

Hardness

Hardness is a material's mechanical resistance to another, harder, material which penetrates it. The hardness is normally determined based on the Vickers hardness test according to ISO 3878. In this test a 136° pyramidal diamond indenter is pressed onto a work piece with a determined test force. The size of the indent is determined optically by measuring the two diagonals of the square indent produced by the applied force (F). The impression surface is calculated with formula #1 (see fig. 3). When introducing this test method the obsolete unit 'kilopond' was used for the test force. Therefore in the formula the factor 0.102 is used for conversion. The standardised indication of the Vickers hardness, for example, is as follows:

620 HV 30

Parameters:
- 620 = hardness
- HV = test procedure
- 30 = test force in kilopond

Another method for determining hardness is the Rockwell procedure (ISO 3738). It is similar to the Vickers procedure but uses a diamond brale indenter. Here, the depth of penetration is used as the degree of hardness. There is no theoretical basis for a conversion between the two procedures. In order to create a comparison a determinate test must be carried out. Like wear resistance, hardness also increases with a smaller grain size and lower cobalt content (see figure 4). As wear resistance and hardness show similar behaviour with regard to cobalt content and grain size, hardness is often used as a reference for wear resistance. Furthermore, the Vickers procedure is easier and quicker than ASTM B611-85. Nevertheless the relation of hardness and wear resistance is exponential and also depends on the grain size (see figure 5).

Formula 2: calculation of the critical tension intensity factor K_{IC}

$$K_{IC} = 0.15 \sqrt{\frac{HV30}{\sum L}} \quad \left[MN\, m^{\frac{3}{2}}\right]$$

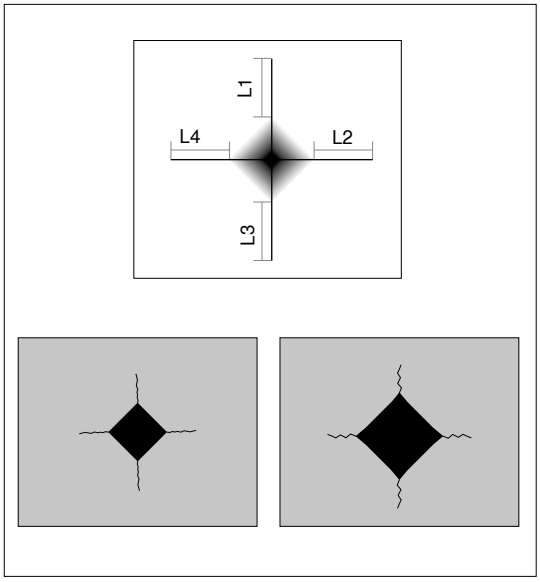


Figure 6: Palmqvist method for the determination of fracture toughness

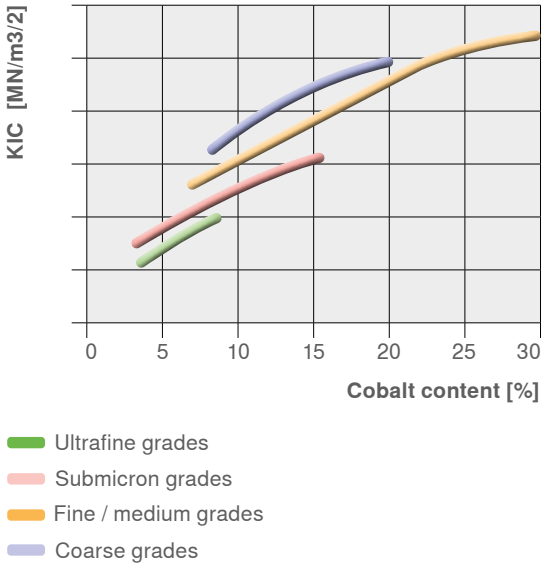
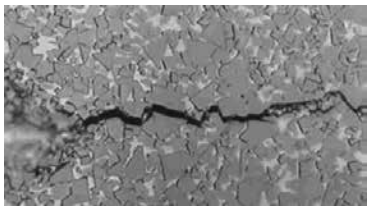


Figure 7: fracture toughness in relation to the grain size and the cobalt content

Toughness

When a material is exposed to external static or dynamic stress, this leads to mechanical tensions. In many cases, particularly with impact loads, both the strength and ductility of the material have to be taken into account. These two properties represent the basis for the concept of toughness, which is defined as the capacity to resist fracture or crack progagation. Fracture in this context means the complete separation of the material into at least two parts. There are numerous possibilities to define or determine toughness, transverse rupture strength or fracture toughness. In the definition above, the integrated product of force and deformation until fracture occurs is used as the toughness value. In the case of carbide, the Palmqvist method is frequently applied to determine the toughness as a critical tension intensity factor K_{IC}. For this purpose, the crack length of a Vickers hardness indent is used to deduce the fracture toughness (see figure 6). This is then converted into the tension intensity factor using formula 2. As can be seen in figure 7, toughness increases with the metal binder content and growing grain size. Compared to other metal materials, carbide can be found in the lower part of the toughness range, about the same as hardened steel.



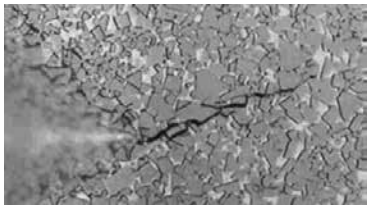
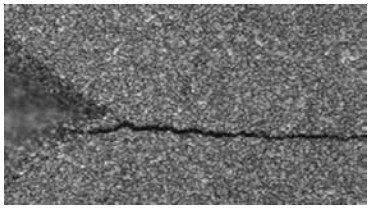


Figure 8: crack propagation in large grain sizes; larger crack propagation requires higher fracture energy - higher toughness



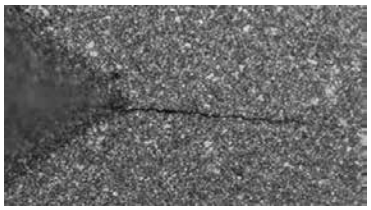


Figure 9: crack propagation in small grain sizes; direct, shorter crack propagation - requires lower fracture energy - lower toughness

By definition, carbide is to be considered a brittle material as there is basically no plastic deformation prior to fracture. This is confirmed by examination of surfaces where breakage occurred. Various carbides, however, show very big differences in terms of toughness which can be best explained by taking a look at the microstructure. Cracks inside the carbide grains may occur just like intergranular fractures and shear fractures in the binder metal. Generally the number of grain cracks rises with increasing grain size and the number of shear fractures when raising the binder content. In terms of fracture energy, the main contribution to toughness comes from the length of the rupture in the metal binder (see figures 8 and 9).

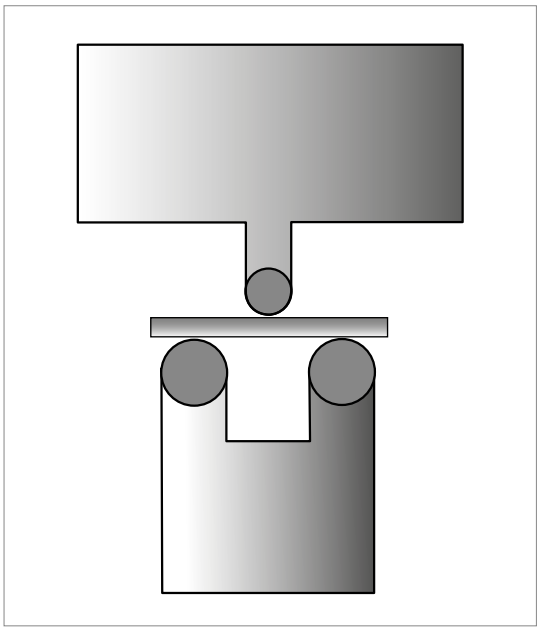


Figure 10: illustration of a transverse rupture strength test

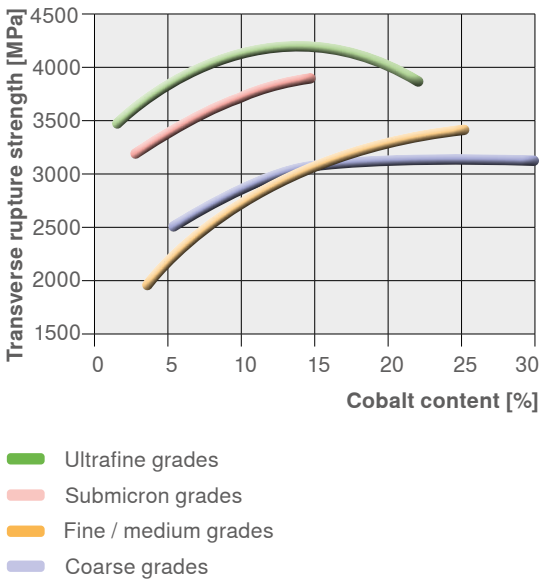


Figure 11: transverse rupture strength in relation to the grain size and the cobalt content

Mechanical strength

Every material has defects such as inclusions and micro-cracks. For brittle materials such as hardened steels or carbide the mechanical strength is limited by the number and size of these defects. In this context the mechanical strength depends on the volume, as with a growing material volume the probability of a large defect rises. Depending on the type of stress, various types of strength are distinguished.

Transverse rupture strength

Testing the transverse rupture strength is the easiest and most common procedure of analysing the mechanical strength of carbide. According to the standardised ISO 3327 procedure a test material of a certain length is placed on a surface and put under stress in the middle until it breaks (see figure 10). The transverse rupture strength (T.R.S.) is then the average value of several tests. The maximum value is achieved with a cobalt content of around 14 weight-% and grain sizes of around 0.2 – 0.5μm.

The very low plastic deformation is normally not taken into account as it occurs only in the toughest carbides. Transverse rupture strength decreases with increasing temperature.

Furthermore, the carbides show creep values when they are subjected to stress or to high temperatures for a long time. The transverse rupture strength is decisively influenced by the number and size of defects in the structure or on the surface. Fractures always occur at the weakest point of the structure, which is also where the largest defect is. A high number of defects therefore increases the probability that one of these defects causes a premature fracture on the point with the highest stress. As the quality demands in the field of carbide manufacturing are high, impurities or defects can be minimised and thus the risk of breakage reduced.

Tensile strength

When testing the tensile strength of brittle materials it is difficult to measure exact results. A precise result depends on both the perfect preparation of the test materials as well as on the additional stress present on the mounting fixtures. Applying the Weibull theory, however, the tensile strength can be deducted from the values of the transverse rupture strength.

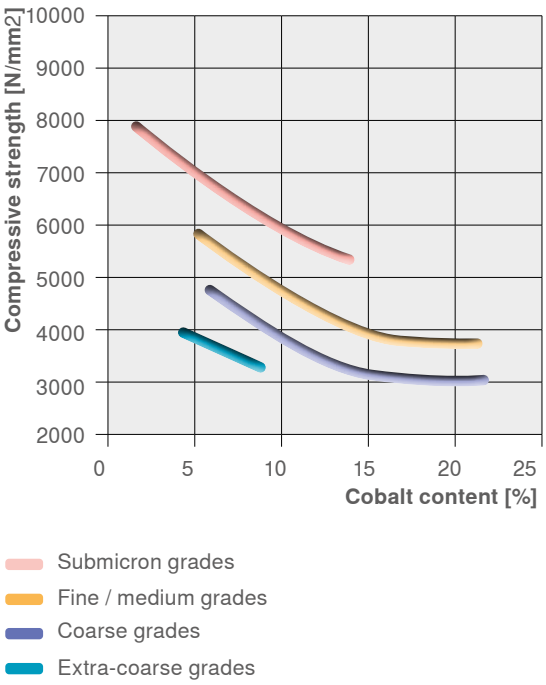


Figure 12: compressive strength in relation to the grain size and the cobalt content

Compressive strength

One of the most remarkable properties of carbide is the extremely high compressive strength under uniaxial stress. This valuable property is used in virtually all application fields (cutting edges with high compressive strength in all machining processes, pressing and drawing dies, rolls, anvils and dies for the production of synthetic diamonds, etc.). The tension of this kind of stress doesn't actually cause fracture due to pressure but due to tension: a shear fracture. A suitable procedure for determining compressive strength can be found in ISO 4506. To achieve precise values for carbide, the test piece's geometry must be changed so that the effects of the edges and contact, which occur in a simple cylindrical test piece, are eliminated. Elastic deformation is produced under initial load; however, before fracture a degree of plastic deformation results. Figure 12 shows the compressive strength of various grain sizes in relation to the cobalt content.

The compressive strength increases when the metal binder content decreases and the grain size is reduced. A small grain carbide grade with a low metal binder content typically has a compressive strength of almost 7,000 N/mm2. The compressive strength decreases when the temperature increases. The degree of plastic deformation increases notably with the temperature, so that the results are variable when temperatures are high.

Shear strength

The implementation of pure shear tests is very difficult. However, numerous things speak for the fact that the shear strength is somewhat higher than the compressive strength.

Fatigue strength

The fatigue strength of carbide is above 2 million pulsating compressive loads at around 65 to 85% of the static compressive strength. The compressive fatigue strength increases with a decreasing cobalt content and with decreasing grain size.

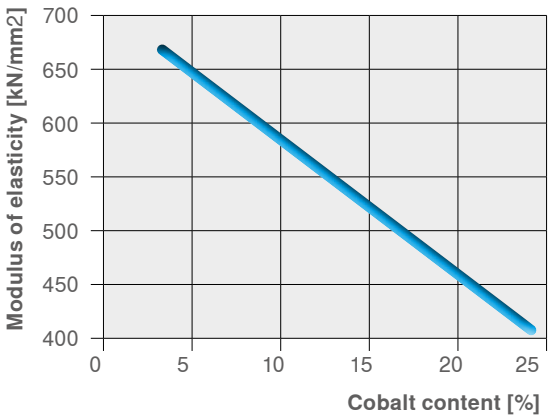


Figure 13: modulus of elasticity of WC-Co carbides

Property	from	to
Hardness [HV30]	1300	2200
Transverse rupture strength [MPa]	2000	4600
Fracture toughness [MPa y · m1/2]	8.4	15

Figure 14: properties of CERATIZIT round rods and preforms

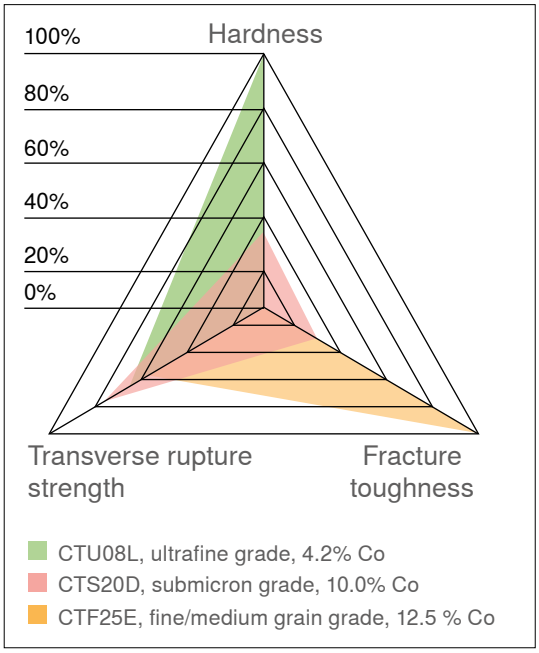


Figure 15: tension fields of three CERATIZIT grades, 0% - lowest value of all grades, 100% - highest value of all grades

Modulus of elasticity, shear modulus, Poisson's ratio

The modulus of elasticity indicates the resistance of a material against elastic deformation and is higher the more rigid a material is. In the case of carbide the modulus of elasticity is 2 to 3 times higher than in steel and increases linearly with decreasing metal binder content. See fig. 13: additives of γ-phase reduce the modulus of elasticity. An exact determination of the modulus of elasticity based on the tension-expansion diagram is difficult. Therefore, for reliable results resonance measurements of transverse and longitudinal waves are carried out according to ISO 3312. The shear module is determined in the same way with the help of torsional vibration. By determining the modulus of elasticity and the shear module the Poisson's ratio can be calculated.

Influence of the grain size and the cobalt content on the most important properties

The most important mechanical properties of the carbide, such as hardness, transverse rupture strength and fracture toughness, are determined by the grain size of the tungsten carbide and cobalt content. Figure 14 shows the properties of CERATIZIT round rods and preforms. Sporadically it can be sustained that through smaller grain sizes higher hardness and transverse rupture strength can be achieved. At the same time, however, fracture toughness decreases. By increasing the cobalt content hardness is reduced, while the transverse rupture strength and fracture toughness are raised. Based on this fact a compromise between hardness and fracture toughness can be made. Figure 15 shows three different CERATIZIT grades and their hardness, fracture toughness and transverse rupture strength. 0% is the lowest value and 100% the highest value of all CERATIZIT grades.

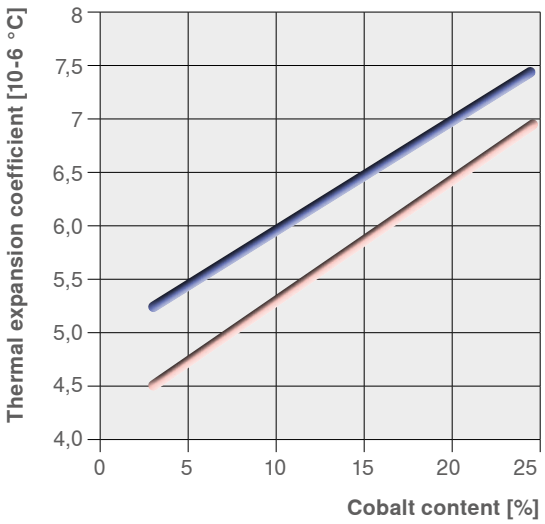


Figure 16: thermal expansion in function of the cobalt content for two temperature intervals

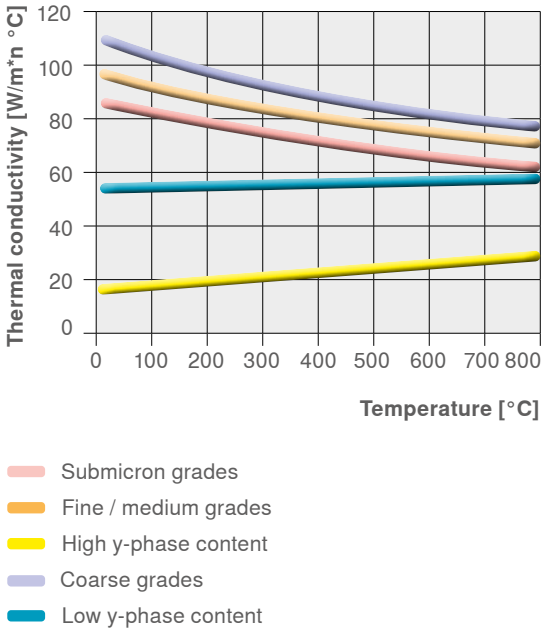


Figure 17: thermal conductivity in relation to the temperature of various micro-structures and grain sizes

Physical properties of carbide

Density

The density of carbide is determined according to ISO 3369 and varies strongly depending on the composition of the carbide grade. Grades with a very high WC content have the highest density. Grades with a high titanium carbide content and a high binder content have the lowest density. Typically it can however be assumed that the density is around 50 to 100% higher than that of steel.

Thermal expansion

As tungsten carbide has a very low thermal expansion coefficient, the values for carbide compared to steel are very low. For carbide grades which contain titanium carbide the values are somewhat higher than for the pure WC-Co carbides. Figure 16 shows the thermal expansion in relation to the cobalt content.

Thermal conductivity

The thermal conductivity is of great significance for carbide applications, as it determines the temperature in the wear areas and has a large influence on the carbide's thermal fatigue resistance and resistance to thermal fluctuations. The thermal conductivity of WC-Co carbide is around twice that of unalloyed steels. It is only slightly influenced by the cobalt content and the grain size, while γ-phases like titanium carbide or tantalum carbide have an impact. Titanium carbide strongly reduces the thermal conductivity. Therefore, for milling grades tantalum carbide is mostly used as γ-phase (see figure 17).

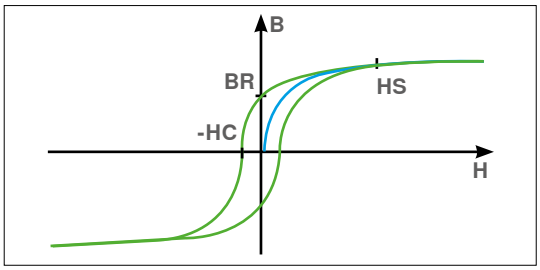


Figure 18: hysteresis curve of a ferromagnetic material

Specific electric resistance

WC-Co carbides have a low specific resistance of around 20$\mu\Omega$ cm and, as such, are good conductors of electricity. Carbides with γ-phases have a higher specific resistance.

Magnetic saturation & coercive field strength

Carbides with cobalt as a metal binder are ferromagnetic. If a ferromagnetic material is exposed to a magnetic field strength H, the magnetic flux density B in this material increases (figure 18, blue line). The flux density decreases when the field strength rises, until maximum saturation is achieved. This maximum flux density is defined as magnetic saturation (4πσ). When the external field strength is removed, the flux density in the material is reduced along the upper green line to a certain residual magnetism (BR), the so called 'remanence'. The higher the remanence is, the better a material can be magnetised and the remanence can only be eliminated when the material is subjected to an inverse field. The inverse field strength HC which is necessary to reduce the magnetic flux density to zero, or to 'de-magnetise' the material, is defined as coercive field strength.

The finer the magnetic field lines of the metal binder phase in the carbide, the higher the coercive field strength. This means that the coercive field strength provides information about the state of the metal binder phase. The metal binder phase becomes finer with smaller tungsten carbide grains and lower binder content. As described in the section on 'Mechanical properties of carbide', the smaller the grains and the lower the metal binder content, the higher the hardness of the structure. In this way an accordant correlation between coercive field strength and hardness can be seen. In practical applications this represents a non-destructive measuring method for the hardness.
The magnetic saturation of carbide also depends on the content and the state of the cobalt binder. When one of these parameters is known, information can be given about the other parameters. In this context the carbon content of the carbide has a decisive influence on the magnetic state of the cobalt. The magnetic saturation provides information about the carburisation of the carbide. This measuring method represents an important tool for checking the production quality.

Chemical compounds	Resistance
Acetone	high resistance
Ethanol	high resistance
Sodium hydroxide	high resistance
All acids	low resistance
Tap water	high resistance
Petroleum	high resistance

Figure 19: some chemical compounds and the corresponding resistance of carbide

Permeability

Magnetic permeability means the penetrability of materials for magnetic fields. Although carbide is ferromagnetic, the magnetic permeability values are low. They increase equally along with the magnetic saturation and with the cobalt content and amount to around 5 H/m with 20 vol.%. Compared to this, vacuum has a magnetic permeability of 1 H/m and iron between 300 and 10,000 H/m.

Corrosion resistance

According to DIN EN ISO 8044 corrosion is a reaction of a metal material with its environment, which causes a measurable modification of the material and may lead to a reduced performance of the metal element or the entire system. In most cases the reaction is electrochemical in nature or in some cases chemical or metallurgical in nature. In carbides corrosion causes a reduction of the surface of the binder phase, thus on the surface there remains only a carbide 'skeleton'. The bond between carbide grains next to each other is very weak, so the rate of destruction increases correspondingly. When the metal binder content is low the carbide 'skeleton' is more pronounced. Consequently this type of carbide grade shows higher wear resistance and corrosion resistance than carbides with a higher metal binder content. In practical applications, however, this is not sufficient to significantly increase the service life. Due to their limited corrosion resistance pure WC-Co carbides are often not suitable for application fields with difficult corrosion conditions. Typically, it can be assumed that WC-Co carbides down to pH 7 are corrosion-resistant.

Headquarters

CERATIZIT S.A.
LU-8232 Mamer
T. +352 31 20 85-1
E. info@ceratizit.com
ceratizit.com

Worldwide
CERATIZIT Austria GmbH
AT-6600 Reutte
T. +43 5672 200-0
E. info.austria@ceratizit.com

Brazil
CERATIZIT América Latina Ltda.
BR-13069-310 Campinas,
São Paulo
T. +55 11 4133 2300
E. info.americalatina@ceratizit.com

China
CB-CERATIZIT Xiamen Co., Ltd.
69 Xingxi Road, Xinglin, Jimei,
CN-361022 Xiamen (Jimei), China
T. +86 592 666 1000

Great Britain
CERATIZIT UK & Ireland Ltd.
UK-Sheffield S9 1XU
Toll Free 0800 048 4877 / 4878
T. +44 1925 261 161
E. info.uk@ceratizit.com

India
CERATIZIT India Pvt. Ltd.
IN-Bengaluru 560099
T. +91 80 4043 1262
E. ctindia.info@ceratizit.com

Italy
CERATIZIT Italia S.p.A.
IT-20092 Cinisello Balsamo (MI)
T. +39 02 641 6731
E. info.italia@ceratizit.com

Japan
CERATIZIT Japan Co.,Ltd.
JP-421–0115 Shizuoka
T. +81-54-268-1060
E. info.japan@ceratizit-j.co.jp

Spain / Portugal
CERATIZIT Ibérica
Herramientas de Precisión S.L.
ES-28660 Madrid
T. +34 91 351 0609
E. info.iberica@ceratizit.com

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