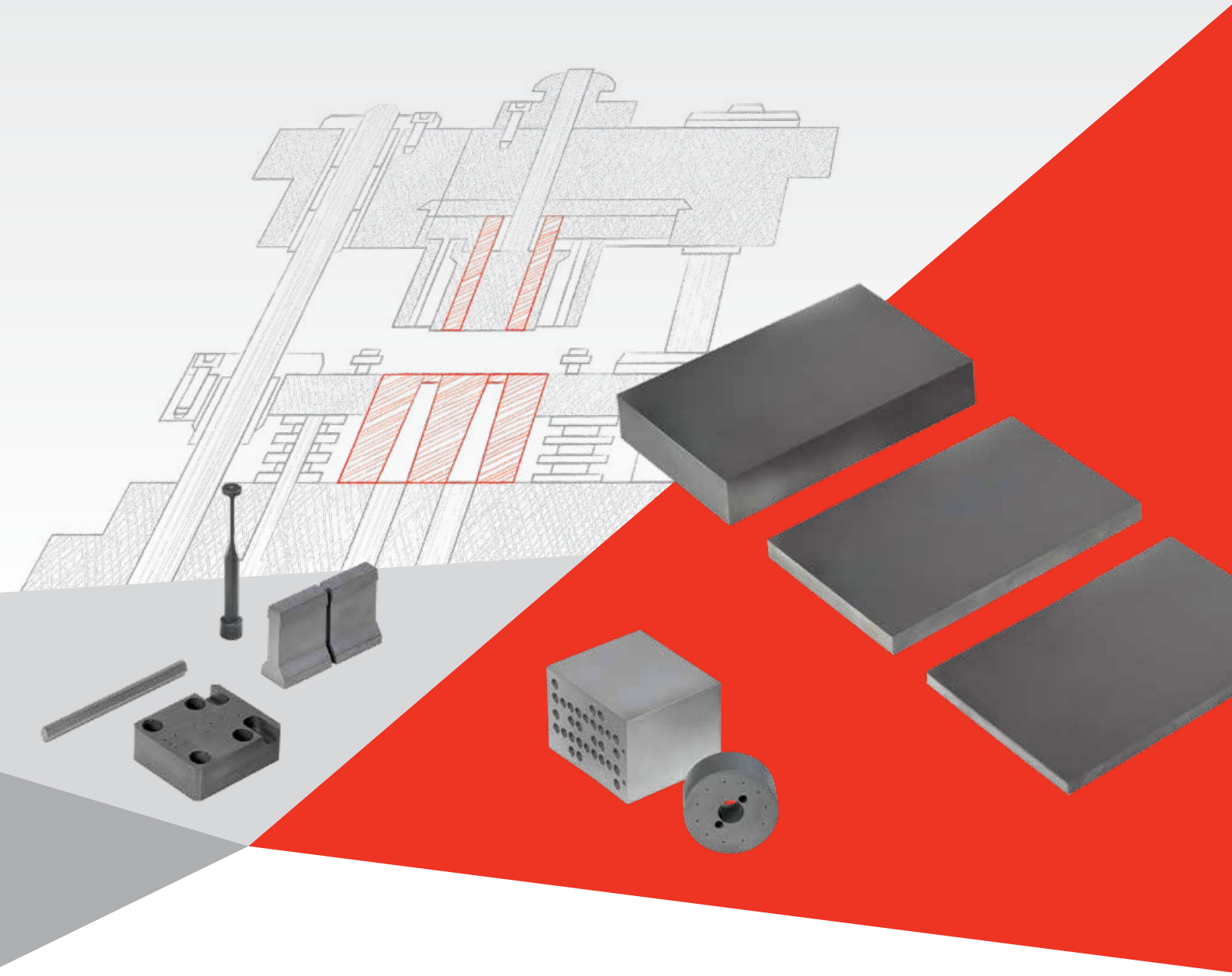
Hard Material Solutions

2020 EN

Solutions for the tool and die industry



CERATIZIT GROUP

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

Tooling the Future

ceratizit.com

Sarah-Jane Breitenreiter,
Customer Service Centre

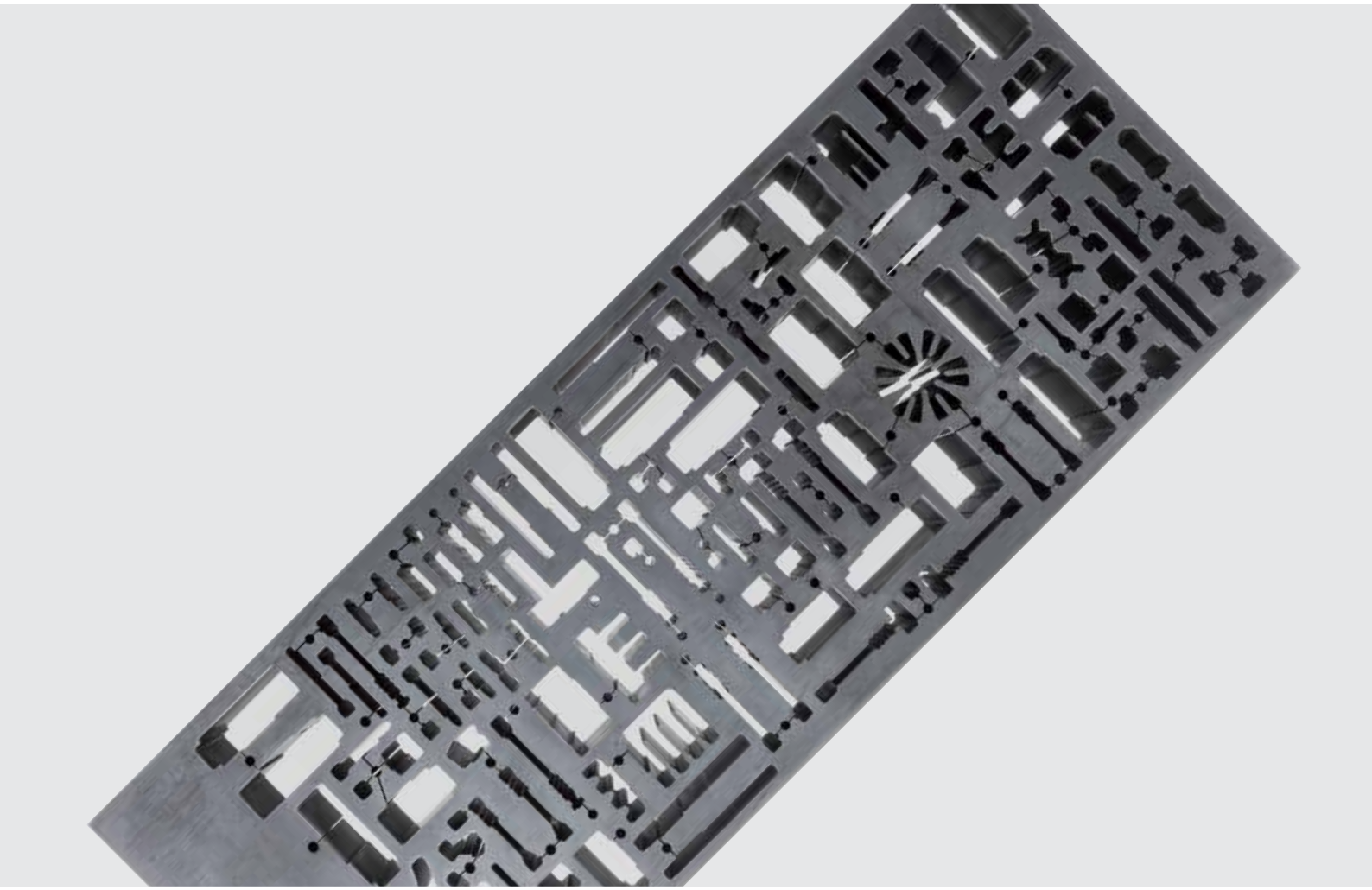
Together towards profitable growth: we can give you the decisive competitive advantage.

Economic efficiency, precision, process reliability.

Solutions from CERATIZIT fulfil all expectations in relation to tools and active parts in particular. They are **sophisticated and powerful** thanks to high-quality carbide grades.

The prerequisite for this is a **permanently homogeneous and consistent carbide structure** which guarantees **long tool life and process stability**. Specifically developed for tool and die construction, our CF carbide grades are extremely resistant to both wear and corrosion and are ideally suited to a wide range of applications.

In order to achieve the best possible result, in addition to the suitable carbide grade for your application, we also provide you with an outstanding **service package:** advice concerning grade characteristics and selection, optimisation of machining processes and customer-specific seminars.



Advantages & benefits

Advantages	Benefits
Economic efficiency	
Targeted recommendation of the most suitable grade	tool life optimisation, increase in productivity
Widest range of corrosion-resistant grades available on the market	individual grade selection for the largest application range in the fields of stamping, bending, blanking and forming operations.
Consistent quality	high productivity and repeatability
CF Premium Line: blocks for wire erosion with ground thickness available from stock	time saving: the ground products can be used immediately on your eroding machine
Standard Line CTM30Y: pressed and sintered blocks with grinding allowance available from stock	Minimum grinding allowance for economic finishing of the parts
Increased stroke rates	great quantities in short time
High rigidity, reduced abrasive wear	improved form accuracy of the active parts compared to steel and PM steel
Higher output quantity compared to active parts in steel	cost and time saving particularly for high quantities
Technical expertise	
Profound knowledge of applications	optimisation of processes and tool life
Research in study groups with scientific institutes and partners in the industry	access to the latest developments and trends
Metallurgical analyses in the CERATIZIT Group	additional technical support in the field of application optimisation and development
Safety and reliability	
Homogeneous structure and minimised porosity, also for larger dimensions	repeatability and high-quality and precise working results
CF+ grades: high K_{IC} values while maintaining the same hardness	excellent cutting edge stability
High product availability, orders 24/7 via the E-Techstore	quick and flexible delivery, saving the customer storage costs

Our solutions for the tool and die industry

Whether stamping, bending or blanking, metal forming, powder pressing or fine cutting – with our active parts made of carbide you can achieve high output rates and quantities, enabling you to turn out mass-produced parts economically.

Our products are available in various carbide grades and versions.

Carbide blocks for wire erosion, as sintered

- ▲ in special execution
- ▲ CF Premium Line: thickness ground to clean up + 0.4/+ 0.6 mm
- ▲ Standard Line: as sintered, with grinding allowance in all dimensions
- ▲ from stock - directly applicable, precise processed and at no extra charge

Rectangular strips for punching dies

- ▲ as sintered, with positive sintering tolerance

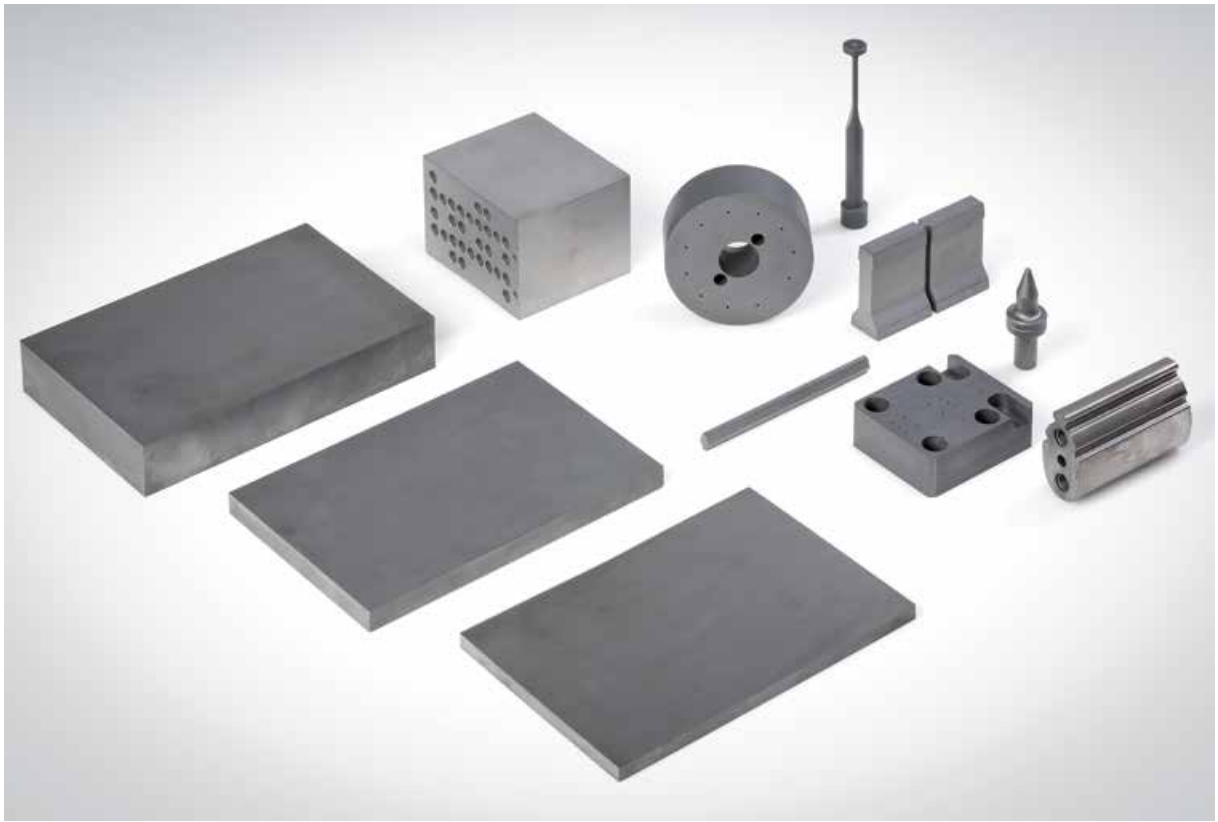
Bushes for guides and dies

- ▲ outer dimensions with grinding allowance, inner diameter with positive sintering tolerances

Rods for punching dies

- ▲ as sintered, length 330 mm
- ▲ diameter ground to h6, length: 330 mm

Preforms according to customer drawings



Application matrix for the tool and die industry

The following table offers a good basis for **choosing the right grade.**

Further influencing factors such as the composition of the strip material, cutting gap, lubrication, geometry of the active parts and the structure of the tools should be taken into account in order to select the optimal grade.

Requirements regarding the surface quality*

Strip thickness	Tensile strength (N/mm²)				
	< 500	500 – 900	900 – 1400	1400 – 2000	> 2000
< 0.2	CF-S12Z CF-S18Z CF-H25S+	CF-S12Z CF-S18Z CF-H25S+	CF-S18Z CF-H25S+	CF-S18Z CF-H40S+	CF-F35Z
0.2 – 0.5	CF-S12Z CF-S18Z CF-H25S+	CF-S12Z CF-S18Z CF-H25S+	CF-S18Z CF-H25S+	CF-H40S+ CF-F35Z	CF-F35Z
0.5 – 0.8	CF-S18Z CF-H25S+	CF-S18Z CF-H40S+	CF-S18Z CF-H40S+	CF-F35Z	°
0.8 – 1.2	CF-S18Z CF-H40S+	CF-H40S+	CF-H40S+	CF-F35Z	°
1.2 – 1.5	CF-H40S+	CF-H40S+	CF-H40S+ CF-F35Z	CF-F35Z	°
1.5 – 2	CF-H40S+	CF-H40S+ CF-F35Z	CF-F35Z	°	°
2 – 3	CF-H40S+	CF-H40S+ CF-F35Z	CF-F35Z	°	°
3 – 6	CF-H40S+ CF-F35Z	CF-F35Z	°	°	°
6 – 10	CF-F35Z	°	°	°	-
> 10	°	°	°	-	-

° Insufficient data. Test can be carried out upon request.

* Minimal damage due to machining operation (formation of thermal cracks, white zone, ...) and low roughness values. Adhesion due to strip material requires the best possible surface quality.

NEW: Standard Line grade CTM30Y, universal application thanks to balanced compromise of hardness and toughness

The new CF grade family

Evolution for higher performance

	CF-grade	replaces old grades	
	CF-S12Z	**TSM10 / CTS12L**	**TSM20 / CTS15L**
Binder content	6.0 %	6.0 %	7.5 %
Grain size	submicron	submicron	submicron
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1860	1870	1790
Transverse rupture strength [MPa]	3600	3500	3600
Fracture toughness [MPa*m$^{1/2}$]	9.0	8.2	8.6
	CF-S18Z	**MG18 / CTS20L**	**TSM33**
Binder content	9.0 %	10.0 %	10.0 %
Grain size	submicron	submicron	submicron
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1610	1680	1610
Transverse rupture strength [MPa]	3500	3700	3700
Fracture toughness [MPa*m$^{1/2}$]	11.0	9.4	9.4
	CF-H25S+	**H20S / CTF12**	**H30S / CTF18**
Binder content	8.5 %	6.0 %	9.0 %
Grain size	fine-medium	fine	fine
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1660	1640	1400
Transverse rupture strength [MPa]	3000	2200	2800
Fracture toughness [MPa*m$^{1/2}$]	10.2	9.9	10.9
	CF-H40S+	**H30S / CTF18**	**H40T / CTF24**
Binder content	12.0 %	9.0 %	12.0 %
Grain size	fine-medium	fine	fine
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1400	1400	1330
Transverse rupture strength [MPa]	3200	2800	3000
Fracture toughness [MPa*m$^{1/2}$]	12.5	10.9	12.0
	CF-F35Z	**H50S / CTF30**	**H60S / CTF40**
Binder content	17.5 %	15.0 %	20.0 %
Grain size	fine-medium	fine	fine
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1200	1240	1070
Transverse rupture strength [MPa]	3300	3100	3400
Fracture toughness [MPa*m$^{1/2}$]	15.6	13.1	14.2
	CTM30Y	**H50S / CTF30**	**H30S / CTF18**
Binder content	15.0 %	15.0 %	9.0 %
Grain size	medium	fine	fine
Corrosion resistance	**SLIGHT**	NO	NO
Hardness [HV10]	1340	1240	1400
Transverse rupture strength [MPa]	3100	3100	2800
Fracture toughness [MPa*m$^{1/2}$]	11.5	13.1	10.9

Optimisation of applications

Tool improvement is the basis for maximum economy in the application process.

CERATIZIT offers a **systematic approach for the optimisation of the overall system.** This includes both an application-specific grade selection and the possibility of optimising the machining strategy of the production process in order to ensure sustainable development for other applications.

CF+ grades: the ‘PLUS’ in terms of performance

Our customers have been working for decades with our proven and fully fledged corrosion-resistant CF (corrosion-free) carbide grades, which were specifically developed for the tool and die industry.

To ensure that this will continue in the future, we have provided our latest developments with a PLUS in terms of performance.

You can benefit right away from even better product characteristics:

- **High process reliability** with optimal cutting edge stability thanks to higher K_{IC} values while maintaining the same hardness
- Strong **corrosion protection** and reduced speed of corrosion
- **Stable processes** including delicate active parts thanks to enhanced transverse rupture strength and improved tensile strength

More safety, reliability and efficiency – at the same price:

	NEW! CF+ grades	former product
	CF-H25S+	**CF-H25S**
Transverse rupture strength (MPa)	3000	2600
Fracture toughness (MPa*m$^{1/2}$)	10.2	10.1
	CF-H40S+	**CF-H40S**
Transverse rupture strength (MPa)	3200	3000
Fracture toughness (MPa*m$^{1/2}$)	12.5	12

CERATIZIT Standard Line – the perfect supplement to the Premium Line of the CF grade family

	NEW! CTM grade
	CTM30Y
Transverse rupture strength (MPa)	3100
Fracture toughness (MPa*m$^{1/2}$)	11.5

The CF grade family – corrosion-resistant carbide grades, specifically developed for tool and die construction

1. CF-H25S+

Fine/medium grade with high hardness and fracture toughness for high requirements in terms of abrasive wear.

	CF grade	replaces old grades	
	CF-H25S+	H20S / CTF12	H30S / CTF18
Binder content	8.5 %	6.0 %	9.0 %
Grain size	fine-medium	fine	fine
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1660	1640	1400
Transverse rupture strength [MPa]	3000	2200	2800
Fracture toughness [MPa*$m^{1/2}$]	10.2	9.9	10.9

Application

- When maximum wear resistance in general and of the skin surface in particular is required

Other

- Replaces fine and medium grades such as H30S/H40S/ CF-H40S+ when there are issues with excessive wear
- Alternative to CF-H40S+ in case of abrasion

2. CF-H40S+

Well-balanced corrosion-resistant fine-medium grade.

	CF grade	replaces old grades	
	CF-H40S+	**H30S / CTF18**	**H40T / CTF24**
Binder content	12.0 %	6.0 %	12.0 %
Grain size	fine-medium	fine	fine
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1400	1400	1330
Transverse rupture strength [MPa]	3200	2800	3000
Fracture toughness [MPa*m$^{1/2}$]	12.5	10.9	12.0

Application

- ▲ Ideal compromise between wear resistance and K_{IC} value (fracture toughness / edge stability)
- ▲ For universal applications: stamping, bending, blanking and forming operations

Other

- ▲ Replaces standard fine-medium grades such as H30S/H40S/H50S when there are problems with wear and corrosion
- ▲ Replaces standard submicron grades such as TSM33/CTS 20L when there are problems with edge chipping or corrosion
- ▲ Alternative to CF-H25S+ in case of primary edge chipping

3. CF-S12Z

Corrosion-resistant submicron grade with high hardness.

	CF grade	replaces old grades	
	CF-S12Z	**TSM10 / CTS12L**	**TSM20 / CTS15L**
Binder content	6.0 %	6.0 %	7.5 %
Grain size	submicron	submicron	submicron
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1860	1870	1790
Transverse rupture strength [MPa]	3600	3500	3600
Fracture toughness [MPa*m$^{1/2}$]	9.0	8.2	8.6

Application

- ▲ For thin strips and strips with low shear and tensile strength
- ▲ For materials with a high tendency to adhesion
- ▲ For soft materials, such as copper alloys, e.g. CuSn4F54, CuZn37, CuNi9Sn2

Other

- ▲ Replaces submicron grades TSM10/CTS12L and TSM20/CTS15L when there are corrosion issues
- ▲ An increase in economic efficiency is possible when CF-H25S+, CF-S18Z or similar grades are subject to abrasion wear only (provided there is no edge chipping)
- ▲ Further reduction of adhesion when applying the current CF-H25S+, CF-S18Z or similar grades (provided there is no edge chipping)

4. CF-S18Z

Corrosion-resistant submicron grade with increased fracture toughness.

	CF grade	replaces old grades	
	CF-S18Z	MG18 / CTS20L	TSM33
Binder content	9.0 %	10 %	10 %
Grain size	submicron	submicron	submicron
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1630	1680	1610
Transverse rupture strength [MPa]	3500	3700	3700
Fracture toughness [MPa*m$^{1/2}$]	11.0	9.4	9.4

Application

- ▲ Particularly for thin-walled punches and dies with delicate shapes which require high transverse rupture strength
- ▲ When high wear resistance in general and high wear resistance of the skin surface are required
- ▲ For materials with a high tendency to adhesion
- ▲ For soft materials, such as copper alloys, e.g. CuSn4F54, CuZn37, CuNi9Sn2

Other

- ▲ Replaces submicron grades such as MG18/ TSM33 (CTS 20L) when there are corrosion issues or edge chipping
- ▲ Replaces submicron grades such as H30S/ H40S when there is insufficient transverse rupture strength and wear
- ▲ Alternative to CF-H25S+ & CF-H40S+ in case of insufficient transverse rupture strength

5. CF-F35Z

Corrosion-resistant fine-medium grade with high fracture toughness.

	CF grade	replaces old grades	
	CF-F35Z	H50S / CTF30	H60S / CTF40
Binder content	17.5 %	15.0 %	20.0 %
Grain size	fine-medium	fine	fine
Corrosion resistance	**YES**	NO	NO
Hardness [HV10]	1200	1240	1070
Transverse rupture strength [MPa]	3300	3100	3400
Fracture toughness [MPa*m$^{1/2}$]	15.6	13.1	14.2

Application

- ▲ Stamping of thick sheet metal
- ▲ Stamping of high-tensile strip material
- ▲ Bending & forming applications

Other

- ▲ Replaces HSS/PM steels in wear or corrosion situations
- ▲ Replaces fine-medium grades such as H40S/H50S/H60S
- ▲ with low K_{IC} values (fracture toughness, edge stability) when there are problems with edge chipping
- ▲ Replaces H50S & H60S as a variant with protection against corrosion
- ▲ Alternative to CF-20HP in case of breakage issues or edge chipping
- ▲ Shows very good results in the milling process regarding surface and economy

“CERATIZIT Standard Line – the perfect supplement to the Premium Line of the CF grade family”

CTM30Y

The alternative to our CF grades, it can be flexibly used thanks to the excellent balance between hardness and toughness. This grade is a very good alternative choice to PM steel when heavy wear is involved.

	CTM grade	replaces old grades	
	CTM30Y	**H50S / CTF30**	**H30S / CTF18**
Binder content	15.0 %	15.0 %	9.0 %
Grain size	medium	fine	fine
Corrosion resistance	**SLIGHT**	NO	NO
Hardness [HV10]	1340	1240	1400
Transverse rupture strength [MPa]	3100	3100	2800
Fracture toughness [MPa*m$^{1/2}$]	11.5	13.1	10.9

Application

- ▲ Universal application for stamping, bending, blanking and forming operations
- ▲ Economical alternative to CF grades for non-critical applications
- ▲ Optimal alternative in case of high abrasive wear when using PM steel

Other

- ▲ Attractive solution for stamping medium batch sizes
- ▲ Very good compromise between wear resistance and toughness

Corrosion-resistant grades

CF-S12 – Submicron grade with very high hardness for applications with highly abrasive materials.

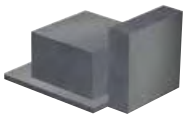
CF-S18Z – Increased fracture toughness allows the usage of a submicron grade for applications where high bending forces occur.

CF-H25S+ – Fine-medium grade with high hardness and fracture toughness for high requirements regarding abrasive wear.

CF-H40S+ – The grade for universal application, ideal compromise between hardness and fracture toughness.

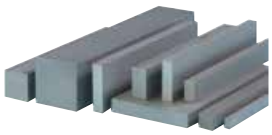
CF-F35Z – Medium-coarse grade combining the hardness of a fine grade with the fracture toughness of a coarse grade.

CTEB00



CTEB20

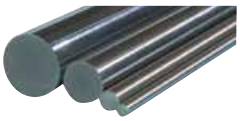
CTSS



CTSB

CTRR

CTRG



Grades available in stock and via E-Techstore within 24 hours

Product code	CF-S12Z	CF-S18Z	CF-H25S+	CF-H40S+	CF-F35Z	CTM30Y
CTEB00	▲	▲	▲	▲	▲	●
CTEB20	●	●	●	●	●	▲
CTSS	▲	▲	▲	▲	▲	▲
CTSB	▲	▲	▲	▲	▲	▲
CTRR	▲	●	▲	●	▲	▲
CTRG	▲	●	▲	●	▲	▲

● = stock item ▲ = upon request

The following grades are available as special versions

Type	CF-S12Z	CF-S18Z	CF-H25S+	CF-H40S+	CF-F35Z	CTM30Y
Special blocks	●	●	●	●	●	●
Special blocks with start bore / steel plug / threaded hole	●	●	●	●	●	▲
Preforms according to customer drawing	●	●	●	●	●	▲
Preforms to customer drawing with steel plug/thread	●	●	●	●	●	▲

● = standard production ▲ = upon request

Direct link to the complete stock programme

E-Techstore the benefit to you

Improved economic efficiency is just one click away: simply order online from our E-Techstore. e-techstore.com

Here we offer you a comprehensive product range for wear protection **24 hours a day.**

You will receive up-to-date detailed technical information and graphic illustrations for all solutions in the E-Techstore.

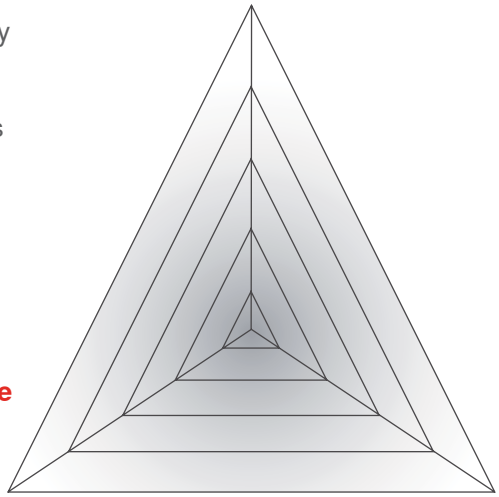
e-techstore.com
24/24 7/7

Your benefits:

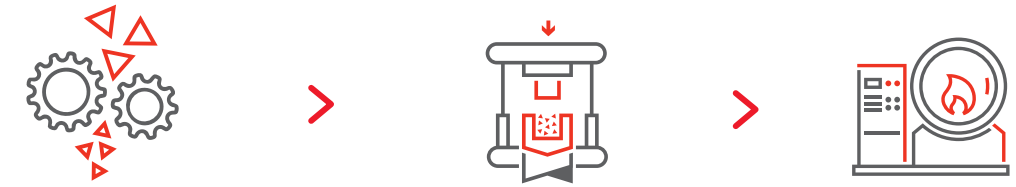
- **Product availability check**
- Easy access with filtering for a **quick overview**
- Orders are **automatically** forwarded on to the responsible sales organisation
- **Fast delivery:** availability from the Kempten warehouse, 24 hours within Europe if in stock

Cemented carbide

Cemented carbide is a powder metallurgical composite consisting of one or more hard material phases (e.g. tungsten carbide) and a binding material (e.g. cobalt). It is an extremely hard material, characterised by high wear resistance and thermal stability. It is used in various fields that require tools or components to be particularly wear-resistant.



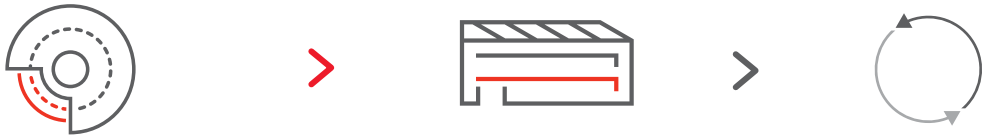
We manage the entire process chain



Powder preparation and mixing

Forming / pressing

Sintering



Grinding

Dispatch

Recycling

Hard Material Solutions

Hard cases are our speciality

We are your ideal partner when it comes to **high-quality hard materials for production processes, tool manufacturing and wear protection.**

From standard products to tailor-made solutions, from massive components to minute parts, from the blank to the fully finished product – a product that meets the highest standards of precision, surface treatment, and user-friendly assembly – our carbide and ceramic solutions ensure improved efficiency and outstanding total cost of ownership.

This is the case in a variety of application fields and industrial sectors. Even when subjected to extreme stress, our cemented carbides are notable for the **high flexibility** they offer in numerous industries. Our products are specially designed for **extreme working conditions**, making our Hard Material Solutions impressive tools for optimising your processes and increasing wear resistance.

Product portfolio

▲ Blanks and semi-finished products

▲ Water-jet cutting

▲ Hob milling

▲ Drawing tools & drawing nibs

Solutions for:

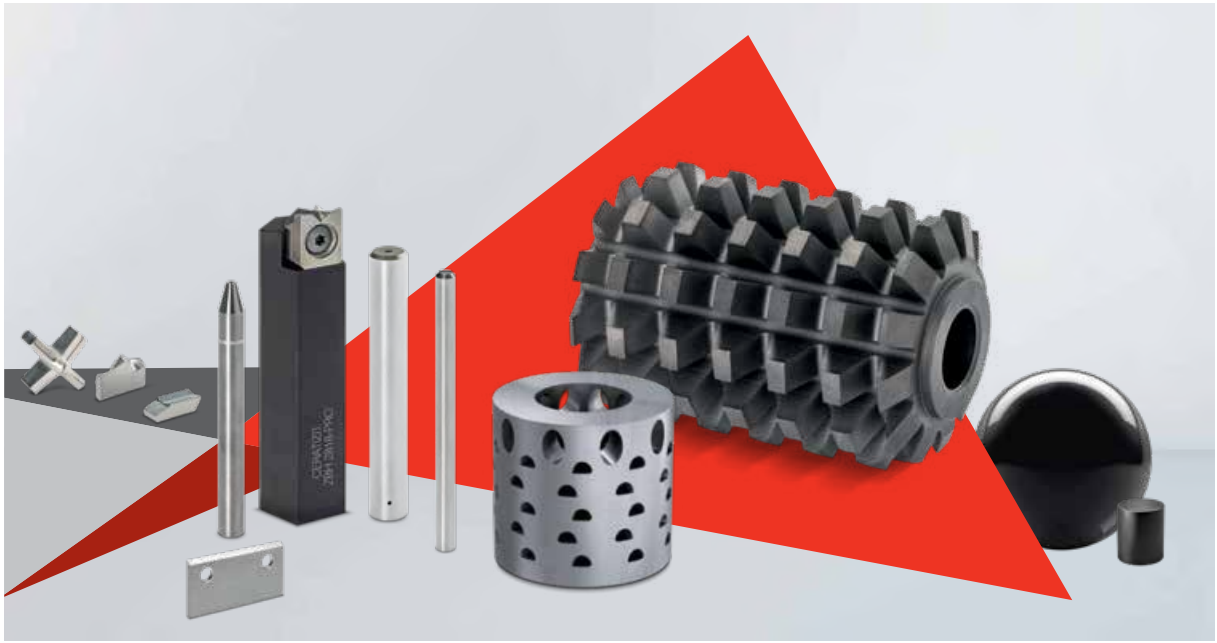
▲ Tool & die

▲ Fastening industry

▲ Injection technology

▲ Health industry

▲ Plastics industry



CERATIZIT Group

For over **95 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 wear part application areas, and successfully develops new types of cemented carbide, cermet and ceramic grades which are used for instance in the wood, metal and stone working industries.

Facts and figures

Headquarters

Mamer, **Luxembourg**

30 more than **production sites**

8 more than **000 employees**

80 more than **countries in which we are active**

1 more than **00 000 products**

1 more than **000 patents & utility models**

2 more than **00 R&D employees**

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

14 more than **innovation awards**

Headquarters

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