

## Composition and properties

CERATIZIT grade code	ISO code	U.S. code	Binder [m %]	Density [g/cm <sup>3</sup> ]	Hardness		Transverse rupture strength		K <sub>IC</sub> * (Shetty) [MPa·m <sup>1/2</sup> ]
					HV30	HRA	[MPa]	[psi]	

### Ultrafine grades

CTU08L	K10	C-2	4,2	15,05	2200	95,2	3700	536.600	8,4
TSF22	K10 – K20	C-2	8,2	14,55	1930	93,7	4400	638.800	9,2
TSF44	K10 – K20	C-2	12,0	14,10	1730	92,7	4600	667.000	9,8

### Submicron grades

CTS12D	K05 – K10	C-3	6,0	14,80	1820	93,1	3600	522.100	9,3
CTS15D	K10 – K30	C-3	7,5	14,70	1750	92,8	3700	536.000	9,5
CTS18D	K20 – K40	C-2	9,0	14,55	1590	91,9	3650	529.400	10,7
CTS20D	K20 – K40	C-2	10,0	14,38	1600	91,9	4000	580.100	10,4
CTS25D	K20 – K40	C-2	12,5	14,13	1540	91,5	4300	623.700	11,8
CTS30D	K30 – K40	C-2	15,0	13,84	1400	90,4	4300	623.700	13,2

### Fine grades

CTF12E	K15	C-2	6,0	14,95	1620	92,1	2200	319.100	9,9
CTF25E	K30 – K40	C-2	12,5	14,15	1300	89,5	3500	507.600	15,0

### Cermet

CTF28T	K05 – K10	C-2	14,1	6,40	1580	91,8	2000	290.100	8,5
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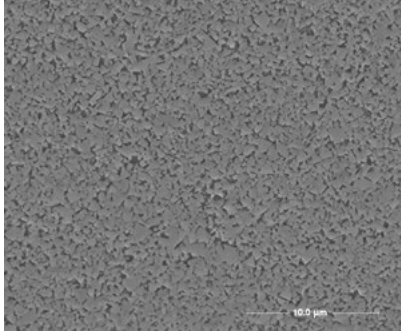
Grain size classification		CERATIZIT code
Average grain size [µm]	Classification	
< 0.2	nano	<b>N</b>
0.2 – < 0.5	ultrafine	<b>U</b>
0.5 – < 0.8	submicron	<b>S</b>
0.8 – < 1.3	fine	<b>F</b>
1.3 – < 2.5	medium	<b>M</b>
2.5 – < 6.0	coarse	<b>C</b>
> 6.0	extra-coarse	<b>E</b>

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. In order to choose the correct grades, only the application data are relevant.

#### Comment:

1. The data in this table are typical material parameters. We reserve the right to modify the data due to technical progress or due to further development within our company.
2. K<sub>IC</sub>\*: The measured critical tension intensity factors (K<sub>IC</sub>) 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.

### Ultrafine grades



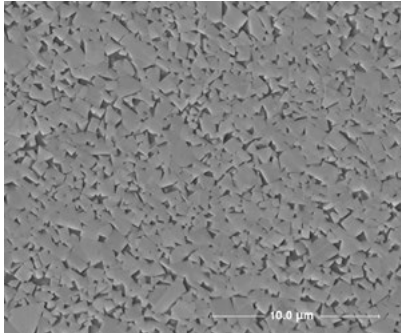
Picture example

**CTU08L:** ultrafine 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- and finishing tools and for a variety of materials.

### Submicron grades



Picture example

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

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

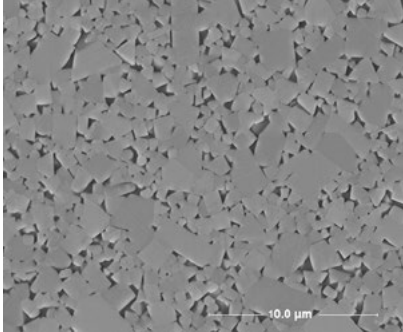
**CTS18D:** special submicron grade for high-performance machining of steel, stainless steel and the machining of difficult to machine materials, for example titanium or Inconel.

**CTS20D:** submicron grade for the universal machining of alloyed and non alloyed steels, titanium alloys and nickel-based alloys. Improved toughness ensures a reduced risk of ruptures on the cutting edges.

**CTS25D:** submicron grade with high toughness for the machining of difficult materials and under unfavourable conditions.

**CTS30D:** submicron grade with very high toughness for difficult machining conditions.

### Fine grain grades

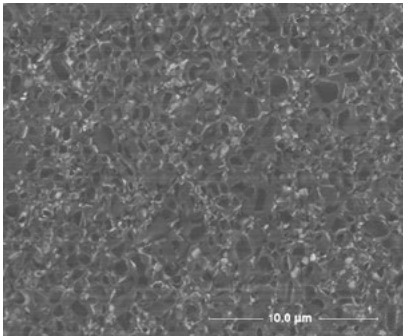


Picture example

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

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

### Cermet



Picture example

**CTF28T:** cermet grade particularly for the finish machining of steel. Thanks to high oxidation resistance and low tendency to stick it is particularly suitable for the production of uncoated reamers.