FCT Ingenieurkeramik GmbH

FCT Special Materials

FCT-Denotation			Tantalum Carbide	Titanium Carbide	Titanium Boride	Boron Carbide
Process			Vacuum Sintered / Hot Pressed	Vacuum Sintered / Hot Pressed	Vacuum Sintered / Hot Pressed	Vacuum Sintered / Hot Pressed
Color			Golden	Silver	Greyish Black	Greyish Black
Geometry			Three-Dimensional / Planar Components	Three-Dimensional / Planar Components	Three-Dimensional / Planar Components	Three-Dimensional / Planar Components
Maximum size			On Request	On Request	On Request	On Request
Application			Mechanical Engineering, Solar and Semiconductor Technology, Chemical Plant Engineering and Construction, Air and Space Applications, Jewelry	Mechanical Engineering, Solar and Semiconductor Technology, Air and Space Applications, Jewelry	Mechanical Engineering, Chemical Plant Engineering and Construction, Wear Protection	Mechanical Engineering, Chemical Plant Engineering and Construction, Wear Protection
General Properties						
Chemical Composition			100 % TaC	100 % TiC	100 % TiB_2	97 % B_4C
Sinter Additives / Fibre Content			-	-	-	3 % C
Density ρ	[1]	(%)	14.1 - 14.3	4.75 - 4.90	4.3 - 4.5	2.45 - 2.52
Residual Porosity		(%)	On Specific Demand	On Specific Demand	On Specific Demand	On Specific Demand
Open Porosity Thereof		(%)	On Specific Demand	On Specific Demand	On Specific Demand	On Specific Demand
Grain Size (Length)		(µm)	2 - 15	1 - 15	-	-
Mechanical Properties						
Compressive Strength		(MPa)	-	-	-	-
Bending Strength σ RT	[2]	(MPa)	400	220	480	500
Weibull-Modulus m			10	-	-	-
Youngs Modulus E		(GPa)	510	495	540	410
Hardness HV	[3]	(GPa)	17	32	33	35 - 40
Fracture Toughness K_{Ic}	[4]	($MPam^{1/2}$)	3.5	-	5.0	3.5
Poissons Ratio ν			0.15	0.19	0.33	0.2
Thermal Properties						
Maximum Working Temperatures						
- Inert Atmosphere		(°C)	2500	2000	2000	1800
- Oxidising Atmosphere		(°C)	600 - 800	600	600	600
Specific Heat Capacitiy		(J/kgK)	190	560	620	-
Thermal Conductivity λ (20°C)		(W/mK)	22	24	24	28
Coefficient of Thermal Expansion	RT-1000 °C	($10^{-6}K^{-1}$)	6.3	7.4	7.6	5.6
	RT- 250 °C	($10^{-6}K^{-1}$)	-	-	4.6	4.5
Thermal Shock Parameter R_1	[5]	(K)	106	-	78	174
Thermal Shock Parameter R_2	[6]	(W/m)	2328	-	1881	4878
Electrical Properties						
Electrical Conductivity (RT)		(10^6 S/m)	3.3 - 4.5	1.5 - 5	1.1	≤ 0.0002
Dielectric Constant (1 MHz)		-	-	-	-	-

RT = Room Temperature

Date: July 2013

[1] Determination of density and porosity according to DIN 623-2
[2] Average value of 4-point bending strength at room temperature according to DIN EN 843-1
[3] Hardness according to DIN EN 843-4
[4] Calculated from crack length derived from Vickers hardness indentation, according to Niihara
[5] Critical temperature difference for an infinite high heat transfer (quenching)
[6] Thermal shock coefficient at finite constant heat transfer (slowly heating)

The material characterisitics listed above are measured at testing samples. They cannot be transfered to components with different size, shape or surface properties. We reserve the right to alter properties within the scope of technical progress or new developments.

Further special materials are available on demand. We also tailor your specific material solution !

You find us at
Gewerbepark 11
D-96528 Frankenblick

Contact us:
Tel.: +49 36766 868-0
Fax: +49 36766 868-30

E-Mail: info@fcti.de
Internet: www.fcti.de