

SILICON CARBIDE MATERIALS AND COMPONENTS



The core competence of FCT Hartbearbeitungs GmbH, a member of the FCT Group, is the precision machining of hard and ultrahard materials, a service which the company offers to external customers.

FCT Hartbearbeitungs GmbH also produces a wide range of small to large-sized high-precision ceramic components of complex shapes, made of silicon carbide and zirconium oxide.

Silicon carbide materials are characterized by:

- their lower density compared to Al_2O_3 , ZrO_2 , and hard metal
- their high mechanical strength up to approx. $1.500^\circ C$
- their low thermal expansion and great heat conductivity
- their higher hardness compared to Al_2O_3 and ZrO_2 ,
- their excellent chemical stability ranging from highly acidic to highly alkaline
- their approval for contact with food products
- their low coefficient of friction when used in self-mated and mixed sliding pairs
- their excellent resistance to wear

FCT Hartbearbeitungs GmbH produces two grades of dense, sintered silicon carbide: the standard S-SiC grade and the high-strength HS-SiC grade. Si-infiltrated (SiSiC) material, liquid-phase sintered (LPS) SiC, and hot-pressed SiC can be produced on request.

SiC components are fabricated in diameter up to $\varnothing 600$ and in length up to 1.250 mm.

Thanks to our extensive molding and green machining know-how, we are able to produce green bodies close to the final shapes and dimensions while minimizing the need for hard machining processing after the sintering process. This know-how allows us to keep our products fairly cost effective.



Properties of the SiC materials produced by FCT Hartbearbeitungs GmbH:

Material Property	Silicon Carbide (sintered)	
	S-SiC	HS-SiC
Short description	S-SiC	HS-SiC
Density [g/cm ³]	> 3,10	
Open porosity [%]	0	
Flexural Strength, RT [MPa] ¹	450	550
1000°C	450	550
1350°C	400	450
Weibull-Modulus, RT	≥ 12	≥ 14
Youngs Modulus, RT [GPa]	400	
Transversal Contraction (Poisson)	0,15	
Fracture Toughness, [MPa*m ^{1/2}]	3 ^{*(2)}	
Hardness, HK5, [GPa]	22	
Thermal Expansion, RT-1000°C, [K ⁻¹]	4,5 * 10 ⁻⁶	
Thermal Conductivity, RT [W/m*K]	125	
Max. working temperature: [°C]		
- air	1600	
- inert gas	1800	

¹: 4-Pt, 40/20mm

²: SEVNB

FCT Hartbearbeitungs GmbH produces prototypes, special parts, and small to medium-sized production series made to customer specifications. We provide our customers competent advice, supported by computer-based analyses like FEM, in connection with the selection of the best suited material and component design to meet ceramic purposes and the most efficient way of production.

Our cooperation with our customers is based on reliability, partnership, and trust. It is our challenge to always find the solution that meets your requirements best and to process your orders in the most economically efficient way.

Certified according to DIN EN ISO 9001:2000

Experience and competence in high-tech ceramics

Challenge us – we find solutions