

Silicon Nitride and Silicon Carbide Qualities

	<i>Silicon Nitride</i>				<i>Silicon Nitride</i>			<i>Silicon Carbide</i>			
	<i>GPSN</i>	<i>HIP-SN</i>	<i>HPSN</i>		<i>Composite Materials</i>			<i>SSiC</i>	<i>Reaction Bonded</i>		
1. Material											
<i>FCT Quality</i>	FSNI, FSNS	FSNI-HIP	FHNY	High Purity	SN/ZrO ₂	SN/TiN	SN/TiN	SSiC	C/C-SiC	NSiC	
<i>Colour</i>	grey, black	grey	grey, black	grey	dark grey	red-gold	red-gold	black	black	green-grey	
<i>Manufacturing route</i>	gas pressure sintered	hot isostatic pressed	hot-pressed	hot-pressed	gas pressure sintered	gas pressure sintered	gas pressure sintered	reaction bonded	reaction bonded	reaction bonded	
2. Microstructure											
<i>Density</i>	[g/cm ³]	>3,21	3,21 - 3,23	>3,23	3,20	3,46	3,64 - 3,84	3,64 - 3,84	>3,10	2,20	2,77 - 2,82
<i>Open porosity</i>	[%]	0	0	0	0	0	0	0	0	4	10 - 12
<i>Grain size</i>	[µm]	1-10	1-10	1-10	1-10	1-10	2-10	2-10			1-150
3. Mechanical properties											
<i>Hardness (Vickers)</i>	[GPa]	16	16	16	17	16	17	17	22	-	-
<i>Compressive strength</i>	[MPa]	3.000	3.000	3.000	3.000	3.000	3.000	3.000		280	600 - 700
<i>Bending strength</i>	[MPa]	>650	>850	950	850	>600	>650	>850	450	300	160 - 180
<i>Weibull modulus</i>		15	15	15	15	15	15	15	12	30	20
<i>Fracture toughness</i>	[MPa m ^{1/2}]	8	8	6	6	6,5	7	7	3	20	3,0 - 3,2
<i>Youngs' modulus</i>	[GPa]	320	320	310	325	235	330	330	90	90	220 - 260
<i>Poisson ratio</i>		0,28	0,28	0,26	0,28	0,28	0,28	0,28	0,15	0,21	0,20
4. Thermal properties											
<i>Max. working temperature</i>											
- inert gas	[°C]	1.200	1.200	1.200	1.200	1.200	1.000	1.000	1.800	1.800	1.500
- air	[°C]	1.200	1.200	1.200	1.200	1.200	800	800	1.600	1.000	1.500
<i>Thermal conductivity 20°C</i>	[W/mK]	25	28	28	30	20	20	20	125	10	23
<i>Thermal conductivity 1000°C</i>	[W/mK]	15	14	17	18	10	15	15	-	-	-
<i>CTE (20°C-1.000°C)</i>	[10 ⁻⁶ K ⁻¹]	3,2	3,2	3,2	3,2	3,5	4,5	4,5	4,5	2,0	5,0
<i>Thermal shock parameter R₁</i>	[K]	535	535	710	600	575	440	440		1.300	115
<i>Thermal shock parameter R₂</i>	[W/m]	16.000	16.000	19.900	17.930	17.250	12.300	12.300		13.000	2.600
5. Other properties											
				sintering aid content Al ₂ O ₃ + Y ₂ O ₃ < 3%			conductive erodible	conductive erodible			