

Properties

Items		Units	Test condition	Machinable Ceramics			Engineering Ceramics				
Trade names / Materials				MACOR®	SHAPAL® Hi Msoft	Boron-nitride	Alumina 99.5%	Zirconia	Aluminum-nitride	Silicon-carbide	
General Properties	Color			White	Ivory	White	Cream-yellow	Cream-yellow	Gray	Black	
	Specific Gravity g/cm ³			2.5	2.88	2.0	3.9	6.0	3.3	3.0	
	Porosity %			0	—	11	0	0	0.2	0	
	Water Absorption %			0	—	—	0	0	0	0	
Electrical Properties	Volume Resistivity Ω·cm		RT	>10 ¹⁶	10 ¹⁴	>10 ¹⁵	10 ¹⁴	10 ¹⁰	10 ¹⁴	10 ⁻² ~10 ¹	
	Dielectrical Breakdown Voltage kV/mm		RT	40	50~60	53	10	—	15	—	
	Dielectric Tangent (×10 ⁻³)		1MHz	7.1 (8.5GHz)	1.0	0.2	0.2~0.3	—	0.14	—	
	Dielectric Constant		1MHz	5.67 (8.5GHz)	6.8	4.1	9.8	—	9.1	—	
Thermal Properties	Coefficient of Thermal Expansion (×10 ⁻⁷) /°C		RT~300°C	93	—	—	77	90	43	—	
			RT~700°C	120	—	30~40	—	—	—	43 (900°C)	
	Coefficient of Thermal Conductivity W/m·k		RT	1.4	92	33~55	29	1.7	177	220	
	Specific Heat kJ/kg·k		RT	0.8	—	0.8	0.8	0.5	0.7	0.7	
	Maximum Allowable Working Temperature °C		Oxidizing Atmosphere		1000	—	850	1600	—	1000	1350
			Non-oxidizing Atmosphere		800	—	1600	—	—	1800	—
Thermal Shock Resistance (ΔT) °C		Water Quench Test		200	400	1500	200	—	250	—	
Mechanical Properties	Vickers Hardness GPa		RT	2.2	3.8	—	15.7	12.8	11.0	—	
	Flexural Strength MPa		RT	>94	320	41~51	441	1177	381	290	
			1000°C		—	—	—	—	—	—	270 (1200°C)
	Compressive Strength MPa		RT	345	—	62~69	2452	>2452	3580	—	
Young's Module GPa		RT	66.9	—	48~62	363	206	320	370		
Main Ingredients				SiO ₂ 46% MgO 17% Al ₂ O ₃ 16%	Complex of AlN, BN	h-BN >94%			AlN ≥ 94%	SiC, Si Sintered Reaction-bonded High Purity Silicon-carbide	
Feature				Ultra-precision Machining	High Thermal Conductivity	Excellent electric Properties	Excellent Wear Resistance	Excellent Wear Resistance	High Thermal Conductivity	Excellent Corrosion Resistance	
				Excellent Heat Insulating	Excellent Rigidity	High Thermal Conductivity	Excellent Electric Properties	Excellent Fracture Toughness	Excellent Electric Properties	High Stiffness	
				Low Outgassing	Precision Machining	Thermal Shock Resistance	Superior Chemical Resistance	Available High Precision Finishing	Withstands Fluorine Plasma	Light Weight	
				Excellent Electric Properties				Superior Chemical Resistance		Maintain Flexural Strength at High Temperature	
Applications				Insulating Materials in vacuum	Thermal Dissipation	High Temperature Dielectric Strength	High Temperature Dielectric Strength	Oilless Bearing	Semiconductor Manufacturing Equipment Parts	Heat Resisting Parts	
				Electrode Support Parts	Dielectric Strength in Vacuum Chamber	Fixture and Crucible for Molten Metals	Semiconductor Manufacturing Equipment Parts	Pick UP Collet	Thermal Dissipation	Shelf board Treatment Parts	
				Electric Gun Parts				Nozzles		Anti Corrosive Parts	
				Ultra Low Temperature Applications		Heat Sink					

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The above data present typical values that are not guaranteed.

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