

Properties of Ceramic Materials(1)

General		Material		99.8% Al2O3	99.5% Al2O3	99% Al2O3	95% Al2O3	94.4% Al2O3	MgO.SiO2 (Steatite)	ZrO2 (Y-TZP)	ZrO2 (MSZ)	TiO2
		Property	Units									
Mechanical	Density	g/cm ³	≥3.95	≥3.90	≥3.85	≥3.65	≥3.60	≥2.70	≥6.0	≥5.72	≥4.0	
	Water absorption	%	0	0	0	0	0	0	0	0	0	
	Hardness	HV	1700	1700	1700	1500	1500	800	1300	1200	800	
	Flexural strength	Mpa	≥390	≥379	≥338	≥320	≥312	≥190	≥1200	≥900	≥158	
	Compressive strength	Mpa	≥2650	≥2240	≥2240	≥2000	≥2103	≥551	≥1990	≥1750	----	
	Fracture toughness	Mpam ^{1/2}	4-5	4-5	4-5	3-4	3-4	----	6.5-8	11	3.2	
Thermal	Max. service temperature (Non-loading)	°C	1750	1675	1600	1500	1500	1290	1000	1200	1000	
	CTE (Coefficient of thermal expansion) 20-800°C	1×10 ⁻⁶ /°C	6.5~8.2	6.5~8.0	6.2~8.0	5.0~8.0	5.0~8.0	7.7~8.0	8.0~9.5	7.8~9.3	8.8	
	Thermal shock		T(°C)	≥200	≥200	≥200	≥220	≥220	≥200	≥300	≥300	≥330
	Thermal conductivity	W/m.k (25°C)	31	30	29	24	22.4	2.5	3	2	5	
	Specific heat	1 x 10 ³ J/(kg·K)	0.78	0.78	0.78	0.78	0.78	0.75	0.46	0.46	----	
	Electrical	Volume resistivity	ohm.cm									
25°C		>1 x 10 ¹⁴		>1 x 10 ¹⁴	>1 x 10 ¹⁴	>1 x 10 ¹⁴	>1 x 10 ¹⁴	>1 x 10 ¹³	>1 x 10 ¹³	>1 x 10 ¹³	>1 x 10 ¹²	
300°C		1 x 10 ¹²		1 x 10 ¹²	8 x 10 ¹¹	10 ¹² -10 ¹³	10 ¹² -10 ¹³	1 x 10 ¹⁰	1 x 10 ¹⁰	1 x 10 ¹⁰	1 x 10 ¹³	
500°C		2 x 10 ¹²		5 x 10 ¹⁰	2 x 10 ⁹	1 x 10 ⁹	1 x 10 ⁹	1 x 10 ⁷	2 x 10 ⁵	2 x 10 ⁵	----	
Dielectric strength		KV/mm	20	19	18	18	18	10	17	9.4	3.93	
Dielectric constant (1Mhz)		(E)	9.8	9.7	9.5	9.5	9.5	5.8	29	28	85	