



Ceramic – Comparative Material Data Sheets

	Properties	Units	Test	99.5% Alumina	Aluminum Nitride	Boron Nitride	Lava, Grade A	Corning Macor®	Mullite	Silicon Carbide	Silicon Nitride (Hot Pressed)	Steatite L-5	Zirconia
Physical	Chemical Formula	-	-	Al ₂ O ₃	AlN	BN	Al ₂ (Si ₄ O ₁₀)(OH) ₂	glass ceramic	3Al ₂ O ₃ -SiO ₂	α-SiC	Si ₃ N ₄	H ₂ Mg ₃ (SiO ₃) ₄	ZrO ₂
	Density	g/cm ³	ASTM C20	3.7 - 3.97	3.25	2.28	2.30	2.52	2.80	3.21	3.31	2.71	6.04
	Color	-	-	ivory/white	white/tan/gray	white	pink	white	tan	dark gray	dark gray	buff	white
	Crystal Structure	-	-	hexagonal	hexagonal	hexagonal	random	random	orthorhombic	hexagonal	hexagonal (α & β)	hexagonal	tetragonal
	Water Absorption	% @ R.T.	ASTM C373	0.0	0.0	0.0-1.0	2.5	0.0	0.0	0.0	0.0	0.0-0.02	0.0
	Hardness	Moh's	-	9	5	2	6	4.5	8	10.9	9	7.5	6.5
Mechanical	Hardness	knoop ^(kg/mm¹)	Knoop 100g	2000	1170	25-205	500	250	1450	2800	2200	-	1600
	Compressive Strength	MPa @ R.T.	ASTM C773	2070-2620	2068	23.5	172.5	345	551	1725-2500	689-2760	621	2500
	Tensile Strength	MPa @ R.T.	ACMA Test #4	260-300	-	2.41 (1000iC)	20.7	90	103.5	310	360-434	62	248
	Modulus of Elasticity (Young's Mod.)	GPa	ASTM C848	394	308	675	-	66.9	150	476	317	138	207
	Flexural Strength (MOR)	MPa @ R.T.	ASTM F417	310-379	428	51.8	69	94	170	324	679-896	140	900
	Poisson's Ratio	-	ASTM C818	0.27	0.25	0.05	-	0.29	0.25	0.19	0.23	-	0.32
	Fracture Toughness	Mpa x m ^{1/2}	Notched Beam Test	4.50	3.50	2.60	-	1.53	2.00	4.0	5.0-8.0	-	13.0

Thermal	Max. Use Temperature (*denotes inert atm.)	°C	No load cond.	1750	1600	985	1150	1000	1700	1400	1500	1425	500
	Thermal Shock Resistance	ΔT (°C)	Quenching	200	400	>1500	-	25-100	300	350-500	750	190	280-360
	Thermal Conductivity	W/m=K @ R.T.	ASTM C408	35.00	82.30	20.00	1.98	1.46	3.50	41.00	27.00	2.90	2.70
	Coefficient of Linear Thermal Expansion	μm/m-°C (-25°C through 21000°C)	ASTM C372	8.40	4.6-5.7	1.0-2.0	3.60	6.3-9.7	5.30	5.12	3.40	7.00	11.00
	Specific Heat	cal/g-°C @ R.T.	ASTM C351	0.21	0.25	0.19	0.20	0.19	0.23	0.15	0.17	0.22	0.10
Electrical	Dielectric Constant	1Mhz @ R.T.	ASTM D150	9.60	8.0-9.1	4.08	5.30	6.03	6.00	10.20	7.00	6.30	26 ^{@1000kHz}
	Dielectric Strength	kV/mm	ASTM D116	15.0	15.0	374.0	0.1	40.0	9.8	-	17.7	9.3	9.0
	Electrical Resistivity	Wcm @ R.T.	ASTM D1829	10 ¹⁴	10 ¹⁴	10 ¹³	10 ¹⁴	>10¹⁷	10 ¹³	10 ⁸	10 ¹³	10 ⁴	>10 ¹³

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