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Alumina (Al_2O_3) Ceramic Material Data Sheet

Property	Unit	AOW37 (96%)	AOI38 (99%)	AOI39 (99.5%)	AOI393 (99.7%)
Colour	-	White	Ivory	Ivory	Ivory
Purity	%	96	99	99.5	99.7
Density	g/cm³	3.7	3.8	3.9	3.93
Water Absorption	%	0	0	0	0
Vickers Hardness HV1	GPa	13.7	15.2	16	16.8
Flexural Strength	MPa	350	310	330	350
Compressive Strength	MPa	2600	2600	2700	2930
Young's Modulus	GPa	320	360	370	380
Poisson's Ratio	-	0.23	0.23	0.22	0.22
Fracture Toughness	MPa·m^0.5	-	3 ~ 4	3 ~ 4	2.5 ~ 3.5
CTE 40–400°C	x10^-6/°C	7.2	7.2	7.2	7.2
CTE 40–800°C	x10^-6/°C	7.9	8	8.2	8.2
Thermal Conductivity @20°C	W/(m·K)	24	29	30	32
Specific Heat	J/(kg·K)	880	880	880	880
Thermal Shock Resistance (water quench)	°C	200	200	200	200
Maximum Service Temperature	°C	1700	1700	1700	1700
Dielectric Strength	kV/mm	15	15	17	18
Volume Resistivity @20°C	Ω·cm	>10^14	>10^14	1x10^14	1x10^15
Volume Resistivity @300°C	Ω·cm	10^10	10^10	1x10^13	1x10^14
Volume Resistivity @500°C	Ω·cm	10^8	10^8	1x10^10	1x10^11
Dielectric Constant (1 MHz)	-	9.4	9.9	10	10.2
Nitric Acid Resistance (HNO3 60%, 90°C, 24H)	mg/cm²	-	0.1	-	-
Sulphuric Acid Resistance (H2SO4 95%, 95°C, 24H)	mg/cm²	-	0.33	-	-
Sodium Hydroxide Resistance (NaOH 30%, 80°C, 24H)	mg/cm²	-	0.26	-	-

Notes

1. "-" indicates the property was not tested for that grade.
2. AOW37 (96%) contains a glass phase, which gives it higher flexural strength but lower hardness and density than the higher-purity grades. It also metallizes and brazes more readily.
3. Higher purity raises hardness, density and volume resistivity, but slightly lowers fracture toughness.
4. Final acceptance criteria are governed by the approved drawing and order confirmation.

Forming and Finishing

Ceramic injection moulding, dry pressing, or machining from a sintered blank. As-moulded tolerance is approximately ±0.3 mm at 94–96% purity and ±0.1 mm at 99% and above; tighter tolerances are produced by diamond grinding after forming.
Metallizing (Mo-Mn), nickel or gold plating and vacuum brazing to metal are available, in assemblies up to 150 mm diameter, helium leak tested below 1 x 10^-9 mbar.l/s.