

Alumina Property Chart

			Alumina				High Purity Alumina			
Property			AL74 74%	AL95 95%	AL96 96%	AL98 98%	AL995 99.5%	AL9980 99.8%	AL9996 99.96%	
ASTM Method			Units							
General	Crystal Size (Average)	Thin Section	Microns	13	11	8	7	6	6	2
	Color	--	--	White	Ivory	White or Purple	White	Ivory-White	Ivory	Off White/Blush
	Gas Permeability	--	atms-cc/sec	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰
	Water Absorption	C 20-97	%	0	0	0	0	0	0	0
	Density	C 20-97	g/cc	3.03	3.65	3.71	3.78	3.88	3.91	3.93
Mechanical	Hardness	Vickers 500 gm	GPa (kg/mm ²)	10.5 (1075)	11.5 (1175)	12.7 (1300)	12.7 (1300)	14.3 (1459)	15 (1530)	19.6 (2000)
	Hardness	--	R45N	78	79	81	81	82	86	90
	Fracture Toughness	Notched Beam	MPam ^{1/2}	2 - 5	3 - 4	4 - 5	4 - 5	4 - 5	3 - 4	5 - 6
	Flexural Strength (MOR) (3 point) @ RT	F417-87	MPa (psi x 10 ³)	241 (35)	310 (45)	358 (52)	393 (57)	338 (49)	379 (55)	455 (66)
	Tensile Strength @ RT	--	MPa (psi x 10 ³)	117 (17)	151 (22)	200 (29)	221 (32)	172 (25)	200 (29)	275 (40)
	Compressive Strength @ RT	--	MPa (psi x 10 ³)	1378 (200)	1827 (265)	2068 (300)	2241 (325)	2137 (310)	2240 (325)	2413 (350)
	Elastic Modulus	C848	GPa (psi x 10 ⁶)	172 (25)	303 (44)	310 (45)	345 (50)	379 (55)	379 (55)	393 (57)
	Poisson's Ratio	C848	--	0.22	0.22	0.22	0.23	0.23	0.23	0.23
Thermal	C.T.E. 25 - 100° C	C 372-96	x 10 ⁻⁶ /C	5.5	6.1	6.0	6.2	6.3	6.5	6.5
	C.T.E. 25 - 300° C	C 372-96	x 10 ⁻⁶ /C	5.8	7.0	6.8	6.8	6.9	7.9	7.9
	C.T.E. 25 - 600° C	C 372-96	x 10 ⁻⁶ /C	6.3	7.7	7.5	7.6	7.6	8.1	8.2
	Thermal Conductivity @ RT	C 408	W/m K	4	19	23	29	30	30	35
	Max Use Temp	--	Fahrenheit (°F)	2800	3000	3100	3100	3047	3047	3100
--		Celsius (°C)	1540	1650	1700	1700	1675	1675	1700	
Electrical	Dielectric Strength (.125" Thick)	D 149-97A	V/mil	225	250	250	260	270	290	422
	Dielectric Constant @ 1 MHz	D 150-98	--	7.0	9.0	9.1	9.5	9.8	9.8	9.9
	Dielectric Constant @ Gigahertz	D 2520-95	--	--	9.2	9.1	9.4	9.7	10	--
				--	11.0	10.9	9.8	9.8	9.6	--
	Dielectric Loss @ 1 MHz	D 150-98	--	0.0012	0.0006	0.0004	0.0006	0.0002	< .0001	< .0001
	Dielectric Loss @ Gigahertz	D 2520-95	--	--	0.0009	0.0007	0.0005	< .0001	< .0001	--
				--	12.5	10.9	9.8	9.8	9.6	--
	Volume Resistivity, 25°C	D 257	ohms-cm	> 1 x 10 ¹³	> 1 x 10 ¹⁴	> 1 x 10 ¹⁴	> 1 x 10 ¹⁴	> 1 x 10 ¹⁴	> 1 x 10 ¹⁴	> 1 x 10 ¹⁴
	Volume Resistivity, 300° C	D 1829	ohms-cm	4 x 10 ¹⁰	5 x 10 ¹²	3 x 10 ¹²	8 x 10 ¹¹	1 x 10 ¹²	3 x 10 ¹²	1 x 10 ¹³
	Volume Resistivity, 500° C	D 1829	ohms-cm	3 x 10 ⁷	3 x 10 ⁹	7 x 10 ⁹	2 x 10 ⁹	5 x 10 ¹⁰	6 x 10 ¹⁰	5 x 10 ¹²
Volume Resistivity, 700° C	D 1829	ohms-cm	2 x 10 ⁶	3 x 10 ⁸	4 x 10 ⁸	2 x 10 ⁸	2 x 10 ⁹	6 x 10 ⁹	1 x 10 ¹²	

Note: The information in this data sheet is for design guidance only. STC does not warrant this data as absolute values. Forming methods and specific geometry could affect properties. Slight adjustments can be made to some of the properties to accommodate specific customer requirements. Most of the dense materials in the table are resistant to mechanical erosion and chemical attack. STC has performed ASTM testing qualification for certain compositions, in accordance with ASTM D2442. Please consult our technical staff for appropriate material and specific test results. In addition to the above compositions, STC offers a wide range of alternative materials. Please contact one of our applications engineers for material requirements that may not be shown above. Revised: 01/05/2021