stc Material Solutions
A Unit of IDEX Corporation

Materials Property Chart

Additional specialty materials may be available upon request

	Property	ASTM Method	Units	Alumina AL74 74%	Alumina AL94 94%	Alumina AL96 96%	Alumina AL98 98%	High Purity Alumina AL998 99.8%	Zirconia Toughened Alumina ZTA-14	Zirconia MSZ (Magnesia Stabilized)	Zirconia YTZP (Yttria Stabilized)	Silicates Steatite L-4	Silicates Steatite L-5	Silicates Cordierite	Silicates Mullite	Silicates Lava Grade A Fired	Units	
General	Crystal Size (Average)	Thin Section	Microns	13	11	8	7	6	6	30	1	7	7	--	7	--	Microns	General
	Color	--	--	White	Ivory	White or Purple	White	Ivory	White	Ivory or Yellow	Ivory	Tan	Gray-Green	Orange-Tan	White	Gray-Tan	--	
	Gas Permeability	F 134	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 $<10^{-10}$	gas tight $<10^{-10}$	--	--	Porous	--	Porous	atms-cc/sec	
	Water Absorption	C 373	%	0	0	0	0	0	0	0	0	0	0	13	0	3	%	
Mechanical	Density	C 373	g/cc	3.00	3.68	3.72	3.78	3.89	4.20	5.60	6.02	2.65	2.75	1.75	2.89	2.3	g/cc	Mechanical
	Hardness	C 1327	GPa (kg/mm^2)	10.5 (1075)	10.1 (1012)	11.6 (1158)	12.7 (1300)	13.5 (1354)	14.5 (1478)	11.7 (1200)	12.5 (1250)	4.9 (500)	4.9 (500)	5.8 (590)	10 (1000)	4.4 (450)	GPa (kg/mm^2)	
	Fracture Toughness	C 1421 Notch	$MPam^{1/2}$	2 - 5	4 - 5	3 - 5	3 - 5	3 - 5	6	12	10	--	--	--	3	--	$MPam^{1/2}$	
	Flexural Strength (MOR) (4 point) @ 25 °C	C 1161	MPa (psi x 10^3)	241 (35)	319 (46)	322 (47)	316 (46)	298 (43)	586 (85)	620 (90)	951 (138)	117 (17)	138 (20)	66 (9.5)	206 (30)	69 (10)	MPa (psi x 10^3)	
	Compressive Strength @ 25 °C	C 773	MPa (psi x 10^3)	1378 (200)	1753 (254)	1534 (222)	2241 (325)	1668 (242)	2758 (400)	1862 (270)	2485 (360)	551 (80)	586 (85)	165 (24)	1034 (150)	172 (25)	MPa (psi x 10^3)	
	Elastic Modulus	C 1259	GPa (psi x 10^6)	172 (25)	312 (45)	319 (46)	346 (50)	383 (56)	338 (49)	206 (29.8)	210 (30)	103 (15)	103 (15)	103 (15)	179 (26)	--	GPa (psi x 10^6)	
	Poisson's Ratio	C 1259	--	0.22	0.22	0.21	0.19	0.21	0.23	0.28	0.3	0.24	0.24	0.31	0.24	--	--	
Thermal	C.T.E. 40 - 200 °C	E 228	x 10^{-6}/C	5.5	6.5	6.5	6.9	6.3	6.0	8.9	6.9	7.3	8.5	1.2	4.8	2.9	x 10^{-6}/C	Thermal
	C.T.E. 40 - 500 °C	E 228	x 10^{-6}/C	5.8	7.2	7.4	7.8	7.1	7.0	9.7	8.1	7.4	8.6	1.8	5.4	3.3	x 10^{-6}/C	
	C.T.E. 40 - 800 °C	E 228	x 10^{-6}/C	6.3	8.1	8.0	8.4	7.6	7.1	10	10.5	7.5	8.6	2.4	5.8	3.6	x 10^{-6}/C	
	Thermal Conductivity @ 25 °C	E 1461	W/m K	4	24	28	28	32	24	3	2.2	3	3	3	4	2	W/m K	
Electrical	Dielectric Strength (.125" Thick)	D 149	V/mil	225	250	250	300	305	250	300	240	260	270	250	250	100	V/mil	Electrical
	Dielectric Constant @ 1 MHz	D 150	--	7	9.2	8.1	9.6	9.9	12.5	22.7	30	5.6	5.7	3.3	6.7	5.3	--	
	Dielectric Loss Tangent @ 1 MHz	D 150	--	0.0012	0.0003	0.0001	0.0004	0.0005	0.0006	0.0016	0.001	0.003	0.0014	0.03	0.003	--	--	
	Volume Resistivity, 25° C	D 257	ohms-cm	$<1 \times 10^{13}$	1×10^{13}	2×10^{13}	1×10^{13}	1×10^{13}	1×10^{14}	$>1 \times 10^{13}$	1×10^{13}	1×10^{14}	1×10^{14}	1×10^{12}	1×10^{14}	--	ohms-cm	
	Volume Resistivity, 300° C	D 257	ohms-cm	4×10^{10}	9×10^{12}	3×10^{13}	1×10^{11}	7×10^{12}	1×10^{10}	5×10^{7}	1×10^{10}	2×10^{10}	2×10^{11}	--	4×10^{10}	--	ohms-cm	
	Volume Resistivity, 500° C	D 257	ohms-cm	3×10^{7}	4×10^{10}	8×10^{11}	3×10^{8}	2×10^{11}	2×10^{9}	1×10^{7}	1×10^{6}	1×10^{9}	4×10^{10}	--	1×10^{9}	--	ohms-cm	
	Volume Resistivity, 700° C	D 257	ohms-cm	2×10^{5}	9×10^{9}	2×10^{11}	1×10^{7}	4×10^{9}	2×10^{8}	2×10^{5}	5×10^{3}	2×10^{8}	1×10^{9}	--	--	--	ohms-cm	

Note: The information in this data sheet is for design guidance only and does not include all available materials. 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.