

Materials Property Chart

Additional specialty materials may be available upon request

Additional specialty materials may be available upon request				Alumina			
Property		ASTM Method	Units	AL74 74%	AL94 94%	AL96 96%	AL98 98%
General	Crystal Size (Average)	Thin Section	Microns	13	11	8	7
	Color	--	--	White	Ivory	White or Purple	White
	Gas Permeability	--	atms-cc/sec	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
	Density	C 20-97	g/cc	3.03	3.65	3.71	3.78
Mechanical	Hardness	Vickers 500 gm	GPa (kg/mm ²)	10.5 (1075)	11.5 (1175)	12.7 (1300)	12.7 (1300)
	Hardness	--	R45N	78	79	81	81
	Fracture Toughness	Notched Beam	MPam ^{1/2}	2 - 5	3 - 4	4 - 5	4 - 5
	Flexural Strength (MOR) (3 point) @ RT	F417-78	MPa (psi x 10 ³)	241 (35)	310 (45)	358 (52)	393 (57)
	Tensile Strength @ RT	--	MPa (psi x 10 ³)	117 (17)	151 (22)	200 (29)	221 (32)
	Compressive Strength @ RT	--	MPa (psi x 10 ³)	1378 (200)	1827 (265)	2068 (300)	2241 (325)
	Elastic Modulus	C848	GPa (psi x 10 ³)	172 (25)	303 (44)	310 (45)	345 (50)
	Poisson's Ratio	C848	--	0.22	0.22	0.22	0.23
Thermal	C.T.E. 25 - 100° C	C 372-96	x 10 ⁻⁶ /C	5.5	6.1	6	6.2
	C.T.E. 25 - 300° C	C 372-96	x 10 ⁻⁶ /C	5.8	7	6.8	6.8
	C.T.E. 25 - 600° C	C 372-96	x 10 ⁻⁶ /C	6.3	7.7	7.5	7.6
	Thermal Conductivity @ RT	C 408	W/m K	4	19	23	29
Electrical	Dielectric Strength (.125" Thick)	D 149-97A	V/mil	225	250	250	260
	Dielectric Constant @ 1 MHz	D 150-98	--	7	9	9.1	9.5
	Dielectric Constant @ Gigahertz	D 2520-95	--	--	9.2	9.1	9.4
	--		--	11	10.9	9.8	
	Dielectric Loss @ 1 MHz	D 150-98	--	0.0012	0.0006	0.0004	0.0006
	Dielectric Loss @ Gigahertz	D 2520-95	--	--	0.0009	0.0007	0.0005
	--		--	12.5	10.9	9.8	
	Volume Resistivity, 25° C	D 257	ohms-cm	< 1 x 10 ¹¹	> 1 x 10 ¹¹	> 1 x 10 ¹¹	> 1 x 10 ¹¹
	Volume Resistivity, 300° C	D 1829	ohms-cm	4 x 10 ¹¹	5 x 10 ¹¹	3 x 10 ¹¹	8 x 10 ¹¹
	Volume Resistivity, 500° C	D 1829	ohms-cm	3 x 10 ¹¹	3 x 10 ¹¹	7 x 10 ¹¹	2 x 10 ¹¹
	Volume Resistivity, 700° C	D 1829	ohms-cm	2 x 10 ¹¹	3 x 10 ¹¹	4 x 10 ¹¹	2 x 10 ¹¹
	Volume Resistivity, 1000° C	D 1829	ohms-cm	--	--	--	--

High Purity Alumina		Zirconia Toughened Alumina	Zirconia	
AL995 99.5%	AL9980 99.8%	ZTA-14	MSZ (Magnesia Stabilized)	YTZP 2000 (Yttria Stabilized)
6	6	6	30	1
Ivory - White	Ivory	White	Ivory or Yellow	Ivory
gas tight	gas tight	gas tight	gas tight	gas tight
<10 ⁻¹⁰	<10 ⁻¹⁰	<10 ⁻¹⁰	<10 ⁻¹⁰	<10 ⁻¹⁰
0	0	0	0	0
3.88	3.91	4.17	5.72	6.02
14.3 (1459)	15 (1530)	14.5 (1478)	11.7 (1200)	12.5 (1250)
82	86	82	78	80
4 - 5	3 - 4	6	12	10
338 (49)	379 (55)	586 (85)	620 (90)	951 (138)
172 (25)	200 (29)	344 (50)	310 (45)	550 (80)
2137 (310)	2240 (325)	2758 (400)	1862 (270)	2485 (360)
379 (55)	379 (55)	338 (49)	206 (29.8)	210 (30)
0.23	0.23	0.23	0.28	0.3
6.3	6.5	6	8.9	6.9
6.9	7.9	7	9.7	8.1
7.6	8.1	7.1	10	10.5
30	30	24	3	2.2
270	290	250	300	240
9.8	9.8	12.5	22.7	30
9.7	10	--	29.2	--
9.8	9.6	--	6.2	--
0.0002	< .0001	0.0006	0.0016	0.001
< .0001	< .0001	0.0005	0.0018	--
9.8	9.6	9.4	6.2	--
> 1 x 10 ¹¹	> 1 x 10 ¹¹	> 1 x 10 ¹¹	> 1 x10 ¹¹	> 1 x10 ¹¹
1 x 10 ¹¹	3 x 10 ¹¹	1 x 10 ¹¹	5 x10 ¹¹	1 x 10 ¹¹
5 x 10 ¹¹	6 x 10 ¹¹	2 x 10 ¹¹	1 x 10 ¹¹	1 x 10 ¹¹
2 x 10 ¹¹	6 x 10 ¹¹	2 x 10 ¹¹	2 x 10 ¹¹	5 x 10 ¹¹
--	--	--	--	--

Silicates					Units
Steatite L-4	Steatite L-5	Corderite	Mullite	Lava Grade A Fired	
7	7	--	7	--	Microns
Tan	Gray-Green	Orange-Tan	Gray-Tan	Gray-Tan	--
--	--	Porous	--	Porous	atms-cc/sec
0	0	10	0	3	%
2.65	2.75	2	3	2.3	g/cc
4.9 (500)	4.9 (500)	5.8 (590)	10 (1000)	4.4 (450)	GPa (kg/mm ²)
57	57	50	78	42	R45N
--	--	--	3	--	MPam ^{1/2}
117 (17)	138 (20)	66 (9.5)	206 (30)	69 (10)	MPa (psi x 10 ³)
103 (15)	103 (15)	19 (2.7)	138 (20)	21 (3)	MPa (psi x 10 ³)
551 (80)	586 (85)	165 (24)	1034 (150)	172 (25)	MPa (psi x 10 ³)
103 (15)	103 (15)	103 (15)	179 (26)	--	GPa (psi x 10 ³)
0.24	0.24	0.31	0.24	--	--
7.3	8.5	2.1	3.6	2.9	x 10 ⁻⁶ /C
7.4	8.6	2.5	4.1	3.3	x 10 ⁻⁶ /C
7.5	8.6	3	4.8	3.6	x 10 ⁻⁶ /C
3	3	3	4	2	W/m K
260	270	120	250	100	V/mil
5.6	5.7	5.5	6.7	5.3	--
5.6	5.8	--	6.7	--	Electrical
9.2	12.5	--	11.4	--	
0.003	0.0014	--	0.003	--	
0.005	0.0017	--	0.003	--	
9.2	12.5	--	11.4	--	
> 1 x 10 ¹¹	> 1 x 10 ¹¹	> 1 x 10 ¹¹	> 1 x 10 ¹¹	--	
2 x 10 ¹¹	1 x 10 ¹¹	--	4 x 10 ¹¹	--	
1 x 10 ¹¹	4 x 10 ¹¹	--	1 x 10 ¹¹	--	
2 x 10 ¹¹	1 x 10 ¹¹	--	--	--	ohms-cm
--	--	--	--	--	ohms-cm

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.