



Ceramic Material Properties

OXIDES

NON-OXIDES

Aluminas

Zirconias

Carbides

Nitrides

PROPERTIES*	UNITS	TEST	PORCELAIN	STEATITE	CORDIERITE	MULLITE	AD-85	AD-90	AD-94	AD-96	FG-995	AD-995	PLASMAPURE™ ALUMINA AD-998	PLASMAPURE-UC™ ALUMINA	ESD ALUMINA	ZTA 10%	DURA-Z™ (TTZ)	YTZP (SINTERED)	YTZP (HIPED)	SC-RB (SC-2)	ULTRASIC™ (SC-30)	PURESIC®	RBB4C	HPB4C	WC (ACI-NI6)	HP AlN	SN 101C	NBD-200	NT 154	STEEL	
			Nom. 85% Al ₂ O ₃	Nom. 90% Al ₂ O ₃	Nom. 94% Al ₂ O ₃	Nom. 96% Al ₂ O ₃	Nom. 98.5% Al ₂ O ₃	Nom. 99.5% Al ₂ O ₃	Min. 99.8% Al ₂ O ₃	Min. 99.9% Al ₂ O ₃	Zirconia-Toughened Alumina	MgO Partially Stabilized Zirconia	Y ₂ O ₃ Partially Stabilized Zirconia	Y ₂ O ₃ Partially Stabilized Zirconia	Reaction Bonded Silicon Carbide	Direct Sintered Silicon Carbide	CVD Silicon Carbide > 99.9995%	Reaction Bonded Boron Carbide	Hot Pressed Boron Carbide	Tungsten Carbide	Hot Pressed Aluminum Nitride	Silicon Nitride (Glass HIPed)	Silicon Nitride (Glass HIPed)	High Temp Silicon Nitride (Glass HIPed)							
Density	g/cm ³	ASTM-C20	2.40	2.78	2.05	2.80	3.42	3.60	3.70	3.72	3.80	3.90	3.92	3.92	3.85	4.01	5.72	6.02	6.07	3.10	3.15	3.21	2.65	2.5	14.90	3.26	3.21	3.16	3.22	7.5-8.0	
Crystal Size	Average	MICRONS	ASTM-E112	-	-	10	6	4	8	6	6	6	6	3	6	2	25	1	1	12	4	-	-	15	1	3	-	-	-	-	
Water Absorption	%	ASTM-373	0	0	9.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gas Permeability	-	-	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Color	-	-	WHITE	BEIGE	YELLOW	TAN	WHITE	WHITE	WHITE	WHITE	WHITE	IVORY	IVORY	IVORY	BLACK	WHITE	IVORY	IVORY	GRAY	BLACK	BLACK	BLACK	-	BLACK	GRAY	GRAY	GRAY	GRAY	GRAY	GRAY	
Flexural Strength (MOR)	20° C	MPa (psi x 10 ³)	ASTM-F417	130 (19)	140 (20)	55 (8)	170 (25)	296 (43)	338 (49)	352 (51)	358 (52)	375 (54)	379 (55)	390 (57)	400 (58)	300 (44)	450 (65)	900 (131)	1240 (180)	1720 (249)	462 (67)	480 (70)	470-520 (68-75) ②	250 (36)	410 (59)	2330 (338)	340 (49) ②	1000 (145)	900 (131)	900 (131) ②	-
Elastic Modulus	20° C	GPa (psi x 10 ⁶)	ASTM-C848	104 (15)	110 (16)	40 (6)	150 (22)	221 (32)	276 (40)	303 (44)	303 (44)	350 (51)	370 (54)	380 (55)	386(56)	370 (54)	360 (52)	200 (29)	210 (30)	210 (30)	393 (57)	410 (59)	435-460 (63-67)	379 (55)	460 (67)	614 (89)	330 (48)	310 (45)	320 (46)	310 (45)	210-235 (30-34)
Poisson's Ratio	20° C	-	ASTM-C848	-	-	-	-	0.22	0.22	0.21	0.21	0.22	0.22	0.22	0.22	0.30	0.30	0.30	0.30	0.20	0.21	0.21	0.18	0.17	-	0.25	0.27	0.26	0.27	0.29	
Compressive Strength	20° C	MPa (psi x 10 ³)	ASTM-C773	590 (86)	-	-	550 (80)	1930 (280)	2482 (360)	2103 (305)	2068 (300)	2500 (363)	2600 (377)	2650 (384)	2700 (392)	1975 (287)	2900 (421)	1750 (254)	2500 (363)	2500 (363)	2700 (392)	3500 (508)	-	1721 (250)	-	4343 (630)	-	2500	2500	-	1000-2000 (145-290)
Hardness	R45N	ROCKWELL 45 N	60	57	-	70	73	75	78	78	82	83	83	86	78	85	77	81	81	-	-	-	-	-	-	-	-	-	-	-	55-60
	GPa (kg/mm ²)	KNOOP 1000 gm	5.9 (600)	-	-	7.4 (750)	9.4 (960)	10.4 (1058)	11.5 (1175)	11.5 (1175)	13.7 (1400)	14.1 (1440)	14.1 (1440)	14.5 (1480)	-	14.5 (1475)	11.8 (1200)	12.7 (1300)	12.7 (1300)	24.5 (2500) ③	27.4 (2800) ③	27 (2750) ③	25.5 (2600) ③	27 (2750) ③	15.2 (1548)	11 (1120)	16 (1630)	15 (1530)	16 (1630)	6.4-8.8 (650-900)	
Tensile Strength	25° C	MPa (psi x 10 ³)	ACMA TEST #4	-	-	-	-	155 (22)	221 (32)	193 (28)	221 (32)	248 (36)	262 (38)	272(39)	283 (41)	-	290 (42)	483 (70)	-	-	307 (44.5)	-	-	-	-	-	-	-	-	630 (91)	1110 (103)
Fracture Toughness	K(I c)	MPa m ^{1/2}	NOTCHED BEAM	2	-	-	2	3 - 4	3 - 4	4 - 5	4 - 5	4 - 5	4 - 5	4 - 5	3 - 4	5 - 6	11	13	13	4	4	3.5	3-4	2.5	24	3	6.5	5.5	6.0	50-80	
Thermal Conductivity	20° C	W/m K	ASTM-C408	5.0	2.5	1.6	3.5	16.0	16.7	22.4	24.7	27.5	30.0	31.0	25	27.0	2.2	2.2	2.2	125.0	150.0	140.0	50.0	90	84.0	80.0	34	29	38	35-55	
Coefficient of Thermal Expansion	25-1000°C	1X 10 ⁻⁶ /°C	ASTM-C372	4.9	9	3.4	5.3	7.2	8.1	8.2	8.2	8.2	8.2	8.2	8	8.3	10.2	10.3	10.3	4.3	4.4	4.6	4.5	5.6	5.9	5.0	3.7	2.9	3.1	12	
Specific Heat	100° C	J/kg*K	ASTM-E1269	-	-	-	950	920	920	880	880	880	880	880	870	-	885	400	400	400	800	800	665	-	-	-	740	-	-	724	475
Thermal Shock Resistance	Δ Tc	°C	①	-	100	350	300	300	250	250	250	200	200	200	200	300	350	350	350	400	300	-	-	-	-	-	-	-	-	-	-
Dielectric Strength	6.35mm	ac-kV/mm (ac V/mil)	ASTM-D116	-	-	-	9.8 (248)	9.4 (240)	8.3 (210)	8.3 (210)	8.3 (210)	8.7 (220)	8.7 (220)	8.7 (220)	8.7 (220)	-	9.0 (228)	9.4 (240)	9.0 (228)	9.0 (228)	-	-	-	-	-	-	8.2 (207)	-	-	-	-
Dielectric Constant	1 MHz	25° C	ASTM-D150	5.9	-	-	6.0	8.2	8.8	9.1	9	9.6	9.7	9.8	9.8	-	10.6	28.0	29.0	29.0	-	-	-	-	-	-	9	8	8	-	-
Dielectric Loss (tan delta)	1 MHz	25° C	ASTM-D150	0.0024	-	-	0.002	0.0009	0.0004	0.0004	0.0002	0.0002	0.0001	< 0.0001	<0.0001	-	0.0005	0.001	0.001	0.001	-	-	-	-	-	-	< 0.001	-	-	-	-
Volume Resistivity	25° C	ohm-cm	ASTM-D1829	-	10 ¹³	10 ¹²	> 10 ¹⁴	> 10 ¹⁴	> 10 ¹⁴	> 10 ¹⁴	> 10 ¹⁴	> 10 ¹⁴	> 10 ¹⁴	> 10 ¹⁴	> 10 ¹⁵	10 ⁸ - 10 ¹⁰	> 10 ¹⁴	> 10 ¹³	> 10 ¹³	> 10 ¹³	< 10 ³	- 10 ⁵	< 0.10 - > 10 ⁵	< 10 ³	10 ²	< 10 ³	> 10 ¹³	10 ¹⁴	10 ¹⁴	-	10 ⁻⁵
	500° C	ohm-cm	ASTM-D1829	-	10 ⁸	10 ⁶	4 x 10 ⁵	4 x 10 ⁸	4 x 10 ⁸	4 x 10 ⁹	4 x 10 ⁹	2 x 10 ¹⁰	2 x 10 ¹⁰	2 x 10 ¹¹	1 x 10 ¹²	-	2 x 10 ⁹	2 x 10 ⁵	2 x 10 ⁴	2 x 10 ⁴	< 10 ³	- 10 ³	-	< 10 ³	-	< 10 ³	> 10 ⁵	-	-	-	-
	1000° C	ohm-cm	ASTM-D1829	-	-	-	-	-	5 x 10 ⁵	5 x 10 ⁵	1 x 10 ⁶	2 x 10 ⁶	2 x 10 ⁶	2 x 10 ⁷	1 x 10 ⁷	-	3 x 10 ⁶	< 10 ³	< 10 ³	< 10 ³	< 10 ³	- 10 ²	- ④	< 10 ³	-	< 10 ³	> 10 ³	-	-	-	-

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Notes:
 ① Thermal Shock Resistance - Tests are run by quenching samples into water from various elevated temperatures. The change in temperature where a sharp decrease in flexural strength is observed is listed as DTC.
 ② Four point bend modulus of rupture
 ③ 100 gm load
 ④ PureSiC available in low, mid, and high resistivity

*The chart is intended to illustrate typical properties. Property values vary with method of manufacture, size, and shape of part. Data contained herein is not to be construed as absolute and does not constitute a representation or warranty for which CoorsTek assumes legal responsibility. Close control of values of most properties can be maintained if specified.