Ceramic Material Properties

NON-OXIDES -

														- Aluminas				Zirconias —				———— Carbides ————						Nitrides —				
					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	НРВ4С	WC (ACI-NI6)	HP AIN	SN 101C	NBD-200	NT 154	STEEL
	PROPERTIES*		UNITS	TEST					Nom. 85% Al ₂ O ₃	Nom. 90% I	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% Al₂O₃		Zirconia- Toughened Alumina	MgO Partially Stabilized Zirconia	Y₂O₃ Partially Stabilized Zirconia	Y₂O₃ Partially Stabilized Zirconia		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/cm³	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
HANICAL	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)	1000 (145)	900 (131)	900 (131) 2	-
MEC	Elastic Modulus	20° C	GPa (psi x 10°)	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	0.22	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/mm²)	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 10³)	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)
RMAL	Fracture Toughness	K(I c)	MPa m ^½	NOTCHED BEAM	2	-	-	2	3 - 4	3 - 4	4 - 5	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
뿓	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	33.0	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 Therma Expansion	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	8.2	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	-	-	-	7 40	-	-	724	475
	Thermal Shock Resistance	ΔTc	°C	0	-	100	350	300	300	250	250	250	200	200	200	200	-	300	350	350	350	400	300	-	-	-	-	-	-	-	-	-
CAL	Dielectric Strength	6.35mm	ac-kV/mm (ac V/mil)	ASTM-D116	-	-	-	9.8 (248)	9.4 (240)	8.3 (210)	3.3 (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)	-	-	-	-
CTRI	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	-	-
ELE	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	-	1013	1012	> 1014	> 1014	> 1014	> 1014	> 1014	> 1014	> 1014	> 1014	> 1015	10 ⁸ - 10 ¹⁰	> 1014	> 10 ¹³	> 10 ¹³	> 10 ¹³	< 10 ³	~ 105	< 0.10 - > 10 ⁵	< 10 ³	10 ²	< 10 ³	> 10 ¹³	1014	1014	-	10 ⁻⁵
		500° C	ohm-cm	ASTM-D1829	-	108	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	~ 10³	-			< 10 ³					
		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	~ 10²	- 4	< 10 ³	-	< 10 ³	> 10 ³	-	-	-	-

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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