



# Advanced Alumina Materials & Manufacturing Processes

CoorsTek provides state-of-the-art materials manufactured by the most cost-effective processes. CoorsTek maintains efficient, large-scale manufacturing facilities that support quick-turn prototype development and high-volume production.

## Wide Variety of Manufacturing Options

- Injection molding
- Roll compacting
- Extruding
- Co-firing
- Isostatic pressing
- Dry pressing
- Hot pressing
- Tape casting
- Slip casting

## Advanced Finishing Services

- Engineering design and support
- Precision grinding and lapping
- Laser machining
- Metallizing
- Ceramic-to-metal brazing
- Specialized coatings
- Threaded components
- Precision motion components
- Complex cleanroom assemblies

PROPERTIES*		UNITS	TEST	AD-85	AD-90	AD-94	AD-96	FG-995	AD-995	PLASMAPURE AD-998	PLASMAPURE-UC™ ALUMINA
				Nom. 85% Al <sub>2</sub> O <sub>3</sub>	Nom. 90% Al <sub>2</sub> O <sub>3</sub>	Nom. 94% Al <sub>2</sub> O <sub>3</sub>	Nom. 96% Al <sub>2</sub> O <sub>3</sub>	Nom. 98.5% Al <sub>2</sub> O <sub>3</sub>	Nom. 99.5% Al <sub>2</sub> O <sub>3</sub>	Min. 99.8% Al <sub>2</sub> O <sub>3</sub>	Min. 99.9% Al <sub>2</sub> O <sub>3</sub>
Density		g/cm <sup>3</sup>	ASTM-C20	3.42	3.60	3.70	3.72	3.80	3.90	3.92	3.92
Crystal Size	Average	MICRONS	THIN-SECTION	6	4	8	6	6	6	6	3
Water Absorption		%	ASTM-373	0	0	0	0	0	0	0	0
Gas Permeability		-	-	0	0	0	0	0	0	0	0
Color		-	-	WHITE	WHITE	WHITE	WHITE	WHITE	IVORY	IVORY	IVORY
Flexural Strength (MOR)	20° C	MPa (psi x 10 <sup>3</sup> )	ASTM-F417	296 (43)	338 (49)	352 (51)	358 (52)	375 (54)	379 (55)	390 (54)	400 (58)
Elastic Modulus	20° C	GPa (psi x 10 <sup>6</sup> )	ASTM-C848	221 (32)	276 (40)	303 (44)	303 (44)	350 (51)	370 (54)	380 (54)	386(56)
Poisson's Ratio	20° C	-	ASTM-C848	0.22	0.22	0.21	0.21	0.22	0.22	0.22	0.22
Compressive Strength	20° C	MPa (psi x 10 <sup>3</sup> )	ASTM-C773	1930 (280)	2482 (360)	2103 (305)	2068 (300)	2500 (363)	2600 (377)	2650 (384)	2700 (392)
Hardness		R45N	ROCKWELL 45 N	73	75	78	78	82	83	83	86
		GPa (kg/mm <sup>2</sup> )	VICKERS 0.5kg	-	-	-	-	-	-	-	-
		GPa (kg/mm <sup>2</sup> )	VICKERS 1.0kg	-	-	-	-	-	-	-	-
		GPa (kg/mm <sup>2</sup> )	KNOOP 1000 gm	9.4 (960)	10.4 (1058)	11.5 (1175)	11.5 (1175)	13.7 (1400)	14.1 (1440)	14.1 (1440)	14.5 (1480)
Tensile Strength	25° C	MPa (psi x 10 <sup>3</sup> )	ACMA TEST #4	155 (22)	221 (32)	193 (28)	221 (32)	248 (36)	262 (38)	272 (39)	283 (41)
Fracture Toughness	K(I c)	MPa m <sup>1/2</sup>	NOTCHED BEAM	3 - 4	3 - 4	4 - 5	4 - 5	4 - 5	4 - 5	4 - 5	4 - 5
Thermal Conductivity	20° C	W/m K	ASTM-C408	16.0	16.7	22.4	24.7	27.5	30.0	31.0	33.0
Coefficient of Thermal Expansion	25-1000° C	1X 10 <sup>-6</sup> /°C	ASTM-C372	7.2	8.1	8.2	8.2	8.2	8.2	8.2	8.2
Specific Heat	100° C	J/kg*K	ASTM-E1269	920	920	880	880	880	880	880	870
Thermal Shock Resistance	Δ Tc	°C	①	300	250	250	250	200	200	200	200
Dielectric Strength	6.35mm	ac-kV/mm (ac V/mil)	ASTM-D116	9.4 (240)	8.3 (210)	8.3 (210)	8.3 (210)	8.7 (220)	8.7 (220)	8.7 (220)	8.7 (220)
Dielectric Constant	1 MHz	25° C	ASTM-D150	8.2	8.8	9.1	9	9.6	9.7	9.8	9.8
Dielectric Loss (tan delta)	1 MHz	25° C	ASTM-D150	0.0009	0.0004	0.0004	0.0002	0.0002	0.0001	< 0.0001	<0.0001
Volume Resistivity	25° C	ohm-cm	ASTM-D1829	> 10 <sup>14</sup>	> 10 <sup>14</sup>	> 10 <sup>14</sup>	> 10 <sup>14</sup>	> 10 <sup>14</sup>	> 10 <sup>14</sup>	> 10 <sup>14</sup>	> 10 <sup>15</sup>
	500° C	ohm-cm	ASTM-D1829	4 x 10 <sup>8</sup>	4 x 10 <sup>8</sup>	4 x 10 <sup>9</sup>	4 x 10 <sup>9</sup>	2 x 10 <sup>10</sup>	2 x 10 <sup>10</sup>	2 x 10 <sup>11</sup>	1 x 10 <sup>12</sup>
	1000° C	ohm-cm	ASTM-D1829	-	5 x 10 <sup>5</sup>	5 x 10 <sup>5</sup>	1 x 10 <sup>6</sup>	2 x 10 <sup>6</sup>	2 x 10 <sup>6</sup>	2 x 10 <sup>7</sup>	1 x 10 <sup>7</sup>

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.

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. CoorsTek, and Amazing Solutions are registered trademarks of CoorsTek, Inc. OpX is a trademark of CoorsTek, Inc. PlasmaPure is a trademark of CoorsTek, Inc. Amazing Solutions and CoorsTek are registered trademarks of CoorsTek, Inc.

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