



# Advanced Ceramic Components for Flat-Panel Display Manufacturing

## Engineered Ceramics Experts

CoorsTek provides high-performance, critical-duty components for Flat Panel Display (FPD) manufacturing from a range of specialized, high-purity engineered ceramics. Our experts help you choose the best design and material for optimal performance and component life.

## Why Specify Ceramic Components?

CoorsTek ceramics provide superior performance in severe-service application environments. Benefits include:

- Excellent corrosion resistance in plasma and chemical etching environments — Our PlasmaPure™ high-purity alumina is engineered to outperform standard ceramic materials in corrosive etch applications
- Superior dielectric strength to help prevent electrical arcing during machine operation
- StatSafe™ ESD safe ceramic materials prevent static charge buildup during glass transport
- Longer component life — CoorsTek ceramics outperform engineering plastics in most plasma etch applications
- Thermal stability — Ceramic components are extremely stable in a wide range of operating and idle temperatures

## Materials and Manufacturing Experts

With over 50 manufacturing sites across four continents, CoorsTek is the international partner of choice for high-performance semiconductor components. For more information, contact a CoorsTek materials expert today at +82 31 8016 9350.

PROPERTY	UNITS	TEST	STATSAFE™ ADC	STATSAFE™ ZDC	STATSAFE™ ZDC-W	AD-96	ADO-96	FG-995	AD-995	PLASMAPURE™ AD-998	AD-999
			Al <sub>2</sub> O <sub>3</sub>	ZrO <sub>2</sub>	ZrO <sub>2</sub>	Nom. 96%	Nom. 96%	Nom. 98.5%	Nom. 99.5%	Nom. 99.8%	Nom. 99.9%
Density	gm/cc	ASTM-C 20	3.85	5.75	5.91	3.72	3.81	3.80	3.90	3.93	3.94
Color	-	-	Black	Black	White	White	Brown	White	Ivory	Ivory	Ivory
Flexural Strength (MOR), 20 °C	MPa (psi X 10 <sup>3</sup> )	ASTM-F417	300 (43)	600 (87)	650 (94)	358 (52)	385 (56)	375 (54)	379 (55)	390 (58)	414 (60)
Elastic Modulus, 20 °C	GPa (psi X 10 <sup>6</sup> )	ASTM-C848	370 (54)	200 (29)	200 (29)	303 (44)	354 (50)	350 (51)	370 (54)	370 (54)	386 (56)
Compressive Strength, 20 °C	MPa (psi X 10 <sup>3</sup> )	ASTM-C773	2060 (300)	1200 (174)	1310 (190)	2068 (300)	2450 (375)	2500 (363)	2600 (377)	2700 (390)	2930 (425)
Hardness	GPa	Rockwell 45N	83	82	82	78	81	82	83	83	85
Fracture Toughness, K1c	MPa m <sup>1/2</sup>	Notched Beam	4 - 5	7 - 9	7 - 9	4 - 5	3 - 4	4 - 5	4 - 5	4 - 5	4 - 5
Thermal Conductivity, 20 °C	W/m °K	ASTM-C408	25	5	3.5	24.7	24.7	27.5	30.0	30.0	31.0
CTE, 25-1000 °C	1X 10 <sup>-6</sup> /°C	ASTM-C372	8	9	10	8.2	8.2	8.2	8.2	8.2	8.2
Thermal Shock Resistance, ΔTc	°C	NOTE 3	200	300	300	250	250	200	200	200	200
Maximum Use Temperature	°C	NO-LOAD COND.	500	500	500	1700	1700	1700	1750	1750	1750
Volume Resistivity, 25 °C	Ohm-cm	ASTM-D1829	10 <sup>6</sup> -10 <sup>7</sup>	10 <sup>6</sup> -10 <sup>7</sup>	10 <sup>6</sup> -10 <sup>7</sup>	> 10 <sup>14</sup>	*	> 10 <sup>14</sup>	> 10 <sup>14</sup>	> 10 <sup>14</sup>	> 10 <sup>14</sup>
Volume Resistivity, 500 °C	Ohm-cm	ASTM-D1829	-	-	-	4 x 10 <sup>9</sup>	*	2 x 10 <sup>10</sup>	2 x 10 <sup>10</sup>	1 x 10 <sup>11</sup>	3.3 x 10 <sup>12</sup>
Volume Resistivity, 1000 °C	Ohm-cm	ASTM-D1829	-	-	-	1 x 10 <sup>6</sup>	*	2 x 10 <sup>6</sup>	2 x 10 <sup>6</sup>	3 x 10 <sup>6</sup>	1.1 x 10 <sup>7</sup>

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**Americas**  
+1 303 271 7100 tel  
+1 855 929 7100 toll free in USA  
coorstek.com  
info@coorstek.com

**Europe**  
+49 160 530 3768  
infoeurope@coorstek.com

**Japan**  
+1 81 3 5437 8411  
japaninfo@coorstek.com

**China**  
+86 21 6232 1125  
info\_shanghai@coorstek.com

**Korea**  
+82 31 613 2946  
koreainfo@coorstek.com

## Critical Components for a Variety of FPD Applications

CoorsTek provides a great variety of thermally stable, corrosion resistant, and high-purity ceramic components for typical FPD applications:

### Etch

- Focus, shield, and insulator plates — Single piece and segmented construction
- Ceramic covers
- Buffer plates

### CVD

- Insulator shield rings
- Guide bushings and support shafts
- Ceramic liners

### Ultra-flat vacuum chucks

- Up to 2.5 meters square
- Low surface contact designs
- Low reflectivity or high transmissivity

### Multi-purpose components

- Various pins, screws, plates, frames, & windows
  - Ceramic clamps and bushings
- End effectors/substrate handling components