



**Metallized Ceramics**  
Electronic Applications



# Advanced Metallized Ceramics for Electrical Components

## Technical Ceramics Experts

CoorsTek supplies custom refractory metallized alumina ceramics for use in power grid tubes, x-ray tubes, vacuum interrupters, and similar applications where ceramic-to-metal seal joints of exceptional strength and hermeticity are required.

## Why Specify Ceramic Components?

- Excellent metallized seal strength and hermeticity
- Proven in extreme-duty applications
- Consistent performance with all common braze alloys
- High-volume production capacity and large part size capability

PROPERTY	UNITS	TEST	AD-94	FG-995	AD-995	AD-998
Dielectric Strength	ac-kv/mm	ASTM D116	8.3	8.7	8.7	8.7
Dielectric Loss	25°C @ 1MHz	ASTM D250	0.0004	0.0002	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>

CoorsTek specializes in molybdenum thick-film metallization on AD-94 ceramic. In addition, we metallize high purity aluminas, sapphire, and Zirconia Toughened Alumina (ZTA) in specialized applications. We utilize either low-stress nickel sulfamate or electroless nickel boron as the preferred deposition over the refractory metallization. This results in a system easily brazed with copper-silver, pure copper, gold, and other common braze alloys.

We also offer hydrogen brazing of subassemblies. We can process small components and large cylinders up to 14" in diameter and 36" long.

## Ceramic Design Recommendations

### Edge Breaks

- Break outside edges 0.002" min. (radius or chamfer) to minimize chipping and stresses.
  - Inside edge breaks are normally sharp.
  - Use of a "green" formed chamfer rather than a ground chamfer or radius will minimize cost.
- NOTE: A much larger tolerance on size of chamfer is required.

### Typical As Fired Tolerances

- ±1%, or ± 0.005", whichever is greater.

## About CoorsTek

CoorsTek is the international partner of choice for high-performance metallized ceramics and other products manufactured from engineered ceramics & advanced materials.



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 is a registered trademark of CoorsTek, Inc.

## Wall Thickness

- Avoid very thin walls, webs, or differential wall thickness to minimize cracking.

## Glaze

- Minimum glaze pullback from ceramic ends is 0.025".
- Dimensions should be specified as being over or under glaze.

## Design of Mating Components

- Avoid tensile or bending loads.
- Ceramic is strongest in compression.

## Typical Ground Tolerances

- Surface (face) grind (OAL): ± 0.001" to ± 0.003"
- OD/ID grind: ± 0.001" to ± 0.005"
- Steps, angles, slots: ± 0.002" to ± 0.005", ±1°

## Metallizing Design Recommendations

### Dimensions

- Dimensions should be specified as being over or under metallization.
- Common dimensional tolerances over metallizing and plating are ± 0.0025" (0.06mm) or greater.
- Tolerances of ± 0.001" (0.25mm) over metallizing and plating can be achieved with special grinding and coating techniques.

### Metallizing Boundaries

- End coated ceramics require an overlap of 0.010" (0.25mm) maximum onto inside and outside chamfer and walls.
- Pattern screen print metallization designs require a minimum pullback from ceramic edges of 0.010" (0.25mm) or greater
- Dimensions of screen printed metallizing patterns should be toleranced ± 0.010" (0.25mm) or greater.
- Typical tolerances on width and location of ID and OD bands are ± 0.020" (0.5mm) or greater.

COORSTEK STANDARD METALLIZING SYSTEM	
Molybdenum-Manganese Thick Film	500-1500µ" (13-38µm)
Nickel Plating	100-400µ" (2.5-10µm)
Tensile Strength, Kovar Cup Method	> 20,000 psi, avg. (138 N/mm2)
Helium Leak Rate	< 10-9 cc-atm/sec

### 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