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

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>UNITS</th>
<th>TEST</th>
<th>AD-94</th>
<th>FG-995</th>
<th>AD-99S</th>
<th>AD-998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Strength</td>
<td>ac-kv/mm</td>
<td>ASTM D116</td>
<td>8.3</td>
<td>8.7</td>
<td>8.7</td>
<td>8.7</td>
</tr>
<tr>
<td>Dielectric Loss</td>
<td>25°C @ 1MHz</td>
<td>ASTM D250</td>
<td>0.0004</td>
<td>0.0002</td>
<td>0.0001</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Volume Resistivity</td>
<td>25°C ohm-cm</td>
<td>ASTM D1829</td>
<td>&gt;10^4</td>
<td>&gt;10^4</td>
<td>&gt;10^4</td>
<td>&gt;10^4</td>
</tr>
</tbody>
</table>

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.

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 tolerated ± 0.010” (0.25mm) or greater.
• Typical tolerances on width and location of ID and OD bands are ± 0.020” (0.5mm) or greater.

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

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