Advanced Zirconias for Severe-Service Environments

CoorsTek — The World’s Leading Technical Ceramics Manufacturer
State-of-the-art processes, precise material controls, and our dedication to operational excellence provide you with the best selection of advanced technical ceramics. When your application demands high strength and toughness, CoorsTek offers a variety of zirconia-toughened aluminas and toughened zirconia materials. These toughened materials not only provide superior mechanical properties, but also offer electrical insulation, wear resistance, and corrosion resistance.

Zirconia-Toughened Aluminas (ZTAs)
ZTAs offer superior strength, toughness, and wear resistance when compared to high-purity alumina. ZTAs are an excellent material choice in particulate wear applications such as slurry nozzles and pump components.

Magnesia (MgO) Partially Stabilized Zirconias
Zirconia materials feature the lowest thermal conductivity of structural-grade ceramics. Additionally, the thermal expansion of zirconia is similar to cast iron, which helps minimize stresses in ceramic-metal assemblies.

CoorsTek Dura-Z™ and Technox® 500 are transformation-toughened zirconias offering superior strength, toughness, wear, and corrosion resistance. Transformation toughening imparts impact resistance and durability in cyclic fatigue environments. Our Dura-Z offers industry leading cyclic-fatigue resistance. Dura-Z and Technox 500 are ideal material choices for valve and pump components, bushings and wear sleeves, oil and gas down-hole tools, and industrial tooling applications.

Yttria (Y₂O₃) Partially Stabilized Zirconia
Adding to the benefits described for MgO partially stabilized zirconia, yttria partially stabilized zirconia offers superior load-bearing capability, facilitates finer surface finishes, and can hold a sharper edge (for cutting blades). Yttria partially stabilized zirconia offers the highest strength and toughness of all our ceramic materials. Their ultrafine (submicron) tetragonal grains provide maximum strength. CoorsTek offers two sintered grades – YTZP and Technox 2000. For additional strengthening through hot isostatic pressing (HIP), we offer three HIPped grades – HIPped YTZP, YZ100HS, and Technox 3000.

Wide Variety of Manufacturing Options
Combining our state-of-the-art manufacturing processes with class-leading zirconia materials creates a cost-effective solution for your most stringent engineering problems. CoorsTek supports everything from quick-turn prototype development to high-volume production. These processes include:

- Die pressing
- Isostatic pressing
- Extrusion
- Injection molding

Advanced Finishing Services
In addition to our wealth of processing methodologies, we provide several advanced finishing services including:

- Precision grinding
- Threading
- Lapping & polishing
- Laser marking

Call us today for more information
Our experts help you choose the best material for your particular application to ensure cost-effective performance.

<table>
<thead>
<tr>
<th>Property</th>
<th>Units</th>
<th>ZTA</th>
<th>AZ-67</th>
<th>AZ-93</th>
<th>Dura-Z™</th>
<th>Technox® 500</th>
<th>YTZP</th>
<th>Technox® 2000</th>
<th>YTZP</th>
<th>YZ 110 HS</th>
<th>Technox® 3000</th>
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<tbody>
<tr>
<td>Density</td>
<td>g/cm³</td>
<td>4.05</td>
<td>4.40</td>
<td>4.80</td>
<td>5.72</td>
<td>5.60</td>
<td>6.02</td>
<td>6.02</td>
<td>6.07</td>
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<tr>
<td>Color</td>
<td></td>
<td>-</td>
<td>WHITE</td>
<td>GRAY</td>
<td>WHITE</td>
<td>YELLOW</td>
<td>WHITE</td>
<td>WHITE</td>
<td>GRAY</td>
<td>OLIVE-BROWN</td>
<td>OLIVE</td>
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<tr>
<td>Flexural Strength (MOR), 20° C</td>
<td>MPa (ksi)</td>
<td>450 (65)</td>
<td>1000 (145)</td>
<td>1200 (174)</td>
<td>758 (110)</td>
<td>545 (79)</td>
<td>1240 (180)</td>
<td>1000 (145)</td>
<td>1720 (250)</td>
<td>1500 (218)</td>
<td>1400 (203)</td>
</tr>
<tr>
<td>Elastic Modulus, 20° C</td>
<td>GPa (msi)</td>
<td>360 (52)</td>
<td>340 (49)</td>
<td>295 (45)</td>
<td>200 (29)</td>
<td>200 (29)</td>
<td>210 (30)</td>
<td>210 (30)</td>
<td>210 (30)</td>
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<tr>
<td>Compressive Strength, 20° C</td>
<td>MPa (ksi)</td>
<td>2900 (427)</td>
<td>-</td>
<td>-</td>
<td>1750 (254)</td>
<td>1700 (247)</td>
<td>2500 (363)</td>
<td>2000 (290)</td>
<td>2500 (363)</td>
<td>2300 (334)</td>
<td>2000 (290)</td>
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<tr>
<td>Hardness − Rockwell (45N)</td>
<td></td>
<td>-</td>
<td>85</td>
<td>84</td>
<td>83</td>
<td>77</td>
<td>81</td>
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<tr>
<td>Hardness − Vickers (HV 1.0)</td>
<td>kg/mm²</td>
<td>1475</td>
<td>1450</td>
<td>1390</td>
<td>1200</td>
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<tr>
<td>Fracture Toughness, K(J)</td>
<td>MPa m²/²</td>
<td>5.0 − 6.0</td>
<td>7.0</td>
<td>7.0</td>
<td>11.0</td>
<td>6.0</td>
<td>13.0</td>
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<td>13.0</td>
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<td>Thermal Conductivity</td>
<td>W/mK</td>
<td>270</td>
<td>20.0</td>
<td>12.0</td>
<td>2.2</td>
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<tr>
<td>Coef. of Thermal Expansion, 25-1000° C</td>
<td>1X10²⁰⁶°/°C</td>
<td>8.3</td>
<td>8.5</td>
<td>9.0</td>
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<tr>
<td>Volume Resistivity, 25° C</td>
<td>ohm-cm</td>
<td>&gt;10¹⁴</td>
<td>&gt;10¹⁴</td>
<td>&gt;10¹⁴</td>
<td>&gt;10¹⁴</td>
<td>&gt;10¹⁴</td>
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Charts 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. Technox, CoorsTek, and Amazing Solutions are registered trademarks of CoorsTek, Inc. Dura-Z is a trademark of CoorsTek, Inc.

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