Zirconia Ceramic Materials

Yttria Stabilized Zirconia (YTZP)
Magnesia Stabilized Zirconia (MSZ)
Ceria Stabilized Zirconia (CSZ)
Zirconia Toughened Alumina (ZTA)

Contact us:

STC looks forward to working closely with you on your quest for a ceramic material solution to any challenging application you may have. We are certain that you will find STC’s full service staff an ideal partner to undertake your ceramic component projects.

Telephone  (802) 527-7726
Fax  (802) 527-1181
Email  sales@ceramics.net
Zirconia Ceramics

Stabilized Zirconia’s are among the strongest ceramic materials we offer. Each one offers different specific properties that can be applied to meet the demands of extreme applications across many industries. Offering very high strength, high toughness, wear/abrasion resistance, and corrosion resistance they can be used in operating environments that plastics, metals and other ceramic materials cannot withstand. Visit our website to review the properties of each material and call us to discuss if they are the solution you are looking for.

Properties

Our understanding of materials helps us guide you through the selection process:

- High strength, hardness & fracture toughness
- Non-magnetic & wear resistant
- Good frictional behaviour
- Electrical insulation
- Low thermal conductivity
- Corrosion resistance in acids and alkalis
- Modulus of elasticity similar to steel
- Coefficient of thermal expansion similar to iron.

Ceramic Engineering Insight

Our 117 years of ceramics engineering experience allows us to provide guidance in material selection, design-to-manufacture geometry and cost effective production.

Total Process Control

How do we control quality? By controlling every aspect of manufacturing in-house, from raw material through to finished component. All aspects of our manufacturing processes are governed by the same principles of total quality management, including powder preparation, forming, green machining, sintering and diamond grinding.

Customer Service Focus

In the larger world of ceramics, we’re a mid-sized firm located in Vermont. We pride ourselves on providing direct access to our key team members and quick response times for our customers.

Call (802) 527-7726
E-mail sales@ceramics.net
## Applications

### YTZP
- Structural ceramics
- Wear parts
- Cutting tools (knives, blades, shears)
- Deep well, down hole components
- Thread and wire guides
- Thermal barrier coatings
- Fiber optic ferrules and sleeves
- Oxygen sensors
- Precision ball valve, balls and seats
- Rollers and guide for metal tube forming
- Hot metal extrusion dies
- Solid oxide fuel cell components

### MSZ
- Wear parts
- Structural ceramics
- Precision valve seats and seals
- Roller guides for tube forming
- MWD tools
- Bushings
- Wear sleeves
- Pump pistons
- Pump sleeves
- Spray nozzles
- Ceramic bearings

### CSZ
- Instrumentation
- Sensors
- Seals
- Bearings
- Desalination plant components
- Steam system instrumentation
- Boiler probes
- Underwater sensors
- Medical instrumentation
- Pump pistons
- Pump liners
- Valve seats
- Emission sensors
- Marine system components
- Chemical pumps
- Fluid metering pumps
- Fluid control valves
- Chemical analysis fluid control systems
- Deep well, down hole components

### ZTA
- Standoffs
- Pump Piston Sleeves
- Insulators
- Instrument
- Probe bodies
- Sensor bulbs
- Pump components
- Valve seals
- Bushings
- Impellers
- Fluid delivery system components
- Analytical instrument columns
## Materials Property Chart

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM Method</th>
<th>Units</th>
<th>MSZ (Magnesia Stabilized)</th>
<th>MSZ (Magnesia Stabilized)</th>
<th>YTZP 2000 (YSZ Stabilized)</th>
<th>YTZP 4000 (YTZP Stabilized)</th>
<th>CSZ (Calcined)</th>
<th>ZTA-02 (US Patent 8175005)</th>
<th>ZTA-14</th>
<th>ZTA-20</th>
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<tbody>
<tr>
<td><strong>General</strong></td>
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<td>Crystal Size (Average)</td>
<td>Thin Section</td>
<td>Microns</td>
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<td>Gas Permeability</td>
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<td>atms-cc/sec</td>
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<td>Density</td>
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<td>Hardness</td>
<td>Vickers 500</td>
<td>GPa (kg/mm²)</td>
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<td>11.7 (1200)</td>
<td>12.5 (1250)</td>
<td>12.5 (1250)</td>
<td>11.7 (1200)</td>
<td>14 (1440)</td>
<td>14.5 (1478)</td>
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<td>Fracture Toughness</td>
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<td>Flexural Strength (MOR) (3 point @ RT°)</td>
<td>F417-87</td>
<td>MPa (psi x 10¹)</td>
<td>620 (90)</td>
<td>586 (85)</td>
<td>951 (138)</td>
<td>1380 (200)</td>
<td>551 (80)</td>
<td>448 (65)</td>
<td>586 (85)</td>
<td>621 (90)</td>
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<td>Tensile Strength @ RT°</td>
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<td>MPa (psi x 10¹)</td>
<td>310 (45)</td>
<td>310 (45)</td>
<td>550 (80)</td>
<td>690 (100)</td>
<td>337 (49)</td>
<td>259 (38)</td>
<td>344 (50)</td>
<td>350 (51)</td>
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<td>Compressive Strength @ RT°</td>
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<td>MPa (psi x 10¹)</td>
<td>1862 (270)</td>
<td>1962 (270)</td>
<td>2485 (360)</td>
<td>2485 (360)</td>
<td>2000 (290)</td>
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<td>Elastic Modulus</td>
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<td>GPa (psi x 10¹)</td>
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<td>210 (30)</td>
<td>200 (29)</td>
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<td>C.T.E. 25 - 100° C</td>
<td>C 372-96</td>
<td>x 10¹/°C</td>
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<td>C.T.E. 25 - 300° C</td>
<td>C 372-96</td>
<td>x 10¹/°C</td>
<td>9.7</td>
<td>9.7</td>
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<td>C.T.E. 25 - 600° C</td>
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<td>x 10¹/°C</td>
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<td>W/m K</td>
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<td>Max Use Temp (non-loading) (at high strength)</td>
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<td>Fahrenheit (°F)</td>
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<td>2200</td>
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<td>Dielcic Strength (.125” Thick)</td>
<td>D 149-97A</td>
<td>V/mil</td>
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<td>Dielectric Constant @ 1 MHz</td>
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<td>22.7</td>
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<td>@ Gigahertz</td>
<td>D 2520-96</td>
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<td>Dielectric Loss @ 1 MHz</td>
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<td>@ Gigahertz</td>
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<td>Volume Resistivity, 25°C</td>
<td>D 257</td>
<td>ohms-cm</td>
<td>&gt; 1 x 10¹⁴</td>
<td>&gt; 1 x 10¹³</td>
<td>&gt; 1 x 10¹³</td>
<td>&gt; 1 x 10¹³</td>
<td>&gt; 1 x 10¹⁴</td>
<td>&gt; 1 x 10¹⁴</td>
<td>&gt; 1 x 10¹⁴</td>
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<tr>
<td>Volume Resistivity, 300°C</td>
<td>D 1829</td>
<td>ohms-cm</td>
<td>5 x 10²</td>
<td>5 x 10¹</td>
<td>1 x 10¹³</td>
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<td>1 x 10¹⁰</td>
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<tr>
<td>Volume Resistivity, 500°C</td>
<td>D 1829</td>
<td>ohms-cm</td>
<td>1 x 10²</td>
<td>1 x 10¹</td>
<td>1 x 10⁹</td>
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<td>6 x 10⁹</td>
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<td>2 x 10⁸</td>
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<tr>
<td>Volume Resistivity, 700°C</td>
<td>D 1829</td>
<td>ohms-cm</td>
<td>2 x 10²</td>
<td>2 x 10¹</td>
<td>5 x 10⁷</td>
<td>5 x 10⁷</td>
<td>6 x 10⁷</td>
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<tr>
<td>Volume Resistivity, 1000°C</td>
<td>D 1829</td>
<td>ohms-cm</td>
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</tbody>
</table>

**Note:** The information in this data sheet is for design guidance only. STC does not warrant this data as absolute values. Forming methods and specific geometry could affect properties. Slight adjustments can be made to some of the properties to accommodate specific customer requirements. Most of the dense materials in the table are resistant to mechanical erosion and chemical attack. STC has performed ASTM testing qualification for certain compositions, in accordance with ASTM D2442. Please consult our technical staff for appropriate material and specific test results.

For a complete version of the Materials Property Chart, visit ceramics.net.