CoorsTek

Zirconia Materials

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 (Y_2O_3) 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, YZ110HS, 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
- Lapping & polishing
- Threading
- 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.

		Zirconia Toughened Alumina			MgO Partially Stabilized Zirconia		Sintered Y_2O_3 Partially Stabilized Zirconia		HIPped Y_2O_3 Yttria Tetragonal Zirconia Polycrystal		
Property	**Units**	**ZTA**	**AZ-67**	**AZ-93**	**Dura-Z™**	**Technox® 500**	**YTZP**	**Technox® 2000**	**YTZP**	**YZ 110 HS**	**Technox® 3000**
Density	g/cm³	4.05	4.40	4.80	5.72	5.60	6.02	6.02	6.07	6.07	6.07
Color	–	WHITE	GRAY	GRAY	WHITE	YELLOW	WHITE	WHITE	GRAY	OLIVE-BROWN	OLIVE
Flexural Strength (MOR), 20° C	MPa (ksi)	450 (65)	1000 (145)	1200 (174)	758 (110)	545 (79)	1240 (180)	1000 (145)	1720 (250)	1500 (218)	1400 (203)
Elastic Modulus, 20° C	GPa (msi)	360 (52)	340 (49)	295 (43)	200 (29)	200 (29)	210 (30)	210 (30)	210 (30)	210 (30)	210 (30)
Compressive Strength, 20° C	MPa (ksi)	2900 (421)	–	–	1750 (254)	1700 (247)	2500 (363)	2000 (290)	2500 (363)	2300 (334)	2000 (290)
Hardness – Rockwell (45N)	–	85	84	83	77	77	81	81	81	81	81
Hardness – Vickers (HV 1.0)	kg/mm²	1475	1430	1390	1200	1200	1300	1300	1300	1300	1300
Fracture Toughness, K(I c)	MPa $m^{1/2}$	5.0 - 6.0	7.0	7.0	11.0	6.0	13.0	10.0	13.0	8.5	10.0
Thermal Conductivity	W/mK	27.0	20.0	12.0	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Coef. of Thermal Expansion, 25-1000° C	1X10^{-6}/°C	8.3	8.5	9.0	10.2	10.2	10.3	10.3	10.3	10.3	10.3
Volume Resistivity, 25° C	ohm-cm	>10^{14}	>10^{14}	>10^{14}	>10^{14}	>10^{14}	>10^{14}	>10^{14}	>10^{14}	>10^{14}	>10^{14}

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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