InstaVoxel

Y-TZP Zirconia (Y_2O_3-Stabilized ZrO_2)

Technical Datasheet

Material Description

Y-TZP zirconia is a high-performance engineering ceramic known for its outstanding strength, fracture toughness, wear resistance, and electrical insulation.

Yttria stabilization retains a fine tetragonal structure at room temperature, supporting precision parts exposed to mechanical loading, abrasion, and corrosive environments.



Example Component: White Y-TZP zirconia ceramic rod.

Key Features

- **High flexural and compressive strength**
- **Excellent wear and abrasion resistance**
- **High fracture toughness for an advanced ceramic**
- **Excellent chemical and corrosion resistance**
- **High electrical resistivity**
- **Fine finish and dimensional stability**

Common Applications

- Semiconductor Equipment Components
- Wear guides, bushings, and bearing parts
- Pump, valve, and seal components
- Precision fixtures and metrology parts
- Electrical insulating components
- Nozzles and wear-critical tooling

Physical & Electrical Properties

Density	~6.0-6.1 g/cm³
Thermal Expansion (CTE)	~10–11 × 10^{-6}/K
Thermal Conductivity	~2.2-3.0 W/m·K
Electrical Resistivity	≥10^{11} Ω·cm at room temperature, grade-dependent
Maximum Use	Up to ~1,000°C
Chemical Resistance	Excellent

Mechanical & Performance Properties

Hardness	~12-13 GPa (Vickers Hardness)
Flexural Strength	~800–1,700 MPa
Compressive Strength	~2,000–2,500 MPa
Fracture Toughness	~5–10 MPa·$m^{1/2}$
Young's Modulus	~200–210 GPa
Wear Resistance	Excellent

Technical Assistance

Our knowledgeable staff, supported by our in-house team of expert metallurgists and engineers, is ready to assist you with any technical inquiries.

InstaVoxel™ - On-Demand Manufacturing Expert

859 Willard Street Suite 400, Quincy MA 02169 USA
+1 (617) 302-1629 | info@instavoxel.com
www.instavoxel.com

InstaVoxel's quality control system is ISO-9001 certified, and all our partners hold relevant certifications.

ISO 9001:2015

UKAS MANAGEMENT SYSTEMS 0142

All information in our data sheet is based on approximate testing and provided to the best of our knowledge and belief. It is presented without any contractual obligations and does not constitute a guarantee of properties, processing, or application possibilities in specific cases. Our warranties and liabilities are defined solely by our terms of trade.

Printed in the USA. © 2026 InstaVoxel, Inc.