



**Technical Products, Inc.**

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## Zirconia (ZrO<sub>2</sub>) Material Specifications

Zirconia (ZrO<sub>2</sub>) is a readily available material with reasonable processing cost, possessing excellent mechanical, electrical, and wear properties. Our fabricated Zirconia is used in a wide range of applications not limited to aerospace, automotive, medical and military.

Technical Products processes include cold isotactic pressing of green billets, pre-fired machining, sintering, and post sintered grinding operations.

Physical Properties	Units	ZrO <sub>2</sub> -YTZP	ZrO <sub>2</sub> -TTZ-C	ZrO <sub>2</sub> -TTZ-T	ZTA
Sintered	-	Yttria	Magnesium (MgO)	Magnesium (MgO)	85% Al <sub>2</sub> O <sub>3</sub> 15% ZrO <sub>2</sub>
Density	g/cc	6.04	5.72	5.70	4.1
Color	-	White	White/Ivory	Yellow	White
Water Absorption	%	0	0	0	0
Gas Permeability	%	0	0	0	0
Hardness (Rockwell 45 N)	-	81	77	77	-

Mechanical Properties	Units	ZrO <sub>2</sub> -YTZP	ZrO <sub>2</sub> -TTZ-C	ZrO <sub>2</sub> -TTZ-T	ZTA
Compressive Strength	MPa / psi x 10 <sup>3</sup>	2500 / 363	1750 / 254	1750 / 254	-
Tensile Strength	MPa	500	483	483	-
Flexural Strength	MPa	1240	900	900	760
Modulus of Elasticity (Young's Mod.)	GPa	210	200	200	310
Fracture Toughness, K(I c)	MPa m <sup>1/2</sup>	13	11	11	6
Poisson's Ratio, 20°C	-	0.23	0.28	0.30	-

Thermal Properties	Units	ZrO <sub>2</sub> -YTZP	ZrO <sub>2</sub> -TTZ-C	ZrO <sub>2</sub> -TTZ-T	ZTA
Max. Use Temperature (no-load cond.)	°C	500	1500	1500	1650
Thermal Shock Resistance Δ Tc	°C	350	350	350	-
Thermal Conductivity, 20°C	W/m-K	2.2	2.2	2.2	-
Thermal Expansion Coefficient, 25°C - 1000°C	1 x 10 <sup>-6</sup> /°C	10.3	10.2	10.2	8.1
Specific Heat, 100°C	J/kg*K	400	400	400	-

Electrical Properties	Units	ZrO <sub>2</sub> -YTZP	ZrO <sub>2</sub> -TTZ-C	ZrO <sub>2</sub> -TTZ-T	ZTA
Dielectric Strength	ac V/mil	228	240	240	-
Dielectric Constant, 25°C	1 MHz	29.0	28.0	28.0	-
Dielectric Loss (tan delta), 25°C	1 MHz	0.001	0.001	0.001	-
Volume Resistivity, 25°C	ohm-cm	>10 <sup>13</sup>	>10 <sup>13</sup>	>10 <sup>13</sup>	-
500°C		2 x 10 <sup>4</sup>	2 x 10 <sup>6</sup>	2 x 10 <sup>6</sup>	
1000°C		<10 <sup>3</sup>	<10 <sup>3</sup>	<10 <sup>3</sup>	

\*\*The information provided in this table is a compilation of publicly available data. This information is provided for comparison purposes only, and is not intended to be warrantable. Further, *Technical Products, Inc.* disclaims any and all liability from errors, in accuracies, or omissions.

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