

**CZ1 MATERIAL - ZIRCONIA  
 TOUGHENED ALUMINA CERAMIC**

Gaiser's CZ1 material is designed for world class, high-speed, fully automatic wire bonders. It is ideal for ultra fine pitch, low-loop, and long-loop bonding applications. When combined with Process 1800, the CZ1 capillary produces the ultimate ultra fine pitch capillary.

- 100% and greater increases in angle bottleneck break strength vs. conventional capillaries
- Longer tool life, reduced cost per bond
- Ideal for standard and high-frequency transducers
- Improved internal bore surface provides reduced wire drag for enhanced looping and wire control
- Sub-micron average grain size

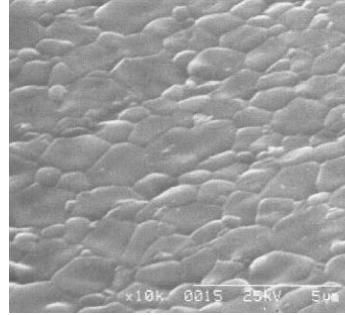


Figure 49. Gaiser's standard Alumina ceramic material: Less than 2µm grain size, near-zero porosity

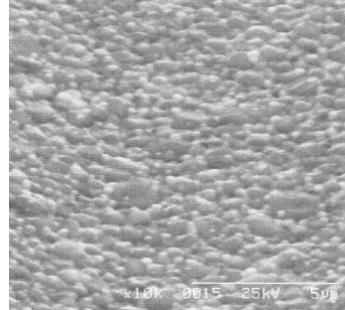


Figure 50. Gaiser's CZ1 - Zirconia toughened Alumina ceramic: Less than 0.7µm grain size, zero porosity

<b>Technical Specifications</b>		
<b>Material Specifications</b>	<b>CZ1 - Zirconia Toughened Alumina</b>	<b>Gaiser Fine Grain Standard Alumina Ceramic</b>
Chemical Composition	Zirconia Toughened Alumina	99.9% Al <sub>2</sub> O <sub>3</sub>
Color Appearance	Pink	White
Density	4.3 g/cm <sup>3</sup>	3.99 g/cm <sup>3</sup>
Average Grain Size	<0.683µm	<2.0µm
Hardness Vickers	1900 HV	2425 HV
Porosity	Zero	Near Zero
Bending Strength	1700 MPa	350 MPa
Thermal Conductivity	0.072 cal/cm sec °C	0.08 cal/cm sec °C
Thermal Expansion Coefficient	6.8 X10 <sup>-6</sup> cm/°C	6.5 X10 <sup>-6</sup> cm/°C
Surface Resistivity	10 <sup>11</sup> - 10 <sup>13</sup> ohm cm	10 <sup>13</sup> - 10 <sup>15</sup> ohm cm
Fracture Toughness	14 MN/m <sup>3/2</sup>	3 MN/m <sup>3/2</sup>

<b>Strength Test Data</b>			
	<b>Standard Manufacturing of 99.9% Al<sub>2</sub>O<sub>3</sub></b>	<b>Process 1800 Al<sub>2</sub>O<sub>3</sub></b>	<b>Process 1800 CZ1</b>
Capillary ABTNK	10° ABTNK	10° ABTNK	10° ABTNK
Manufacturing Method	Standard Grinding	Process 1800	Process 1800
Capillary Material	99.9% Al <sub>2</sub> O <sub>3</sub>	99.9% Al <sub>2</sub> O <sub>3</sub>	Zirconia Toughened Alumina
Tip Diameter	.0036in./90µm	.0036in./90µm	.0036in./90µm
ABTNK Height	.010in./254µm	.010in./254µm	.010in./254µm
Core Angle	10°	10°	10°
Lot No.	L7A	L7A	L7A
No. of Tools Tested	25	25	25
Mean ABTNK Break Strength	142 gm	272 gm	323 gm