Features & Benefits of CZRy™ Capillaries

Tip Finish
Several GatorGrip™ finish configurations are available to meet various copper wire bonding applications including NiPd, silver, and copper leadframes.

Physical Properties
CZRy combines higher hardness and bending strength properties for increased wear resistance & strong mechanical resistance to bond process stresses.

Chemical Properties
The ruby-like properties of CZRy improve grain boundary resistance to failures through increased density and optimized chemical composition. This translates to longer tool life. A denser surface finish makes it less prone to build-up and accumulation of foreign debris.

Mechanical Bonding Performance
CZRy grain size was designed to increase the mechanical coupling between the capillary and the copper wire. The granular finish provides a superior anchoring of the wire to prevent micro-sliding, greatly improving stitch strength, short-tailing, and adhesion with better Cu remains after stitch pull.

Ultrasonic Bonding Performance
The ceramic blend of CZRy produces an acoustically stable tool without the need for high ultrasonic power. Process optimization is made easy with this ‘Plug & Play’ advantage.

Material Engineering Results

The unique material properties of CZRy offer:
- Near-perfect material distribution to prevent premature fatigue failures during bonding process
- High mechanical resistance to bonding stresses to improve life span
- Excellent acoustical performance to minimize ultrasonic power requirements
- Suitable for a wide range of product applications

<table>
<thead>
<tr>
<th>PHYSICAL PROPERTIES</th>
<th>CZRy</th>
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<tr>
<td>Bulk Density</td>
<td>4.40 g/cc</td>
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<tr>
<td>Avg. grain size, alumina</td>
<td>0.9 µm</td>
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<tr>
<td>Ultrasonic Efficiency</td>
<td>82.2 %</td>
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Bondability Results
CoorsTek Gaiser developed a specialized Peeled Stitch Test to verify area of bondability and weld integrity. This test:

• Helps visualize stitch strength to axial stress components present during device encapsulation
• Exposes poor or marginal stitch bonds
• Facilitates process optimization and parameter settings
• Optimally shows 100% of welded area remaining

Pictures shown indicate excellent welded area coverage achieved with different CZRy finishes.

When optimized for each application, CZRy finishes yield optimum Peel Test results as seen on the magnified photos to the right.

Surface Texture Comparison

Peeled Stich Test

• Texture characterization is based on entire capillary surface area
• Each finish offers well-defined areal Ra and Rz values
• Texture finishes are tailored to application requirements

Following extensive surface texture analyses, CoorsTek Gaiser offers the latest and best materials and textured finish solutions to address the ever-growing challenges presented in newer and more advanced semiconductor packaging materials.
CZRy – Capillaries for Longer Tool Life

CoorsTek Gaiser CZRy ceramic capillaries provide exceptionally long-life durability. Combined with our superior, rough and tough GatorGrip tip finishes, these capillaries extend tool life far beyond current expectations. Let us show you the real difference — contact our experts today.

<table>
<thead>
<tr>
<th>APPLICATION GUIDE</th>
<th>CZRy RFT</th>
<th>CZRy RFG</th>
<th>CZRy RF2P</th>
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<tbody>
<tr>
<td>COPPER (Cu) WIRE / BARE COPPER (Cu) SUBSTRATE</td>
<td>-</td>
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<tr>
<td>COPPER (Cu) WIRE / NiPd SUBSTRATE</td>
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<tr>
<td>COPPER (Cu) WIRE / SILVER (Ag) SUBSTRATE</td>
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<tr>
<td>GOLD (Au) WIRE / NiPd SUBSTRATE</td>
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CoorsTek Gaiser Bonding Tools

CoorsTek Gaiser® precision ceramic wire bonding tools represent decades of material and design refinement recognized by users all over the world. We invented the ceramic capillary and continue to lead the market with innovative, high-durability designs and unparalleled support services.

With over 50 manufacturing locations across four continents, CoorsTek is the international partner of choice for high-performance semiconductor materials.

Values presented here represent CoorsTek, Inc. improvements in ceramic processing and control guidelines of the original Gaiser products as well as new ceramic mixtures. These charts are 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. CoorsTek and Gaiser are registered trademarks of CoorsTek, Inc. CZRy and GatorGrip are trademarks of CoorsTek, Inc.