

Fine Pitch Capillaries

Introducing Process1800

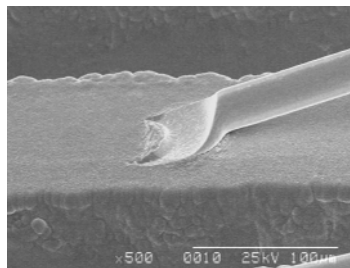
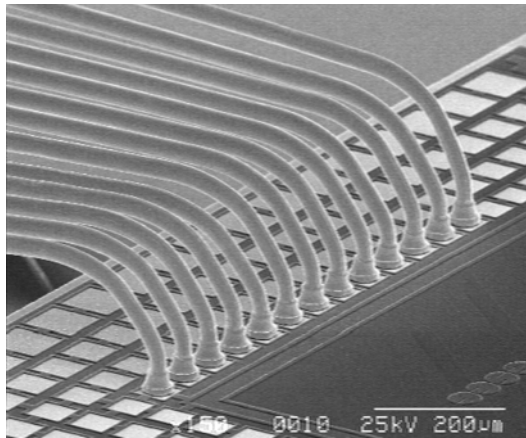
- Reliable Fine-Pitch Bonding Solutions
- Ideal for High Frequency Transducers
- New Improved Ceramic Strength
- Tighter Tolerances

As the semiconductor industry moves to finer and finer pitches, Gaiser Tool Company has observed an increasing demand for smaller angle-bottleneck tip diameters and tighter dimensional tolerances. As these tip diameters and tolerances are decreased, the limits of existing ceramic materials and machining techniques have been tested.

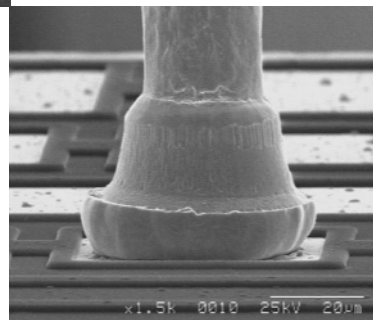
- Combined with the advent of the high frequency transducer, these smaller tip diameter capillaries can be stressed to their physical limits, and actually broken during the wire bonding process. To address the need for increased strength and tightened tolerances, Gaiser Tool Company has developed a proprietary new manufacturing process: Process 1800, standard in our new 1800 series fine-pitch capillaries.

- Process 1800 eliminates the previously standard grinding operation used to produce the angle-bottleneck feature on a fine-pitch capillary. Process 1800 imparts a high-tension, mirror smooth, secondary alumina skin on the angle bottleneck portion of the tool, substantially increasing shear strength and rigidity.

Increased shear strength allows Gaiser Tool Company to produce a more robust, high-strength, small tip diameter, angle-bottleneck capillary. Increased rigidity reduces the ultrasonic energy loss inherent in the angle-bottleneck design, resulting in superior ultrasonic energy transmission and a wider tuning window — ideal for high frequency transducers.



- Process 1800 inherently yields a tighter tolerance capillary, with substantially improved dimensional tolerances as well as reduced standard deviations. The tolerances necessary for ultra fine-pitch bonding are standard in the 1800 series. Process 1800 capillaries are manufactured with our sub-micron average grain size, near-zero porosity improved ceramic material. Zirconia/alumina materials are also available.



- As the company that invented the first ceramic capillary, Gaiser Tool Company is pleased to offer what we believe to be

the next generation ultra fine-pitch capillary: The 1800 series. Proven designs are available for 60 μ , 70 μ , 80 μ , and greater pitches. Our advances in manufacturing processes, materials, tolerances, and design will be evident in your next fine-pitch application.

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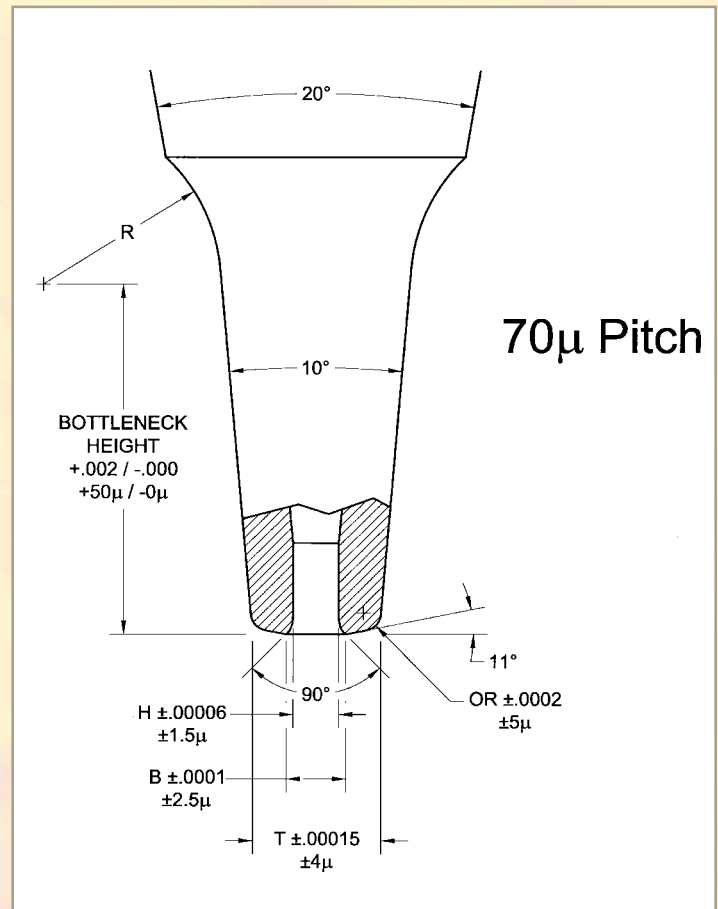
• HIGH PRECISION SINCE 1967

Fine Pitch Capillary

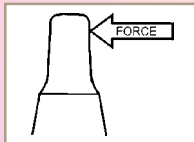
Part Number 1800-13A-437GM

SPECIFICATIONS	INCH/μ
Suggested Squashed Ball Diameter	0.0019 / 48μ
Suggested Wire Diameter	0.0010 / 25μ
Approximate Ball Shear Strength	8.5 g/mil ²
Capillary T Dimension	0.0036 ± .00015 91μ ± 4μ
Capillary Hole Diameter	0.0013 ± .00006 33μ ± 1.5μ
Capillary B Dimension	0.0017 ± .0001 43μ ± 2.5μ
Capillary IC Dimension	0.0002 (ref) / 5μ (ref)
Capillary Face Angle	11°
Capillary Outside Radius	0.0005 ± .0002 / 13μ ± 5μ
Capillary Angle Bottleneck Angle	10°
Capillary Angle Bottleneck Height	0.010 +.002 / -.000 250μ +50μ / -0μ
Capillary Cone Angle	20°

The new materials group and process engineering have been busy at Gaiser Tool Company, developing near zero porosity, sub-micron average grain size ceramic material, as well as zirconia formulations. Our high strength materials combined with the new proprietary Process1800 produce an angle bottleneck capillary with superior strength and rigidity, even at very small tip diameters.



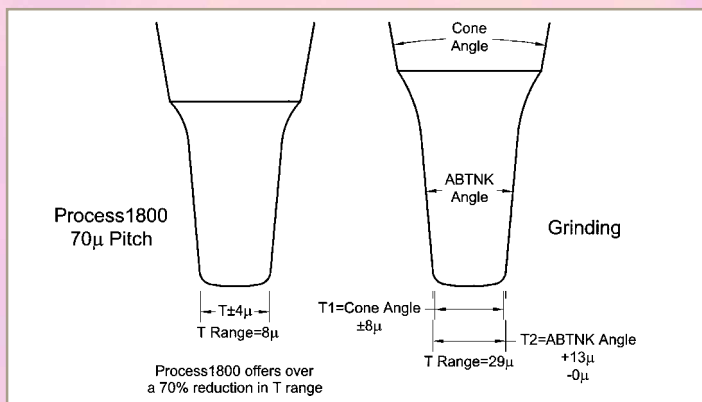
70μ Pitch



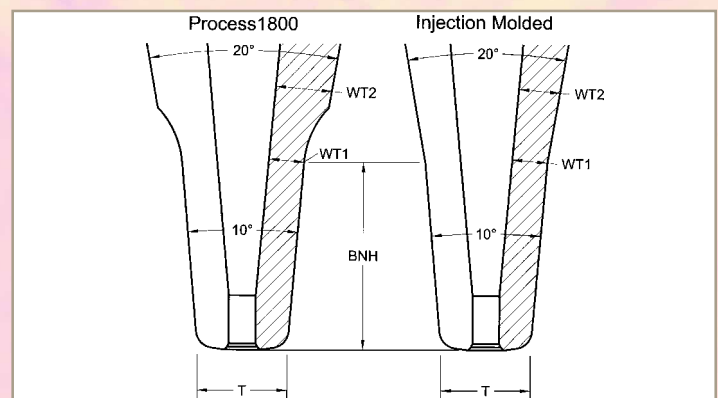
Process1800 improves shear strength by more than 50% compared to a ground angle bottleneck in most tip configurations; ideal for high frequency transducers.

Gaiser Tool Company provides the tight tolerances necessary to reliably achieve 70μ Fine-Pitch bonding.

Process1800 vs. Grinding the Angle Bottleneck



Process1800 vs. Injection Molding



Process1800 eliminates tolerance stacking when producing an angle bottleneck capillary, greatly reducing the effective $\Delta X T$ tolerance range and eliminating the risk of touching adjacent loops.

The Process1800 capillary is not subjected to the stresses, micro-cracking, and rough finish left from a grinding wheel. Process1800 imparts a high-tension, mirror smooth, secondary alumina skin on the angle bottleneck portion of the tool.

Process1800 produces significantly greater strength, consistency, and tighter tolerance ranges.

If the same T and BNH are compared, the Process1800 tool offers greater mass at WT2 for superior strength and ultrasonics.

The Process1800 design features a radiused transition from the angle bottleneck to the cone. This gradual transition provides better stress distribution for strength and a stiffer, more rigid bottleneck for less ultrasonic energy loss.

Like previous Gaiser capillaries, BNH and all other dimensions can be easily customized to meet specific applications.