

## **Service Note: Guidelines for Handling, Soldering and Splicing of High Strength Plus, Compression Tolerant and Hermetic Superconductor Wire**

*American Superconductor High Strength Plus, Compression Tolerant and Hermetic superconductor wires comprise a conductor of BSCCO ceramic filaments embedded in a silver alloy matrix. The conductor is then laminated on both sides to a reinforcement material utilizing a solder having a 179°C melting point. While lamination provides protection and reinforcement to the superconductor, these laminated wires can still be damaged if handled improperly.*

Handling	Ways to avoid damaging the superconductor wire: <ul style="list-style-type: none"><li>• Do not rest heavy objects on the superconductor wire.</li><li>• Do not pinch, hammer, puncture, scrape, or sand the surface.</li><li>• Avoid sharp bends. Bending back to the original shape does not undo the damage. The recommended minimum bend diameter is indicated in the wire fact sheets, found at <a href="http://www.amsuper.com/products/htsWire/index.cfm">http://www.amsuper.com/products/htsWire/index.cfm</a>.</li><li>• Do not immerse in flux.</li><li>• Do not immerse in solvent, or clean in an ultrasonic bath.</li><li>• Do not use an uncontrolled method of heating such as heat gun or open flame or solder gun with high tip temperature.</li><li>• Solder current leads and voltage taps directly to the laminate; do not remove the laminate.</li></ul>
Environment	Store dry – keep away from water.
Winding diameter	Please consult superconductor wire fact sheets, found at <a href="http://www.amsuper.com/products/htsWire/index.cfm">http://www.amsuper.com/products/htsWire/index.cfm</a> .
Winding tension	Please consult superconductor wire fact sheets, found at <a href="http://www.amsuper.com/products/htsWire/index.cfm">http://www.amsuper.com/products/htsWire/index.cfm</a> .

### **Soldering to High Strength Plus, Compression Tolerant and Hermetic Wire**

Soldering should be performed using the following basic guidelines:

- The material to be soldered must be smooth and clean, free of any contamination.
- The laminated superconductor wire must be heated to the temperature recommended by the manufacturer of the solder chosen by the user. However, the temperature of the superconductor must not exceed the melting point of the solder used for the lamination (179°C). It is recommended that laminated superconductor wire not be heated above 165°C to ensure that the reinforcement does not delaminate from the superconductor.
- It is recommended that a flux be applied to the surface of the wire and that the flux be removed carefully after soldering. Carefully clean the wire surface with alcohol before and after soldering. Do not immerse the superconductor wire in flux.
- Do not press the tip of the soldering iron into the tape.

## Wire Splices

The electrical resistance of a solder connection to the laminated superconductor depends upon a number of factors (laminated material, solder material, quality of splice, length of splice, etc.). Using the solder and flux recommendations below, a splice resistance of less than 200 nano-Ohms at 77K can be achieved. In many cases, a splice resistance of approximately 100 nano-Ohms at 77K has been achieved. Recommended splice lengths are between 2.5cm and 10cm.

## Recommendations for Solder and Flux

<b>Solder</b>	157°C pure Indium (Indalloy 4, <a href="http://www.indium.com">www.indium.com</a> ) OR 118°C Eutectic 52In 48Sn (Indalloy 1E, <a href="http://www.indium.com">www.indium.com</a> )
<b>Flux</b>	Acid-free fluxes such as: HF260, Litton ESF33, Multicore Kester 135

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