## **GlueX FDC Wire Specification Document**

August 29, 2008– v1.0 D.S. Carman, Jefferson Laboratory, file: wire\_spec.tex

## Gold-Plated Tungsten Sense Wires:

The sense wire for the FDC chambers shall consist of  $30-\mu$ m diameter gold-plated tungsten wire. Material certification is to be provided by the vendor. This information shall include data on the yield strength, tensile strength, and percent elongation of the wire. The specified tolerance on the diameter is  $\pm 3\%$ . The gold plating must not exceed 1.2  $\mu$ m thickness while maintaining 100% coverage of the wire. The surface finish should be 0.2  $\mu$ m or less. The tensile strength of the wire should be a minimum of 300,000 p.s.i, and will be checked by hanging weights on a sample of the wire. The wire must also be stress relieved. The wire must be completely free of oils, lubricants, or any other foreign materials. The wire shall be straight to 3 mm over a 3 m length when pulled vertically by a 1 g weight. The wire shall be free of kinks and sharp bends.

All sense wire spools will have their properties verified through checks at JLab within 30 days of delivery. The wire diameter will be measured using a calibrated scale in the SEM. A stress-strain curve for a sample of wire in each spool will be determined and compared to results provided by the vendor. The gold plating quality will be studied in the SEM using an x-ray Energy Dispersive System (EDS) analysis. Any evidence of gold flaking will cause the wire spool to be rejected.

The spool shall be protected from damage during shipping and handling by a lint-free, protective container. The wire shall roll off the spool freely, without snagging, which could cause the wire to be damaged. The wire shall be on a single spool with total length of 1000 m and be fully continuous without breaks.

## Gold-Plated Copper-Beryllium Field Wires:

The field wire for the FDC chambers shall consist of  $80-\mu$ m diameter gold-plated copper beryllium wire. The wire should be made of Alloy 25 (1.8% Be and 98.1% Cu). Material certification is to be provided by the vendor. This information shall include data on the yield strength, tensile strength, and percent elongation of the wire. The specified tolerance on the diameter is  $\pm 5\%$ . The gold plating must not exceed 1.2  $\mu$ m thickness while maintaining 100% coverage of the wire. The surface finish should be 0.2  $\mu$ m or less. The tensile strength of the wire should be a minimum of 190,000 p.s.i, and will be checked by hanging weights on a sample of the wire. The wire must also be tempered and stress relieved. The wire shall be straight to 3 mm over a 3 m length when pulled vertically by a 1 g weight. The wire shall be free of kinks and sharp bends.

All field wire spools will have their properties verified through checks at JLab within 30 days of delivery. The wire diameter will be measured using a Mitutoyo Digimatic No. 293-725-10 or equivalent device. A stress-strain curve for a sample of wire in each spool will be determined and compared to results provided by the vendor. The gold plating quality

will be studied in the SEM using an x-ray Energy Dispersive System (EDS) analysis. Any evidence of gold flaking will cause the wire spool to be rejected.

The spool shall be protected from damage during shipping and handling by a lint-free, protective container. The wire shall roll off the spool freely, without snagging, which could cause the wire to be damaged. The wire must be completely free of oils, lubricants, or any other foreign materials. The wire shall be on a single spool with total length of 1000 m and be fully continuous without breaks.