

SPECIFICATION 115070-1001S
WAVEGUIDE – COPPER PLATING SPECIFICATION

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1.0 PURPOSE

This specification defines the requirements for the electroplating of copper on the inner surface of the JLAB waveguide assemblies.

2.0 SCOPE

The Seller shall provide all material, personnel, and all other associated facilities necessary to perform, inspect and test the electroplating of copper on the inner surface of the waveguide assemblies as specified herein.

The Seller shall prepare and submit with their proposal the following to the Buyer (JLAB) for review with the right disapproval.

2.1 A documented quality assurance program which satisfies the requirements of Section 6.0 of this specification.

2.2 Documented detailed electroplating procedures including but not limited to the following:

- a. Cleaning process (degreasing, pickling, etc.)
- b. Fixturing
- c. Activation (solution composition, condition, etc.)
- d. Strike (if applicable)
- e. Rinsing
- f. Electroplating (solution composition, addition agents, current density, anodic composition, operating conditions, etc.)
- g. Cleaning after electroplating.

3.0 APPLICABLE DOCUMENTS

The following drawings and standards form an integral part of this specification.

3.1 Drawings

Waveguide Assembly 115120-1001 Rev A or an alternate approved by the Buyer.

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3.2 Standards

3.2.1 American Society of Testing and Materials (ASTM).

- a. Standard Practice for Preparation of and Electroplating on Stainless Steel, B-254.
- b. Standard Specification for Electrodeposited Copper for Engineering Uses, B-734.

4.0 REQUIREMENTS

4.1 Significant Surfaces

All interior surfaces of the waveguide assembly, plus a band ¼” wide (minimum) adjacent to the interior tube surface on the flanges at both ends shall be electroplated with copper.

4.2 Thickness of Electrodeposited Copper

The thickness of the electrodeposited copper shall be as follows:

- a. From the inner flange to the outer flange – 60 microinches +30% and –20%.

4.3 Anode Material

To obtain a target copper purity of 99.99%, it is preferred that OFC Grade 1 Copper (RRR 250) be used as the electroplating anode. In no case should copper plating fall below 99.95% pure copper.

4.4 Additional Requirements

- a. The electroplating process used shall entrap the least amount of hydrogen gas possible.
- b. Absolutely no physical nor chemical alteration nor destruction shall occur to the original waveguide assembly.
- c. The finished waveguide assembly shall be free from residues from the solution.
- d. Masking material will not be used..
- e. Additive or brighteners will not be used.
- f. Waveguide will be put into an ultrasonic cleaner with a 3MO deionized water in solution for 1 hour.

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5.0 ACCEPTANCE TESTS

5.1 Vendor Qualifications

Prior to the commencement of work, the Vendor shall document and provide the buyer with the plating protocol that will be used. The Buyer shall determine if the Seller has the capability to carry out the requirements of this specification by reviewing the protocol and providing the Seller with sample coupons that the Vendor shall electroplate. Once plated, these samples will be analyzed by the Buyer. The Seller shall plate the samples in accordance with Section 4.0 of this specification with the following exceptions:

- a. Since there are no flanges on the tube, there is no ¼” band as specified in Section 4.1.

The Seller may fixture the waveguide tube in any manner he wishes to facilitate the plating process. Note that only the interior surface of the tube is to be plated. If both interior and exterior surfaces of the tube are plated, Buyer will immediately reject the item without testing.

5.1.1 Nondestructive Tests

5.1.1.1 Visual Inspection

The electroplated surface shall be free of visual plating defects, such as blisters, pits, cracks, and uncoated areas. The whole tube shall be clean and free of damage.

5.1.1.2 Blister Test (Performed at JLab)

The tube shall be vacuum fired (pressure $< 1 \cdot 10^{-5}$ torr) at $400 \text{ C} \pm 20 \text{ C}$ for one hours.

- a. The tube shall show no signs of blistering.

6.0 QUALITY ASSURANCE

6.1 The Seller shall conduct quality procedure methods and tests which will guarantee that the material to be furnished by the Seller is in full conformance with these specifications.

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- 6.2 The consistent quality of the items defined by this specification is to be ensured by a continuing surveillance program that shall be carried on by the Seller for the full term of the work associated with this specification.
- 6.2.1 The Seller shall prepare a detailed procedure describing the plating process for the waveguide assemblies as stated in Section 5.1. This procedure shall be submitted, along with the proposal, to the Buyer prior to use for review with the right of disapproval.
- 6.2.2 The Seller shall train and certify personnel performing the plating process to the procedure described in 6.2.1.
- 6.2.3 The Seller shall prepare a detailed procedure describing how the waveguide assemblies will be handled and stored to prevent damage at the Seller's facility, from the time of receipt to shipment. This procedure shall be submitted to the Buyer along with the proposal for review with the right of disapproval.
- 6.2.4 The Seller shall prepare an inspection and test procedure describing (in terms of what, when, where, and how) the exact inspection and test procedure for the plating. This procedure shall be submitted with the proposal to the Buyer for review with the right of disapproval.
- 6.2.5 The Seller shall submit with each shipment a certification which states that all waveguide assemblies are plated, handled, stored, inspected and tested in accordance with the procedures submitted to the Buyer per Sections 6.2.1, 6.2.2, 6.2.3, and 6.2.4. The certification shall also state that the plating was performed by personnel certified per Section 6.2.2. Each certification shall be signed by an officer of the Seller's company.
- 6.2.6 The Seller shall forward copies of test data to JLab.
- 6.2.7 The Buyer or his representative shall have reasonable access to the Seller's facilities during normal business hours for the purpose of Quality Assurance inspections.

7.0 PACKING

Each electroplated waveguide assembly shall be rinsed, dried and free from plating solution before being enclosed with clean wrapping materials.