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SUPERSEDING
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8 August 1968

MILITARY SPECIFICATION

PLATING, NICKEL-TUNGSTEN, ELECTRODEPOSIT ON ALUMINUM ALLOYS, BY SELECTIVE (BRUSH) METHOD

This specification is approved for use by all departments and agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the materials, method, and requirements for the plating of a nickel-tungsten alloy on aluminum as applied by the brush method.

2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFICATIONS

Federal

L-T-90	Tape, Pressure-Sensitive, Cellophane

STANDARDS

Federal

FED-STD-151	Metals, Test Methods

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-169	Extreme Temperature Cycle
MIL-STD-170	Moisture Resistance Test Cycle

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer).

2.2 Other publications. The following documents form a part of this specification. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

American Society for Testing Materials

ASTM E 70	Determination of pH of Aqueous Solutions with Glass Electrode

(Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.

3. REQUIREMENTS

3.1 Materials. All materials or solutions used shall be acceptable to the procuring agency and entirely suitable for the intended use. The parts to be plated shall be in accordance with the applicable design drawings. The plating and surface preparation solutions shall be a proprietary material supplied by a qualified manufacturer, with manufacturer's instructions. The materials used shall be such as to produce plating which will meet the requirements of this specification.

3.2 Equipment. The plating equipment shall consist of Dalic Plating Process Equipment, Brooktron Plating Process Equipment, or equivalent.

3.3 Basis metal. The basis metal shall be free from visible defects detrimental to the appearance or performance of the plating.

3.3.1 Basis metal condition. The plating shall be applied after all basis metal treatment and mechanical operations, such as machining, forming, or anodizing of the article have been completed.

3.4 Procedure. The following procedure shall be used:

3.4.1 Surface preparation. The areas to be plated shall be prepared as follows:

3.4.1.1.1 Clean. Solvent clean the surface to be plated using perchloroethylene or equivalent degreasing solvent.

3.4.1.2 Mask. Areas not to be plated shall be adequately masked prior to application of the plating.

3.4.1.3 Scale. Remove heavy scale or oxides by chemical or mechanical means.

3.4.1.4 Prepare. Prepare the surface for plating, using the equipment specified in 3.2 and the appropriate activating solutions conforming to manufactures instructions for the basis metal being treated.

3.4.2 Plating. Deposit the metals, as required, from the proprietary nickel-tungsten plating solution in accordance with chemical and plating requirements supplied by the solution manufacturer. The pH of the plating solution shall be checked prior to plating in accordance with ASTM E 70.

3.4.2.1 Article. The plating article described in 3.4.2 need not be baked after plating if the pretreatment, plating solutions and processes have been demonstrated not to have harmfully affected the performance of the plating article.

3.5 Thickness of plating. The thickness and other dimensions of the plating shall be as specified on the applicable Engineering document.

3.6 Adhesion. The adhesion of the final plating, and any undercoat shall be such that separation of the plate or any electrodeposited undercoat from the basis metal or from each other at their common interfaces cannot be detected when subjected to the test specified in 4.4.2 and examined at a magnification of four (4) diameters. The formation of cracks in the plate that result in flaking, peeling, or blistering of the plate shall be considered as non-conformance to this requirement.

3.7 Hardness. Unless otherwise specified, the hardness of the electroplated nickel-tungsten layer shall be 61-65 Rockwell "C".

3.8 Environmental. The plating shall be such that corrosion or flaking cannot be detected when subjected to the tests as specified in 4.4.4 and 4.4.5 and examined at a magnification of four (4) diameters.

3.9 Workmanship. The plating shall be smooth, fine grained, adherent, and free from blisters, nodules, indications of burning, and other defects. Superficial staining shall not be cause for rejection.

3.9.1 Boundaries. Boundaries of the plating that cover only a portion of the surface shall be free from beads, nodules, jagged edges and other irregularities, and shall blend smoothly into the unplated surface.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspection. Examinations and tests shall be classified as follows:

a. Preproduction inspection.

b. Acceptance inspection.

4.2.1 Preproduction inspection. Preproduction inspection shall consist of all those tests performed for the purpose of qualifying a product to the requirements of this specification. Preproduction test samples shall be representative of the manufacturer's normal production.

4.2.2 Acceptance inspection. Acceptance inspection shall consist of those tests performed on individual lots to determine conformance of the lots with the specified requirements prior to their acceptance. Certified test reports of the tests made to determine conformance shall be submitted with each lot shipment.

4.2.2.1 Lot. A lot shall consist of all plated articles of the same basis alloy material, size, shape and conditions, plated with the same thickness of plating, under the same conditions, and submitted for inspection at the same time.

4.2.2.2 Sampling. For purposes of inspection, sampling shall be in accordance with MIL-STD-105. When the plated articles are not readily adaptable to tests specified herein, the acceptance tests may be performed on separate specimens plated concurrently with the articles represented. The separate specimens shall be of the same nominal chemical composition, heat treat condition and surface finish as the articles represented. Conditions affecting the plating of the specimens shall correspond as nearly as possible to those affecting the significant surfaces of the articles represented.

4.3 Examination. Samples shall be visually examined for compliance with workmanship requirements cited in 3.9 and 3.9.1.

4.4 Test methods.

4.4.1 Thickness of plating. Unless otherwise specified, the plating thickness shall be determined in accordance with Method 521 or 522 of FED-STD-151 with an accuracy of plus or minus 10 percent.

4.4.2 Adhesion of plating. Pressure sensitive cellophane tape in accordance with L-T-90 shall be applied firmly to the plating, and then peeled from the plating suddenly at a 90 degree angle. The plating shall not separate from the basis metal when so tested.

4.4.3 Hardness of plating. Hardness of electrodeposited nickel-tungsten shall be determined in accordance with MIL-STD-151.

4.4.4 Humidity. Unless otherwise specified, the plating shall be capable of withstanding the humidity cycle in accordance with MIL-STD-170.

4.4.5 Thermal. Unless otherwise specified, the plating shall be capable of withstanding the temperature cycle in accordance with MIL-STD-169.

5. PREPARATION FOR DELIVERY

This section is not applicable to this specification.

6. NOTES

6.1 Intended use. This specification indicates the requirements and materials necessary for the plating of a nickel-tungsten alloy on aluminum as applied by the brush method.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of this specification.

6.3 Supersession data. This specification includes the requirements of Missile Interim Specification, MIS-18159, dated 8 August 1968.

Custodian:
ARMY-MI

Preparing Activity:
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