



AEROSPACE MATERIAL SPECIFICATION

AMS2451™/14

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Plating, Brush, Nickel-Tungsten
Low Hydrogen Embrittlement

RATIONALE

AMS2451/14 results from the industry need for a specification for this process.

1. SCOPE

1.1 Purpose

This specification covers the requirements for brush plating of nickel-tungsten by electrodeposition.

1.2 Application

This process has been used as a chromium alternative for repair and OEM applications that require exceptionally hard electroplated deposits. It's typically used to improve hardness and wearability and to repair damaged or worn parts, but usage is not limited to such applications.

1.3 Safety - Hazardous Materials

Shall be in accordance with AMS2451.

2. APPLICABLE DOCUMENTS

Shall be in accordance with AMS2451.

3. TECHNICAL REQUIREMENTS

Shall be in accordance with AMS2451 and as follows.

3.1 Procedure

3.1.1 Nickel-tungsten alloy plate shall be electrodeposited from a brush plating solution in accordance with processing instructions from the solution manufacturer.

3.1.2 When specifically allowed by the cognizant engineering organization, the hydrogen embrittlement relief baking requirement of AMS2451 may be waived (see 8.3).

3.2 Properties

Shall be in accordance with AMS2451 and as follows:

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Documents

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3.2.1 Composition

The nickel-tungsten alloy deposit shall contain 38 to 45% tungsten and the balance nickel, determined by a method agreed upon by purchaser and processor.

3.2.2 Adhesion to Specimens

Adhesion to specimens is required and shall be in accordance with AMS2451.

3.2.3 Hardness

The hardness of the deposit shall be not less than 675 HV or equivalent.

3.2.4 Stress

The residual stress in the deposit shall be within the range of 30 ksi (206 MPa) tensile to 80 ksi (551 MPa) tensile.

3.2.5 Corrosion Resistance

The requirements of AMS2451 shall apply except that salt spray exposure time shall be 500 hours $\pm$ 1 hour. Specimens shall be plated to a thickness of 0.0004 to 0.0007 inch (10 to 18 micrometers), with a preplate or bonding layer of copper first, plated to a maximum thickness of 0.0002 inch (5 micrometers).

3.2.6 Hydrogen Embrittlement

Shall be in accordance with AMS2451 except that when specifically allowed by the cognizant engineering organization, this test may be waived (see 8.2).

4. QUALITY ASSURANCE PROVISIONS

Shall be in accordance with AMS2451 except as follows.

4.1 Periodic Tests

Hydrogen embrittlement (3.2.6) is a periodic test and shall be performed at least once each month that parts are processed, unless the solution is batch controlled and the batch has been previously tested and passed the hydrogen embrittlement test of AMS2451. Every batch of solution shall be tested in accordance with AMS2451 and given an expiration date or shelf-life from date of testing and be so noted on the solution container label. Tests of cleaning and plating solutions are periodic tests and shall be performed at a frequency established by the processor unless frequency of testing is specified by cognizant engineering organization.

5. PREPARATION FOR DELIVERY

Shall be in accordance with AMS2451.

6. ACKNOWLEDGMENT

Shall be in accordance with AMS2451.

7. REJECTIONS

Shall be in accordance with AMS2451.