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AEROSPACE MATERIAL SPECIFICATION

SAE AMS2451/9 | REV. B

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Superseding AMS2451/9A

Plating, Brush, Zinc-Nickel Low Hydrogen Embrittlement

RATIONALE

This revision allows use of Type 1a.2 notched specimens as an alternative to Type 1a.1 for testing per ASTM F 519, and also adds a provision for batch control of plating solution.

1. SCOPE

1.1 Purpose

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

1.2 Application

This process has been used typically to improve corrosion resistance of steel parts operating under 500 °F (260 °C) as-plated or under 250 °F (121 °C) when chromate treated, to repair zinc-nickel deposits and to repair damaged or worn parts, but usage is not limited to such applications.

1.3 Classification

Type 1 - As-plated

Type 2 - With supplementary surface treatment

1.3.1 Unless a specific type is specified, Type 1 shall be supplied.

1.4 Safety - Hazardous Materials

See AMS2451.

2. APPLICABLE DOCUMENTS

See AMS2451.

3. TECHNICAL REQUIREMENTS

See AMS2451.

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3.1 Procedure

3.1.1 Zinc-nickel alloy plate shall be electrodeposited from low-hydrogen-embrittlement brush plating solution in accordance with processing instructions from the solution manufacturer. When Type 2 plating is specified, the supplementary coating shall be applied using brush, spray or dip.

3.1.2 When specified by the cognizant engineering organization, the hydrogen embrittlement relief baking requirement of AMS2451 may be waived. See 8.4.

3.2 Properties

3.2.1 Composition

The zinc-nickel alloy deposit shall contain 6 to 20% nickel and the balance essentially zinc, determined by a method agreed upon by purchaser and processor.

3.2.2 Nickel Strike

When applied, shall be not less than 0.00005 inch (1.3 µm) thick.

3.2.3 Corrosion Resistance

The requirements of AMS2451 shall apply except that salt spray exposure time shall be 500 hours ± 1. Specimens shall be plated to a thickness of 0.0004 to 0.0007 inch (10 to 18 µm).

3.2.3.1 Type 2 parts shall show no evidence of corrosion products after 96 hours and no evidence of basis metal corrosion after 500 hours exposure to salt spray corrosion test in accordance with ASTM B 117.

3.2.4 The hardness, stress, and heat resistance tests of AMS2451 section 3.4.2 are not applicable to this deposit.

3.2.5 Hydrogen Embrittlement

The plating process shall not cause hydrogen embrittlement in steel parts, determined in accordance with 4.2.

4. QUALITY ASSURANCE PROVISIONS

See AMS2451.

4.1 When specified by the cognizant engineering organization, the hydrogen embrittlement relief testing of 4.2 may be waived. See 8.4.

4.2 Hydrogen Embrittlement Test

Test shall be in accordance with the requirements of ASTM F 519 using three Type 1a.1 or Type 1a.2 notched specimens stressed in tension under constant load, unless a different specimen is specified by the purchaser. For test purposes, the plating thickness shall be 0.0003 to 0.0006 inch (8 to 15 µm) measured on the smooth section of the specimen, but with visual plating at the root of the notch.

4.3 Periodic Tests

Hydrogen embrittlement (4.2) 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 section 4.3.3.3. Each individual batch shall be tested in accordance with AMS2451 section 4.3.3.3 and given an expiration date or shelf-life from date of testing and be so noted on the solution bottle 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.