SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

AMS 2451/10A

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Superseding AMS 2451/10

Plating, Brush, Tin-Zinc Low Hydrogen Embrittlement

RATIONALE

This specification was issued as part of the SAE Five Year Review process.

1. SCOPE

1.1 Purpose

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

1.2 Application

This process has been used typically to improve corrosion resistance of steel parts, to repair tin-zinc deposits and to repair damaged or worn parts, but usage is not limited to such applications.

1.3 Classification

Plating covered by this specification is classified as follows:

Type 1 - As-plated
Type 2 - With supplementary surface treatment

1.4 Safety - Hazardous Materials

See AMS 2451.

2. APPLICABLE DOCUMENTS

See AMS 2451.

3. TECHNICAL REQUIREMENTS

See AMS 2451.

3.1 Procedure

3.1.1 Tin-zinc 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.

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3.1.2 When specified by the cognizant engineering organization, the hydrogen embrittlement relief baking requirement of AMS 2451 may be waived. See 8.5. When not waived, the hydrogen embrittlement relief baking temperature and time at temperature shall be 340 °F ± 25 (171 °C ± 14) for 12 hours.

3.2 Properties

3.2.1 Composition

The tin-zinc alloy deposit shall contain 70 to 90% tin and 10 to 30% zinc, as determined by a method acceptable to purchaser. In case of dispute, one or more of the parts may be stripped of coating, and the resultant solution analyzed by conventional wet chemical methods for relative proportions of tin and zinc.

3.2.2 Corrosion Resistance

Parts or specimens with Type 1 plating having a plate thickness of 0.0003 to 0.0005 inch (8 to 13 µm) shall show no evidence of basis metal corrosion after 96 hours of continuous salt spray corrosion testing conducted in accordance with ASTM B 117. Parts or specimens with Type 2 plating having a plate thickness of 0.0003 to 0.0005 inch (8 to 13 µm) shall neither show white corrosion products nor basis metal corrosion after 96 hours of continuous salt spray testing conducted in accordance with ASTM B 117. The presence of white corrosion product within 0.25 inch (6.4 mm) from the edge of the specimen shall not constitute failure.

3.2.3 The heat resistance, corrosion resistance, and stress tests of AMS 2451 section 3.4.2 are not applicable to this deposit.

3.2.4 Hydrogen Embrittlement

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

4. QUALITY ASSURANCE PROVISIONS

See AMS 2451.

4.1 When specified by the cognizant engineering organization, the hydrogen embrittlement relief testing of 4.2 may be waived. See 8.5.

4.2 Hydrogen Embrittlement Test

Test shall be in accordance with the requirements of ASTM F 519 using three Type 1a.1 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. 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 the cognizant engineering organization.

5. PREPARATION FOR DELIVERY

See AMS 2451.

6. ACKNOWLEDGMENT

See AMS 2451.

7. REJECTIONS

See AMS 2451.