



<b>AEROSPACE MATERIAL SPECIFICATION</b>	<b>AMS2451™/9</b>	<b>REV. C</b>
	Issued 2002-01 Revised 2018-08 Reaffirmed 2023-05	
Superseding AMS2451/9B		
Plating, Brush, Zinc-Nickel Low Hydrogen Embrittlement		

## RATIONALE

AMS2451/9C is the result of a Five-Year Review and update of this specification with changes to paragraphs 1.3 Classification, 3.1.2 Procedure, 3.2.2 Nickel Strike 3.2.3.1 and 3.2.3.2, Corrosion Resistance, 3.2.4 Hydrogen Embrittlement, 4.1 Hydrogen Embrittlement Test, and 4.2 Periodic Tests.

AMS2451/9C has been reaffirmed to comply with the SAE Five-Year Review policy.

### 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 - As plated with supplementary surface treatment

Grade A - Hexavalent chromate treatment

Grade B - Trivalent chromium treatment

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

1.3.2 Unless a specific grade is specified, either may be supplied.

#### 1.4 Safety - Hazardous Materials

Shall be in accordance with AMS2451.

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<https://www.sae.org/standards/content/AMS2451/9C/>

## 2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

### 2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

AMS2417      Plating, Zinc-Nickel Alloy

## 3. TECHNICAL REQUIREMENTS

Shall be in accordance with AMS2451 and as follows.

### 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 Grade A supplementary surface treatments shall be applied after post plate hydrogen embrittlement relief baking (in some cases this may require additional post plate, baking, cleaning and reactivation of the plating). Grade B supplementary surface treatment shall be applied prior to post plate hydrogen embrittlement relief bake.

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

### 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 approximately 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 hour. Specimens shall be plated to a thickness of 0.0004 to 0.0007 inch (10 to 18 μm).

3.2.3.1 Type 1 parts shall show no evidence of red corrosion on basis metal corrosion after 500 hours exposure to salt spray corrosion test in accordance with ASTM B117.

3.2.3.2 Type 2 parts shall show no evidence of white corrosion products after 96 hours and no evidence of red corrosion on the basis metal after 500 hours exposure to salt spray corrosion test in accordance with ASTM B117.

#### 3.2.4 Hydrogen Embrittlement

The plating process shall not cause hydrogen embrittlement in steel parts 36 HRC and over, determined in accordance with AMS2451 and 4.1. When specified by the cognizant engineering organization, this requirement may be waived (see 8.3).