



AEROSPACE MATERIAL SPECIFICATION	AMS2460™	REV. B
	Issued 2007-07 Revised 2023-02	
	Superseding AMS2460A	
(R) Plating, Chromium		

RATIONALE

AMS2460B results from a Five-Year Review and update of this specification. This is a complete revision; as such, change bars are not used.

NOTICE

ORDERING INFORMATION: The following information shall be provided to the plating processor by the purchaser:

Purchase orders shall specify not less than the following:

- AMS2460B
- Part number and quantity of pieces to be plated
- Class of plating (see 1.4.1)
- For Class 1 plating, type of surface luster (see 1.4.2 and 3.5.1.2)
- Chromium plating thickness (see 3.5.1)
- Underplating and/or thickness, if different from 3.3.2
- Basis metal to be plated
- Tensile strength or hardness of the basis metal
- Pre-plate stress relief (time and temperature) if different from 3.2.1, or instructions that pre-plate stress relief has already been performed prior to submitting parts to the plating processor, or statement that pre-plate stress relief is not required
- Optional: Fixture/Electrical contact locations, when not specified (3.2.3)
- Plating coverage: special features, geometry or processing present on parts that requires special attention by the plating processor
- Hydrogen embrittlement relief to be performed by the plating processor (parameters or requirements document), if different from 3.4.1
- Peening requirements if peening is required to be performed by the plating processor (see 3.1.3 and 8.5.1)

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Full document details: SAE AMS2460B

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Documents
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- If tests for hardness, porosity, or hydrogen embrittlement are required for lot acceptance (see 4.2.1)
- If adhesion is to be evaluated by grinding (see 3.5.2.1) responsible party (plating processor or part fabricator) to perform this evaluation

Parts manufacturing operations such as heat treating, forming, joining, and media finishing can affect the condition of the substrate for plating, or if performed after plating, could adversely affect the plated part. The sequencing of these types of operations should be specified by the cognizant engineering organization or purchaser and is not controlled by this specification, except as noted herein. Requirements for basis metal quality (3.1.1), peening (3.1.3), and preplating stress relief (3.2.1) require special coordination with the plating processor.

1. SCOPE

1.1 Purpose

This specification covers the requirements for electrodeposited chromium plating.

1.2 Application

This plating has been used typically as a decorative finish, to improve corrosion resistance, to increase wear resistance, to extend tool and die life, to maintain accuracy of gauges, and to recondition worn or undersized parts, but usage is not limited to such applications. While this document is primarily intended to address electrodeposition on steels, the process has been performed on aluminum, heat resistant alloys, high nickel alloys, super alloys, and other metals. The requirements of this specification are equivalent to AMS-QQ-C-320 but generally more stringent than AMS2406. Thin Dense Chrome plating should be specified by reference to AMS2438.

1.2.1 Restriction

Application of chromium plating to steel parts having a hardness of HRC 48 (ultimate tensile strength of 238 ksi [1641 MPa]) or higher shall not be performed unless authorized by the design documentation of the cognizant engineering organization (see 4.2.3.1 and 8.5.2). Application of chromium plating for repair of steel parts having a hardness of HRC 48 (ultimate tensile strength of 238 ksi [1641 MPa]) or higher requires a design evaluation and shall not be performed unless specific approval has been received from the cognizant engineering organization.

1.3 Safety-Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials, to take precautionary measures to ensure the health and safety of all personnel involved.

1.4 Classification

1.4.1 Classes

Electrodeposited chromium plating shall be one of the following classes:

Class 1 - Corrosion protective plating (see 8.4.3)

Class 2 - Engineering plating (see 8.4.4)

1.4.2 Appearance

Class 1 plating shall have one of the following types of lusters, as specified:

Type I - Bright finish

Type II - Satin finish

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.

AMS2403	Plating, Nickel, General Purpose
AMS2406	Plating, Chromium, Hard Deposit
AMS2430	Shot Peening, Automatic
AMS2432	Shot Peening, Computer Monitored
AMS2438	Plating, Chromium, Thin, Hard, Dense Deposit
AMS2440	Inspection of Ground, Chromium Plated Steel Parts
AMS2546	Laser Peening
AMS2590	Rotary Flap Peening of Metal Parts
AMS2750	Pyrometry
AMS2759/9	Hydrogen Embrittlement Relief (Baking) of Steel Parts
AMS-QQ-C-320	Chromium Plating (Electrodeposited)
AMS-QQ-N-290	Nickel Plating (Electrodeposited)
AMS-R-81841	Rotary Flap Peening of Metal Parts
ARP4992	Periodic Test Plan for Process Solutions
AS2390	Chemical Process Test Specimen Material
AS7766	Terms Used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B253	Preparation of Aluminum Alloys for Electroplating
ASTM B374	Terminology Relating to Electroplating
ASTM B487	Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of Cross Section
ASTM B499	Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals
ASTM B504	Measuring the Thickness of Metallic Coatings by the Coulometric Method



ASTM B556	Thin Chromium Coatings by the Spot Test, Guideline for Measurement of
ASTM B567	Measurement of Coating Thickness by Beta Backscatter Method
ASTM B568	Measurement of Coating Thickness by X-Ray Spectrometry
ASTM B571	Qualitative Adhesion Testing of Metallic Coatings
ASTM B748	Measurement of Thickness of Metallic Coatings by Measurement of Cross Section with a Scanning Electron Microscope
ASTM B764	Simultaneous Thickness and Electrode Potential Determination of Individual Layers in Multilayer Nickel Deposit (STEP Test)
ASTM E384	Microindentation Hardness of Materials
ASTM F519	Mechanical Hydrogen Embrittlement Evaluation of Plating/Coating Processes and Service Environments

2.3 AIA Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NASM1312-12 Fastener Test Methods, Method 12, Thickness of Metallic Coatings

3. TECHNICAL REQUIREMENTS

3.1 Material

3.1.1 Part Quality

The parts to be plated shall be free from visible defects such as blemishes, pitting from corrosion, nicks, scratches, burrs or other geometrical or base metal defects that could be detrimental to the appearance or performance of the plating.

3.1.2 Parts dimensions should be such that, after plating, specified tolerances will be met (see 8.2 and 8.3).

3.1.3 Peening

When specified, parts shall be peened prior to plating. Unless otherwise specified, such peening shall be accomplished on all surfaces for which the plating is required and on all immediately adjacent surfaces that contain notches, fillets, or other abrupt changes of section size (see 8.5.1). Peening shall be performed by or on behalf of the part fabricator, unless specifically delegated to the plating processor.

3.2 Preparation

3.2.1 Stress Relief Treatment

Unless otherwise specified, steel parts HRC 34 (ultimate tensile strength 152 ksi [1048 MPa]) and higher and that have been machined, ground, cold formed, or cold straightened after heat treatment shall be cleaned to remove surface contamination and thermally stress relieved before plating. Acid cleaning shall not be used (see 8.4.2.3). (Residual tensile stresses have been found to be damaging during electrofinishing.) Furnaces used for stress relief shall be controlled per AMS2750: the minimum requirements shall be Class 5 and Type D Instrumentation. Temperatures to which parts are heated shall be such that maximum stress relief is obtained while still maintaining hardness of parts within drawing limits. Unless otherwise specified, the following treatment temperatures and times shall be used:

3.2.1.1 For parts, excluding nitrided parts, having a hardness of HRC 55 and above, including carburized and induction hardened parts, stress relieve at 275 °F ± 25 °F (135 °C ± 14 °C) for 5 to 10 hours.

3.2.1.2 For parts having a hardness less than HRC 55, and for nitrided parts, stress relieve at 375 °F ± 25 °F (191 °C ± 14 °C) for a minimum of 4 hours. Higher temperatures shall be used only when specified or approved by the cognizant engineering organization.

3.2.1.3 For Peened Parts

If stress relief temperatures above 375 °F (191 °C) are specified, the stress relieve shall be performed prior to peening.

3.2.2 Cleaning

The plating shall be applied over a surface free from water breaks. The cleaning procedure shall not produce pitting, intergranular attack, or hydrogen embrittlement of the basis metal and shall preserve dimensional requirements (see 8.4.2).

3.2.3 Fixture/Electrical Contact Locations

3.2.3.1 Except for barrel plating, for parts that are to be electroplated/coated all over, and contact locations are not specified, contact locations shall be at the discretion of the processor.

3.2.3.2 For parts that are not to be electroplated/coated all over, and contact locations are not specified, contact locations shall be in areas on which plate/coating is not required.

3.2.4 Zincate Treatment

Aluminum alloys shall be zincate treated in accordance with ASTM B253 or other method acceptable to purchaser prior to plating.

3.3 Procedure

3.3.1 Parts shall be plated by electrodeposition of chromium plating onto a properly prepared surface. Procedures and operating parameters shall be adequate to meet the properties and quality requirements of this specification.

3.3.2 Underplating

3.3.2.1 Class 1 plating requires a nickel underplate in accordance with AMS2403 or AMS-QQ-N-290.

3.3.2.1.1 Unless otherwise specified, the minimum underplate thickness on copper and copper alloys shall be 0.0008 inch (20 µm), and on steel alloys, zinc, and zinc alloys 0.0010 inch (25 µm). For other alloys, the underplating shall be as specified.

3.3.2.1.2 Underplate and chrome plating shall be conducted on a continuous basis such that the parts are not allowed to dry between plating solutions. This is to ensure good layer to layer adhesion.

3.3.2.2 Class 2 plating shall be deposited directly on the basis metal without an underplate of another metal, except parts made from maraging steel, or corrosion resistant steel, or aluminum alloy which may receive a strike of nickel or other suitable metal to a thickness not greater than 0.0002 inch (5 µm).

3.3.2.3 Underplate shall not be substituted for any portion of the specified chromium plate thickness.

3.3.2.4 When an underplate or strike is deposited in accordance with a specification other than AMS2460, the quality requirements and testing requirements of AMS2460 shall be used in place of those in the other specification.

3.3.3 Plating re-start procedures or procedures for plating chromium on chromium if used, shall be approved by the cognizant engineering organization (see 4.5.3).