Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 2407C
Superseding AMS 2407B

Issued 6-1-51
Revised 7-1-76

CHROMIUM PLATING, POROUS

1. SCOPE:

1.1 Purpose: This specification covers the engineering requirements for electrodeposition of a porous chromium plate and the properties of the deposit.

1.2 Application: Primarily to improve load-carrying and lubricating characteristics of ferrous parts.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B487 - Measurement of Metal and Oxide Coating Thicknesses by Microscopical Examination of a Cross Section
ASTM B499 - Measurement of Coating Thickness by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals
ASTM B504 - Measurement of the Thickness of Metallic Coatings by the Coulometric Method

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

2.4 ANSI Publications: Available from American National Standards Institute, Inc., 1420 Broadway, New York, NY 10018.

ANSI B46.1 - Surface Texture

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

3.1.1 Surfaces of the parts to be plated shall be free from blemishes, pits, and other irregularities.

3.1.2 Unless otherwise specified, parts, before plating, shall have a surface roughness not greater than 10 microinches (0.3 µm), determined in accordance with ANSI B46.1.

3.1.3 Parts having hardness higher than 40 HRC and which have been ground after heat treatment shall be suitably stress-relieved before cleaning for plating. Temperatures to which parts are heated shall be such that maximum stress-relief is obtained without reducing hardness of parts below drawing limits.

3.1.4 When magnetic particle inspection is specified, parts shall be so inspected before plating and again after plating and complete finishing.

3.1.5 Parts shall have chemically clean surfaces, prepared with minimum abrasion, errosion, or pitting, prior to immersion in the plating solution. The final step in cleaning shall consist of anodically cleaning the parts in a chromic acid solution of a concentration approximately equal to that of the chromic acid solution used in plating, or by other methods agreed upon by purchaser and vendor.

3.1.6 Electrical contacts between the parts and power source shall be made in such a manner as will ensure that neither chemical or immersion deposition nor electrical arcing or overheating will occur.

Ø If parts are to be plated all over, contact points shall be located where specified or where agreed upon by purchaser and vendor. If parts are not required to be plated all over, contact points shall be located in areas on which plating is not required or is optional.

3.2 Procedure:

3.2.1 Chromium shall be electrodeposited from a chromic acid solution containing added sulfate or fluoride ions. Chromium shall be deposited directly on the basis metel without a flash coating of other metal underneath, except in the case of parts made of corrosion-resistant steel on which a preliminary flash of nickel or other sutiable metal is permissible.

3.2.2 Unless purchaser permits the use of other methods of producing porosity, the plating current shall be reversed immediately after plating and the plate partially removed to produce porosity and surface finish as specified in 3.3.2 and 3.3.3.

3.2.3 Unless otherwise specified, immediately following the reversed-current operation of 3.2.2, parts shall be rinsed in cold water, immersed in boiling water for not less than 1 hr to relieve possible hydrogen embrittlement, and dried.

3.3 Properties: The deposit shall conform to the following requirements except as otherwise specified:

3.3.1 Thickness: Shall be 0.004 - 0.006 in. (0.10 - 0.15 mm), determined on representative parts in accordance with ASTM B487, ASTM B499, ASTM B504, or other suitable method agreed upon by purchaser and vendor.

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3.3.2 Porosity: Shall be of the pinpoint type and its depth shall be 0.0010 - 0.0015 in. (0.025 - 0.038 mm). Pores in the plate shall be free from metal chips and powder residue.

3.3.3 Surface Texture: Shall be 45 - 90 microinches (1.1 - 2.3μ m), determined on plated areas of finished parts in accordance with ANSI B46.1.

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3.4 Quality: Plate shall be firmly bonded to the basis metal and shall be uniform in appearance and free from frosty areas, blisters, and imperfections detrimental to performance of parts.

3.4.1 Double plating and spotting-in after plating are not permitted, unless otherwise specified.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The processing vendor shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that processing conforms to the requirements of this specification.

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4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests.

4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be not less than the following; a lot shall be all parts of the same part number processed in a continuous operation and presented for vendor's inspection at one time:

4.3.1 Coverage and Appearance: All parts in each lot.

4.3.2 Thickness, Porosity, and Roughness: Three parts from each lot.

4.4 Approval:

4.4.1 Plated parts shall be approved by purchaser before parts for production use are supplied, unless such approval be waived. Results of tests on production parts shall be essentially equivalent to those on the approved sample parts.

4.4.2 Vendor shall use manufacturing procedures, processes, and methods of inspection on production parts which are essentially the same as those used on the approved sample parts. If any change is necessary in type of equipment or in established composition limits and operating conditions of process solutions, vendor shall submit for reapproval of the process a statement of the proposed changes in processing and, when requested, sample parts, test panels, or both. Production parts plated by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Reports: The processing vendor shall furnish with each shipment three copies of a report stating that the parts have been processed and tested in conformance with the requirements of this specification and that they conform to the technical requirements. This report shall include the purchase order number, this specification number and its revision letter, part number, and quantity.

4.6 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the parts may be based on the results of testing three additional specimens for each original nonconforming specimen. Except as permitted by 4.6.1, failure of any retest specimen to meet the specified requirements shall be cause for rejection of the parts represented and no additional testing shall be permitted. Results of all tests shall be reported.

4.6.1 If any part fails to meet the specified requirements, either on the original sampling as in 4.3 or upon resampling as in 4.6, the parts in that lot may be stripped by a method approved by purchaser which does not roughen, pit, or embrittle the basis metal, replated, and retested.

5. PREPARATION FOR DELIVERY:

5.1 Parts shall be handled and packaged in such a manner as will ensure that the required physical characteristics and properties of the plating are preserved.

5.2 Packages of parts shall be prepared for shipment in accordance with commercial practice to ensure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.3 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-794, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.2 will be acceptable if it meets the requirements of Level C.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.