

AEROSPACE

MATERIAL SPECIFICATIONS

AMS 2406C

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

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CHROMIUM PLATING Hard Deposit

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.
2. **APPLICATION:** Primarily for use on ferrous parts for increasing abrasion resistance, increasing tool and die life, maintaining accuracy of gages, reconditioning worn or undersized parts, and increasing corrosion resistance.
3. **TECHNICAL REQUIREMENTS:**
 - 3.1 Surfaces of parts to be plated shall be substantially free from blemishes, pits, tool marks, and other irregularities.
 - 3.1.1 Parts to be finished after plating shall have smooth surfaces before plating.
 - 3.1.2 Parts not to be finished after plating shall have a surface finish before plating that is equal to, or smoother than, that required on the parts after plating.
 - 3.2 Unless otherwise specified, parts having hardness higher than Rockwell C 40 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.
 - 3.3 When magnetic particle inspection is required, parts shall be so inspected before plating, and after plating and complete finishing.
 - 3.4 Before placing parts in plating solutions, they shall have chemically clean surfaces prepared with minimum abrasion, erosion, or pitting. Except as specified in 3.4.1 and 3.4.2, the final step in cleaning shall consist of anodically cleaning the parts in a chromic acid solution of concentration approximately equal to that of the chromic acid solution used in plating.
 - 3.4.1 For plating nickel base alloys, and for plating other alloys on which a deposit of nickel is used as an undercoating for chromium, the final step in cleaning shall consist of anodically cleaning the parts in a sulfuric-hydrofluoric acid solution (25% by volume H₂SO₄ and 4.5% by volume H₂F₂) or in a 40% (by volume) solution of sulfuric acid.
 - 3.4.2 Other methods of cleaning may be used when agreed upon by purchaser and vendor.
 - 3.5 Tight electrical connections shall be made and maintained for satisfactory plating.

Section 8.3 of the SAE Technical Board rules provides that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and issuing technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the reports are responsible for protecting themselves against liability for infringement of patents."

- 3.6 The plating process consists of electrodeposition of chromium from a chromic acid solution containing added sulfate or fluoride ions. Unless otherwise specified, the chromium shall be deposited directly on the basis metal without a coating of other metal underneath, except in the case of parts made of maraging steels, corrosion-resistant steels, or aluminum alloys, on which a preliminary deposit of nickel or other suitable metal is permissible.
- 3.7 When specified, steel parts after plating, washing, and drying shall be treated to remove hydrogen embrittlement and/or to restore endurance limit; temperature to which parts are heated and time of heating shall be as specified on the drawing.
- 3.8 The finished thickness of plate shall be as specified on the drawing or in a letter of instruction.
- 3.9 The plate shall be substantially uniform in thickness on significant surfaces, except that slight build-up at exterior corners or edges will be permitted provided finished drawing dimensions are met.
- 3.10 Thickness of plate shall be determined by micrometer measurement, by stripping or dropping tests, by magnetic methods, or by other method agreed upon by purchaser and vendor. The method used shall be calibrated by microscopic examination.
- 3.11 Plate shall be firmly bonded to the basis metal, and shall be smooth and uniform in appearance and, except as noted in 3.11.1, shall be free from frosty areas, pin holes, nodules, blisters, and other imperfections detrimental to performance of parts. The method of determining satisfactory adhesion shall be as agreed upon by purchaser and vendor. Visual inspection may be aided by magnification of not greater than 5 diameters.
- 3.11.1 Pin holes and other imperfections which can be shown to be the result of failure of the deposit to bridge or fill imperfections, such as porosity, in the surface of the basis metal will not be cause for rejection.
- 3.12 The plate shall have hardness not lower than Vickers 700 or equivalent except that plate on parts heated at temperatures between 550 F (287.8 C) and 750 F (398.9 C) may have hardness not lower than Vickers 600 or equivalent.
- 3.13 Parts rejected for defective plating shall be stripped before replating. Spotting-in after plating, and double plating unless evidence of satisfactory bond is established shall be causes for rejection. Parts having hardness higher than Rockwell C 40 which have been stripped for replating shall be given a short-time low-temperature stress relieving treatment before replating.

4. PRECAUTIONS:

- 4.1 Recommended maximum thickness of chromium is 0.015 in. except on tools and dies.