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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 2485G
Superseding AMS 2485F

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BLACK OXIDE COATING

1. SCOPE:

1.1 Purpose: This specification covers the engineering requirements for producing black oxide coatings on parts and the properties of such coatings.

1.2 Application: Primarily to increase the anti-chafing and anti-friction properties of carbon and low-alloy steel parts, particularly sliding or bearing surfaces, by providing a finish coating which will retain an oil film.

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 SAE, 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 D2247 - Testing Coated Metal Specimens at 100 Percent Relative Humidity

2.3 U.S. 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

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

3.1.1 Parts should be finish machined, inspected, and deemed acceptable for uncoated parts by the parts manufacturer before being treated.

3.1.2 The parts to be coated shall have chemically clean surfaces, free from water-breaks, prepared with minimum abrasion, erosion, and pitting. Parts showing a water-break shall be recleaned before being coated.

3.2 Procedure:

3.2.1 The properly cleaned parts, while still wet, shall be immersed in one or more boiling aqueous alkali oxidizing baths for such times and at such temperatures (See 8.2) as will produce coatings meeting the requirements of 3.3 and 3.4.

3.2.2 Coated parts shall be washed thoroughly in running tap water to remove all traces of processing solution and deposited salts. Parts shall not be allowed to dry during the entire sequence of operations until completion of this rinse.

3.2.3 Parts shall be thoroughly dried unless a water-displacing oil is used in 3.2.4 in which case drying may be omitted.

3.2.4 Parts shall be dipped in a suitable corrosion-preventive oil.

3.3 Properties: Coated parts shall conform to the following requirements:

3.3.1 Smut Test: Coatings on parts before oiling as in 3.2.4, or on oiled parts after vapor degreasing, shall show no indications of reddish-brown or green smut when wiped with a clean, white cloth.

3.3.2 Humidity Resistance: Completely processed parts, or panels processed with parts, shall withstand, without evidence of corrosion, exposure for not Ø less than 120 hr to humidity test conducted in accordance with ASTM D2247 except that the temperature in the humidity cabinet shall be 120°F ± 5 (50°C ± 3).

3.4 Quality:

3.4.1 Except as otherwise specified herein, the coating on polished surfaces shall be a lustrous black color, uniform in color and luster; coating on other surfaces shall be black or dark gray in color, uniform on areas of equivalent surface roughness. Coating on all types of surfaces shall be free of spots of red oxide or an overall reddish-brown color but an overall reddish-brown cast on a basically black color is permissible. Standards for acceptance shall be as agreed upon by purchaser and vendor taking into consideration the factors mentioned in 8.3. Coating shall be continuous, smooth, dense, and adherent and shall not chip, peel, crack, or rub off under any conditions incident to normal handling or storage.

3.4.2 No measurable dimensional changes shall result from processing.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of treated parts shall supply all samples for vendor's tests 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 sample and to perform any confirmatory testing deemed necessary to ensure that processing conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for smut test (3.3.1) and quality (3.4.1) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for humidity resistance (3.3.2) are classified as periodic tests, and shall be performed at a frequency selected by processing vendor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed on the initial shipment of plated parts to a purchaser, when a change in material and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.3.1 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 in accordance with the following; a lot shall be all parts made of the same material, heat treated to the same hardness or tensile strength level, processed in the same solution(s) in a period not longer than eight consecutive hours, and presented for vendor's inspection at one time:

4.3.1 Smut Test: Three pieces from each lot.

4.3.2 Quality: All parts.

4.3.3 Humidity Resistance: As agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Coated parts shall be approved by purchaser before parts for production Ø use are supplied, unless such approval be waived by purchaser. Results of tests on production coated 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 coated parts which are essentially the same as those used on the approved sample parts. If necessary to make any change in type of equipment or in established composition limits and operating conditions of process solutions, vendor shall submit for reapproval of the process a detailed statement of the revised operations and, when requested, sample coated parts. Production parts coated by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Reports: The vendor of coated parts shall furnish with each shipment three copies of a report stating that the parts have been processed and tested in Ø accordance with the requirements of this specification and that they conform to the acceptance test requirements. This report shall include the purchase order number, AMS 2485G, 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 Ø the results of testing three additional specimens for each original nonconforming specimen. Except as specified in 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.

4.6.1 If any parts fail to meet the specified requirements, either on the Ø 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, recoated, and retested.

5. PREPARATION FOR DELIVERY:

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

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