

**AEROSPACE  
MATERIAL  
SPECIFICATION**

Submitted for recognition as an American National Standard

SAE AMS 2481E

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Superseding AMS 2481D

**PHOSPHATE TREATMENT  
Anti-Chafing**

1. SCOPE:

1.1 Form: This specification covers the engineering requirements for producing a phosphate coating on ferrous alloys and the properties of the coating.

1.2 Application: Primarily to produce a coating which will minimize chafing of contacting steel surfaces and effectively 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 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 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.2.1 Military Standards:

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

**REAFFIRMED**

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10/91

### 3. TECHNICAL REQUIREMENTS:

#### 3.1 Preparation:

- 3.1.1 All heat treatment, machining, forming, brazing, welding, and perforating operations shall, insofar as practicable, be completed before parts are treated.
- 3.1.2 Parts, prior to being treated, shall have chemically clean surfaces, free from waterbreaks, prepared with minimum abrasion, erosion, or pitting.

3.2 Procedure: Parts shall be coated by immersing in a balanced manganese acid phosphate solution containing a suitable accelerating agent for sufficient time to produce the desired coating. Solution shall be maintained at 190° - 210°F (90° - 100°C). Immediately after processing, parts shall be rinsed thoroughly in cold running water.

3.3 Post Treatment: After the cold water rinse, parts shall be dipped in hot water. The hot water rinse may contain small amounts of chromic acid or chromic and phosphoric acids. Parts shall be thoroughly dried unless a water-displacing oil is used for protection of parts in which case, drying may be omitted. Dried parts shall be oiled with a suitable corrosion-inhibiting oil.

3.4 Color: Coated parts shall have a uniform, usually grayish-black, finely-crystalline appearance.

3.5 Quality: Surfaces of treated parts, as received by purchaser, shall be uniform in texture and appearance. Powdery areas, excessive buildup, and darkening of corners and edges are not acceptable.

#### 4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The processing vendor 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: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and as preproduction tests and shall be performed prior to or on the initial shipment of coated parts to a purchaser, on each lot, when a change in material, processing, or both requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

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 as agreed upon by purchaser and vendor; a lot shall be all parts processed in the same solution in not longer than 8 hr of continuous operation and presented for vendor's inspection at one time.
- 4.4 Approval:
- 4.4.1 Sample coated parts shall be approved by purchaser before parts for production use are supplied, unless such approval be waived by purchaser. Results of tests on production parts shall be essentially equivalent to those on the approved samples.
- 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 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 statement of the proposed changes in processing 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 a report stating that the parts have been processed and tested in accordance with the requirements of this specification and that they conform to the technical requirements. This report shall include the purchase order number, AMS 2481E, lot number, 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 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. 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, recoated, and retested.
5. PREPARATION FOR DELIVERY:
- 5.1 Coated parts shall be handled and packaged in such a manner as will ensure that the required physical characteristics and properties of the coating are preserved.
- 5.2 Packages of coated parts shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the coated parts to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.