SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2526C

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Superseding AMS 2526B

Molybdenum Disulfide Coating, Thin Lubricating Film Impingement Applied

RATIONALE

This specification was issued as part of the SAE Five Year Review process.

1. SCOPE

1.1 Form

This specification covers a coating consisting of finely-powdered molybdenum disulfide in a heat-resistant inorganic binder applied to parts.

1.2 Application

This product has been used typically on metal parts and selected nonmetallic materials requiring a coating under 0.0002 inch (5 µm) thick for reducing wear or minimizing galling, but usage is not limited to such applications.

This lubricating film may be applied to surfaces of ferrous and nonferrous metals and alloys, thermoplastic and thermosetting polymers, and rubber (O-rings, seals, etc). Aluminum, magnesium, and ferrous alloys, other than corrosion-resistant types, either coated or in contact with other parts having this coating, may be susceptible to corrosion.

This lubricating film has been shown to be compatible with such fluids as distilled water, petroleum-based hydraulic fluid, SAE phosphate ester test fluid #1, silicone fluid, UDMG-compatible grease, IFRNA-compatible grease, solid rocket propellants, nitrogen tetroxide, and liquid oxygen.

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 sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

2.1 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 D 1186	Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base
ASTM D 2510	Adhesion of Solid Film Lubricants
ASTM D 2714	Calibration and Operation of the Falex Block-on-Ring Friction and Wear Testing Machine

2.2 American Society for Quality Publications

Available from American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (North America) or +1-414-272-8575 (International), www.asq.org.

ANSI / ASQC Z1.4-2003	Sampling Procedures and Tables for Inspection by Attributes

3. TECHNICAL REQUIREMENTS

3.1 Preparation

3.1.1 Cleaning

Before applying the coating, surfaces of the basis material shall be thoroughly cleaned with minimum abrasion or erosion. The cleaned surfaces shall be free from oxides and from foreign materials detrimental to coating adhesion.

3.1.2 Surface Finishing

Surfaces of parts to be coated shall be honed with 120 to 400 mesh aluminum oxide powder to prepare the basis material for coating. To provide the proper surface for bearing applications, remove all residual metallic particles, whether mechanically or electrostatically held.

3.2 Procedure

3.2.1 Coating

The coating material shall be applied to all specified surfaces by spraying at high velocity (impinging) under controlled conditions.

3.2.2 Curing

Curing temperature shall not exceed 310 °F (154 °C). Curing temperature shall be acceptable to the cognizant engineering organization to ensure that the substrate material properties are not be affected by the curing conditions.

3.2.3 Preservation

Unless otherwise specified by purchaser, a supplementary preservative treatment shall be applied to metallic parts after curing. The preservative treatment shall be removable by vapor degreasing or other suitable process.

3.3 Properties

The coating shall conform to the following requirements:

3.3.1 Composition shall consist of finely-powdered molybdenum disulfide in a heat-resistant inorganic binder. The coating, properly applied, shall form a lubricating film conforming to the following requirements.

3.3.2 Adhesion

A pressure-sensitive film-backed tape with an adhesion of not less than 45 ounces per inch (12.5 N/25.4 mm), shall be applied to a flat surface of a coated specimen, rolled in place, and rapidly removed in accordance with ASTM D 2510, Procedure B. The lifting of flakes or particles of the coating from the specimen, exposing the basis metal, is not acceptable. A uniform deposit of powdery material clinging to the tape is acceptable.

3.3.3 Thickness shall be not greater than 0.0002 inch (5 µm), determined in accordance with ASTM D 1186 or by a method acceptable to the cognizant engineering organization.

3.3.4 Wear Rate

Time to failure shall be not less than 15 minutes average, determined in accordance with 4.3.5.

3.4 Quality

Coating on parts, as received by purchaser, shall be uniform in color, smooth, adherent to basis material and free from surface imperfections detrimental to performance of the coating. Evidence of porosity or other conditions detrimental to performance of the coating is not acceptable.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The coating processor shall supply all samples for processor's tests and shall be responsible for the performance of all required tests. Actual parts, when required for tests, shall be supplied by the purchaser. The cognizant engineering organization reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the coating conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Adhesion (3.3.2) and quality (3.4) are acceptance tests and shall be performed on parts, or samples representing parts when permitted, from each lot.

4.2.2 Periodic Tests

Thickness (3.3.3) and wear rate (3.3.4) are periodic tests and shall be performed not less than annually unless frequency of testing is specified by the cognizant engineering organization.

4.2.3 Preproduction Tests

All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of a coated part to a purchaser, when a change in material and/or processing requires reapproval as in 4.4.2, and when the cognizant engineering organization deems confirmatory testing to be required.

4.3 Sampling and testing shall be in accordance with the following; a lot shall be all parts of the same material, size, and shape, coated in a continuous series of operations in not more than eight consecutive hours, cured at the same time under the same conditions, and presented for processor's inspection at one time.

4.3.1 Acceptance Tests

4.3.1.1 Adhesion

When size and/or configuration prevents testing of parts, two specimens shall be processed with each lot and tested as in 3.3.2.

4.3.1.2 Quality

Visual inspection samples shall be selected at random in accordance with ANSI Z1.4

4.3.2 Periodic Tests

Unless otherwise specified by the cognizant engineering organization, sampling for periodic testing shall be as follows. For thickness testing, two samples in accordance with 4.3.4.2. For wear rate testing, a minimum of two samples in accordance with 4.3.5.

4.3.3 Preproduction Tests

Sampling for preproduction testing shall be as agreed upon by the cognizant engineering organization and processor.

4.3.4 Specimens

Specimens for adhesion (3.3.2) and thickness (3.3.3) shall be as follows:

4.3.4.1 Adhesion

Test specimens, approximately 0.20 x 1 x 4 inches (5 x 25 x 102 mm), shall be made from 3003-H14 aluminum alloy.

4.3.4.2 Thickness

Test panels, approximately 0.20 x 2 x 4 inches (5 x 51 x 102 mm), shall be made from cold-rolled, low-carbon steel.

4.3.5 Wear Rate

Test shall be conducted in accordance with ASTM D 2714, Procedure A, and the following:

4.3.5.1 Test Procedure

4.3.5.1.1 Prepare specimens in accordance with 3.1 through 3.2.2.

4.3.5.1.2 Prepare wear tester in accordance with ASTM D 2714, Procedure A.

4.3.5.1.3 Load coated specimens (ring and block) on machine.

4.3.5.1.4 Adjust counters to zero.

4.3.5.1.5 Run machine for five seconds ± 3 to ensure alignment of ring and block.

4.3.5.1.6 Place a one-pound (454 g) weight on the bale rod. Do not overload. Run machine for 60 seconds ± 5.

4.3.5.1.7 Place a second one-pound (454 g) weight on bale rod. Do not overload. Run machine for 60 seconds ± 5.

4.3.5.1.8 Place a third one-pound (454 g) weight on bale rod and run to failure. Test time starts at the time of the loading of the first weight. Each one pound (454 g) weight is equal to 30 pounds (13.6 kg) at ring and block due to configuration of the testing machine.

4.3.5.2 Results

The average of not less than two specimens shall meet the wear rate requirement of 3.3.4.