SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS2526 REV. D

Issued 1979-05
Revised 2013-01

Superseding AMS2526C

Molybdenum Disulfide Coating, Thin Lubricating Film Impingement Applied

RATIONALE

This revision results from a Five Year Review and update and includes changes to achieve similarity with other AMS impingement coating documents.

1. SCOPE

1.1 Form

This specification covers requirements for 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 (See 8.4) for reducing friction or wear, or for 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.

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)**
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS2526D

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 Coating Material

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 requirements of 3.3.

3.2 Procedure

3.2.1 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.

3.2.2 Masking (and removal)

For parts with surfaces on which coating is not permitted, masking shall be applied (and removed after coating) by a method that will not change the properties of the base material or the applied coating. External shielding between the impingement nozzle and the part may be used instead of masking the part if its effectiveness can be demonstrated by inspection.

3.2.3 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. The cleaning method may be the same or different from the one used in 3.2.1, depending on suitability.

3.2.4 Coating

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

3.2.5 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.

3.2.6 Preservation

Unless otherwise specified by purchaser,after curing, a supplementary preservative treatment shall be applied to metallic parts subject to corrosion. 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 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.

3.3.2 Thickness

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. An alternate method is required if the ASTM D 1186 method is not practical (for example, on a non-magnetic substrate).

3.3.3 Wear Life: The average of specimen time to failure shall be not less than 15 minutes, determined in accordance with ASTM D 2714, Procedure A, and the following:

3.3.3.1 Test Procedure

3.3.3.1.1 Prepare specimens in accordance with 3.1 through 3.2.2.

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

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

3.3.3.1.4 Adjust counters to zero.

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

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

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

3.3.3.1.8 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.

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, blistering, 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 (3.4.1) and quality (3.5) are acceptance tests and shall be performed on parts, or specimens representing parts when permitted, from each lot.

4.2.2 Periodic Tests

Thickness (3.4.2) and wear life (3.4.3) are periodic tests and shall be performed not less than annually unless frequency of testing is otherwise specified specified by the purchaser.

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. Except as noted, actual parts shall be selected as samples for test. Nondestructive testing shall be performed whenever practical and authorized herein.

4.3.1 Acceptance Tests

Sampling shall be as shown in Table 1. Test samples shall be randomly selected from all parts in the lot.

TABLE 1 - SAMPLING FOR ACCEPTANCE

Number of Parts in Lot		Quality	Adhesion
1 to	6	All	2
7 to	15	7	2
15 to	40	10	2
41 to	110	15	3
111 to	300	25	3
301 to	500	35	4
501 to	700	50	4
Over	700	75	5

4.3.1.1 Adhesion

When size and/or configuration prevents testing of parts, specimens shall be processed with each lot and tested as in 3.4.1.

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.

4.3.2.1 For thickness testing, two samples in accordance with 4.3.4.2.

4.3.2.2 For wear life testing, a minimum of two samples in accordance with 3.4.3.

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.

4.4 Approval

4.4.1 The process and control procedures, or a preproduction sample part, or both, whichever is specified by purchaser, shall be approved by the cognizant engineering organization before production parts are supplied.

4.4.2 If the processor makes a significant change to any material, process, or control factor from that which was used for process approval, all preproduction tests shall be performed and the results submitted to the purchaser for process reapproval unless the change is approved by the cognizant engineering organization. A significant change is one which, in the judgment of the cognizant engineering organization, could affect the properties or performance of the parts. Production parts plated by the revised procedure shall not be shipped prior to receipt of reapproval.

4.4.3 Control factors shall include, but not be limited to the following

Surface preparation and cleaning methods

Coating material trade name and manufacturer

Impingement procedure and parameters

Stripping procedure, when applicable

Curing conditions

Type of preservative, if applied

Periodic test plan