



AEROSPACE MATERIAL SPECIFICATION

AMS2526™**REV. E**

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Superseding AMS2526D

Molybdenum Disulfide Coating, Thin Lubricating Film
Impingement Applied

RATIONALE

AMS2526E results from a Five-Year Review and update of this specification with changes to Ordering Information, Preservation (see 3.2.6), Wear Life (see 3.3.3), Adhesion (see 4.3.4.1), control factors (see 4.4.3), and Notes (see 8.5).

ORDERING INFORMATION: The following information shall be provided to the processor by the purchaser.

1. The purchase order shall specify not less than the following:

- AMS2526E
 - Part number of parts to be coated
 - Quantity of pieces to be coated
 - Basis metal and condition to be coated
 - Coating thickness if other than in 3.3.2
 - Curing conditions (see 3.2.5)
2. Parts manufacturing operations such as heat treating, forming, joining, and media finishing can affect the condition of the substrate for coating, or if performed after coating, could adversely affect the performance of the coated part. The sequencing of these types of operations should be specified by the cognizant engineering organization (CEO) and is not controlled by this specification.

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.

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For more information on this standard, visit
<https://www.sae.org/standards/content/AMS2526E/>

1.2 Application

- 1.2.1 This product has been used typically on metal parts and selected nonmetallic materials requiring a coating under 0.0002-inch (5- μ m) thick (see 8.3) for reducing friction or wear or for minimizing galling, but usage is not limited to such applications.
- 1.2.2 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 that 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.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AS7766 Terms Used in Aerospace Metals Specifications

2.2 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 D2510 Adhesion of Solid Film Lubricants

ASTM D2714 Calibration and Operation of the Falex Block-on-Ring Friction and Wear Testing Machine

ASTM D7091 Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals

2.3 ASQ Publications

Available from American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (United States or Canada), 001-800-514-1564 (Mexico), or +1-414-272-8575 (all other locations), www.asq.org.

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.4 Definitions

Terms used in AMS are defined in AS7766.

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

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.

3.2.3.1 To provide the proper surface for bearing applications, all residual metallic particles, whether mechanically or electrostatically held, shall be removed. 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 affected by the curing conditions.

3.2.6 Preservation

Unless otherwise specified by the 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 that does not affect the adhesion or performance of the coating.

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 oz/in (0.49 N/mm) shall be applied to a flat surface of a coated specimen, rolled in place, and rapidly removed in accordance with ASTM D2510, 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 D7091 or by an alternate method acceptable to the cognizant engineering organization. An alternate method is required if the ASTM D7091 method is not practical (for example, on a nonmagnetic substrate).

3.3.3 Wear Life

The average of specimen total test time to failure shall be not less than 15 minutes, determined in accordance with ASTM D2714.

3.3.3.1 Wear Testing

Perform wear testing in accordance with ASTM D2714 except as follows:

3.3.3.1.1 Prepare specimens in accordance with 3.2.1 through 3.2.5 of AMS2526.

3.3.3.1.2 Before each test, clean equipment as stated in ASTM D2714.

3.3.3.1.3 Prepare wear tester in accordance with ASTM D2714, except do not fill the test chamber with the test fluid and do not apply heat. Testing shall be conducted in air at ambient room temperature, typically 75 °F (24 °C).

3.3.3.2 Procedure

3.3.3.2.1 Assemble coated ring and block specimens onto the wear tester, adjust counter to zero, and bring the speed to 72 rpm $\pm$ 2 rpm or approximately 72 rpm if no tolerance is specified.

3.3.3.2.2 Run machine for 5 seconds $\pm$ 3 seconds to ensure alignment of ring and block.

3.3.3.2.3 Perform wear test using either computer-controlled loading test machine or manual loading test machine.

3.3.3.2.4 Computer-controlled test machines:

3.3.3.2.4.1 Gently apply ramp load of 2 to 5 lb/sec (9 to 22 N/sec) until a total applied normal force of 90 pounds $\pm$ 0.5 pound (400 N $\pm$ 2 N) is reached. Then run the tester until the coefficient of friction exceeds 0.20 (friction force of 18.0 pounds). Total test time shall include the load ramp time and the time at load.

3.3.3.2.5 Manual applied load wear test machines:

3.3.3.2.5.1 Gently apply 30.0 pounds $\pm$ 0.51 pound (133 N $\pm$ 2 N) normal force at the frictional contact point and run machine for 60 seconds $\pm$ 5 seconds.

3.3.3.2.5.2 Increase the total applied normal force to 60.0 pounds $\pm$ 0.5 pound (267 N $\pm$ 2 N) and run machine for 60 seconds $\pm$ 5 seconds.

3.3.3.2.5.3 Increase the total applied normal force to 90 pounds $\pm$ 0.5 pound (400 N $\pm$ 2 N) and run the tester until the coefficient of friction exceeds 0.20 (friction force of 18.0 pounds). Total test time shall include the time accumulated from each of the above steps for manual applied load wear test machines.

3.4 Quality

Coating on parts, as received by the 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 the 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 (see 3.3.1) and quality (see 3.4) are acceptance tests and shall be performed on parts, or specimens representing parts when permitted, from each lot.

4.2.2 Periodic Tests

Thickness (see 3.3.2) and wear life (see 3.3.3) are periodic tests and shall be performed not less than annually unless frequency of testing is otherwise 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 the 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 (see 4.3.4.1) 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/ASQ 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 3.3.3.

4.3.3 Preproduction Tests

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

4.3.4 Specimens

Specimens for adhesion (see 3.3.2) and thickness (see 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 any aluminum alloy with a BHN of 100 or less.

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 factors, or a preproduction sample part, or both, whichever is specified by the 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
- Masking procedure, if required
- Impingement procedure and parameters
- Stripping procedure, when applicable
- Curing conditions
- Type of preservative, if applied
- Periodic test plan