



AEROSPACE MATERIAL SPECIFICATION

AMS2436™**REV. E**

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Revised 2022-02

Superseding AMS2436D

Coating, Aluminum Oxide
Detonation Deposition

RATIONALE

AMS2436E results from a Five-Year Review and update of this specification with the addition of Ordering Information, updated paragraphs for Microscopic Examination (3.5.4), updated Acceptance Tests (4.2.1), updated Periodic Tests (4.2.2), new definition of lot per GAB16AA (4.3), combined Test Specimens paragraphs (4.3.1), and Purchase documents (8.3) moved to Ordering Information. No technical changes were made.

NOTICE

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

1. Purchase order shall specify not less than the following:

- AMS2436E
- Quantity of pieces to be plated
- Basis metal to be plated
- Finished coating thickness desired (3.5.1)

2. Parts manufacturing operations, such as heat treatment, forming, joining, and media finishing, can affect the condition of the substrate for coating, or if performed after coating, could adversely affect the coating. The sequencing of these types of operations should be specified by the cognizant engineering organization and is not controlled by this specification.

1. SCOPE

1.1 Form

This specification covers the engineering requirements for applying aluminum oxide to metal parts by detonation deposition and the properties of such coatings.

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<https://www.sae.org/standards/content/AMS2436E/>

1.2 Application

This process has been used typically to provide a hard, wear-resistant surface on metal parts, particularly those used under corrosive or elevated-temperature oxidizing conditions, but usage is not limited to such applications. This coating is not recommended for surfaces with deep vee-shaped grooves, blind cavities, narrow holes, or sharp corners, or where deformation of the basis metal may be expected.

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. REFERENCES

2.1 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.

2.1.1 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

2.1.2 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 C633 Adhesion or Cohesive Strength of Thermal Spray Coatings

ASTM E384 Microindentation Hardness of Materials

2.2 Definitions

Terms used in AMS specifications are stated in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Equipment

Shall consist of a specially constructed machine in which the particles of coating compound are fed into the tube of a gun, suspended in a mixture of oxygen, acetylene, and nitrogen, and detonated, heating the particles to plasticity, and propelling them at high velocity out of the gun barrel onto the part.

3.2 Coating Compound

Shall consist of not less than 99% aluminum oxide, determined by a method acceptable to the cognizant engineering organization.

3.3 Preparation

3.3.1 Surfaces to be coated shall be machined to allow for the finished thickness of the coating.

- 3.3.2 Parts requiring heat treatment or shot peening shall be so processed prior to coating.
- 3.3.3 Parts shall be cleaned to remove water, oil, grease, dirt, scale, paint, and other foreign materials detrimental to adhesion of the coating.
- 3.3.4 Parts shall be suitably masked to protect surfaces not required to be coated.
- 3.3.5 Surfaces to be coated shall be grit blasted to produce a uniform matte finish sufficient to provide good adhesion of the coating. The grit type and size shall be recorded in the approved process procedure for each part. Surfaces shall not be blasted with grit previously used on dissimilar materials.

3.4 Procedure

The temperature of the parts during deposition shall be controlled so as not to exceed 300 °F (149 °C).

3.5 Properties

The coating on parts or representative test specimens shall conform to the following requirements.

3.5.1 Thickness

The coating compound shall be deposited onto the designated surfaces to a sufficient thickness to permit finishing to specified dimensions.

3.5.2 Hardness

Shall be 950 to 1300 HV300, or equivalent, determined in accordance with ASTM E384 as the average of not less than 10 microhardness readings taken on a cross-section of specimens as in 4.3.1.1.

3.5.3 Bond Strength

Shall be not less than 6000 psi (41.4 MPa), determined in accordance with ASTM C633 or other procedure acceptable to cognizant engineering organization on specimens as in 4.3.1.2.

3.5.4 Microscopic Examination

3.5.4.1 Foreign particle inclusions and apparent porosity shall be not more than 2.0% of the coating cross-section, determined by microscopic examination at a minimum of 200X magnification of specimens as in 4.3.1.1.

3.5.4.2 Cracks and interface bond separation shall not be present, determined by microscopic examination of the coating cross-section at a minimum of 200X magnification of specimens as in 4.3.1.1.

3.5.5 Finished Parts Hardness

Shall be 950 to 1300 HV300, or equivalent, determined in accordance with ASTM E384 as the average of not less than 10 microhardness readings taken on a cross-section of a part.

3.6 Quality

The coating on parts, as received by purchaser, shall be adherent to the basis metal and shall have a uniform, continuous surface free from spalling, chipping, flaking, and other imperfections detrimental to usage of the coating.

3.7 Tolerances

A maximum tolerance of +0.125 inch (+3.18 mm) is permissible on the boundaries of areas designated to be coated.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The processor of coated parts shall supply all samples for processor's tests and shall be responsible for the performance of all required tests. When tests are required on actual parts, such parts shall be supplied by purchaser. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the coating conforms to the requirements of this specification.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Thickness (3.5.1), hardness (3.5.2), and bond strength (3.5.3), microscopic examination (3.5.4), quality (3.6), and tolerances (3.7) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests

Composition of coating compound (3.2) and finished part hardness (3.5.5) are periodic tests and shall be performed at a frequency selected by the processor unless frequency of testing is specified by cognizant quality organization.

4.2.3 Preproduction Tests

All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of coated parts to a purchaser, when a change in material and/or processing requires approval by the cognizant engineering organization (see 4.4.2), and when cognizant quality or engineering organization deems confirmatory testing be required.

4.3 Sampling and Testing

Shall be not less than the following: A lot is a group of parts, all of the same part number, processed under the same conditions, which have been coated within a period of 24 hours of each other and are presented to inspection at the same time.

4.3.1 Test Specimens

Two sets of specimens, one coated at the beginning and one coated at the end of each lot shall be used for each test. Specimens shall be prepared and coated in the same manner and under the same conditions as the actual parts.

4.3.1.1 Hardness and microscopic examination test specimens shall be approximately 3/8 inch (9.5 mm) cubes fabricated from the same generic class of material and condition as the parts represented and coated at an impingement angle of approximately 90 degrees to a thickness of 0.007 inch (0.18 mm) minimum.

4.3.1.2 Bond strength test specimens shall be solid cylindrical specimens approximately 1.0 inch (25 mm) in diameter, fabricated from the same generic class of material and condition as the parts represented and coated at an impingement angle of approximately 90 degrees on one flat face to a thickness of 0.007 inch (0.18 mm) minimum.

4.3.1.3 For parts of a complex geometry or which requires that the coating be applied at other than a nominal 90 degrees, the cognizant engineering organization and processor may agree on a sampling technique to determine acceptable coating properties. Where no such agreement exists, test results shall be based on samples coated at approximately 90 degrees.

4.3.2 When a statistical sampling plan has been agreed upon by the cognizant quality organization and processor, sampling shall be in accordance with such plan in lieu of sampling in accordance with 4.3.1 and the report of 4.5 shall state that such plan was used.

4.4 Approval

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