SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2491D

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Superseding AMS 2491C

Surface Treatment of Polytetrafluoroethylene Preparation for Bonding

1. SCOPE:

1.1 Purpose:

This specification covers the engineering requirements for preparing surfaces of polytetrafluoroethylene for bonding and the properties resulting from the treatment.

1.2 Application:

Primarily for rendering surfaces of parts capable of supporting a high strength adhesive bond. The bonding preparation can affect the electrical properties of the polytetrafluoroethylene and this should be considered before using it for treatment of electronic components.

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 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.

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

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
AMS 2825	Material Safety Data Sheets
AMS 3690	Adhesive Compound, Epoxy, Room Temperature Curing

2.2 ASTM Publications:

Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D 897	Tensile Properties of Adhesive Bonds
ASTM D 1002	Strength Properties of Adhesives in Shear by Tension Loading (Metal-to-Metal)

2.3 U.S. Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Material:

The surface treating agent shall be a solution of sodium or other alkali metal in anhydrous liquid ammonia or tetrahydrofuran-naphthalene or other suitable solvent.

3.1.1 Safety Precaution: Sodium metal reacts violently with water. Tetrahydrofuran solvent is highly flammable. Therefore, it is recommended that persons handling these materials be experienced or trained in their use.

3.2 Preparation:

Parts to be treated shall be cleaned free from dirt, grease, oil, and other contamination. Cleaned parts shall be thoroughly dried prior to surface treatment.

3.3 Procedure:

The clean, dry parts shall be exposed to the surface treating agent until all surfaces to be bonded display a uniform color.

3.4 Post-Treatment:

The treated parts shall be cleaned and thoroughly dried. A suitable cleaning technique involves immersion of parts in acetone, a water rinse, followed by a final rinse with clean, anhydrous acetone.

3.4.1 Treated parts which are not to be bonded immediately shall be packaged in heat-sealed polyethylene bags in a manner which will prevent exposure to ultraviolet light and surface contamination.

3.5 Properties:

Treated parts shall conform to the following requirements:

3.5.1 Color: Treated surfaces of parts shall have a uniform, dull, dark brown-to-black color.

3.5.2 Tensile and Shear Strengths: Representative specimens of surface-treated polytetrafluoroethylene which have been bonded to the applicable aluminum specimens with an epoxy adhesive compound conforming to AMS 3690 shall have the following properties:

3.5.2.1 Tensile Strength: Shall be not lower than 1000 psi (6.90 MPa) at 70E - 75EF (21E - 24EC), determined in accordance with ASTM D 897 on specimens prepared by bonding a treated polytetrafluoroethylene disc, approximately 0.030 inch (0.76 mm) thick, between the two halves of a standard aluminum alloy tensile specimen.

3.5.2.2 Shear Strength: Shall be not lower than 1000 psi (6.90 MPa) at 70E - 75EF (21E - 24EC), determined in accordance with ASTM D 1002 on specimens prepared by bonding a treated polytetrafluoroethylene strip, not greater than 0.030 inch (0.76 mm) in thickness, between standard aluminum alloy lap shear plates.

3.6 Quality:

θ Surfaces of treated parts, as received by purchaser, shall be uniform in texture and appearance and free from imperfections detrimental to usage of the treated parts. There shall be no bare or definite lighter colored areas.

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 the processing conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for color uniformity (3.5.1), shear strength (3.5.2.2), and quality (3.6) are classified as acceptance tests and shall be performed to represent each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for tensile strength (3.5.2.1) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of treated parts to a purchaser, when a change in material and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.3.1 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, contracting officer, or request for procurement.

4.3 Sampling:

θ Shall be as agreed upon by purchaser and vendor; a lot shall be all parts treated in a single production run under the same fixed conditions and presented for vendor's inspection at one time.

4.4 Approval:

4.4.1 Parts treated in accordance with this specification 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 sample.

4.4.2 Vendor shall use ingredients, manufacturing procedures, 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 ingredients or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material or processing and, when requested, sample processed parts, test specimens, or both. Production parts treated by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Reports:

The vendor of treated parts shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and, when performed, to the periodic test requirements and stating that the processed parts conform to the other technical requirements of this specification. This report shall include the purchase order number, AMS 2491D, manufacturer's identification, lot number, part number, and quantity.