



# AEROSPACE MATERIAL SPECIFICATION

**AMS3686™****REV. A**

Issued 1975-09  
Revised 1991-10  
Reaffirmed 2022-01

Superseding AMS3686

Adhesive, Polyimide Resin, Film and Paste  
High Temperature Resistant, 315 °C (599 °F)

## RATIONALE

AMS3686A has been reaffirmed to comply with the SAE five year review policy.

### 1. SCOPE:

#### 1.1 Form:

This specification covers a high-temperature, electrical grade, polyimide resin adhesive in the form of film or paste.

#### 1.2 Application:

This product has been used typically as an adhesive for bonding polyimide-laminate-faced sandwich structures in radar-transparent assemblies, but usage is not limited to such applications. The adhesive is useful over the temperature range -55 to +315 °C (-67 to +600 °F).

#### 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.

##### 1.3.1 CAUTION:

These materials may contain an arsenic compound. Ingestion, contact with skin, and inhalation of vapors should be avoided. Handle only with rubber or plastic gloves. Bonding operations should be carried out in vacuum bags with exhaust vented away from working areas.

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## 2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

### 2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2825 Material Safety Data Sheets

AMS 4037 Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate), Solution Heat Treated

AMS 4348 Core, Honeycomb, Aluminum Alloy, Corrosion Inhibited, For Sandwich Construction, 5052, 350 (177)

AMS 4911 Titanium Alloy Sheet, Strip, and Plate, 6Al - 4V, Annealed

### 2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM C 297 Tension Test of Flat Sandwich Constructions in Flatwise Plane

ASTM D 618 Conditioning Plastics and Electrical Insulating Materials for Testing

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

### 2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D 700 Robbins Avenue, Philadelphia, PA 19111-5094,

MIL-Y-1140 Yarn, Cord, Sleeving, Cloth and Tape - Glass

MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

## 3. TECHNICAL REQUIREMENTS:

### 3.1 Material:

The adhesive shall be a polyimide resin supplied in sheets, in rolls of film, or in paste form. The adhesive formulation shall be suitable for use in electrical applications and shall contain no metal fillers or other inorganic additives, except for anti-oxidants and thixotropic agents of not more than 35% by weight, total, based on cured resin solids.

**3.1.1 Film Carrier:** The carrier for film adhesive shall be MIL-Y-1140 glass (R) yarn.

**3.1.2 Storage Life:** The carrier, stored in waterproof, sealed containers at a temperature not higher than -18 °C (0 °F), shall meet the requirements of this specification when tested at any time up to six months from date of receipt by purchaser.

**3.2 Properties of Uncured Adhesive:**

Shall be as follows; tests shall be performed on the product supplied and in accordance with specified test methods.

**3.2.1 Solids Content of Paste Adhesive:** Shall be within  $\pm 3\%$  of the preproduction value, determined in accordance with 4.5.1.1.

**3.2.2 Volatile Content of Film Adhesive:** Shall be within  $\pm 30\%$  of the (R) preproduction value, (e.g.  $10\% \pm 3$ ) determined in accordance with 4.5.1.2.

**3.2.3 Weight of Film Adhesive:** Shall be within  $\pm 10\%$  of the preproduction value, but weight shall not exceed 0.10 pound per square foot ( $0.49 \text{ kg/m}^2$ ) including the glass cloth carrier, determined in accordance with 4.5.1.3.

**3.3 Properties of Cured Adhesive:**

Shall be as specified in Table 1, determined on specimens prepared in accordance with 4.5.2.1 and tested in accordance with specified test procedures; specimens to be tested at room temperature shall be conditioned and tested at standard conditions in accordance with ASTM D 618.

**3.4 Quality:**

Adhesive, as received by purchaser, shall be uniform in quality and condition, and free from foreign materials and from imperfections detrimental to usage of adhesive.

**3.5 Sizes and Tolerances for Film Adhesive:**

Film thickness and corresponding weight in widths up to 48 inches (1.2 mm) shall be as ordered. Individual rolls shall contain not more than 600 square feet ( $56 \text{ m}^2$ ). The following tolerances shall apply:

**3.5.1 Thickness:**  $\pm 10\%$  measured to the nearest 0.001 inch (0.025 mm).

**3.5.2 Width:**  $\pm 0.25$  inch ( $\pm 6.4$  mm).

**4. QUALITY ASSURANCE PROVISION**

**4.1 Responsibility for Inspection:**

(R) The vendor of adhesive shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the adhesive conforms to the requirements of this specification.

## 4.2 Classification of Tests:

- 4.2.1 Acceptance Tests: Tests for solids content of paste adhesive (3.2.1),  
(R) volatile content (3.2.2), and weight of film adhesive (3.2.3), and tensile shear strength of cured adhesive (Table 1, Tests 1 and 2) are acceptance tests and shall be performed on each lot.
- 4.2.2 Preproduction Tests: Tests for all technical requirements are  
(R) preproduction tests and shall be performed prior to or on the initial shipment of adhesive to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.
- 4.2.2.1 For direct U.S. Military procurement, substantiating test data and, when  
(R) 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 and Testing: (R)

- 4.3.1 For Acceptance Tests: Sufficient adhesive shall be taken at random, after  
(R) warming to above the dew point, from each lot to perform all required tests. Tests shall be run in triplicate or as specified in Table 1. A lot shall be all adhesive produced in a single production run from the same batches of raw materials under the same fixed conditions and presented for vendor's inspection at one time. A lot may be packaged in small quantities and delivered under the basic lot approval provided lot identification is maintained.
- 4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor.  
(R)

## 4.4 Approval:

- 4.4.1 Sample adhesive shall be approved by purchaser before adhesive for  
production use is supplied, unless such approval be waived by purchaser. Results of tests on production adhesive shall be essentially equivalent to those on the approved sample.
- 4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and  
methods of inspection on production adhesive which are essentially the same as those used on the approved sample adhesive. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample adhesive. Production adhesive made by the revised procedure shall not be shipped prior to receipt of reapproval.