Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AEROSPACE MATERIAL SPECIFICATION

AMS 3687

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Revised

ADHESIVE FILM, HUMIDITY-RESISTANT
For Sandwich Panels, -55° to +95°C (-67° to +203°F)

1. SCOPE:

1.1 Form: This specification covers a high-humidity-resistant, modified epoxy adhesive in the form of film.

1.2 Application: Primarily for bonding aluminum-faced sandwich panels in the construction of light weight, portable shelters. The adhesive is useful over the temperature range -55° to +95°C (-67° to +203°F).

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 3106 - Primer, Adhesive, Corrosion-Inhibiting, -55° to +95°C (-67° to +203°F)
AMS 3911 - Fabrication of Sandwich Panels for Light Weight Portable Shelters

2.2 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

2.2.1 Federal Specifications:

MMM-A-132 - Adhesive, Heat Resistant, Airframe Structural, Metal to Metal

2.2.2 Military Specifications:

MIL-A-25463 - Adhesive, Film Form, Metallic Structural Sandwich Construction

2.2.3 Military Standards:

MIL-STD-1472 - Human Engineering Design Criteria for Military Systems, Equipment, and Facilities

3. TECHNICAL REQUIREMENTS:

3.1 Material: The adhesive shall be a modified epoxy film supplied in sheets or rolls, consisting either entirely of adhesive material or of a carrier impregnated with adhesive, with a suitable nonadhering separator film on both surfaces. The adhesive film shall possess high-humidity resistance, shall be compatible with AMS 3106 corrosion-inhibiting primer, and shall not have a deleterious effect on the surfaces or materials being bonded.

3.1.1 Storage Life: The product shall meet the requirements of this specification when tested at any time up to 6 months from the date of manufacture when stored at a temperature not higher than 7° C (45° F) and conditioned at 30° C ± 2 (86° F ± 3.6) for not less than 120 hr before being cured.

3.2 Properties of Uncured Adhesive: The product, as-received, shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with the test procedures specified herein:

3.2.1 Tack: The product shall be of moderate tack such that, when applied to a vertical surface of clean aluminum-base alloy sheet at temperatures of 18° - 30° C (64.4° - 86° F), the film shall not sag or separate from the surface in less than 72 hours.

3.2.2 Volatile Content: Shall be not greater than 1% of the total weight of adhesive, including the carrier or scrim if used.

3.2.3 Color: Shall be as ordered. Variations of color shall not affect any adhesive property specified herein.

3.3 Curing Properties: The time, temperature, and pressure used to cure the adhesive shall be within the ranges specified below. An adhesive not producing satisfactory bonds under these curing conditions will be acceptable at the option of the purchaser if the adhesive meets the strength requirements specified herein when bonded under other conditions; such material shall be identified with the curing parameters required to produce satisfactory bonds.

Time, max	2 hr
Bond Line Temperature, max	175° C (347° F)
Pressure, max	20 psi (138 kPa)

3.4 Properties of Cured Adhesive: The product shall conform to the requirements specified in Table I, determined on specimens prepared as specified herein and cured in accordance with the manufacturer's recommendations.

3.5 Toxicity and Safety: The product, uncured, during cure, and fully cured shall be nontoxic and shall not be classed as a safety hazard under the definitions in MIL-STD-1472.

3.6 Quality: The product shall be uniform in quality and condition, clean, smooth (wrinkle or distortion free), homogeneous, and free from foreign materials and imperfections detrimental to fabrication or to performance of parts.

3.7 Sizes and Tolerances: The film or sheet thickness and corresponding weight and the width, up to a maximum of 48 in. (1.22 m), shall be as ordered. Individual rolls shall contain not over 600 sq ft (55 m^2), unless otherwise ordered. The following tolerances shall apply:

3.7.1 Thickness: ±10% to the nearest mil (0.03 mm).

3.7.2 Weight: ±10% in lb per sq ft (kg/m^2) to the nearest 0.010 lb (5 g).

3.7.3 Width: ±0.25 in. (±6.4 mm).

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to thickness and weight and to tensile shear strength at 25° C (77° F) (Table I, Test 1) and at 95° C (203° F) (Table I, Test 2) are classified as acceptance or routine control tests.

4.2.2 Qualification Tests: Tests to determine conformance to all technical requirements of this specification are classified as qualification or periodic control tests and may be the basis for approval of the adhesive material (See 4.4.1).

4.3 Sampling: Each lot of adhesive material shall be sampled at random to provide sufficient material to perform the acceptance tests on the specified number of specimens.

4.3.1 A lot shall be all material produced in a single production run from the same batch of raw materials under the same fixed conditions, or all material subjected to the same unit chemical or physical process intended to make the final product homogeneous, and submitted for inspection at one time.

4.4 Approval:

4.4.1 Sample material shall be approved by purchaser before material for production use in supplied, unless such approval be waived. Results of tests on production material 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 material which are essentially the same as those used on the approved sample material. If any change is necessary in ingredients, in type of equipment for processing, or in manufacturing procedures which could affect quality or properties of the material, vendor shall submit samples for reapproval unless purchaser grants written approval after review of a detailed statement of materials and processing used on the approved sample and those proposed. No production material made by the revised procedure shall be shipped prior to receipt of approval of such procedure.

4.5 Test Methods:

4.5.1 Tensile Shear, Fatigue Strength, Creep Rupture, and Blister Detection: Specimen configuration, specimen preparation, and test procedure shall be in accordance with MMM-A-132 for Type I, Class 2 materials, using the conditioning and test temperatures specified in Table I herein.

4.5.2 Sandwich Peel, Flatwise Tensile Strength, Flexural Strength, and Creep Deflection in Flexure: Specimen configuration, specimen preparation, and test procedures shall be in accordance with MIL-A-25463 for Type I, Class 2 materials, using the conditioning and test temperatures specified in Table I herein.

4.5.3 Cleaning of Test Specimen Materials: Materials used in the preparation of test specimens shall be cleaned in accordance with the adhesive manufacturer's instructions or by the methods specified in AMS 3911, as applicable.

4.6 Reports:

4.6.1 The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests made on the product to determine conformance to the acceptance test requirements and a statement that the product conforms to all other technical requirements of this specification. This report shall include the purchase order number, material specification number, vendor's material designation, lot number, date of manufacture, thickness, weight, and quantity. Instruction sheets including the recommended curing time, temperatures, and pressures for each lot of adhesive in the shipment shall also be supplied.

4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number, contractor or other direct supplier of material, supplier's material designation, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.7 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 Packaging: Adhesive film in each roll or sheet shall be protected on both sides by nonadherent separator film. Rolls and sheets shall be packaged individually, or as specified, in sealed bags of suitable nonadherent material to prevent penetration of moisture or loss of volatiles.

5.1.2 Each roll or sheet shall be identified by a tag attached to the roll or sheet, marked with characters of such size as to be clearly legible and which will not be obliterated by normal handling. Each tag shall show the following information:

ADHESIVE FILM, HUMIDITY-RESISTANT, FOR SANDWICH PANELS
AMS 3687
MANUFACTURER'S MATERIAL DESIGNATION _____
PURCHASE ORDER NUMBER _____
DATE OF MANUFACTURE _____
LOT NUMBER _____ ROLL NUMBER _____
THICKNESS _____ WEIGHT _____
QUANTITY (AREA) _____

5.1.3 The protected rolls or sheets shall be packed in an exterior container capable of protecting the materials adequately during shipment and storage below the specified temperature.

5.1.4 Each exterior shipping container shall be legibly marked with the following information in such a manner that the markings will not smear or be obliterated during normal handling or use:

ADHESIVE FILM, HUMIDITY-RESISTANT, FOR SANDWICH PANELS
AMS 3687
PURCHASE ORDER NUMBER _____
MANUFACTURER'S MATERIAL DESIGNATION _____
DATE OF MANUFACTURE _____
BATCH OR LOT NUMBER _____
QUANTITY _____
PERISHABLE - STORE BELOW 7°C (45°F)

5.1.5 Containers shall be prepared for shipment in accordance with commercial practice to assure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

7. REJECTIONS: Material not conforming to this specification or to authorized modifications will be subject to rejection.

8. NOTES: None.