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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3572B

Issued 15 JUL 1978
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Superseding AMS 3572A

Submitted for recognition as an American National Standard

RESIN POLYURETHANE, FOAM-IN-PLACE, RIGID

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of July, 1992. It is recommended, therefore, that this specification not be specified for new designs.

This cover sheet should be attached to revision "A" of the subject specification.

"NONCURRENT" refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these "NONCURRENT" specifications is available from SAE upon request.

PREPARED UNDER THE JURISDICTION OF AMS COMMITTEE "CP".

SAE The Engineering Resource For Advancing Mobility®
400 COMMONWEALTH ORIVE WARRENDALE PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 3572A
Superseding AMS 3572

Issued 7-15-78
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POLYURETHANE, FOAM-IN-PLACE, RIGID

1. SCOPE:

1.1 Form: This specification covers polyurethane systems consisting of an isocyanate component and other components containing a polyol and other ingredients which, when mixed and cured, produce thermosetting, rigid, cellular products.

1.2 Application: Primarily for foam-in-place applications such as electronic encapsulating or miscellaneous packaging for use from -70° to +105°C (-95° to +225°F).

1.3 Classification: The resin system is classified by density of the cured product as shown in Table I wherein each material is defined by nominal bulk densities of foam in the range 2 - 26 lb per cu ft (32 - 416 kg/m^3) in increments of 2 lb per cu ft (32 kg/m^3).

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.

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

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103,

ASTM D1621 - Compressive Properties of Rigid Cellular Plastics
ASTM D1622 - Apparent Density of Rigid Cellular Plastics
ASTM Dl673 - Relative Permittivity and Dissipation Factor of Expanded Cellular Plastics Used for Electrical Insulation
ASTM D2842 - Water Absorption of Rigid Cellular Plastics
ASTM F501 - Aerospace Materials Response to Flame with Vertical Test Specimen (for Aerospace Vehicles Standard Conditions)

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120, except as specified in 2.3.3.

2.3.1 Military Specifications:

MIL-I-16923 - Insulating Compound, Electrical Imbedding

2.3.2 Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-794 - Parts and Equipment, Procedures for Packing and Packaging of

2.3.3 Federal Aviation Administration Regulations: Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FAR Part 25 - Airworthiness Standards: Transport Category Airplanes

3. TECHNICAL REQUIREMENTS:

3.1 Material: The compound shall consist of a polyether-type isocyanate component and other components containing a polyol and other ingredients.

3.1.1 Appearance: The liquid, unmixed material shall have a uniform homogeneous texture.

3.1.2 Storage Life: The components shall meet the requirements of 3.2 at any time up to 6 months from date of receipt by purchaser when stored in the original unopened containers below 30°C (85°F).

3.2 Properties of Cured Product: The components, mixed and cured in accordance with manufacturer's instructions, shall meet the requirements of 3.2.1 through 3.2.4 and of Table I, determined in accordance with test methods specified in 4.5.

3.2.1 Aging Stability:

3.2.1.1 The stress required to produce any specific strain in a specimen aged as in 4.5.1 shall be not less than 90% of the stress required to produce the same strain in an unaged specimen.

3.2.1.2 The volume change due to aging as in 4.5.1 shall be not greater than 5% of the unaged volume.

3.2.2 Corrosivity: The cured foam shall have no corrosive effect on copper, steel, and aluminum alloys when exposed for not less than 96 hr to 100% relative humidity at 20° - 30°C (68° - 86°F). Discoloration of metal shall not be considered objectionable.

3.2.3 Service Temperature: The cured foam shall meet the requirements of Table I, determined in accordance with 4.5.2.

3.2.4 Flammability: The product shall meet the requirements of FAR 25.853 (b) and Appendix F, determined in accordance with ASTM F501.

4. QUALITY ASSURANCE PROVISIONS:

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

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance of the unmixed, uncured Ø compound to appearance (3.1.2) and of the cured material to density (Table I) requirements are classified as acceptance tests and shall be performed on each lot.

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests Ø and shall be performed prior to or on the initial shipment of the product to a purchaser, when a change in material or processing, or both, 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 requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be as follows:
Ø

4.3.1 For Acceptance Tests: Sufficient product shall be selected at random from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

4.3.2 A lot shall be all product produced in a single production run, from the same batches of raw materials, under the same conditions, and presented for vendor's inspection at one time. A lot shall not exceed 6000 lb (2,725 kg).

4.3.3 When a statistical sampling plan and acceptance quality level (AQL) in accordance with MIL-STD-105 have been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.6.1 shall state that such plan was used.

4.4 Approval:

4.4.1 Sample material shall be approved by purchaser before material for production use is supplied, unless such approval be waived by purchaser. Results of tests on production material shall be essentially equivalent to those on the approved samples.

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 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 material or processing, or both, and, when requested, sample material. Production material made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods: Tests of cured product shall be performed in accordance with methods specified below except where otherwise specified. Specimens shall be cut from blocks 8 in. (200 mm) square x 4 in. (100 mm) high. The blocks shall be cast from resin which has been mixed with catalyst in accordance with manufacturer's recommendations and poured into metal molds which allow free rise and suitable venting. The "skin" shall be removed from the block to expose the cellular core before cutting specimens. Mechanical tests shall be performed with force applied in the direction of foam rise. Tests shall be performed at 20° - 3O°C (68° - 86°F) and relative humidity of 50% ± 5, unless otherwise specified. In case of dispute the specimens shall

4.5 (Continued):

be conditioned at 23°C ± 1 (73°F ± 2) and relative humidity of 50% ± 2 for not less than 16 hr before being tested.

Requirement	Test Procedure
Density	ASTM D1622
Compressive Strength	ASTM D1621
Compressive Modulus	ASTM D1621
Aging Stability	4.5.1
Service Temperature	4.5.2
Flammability	ASTM F501
Water Absorption	4.5.3
Dielectric Constant	ASTM D1673
Dissipation Factor	ASTM D1673
Thermal Conductivity	MIL-I-16923

4.5.1 Aging Stability: Test specimens shall be exposed for 14 days at 70°C ± 2 (158°F ± 4) and relative humidity of 95% ± 5, followed by exposure for 24 hr ± 2 at 50°C ± 2 (120°F ± 4) in a dry oven. Specimens shall then be conditioned for not less than 4 hr at 20° - 30°C (68° - 86°F) and relative humidity not higher than 55%. The stress-strain curve shall be determined in accordance with ASTM D1621 and compared with that of an unaged specimen.

4.5.2 Service Temperature: Specimens of cured foam shall be cooled to -70°C ± 5 (-95°F ± 10), held at that temperature for 6 hr ± 0.5, warmed in air to room temperature, heated to 105°C ± 5 (225°F ± 10) held at heat for 48 hr ± 2, cooled to room temperature, and tested to determine conformance to the-requirements of Table I.

4.5.3 Water Absorption: Shall be determined in accordance with ASTM D2842 except that the immersion period shall be 24 hr ± 0.25, the water temperature shall be 25°C ± 1 (77°F ± 2), and the test specimen shall be a cube approximately 2 in. (50 mm) on a side.

4.6 Reports:

4.6.1 The vendor of the product shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the product conforms to the other technical requirements of this specification. This report shall include the purchase order number, AMS 3572A, nominal density, vendor's material designation, lot number, and quantity.

4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 3572A, nominal density, 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

4.6.2 (Continued):

of this specification and shall include in the report either a statement that the material conforms or copies of laboratory reports showing the results of test to determine conformance.

4.6.3 A material safety data sheet conforming to AMS 2825 or equivalent shall be supplied to each purchaser prior to, or concurrent with, the report of Ø preproduction test results or, if preproduction testing be waived by purchaser, concurrent with the first shipment of product for production use. Each request for modification of product formulation shall be accompanied by a revised data sheet for the proposed formulation.

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 Unit Packaging: The base compound and the correct amount of curing system shall be packaged in individual containers. When kits are ordered, a fiberboard separator shall be used between the containers in a manner which will prevent accidental separation but which will permit easy separation for mixing purposes. Unit packs are acceptable providing positive separation of compound and curing system is achieved.

5.2 Identification: Each exterior shipping container shall be legibly marked with not less than AMS 3572A, nominal density, manufacturer's identification, lot number, quantity, and date of manufacture, and any applicable precautions or handling instructions for toxic or hazardous materials.

5.3 Packaging:

5.3.1 Containers of product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.3.2 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-794, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.1 and 5.3.1 will be acceptable if it meets the requirements of Level C.

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

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

8. NOTES:

8.1 Marginal Indicia: The phi (Ø) symbol is used to indicate technical changes from the previous issue of this specification.

8.2 The flammability test is intended only for comparative evaluation of materials and is not to be construed as an indication of characteristics of the product under actual fire conditions.

8.3 Dimensions and properties in inch/pound units and the Celsius temperatures are primary: dimensions and properties in SI units and the Fahrenheit temperatures are shown as the approximate equivalents of the primary units and are presented only for information.

8.4 For direct U.S. Military procurement, purchase documents should specify not less than the following:

Title, number and date of this specification
Nominal foam density desired
Size of containers desired
Quantity of material desired
Applicable level of packaging (See 5.3.2)

8.5 Foam meeting the requirements of this specification has been classified under Federal Supply Classification (FSC) 9330.

This specification is under the jurisdiction of AMS Committee "C" (NOMETCOM).