SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
400 Commonwealth Drive, Warrendale, PA 15096-0001

# AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 3570D

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Superseding AMS 3570C

## FOAM, FLEXIBLE POLYURETHANE
## Open Cell, Medium Flexibility

1. SCOPE:

1.1 Form: This specification covers two types of an open-cell, medium-flexibility polyurethane foam in the form of sheet, strip, and shapes.

1.2 Application: Primarily for general interior padding, cushioning, and vibration insulation.

1.3 Classification: Foam furnished to this specification shall be classified as follows:

Type I - Polyurethane Foam - Ester
Type II - Polyurethane Foam - Ether

1.3.1 Type II shall be supplied unless Type I is ordered.

1.4 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 SAE publications 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

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

ASTM D 3574 - Flexible Cellular Materials - Slab, Bonded, and Molded Urethane Foam

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 2.3.2.

2.3.1 Military Standards:

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

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

FAR Part 25.853 - Airworthiness Standards: Transport Category Airplanes, Compartment Interiors

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be a flexible polyurethane foam free from contamination and from foreign and scrap materials.

3.1.1 Finish: All surfaces of sheet and strip shall have a cut finish.

3.1.2 Color: Shall be natural.

3.1.3 Non-Toxicity: Foam shall be non-toxic and shall not cause any harmful effects when in prolonged contact with human skin.

3.2 Properties: Foam shall conform to the following requirements; tests shall be performed in accordance with specified test methods on foam supplied insofar as practicable:

3.2.1 As Received:

3.2.1.1 Density

| | | |
|---|---|---|
| 3.2.1.1.1 Type I<br>Ø | 1.9 - 2.5 pounds/cubic foot<br>(30.5 - 40.0 kg/$m^3$) | ASTM D3574, Test A |
| 3.2.1.1.2 Type II<br>Ø | 2.1 - 2.9 pounds/cubic foot<br>(33.5 - 46.5 kg/$m^3$) | |

| | | | |
|---|---|---|---|
| 3.2.1.2 Ø | Indentation Force Deflection Test - Specified Deflection 25% Compression | | ASTM D3574, Test $B_1$ |
| 3.2.1.2.1 Ø | Type I | 45 - 75 pounds/50 square inches (6.2 - 10.3 kPa/320 $cm^2$) | |
| 3.2.1.2.2 Ø | Type II | 50 - 80 pounds/50 square inches (6.9 - 11.0 kPa/320 $cm^2$) | |
| 3.2.1.3 | Resiliency, Type I or II, time for recovery to 95% original thickness, maximum | 5 seconds | 4.5.1 |
| 3.2.1.4 | Flammability, Type I or II, burn rate, maximum (See 8.2) | Pass | FAR 25.853, (b-2), Appendix F, (e) |
| 3.2.2 | Compression Set: | | ASTM D 3574, Test D; compress specimen to 75% of original thickness |
| 3.2.2.1 | Percent of Original Thickness, Type I or II, maximum | 20% | |
| 3.2.3 | Hydrolytic Stability: | | |
| 3.2.3.1 | Change in Load Deflection for 25% Compression, maximum | | |
| 3.2.3.1.1 Ø | Type I | 50% | ASTM D 3574, Test $J_1$ |
| 3.2.3.1.2 Ø | Type II | 40% | ASTM D 3574, Test $J_2$ |
| 3.2.3.2 Ø | Compression Set, maximum | | ASTM D 3574, Test D |
| 3.2.3.2.1 Ø | Type I | 30% | |
| 3.2.3.2.2 Ø | Type II | 25% | |
| 3.2.3.3 | Evidence of Surface Deterioration | No tackiness, exudation, or cracking | |

3.2.4 Low-Temperature Compression Set:

| | | | |
|---|---|---|---|
| 3.2.4.1 | Percent of Original Thickness, maximum | | 4.5.2 |
| 3.2.4.1.1 Ø | Type I | 30% | |
| 3.2.4.1.2 Ø | Type II | 25% | |

3.2.5 Weathering: When specified, foam shall have weather resistance acceptable to purchaser, determined by a procedure agreed upon by purchaser and vendor.

3.2.6 Corrosion: Foam shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service. Discoloration of contacting metal shall not be considered objectionable. Method of test and standards for acceptance shall be as agreed upon by purchaser and vendor.

3.3 Quality: Foam, as received by purchaser, shall be uniform in quality and condition, homogeneous, and free from foreign materials and from imperfections detrimental to usage of the foam.

3.3.1 Voids: The foam shall contain no surface voids larger in diameter than the sheet thickness or 1/2 inch (12.7 mm), whichever is smaller.

3.4 Tolerances: Thickness of sheet and strip shall not vary from the nominal by more than ±1/16 inch (± 1.6 mm).

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of foam 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 4.6. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the foam conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for the following requirements are acceptance Ø tests and shall be performed on each lot:

| Requirement | Paragraph Reference | |
|---|---|---|
| | Type I | Type II |
| Density | 3.2.1.1.1 | 3.2.1.1.2 |
| Indentation Force Deflection | 3.2.1.2.1 | 3.2.1.2.2 |
| Resiliency | 3.2.1.3 | 3.2.1.3 |
| Flammability | 3.2.1.4 | 3.2.1.4 |

4.2.2 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of foam 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 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: Shall be as follows:
Ø

4.3.1 For Acceptance Tests: Sufficient foam shall be taken 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.

4.3.1.1 A lot shall be all foam of the same thickness and density produced in a single production run from the same batches of raw materials and presented for vendor's inspection at one time. An inspection lot shall be all sheets cut from a single block of foam formed in an individual mold cavity and shall not exceed 200 pounds (91 kg) or 2000 board feet (4.7 $m^3$) of foam and may be packaged in smaller quantities and delivered under the basic lot approval provided lot identification is maintained.

4.3.1.2 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 shall state that such plan was used.

4.3.2 For Preproduction Tests: Shall be as agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Sample foam shall be approved by purchaser before foam for production use is supplied, unless such approval be waived by purchaser. Results of tests on production foam 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 foam which are essentially the same as those used on the approved sample foam. 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 foam. Production foam made by the revised procedure shall not be shipped prior to receipt of reapproval.