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An American National Standard

Standard Specification for Sound-Absorbing Board, Fibrous Glass, Perforated Fibrous Glass Cloth Faced[1]

This standard is issued under the fixed designation F2154; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers fibrous glass sound-absorbing board with a perforated fibrous glass cloth facing for sound reduction in ship spaces with high noise levels. This specification is primarily for materials used on ships. Additional requirements, testing, and certification are required for use of this material aboard U.S. Coast Guard inspected vessels in the United States.

1.2 Supplemental requirements and exceptions to the requirements discussed herein for ships of the US Navy are included in Supplementary Requirements S1.

1.3 This standard measures and describes the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of materials, products, or assemblies under actual fire conditions.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C423 Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

C634 Terminology Relating to Building and Environmental Acoustics

D3951 Practice for Commercial Packaging

E84 Test Method for Surface Burning Characteristics of Building Materials

2.2 *ANSI Standard:*

ANSI/ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes[3]

2.3 *Other Documents:*

46 CFR 164.012 Code of Federal Regulations—Interior Finishes for Merchant Vessels[4]

Navigation and Vessel Inspection Circular (NVIC) 9-97[5]

3. Terminology

3.1 For definitions of terms used in this specification, see Terminology C634.

4. Ordering Information

4.1 Title, number, and date of this specification.

4.2 First article sample, when required (see 7.1).

4.3 Width and length required, if other than 24- by 36-in. (609.6- by 914.4-mm) board (see 8.1).

4.4 Thickness required (see 8.2).

4.5 Density of waffle board (see 10.1).

4.6 Conformance inspection reports required (see 11.1).

5. Materials and Manufacture

5.1 See typical construction details located in Supplementary Requirements Section S3.

6. Performance Requirements

6.1 *Surface Flame Spread and Smoke Generation Properties* —The sound-absorbing board shall meet the requirements for surface flame spread and smoke generation properties for an U.S. Coast Guard Approved Interior Finish in accordance with 46 CFR 164.012 or NVIC Circular 9-97.

6.2 *Facing Separation*—When the sound-absorbing board is cut or sawed, the threads of the fibrous glass cloth facing across

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

[5] Available from Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250–7954.

which the cut is made shall not be separated from the face over a distance of more than 3.0 mm (⅛ in.). In case the fibrous glass cloth facing does not cover the entire surface of the board, the uncovered portion of the board shall not extend further than 3.175 mm (⅛ in.) from any edge. The fibrous glass cloth facing shall not extend over the edge of the board.

6.3 *Sound-Absorption*—When tested as specified in 10.3, the sound-absorbing board shall have coefficients of absorption that are equal to or greater than those shown in Table 1.

7. Other Requirements

7.1 *First Article*—When specified (see Section 4), the contractor shall furnish sample unit(s) for first article inspection and approval (see 11.1).

8. Dimensions and Tolerances

8.1 *Width and Length*—Unless otherwise specified (see Section 4), the sound-absorbing board shall be furnished in a width of 609.6 mm (24 in.) and a length of 914.4 mm (36 in.) (see 11.2).

8.2 *Thickness*—The sound-absorbing board shall be furnished in thicknesses of 25.4 mm (1 in.) or 50.8 mm (2 in.), as specified (see Section 4 and 11.2).

8.3 *Tolerances*—Tolerances on length and width shall not exceed ±6.35 mm (¼ in.). Tolerance on thickness shall not exceed ±2.38 mm (3⁄32 in.) –0 mm (0 in.).

9. Sampling

9.1 *Inspection Lot*—For the purpose of sampling, a lot shall consist of all boards of the same thickness produced under essentially the same conditions, and offered for delivery at one time.

9.2 *Sampling for Visual and Dimensional Examination* —A random sample of board shall be selected from each lot offered for inspection in accordance with ANSI Z1.4 at Inspection Level II. No defects shall be allowed.

TABLE 1 Minimum Sound-Absorption Coefficients

Board Thickness,		Frequency, Hz					
mm	in.	125	250	500	1000	2000	4000
25.4	1	0.07	0.25	0.70	0.90	0.75	0.70
50.8	2	0.25	0.70	0.90	0.85	0.75	0.75

9.3 *Conformance Test Sampling*—When density and surface flame spread and smoke generation property tests are required in accordance with 11.1.2, the samples shall be selected in accordance with 9.3.1 and 9.3.2.

9.3.1 *Sampling for Density Test*—Sample boards shall be selected in accordance with ANSI Z1.4 at Inspection Level S-4 for the density test of 10.1. No defects shall be allowed.

9.3.2 *Sampling for Surface Flame Spread and Smoke Generation Properties*—A sufficient number of boards shall be randomly selected and joined end-to-end to form a specimen 50.8 cm (20 in.) wide by 50.8 mm (2 in.) thick by 731.5 cm (24 ft) long. The specimen shall be subject to the surface flame spread and smoke generation property test of 10.2.

10. Test Methods

10.1 *Density*—The density of the waffle board fibrous glass layer (see S3.1.2) shall be tested at the location of manufacture prior to fabrication into final form panels. Density is determined by dividing sample mass by sample volume. Sample mass is measured to the nearest 1.0 g and sample volume is measured to the nearest 1 cm^3 of water displaced by one standard board as specified (see 9.3.1).

10.2 *Surface Flame Spread and Smoke Generation Properties* —The test specimens (see 9.3.2) shall be tested in accordance with Test Method E84 (see S5).

10.3 *Sound Absorption Coefficients*— The sound-absorbing board shall be laid directly on the floor of a reverberation room and tested in accordance with Test Method C423.

11. Inspection

11.1 Type approvals for 46 CFR 164.012 include inspection requirements as part of the specific type approval.

12. Packaging

12.1 *Commercial Packaging*—Commercial packaging shall be in accordance with Practice D3951.

13. Keywords

13.1 fibrous glass cloth; perforated fibrous glass cloth; reverberation room method; sound absorbing; sound absorption coefficient; sound reduction; surface flame spread and smoke generation properties; waffle board

SUPPLEMENTARY REQUIREMENTS

(Mandatory Information for U.S. Navy)

This specification is adapted from MIL-A-23054.

S1. Supplemental Requirements and Exceptions to the Requirements of This Specification for Ships of the U.S. Navy

S1.1 *DoD Intended Use*—The sound-absorbing board covered by this specification is intended for reduction of sound in spaces where there is a high level of noise.

S2. Referenced Documents

S2.1 *Military Specifications:*

MIL-I-742 Insulation Board, Thermal, Fibrous Glass[6]

MIL-A-3316 Adhesives, Fire-Resistant, Thermal Insulation[6]

MIL-C-20079 Cloth, Glass; Tape, Textile, Glass; and Thread, Glass[6]

S3. Materials and Manufacture

S3.1 *Material*—The sound-absorbing board shall be a laminate consisting of a perforated fibrous glass cloth facing, a high-density fibrous glass layer waffle board, and a fibrous glass backing board. Asbestos fibers and components containing asbestos fibers are prohibited.

S3.1.1 *Backing Board*—The backing board shall conform to type II of MIL-I-742 unfaced board except that the board shall be furnished in nominal thickness of 19.05 mm (¾ in.) or 44.45 mm (1¾ in.) (see 5.1.2 and 8.2).

S3.1.2 *High-Density Fibrous Glass Layer*—The fibrous glass layer shall have a density of not less than 160 kg/m^3 (10 lb/ft^3) (see 10.1). The layer shall consist of glass fibers impregnated with a suitable binder and compressed or otherwise formed into a waffle. The nominal thickness of the high-density fibrous glass layer shall be 6.35 mm (¼ in.).

S3.1.2.1 *Waffle*—The waffle shall be constructed having 4.76–mm (3⁄16-in.) deep indentations tapering from a nominal 6.0–mm (¼-in.) diameter to a nominal 3.175–mm (⅛-in.) diameter indentations on a 12.7–mm (½-in.) center.

S3.1.3 *Fibrous Glass Cloth Facing*—The cloth used for facing the high-density fibrous glass layer shall conform to Type I, Class 2 of MIL-C-20079. The cloth facing shall be impregnated with a hardening agent. The cloth facing shall be perforated with nominal 4.76–mm (3⁄16-in.) diameter holes on a 12.7-mm (½-in.) center.

S3.1.3.1 *Facing Adhesive*—The impregnated fibrous glass cloth facing shall be compatible with adhesive conforming to Type II of MIL-A-3316. The adhesive strength requirements for securing fibrous glass cloth facing to the high-density fibrous glass layer shall conform to MIL-A-3316.

S3.2 *Recycled, Recovered, or Environmentally Preferable Materials*— Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

S3.3 *Construction*— One side of the high-density fibrous glass layer shall be adhered to the backing board and the other side adhered to the fibrous glass cloth facing, using adhesive. The fibrous glass cloth facing shall be free of wrinkles or other irregularities. The sound-absorbing board shall be so designed that the perforations in the fibrous glass cloth facing shall be centered over the indentations in the waffle-type high-density fibrous glass layer.

S4. Department of Defense Packaging

S4.1 *DoD Packaging*—For acquisition purposes, the packaging requirements should be as specified in the contract or order. When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible contracting activity.

S5. Performance Requirements

S5.1 *Surface Flame Spread and Smoke Generation Properties*—The sound-absorbing board shall have a flame spread index less than 30 and smoke development less than 100 when tested as specified in 10.2.

S6. Inspection

S6.1 *Classification of Inspections*—The inspection requirements specified herein are classified as follows: (*1*) first article inspection (see 11.1.1), and (*2*) conformance inspection (see 11.1.2).

S6.1.1 *First Article Inspection*— The first article inspection shall consist of the examination and tests shown in Table S6.1.

S6.1.2 *Conformance Inspection*—Conformance inspection shall consist of the visual and dimensional examination of S6.2. The density test of 10.1 shall be tested on each lot of material. New tests for density (10.1) and fire resistance (10.2) are required whenever the manufacturing methods or component materials are changed and reports supplied when requested.

S6.1.3 *Examination*—Each of the boards selected in accordance with 9.2 shall be examined to verify compliance with the dimensional requirements of this specification. When measuring length, width, or thickness, any convenient measuring rule graduated to 1.59 mm (1⁄16-in.) shall be used. Any board in the sample containing one or more defects shall be rejected. If the sample contains 3 % or more of defective boards, the entire lot represented by the sample shall be rejected. The facing separation and workmanship examinations shall be included.

TABLE S6.1 First Article Inspection

Inspection	Requirement Paragraph	Examination and Test Paragraph
Visual and dimensional examination	8.1-8.3	11.2
Density	S3.1.2	10.1
Surface flame spread and smoke generation properties	10.2	6.1
Sound absorption	6.3	10.3

[6] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

S6.1.4 *Workmanship*—The insulation shall be free of visual defects that will adversely affect the service quality. For example, holes or delamination of the facing when occurring to an excessive degree shall be judged to adversely affect the service quality of the material.