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Standard Specification for Fibrous Glass Thermal Insulation and Sound Absorbing Blanket and Board for Military Applications[1]

This standard is issued under the fixed designation C1139; 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 unfaced flexible fibrous glass blanket and faced board used for thermal and sound absorbing insulation at temperatures up to 450°F (232°C) for military applications as a replacement for MIL-I-22023D.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 This specification 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 the materials, products, or assemblies under actual fire conditions.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 The following hazard caveat pertains only to the test method section of this specification. *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 limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C167 Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations

C168 Terminology Relating to Thermal Insulation

C177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

C390 Practice for Sampling and Acceptance of Thermal Insulation Lots

C411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

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

C518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

C665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

C1101/C1101M Test Methods for Classifying the Flexibility or Rigidity of Mineral Fiber Blanket and Board Insulation

C1335 Test Method for Measuring Non-Fibrous Content of Man-Made Rock and Slag Mineral Fiber Insulation

D1448 Test Method for Micronaire Reading of Cotton Fibers

E70 Test Method for pH of Aqueous Solutions With the Glass Electrode

E84 Test Method for Surface Burning Characteristics of Building Materials

E176 Terminology of Fire Standards

E2231 Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics

2.2 *U.S. Military Standards:*[3]

MIL-STD-167-1 Mechanical Vibrations of Shipboard Equipment (Type 1 Environmental and Type II Internally Excited)

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

MIL-A-3316 Adhesives, Fire Resistant, Thermal Insulation

MIL-E-17970 Enamel, Non-Flaming Semi-Gloss White

MIL-C-20079 Cloth, Glass; Tape, Textile Glass And Thread, Glass And Wire-Reinforced Glass

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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 Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, http://www.dodssp.daps.mil.

3. Terminology

3.1 Definitions—Terminology C168 and Terminology E176 shall apply to the terms used in this specification.

4. Classification

4.1 The fibrous glass felt shall be of the following types and grades:

Type I, Unfaced Thermal Blanket	Nominal Density, lb/ft^3 (kg/m^3)
Grade 1	0.75 (12)
Grade 2	1.00 (16)
Grade 3	1.50 (24)
Grade 4	2.00 (32)
Grade 5	2.50 (40)
Grade 6	3.00 (48)
Type II, Unfaced Sound Absorbing Blanket	Nominal Density, lb/ft^3 (kg/m^3)
Grade 1	0.75 (12)
Grade 2	1.00 (16)
Grade 3	1.50 (24)
Grade 4	2.00 (32)
Grade 5	2.50 (40)
Grade 6	3.00 (48)
Type III, Faced, Thermal and Sound Absorbing Board	Density shall be 2.8 (45) lb/ft^3 (kg/m^3)

5. Ordering Information

5.1 The type, dimensions, density, maximum use temperature, and facing (if required) shall be specified by the purchaser. A product certification (if required) shall be specified in the purchase order.

6. Materials and Manufacture

6.1 *Composition:*

6.1.1 The insulation shall be composed of glass, processed from a molten state into a fibrous form, bonded with a chemical binder.

6.1.2 The facing shall be a polyester film reinforced with glass yarns (MIL-I-1140). The laminating adhesive shall conform to the requirements of MIL-A-3316.

7. Physical Requirements

7.1 A 1-in. (25-mm) thick sample of the insulation shall be flexible when tested in accordance with 11.1.

7.2 The insulation shall be of the nominal density specified for its grade with a tolerance of ±10 %. Density shall be determined in accordance with 11.2.

7.3 *Maximum Temperature of Use*—When tested in accordance with 11.10 at the insulation's maximum use temperature of 450°F (232°C), the insulation shall not crack, warp, flame, glow, smolder, or show evidence of fused fibers.

7.4 The nonfibrous material (shot) content shall not be greater than 1.5 % by weight when tested in accordance with 11.3.

7.5 *Binder Content*—When tested in accordance with 11.4, the binder content shall not exceed 30 % by weight.

7.6 *Corrosiveness to Steel*—When tested in accordance with 11.6, steel plates in contact with the insulation shall show no corrosion greater than comparative plates in contact with sterile cotton.

7.7 *Surface Burning Characteristics Type I and II*—The insulation shall have a flame spread index not greater than 25 and a smoke developed index not greater than 50 when tested in accordance with 11.7.

7.8 *Quarter Scale Room Fire Test of Type III*—Type III shall meet the requirements of the Quarter-Scale Room-Fire Test Method described in 11.12.

7.9 *Apparent Thermal Conductivity*—The thermal conductivities for Type I, Grade 1 through 6 and Type III materials shall not exceed the values shown in Table 1. Thermal conductivity shall be determined by Test Methods C177 or C518.

7.10 *Vibration Resistance of Type II Materials*—There shall be a maximum of 0.50 % weight loss and the insulation shall not settle and lose thickness when subjected to the vibration test described in 11.9.

7.11 *Acoustical Performance of Type II Materials*—The coefficients of absorption shall be not less than those shown in Table 2 when Type II material is tested in accordance with 11.8.

7.12 *Kerfing*—Type III panels shall be capable of being kerfed with a 90° *V*-groove to facilitate bending when the panel is folded to a right angle. The facing material shall be flexible to form a neat square corner at the kerfed joint (see 11.11).

7.13 *Flashover Time*—Flashover time shall not occur within 10 min when tested in accordance with 11.12.4.5.

8. Dimensions and Permissible Variations

8.1 The standard sizes and tolerances of Types I, II, and III materials are listed in Table 3.

TABLE 1 Type I and Type III Thermal Insulation Blanket Physical Requirements

Type I	Type I Grade 1	Type I Grade 2	Type I Grade 3	Type I Grade 4	Type I Grade 5	Type I Grade 6	Type III
Nominal Density (lb/ft^3)	0.75	1.0	1.5	2.0	2.5	3.0	2.8
	Thermal Conductivity, max Btu·in./h ft^2·°F (W/m·K)						
Mean Temperature,° F (°C)							
25 (–4)	0.27 (0.039)	0.26 (0.037)	0.24 (0.035)	0.22 (0.032)	0.22 (0.032)	0.22 (0.032)	0.22 (0.032)
50 (10)	0.29 (0.042)	0.28 (0.040)	0.26 (0.037)	0.24 (0.035)	0.23 (0.033)	0.23 (0.033)	0.23 (0.033)
75 (24)	0.32 (0.046)	0.30 (0.043)	0.27 (0.039)	0.25 (0.036)	0.24 (0.035)	0.24 (0.035)	0.24 (0.035)
100 (38)	0.35 (0.050)	0.32 (0.046)	0.29 (0.042)	0.27 (0.039)	0.26 (0.037)	0.25 (0.036)	0.26 (0.037)
200 (93)	0.49 (0.071)	0.43 (0.062)	0.38 (0.055)	0.34 (0.049)	0.31 (0.045)	0.30 (0.043)	0.31 (0.045)
300 (149)	0.70 (0.101)	0.58 (0.083)	0.50 (0.072)	0.44 (0.063)	0.38 (0.055)	0.37 (0.053)	0.38 (0.055)

TABLE 2 Coefficients of Sound Absorption Minimum, Using a Type "A" Mounting (Types II and III)

NOTE 1— Data on Type "A" Mounting is for comparison only and not meant to indicate characteristics in service.

Nominal Insulation Thickness, in. (mm)	Frequency, Hz						
	125	250	500	1000	2000	4000	Noise Reduction Coefficient (NRC)
Type II, All Grades							
0.75 (19)	0.04	0.10	0.20	0.40	0.55	0.55	0.31
1.0 (25)	0.06	0.20	0.45	0.65	0.65	0.65	0.49
2.0 (51)	0.15	0.40	0.75	0.75	0.75	0.70	0.66
3.0 (75)	0.20	0.60	0.90	0.80	0.80	0.75	0.77
4.0 (100)	0.25	0.65	0.95	0.85	0.85	0.80	0.82
Type III							
2 (51)	0.43	0.96	1.00	0.70	0.51	0.35	0.80

TABLE 3 Type I, II, III Tolerances for Standard Sizes

	Standard Sizes Types I and II	Tolerances
Length ft (m)	4 (1.22), 8 (2.43)	±¼ in. (0.64 cm)
	50 (15.24), 75 (22.86), 100 (30.49), 150 (45.73), 200 (61)	±6 in. (15.24 cm)
Width in. (cm)	24 (61.68), 36 (91.44), 48 (122), 72 (183)	±¼ in. (0.64 cm)
Thickness in. (cm)	0.75 (1.9), 1.0 (2.54), 1.5 (3.8), 2.0 (5.1), 2.5 (6.35), 30 (7.62), 3.5 (8.9), 4.0 (10.2)	±⅛ in. (0.32 cm)
	Standard Sizes Types III	Tolerances
Length, in. (cm)	36 (91.44), 48 (122)	±¼ in. (0.64 cm)
Width, in. (cm)	24 (61.68)	±¼ in. (0.64 cm)
Thickness, in. (cm)	0.75 (1.9), 1.0 (2.54), 1.5 (3.8), 2.0 (5.1)	±⅛ in. (0.32 cm)

9. Workmanship, Finish, and Appearance

9.1 The insulation units shall indicate good workmanship and shall not have defects that adversely affect their installation and service qualities.

10. Sampling

10.1 Inspection and qualification shall be in accordance with Practice C390. Other provisions for sampling can be agreed upon between the purchaser, seller, and manufacturer.

11. Test Methods

11.1 *Flexibility—Rigidity*—Test in accordance with Test Method C1101/C1101M.

11.2 *Density*—Test in accordance with Test Methods C167.

11.3 *Nonfibrous Shot Content*—Test in accordance with the Annex in Specification C1335.

11.4 *Test Method for Determining Binder Content:*

11.4.1 *Scope*—This test method provides a test to determine the amount of organic binder present in the insulation.

11.4.2 *Summary of Test Method*—The percent binder by weight is measured by determining the weight lost by the insulation after it is placed in a 1000°F (538°C) furnace for 1 h.

11.4.3 *Significance and Use*—There is a susceptibility of the product to have an exothermic reaction at high temperature.

11.4.4 *Apparatus:*

11.4.4.1 *Furnace,* capable of maintaining a 1000°F (538°C) temperature.

11.4.4.2 *Scales,* accurate to 0.1 % of specimen weight.

11.4.5 *Test Specimen:*

11.4.5.1 Three test specimens shall be tested.

11.4.5.2 The test specimen shall be between 0.17 lb (75 g) and 0.33 lb (150 g).

11.4.6 *Procedure:*

11.4.6.1 Weigh the specimens; then place the specimens in the 1000°F (538°C) furnace for 1 h.

11.4.6.2 Remove the specimens from the furnace and let them cool to room temperature in the same laboratory atmosphere (temperature and relative humidity) as they were previous to placing them in the furnace.

11.4.6.3 Weigh the specimens when they have cooled to ambient temperature. The percent binder is the average of the following calculation for the three specimens:

$$B, \% = \frac{W_I - W_F}{W_I} \times 100$$

where:

B = percent binder,
W_I = initial weight, and
W_F = final weight after 1 h.

11.4.7 *Precision and Bias*—The precision of this test method is not known because interlaboratory data are not available. This test method is not be suitable for use in specifications or in case of disputed results as long as these data are not available.

11.5 *Thermal Conductivity*—Test in accordance with Test Methods C177 or C518.

11.6 *Corrosiveness to Steel*—Test in accordance with the corrosiveness method of Specification C665.

11.7 *Surface Burning Characteristics*—Test in accordance with Test Method E84, using the specimen preparation and mounting method of Practice E2231.

11.8 *Acoustical Performance*—Test in accordance with Test Method C423 using an "A" mounting.

11.9 *Test Method for Determining the Vibration Resistance of Fibrous Glass Insulation:*

11.9.1 *Scope*—This test method provides a test to determine the effect of vibration, at ambient temperature, on fibrous glass insulation.

11.9.2 *Summary of Test Method*—A 12-in. (30.5-cm) square specimen is subjected to a 0.13-in. (3-mm) amplitude vibration with a 12-Hz frequency in a horizontal plane for a period of 100 h. After the 100 h of vibration, the specimen is examined for weight loss and loss of thickness due to settling.

11.9.3 *Significance and Use*—This is a test method to test products that are installed in an above ambient temperature and vibrating environment.

11.9.4 *Apparatus:*

11.9.4.1 *Pin Probe,* as described in Test Methods C167.

11.9.4.2 *Sheet Metal Box, 12-in. (30.5-cm) Square,* with a 16-mesh wire screen tightly stretched over one open side.

11.9.4.3 *Vibration Testing Fixture,* capable of vibrating at a 12 Hz frequency and a 0.13-in. (3-mm) amplitude in the horizontal plane.

11.9.5 *Test Specimen*—Cut a 12-in. (30.5-cm) square, full thickness sample of the insulation and blow it clean of all loose or cut surface particles.

11.9.6 *Procedure:*

11.9.6.1 Measure the thickness of the specimen in 5 places to the nearest 0.1 in. (2.5 mm) using a pin probe described in Test Methods C167.

11.9.6.2 Subject the test specimen to the endurance test for Type I of MIL-STD-167-1 except that the total period of the test shall be 100 h at a frequency of 12 Hz with an amplitude of vibration of 0.13 ± 0.006 in. (3.3 mm ± 0.065 mm) only. In preparation for the test, the test specimen shall be blown clean of all loose or cut surface particles and weighed to the nearest 0.1 g (0.002 lb). After weighing, the test specimen shall be placed in a tight fitting five-sided sheet metal box covered with a No. 16-mesh wire screen tightly stretched and firmly attached to the box over the open side. The specimen shall be in intimate contact with the screen and five sides of the box. The method of attachment shall be in accordance with MIL-STD-167-1, allowing the test specimen to have the exposed face down and in a horizontal position. A pan shall be installed below the test specimen to catch all material particles that fall from the test specimen during the test. The test shall be conducted with the specimen in the horizontal position only. The vibration excitation shall be in the horizontal position only.

11.9.6.3 At the completion of the 100 h of vibration, remove the test specimen from its mounting attachments and sheet metal box. Weigh the specimen again to the nearest 0.002 lb (0.1 g) and calculate the percent weight loss. Also measure the specimen's thickness again in 5 places to the nearest 0.1 in. (2.5 mm) and determine the percent loss in thickness.

11.9.7 *Precision and Bias*—The precision of this test method is not known because interlaboratory data are not available. This test method is not be suitable for use in specifications or in case of disputed results as long as these data are not available.

11.10 *Maximum Use Temperature*—Test in accordance with Test Method C411.

11.11 *Kerfing:*

11.11.1 *Scope*—This test method provides a test to determine the suitability of a board to be kerfed.

11.11.2 *Summary of Test Method*—The insulation board is *V*-grooved with two sharp knives to facilitate bending when the board is folded to a right angle. The grooves shall be examined for smoothness of surface.

11.11.3 *Significance and Use*—A board must be capable of being kerfed properly to ensure an acceptable installation.

11.11.4 *Apparatus:*

11.11.4.1 *Two Sharp Kerf Cutting Blades,* positioned so they form an angle of 90° with each other so that the top of one knife is approximately ¼ in. (6 mm) in advance of the tip of the other knife are required. The knives are adjusted to reach just beneath the facing.

11.11.5 *Test Specimen*—One specimen 24 by 36 in. (610 by 910 mm) or 24 by 48 in. (610 by 1220 mm) shall be used.

11.11.6 *Procedure:*

11.11.6.1 Ninety degree *V*-grooves shall be kerfed in the sample board.

11.11.6.2 The grooves shall be examined for smoothness of surfaces. The board shall be folded, examined and the facings shall also be examined to determine if the corners are neat and square.

11.11.7 *Precision and Bias*—The precision of this test method is not known because interlaboratory data are not available. This test method is not be suitable for use in specifications or in case of disputed results as long as these data are not available.

11.12 *Determination of the Flashover Potential of a Lining Material Using a Quarter-Scale Room Fire Test:*

11.12.1 *Scope*—This test method describes a procedure to determine the flashover potential of materials in a room when subjected to a fire exposure. The test method described will yield a time from the introduction of the fire exposure until the moment of flashover. The information contained herein is intended for compliance.

11.12.2 *Significance and Use*—In the interest of reduction, both the set-up time and cost associated with fire testing in a full size room (defined as a 10 by 10 by 8-ft high room having a 30 by 80-in. high doorway), a one-quarter-scale room fire test was devised to predict flashover potential of lining materials exposed to fire.

11.12.3 *Apparatus:*

11.12.3.1 *The Quarter-Scale Room*—The quarter-scale room shall be constructed from a suitable ceramic insulation board and shall form an airtight box having a ceiling and four sides. The box shall sit on a floor fabricated with the same material. The interior dimensions of the fully lined quarter-scale room are 30 by 30 by 24 in. (76.2 by 76.2 by 61 cm) high. The doorway is located at the center of one wall and shall be 19.5 in. (49.5 cm) wide and 17 in. (43 cm) high to secure the proper ventilation and fire development. The height between the finished ceiling and the top of the doorway shall be 7 in. (18 cm). The floor of the model room shall extend at least 12 in. (30.5 cm) outside of the doorway. The box shall be removable to allow for application of ceiling and wall covering. The entire base of the box in contact with the floor shall be made airtight.

11.12.3.2 *Porous Plate Diffusion Flame Burner*—The burner shall be used as the fire source. The burner shall be 3.5 by 3.5 by 3 in. (9 by 9 by 7.6 cm) high, consisting of a horizontal porous plate area of 3 by 3 in. (7.6 by 7.6 cm) with a 0.25 in. (0.64-cm) wide steel plate perimeter and steel plate sides and bottom.

11.12.3.3 *Four 10-mil Chromel-Alumel Thermocouples*—Thermocouples placed 1 in. (2.54 cm) and 3 in. (7.6 cm) below the center of the overhead and 1 in. (2.54 cm) and 2 in. (5 cm) below the top of the doorway shall be used.

11.12.4 *Procedure:*

11.12.4.1 The test material shall fully line the walls and ceiling.

11.12.4.2 Prior to testing, the fully-lined test room shall be conditioned for at least 24 h at a relative humidity between 20 and 60 %, and a temperature of 73.4 ± 122°F (23 ± 50°C).

11.12.4.3 The fire source shall be positioned on the floor snugly against one near corner of the test room. A flow rate of 0.32 ft^3/min (0.0091/m^3/min) methane shall be used to produce a constant heat input to approximately 320 Btu for the duration of the test.

11.12.4.4 The test data from the four thermocouples shall be recorded as a continuous function of time.

11.12.4.5 The primary data generated by this test will be the time to flashover, if it occurs, and the maximum temperature if flashover is not reached. Flashover is characterized by thermal flux levels ≥2 W/cm^2 (3.23 W/$in.^2$) at the floor level. This corresponds to interior temperatures of 1112°F (600°C) and higher, and doorway temperatures of 927°F (500°C) and higher. For this test purpose, flashover is defined as the fire condition when one of the interior thermocouple measurements reach 1112°F (600°C) or one of the doorway measurements reach 927°F (500°C), whichever occurs first. Flashover shall not occur within 10 min.

11.12.4.6 Color slides shall be taken before the test, at the point of maximum involvement and after the fire has been extinguished, and shall be included with the test report data.

11.12.5 *Report:*

11.12.5.1 The report shall contain the following information:

(1) Data from four thermocouples,

(2) If flashover occurs, flashover time, and

(3) Color slides.

11.12.6 *Precision and Bias*—The precision of this test method is not known because interlaboratory data are not available. This test method is not be suitable for use in specifications or in case of disputed results as long as these data are not available.

12. Qualification Requirements

12.1 The following requirements shall be employed for the purpose of initial material or product qualification:

12.1.1 Flexibility,

12.1.2 Maximum use temperature,

12.1.3 Density,

12.1.4 Nonfibrous shot content,

12.1.5 Binder content,

12.1.6 Corrosiveness,

12.1.7 Surface burning characteristics (Type I and II),

12.1.8 Thermal conductivity,

12.1.9 Vibration resistance,

12.1.10 Acoustical performance,

12.1.11 Kerfing, and

12.1.12 Flashover (Type III).

13. Inspection

13.1 The following requirements are generally employed for purposes of acceptance sampling of lots or shipments of qualified insulation:

13.1.1 Density,

13.1.2 Dimensional tolerances, and

13.1.3 Workmanship.

14. Rejection and Rehearing

14.1 Failure to conform to the requirements of this specification shall constitute cause for rejection. Rejection shall be reported to the manufacturer or seller promptly and in writing. The manufacturer and supplier have the right to verify rejected products.

15. Certification

15.1 When specified in the purchase order or contract, the manufacturer's or supplier's certification shall be furnished to the purchaser stating that samples representing each lot have been manufactured, tested, and inspected in accordance with this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

16. Packaging and Package Marking

16.1 Unless otherwise specified, insulation shall be packaged in the manufacturer's standard commercial container.

16.2 *Marking*—Unless otherwise specified, each container shall be plainly marked to include the following:

16.2.1 Name of manufacturer,

16.2.2 Name of product,

16.2.3 Type,

16.2.4 Quality,

16.2.5 Nominal dimensions, and

16.2.6 Facing and accessories, if any, of the material in the container.

17. Keywords

17.1 blanket; insulation; mineral fiber; ship insulation; thermal

ANNEX

A1. SUPPLEMENT REQUIREMENTS TO FIBROUS GLASS THERMAL INSULATION AND SOUND ABSORBING BLANKET FOR MILITARY APPLICATIONS

A1.1 *Scope*—This annex provides requirements not addressed in the current standard but historically has been part of various military standards.

A1.2 *Fiber diameter*—The diameter of the fiber shall be determined by one of the following methods:

A1.2.1 *Microscopic*—Diameter of the fiber shall be determined microscopically on the basis of measuring 50 fibers on each of the samples selected on a per lot basis. The average diameter for purposes of determining conformance with shall be the average of all measurements on the samples.

A1.2.2 *Air flow*—The air flow method as measured by the Micronaire instrument in accordance with Test Method D1448.

A1.2.3 The average fiber diameter shall not exceed 1.5×10^4 centimeters (cm) (0.00038 inch).

A1.3 *Facing alignment*—In case the facing material does not cover the entire surface of the board. The uncovered portion of the board shall not extend back further than 3 mm (⅛ in.) from any edge. The facing shall no extend over the edge of the board more than 3 mm (⅛ in) except as noted. Face alignment shall be tested by direct measurement using a steel rule with 1 mm graduations.

A1.4 *Special wraparound facing*—Special order faced panels is required in accordance with acquisition requirements (see acquisition documents). This type of special facing will extend over the edge of the panel more than 3mm, according to the specific order.

A1.5 *Paintability*—The faced board, as furnished, shall be compatible with and shall hold one coat of paint in accordance with Mil- E-17970, after one coat of latex Emulsion flat primer has been applied to the Type III facing. Apply one coat of Latex Emulsion flat primer (Ocean chemicals, Inc. no 634 or equal) and one coat of fire retardant paint conforming to Mil-E-17970 to the cloth surface of the type III board. The paint shall dry to a uniform smoth coat which shall have a flat to semi-gloss appearance when viewed under ordinary conditions of illumination. There shall be no shiners or flashed. Tinted colors shall dry to a uniform even color.

A1.6 *Tape*—Fibrous glass tape covering the butted joints of the board shall conform to type II, class 1 or Mil-C-20079.

A1.7 *Adhesive bond strength (Type III)*—Adhesive bond strength for tape shall confirm to the requirements of Class 1, grade a of Mil-A-3316. Adhesive bond strength shall not be less than 3 lbs when tested as specified. Adhesive bond strength shall be determined in accordance with Mil-A-3316, using cement confirming to Class 1 of Mil-A-3316, and fibrous glass tape conforming to Type II, Class 1 of Mil-C-20079. The tape shall be applied to the face surface.

A1.8 *Compression for type III*—The unit load required to compress the board to 40% of its original thickness shall average not less than 1246 Newton per square meter (n^2/m^2) (255 pounds per square foot (lb/ft^2)). Upon completion of the test, the board, after a 5-min interval, shall return to at least 70 percent of its original thickness. The compression test shall be performed in accordance with Test Methods C167 to determine conformance.

A1.9 *Alkalinity and pH*—The alkalinity of the felt expressed as equivalent sodium oxide (Na_2O) shall be not greater than 0.060 percent when tested as specified in The pH shall be not less than 7.5 nor more than 12.0 when measure as specified in Test Method E70.