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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing[1]

This standard is issued under the fixed designation C 665; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers the composition and physical properties of mineral-fiber blanket insulation used to thermally or acoustically insulate ceilings, floors, and walls in light frame construction and manufactured housing. The requirements cover fibrous blankets and facings. Values for water-vapor permeance of facings are suggested for information that will be helpful to designers and installers.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are provided for information only.

1.3 *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:*

C 167 Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations[2]

C 168 Terminology Relating to Thermal Insulating Materials[2]

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus[2]

C 390 Criteria for Sampling and Acceptance of Preformed Thermal Insulation Lots[2]

C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus[2]

C 653 Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral-Fiber Insulation[2]

C 1104/C 1104M Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation[2]

C 1304 Test Method for Assessing the Odor Emission of Thermal Insulation Materials

C 1338 Test Method for Determining Fungi Resistance of Insulation Materials and Facings

E 84 Test Method for Surface Burning Characteristics of Building Materials[3]

E 96 Test Methods for Water Vapor Transmission of Materials[2]

E 970 Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source[3]

G 1 Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens[4]

3. Terminology

3.1 *Definitions*—For definitions of terms defined in this specification, see Terminology C 168.

4. Classification

4.1 Typical mineral-fiber thermal insulation consists of three types:

4.1.1 *Type I*—Blankets without membrane coverings.

4.1.2 *Type II*—Blankets with nonreflective membrane coverings.

4.1.2.1 *Class A*—Membrane-faced surface with a flame spread of 25 or less.

4.1.2.2 *Class B*—Membrane-faced surface with a flame propagation resistance; critical radiant flux of 0.12 W/cm^2 (.11 Btu/ft^2·s) or greater.

4.1.2.3 *Class C*—Membrane-faced surface not rated for flame propagation resistance (for use in nonexposed applications only).

4.1.2.4 *Category 1*—Membrane is a vapor retarder.

4.1.2.5 *Category 2*—Membrane is not a vapor retarder.

4.1.3 *Type III*—Blankets with reflective membrane coverings:

4.1.3.1 *Class A*—Membrane-faced surface with a flame spread of 25 or less.

4.1.3.2 *Class B*—Membrane-faced surface with a flame propagation resistance; critical radiant flux of 0.12 W/cm^2 (.11 Btu/ft^2·s) or greater.

4.1.3.3 *Class C*—Membrane-faced surface not rated for

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[2] *Annual Book of ASTM Standards,* Vol 04.06.

[3] *Annual Book of ASTM Standards,* Vol 04.07.

[4] *Annual Book of ASTM Standards,* Vol 03.02.

flame propagation resistance (for use in nonexposed applications only).

4.1.3.4 *Category 1*—Membrane is a vapor retarder.

4.1.3.5 *Category 2*—Membrane is not a vapor retarder.

5. Ordering Information

5.1 For specific installations, thermal resistance, lengths, and widths suited to the intended use shall be specified by the purchaser. When desired, vapor-barrier facings may be specified.

6. Materials and Manufacture

6.1 *Basic Material*— The basic material shall be fibers made from mineral substances such as rock, slag, or glass processed from the molten state into a fibrous form.

6.2 *Manufacture*— Insulation blankets shall consist of flexible units composed of felted, bonded, or unbonded fibers formed into rolls or flat cut pieces (batts), with or without various adhered coverings, and with or without a means for attachment of the blanket to applicable constructions.

7. Physical Properties

7.1 *Thermal Resistance*—The standard thermal resistance values in °F·h·ft^2/Btu (K·m^2/W) are: 4, 7, 11, 13, 19, 22, 30, and 38 (0.7, 1.2, 1.9, 2.3, 3.3, 3.9, 5.3, and 6.7). The thermal resistance, *R*, for the average of any four randomly selected samples shall not be more than 5 % below the listed *R* value when tested in accordance with 13.2, nor shall any single specimen be more than 10 % below the listed *R* value. *R* values other than those listed shall be agreed upon between the supplier and the purchaser.

7.2 *Surface Burning Characteristics*:

7.2.1 Insulation blankets exclusive of membrane facing, when tested in accordance with Test Method E 84, shall have a flame spread classification no greater than 25, and a smoke developed classification no greater than 50.

7.2.2 Insulation blankets with facings and membranes intended for exposed application, when tested in accordance with Test Method E 84, shall have a flame spread classification no greater than 25, and a smoke developed classification no greater than 50.

7.3 *Critical Radiant Flux*—Insulation blankets, when tested in accordance with 13.4, shall have a critical radiant flux-flame propagation resistance ≥0.12 W/cm^2 (0.11 Btu/ft^2·s). Blankets with membrane coverings on both surfaces, shall be tested on the surface to be left exposed and shall be marked on either surface.

7.4 *Water-Vapor Permeance*—When tested in accordance with 13.5, vapor-resistant membrane coverings shall have a vapor permeance of no more than 1 perm (5.7×10^{-11} kg·Pa^{-1}·s^{-1}·m^2) and vapor-permeable membrane coverings shall have a vapor permeance of no less than 5 perm (2.9×10^{-10} kg·Pa^{-1}·s^{-1}·m^{-2}).

7.5 *Water Vapor Sorption*—The water vapor sorption of the insulation without facing shall be not more than 5 % by weight, when tested in accordance with 13.6.

7.6 *Odor Emission*— A detectable odor of objectionable nature recorded by more than two of the five panel members shall constitute rejection of the material when tested in accordance with 13.7.

7.7 *Corrosiveness*— When tested in accordance with 13.8, the metal plates in contact with the insulation shall show no corrosion greater than that observed on the comparative plates in contact with sterile cotton.

7.8 *Fungi Resistance*— When tested in accordance with 13.9, the insulation shall have growth no greater than that observed on the white birch tongue depressor comparative item.

8. Other Requirements

8.1 *Qualification Requirements*—The following requirements are generally used for purposes of initial material or product qualification:

8.1.1 Thermal resistance,

8.1.2 Surface burning characteristics,

8.1.3 Critical radiant flux,

8.1.4 Water-vapor permeance,

8.1.5 Water vapor sorption,

8.1.6 Odor emission,

8.1.7 Corrosiveness, and

8.1.8 Fungi resistance.

8.2 *Inspection Requirements*—The following requirements are generally used for purposes of acceptance sampling of lots or shipments of qualified thermal insulation:

8.2.1 Dimensional tolerances, and

8.2.2 Workmanship.

9. Dimensions

9.1 The material shall conform to the standard sizes and dimensions prescribed in Table 1.

10. Workmanship and Finish

10.1 Although all requirements for physical properties of materials such as blankets are not easily defined or stated

TABLE 1 Sizes and Dimensions[A]

Element	Dimension	Tolerance
Length, in. (mm)	cut pieces up to 96 in. (2 m)	−½in. (13 mm), excess permitted
	cut pieces up to 144 in. (4 m)	−1.0 in. (25 mm), excess permitted
	rolls over 144 in. (4 m)	−0.5 %, excess permitted
Width, in. (mm)	pieces and rolls up to 24 in. (0.6 m)	−¼in. (6 mm), + ½in. (13 mm)
	rolls 24 to 144 in. (0.6 to 4 m)	−¼ in. (6 mm), + ½in. (13 mm)
Thickness	as required for thermal resistance[B]	consistent with tolerances of thermal resistance[C]

[A] All sizes listed may not be available from all manufacturers. For sizes other than those listed, consult manufacturers.

[B] Thicknesses of the various mineral fiber insulations available may differ to provide rated thermal resistance. Products are generally available in a range of thicknesses from 3 to 12 in. (75 to 305 mm). Thickness required to attain a rated performance shall not exceed that of the cavity into which the material shall be installed.

[C] Blanket insulation manufactured to provide a designated thermal resistance may be produced by varying one or more of the factors of density, thickness, or fiber characteristics. Therefore, blankets having the same designated thermal resistance but different manufacturing sources may vary in one or more of these factors. Properties of facings or coverings are not included in this specification, except that experience has shown that if a facing material is to be considered a vapor retarder in buildings in which blankets are used, it shall have a water vapor permeance of not more than 1 perm (5.7×10^{-11} kg·Pa^{-1}·s^{-1}·m^2). Consult manufacturing sources or suppliers for specific properties of blankets with facings or coverings.