



Standard Specification for Mineral Fiber Block and Board Thermal Insulation¹

This standard is issued under the fixed designation C 612; 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 classification, composition, dimension, and physical properties of mineral fiber (rock, slag, or glass) semirigid and rigid board insulation for the use on cooled surfaces and on heated surfaces up to 1800°F (982°C). For specific applications, the maximum and minimum temperature limits shall be agreed upon between the supplier and the purchaser.

1.2 The orientation of the fibers within the boards is primarily parallel to the principal surface (face). This specification does not cover fabricated pipe and tank wrap insulation where the insulation has been cut and fabricated to provide a fiber orientation that is perpendicular to the principal large surface (face).

1.3 For satisfactory performance, properly installed protective vapor retarders must be used in low-temperature (below ambient) applications to prevent movement of water vapor through or around the insulation towards the colder surface.

1.4 The values stated in inch-pound units are to be regarded as the standard. The SI equivalents of inch-pound units are given in parentheses for information only and may be approximate.

1.5 *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 165 Test Method for Measuring Compressive Properties of Thermal Insulations²
- C 168 Terminology Relating to Thermal Insulating Materials²
- C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus²

- C 303 Test Method for Density of Preformed Block-Type Thermal Insulations²
- C 356 Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat²
- C 390 Criteria for Sampling and Acceptance of Preformed Thermal Insulation Lots²
- C 411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation²
- C 447 Practice for Estimating the Maximum Use Temperature of Thermal Insulations²
- C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by means of the Heat Flow Meter Apparatus²
- C 665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing²
- C 680 Practice for Determination of Heat Gain or Loss and the Surface Temperatures of Insulated Pipe and Equipment Systems by the Use of a Computer Program²
- C 795 Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel²
- C 1045 Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions²
- C 1058 Practice for Selecting Temperatures for Evaluating and Reporting Thermal Properties of Thermal Insulation²
- C 1101/C 1101M Test Methods for Classifying the Flexibility or Rigidity of Mineral Fiber Blanket and Board Insulation²
- C 1104/C 1104M Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation²
- C 1114 Test Method for Steady-State Thermal Transmission Properties by Means of the Thin-Heater Apparatus²
- C 1136 Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation²
- C 1304 Test Method for Assessing the Odor Emission of Thermal Insulation Materials²
- C 1335 Test Method for Measuring the Non-Fibrous Content of Man-Made Rock and Slag Mineral Fiber Insulation²
- E 84 Test Method for Surface Burning Characteristics of Building Materials³

¹ This specification is under the jurisdiction of ASTM Committee C-16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.20 on Homogeneous Inorganic Thermal Insulation.

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

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

3. Terminology

3.1 For definitions used in this specification see Terminology C 168.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *delivered thickness*—the actual thickness of the product shipped by the manufacturer or the seller and received by the purchaser.

3.2.2 *mean temperature*—the sum of the cold surface temperature and the hot surface temperature divided by two.

3.2.3 *shot*—for the purposes of this specification, as that material which cannot be brushed or mechanically shaken through No. 100 (150-µm) sieve.

4. Classification

4.1 Mineral fiber board insulation covered by this specification shall be classified into seven types and two categories shown in Table 1. This classification is based upon the insulation’s maximum use temperature, maximum apparent thermal conductivity, maximum linear shrinkage, maximum water vapor sorption, and maximum surface burning characteristics.

4.1.1 *Category 1*—No compressive resistance (load-bearing) properties are required.

4.1.2 *Category 2*—Minimum compressive resistance (load-bearing) properties are required.

5. Ordering Information

5.1 The type, category, and dimensions shall be specified by the purchaser.

6. Materials and Manufacture

6.1 *Composition*—Mineral fiber block and semirigid and rigid board insulation shall be composed of rock, slag, or glass processed from the molten state into fibrous form and bonded with an organic or inorganic binder, or both. Asbestos shall not be used as an ingredient or component part of the product.

6.2 Facings:

6.2.1 The purchaser shall specify whether the insulation shall be supplied plain or with facings and, if faced, shall specify the type and its requirements.

Caution: The user is advised that the maximum use temperature of facings and adhesives may be lower than the maximum use temperature of the insulation. The user shall ensure that sufficient thickness shall be installed so none of these accessory items (facings and adhesives) are exposed to temperatures above their maximum use temperature.

6.2.2 The vapor retarder facings shall be in accordance with Specification C 1136.

6.2.3 Typical facings are as follows:

6.2.3.1 Aluminum foil, reinforced fiberglass scrim, and natural (brown) kraft paper laminate (facing) generally known as FRK or FSK.

6.2.3.2 White kraft paper, reinforced fiberglass scrim, and aluminum foil laminate (facing) generally known as ASJ (All Service Jacket).

6.2.3.3 Aluminum foil, reinforced fiberglass scrim, and plastic film (example: polyethylene) laminate (facing) generally known as FSP (Foil - Scrim - Polyethylene).

7. Physical Properties

7.1 The insulation type shall conform to the following requirements in Table 1: maximum use temperature, apparent thermal conductivity, compressive resistance, linear shrinkage, water vapor sorption, and surface burning characteristics.

7.2 *Odor Emission*—A detectable odor of objectionable nature recorded by more than two of five panel members shall constitute rejection of the material when tested in accordance with 12.8.

7.3 *Corrosiveness to Steel*—When tested and evaluated in accordance with 12.9, the corrosion resulting from insulation in contact with steel plates shall be judged to be no greater than for comparative plates in contact with sterile cotton. Test the

TABLE 1 Physical Property Requirements^A

Properties	Type IA	Type IB	Type II	Type III	Type IVA	Type IVB	Type V
Maximum use temperature ^B °F (°C)	450 (232)	450 (232)	850 (454)	1000 (538)	1200 (649)	1200 (649)	1800 (982)
Apparent thermal conductivity, max, Btu in./h ft ² °F (W/m K)							
Mean temperatures °F (°C)							
75 (24)	0.26 (0.037)	0.26 (0.037)	0.25 (0.036)	0.25 (0.036)	0.25 (0.036)	0.24 (0.035)	
100 (38)	0.28 (0.040)	0.27 (0.039)	0.27 (0.039)	0.27 (0.039)	0.27 (0.039)	0.25 (0.036)	
200 (93)	0.36 (0.052)	0.34 (0.049)	0.35 (0.050)	0.35 (0.050)	0.34 (0.049)	0.30 (0.043)	0.35 (0.050)
300 (149)	0.46 (0.066)	0.42 (0.060)	0.44 (0.063)	0.44 (0.063)	0.44 (0.063)	0.36 (0.052)	0.42 (0.061)
400 (204)			0.55 (0.079)	0.55 (0.079)	0.55 (0.079)	0.42 (0.061)	0.52 (0.075)
500 (260)			0.70 (0.101)	0.70 (0.101)	0.70 (0.101)	0.53 (0.076)	0.64 (0.092)
600 (316)				0.90 (0.130)	0.85 (0.123)	0.63 (0.091)	0.72 (0.104)
700 (371)					1.00 (0.144)	0.75 (0.108)	0.79 (0.114)
800 (427)							0.95 (0.137)
Category 1			no compressive resistance requirement				
Category 2	N. A. ^C	25 (1.2)	25 (1.2)	12 (0.6)	50 (2.4)	50 (2.4)	1000 (48)
Minimum Compressive resistance at 10 % deformation, min, lb/ft ² (kPa)							
Linear shrinkage, at maximum use temperature, %	2.0	2.0	2.0	2.0	2.0	2.0	4.0
Water vapor sorption, max, %	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Surface burning characteristics:							
Flame spread index, max	25	25	25	25	25	25	25
Smoke developed, max	50	50	50	50	50	50	50

^A Refer to Section 7 for additional physical property requirements.

^BSee **Caution** in 6.2.1.

^CN. A. indicates not applicable.