



Designation: C 612 – 04

## Standard Specification for Mineral Fiber Block and Board Thermal Insulation<sup>1</sup>

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 approval. A superscript epsilon ( $\epsilon$ ) 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) semi-rigid and rigid board insulation for the use on 0°F (-18°C) cooled surfaces and on heated surfaces up to 1800°F (982°C). Specific applications outside the maximum and minimum temperature limits shall be agreed upon between the supplier and the purchaser.

1.2 For satisfactory performance, properly installed protective vapor retarder or barriers shall be used on below ambient temperature applications to reduce movement of moisture through or around the insulation to the colder surface. Failure to use a vapor barrier can lead to insulation and system damage. Refer to Practice C 921 to aid material selection. Although vapor retarder properties are not part of this specification, properties required in Specification C 1136 are pertinent to applications or performance.

1.3 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).

1.4 This standard does not purport to provide the performance requirements of hourly-rated fire systems. Consult the manufacturer for the appropriate system.

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

1.6 *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:*<sup>2</sup>

- C 165 Test Method for Measuring Compressive Properties of Thermal Insulations
- C 168 Terminology Relating to Thermal Insulating Materials
- C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
- C 303 Test Method for Density of Preformed Block-Type Thermal Insulations
- C 356 Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat
- C 390 Criteria for Sampling and Acceptance of Preformed Thermal Insulation Lots
- C 411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation
- C 447 Practice for Estimating the Maximum Use Temperature of Thermal Insulations
- C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by means of the Heat Flow Meter Apparatus
- C 665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
- 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 Program
- C 795 Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel
- C 921 Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
- C 1045 Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.20 on Homogeneous Inorganic Thermal Insulation.

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<sup>2</sup> 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.

**TABLE 1 Physical Property Requirements<sup>A</sup>**

Properties	Type IA	Type IB	Type II	Type III	Type IVA	Type IVB	Type V Grade A and B
Maximum use temperature <sup>B</sup> °F (°C)	450 (232)	450 (232)	850 (454)	1000 (538)	1200 (649)	1200 (649)	1800 (982)
Apparent thermal conductivity, max, Btu in./h ft <sup>2</sup> °F (W/m K)							
Mean temperatures °F (°C)							
25 (-4)	0.22 (0.032)	0.21 (0.030)	0.21 (0.030)	0.21 (0.030)	0.21 (0.030)	0.23 (0.033)	0.44 (0.063)
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)	0.45 (0.064)
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)	0.45 (0.064)
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)	0.47 (0.068)
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)	0.49 (0.071)
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)	0.55 (0.080)
600 (316)				0.90 (0.130)	0.85 (0.123)	0.63 (0.091)	0.59 (0.085)
700 (371)					1.00 (0.144)	0.75 (0.108)	0.63 (0.091)
800 (427)							0.67 (0.097)
Minimum Compressive resistance at 10 % deformation, min, lb/ft <sup>2</sup> (kPa)							
Category 1			no compressive resistance requirement				
Category 2	N. A. <sup>C</sup>	25 (1.2)	25 (1.2)	12 (0.6)	50 (2.4)	50 (2.4)	1000 (48)
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

<sup>A</sup> Refer to Section 7 for additional physical property requirements.

<sup>B</sup> See **Caution** in 6.2.1.

<sup>C</sup> N. A. indicates not applicable.

- C 1058 Practice for Selecting Temperatures for Evaluating and Reporting Thermal Properties of Thermal Insulation
- C 1101/C 1101M Test Methods for Classifying the Flexibility or Rigidity of Mineral Fiber Blanket and Board Insulation
- C 1104/C 1104M Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation
- C 1114 Test Method for Steady-State Thermal Transmission Properties by Means of the Thin-Heater Apparatus
- C 1136 Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
- C 1304 Test Method for Assessing the Odor Emission of Thermal Insulation Materials
- C 1335 Test Method for Measuring the Non-Fibrous Content of Man-Made Rock and Slag Mineral Fiber Insulation
- E 84 Test Method for Surface Burning Characteristics of Building Materials

### 2.2 Other Referenced Document:

CAN/ULC-S102-M88 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies<sup>3</sup>

## 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- $\mu$ m) 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, minimum compressive resistance, 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.

4.1.3 *Type V, Grade A*—Requires no heat-up schedule.

4.1.4 *Type V, Grade B*—Heat-up schedule is required.

NOTE 1—**Caution:** Grade B may not be suitable for applications requiring hot installation capability at the maximum temperature indicated. In general, products having a Grade B designation are designed to be used with a heat-up schedule. Failure to use a heat-up schedule with Grade B products may lead to an exothermic reaction. This is dependent on thickness and temperature. Consult the manufacturer or manufacturer's literature for special heat rate considerations.

## 5. Ordering Information

5.1 The type, category, grade for Type V, and dimensions shall be specified by the purchaser.

<sup>3</sup> Available from Underwriters Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario, Canada M1R 3A9.