



Designation: C552 – 21a

Standard Specification for Cellular Glass Thermal Insulation¹

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

1. Scope

1.1 This specification covers the composition, sizes, dimensions, and physical properties of cellular glass thermal insulation intended for use on surfaces operating at temperatures between –450 and 800°F (–268 and 427°C). It is possible that special fabrication or techniques for pipe insulation, or both, will be required for application in the temperature range from 250 to 800°F (121 to 427°C). Contact the manufacturer for recommendations regarding fabrication and application procedures for use in this temperature range. For specific applications, the actual temperature limits shall be agreed upon between the manufacturer and the purchaser.

1.2 Cellular glass insulation has the potential to exhibit stress cracks if the rate of temperature change exceeds 200°F (112°C) per hour.

1.3 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.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ 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 Insulations.

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2. Referenced Documents

2.1 ASTM Standards:²

- C165 Test Method for Measuring Compressive Properties of 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
- C203 Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation
- C240 Test Methods for Testing Cellular Glass Insulation Block
- C302 Test Method for Density and Dimensions of Preformed Pipe-Covering-Type Thermal Insulation
- C303 Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation
- C335/C335M Test Method for Steady-State Heat Transfer Properties of Pipe Insulation
- C390 Practice for Sampling and Acceptance of Thermal Insulation Lots
- C411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation
- C450 Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging
- C518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- C585 Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing
- C692 Test Method for Evaluating the Influence of Thermal Insulations on External Stress Corrosion Cracking Tendency of Austenitic Stainless Steel
- C795 Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel

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.

C871 Test Methods for Chemical Analysis of Thermal Insulation Materials for Leachable Chloride, Fluoride, Silicate, and Sodium Ions

C1045 Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions

C1058/C1058M Practice for Selecting Temperatures for Evaluating and Reporting Thermal Properties of Thermal Insulation

C1114 Test Method for Steady-State Thermal Transmission Properties by Means of the Thin-Heater Apparatus

C1617 Practice for Quantitative Accelerated Laboratory Evaluation of Extraction Solutions Containing Ions Leached from Thermal Insulation on Aqueous Corrosion of Metals

C1639 Specification for Fabrication Of Cellular Glass Pipe And Tubing Insulation

E84 Test Method for Surface Burning Characteristics of Building Materials

E96/E96M Test Methods for Water Vapor Transmission of Materials

2.2 ISO Documents:³

ISO 3951 Sampling Procedure and Charts for Inspection by Variables for Percent Defective

ISO 8497 Determination of steady-state thermal transmission properties of thermal insulation for circular pipes

3. Terminology

3.1 For definitions used in this specification, see Terminology **C168**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *board*—fabricated sections of cellular glass adhered and together covered with a facing such as a laminated kraft paper adhered to both faces.

4. Classification⁴

4.1 Cellular glass insulation covered by this specification shall be classified in the seven grades shown in **Table 1**. Grades vary in compressive strength, density, thermal conductivity, and flexural strength. Cellular glass insulation is furnished in the following types:

4.1.1 *Type I*—Flat block manufactured,

4.1.2 *Type II*—Pipe and tubing insulation fabricated from Type I,

4.1.3 *Type III*—Special shapes fabricated from Type I,

4.1.4 *Type IV*—Board fabricated from Type I,

NOTE 1—Types not listed here may not be commercially available. These would be considered special order items.

5. Ordering Information

5.1 Purchase orders for cellular glass insulation furnished to this specification shall include the following information:

5.1.1 Type designation (see **4.1**),

5.1.2 Dimensions according to type (see Section **9**), and

5.1.3 Jacketing when required.

5.2 Any special requirements, such as, type, fabrication combinations not listed in accordance with Section **4**, nonstandard dimensions in accordance with Section **9**, inspection requirements in accordance with Section **13**, or certification requirements in accordance with Section **16** shall be agreed upon between the purchaser and the supplier and stated in the purchase contract.

6. Materials and Manufacture

6.1 The block material shall consist of a glass composition that has been foamed or cellulated under molten conditions, annealed, and set to form a rigid noncombustible material with hermetically sealed cells. The material shall be trimmed into blocks of standard dimensions that are rectangular or tapered.

6.2 Special shapes and pipe covering shall be fabricated from blocks in accordance with Practices **C450**, **C585** and Specification **C1639**.

6.3 Board, tapered or flat, shall be fabricated from blocks.

7. Physical Properties

7.1 The cellular glass insulation shall conform to the physical requirements in **Table 1**. Contact the manufacturer for specific design recommendations for all material types.

8. Qualification Requirements

8.1 The following requirements are generally employed for the purpose of initial material or product qualification for Type I, Block Material:

8.1.1 Compressive strength.

8.1.2 Flexural strength.

8.1.3 Water absorption.

8.1.4 Water vapor permeability.

8.1.5 Thermal conductivity.

8.1.6 Hot-surface performance.

8.1.7 Surface burning characteristics.

8.2 The following requirements are generally employed for qualification of Type II, pipe and tubing insulation:

8.2.1 Thermal Conductivity.

8.2.2 Type II, pipe and tubing insulation shall be fabricated from material having met the qualification requirements of Grade 6 Type I block.

8.3 Type III and Type IV material shall be fabricated from material having met the qualification requirements of Grade 6 Type I block.

9. Dimensions, Mass, and Permissible Variations

9.1 *Type I, Flat Block*—Blocks shall be nominal rectangular sections. The dimensions shall be as agreed upon by the purchaser and the supplier. Cellular glass thermal insulation block is available in lengths from 24 in. to 36 in. (600 mm to 914 mm) and widths from 18 in. to 24 in. (450 mm to 610 mm). Cellular glass thermal insulation block is available in thicknesses from 1.5 in. to 8 in. (38 mm to 203 mm).

9.2 *Type II, Pipe and Tubing Insulation*—See Specification **C1639**.

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

⁴ Type and grade designations are in accordance with *Form and Style for ASTM Standards*, Part B, Section B8, March 2002.