



Designation: C892 – 10

# Standard Specification for High-Temperature Fiber Blanket Thermal Insulation<sup>1</sup>

This standard is issued under the fixed designation C892; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

## 1. Scope

1.1 This specification covers high-temperature fiber blanket thermal insulation for use from ambient up to 3000°F (1649°C).

1.2 *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.*

1.3 When the potential exists that the installation or use of thermal insulation materials, accessories, and systems will pose safety or health problems, the manufacturers shall provide the user with appropriate current information regarding any known problems associated with the recommended use of the products, and shall also recommend protective measures to be employed in their safe utilization. The user shall establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.

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

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

- C71 Terminology Relating to Refractories
- 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
- C209 Test Methods for Cellulosic Fiber Insulating Board

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.23 on Blanket and Loose Fill Insulation.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- C356 Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat
- C390 Practice for Sampling and Acceptance of Thermal Insulation Lots
- C411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation
- C447 Practice for Estimating the Maximum Use Temperature of Thermal Insulations
- C665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
- C680 Practice for Estimate of the Heat Gain or Loss and the Surface Temperatures of Insulated Flat, Cylindrical, and Spherical Systems by Use of Computer Programs
- C795 Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel
- C1045 Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions
- C1058 Practice for Selecting Temperatures for Evaluating and Reporting Thermal Properties of Thermal Insulation
- C1101/C1101M Test Methods for Classifying the Flexibility or Rigidity of Mineral Fiber Blanket and Board Insulation
- C1104/C1104M Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation
- C1335 Test Method for Measuring Non-Fibrous Content of Man-Made Rock and Slag Mineral Fiber Insulation

## 3. Terminology

3.1 *Definitions*—Terminology C71 and Terminology C168 shall be considered as applying to the terms used in this standard.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *fibers*—the fibers shall be refractory oxides, processed from a molten state into fibrous form.

3.2.2 *high-temperature fiber thermal insulation*— a thermal insulation, varying in flexibility, composed of refractory inorganic fibers, with or without binder added, and furnished in either flat sheets or rolls.

## 4. Classification

4.1 The general-type product governed by this specification is blanket or batt composed of inorganic refractory fibers.

4.2 *Types*—The product is separated into types based upon temperatures of use (Table 1).

4.3 *Grades*—The product is separated into grades based upon its maximum Apparent Thermal Conductivity values (see Table 2) and minimum Tensile Strength values (see Table 3).

## 5. Ordering Information

5.1 High-temperature fiber blanket thermal insulation is normally purchased on the basis of brand name, type, grade, length, width, thickness, and total square footage as specified in the purchase order.

5.2 The type and grade for the intended service shall be as specified by the user with the assistance of the supplier where desirable.

5.3 The purchaser shall be permitted to specify, inspect and sample the material.

5.4 When a certification or test report, or both, is required, this shall be specified by the purchaser.

## 6. Materials and Manufacture

6.1 *Composition*—High temperature fiber thermal insulation shall be composed of fibers, made of metallic oxides of, but not limited to, silicon, aluminum, calcium, and magnesium. The raw materials, processed from the molten state into spun fibers, are then mechanically interlocked through a needling process into insulation blanket felts with out the use of chemical binders.

## 7. Physical and Mechanical, and Chemical Properties Requirements

7.1 *Apparent Thermal Conductivity* shall conform to the requirements of Table 2 when tested in accordance with 11.1.2.

7.2 *Tensile Strength*—shall conform to the requirements of Table 3 when tested in accordance with 11.1.5.

7.3 *Flexibility*—shall be classified as flexible when tested in accordance with 11.1.8.

7.4 *Maximum Use Temperature*—shall conform to the requirements of 4.2 when tested in accordance with 11.1.4.

7.5 *Non-fibrous content (shot)*—shall be limited to a maximum of 30% by weight when testing in accordance with 11.1.3.

7.6 *Linear Shrinkage*—shall be limited to a maximum of 5%, after exposure to the Maximum Use Temperature, in accordance with 11.1.4.

## 8. Dimensions, Mass, and Permissible Variations

8.1 Rolls or flat sheets of blanket are normally furnished in standard dimensions as shown in Table 4, Table 5, and Table 6.

8.2 The standard length, width, and thickness combinations available are a function of the type and grade. Contact the supplier for information on standard or non-standard dimension and combinations.

8.3 The maximum density (determined in accordance with Test Method C167) specified in Table 4 for Grades 3, 4, 6, 8, 10, and 12 are for weight design purposes only.

## 9. Workmanship, Finish, and Appearance

9.1 The insulation shall indicate good workmanship in fabrication by a uniform appearance, shall not have visible defects such as tears and holes that will adversely affect the service quality, and shall be free from foreign materials.

## 10. Sampling

10.1 The insulation shall be sampled for the purposes of test in accordance with Practice C390. Specific provision for sampling shall be agreed upon between the supplier and the purchaser.

## 11. Test Methods

11.1 The properties enumerated in this specification shall be determined in accordance with the following test methods:

11.1.1 *Dimensional Measurement and Density*—Test Methods C167. Density is based on nominal thickness.

11.1.2 *Apparent Thermal Conductivity*— Test in accordance with Test Methods C177.

11.1.2.1 Practice C1058. shall be used to obtain recommended test temperature combinations for testing purposes.

11.1.2.2 As specified in Practice C1045, the range of test conditions must include at least one test where the hot surface temperature is greater than, or equal to, the hot limit of the temperature range of desired data and at least one test where the cold surface temperature is less than, or equal to, the cold limit of the temperature range desired. The exception to this requirement is given in 11.1.2.2(1) below. At least two additional tests shall be distributed somewhat evenly over the rest of the temperature range.

(1) In cases where the maximum temperature of the C177 test device is exceeded by the required hot surface temperature as stipulated in 11.1.2.2, it is acceptable to operate one hot plate at the C177 upper temperature limit and the other hot plate at the lower temperature that gives the target mean temperature.

11.1.2.3 Final analysis of the thermal data shall be conducted in accordance with Practice C1045 to generate a thermal conductivity versus mean temperature relationship for the specimen. Practice C1045 and the specific hot and cold surface temperatures is required to determine the effective thermal conductivity for comparison to the specification requirements.

11.1.2.4 Final step of Practice C1045 analysis would be to calculate the thermal conductivity using the equations generated at a set of mean temperatures for comparison to the specification.

(1) While it is recommended that the specification data be presented as conductivity versus temperature, it is possible that several existing specifications will contain mean temperature

**TABLE 1 Classification by Type**

Type	Temperature of use, °F (°C), maximum
I	1350 (732)
II	1600 (871)
III	2300 (1260)
IV	2600 (1427)
V	3000 (1649)