



Designation: C 1497 – 01^{ε1}

Standard Specification for Cellulosic Fiber Stabilized Thermal Insulation¹

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^{ε1} NOTE—Section 9.2 was editorially updated in January 2002.

1. Scope

1.1 This specification covers the composition and physical properties of spray-applied cellulosic fiber stabilized thermal insulation applied to open or closed ceiling spaces, regardless of slope, where temperatures range from -49 to 194°F (-45 to 90°C).

1.2 Stabilized cellulosic fiber thermal insulation is produced by the addition of adhesive(s) to loose-fill cellulosic fiber insulation. The adhesive(s) may be added to the insulation at time of manufacture and, if necessary, activated by the addition of water when installed or the adhesive may be added to the insulation at the time of installation.

1.3 This is a material specification that is not intended to deal with methods of application that are supplied by the manufacturer.

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

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 167 Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations²

C 168 Terminology Relating to Thermal Insulating Materials²

C 739 Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation²

C 1149 Specification for Self-Supported Spray Applied Cellulosic Thermal Insulation²

C 1304 Test Method for Assessing the Odor Emission of Thermal Insulation Materials²

C 1338 Test Method for Determining Fungi Resistance of

Insulation Materials and Facings²

E 970 Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source³

3. Terminology

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

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *shrinkage*—decrease in thickness that occurs from the time of installation until the insulation achieves a stable moisture content.

3.2.2 *stabilized cellulose*—a cellulosic insulation product treated to resist, after drying, further settling of no more than 5 %.

4. Materials and Manufacture

4.1 The basic material shall be recycled cellulosic fiber made from selected paper or paperboard stock. Additives are introduced to provide properties such as flame resistance, processing and handling characteristics. An adhesive is added to the insulation product to resist long-term settling of the insulation after installation and curing.

4.2 The materials are processed into a form suitable for installation by a pneumatic method.

4.3 The adhesive may be added to the product at the time of manufacture or at the time of installation by means of a liquid spray.

5. Physical and Chemical Properties

5.1 *Density*—The density of conditioned stabilized insulation in lb/ft³(kg/m³) shall be determined in accordance with Section 7.

5.2 *Corrosiveness*—The loose-fill insulation material shall be tested for corrosiveness in accordance with Section 8. The composition of the insulation material shall be such that after testing, no perforation of the 0.003 in. (0.076 mm) metal specimens shall be evident when the specimens are observed over a 40-W appliance light bulb. Notches extending into the coupon 0.1 in. (3 mm) or less from any edge shall be ignored.

¹ 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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² *Annual Book of ASTM Standards*, Vol 04.06.

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

5.3 Critical Radiant Flux—When tested in accordance with Section 9, the critical radiant flux shall be equal to or greater than 0.11 Btu/ft²·s (0.12 W/cm²). All values shall be reported to two significant digits.

5.4 Fungi Resistance—The loose-fill insulation material shall be tested and pass fungi resistance as specified in Section 10. The test specimen shall exhibit growth less than or equal to the comparative material in order to pass.

5.5 Water Vapor Sorption—Moisture gain in the insulation shall be no more than 15 % by weight when tested in accordance with Section 11.

5.6 Odor Emission—Any sample producing a detectable odor that is classified as objectionable and strong or strong by more than two panel members shall be considered to have failed the test when tested in accordance with Section 12.

5.7 Smoldering Combustion—When tested in accordance with the smoldering combustion test method in Section 13, the insulation shall show no evidence of flaming and a weight loss of no greater than 15 % of the specimen weight.

5.8 Thermal Resistance—The standard thermal resistance values recommended for application shall be expressed in °F·h·ft²/Btu (K·m²/W). The R-value shall be measured in accordance with Section 14. During random sampling, an average measured R for four specimens that is 95 % of the labeled value shall be acceptable provided no measurement is less than 90 % of the labeled value.⁴

5.9 Flame Resistance Permanency—The importance of an insulation product to maintain its fire retardant characteristics is recognized. A task group is currently studying methods to ascertain if there is long-term deterioration of fire performance characteristics of cellulose insulation. Should the need for a permanency test method be determined by this task group and a test method developed and finalized, it will become a part of this specification.

5.10 Shrinkage—The shrinkage (S_1) determined in accordance with Section 7.

5.11 Settling—The settling (S_2) determined in accordance with Section 7 shall be no greater than 5 %.

6. Workmanship, Finish, and Appearance

6.1 The product shall be free of extraneous foreign materials such as metals and glass that will adversely affect the performance in service.

7. Shrinkage, Settling, and Density

7.1 Density:

7.1.1 Scope—This test method provides a basis for calculating the product coverage values and for conducting physical property tests requiring the use of density for specimen preparation. The shrinkage and settling results provide information for installation.

7.1.2 Significance and Use—The density is the weight per unit volume expected after long-term attic use. All testing of

this product shall be done using specimens having the density determined by the drop box method described in this section.

7.1.3 Apparatus:

7.1.3.1 Insulation Specimen Container—The drop box apparatus shall consist of an open-top box with sides and bottom made from ¾-inch (19 mm) thick plywood. The interior of the box should be treated with a water sealer. The interior dimensions of the box shall be 22×36×5-inch (deep) (559×914×127 mm) for insulation with $R < 22 \text{ ft}^2 \cdot \text{h} \cdot ^\circ\text{F}/\text{Btu}$ ($3.87 \text{ K} \cdot \text{m}^2/\text{W}$), 22×36×7½-inch (deep) (559×914×191 mm) for insulation with $22 < R < 32 \text{ ft}^2 \cdot \text{h} \cdot ^\circ\text{F}/\text{Btu}$ and 22×36×10-inch (deep) (550×914×254 mm) for insulation with $R > 32 \text{ ft}^2 \cdot \text{h} \cdot ^\circ\text{F}/\text{Btu}$ ($5.64 \text{ K} \cdot \text{m}^2/\text{W}$). A 1.0-inch (25 mm) steel “eye” shall be attached to each corner to facilitate lifting the box with a cable or rope harness and pulley system. All box dimensions shall be within ±3 % of the values specified above.

7.1.3.2 Spacer—A 6.0-inch (150 mm) thick spacer shall be fabricated for positioning the box above a concrete floor. The spacer should be fitted with a handle or heavy cord to assist moving it from below the suspended box. A quick release device can be used to drop the suspended box.

7.1.3.3 Balance—A balance having sufficient capacity to weigh a specimen container with freshly installed insulation to within 0.01 lb (5g).

7.1.3.4 Probe and Ruler—A 0.125 ± 0.008 inch (3.2 ± 0.2 mm) diameter metal rod that is pointed on one end shall be used as a pin gauge. A steel rule with 0.05 inch (1.0 mm) or finer readability shall be used to determine insulation thicknesses. The device pictured in Figure 1 of Test Method C 167 may be used.

7.2 Procedure:

7.2.1 A partially enclosed area is required for specimen preparation. The enclosure must protect the blowing operation from wind or strong air currents. The geometry of the room should not influence the stream of insulation from the hose. It is recommended that the area of the enclosure be at least 2.5 times the area of the test specimen container.

7.2.2 The weight of the empty box, M_1 , shall be determined to within 0.06 lb (25g).

7.2.3 The product to be tested shall be installed in the box using equipment and installation instructions recommended by the manufacturer. Excess insulation shall be screed from the top of the test specimen to provide a level surface that coincides with the top edges of the box. The weight of the box and newly installed insulation, M_2 , shall be determined to within 0.06 lb (25g) and recorded.

7.2.4 The average depth of the insulation shall be determined to within 0.05-inch (1 mm) using a metal probe. Five individual depth measurements shall be averaged to obtain the depth that is representative of the newly installed insulation. Individual measurements shall be taken at the center of the box and in each quadrant of the box.

7.2.5 The insulation shall be allowed to dry in a conditioned space maintained at $75 \pm 5^\circ\text{F}$ and $50 \pm 5 \%$ RH until a change in net weight of the specimen is less than 0.06 lbs (25 g) in two consecutive weighings with 24 hours between weighings. The weight of the box with the conditioned (dry) insulation, M_3 , shall be recorded. Since moving of boxes containing insulation

⁴ The ranges of thermal resistance, R, listed in this section are allowed by Federal Trade Commission 16 CFR Part 460 Trade Regulation Rule: Labeling and Advertising of Home Insulation.