



Designation: C 687 – 96

Standard Practice for Determination of Thermal Resistance of Loose-Fill Building Insulation¹

This standard is issued under the fixed designation C 687; 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.

1. Scope

1.1 This practice presents a laboratory guide to determine the thermal resistance of loose-fill building insulations at mean temperatures between – 20 and 55°C (–4 to 131°F).

1.2 This practice applies to a wide variety of loose-fill thermal insulation products including fibrous glass, rock/slag wool, or cellulosic fiber materials; granular types including vermiculite and perlite; pelletized products; and any other insulation material that may be installed pneumatically or poured in place. It does not apply to products that change their character after installation either by chemical reaction or the application of binders or adhesives, nor does it consider the effects of structures, containments, facings, or air films.

1.3 Since this practice is designed for reproducible product comparison, it measures the thermal resistance of an insulation material which has been preconditioned to a relatively dry state. Consideration of changes of thermal performance of a hygroscopic insulation by sorption of water is beyond the scope of this practice.

1.4 The sample preparation techniques outlined in this practice do not cover the characterization of loose-fill materials intended for enclosed applications. For those applications, a separate sample preparation technique that simulates the installed condition will be required. For those applications, however, other aspects of this practice should be applicable.

1.5 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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:

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

¹ This practice is under the jurisdiction of ASTM Committee C-16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.30 on Thermal Measurement.

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² Annual Book of ASTM Standards, Vol 04.06.

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 236 Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box²

C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus²

C 653 Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral Fiber Insulation²

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

C 976 Test Method for Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box²

C 1045 Practice for Calculating Thermal Transmission Properties from Steady-State Heat Flux Measurements²

C 1114 Test Method for Steady-State Thermal Transmission Properties by Means of the Thin-Heater Apparatus²

3. Terminology

3.1 Unless otherwise stated, the terms and definitions found in Terminology C 168 are applicable herein.

3.2 *label density*—the expected mass per unit volume, after long-term settlement, of a loose-fill insulation that has been applied per manufacturer's specifications. This test density will yield the labeled thermal resistance when tested under the conditions specified by this practice.

4. Significance and Use

4.1 The thermal resistance, *R*, of an insulation is used to describe its thermal performance.

4.2 The thermal resistance of an insulation is related to the density and thickness of the insulation. It is desirable to obtain test data on thermal resistances at thicknesses and densities related to the end uses of the product.

4.3 In normal use, the thickness of these products may range from less than 100 mm (4 in.) to greater than 500 mm (20 in.). Installed densities will depend upon the product type, the installed thickness, the installation equipment used, the installation techniques, and the geometry of the insulated space.

4.4 Loose-fill insulations are specified using label densities selected by manufacturers to represent the product settled