



Standard Practice for Evaluating Thermal Insulation Materials for Use in Solar Collectors¹

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1. Scope

1.1 This practice sets forth a testing methodology for evaluating the properties of thermal insulation materials to be used in solar collectors with concentration ratios of less than 10. Tests are given herein to evaluate the pH, surface burning characteristics, moisture adsorption, water absorption, thermal resistance, linear shrinkage (or expansion), hot surface performance, and accelerated aging. This practice provides a test for surface burning characteristics but does not provide a methodology for determining combustibility performance of thermal insulation materials.

1.2 The tests shall apply to blanket, rigid board, loose-fill, and foam thermal insulation materials used in solar collectors. Other thermal insulation materials shall be tested in accordance with the provisions set forth herein and should not be excluded from consideration.

1.3 The assumption is made that elevated temperature, moisture, and applied stresses are the primary factors contributing to the degradation of thermal insulation materials used in solar collectors.

1.4 Solar radiation is not considered a contributing factor since insulating materials are not normally exposed to it.

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 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus²

C 209 Test Methods for Cellulosic Fiber Insulating Board²
C 356 Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat²
C 411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation²
C 518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus²
C 553 Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications²
C 687 Practice for Determination of the Thermal Resistance of Loose-Fill Building Insulation²
D 2842 Test Method for Water Absorption of Rigid Cellular Plastics³
E 84 Test Method for Surface Burning Characteristics of Building Materials⁴

3. Summary of Practice

3.1 The following factors, in most cases, should be considered when evaluating insulation materials for use in solar collectors. Design considerations should dictate priorities in material test evaluations:

Factor	Reference Section
pH	7.2
Surface Burning Characteristics	7.3
Moisture Adsorption	7.4
Water Absorption	7.5
Thermal Resistance	7.6
Linear Shrinkage (or Expansion)	7.7
Hot Surface Performance	7.8
Chemical Compatibility	7.9
Outgassing	7.10
Durability	7.11

¹ These test methods are under the jurisdiction of ASTM Committee E44 on Solar, Geothermal, and Other Alternative Energy Sources and is the direct responsibility of Subcommittee E44.05 on Solar Heating and Cooling Subsystems and Systems.

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² Annual Book of ASTM Standards, Vol 04.06.

³ Annual Book of ASTM Standards, Vol 08.02.

⁴ Annual Book of ASTM Standards, Vol 04.07.