



Standard Test Method for Estimating the Long-Term Change in the Thermal Resistance of Unfaced Rigid Closed-Cell Plastic Foams by Slicing and Scaling Under Controlled Laboratory Conditions^{1,2}

This standard is issued under the fixed designation C 1303; 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 test method covers a procedure for estimating the long-term change in thermal resistance of unfaced rigid closed-cell plastic foams by reducing the material thickness to accelerate aging under controlled laboratory conditions **(1-3)**.³

1.2 This test method is limited to unfaced, homogeneous materials (see 3.2.4). It may be applied to a wide range of rigid closed cell plastic foam types, including but not limited to, polystyrenes, polyurethanes, polyisocyanurates, and phenolics produced in board form, foamed-in-place, or spray-applied applications. No specific procedures are detailed in this test method to address the effects of permeable or impermeable facings or skins, manufactured thickness, orientation, manufacturing process, density, quality, the influence of structures or containments, or the end-use environmental conditions on internal cell gas composition. The user of this test method shall consider if these parameters limit the use of this test method for a specific application.

1.3 This test method utilizes standard test procedures for measuring thermal resistance. Periodic measurements are performed on specimens to observe the effects of aging. Specimens of reduced thickness are used to shorten the time required for these observations. The results of these measurements are coupled with a scaling factor to estimate the thermal resistance of the material under evaluation for other thicknesses as a function of time.

1.4 This test method specifies methods of specimen preparation, procedures for determining the specimen effective diffusion thickness (see 3.2.3), and precautions for determining the thermal resistance of thin specimens.

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 test method should be used to measure and describe the relative change in thermal resistance of rigid closed-cell plastic foams under controlled laboratory conditions. It should not be used to describe or appraise the performance of these materials or products under actual use conditions. With continuing development, results from this test method may be used as an element in an assessment which takes into account all of the factors that are pertinent to an estimation of the thermal performance of these materials. Critical elements of this assessment are presently not available. See 1.2.

1.7 *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 168 Terminology Relating to Thermal Insulating Materials⁴
- C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus⁴
- C 236 Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box⁴
- C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus⁴
- C 578 Specification for Rigid, Cellular Polystyrene Thermal Insulation⁴
- C 591 Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation⁴
- C 976 Test Method for Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box⁴
- C 1029 Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation⁴
- C 1045 Practice for Calculating Thermal Transmission Properties from Steady-State Heat Flux Measurements⁴

¹ This test method 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 ISO/TC163/SC2/WG7 is also developing a standard to address the aging of unfaced rigid closed-cell plastic foams. This document is entitled, "Determination of the Long-Term Thermal Resistance of Closed-Cell Cellular Plastic Thermal Insulation."

³ The boldface numbers in parentheses refer to the list of references at the end of this standard.

⁴ Annual Book of ASTM Standards, Vol 04.06.

