



Standard Test Method for Using Heat Flow Meter Apparatus to Measure the Center-of- Panel Thermal Transmission Properties of Vacuum Insulation Panels¹

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1. Scope

1.1 This test method covers the measurement of steady-state thermal transmission through the center of a flat rectangular vacuum insulation panel using a heat flow meter apparatus.

1.2 Total heat transfer through the non-homogenous geometry of a vacuum insulation panel requires the determination of several factors, as discussed in Specification C1484. One of those factors is the center-of-panel thermal resistivity. The center-of-panel thermal resistivity is an approximation of the thermal resistivity of the core evacuated region.

1.3 This test method is based upon the technology of Test Method C518 but includes modifications for vacuum insulation panel applications as outlined in this test method.²

1.4 This test method shall be used in conjunction with Practice C1045 and Practice C1058.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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:³

C168 Terminology Relating to Thermal Insulation

C518 Test Method for Steady-State Thermal Transmission

C740 Practice for Evacuated Reflective Insulation In Cryogenic Service

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

C1484 Specification for Vacuum Insulation Panels

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

3. Terminology

3.1 *Definitions*—Terminology C168 applies to terms used in this specification.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *center-of-panel*—the location at the center of the largest planar surface of the panel, equidistant from each pair of opposite edges of that surface.

3.2.2 *center-of-panel apparent thermal resistivity*—the thermal performance of vacuum insulation panels includes an edge effect due to heat flow through the barrier material and this shunting of heat around the evacuated volume of the panel becomes more prevalent with greater barrier thermal conductivity, as shown in Fig. 1. For panels larger than a minimum size (as described in Annex A1), the center-of-panel apparent thermal resistivity is a close approximation of the intrinsic core thermal resistivity of the vacuum insulation panel. The effective thermal performance of a panel will vary with the size and shape of the panel.

3.2.2.1 *Discussion*—Thermal resistivity, the reciprocal of apparent thermal conductivity, is used when discussing the center-of-panel thermal behavior.

3.2.3 *core*—the material placed within the evacuated volume of a vacuum insulation panel. This material may perform any or all of the following functions: prevent panel collapse due to atmospheric pressure, reduce radiation heat transfer, and reduce gas-phase conduction. The apparent thermal conductivity of the core, or λ_{core} , is defined as the apparent thermal

¹ This test method is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.30 on Thermal Measurement.

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² All references to particular sections of Test Method C518 within this document refer to the 2010 edition of Test Method C518.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.