



Standard Practice for Specimen Preparation and Mounting of Reflective Insulation, Radiant Barrier and Vinyl Stretch Ceiling Materials for Building Applications to Assess Surface Burning Characteristics¹

This standard is issued under the fixed designation E2599; 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 describes a procedure for specimen preparation and mounting when testing reflective insulation, radiant barrier and vinyl stretch ceiling materials to assess flame spread and smoke development as surface burning characteristics using Test Method E84.

1.2 This practice is for reflective insulation materials and radiant barrier materials intended for mechanical fastening to substrates or building structural members, or intended to be mounted to a substrate with an adhesive.

1.3 Specimens of reflective insulation materials and radiant barrier materials intended for mechanical fastening shall be prepared and mounted in accordance with 6.1. Specimens of reflective insulation materials and radiant barrier materials intended to be mounted to a substrate with an adhesive shall be prepared and mounted in accordance with 6.2. If the reflective insulation material or sheet radiant barrier material includes manufacturer recommended installation instructions with the option to be installed either by mechanical attachment or adhered, the insulation material shall be tested by both mounting procedures as outlined in 6.1 and 6.2.

1.4 Specimens of vinyl stretch ceiling materials shall be prepared and mounted in accordance with 6.1.

NOTE 1—Vinyl stretch ceiling materials are mechanically fastened.

1.5 This practice shall apply to reflective insulation materials and radiant barrier materials as defined in Section 3.

¹ This practice is under the jurisdiction of ASTM Committee E05 on Fire Standards and is the direct responsibility of Subcommittee E05.22 on Surface Burning.

Current edition approved July 1, 2016. Published August 2016. Originally approved in 2009. Last previous edition approved in 2015 as E2599-15. DOI: 10.1520/E2599-16.

1.6 This practice shall apply to reflective plastic core insulation materials as defined in 3.2.3. Reflective plastic core insulation materials are one specific type of reflective insulation materials.

1.7 This practice shall apply to vinyl stretch ceiling materials as defined in Section 3.

1.8 This practice shall not apply to rigid foam plastics with or without reflective facers.

1.9 This practice shall not apply to site-fabricated stretch systems covered by Practice E2573.

1.10 Testing is conducted in accordance with Test Method E84.

1.11 This practice does not provide pass/fail criteria that can be used as a regulatory tool.

1.12 Use the values stated in inch-pound units as the standard in referee decisions. The values in the SI system of units are given in parentheses, for information only; see IEEE/ASTM SI-10 for further details.

1.13 This fire standard cannot be used to provide quantitative measures.

1.14 Fire testing of products and materials is inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting these tests. Fire testing involves hazardous materials, operations and equipment. This practice gives instructions on specimen preparation and mounting but the fire-test-response method is given in Test Method E84. See also Section 8.

1.15 The text of this practice references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered requirements of the standard.

1.16 *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*:²

C168 Terminology Relating to Thermal Insulation

C1224 Specification for Reflective Insulation for Building Applications

C1313 Specification for Sheet Radiant Barriers for Building Construction Applications

E84 Test Method for Surface Burning Characteristics of Building Materials

E176 Terminology of Fire Standards

E2231 Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics

E2573 Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics

IEEE/ASTM SI-10 International System of Units (SI): The Modern Metric System

3. Terminology

3.1 *Definitions*: For definitions of terms used in this practice and associated with fire issues, refer to the terminology contained in Terminologies **E176**. For definitions of terms used in this practice and associated with thermal insulation issues refer to Terminology **C168**.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *radiant barrier, n*—a low emittance (0.1 or less) surface used in the construction of a radiant barrier system.

3.2.1.1 *Discussion*—Radiant barrier materials are defined in Specification **C1313**.

3.2.2 *reflective insulation, n*—thermal insulation consisting of one or more low emittance surfaces bounding one or more enclosed air spaces.

3.2.2.1 *Discussion*—Reflective insulation materials are defined in Specification **C1224**.

3.2.3 *reflective plastic core insulation, n*—an insulation material packaged in rolls, with at least one exterior low emittance surface (0.1 or less) and a core material containing voids or cells.

3.2.3.1 *Discussion*—Reflective plastic core insulation materials are one specific type of reflective insulation materials.

3.2.4 *site-fabricated stretch system, n*—a system, fabricated on site and intended for acoustical, tackable or aesthetic purposes, that is comprised of three elements: (a) a frame (constructed of plastic, wood, metal or other material) used to hold fabric in place, (b) a core material (infill, with the correct properties for the application), and (c) an outside layer, comprised of a textile, fabric or vinyl, that is stretched taut and held in place by tension or mechanical fasteners via the frame.

3.2.5 *vinyl stretch ceiling material, n*—a vinyl material stretched and mechanically fastened to a noncombustible frame and intended to be used as a suspended ceiling without associated backing material.

4. Summary of Practice

4.1 This practice describes a procedure for specimen preparation and mounting when testing reflective insulation, radiant barrier and vinyl stretch ceiling materials to assess flame spread and smoke development as surface burning characteristics using Test Method **E84**.

4.2 Reflective insulation materials and radiant barrier materials intended for mechanical fastening to substrates or building structural members, or intended to be mounted to a substrate with an adhesive shall be tested in accordance with the specimen preparation and mounting procedures described in this practice, using Test Method **E84**.

4.3 Reflective insulation materials and radiant barrier materials intended to be used as pipe and duct insulation materials and installed without an air gap shall be tested using the specimen installation and mounting procedures described in Practice **E2231**. Reflective insulation procedures intended to be used as pipe or duct insulation materials and installed with an air gap shall be tested using the specimen preparation and mounting procedures described in Section 6 of this practice.

4.4 Vinyl stretch ceiling materials intended to be assessed for flame spread and smoke development as surface burning characteristics using Test Method **E84** shall be tested in accordance with the specimen preparation and mounting requirements described in 6.1 of this Practice.

5. Significance and Use

5.1 Reflective insulation, radiant barrier and vinyl stretch ceiling materials are evaluated in accordance with Test Method **E84** to comply with building or mechanical code requirements. This practice describes, in detail, a specimen mounting procedure for reflective insulation, radiant barrier and vinyl stretch ceiling materials.

5.2 The material shall be representative of the materials used in actual field installations.

5.3 Specimen preparation and mounting procedures for materials not described in this practice shall be added as the information becomes available.

5.4 The limitations for this procedure are those associated with Test Method **E84**.

5.5 This practice shall not apply to rigid foam plastics with or without reflective facers.

5.6 This practice shall not apply to site-fabricated stretch systems covered by Practice **E2573**.

6. Specimen Preparation and Mounting

6.1 *Specimens of Mechanically Attached Materials*:

6.1.1 Specimens shall be mechanically attached to three, steel or aluminum test frames. Each test frame shall be nominally 8.25 ft (2.5 m) by 22 to 24 in. (559 to 610 mm) wide

² 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.

by 2 in. (51 mm) deep, made from 2 by 2 by 3/16 in. (51 by 51 by 5 mm) aluminum or steel angles or equivalent. No screening or netting shall be attached to the opening of the frames where the test specimen is attached. See Fig. 1.

6.1.2 Each test on a reflective insulation material shall be conducted using a factory or field joint along the longitudinal centerline of the test specimen, with a longitudinal seam created in the approximate centerline using the same method of closure used in actual field installations.

6.1.3 It shall be permitted to represent the field joint on reflective insulation materials by introducing a longitudinal slit cut along the longitudinal centerline of the specimen facing and applying the manufacturer’s recommended field closure system (if applicable). The longitudinal slit shall not be used for radiant barriers or for vinyl stretch ceiling materials.

6.1.4 The specimens shall be of a width sufficient to cover the angle framing for attachment. Specimens shall be placed on the horizontal legs of the angle. See Section A-A of Fig. 1. The specimen shall be attached to each of the horizontal legs using self-tapping screws, through bolts or similar fastening technique.

Fasteners shall be placed a maximum of 24 in. (610 mm) on-center down the length on both sides of each 8-ft. (2.4 m) frame.

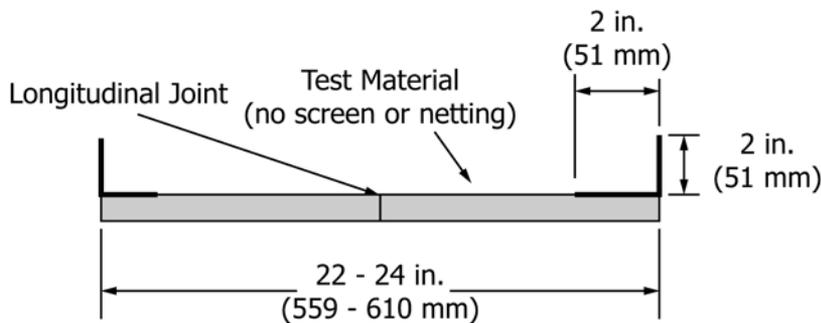
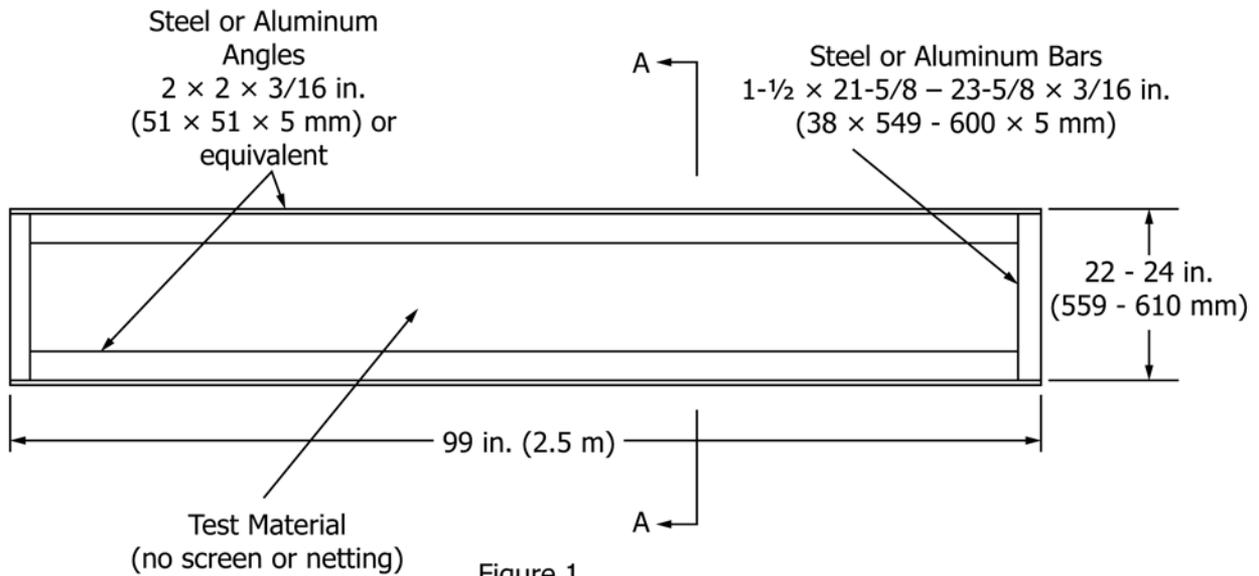
6.1.5 Mount the three frames with the attached specimen end-to-end on the ledges of the E84 furnace without using any auxiliary support. The specimen shall face the interior of the test chamber. The tunnel lid shall rest on the frame as to create a nominal 2-in. air gap between the insulation and lid.

6.1.6 The two transverse butt joints formed by the three frames are to be left uncovered or taped in accordance with manufacturer’s application instructions.

6.2 Specimens of Adhesively Attached Reflective Insulation or Radiant Barrier Materials:

6.2.1 Specimens shall be adhesively attached to a substrate. The substrate shall be representative of that used in actual field installation. The substrate shall consist of flat sheets cut to size as appropriate for mounting in Test Method E84.

6.2.2 Each test shall be conducted using a factory or field joint along the longitudinal centerline of the test specimen,



Section A-A

FIG. 1 Mounting Frame (three required)

with a longitudinal seam created in the approximate centerline using the same method of closure used in actual field installations.

6.2.3 It shall be permitted to represent the field joint by introducing a longitudinal slit cut along the longitudinal centerline of the specimen facing and applying the manufacturer's recommended field closure system (if applicable).

6.2.4 Specimens shall be mounted to the substrate using the adhesive that is representative of that used in actual field installation. The adhesive shall be applied per the manufacturer's installation directions.

6.2.5 The specimens shall be of a width sufficient to cover the substrate and the attachment of the specimen to the adhesive shall be in accordance with manufacturer's installation directions.

6.2.6 Mount the substrates with the attached specimens end-to-end on the ledges of the E84 furnace without using any auxiliary support. The specimen shall face the interior of the test chamber.

6.2.7 The transverse butt joints formed by the substrates with the attached specimens are to be left uncovered or taped in accordance with manufacturer's application instructions.

6.3 If the manufacturer recommended installation instructions include installation of the reflective insulation material or sheet radiant barrier material either by mechanical attachment or by adhesive attachment, the insulation material shall be

tested using both the specimen preparation and mounting procedure outlined in 6.1 and the one outlined in 6.2.

6.4 For materials that are asymmetrical in cross-section, each side of the material shall be tested separately.

7. Testing of Specimens

7.1 All testing shall be conducted using the methodology described in Test Method E84.

8. Operator Safety

8.1 The primary concerns for operator safety are associated with the fire-test-response procedure, Test Method E84, and not with the specimen preparation procedure. Safety recommendations are included in Test Method E84.

9. Report

9.1 Report a detailed description of the specimen preparation and mounting used.

9.2 Report all the information required in the reporting section of Test Method E84, including observations, graphical results and the values of the flame spread index and of the smoke developed index in each test.

10. Keywords

10.1 fire; fire test; flame spread; insulation; radiant barrier; reflective insulation; reflective plastic core; smoke developed; Steiner tunnel; vinyl stretch ceiling material

APPENDIX

X1. COMMENTARY

X1.1 *Introduction*—It has been shown that the careful replication of realistic fire scenarios is the most appropriate means of fire testing of products and systems. However, this is not always achievable within the confines of a standard test method.

X1.2 The use of any standard fire test method intrinsically carries some limitations, including the source of heat or flame, the specimen size and orientation, the specimen location and the fire-test-response characteristics measured.

X1.3 Fire tests on reflective insulation, sheet radiant barriers and vinyl stretch ceiling materials are often conducted by using Test Method E84.

X1.3.1 The source of heat and flame in Test Method E84 is a set of two gas burners supplying approximately 300 000 BTU/h (87.9 kW) onto the test specimen from underneath for a period of 10 min.

X1.3.2 The approximate specimen sizes in Test Method E84 are 24 ft (7.3 m) long by 20 to 24 in. (510-610 mm) wide. The recommended specimen thickness is up to 4 in. (102 mm) thick.

X1.4 The mounting method using the 2 in. (51 mm) air gap is applicable for materials installed over open framing or when the materials are mechanically installed against a substrate.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; <http://www.copyright.com/>