



# Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facings and Veneers, to Assess Surface Burning Characteristics<sup>1</sup>

This standard is issued under the fixed designation E2404; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This practice describes procedures for specimen preparation and mounting when testing textile, paper, vinyl, expanded vinyl or other polymeric wall or ceiling covering materials to assess flame spread and smoke development as surface burning characteristics using Test Method E84.

1.2 This practice applies also to facings or wood veneers intended to be applied on site over a wood substrate (see 8.7).

1.3 This practice applies also to water-resistive barriers that are used as a component of exterior wall systems, as part of the exterior envelope (see 3.2.10 and 8.9).

1.4 This practice does not apply to the following:

1.4.1 Laminated products factory produced with a wood substrate, which are covered by Practice E2579.

1.4.2 Water-resistive barriers comprised of foam plastic materials contained within the wall system (see 5.3.1).

1.4.3 Water vapor retarders used, in conjunction with thermal insulation, on the interior or exterior side of an exterior wall (see 3.2.11 and 5.3.1).

1.5 Testing is conducted with Test Method E84.

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

1.7 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.

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

1.9 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 standard gives instructions on specimen preparation and mounting, but the fire-test-response method is given in Test Method E84. See also Section 10.

1.10 *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.*

1.11 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes shall not be considered requirements of the standard.

1.12 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

C1186 Specification for Flat Fiber-Cement Sheets

C1396/C1396M Specification for Gypsum Board

E84 Test Method for Surface Burning Characteristics of Building Materials

E176 Terminology of Fire Standards

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

E2579 Practice for Specimen Preparation and Mounting of Wood Products to Assess Surface Burning Characteristics

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

<sup>1</sup> 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.

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<sup>2</sup> 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.

2.2 *CSA Standard*.<sup>3</sup>

**CSA O121 Douglas Fir Plywood**

2.3 *NIST Standard*.<sup>4</sup>

**Voluntary Product Standard PS 1-07 Structural Plywood**

### 3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice refer to the terminology contained in Terminology **E176**.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *expanded vinyl wall or ceiling covering, n*—a wall or ceiling covering consisting of a woven textile backing, an expanded vinyl base coat layer (which is a homogeneous vinyl layer that contains a blowing agent), and a nonexpanded vinyl skin coat.

3.2.2 *paper wall or ceiling covering, n*—a wall or ceiling covering with a top layer consisting of paper or an alternative cellulosic-based material, but not consisting of a wood product.

3.2.3 *polymeric wall or ceiling covering, n*—a wall or ceiling covering with a top layer consisting of polymeric-based material.

3.2.4 *self-supporting specimen, n*—a specimen that remains in place by its own structural characteristics both before and during the fire test.

3.2.5 *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.

3.2.6 *textile, n*—originally a woven fabric, now generally applied to (1) staple fibers and filaments suitable for conversion to or use as yarns or for the preparation of nonwoven fabrics, (2) yarns made from natural or manufactured fibers, and (3) fabrics made from fibers as defined in (1) and (2) and from yarns.

3.2.7 *vinyl wall or ceiling covering, n*—a wall or ceiling covering produced by applying a poly(vinyl chloride) (PVC, vinyl) based coating, or laminating a preformed vinyl film, onto a woven or nonwoven fabric substrate or paper.

3.2.8 *wall or ceiling covering, n*—a textile-, paper- or polymeric (including vinyl) based product designed to be attached to a wall or ceiling surface for decorative or acoustical purposes.

3.2.8.1 *Discussion*—Wall or ceiling coverings with ink or topcoat layers added as part of the manufacturing process are included in this definition.

3.2.9 *wall or ceiling covering system, n*—an assembly of a textile wall or ceiling covering, a paper wall or ceiling covering or a polymeric (including vinyl) wall or ceiling covering,

adhesive (if used), and substrate (if it is part of the assembly) used as a wall or ceiling treatment for decorative or acoustical purposes.

3.2.9.1 *Discussion*—The wall or ceiling covering material is usually intended to be directly attached to a substrate, via adhesives or mechanical fasteners. In some cases the wall or ceiling covering system will be supported by a frame system some distance away from the wall or ceiling covering material.

3.2.10 *water-resistive barrier, n*—a material behind an exterior wall covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly.

3.2.10.1 *Discussion*—The definition above is the way that the International Code Council building code defines and uses the term.

3.2.11 *water vapor retarder, n*—a material or system that impedes the transmission of water vapor under specified conditions.

3.2.11.1 *Discussion*—The definition above is identical to the definitions of water vapor retarder contained in the terminology standards of ASTM Committees C16 (on Thermal Insulation) and E06 (on Buildings).

### 4. Summary of Practice

4.1 This practice describes procedures for specimen preparation and mounting when testing textile, paper, vinyl, expanded vinyl, or other polymeric wall or ceiling coverings to assess flame spread and smoke development as surface burning characteristics using Test Method **E84**.

4.2 This practice also describes procedures for specimen preparation and mounting for facings or wood veneers intended to be applied on site over a wood substrate and for water-resistive barriers.

### 5. Significance and Use

5.1 Textile, paper, vinyl, expanded vinyl or other polymeric wall or ceiling coverings and wall or ceiling covering systems used as interior finish are often evaluated with Test Method **E84** to comply with building or life safety code requirements. This practice describes specimen preparation and mounting procedures for such materials and systems.

5.2 This practice also describes specimen preparation and mounting procedures for other systems that are evaluated with Test Method **E84** to comply with building or life safety code requirements. Such systems are facings or wood veneers intended to be applied on site over a wood substrate and water-resistive barriers.

5.3 This practice is not applicable to the following materials:

5.3.1 Foam plastic materials used as water-resistive barriers.

5.3.2 Water vapor retarders installed over thermal insulation.

### 6. Conditioning

6.1 The test specimens shall be conditioned as described in the section on specimen conditioning in Test Method **E84**.

<sup>3</sup> Available from Canadian Standards Association (CSA), 178 Rexdale Blvd., Toronto, ON Canada M9W 1R3.

<sup>4</sup> Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Gaithersburg, MD 20899-3460.

## 7. Test Specimens

7.1 The test specimen sizes shall comply with those described in the test specimen section of Test Method E84. The test specimens shall be butted against the vent end of the fire test chamber and shall consist of a continuous, unbroken length, or of sections joined end-to-end. The test specimens shall have a width of 20 to 24 in. (510 to 610 mm), a length of 24 ft + 12 in. – 6 in. (7.32 m + 305 mm – 152 mm) and a maximum thickness of 4 in. (101 mm).

7.2 The wall covering system test specimens shall be prepared as described in Section 8.

## 8. Test Specimen Preparation

8.1 Whenever a wall or ceiling covering system uses an adhesive to attach a wall or ceiling covering material, the adhesive specified by the manufacturer shall be used for construction of the test specimen in accordance with the wall or ceiling covering manufacturer application instructions.

8.1.1 If the wall or ceiling covering system is a factory-produced wall panel, the adhesive shall be the same one used in the manufacture of the factory-produced wall or ceiling panel.

8.2 *Wall or Ceiling Coverings Intended to be Applied Directly to a Noncombustible Wall or Ceiling Surface*—If the wall or ceiling coverings are intended to be applied directly to a noncombustible wall or ceiling surface, the specimens shall consist of the wall or ceiling covering mounted on a ¼ in. (6.3 mm) thick fiber-cement board, complying with Specification C1186 (Grade II) and the requirements contained in the Annex on Fiber-Cement Board Requirements of Test Method E84. Mount the specimens on the ledges of the Test Method E84 furnace without using additional means of support.

8.3 *Wall or Ceiling Coverings Intended to be Applied over Gypsum Board*—If the wall or ceiling coverings are intended to be applied over gypsum board, the specimens shall consist of the wall or ceiling covering mounted on a 5/8 in. (15.9 mm) thick Type X gypsum board, complying with Specification C1396/C1396M. The gypsum board shall not be required to be mounted on studs. Mount the specimens on the ledges of the Test Method E84 furnace without using additional means of support.

8.3.1 Whenever a wall or ceiling covering has been tested using the test specimen described in 8.3 (over gypsum board), it shall not be required to be additionally tested mounted on a fiber-cement board.

8.4 *Wall or Ceiling Coverings Intended to be Applied over a Wood Substrate*—If the wall or ceiling coverings are intended to be applied over a wood substrate, the specimens shall consist of the wall or ceiling covering mounted on untreated plywood, with a face veneer of Douglas fir. The plywood shall have the same thickness as the wood substrate used in field practice, and shall comply with NIST Voluntary Product Standard PS 1-07, Structural Plywood. The plywood shall carry a grade stamp indicating that the plywood has been graded PS 1-07 A-B and is for exterior exposure. The plywood shall contain a grade stamp issued by a quality control agency. Alternatively, the plywood shall be permitted to be stamped as conforming to

CSA Standard O121 (Douglas fir plywood). Mount the specimens on the ledges of the Test Method E84 furnace without using an additional means of support.

8.5 *Wall or Ceiling Coverings Intended to be Applied over Substrates other than Wood, Gypsum Board or Noncombustible Surfaces*—If the wall or ceiling coverings are intended to be applied over substrates other than wood, gypsum board or noncombustible surfaces, the specimens shall consist of the wall or ceiling covering mounted on the substrate to be used in field practice. Mount the specimens on the ledges of the Test Method E84 furnace without using an additional means of support.

8.6 *Wall or Ceiling Coverings Not Intended to be Adhered Directly to a Wall or Ceiling Surface, but Intended to be Otherwise Supported by Framing or a Track System*—The specimens shall be prepared in accordance with the requirements of Practice E2573, in the same way that specimens of site-fabricated stretch systems are prepared.

8.7 *Facings or Wood Veneers Intended to be Applied On-site Over a Wood Substrate:*

8.7.1 If the facing or wood veneer is intended to be applied on-site over a wood substrate, the specimens shall comply with 8.7.1.1 as well as with 8.1.

8.7.1.1 The specimens shall consist of the facing or wood veneer mounted on the “A” face of nominal 1<sup>5</sup>/<sub>32</sub> in. untreated plywood with a face veneer of Douglas fir. The plywood shall comply with NIST Voluntary Product Standard PS 1-07. The plywood shall carry the grade stamp of either APA-*The Engineered Wood Association*<sup>5</sup> or TECO<sup>6</sup>, indicating that the plywood has been graded PS 1-07 A-C and is for exterior exposure. Alternatively, the plywood shall be permitted to be stamped as conforming to CSA O121 (Standard for Douglas fir plywood). Mount the specimens on the ledges of the Test Method E84 furnace without using additional means of support.

8.8 *Laminated Products Factory-produced with a Wood Substrate*—If the laminated product is factory-produced the specimens shall comply with the requirements of Practice E2579.

8.9 *Water-resistive Barriers*—The test specimen preparation method to be used shall be a function of the substrate over which the water-resistive barrier is intended to be applied. The test specimen preparation method to be used shall be that described in one of the following sections (8.2 through 8.5), corresponding to the substrate (noncombustible material, gypsum board, wood or other combustible material) over which the water-resistive barrier is intended to be applied.

## 9. Testing of Specimens

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

<sup>5</sup> Information available from APA The Engineered Wood Association, 7011 South 19th, Tacoma, WA, 98466.

<sup>6</sup> Information available from TECO, 5650 Terra Court, Sun Prairie, WI, 53590.

## 10. Operator Safety

10.1 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.

## 11. Report

11.1 Report the following within the Test Method E84 test report:

11.1.1 a detailed description of the system being tested.

11.1.2 a detailed description of the specimen preparation method used, including the adhesive, if used, and its application rate, per Section 8.

11.1.3 all observations, graphical results and the values of the flame spread index and of the smoke developed index in each test.

## 12. Keywords

12.1 fire; fire test; flame spread; paper ceiling coverings; paper wall coverings; smoke developed; Steiner tunnel; textile ceiling coverings; textile wall coverings; vinyl ceiling coverings; vinyl wall coverings

## APPENDIX

### X1. Grade Stamping Agencies

X1.1 APA–The Engineered Wood Association<sup>5</sup> and TECO<sup>6</sup> are quality control agencies that can issue grade stamps for PS 1-07 plywood.

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