



Standard Test Method for Fire Testing of Upholstered Furniture¹

This standard is issued under the fixed designation E1537; 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 is a fire-test-response standard.

1.2 The purpose of this test method is to determine the burning behavior of upholstered furniture used in public occupancies by measuring specific fire-test responses when the specimen of furniture is subjected to a specified flaming ignition source under well-ventilated conditions.

1.3 Data are obtained describing the burning behavior from a specific ignition source until all burning has ceased, a period of 1 h has elapsed, or flashover appears inevitable.

1.4 This test method does not provide information on the fire performance of upholstered furniture in fire conditions other than those conditions specified. In particular, this test method does not apply to smoldering ignition by cigarettes. See [X1.6](#) for further information.

1.5 The rate of heat release of the burning specimen is measured by an oxygen consumption method. See [X1.6.4](#) for further information.

1.6 The production of light obscuring smoke is measured and the concentrations of certain toxic gas species in the combustion gases are determined. See [X1.6.5](#) for further information.

1.7 The burning behavior is visually documented by photographic or video recordings, whenever possible.

1.8 The system of units to be used in referee decisions is the SI system of units, see [IEEE/ASTM SI-10](#) only. The units given in parentheses are for information only.

1.9 *This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products or assemblies under actual fire conditions.*

1.10 *Fire testing is inherently hazardous. Adequate safeguards for personnel and property shall be employed in conducting these tests.*

1.11 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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:²

[D123 Terminology Relating to Textiles](#)
[E84 Test Method for Surface Burning Characteristics of Building Materials](#)
[E176 Terminology of Fire Standards](#)
[E603 Guide for Room Fire Experiments](#)
[E800 Guide for Measurement of Gases Present or Generated During Fires](#)
[E1354 Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter](#)
[E2067 Practice for Full-Scale Oxygen Consumption Calorimetry Fire Tests](#)
[E2257 Test Method for Room Fire Test of Wall and Ceiling Materials and Assemblies](#)
[IEEE/ASTM SI-10 International System of Units \(SI\): The Modern Metric System](#)

2.2 ISO Standards:³

[ISO 4880 Burning Behaviour of Textiles and Textile Products—Vocabulary](#)
[ISO 9705 Fire Tests—Full Scale Room Test for Surface Products](#)

¹ This test method is under the jurisdiction of ASTM Committee E05 on Fire Standards and is the direct responsibility of Subcommittee E05.15 on Furnishings and Contents.

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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.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

*A Summary of Changes section appears at the end of this standard

ISO 13943 Fire Safety—Vocabulary

2.3 UL Standard:⁴

UL 1056 Fire Test of Upholstered Furniture (withdrawn)

2.4 CA Standard:⁵

CA Technical Bulletin 133 Flammability Test Procedure for Seating Furniture for Use in Public Occupancies (withdrawn)

2.5 BSI Standard:⁶

BS 5852 Fire Tests for Furniture. Methods of Test for the Ignitability of Upholstered Composites for Seating by Flame Sources

2.6 Nordtest Standard:⁷

Nordtest Method NT Fire 032 Upholstered Furniture: Burning Behavior—Full Scale Test

2.7 NFPA Standards:⁸

NFPA 265 Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls

NFPA 286 Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method and associated with fire issues, refer to the terminology contained in Terminology E176 and in ISO 13943. The definitions given in Terminology E176 shall prevail in case of conflict. For definitions of terms used in this test method and associated with textile issues, refer to Terminology D123 and ISO 4880. The definitions given in Terminology D123 shall prevail in case of conflict.

3.1.2 For definitions of terms used in this test method and associated with textile issues refer to the terminology contained in Terminology D123.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *product, n*—the upholstered furniture for which information is required.

3.2.2 *specimen, n*—manufactured item of the product, representative prototype of the product, or mock-up of the product.

3.2.2.1 *Discussion*—The mock-up shall be constructed as described in Annex A1.

3.2.3 *upholstered, adj*—covered with material (as fabric or padding) to provide a soft surface.

3.2.4 *upholstered seating furniture, n*—a unit of interior furnishing that (1) contains any surface that is covered, in whole or in part, with a fabric or other upholstery cover

material, (2) contains upholstery material, and (3) is intended or promoted for sitting upon.

3.2.5 *upholstery cover material, n*—the outermost layer of fabric or related materials used to enclose the main support system, or upholstery materials, or both, used in the furniture unit.

3.2.6 *upholstery material, n*—the padding, stuffing, or filling material used in a furniture unit, which may be either loose or attached, enclosed by an upholstery cover material, or located between the upholstery cover material and support system, if present.

3.2.6.1 *Discussion*—This includes, but is not limited to, material, such as foams, cotton batting, polyester fiberfill, bonded cellulose, or down.

4. Summary of Test Method

4.1 This test method determines a number of fire-test-response characteristics from a full-scale specimen of upholstered furniture ignited with a propane gas burner. Measurements to be made include rate of heat and smoke release, total amount of heat and smoke released, rate and concentration of carbon oxides released, and rate and amount of mass of specimen lost. Other optional measurements are also described.

4.2 Three options are provided, in all of which the upholstered furniture specimen to be tested is placed on a weighing platform and measurements of heat release, smoke release, and combustion gas release are made in an exhaust duct.

4.3 In Options A and B the duct is located outside the doorway of a test room. In Option C the duct is located directly over the specimen.

4.4 Additional (optional) instrumentation placed in the test room is also described.

5. Significance and Use

5.1 This test method provides a means to measure a variety of fire-test-response characteristics resulting from burning a specimen of upholstered furniture. The upholstered furniture specimen is allowed to burn freely under well-ventilated conditions after ignition using a propane gas burner. The most important fire-test-response characteristic measured is the rate of heat release, which quantifies the intensity of the fire generated.

5.2 The rate of heat release is measured by the principle of oxygen consumption. The assumptions and limitations of oxygen depletion calorimetry are discussed in Annex A4, and in particular in A4.1.2.

5.3 Other fire-test-response characteristics are measured, namely smoke obscuration and combustion gas release, as they are also important in making decisions on fire safety.

5.4 The most important gaseous components of smoke are the carbon oxides, present in all fires. They are indicators of the toxicity of the atmosphere and of the completeness of combustion. Measurement of concentrations of carbon oxides are useful for two purposes: as part of fire hazard assessment calculations and to improve the accuracy of heat release

⁴ Available from Underwriters Laboratories (UL), 333 Pfingsten Rd., Northbrook, IL 60062-2096, <http://www.ul.com>.

⁵ Available from Bureau of Household Goods and Service (BHGS), State of California, Dept. of Consumer Affairs, 3485 Orange Grove Ave., North Highlands, CA 95660-5595, <http://www.bhgs.dca.ca.gov/industry/tb133>.

⁶ Available from British Standards Institution (BSI), 389 Chiswick High Rd., London W4 4AL, U.K., <http://www.bsigroup.com>.

⁷ Available from Nordtest, PO Box 22, SF-00341, Helsinki, Finland.

⁸ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.