Designation: E1822 – 21

An American National Standard

Standard Test Method for Fire Testing of Stacked Chairs[1]

This standard is issued under the fixed designation E1822; 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 This test method provides a means of determining the burning behavior of stacking chairs used in public occupancies by measuring specific fire-test responses when a stack of chairs is subjected to a specified flaming ignition source under well ventilated conditions.

1.3 This test method is limited to stacked chairs.

1.4 Test data are obtained describing the burning behavior following application of a specific ignition source, from ignition until all burning has ceased, a period of one hour has elapsed, or flashover under test conditions appears inevitable.

1.5 This test method does not provide information on the fire performance of stacked chairs under fire conditions other than those conditions specified in this test method. In particular, this test method does not apply to smoldering ignition by cigarettes. See 5.11 for further information.

1.6 The rate of heat release of the burning test specimen is measured by an oxygen consumption method. See 5.11.4 for further information.

1.7 Other measurements are the production of light-obscuring smoke and the concentrations of certain toxic gas species in the combustion gases. See 5.11.5 for further information.

1.8 The burning behavior is documented visually by photographic or video recordings.

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 Use the SI system of units in referee decisions; see IEEE/ASTM SI-10. The units given in parentheses are for information only.

1.12 *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.*

1.13 *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

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

E1474 Test Method for Determining the Heat Release Rate of Upholstered Furniture and Mattress Components or Composites Using a Bench Scale Oxygen Consumption Calorimeter

E1537 Test Method for Fire Testing of Upholstered Furniture

E1590 Test Method for Fire Testing of Mattresses

[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.

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

IEEE/ASTM SI-10 American National Standard for Use of the 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

ISO 13943 Fire Safety—Vocabulary[3]

2.3 *UL Standards:*[4]

UL 1056 Fire Test of Upholstered Furniture (withdrawn)

UL 1895 Fire Test of Mattresses (withdrawn)

2.4 *CA Standards:*[5]

CA TB 129, Flammability Test Procedure for Mattresses for Use in Public Buildings

CA TB 133, Flammability Test Procedure for Seating Furniture for Use in Public Occupancies (withdrawn)

2.5 *NFPA Standard:*[6]

NFPA 289 Standard Method of Fire Test for Individual Fuel Packages

2.6 *Other Document:*[7]

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

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method and associated with fire issues, refer to Terminology E176 and ISO 13943. In case of conflict, the definitions in Terminology E176 shall prevail. For definitions of terms used in this test method and associated with textile issues refer to Terminology D123 and ISO 4880. In case of conflict, the definitions in Terminology D123 shall prevail.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *stacking chair, n*—chair that is intended to be stacked when not in use.

3.2.2 *test specimen, n*—stack of five identical stacking chairs.

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 material 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 item, 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 fire-test-response test method determines a number of fire-test-response characteristics associated with a stack of five stacking chairs, ignited with a propane gas burner. Measurements to be made include the rate of heat and smoke release, total amount of heat released, rates and concentrations of carbon oxides released, and rates and amounts of mass of test specimen lost. Other optional measurements are also described.

4.2 In Test Configurations A and B, the test specimen is placed on a weighing platform located in a test room. An exhaust hood, connected to a duct, is located at the doorway of the room.

4.3 In Test Configuration C, the test specimen is placed on a weighing platform located directly under a hood.

4.4 Heat, smoke, and combustion gas release instrumentation is placed in the duct.

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

5. Significance and Use

5.1 This test method provides a means of measuring a variety of fire-test-response characteristics resulting from burning a stack of five stacking chairs. After ignition using a propane gas burner, the test specimen is permitted to burn freely under well-ventilated conditions. The most important fire-test-response characteristic measured in this test method 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. Annex A3 discusses the assumptions and limitations.

5.3 This test method also provides measures of other fire-test-response characteristics, including smoke obscuration (as the rate of smoke release, total smoke released or optical density of smoke), combustion gas release (as concentrations of combustion gases), and mass loss, that are important to making decisions on fire safety.

5.4 In the majority of fires, 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

[3] Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, https://www.iso.org.

[4] Available from Underwriters Laboratories (UL) (hard copy only), 333 Pfingsten Rd., Northbrook, IL 60062-2096, http://www.ul.com. UL 1056 withdrawn / August 11, 2000. UL 1895 withdrawn Feb. 11, 2000.

[5] Available from California Bureau of Household Goods and Services (BHGS), State of California, Department of Consumer Affairs, 3485 Orange Grove Ave., North Highlands, CA 95660-5595, https://bhgs.dca.ca.gov/industry/tb129.pdf and https://bhgs.dca.ca.gov/industry/tb133.pdf

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

[7] Available from Nordtest, P.O. Box 22, SF-00341, Helsingfors, Finland, http://www.nordtest.info/wp/1991/05/14/upholstered-furniture-burning-behaviour-full-scale-test-nt-fire-032/