



Standard Practice for Ignition Sources¹

This standard is issued under the fixed designation E3020; 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 series of ignition sources that have been used and that are potentially applicable to assessing fire-test-response characteristics resulting from the ignition of materials, products, or assemblies.

1.2 This practice does not identify which of the ignition sources described is applicable to any specific use since that is a function of the associated fire hazard (see also 5.2).

1.3 This practice is not necessarily comprehensive and it is possible that other applicable ignition sources exist (see also 5.3).

1.4 This practice describes both flaming and non-flaming ignition sources, since the outcome of a non-flaming ignition can be the eventual flaming ignition of these materials or products (see also 4.2).

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

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

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

1.8 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.

1.9 This practice contains 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.

1.10 The values stated in SI units are to be regarded as standard in referee decisions. No other units of measurement are included in this standard. See [IEEE/ASTM SI 10](#) for further details.

¹ This practice is under the jurisdiction of ASTM Committee E05 on Fire Standards and is the direct responsibility of Subcommittee E05.33 on Fire Safety Engineering.

Current edition approved Feb. 1, 2022. Published March 2022. Originally approved in 2015. Last previous edition approved in 2016 as E3020-16a. DOI: 10.1520/E3020-22.

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

- D635 Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
- D1929 Test Method for Determining Ignition Temperature of Plastics
- D3675 Test Method for Surface Flammability of Flexible Cellular Materials Using a Radiant Heat Energy Source
- D3874 Test Method for Ignition of Materials by Hot Wire Sources
- D5025 Specification for Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials
- D5207 Practice for Confirmation of 20-mm (50-W) and 125-mm (500-W) Test Flames for Small-Scale Burning Tests on Plastic Materials
- D5424 Test Method for Smoke Obscuration of Insulating Materials Contained in Electrical or Optical Fiber Cables When Burning in a Vertical Cable Tray Configuration
- D5537 Test Method for Heat Release, Flame Spread, Smoke Obscuration, and Mass Loss Testing of Insulating Materials Contained in Electrical or Optical Fiber Cables When Burning in a Vertical Cable Tray Configuration
- D6194 Test Method for Glow-Wire Ignition of Materials
- E84 Test Method for Surface Burning Characteristics of Building Materials
- E108 Test Methods for Fire Tests of Roof Coverings
- E136 Test Method for Assessing Combustibility of Materials

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.

Using a Vertical Tube Furnace at 750°C

E162 Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source

E176 Terminology of Fire Standards

E648 Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

E662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials

E906/E906M Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using a Thermopile Method

E1321 Test Method for Determining Material Ignition and Flame Spread Properties

E1352 Test Method for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies

E1353 Test Methods for Cigarette Ignition Resistance of Components of Upholstered Furniture

E1354 Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

E1537 Test Method for Fire Testing of Upholstered Furniture

E1590 Test Method for Fire Testing of Mattresses

E1623 Test Method for Determination of Fire and Thermal Parameters of Materials, Products, and Systems Using an Intermediate Scale Calorimeter (ICAL)

E1822 Test Method for Fire Testing of Stacked Chairs

E1995 Test Method for Measurement of Smoke Obscuration Using a Conical Radiant Source in a Single Closed Chamber, With the Test Specimen Oriented Horizontally

E2058 Test Methods for Measurement of Material Flammability Using a Fire Propagation Apparatus (FPA)

E2187 Test Method for Measuring the Ignition Strength of Cigarettes

E2574/E2574M Test Method for Fire Testing of School Bus Seat Assemblies

IEEE/ASTM SI 10 American National Standard for Use of the International System of Units (SI): The Modern Metric System

2.2 *Institute of Electrical and Electronic Engineers (IEEE) Standards:*³

IEEE 383 IEEE Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations

IEEE 1202 IEEE Standard for Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies

2.3 *International Organization for Standardization (ISO) Standards:*⁴

ISO 871 Plastics—Determination of Ignition Temperature Using a Hot-Air Furnace

ISO 5657 Reaction to Fire Tests—Ignitability of Building Products Using a Radiant Heat Source

ISO 5659-2 Plastics—Smoke Generation Part 2: Determination of Optical Density by a Single-Chamber Test

ISO 5660-1 Reaction to Fire Tests—Heat Release, Smoke Production and Mass Loss Rate—Part 1: Heat Release (Cone Calorimeter Method)

ISO 8191-1 Furniture—Assessment of the Ignitability of Upholstered Furniture—Part 1: Ignition Source: Smouldering Cigarette

ISO 8191-2 Furniture—Assessment of the Ignitability of Upholstered Furniture—Part 2: Ignition Source: Match Flame Equivalent

ISO 9705 Reaction to Fire Tests—Full-Scale Room Test for Surface Products

ISO 12863 Standard Test Method for Assessing the Ignition Propensity of Cigarettes

ISO 12949 Standard Test Method for Measuring the Heat Release Rate of Low Flammability Mattresses and Mattress Sets

ISO 13943 Fire Safety—Vocabulary

2.4 *International Electrotechnical Commission (IEC) Standards:*⁵

IEC 60332-1-2 Tests on Electric and Optical Fibre Cables Under Fire Conditions—Part 1-2: Test for Vertical Flame Propagation for a Single Insulated Wire or Cable—Procedure for 1 kW Pre-mixed Flame

IEC 60332-2-1 Tests on Electric and Optical Fibre Cables Under Fire Conditions—Part 2-1: Test for Vertical Flame Propagation for a Single Small Insulated Wire or Cable – Apparatus

IEC 60332-3-10 Tests on Electric and Optical Fibre Cables Under Fire Conditions—Part 3-10: Test for Vertical Flame Spread of Vertically-mounted Bunched Wires or Cables—Apparatus

IEC 60695-2-10 Fire Hazard Testing—Part 2-10: Glowing/Hot-Wire Based Test Methods—Glow-Wire Apparatus and Common Test Procedure

IEC 60695-2-11 Fire Hazard Testing—Part 2-11: Glowing/Hot-Wire Based Test Methods—Glow-Wire Flammability Test Method for End-Products

IEC/TS 60695-2-20 Fire Hazard Testing—Part 2-20: Glowing/Hot-Wire Based Test Methods—Hot Wire Ignition Test—Apparatus, Confirmatory Test Arrangement and Guidance

IEC TS 60695-11-2 Fire Hazard Testing—Part 11-2: Test Flames—1 kW Nominal Pre-Mixed Flame—Apparatus, Confirmatory Test Arrangement and Guidance

IEC TS 60695-11-3 Fire Hazard Testing—Part 11-3: Test Flames—50 W Flame—Apparatus and Confirmational Test Methods

IEC TS 60695-11-4 Fire Hazard Testing—Part 11-4: Test Flames—50 W Flame—Apparatus and Confirmational Test Methods

³ Available from Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., Piscataway, NJ 08854-4141, <http://www.ieee.org>.

⁴ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.

⁵ Available from International Electrotechnical Commission (IEC), 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland, <http://www.iec.ch>.