



Designation: E 176 – 02

## Standard Terminology of Fire Standards<sup>1</sup>

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### 1. Scope

1.1 This terminology covers terms, related definitions, and descriptions of terms used or likely to be used in fire-test-response standards, fire-hazard-assessment standards, and fire-risk-assessment standards. Definitions of terms are special-purpose definitions that are consistent with the standard definitions but are written to ensure that a specific fire-test-response standard, fire-hazard-assessment standard, or fire-risk-assessment standard is properly understood and precisely interpreted.

NOTE 1—For additional information, refer to ASTM Policy on Fire Standards.<sup>2</sup>

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- D 3286 Test Method for Gross Calorific Value of Coal and Coke by the Isoperibol Bomb Calorimeter<sup>3</sup>
- E 84 Test Method for Surface Burning Characteristics of Building Materials<sup>4</sup>
- E 119 Test Methods for Fire Tests of Building Construction and Materials<sup>4</sup>
- E 152 Methods of Fire Tests of Door Assemblies<sup>5</sup>
- E 163 Method for Fire Tests of Window Assemblies<sup>5</sup>
- E 648 Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source<sup>4</sup>
- E 800 Guide for Measurement of Gases Present or Generated During Fires<sup>4</sup>
- E 814 Test Method for Fire Tests of Through-Penetration Fire Stops<sup>4</sup>
- E 906 Test Method for Heat and Visible Smoke Release Rates for Materials and Products<sup>4</sup>
- E 970 Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source<sup>4</sup>

- E 1317 Test Method for Flammability of Marine Surface Finishes<sup>4</sup>
  - E 1321 Test Method for Determining Material Ignition and Flame Spread Properties<sup>4</sup>
  - E 1352 Test Method for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies<sup>4</sup>
  - E 1353 Test Method for Cigarette Ignition Resistance of Components of Upholstered Furniture<sup>4</sup>
  - E 1354 Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter<sup>4</sup>
  - E 1474 Test Method for Determining the Heat Release Rate of Upholstered Furniture and Mattress Components or Composites Using a Bench Scale Oxygen Consumption Calorimeter<sup>4</sup>
  - E 1529 Test Method for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies<sup>4</sup>
  - E 1537 Test Method for Fire Testing of Upholstered Furniture Items<sup>4</sup>
  - E 1590 Test Method for Fire Testing of Mattresses<sup>4</sup>
  - E 1623 Test Method for Determination of Fire and Thermal Parameters of Materials, Products, and Systems Using an Intermediate Scale Calorimeter (ICAL)<sup>4</sup>
  - E 1678 Test Method for Measuring Smoke Toxicity for Use in Fire Hazard Analyses<sup>4</sup>
  - E 1725 Test Method for Fire Tests of Fire Resistive Barrier Systems for Electrical System Components<sup>4</sup>
  - E 1776 Guide for Development of Fire-Risk-Assessment Standards<sup>4</sup>
  - E 1822 Test Method for Fire Testing of Stacked Chairs<sup>4</sup>
- #### 2.2 ISO Standards<sup>6</sup>:
- ISO 13943, Fire Safety-Vocabulary

### 3. Significance and Use

3.1 *Definitions*—Terms and related definitions given in Section 4 are intended for use uniformly and consistently in all fire test standards and in all fire-test-response standards, fire-hazard-assessment standards, and fire-risk-assessment standards in which they appear.

#### 3.2 *Definitions of Terms Specific to This Standard:*

<sup>1</sup> This terminology is under the jurisdiction of ASTM Committee E05 on Fire Standards and is the responsibility of Subcommittee E05.31 on Terminology and Editorial.

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<sup>2</sup> Available from ASTM Headquarters, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 05.05.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 04.07.

<sup>5</sup> Discontinued; see *1994 Annual Book of ASTM Standards*, Vol 04.07.

<sup>6</sup> Date indicates year of introduction or latest review or revision.

3.2.1 As indicated in Section 4, terms and their definitions are intended to provide a precise understanding and interpretation of fire-test-response standards, fire-hazard-assessment standards, and fire-risk-assessment standards in which they appear.

3.2.2 A specific definition of a given term is applicable to the standard or standards in which the term is described and used.

3.2.3 Different definitions of the same term, appearing respectively in two or more standards, are acceptable provided each one is consistent with and not in conflict with the standard definition for the same term, that is, concept.

3.2.4 Each standard in which a term is used in a manner specially defined (see 1.1 and Section 5) should list the term and its description under the subheading, Definitions of Terms.

3.3 Definitions for some terms associated with fire issues and not included in Terminology E 176 can be found in ISO 13943. When discrepancies exist, the definition in Terminology E 176 shall prevail.

#### 4. Terminology

4.1 Terms and their standard definitions within the scope of this standard are given in Section 4 in alphabetical order. Annex A1 contains the definitions of terms that are included in other fire standards.

4.2 Discussions associated with definitions are printed directly under the appropriate definition. The date following each definition or discussion indicates the year of introduction or of latest revision of that particular definition or discussion.

**afterglow**, *n*—emission of light, usually subsiding, from a material undergoing combustion, but occurring after flaming has ceased. (1986)<sup>6</sup>

**assembly**, *n*—a unit or structure composed of a combination of materials or products, or both. (1990)

**burn**, *v*—to undergo combustion. (1989)

**char**, *v*—to form carbonaceous residue during pyrolysis or during incomplete combustion. (1979)

**char**, *n*—a carbonaceous residue formed by pyrolysis or incomplete combustion. (1979)

**chimney effect**—upward thrust of smoke and hot gases by convection currents confined in a vertical enclosure. (1999)

**combustible**, *adj*—capable of undergoing combustion. (1985)

**DISCUSSION**—The term combustible is often delimited to specific fire-exposure conditions. For example, building materials are considered combustible if they are capable of undergoing combustion in air at pressures and temperatures that might occur during a fire in a building. Similarly, some materials that are not combustible under such conditions may be combustible when exposed to higher temperatures and pressures or to an oxygen-enriched environment. Materials that are not combustible in bulk form may be combustible in finely divided form. (1985)

**combustion**, *n*—a chemical process of oxidation that occurs at a rate fast enough to produce temperature rise and usually light either as a glow or flame. (See also **glow** and **smoldering**.) (1989)

**combustion products**, *n*—effluent produced when a material undergoes combustion (see also **smoke**; see also **combustion**). (2001)

**DISCUSSION**—The combustion process releases effluents that have mass, in gaseous, liquid, or solid form, and generates radiant energy, as heat or light, and sometimes sound. However, the common usage of the term *combustion products* in ASTM E05 standards is only for those which have mass. (2001)

**composite material**, *n*—structured combination of two or more discrete materials. (1997)

**effective heat of combustion**, *n*—the amount of heat generated per unit mass lost by a material, product or assembly, when exposed to specific fire test conditions (see **gross heat of combustion**). (2001)

**DISCUSSION**—The effective heat of combustion depends on the test method and is determined by dividing the measured heat release by the mass loss during a specified period of time under the specified test conditions. Typically, the specified fire test conditions are provided by the specifications of the fire test standard that cites effective heat of combustion as a quantity to be measured. For certain fire test conditions, involving very high heat and high oxygen concentrations under high pressure, the effective heat of combustion will approximate the gross heat of combustion. More often, the fire test conditions will represent or approximate certain real fire exposure conditions, and the effective heat of combustion is the appropriate measure. Typical units are kJ/g or MJ/kg. (2001)

**environment**, *n*—*as related to fire*, the conditions and surroundings that may influence the behavior of a material, product, or assembly when it is exposed to ignition sources or fire. (1989)

**fire**, *n*—destructive burning as manifested by any or all of the following: light, flame, heat, smoke. (1988)

**fire-characteristic profile**, *n*—an array of fire-test-response characteristics, all measured using tests relevant to the same fire scenario, for a material, product, or assembly to address, collectively, the corresponding fire hazard. (See also **fire hazard**, **fire risk**, and **fire-test-response characteristic**.) (1993)

**DISCUSSION**—An array of fire-test-response characteristics in a set of data relevant to the assessment of fire hazard in a particular fire scenario. In other words, all the fire tests used would have a demonstrated validity for the fire scenario in question, for example by having comparable fire intensities. The fire-characteristic profile is intended as a collective guide to the potential fire hazard from a material, product, or assembly involved in a fire that could be represented by the laboratory test conditions. (1993)

**fire endurance**, *n*—a measure of the elapsed time during which a material or assemblage continues to exhibit fire resistance. (1986)

**DISCUSSION**—As applied to elements of buildings, it shall be measured by the methods and to the criteria defined in Test Methods E 119, E 152, E 163, or E 814.

**fire exposure**, *n*—process by which or extent to which humans, animals, materials, products, or assemblies are subjected to the conditions created by fire. (1991)

**fire gases**, *n*—the airborne products emitted by a material, product, or assembly undergoing pyrolysis or combustion, that exist in the gas phase at the relevant temperature. (1979)

**fire hazard**, *n*—the potential for harm associated with fire. (1989)

**DISCUSSION**—A fire may pose one or more types of hazard to people,

animals, or property. These hazards are associated with the environment and with a number of fire-test-response characteristics of materials, products, or assemblies including but not limited to ease of ignition, flame spread, rate of heat release, smoke generation and obscuration, toxicity of combustion products, and ease of extinguishment. (1989)

**fire model**, *n*—a physical representation or set of mathematical equations that approximately simulate the dynamics of burning and associated processes. (1992)

**fire performance**, *n*—response of a material, product, or assembly in a particular fire, other than in a fire test involving controlled conditions (different from **fire-test-response characteristic**). (1993)

**DISCUSSION**—The ASTM Policy on Fire Standards distinguishes between the response of materials, products, or assemblies to heat and flame under controlled conditions, which is fire-test-response characteristic, and under actual fire conditions, which is fire performance. Fire performance depends on the occasion or environment and may not be measurable. In view of the limited availability of fire-performance data, the response to one or more fire tests, appropriately recognized as representing end-use conditions, is generally used as a predictor of the fire performance of a material, product, or assembly. (1993)

**fire performance characteristic**, *n*—this term is deprecated. (See **fire-test-response characteristic** and **fire performance** (q.v.)) (1990)

**fire performance test**, *n*—this term is deprecated. (See **fire-test-response characteristic** and **fire performance** (q.v.)) (1990).

*fireproof*, *adj*—an inappropriate and misleading term. Do not use. (See commentary in X1.2.)

**DISCUSSION**—This term was originally used to describe buildings having all noncombustible structural elements and some degree of fire resistance. However, the term has been misunderstood to mean an absolute or unconditional property, and therefore the use of the term, fireproof, is inappropriate and misleading. (1990)

**fire resistance**, *n*—the property of a material or assemblage to withstand fire or give protection from it. (1986)

**DISCUSSION**—As applied to elements of buildings, it is characterized by the ability to confine a fire or to continue to perform a given structural function, or both.

*fire resistant*, *adj*—See **fire resistive**, the preferred term. (1983)

**fire resistive**, *adj*—having fire resistance (TCG-01). (1983)

*fire retardant*, *n*—a deprecated term. Do not use. (1986)

*fire retardant*, *adj*—not a defined term. Use as a modifier only with defined compound terms: **fire-retardant barrier**, **fire-retardant chemical**, **fire-retardant coating**, and **fire-retardant treatment**. (1986)

**fire-retardant barrier**, *n*—a layer of material which, when secured to a combustible material or otherwise interposed between the material and a potential fire source, delays ignition and combustion of the material when the barrier is exposed to fire. (1986)

**fire-retardant chemical**, *n*—a chemical, which when added to a combustible material, delays ignition and combustion of the resulting material when exposed to fire. (1986)

**DISCUSSION**—A fire-retardant chemical can be a part of the molecular structure, an admixture, or an impregnant.

**fire-retardant coating**, *n*—a fluid-applied surface covering on

a combustible material which delays ignition and combustion of the material when the coating is exposed to fire. (See also **flame-retardant coating**. Compare **fire-retardant barrier**.) (1986)

**fire-retardant treatment**, *n*—the use of a fire-retardant chemical or a fire-retardant coating. (See also **flame-retardant treatment**.) (1986)

**fire risk**, *n*—an estimation of expected fire loss that combines the potential for harm in various fire scenarios that can occur with the probabilities of occurrence of those scenarios. (1993)

**DISCUSSION**—Risk may be defined as the probability of having a certain type of fire, where the type of fire may be defined in whole or in part by the degree of potential harm associated with it, or as potential for harm weighted by associated probabilities. However it is defined, no risk scale implies a single value of acceptable risk. Different individuals presented with the same risk situation may have different opinions on its acceptability. (1993)

**fire scenario**, *n*—a detailed description of conditions, including environmental, of one or more of the stages from before ignition to the completion of combustion in an actual fire, or in a full scale simulation. (1998)

**DISCUSSION**—The conditions describing a fire scenario, or a group of fire scenarios, are those required for the testing, analysis, or assessment that is of interest. Typically they are those conditions that can create significant variation in the results. The degree of detail necessary will depend upon the intended use of the fire scenario. Environmental conditions may be included in a scenario definition but are not required in all cases. Fire scenarios often define conditions in the early stages of a fire while allowing analysis to calculate conditions in later stages. (1998)

**fire test exposure severity**, *n*—a measure of the degree of fire exposure; specifically in connection with Test Methods E 119, E 152, and E 163, the ratio of the area under the curve of average furnace temperature to the area under the standard time/temperature curve, each from the start of the test to the end or time of failure, and above the base temperatures 68°F (20°C). (1976)

**fire-test-response characteristic**, *n*—a response characteristic of a material, product, or assembly, to a prescribed source of heat or flame, under controlled fire conditions; such response characteristics may include but are not limited to ease of ignition, flame spread, heat release, mass loss, smoke generation, fire endurance, and toxic potency of smoke. (1992)

**DISCUSSION**—A fire-test-response characteristic can be influenced by variables of exposure such as ignition source intensity, ventilation, geometry of item or enclosure, humidity, or oxygen concentration. It is not an intrinsic property such as specific heat, thermal conductivity, or heat of combustion, where the value is independent of test variables.

A fire-test-response characteristic may be described in one of several terms. Smoke generation, for example, may be described as smoke opacity, change of opacity with time, or smoke weight. No quantitative correlation need exist between values of a fire-test-response characteristic for different materials, products, or assemblies, as measured by different methods or tested under different sets of conditions for a given method. (1992)

**flame**, *n*—a hot, usually luminous zone of gas that is undergoing combustion. (1991)

**DISCUSSION**—The luminosity of a flame is frequently caused by the

presence of glowing particulate matter suspended in the hot gases. (1991)

**flame front**, *n*—the leading edge of a flame propagating through a gaseous mixture or across the surface of a liquid or solid. (1983)

*flameproof*, *adj*—an inappropriate and misleading term. Do not use.

**DISCUSSION**—This term was originally used to describe the treatment of textile fabrics or other organic products to make them resistant to ignition. However, the term has been misunderstood to mean an absolute or unconditional property, and therefore the use of the term, *flameproof*, is inappropriate and misleading.

**flame resistance**, *n*—the ability to withstand flame impingement or give protection from it. (1983)

**flame resistant**, *adj*—having flame resistance. (1983)

*flame resistive*, *n*—See **flame resistant**, the preferred term. (1983)

*flame retardant*, *n*—a deprecated term. Do not use. (1986)

**flame retardant**, *adj*—not a defined term. Use only as a modifier with defined compound terms: **flame-retardant chemical**, **flame-retardant coating**, and **flame-retardant treatment**. (1986)

**flame-retardant chemical**, *n*—a chemical, which when added to a combustible material, delays ignition and reduces flame spread of the resulting material when exposed to flame impingement. (See also **fire-retardant chemical**.) (1986)

**flame-retardant coating**, *n*—a fluid-applied surface covering on a combustible material which delays ignition and reduces flame spread when the covering is exposed to flame impingement. (See also **fire-retardant coating**.) (1986)

**flame-retardant treatment**, *n*—the use of a flame-retardant chemical or a flame-retardant coating. (See also **fire-retardant treatment**.) (1986)

**flame speed**, *n*—the velocity of propagation of a flame front through a gaseous mixture (fuel and oxidizer) relative to a reference point. (1982)

*flame spread*, *n*—See **surface flame spread**, **volumetric flame spread**. (1989)

**flame spread index**, *n*—a number or classification indicating a comparative measure derived from observations made during the progress of the boundary of a zone of flame under defined test conditions. (1986)

**flameproof**, *adj*—an inappropriate and misleading term. Do not use. (1983)

**DISCUSSION**—This term was originally used to describe the treatment of textile fabrics or other organic products to make them resistant to ignition. However, the term has been misunderstood to mean an absolute or unconditional property, and therefore the use of the term, *flameproof*, is inappropriate and misleading. (1983)

**flammable**, *adj*—(1) capable of burning with a flame under specified conditions, or (2) when used to designate high hazard, subject to easy ignition and rapid flaming combustion. (1995)

**DISCUSSION**—The first definition is needed as it is the definition recognized by the principal international standardization bodies, the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO). The second definition has been the ASTM Terminology E 176 definition and is the principal definition

recognized by the lay public. The terms in the second definition “easy ignition” and “rapid flaming combustion,” may seem insufficiently precise but are made precise in standards that use the terms in that way, such as standards on the fire hazards of materials (for example, NFPA 704; NFPA 321, on flammable liquids; and NFPA 55, on flammable gases). (1995)

**flashover**, *n*—the rapid transition to a state of total surface involvement in a fire of combustible materials within an enclosure. (1997)

**DISCUSSION**—Flashover is a fluid-mechanical combustion instability within an enclosure that occurs when the surface temperatures of an enclosure and its contents rise rapidly, producing combustible gases and vapors, and the enclosure heat flux becomes sufficient to heat these gases and vapors to their ignition temperatures. At flashover, the volume occupied by hot combustion gases rapidly increases and ends up comprising more than 50% of the enclosure’s volume. Experimentally it is found that flashover occurs when the upper gas layer temperature surpasses 600°C or when the radiant heat flux at the floor surpasses 20 kW/m<sup>2</sup>. Visually, flashover often corresponds to a transition from flaming on a few surfaces to flames throughout the volume of the enclosure. (2002)

**gasification**, *n*—transformation of a solid and/or liquid material into a gaseous state. (2001)

**glow**, *n*—(1) the visible light emitted by a substance because of its high temperature. (2) visible light, other than from flaming, emitted by a solid undergoing combustion. (1989)

**gross heat of combustion**, *n*—the maximum amount of heat per unit mass that theoretically can be released by the combustion of a material, product, or assembly; it can be determined experimentally only under conditions of high pressure and in pure oxygen (See **effective heat of combustion**). (1998)

**heat flux**, *n*—heat transfer to a surface per unit area, per unit time. (2000)

**DISCUSSION**—The heat flux from an energy source, such as a radiant heater, can be measured at the initiation of a test (such as Test Method E 1354 or Test Method E 906) and then reported as the incident heat flux, with the understanding that the burning of the test specimen can generate additional heat flux to the specimen surface. The heat flux can also be measured at any time during a fire test, for example as described in Guide E 603, on any surface, and with measurement devices responding to radiative and convective fluxes. Typical units are kW/m<sup>2</sup>, kJ/(s m<sup>2</sup>), W/cm<sup>2</sup>, or BTU/(s ft<sup>2</sup>). (2001)

**heat release rate**, *n*—the heat evolved from the specimen, per unit of time. (1997)

**heat stress**, *n*—(physiological) adverse condition caused by exposure to elevated temperature, radiant heat flux, or combinations of these factors. (1988)

**ignition**, *n*—the initiation of combustion. (1989)

**DISCUSSION**—The combustion may be evidenced by glow, flame, detonation, or explosion. The combustion may be sustained or transient. (1989)

**ignition temperature**, *n*—the lowest temperature at which sustained combustion of a material can be initiated under specified test conditions. (1990)

**DISCUSSION**—While the phenomenon of combustion may be transient or sustained, in fire testing practice, the ignition temperature is reached when combustion continues after the pilot source is removed. (1990)

**incandescence**, *n*—emission of light produced by a material

when intensely heated; it can be produced with or without combustion. (1997)

**mass burning rate**, *n*—mass loss per unit time by materials burning under specified conditions. (1989)

**noncombustible**, *adj*—not capable of undergoing combustion under specified conditions. (See **combustible**.) (2001)

DISCUSSION—In fire testing, noncombustibility is often assessed by means of Test Method E 136 or ISO 1182. (2001)

**optical density of smoke**, *D*, *n*—a measure of the attenuation of a light beam passing through smoke, expressed as the common logarithm of the ratio of the incident flux,  $I_o$ , to the transmitted flux,  $I$ . ( $D = \log_{10}(I_o/I)$ ). (1989)

**orientation**, *n*—the plane in which the exposed face of the specimen is located during testing. (1977)

DISCUSSION—The orientation may be vertical, horizontal or at an angle. In the latter two cases, the specimen may be facing up or down. (1977)

**oxygen consumption principle**, *n*—the expression of the relationship between the mass of oxygen consumed during combustion and the heat released. (1998)

**oxygen depletion**, *n*—*in a fire*, reduction of oxygen ( $O_2$ ) content of an atmosphere as a result of combustion. (1988)

**oxygen index**, *n*—minimum concentration of oxygen in a mixture of oxygen and nitrogen that will just support flaming combustion of a material under specified conditions. (2000)

**piloted ignition**, *n*—ignition of combustible gases or vapors by a pilot source of ignition (compare **spontaneous ignition**, **unpiloted ignition**). (1991)

**pilot source of ignition**, *n*—a discrete source of energy, such as, for example, a flame, spark, electrical arc, or glowing wire (compare **piloted ignition**, **unpiloted ignition**). (1991)

**pyrolysis**, *n*—process of simultaneous phase and chemical species change caused by heat (compare **smoldering**). (1991)

**reaction to fire**—response of a material in contributing by its own decomposition to a fire to which it is exposed, under specified conditions. (2002)

DISCUSSION—In fire testing, it is usual to distinguish between two types of fire-test-response characteristics: those associated with “reaction to fire” and those associated with “fire resistance” or “fire endurance.” (2002)

**screening test**, *n*—*as related to fire*, a fire-response test performed to determine whether a material, product, or assembly (*a*) exhibits any unusual fire-related characteristics, (*b*) has certain expected fire-related characteristics, or (*c*) is capable of being preliminarily categorized according to the fire characteristic in question. (1993)

**self heating**, *n*—a rise in the temperature of a material, assemblage, or product caused by internal, exothermic chemical reaction. (1985)

**self ignition**, *n*—See **spontaneous ignition**, the preferred term. (1985)

**self-propagation of flame**, *n*—propagation of a flame front after the removal of any applied energy source. (2001)

**smoke**, *n*—the airborne solid and liquid particulates and gases evolved when a material undergoes pyrolysis or combustion. (1989)

DISCUSSION—So-called chemical smokes are excluded from this definition. (1989)

**smoke developed index**, *n*—a comparative measure expressed as a dimensionless number, derived from measurements of smoke obscuration vs. time in Test Method E 84. (2001)

DISCUSSION—Classifications have been developed musing these values. (2001)

**smoke obscuration**, *n*—reduction of light transmission by smoke, as measured by light attenuation. (2001)

**smoke toxicity**, *n*—the propensity of smoke to produce adverse biochemical or physiological effects. (See **smoke**.) (1988)

**smoldering**, *n*—combustion of a solid without flame, often evidenced by visible smoke. (1979)

DISCUSSION—Smoldering can be initiated by small sources of ignition, especially in dusts or fibrous or porous materials, and may persist for an extended period of time after which a flame may be produced. (1979)

**spontaneous ignition**, *n*—unpiloted ignition caused by an internal exothermic reaction (compare **piloted ignition**). (1991)

**standard temperature/time curve (standard time/temperature curve)**, *n*—*in fire testing*, a graphical representation derived from prescribed time-temperature relationships and used to control furnace temperature with progressing time. (1989)

DISCUSSION—One example is found in Test Methods E 119. (1989)

**superimposed load**, *n*—force applied to a specimen or structure other than that associated with its own mass. (1979)

**surface flame spread**, *n*—the propagation of a flame away from the source of ignition across the surface of a liquid or a solid. Compare: **volumetric flame spread** and **burning velocity**. (1989)

**thermal decomposition**, *n*—a process of extensive chemical species change caused by heat (different from thermal degradation, *q.v.*; compare **pyrolysis**). (1992)

**thermal degradation**, *n*—a process whereby the action of heat or elevated temperature on a material, product, or assembly causes a loss of physical, mechanical, or electrical properties (different from **thermal decomposition**, *q.v.*). (1992)

**toxicity**, *n*—the propensity of a substance to produce adverse biochemical or physiological effects. (1988)

**toxic hazard**, *n*—*as related to fire*, the potential for physiological harm from toxic products of combustion. (1995)

DISCUSSION—Toxic hazard reflects both the quantity of toxic products and the quality of those products, which is given by toxic potency. Toxic hazard is not the only hazard associated with fire. Toxic hazard is not an intrinsic characteristic of a material or product but will depend upon the fire scenario, the condition of use of the material or product, and possibly other factors. (1995)

**toxic potency**, *n*—*as applied to inhalation of smoke or its component gases*, a quantitative expression relating concentration and exposure time to a particular degree of adverse physiological response, for example, death, on exposure of humans or animals. (1991)

DISCUSSION—The toxic potency of the smoke from any material,

product, or assembly is related to the composition of that smoke which, in turn, is dependent upon the conditions under which the smoke is generated. (1991)

**unpiloted ignition**, *n*—ignition caused by one or more sources of energy without the presence of a pilot source of ignition

(compare **piloted ignition**, **spontaneous ignition**). (1991)  
**upholstered**, *adj*—covered with material (as fabric or padding) to provide a soft surface. (1999)  
**volumetric flame spread**, *n*—flame propagation through the volume of a gaseous mixture. (1989)

## ANNEX

### (Mandatory Information)

#### A1. DEFINITIONS OF TERMS

A1.0.1 Terms, their definitions, and the standard(s) to which they apply are given below in alphabetical order:

**acoustical ceiling panel**, *n*—a form of a prefabricated sound absorbing ceiling element used with exposed suspension systems (see Specification E 1264). (1999) **E 2032**

**acoustical ceiling tile**, *n*—a form of a prefabricated sound absorbing ceiling element used with concealed or semi-exposed suspension systems, stapling, or adhesive bonding (see Specification E 1264). (1999) **E 2032**

**air drop**, *n*—lengths of open run conductors or cables supported only at each end. (1995) **E 1725**

**attic**, *n*—an accessible enclosed space in a building immediately below the roof and wholly or partly within the roof framing. (1996) **E 970**

**assembly**, *n*—a unit or structure composed of a combination of materials or products, or both. (2000) **E 1995, E 2102**

**backing board**, *n*—a noncombustible insulating board, mounted behind the specimen during actual testing to satisfy the theoretical analysis assumption of no heat loss through the specimen. It shall be roughly  $25 \pm 5$  mm thick with a density no greater than  $200 \pm 50$  kg/m<sup>3</sup>. (1997) **E 1321**

**batch sampling**—sampling over some time period in such a way as to produce a single test sample for analysis. (1981) **E 800**

**beams**, *n*—all horizontally oriented structural members employed in building construction and known variously as beams, joists, or girders. (1999) **E 2032**

**blackbody temperature**, *n*—the temperature of a perfect radiator—a surface with an emissivity of unity and, therefore, a reflectivity of zero. (1997) **E 648**

**bolster**, *n*—pillow or similarly shaped unit containing upholstery material covered by upholstery cover material that may or may not be attached to the upholstered furniture item but is sold and delivered with it. (1994) **E 1352**

**carboxyhemoglobin saturation**, *n*—the percent of blood hemoglobin converted to carboxyhemoglobin from reaction with inhaled carbon monoxide. (1996) **E 1678**

**ceiling protective membrane**, *n*—a ceiling membrane attached to or suspended from the structural members of the floor or ceiling assembly, usually by hanger wire or threaded rods, consisting of a grid suspension system with lay-in ceiling panels or a grid of steel furring channels to which the ceiling membrane is directly attached, intended to provide fire protection, acoustical and or aesthetic enhancements, or

both. (1999) **E 2032**

**combustion products**—airborne effluent from a material undergoing combustion; this may also include pyrolysates. (1981) **E 800**

**composite**, *n*—a combination of materials, which generally are recognized as distinct entities, for example, coated or laminated materials. (2000) **E 2067, E 2102, E 1995**

**composite**, *n*—as applied to loadbearing elements an interaction between structural components which is to be taken into account in the evaluation of load capacity. (1999) **E 2032**

**concentration-time curve**, *n*—a plot of the concentration of a gaseous toxicant as a function of time. (1996) **E 1678**

**continuous** (as related to data acquisition), *adj*—conducted at data collection intervals of 5 s or less. (2000) **E 2102**

**continuous** (as related to data acquisition), *adj*—conducted at data collection intervals of 6 s or less. (2000) **E 2067**

**corridor**, *n*—an enclosed space connecting a room or compartment with an exit. The corridor may include normal extensions, such as lobbies and other enlarged spaces. (1997) **E 648**

**compensating thermocouple**, *n*—a thermocouple for the purpose of generating an electrical signal representing long-term changes in the stack metal temperatures wherein a fraction of the signal generated is subtracted from the signal developed by the stack-gas thermocouples. (1997) **E 1317**

**critical flux at extinguishment**, *n*—a flux level at the specimen surface corresponding to the distance of farthest advance and subsequent self-extinguishment of the flame on the centerline of a specimen. (1997) **E 1317**

DISCUSSION—The flux reported is based on calibration tests with a special calibration dummy specimen.

**critical radiant flux**, *n*—the level of incident radiant heat energy on the floor covering system at the most distant flame-out point. It is reported as W/cm<sup>2</sup>(Btu/ft<sup>2</sup> · s). (1997) **E 648**

**critical radiant flux**, *n*—the level of incident radiant heat energy on the attic floor insulation system at the most distant flame-out point. It is reported as W/cm<sup>2</sup>(or Btu/ft<sup>2</sup> · s). (1996) **E 970**

**Ct product**, *n*—the concentration-time product in ppm · min obtained by integration of the area under a concentration-time curve. (1996) **E 1678**

**deck**, *n*—in upholstered furniture, the upholstered support under the seat cushion in a loose-seat construction. (1994)

- E 1352, E 1353**  
**design load**, *n*—the intended maximum design load condition allowed by design under appropriate nationally recognized structural design criteria. (1999) **E 2032**
- directly applied fire resistive coating**, *n*—materials that are normally sprayed onto substrates to provide fire-resistive protection of the substrates. (1999) **E 2032**
- dummy specimen**, *n*—a noncombustible (as defined by 46 CFR 164.009) specimen used for standardizing the operating condition of the equipment, roughly 20 mm in thickness with a density of  $750 \pm 100 \text{ kg/m}^3$ . (1997) **E 1317**
- dummy specimen**, *n*—a noncombustible insulating board used for stabilizing the operating condition of the equipment, mounted in the apparatus in the position of the specimen and removed only when a test specimen is to be inserted. It shall be roughly  $20 \pm 5 \text{ mm}$  in thickness with a density of  $750 \pm 100 \text{ kg/m}^3$ . (1997) **E 1321**
- DISCUSSION—For the ignition tests, the dummy specimen board shall have a hole at the 50-mm position for mounting the fluxmeter.
- effective heat of combustion**, *n*—the measured heat release divided by the mass loss for a specified time period. (1997) **E 1474, E 1354, E 1623**
- effective heat of combustion**, *n*—the total measured heat released divided by the mass loss for a specified time period. (2000) **E 1740**
- effective heat of combustion, EHC, (kJ/kg)**, *n*—the energy generated by chemical reactions per unit mass of fuel vaporized. (2001) **E 2058**
- effective thermal property**, *n*—thermal properties derived from heat-conduction theory applied to ignition/flame-spread data treating the material as homogenous in structure. (1997) **E 1321**
- electrical system components**, *n*—cable trays, conduits and other raceways, open run cables and conductors, cables, conductors, cabinets, and other components, as defined or used in the National Electrical Code, and air drops as defined in A1.1.1. (1995) **E 1725**
- emissivity**, *n*—the ratio of the power per unit area radiated from a material's surface to that radiated from a black body at the same temperature. (1994) **E 1623**
- equivalent thickness**, *n*—the calculated solid thickness of concrete or masonry for purposes of determining fire resistance ratings of barrier elements on the basis of heat transmission end-point criteria. (1999) **E 2032**
- essentially flat surface**, *n*—surface where the irregularity from a plane does not exceed  $\pm 1 \text{ mm}$ . (2000) **E 1995, E 2102**
- exposed surface**, *n*—that surface of the specimen subjected to the incident heat. (2000) **E 1995, E 2102**
- fire-characteristic profile**, *n*—array of fire-test-response characteristics, all measured using tests relevant to the same fire scenario, for a material product, or assembly to address, collectively, the corresponding fire hazard. (2000) **E 2061**
- fire endurance**, *n*—a measure of the elapsed time during which a material or assemblage continues to exhibit fire resistance. (1999) **E 2032**
- fire hazard**, *n*—the potential for harm associated with fire. (2000) **E 2061**
- fire performance**, *n*—response of a material, product, or assembly in a specific fire, other than in a fire test involving controlled conditions (different from fire-test-response characteristics, q.v.) (2000) **E 2061**
- fire resistance**, *n*—the property of a material or assemblage to withstand fire or give protection from it. (1999) **E 2032**
- fire-resistive barrier system**, *n*—a specific construction of devices, materials, or coatings installed around, or applied to, the electrical system components. (1995) **E 1725**
- fire resistive joint system**, *n*—a device or designed feature that provides a fire separating function along continuous linear openings, including changes in direction, between or bounded by fire separating elements. (2000) **E 1966**
- fire scenario**, *n*—a detailed description of conditions, including environmental, of one or more of the steps from before ignition to the completion of combustion in an actual fire, or in a full-scale simulation. (2001) **E 2061**
- fire separating element**, *n*—floors, walls, and partitions having a period of fire resistance determined in accordance with Test Methods E 119 or E 1529. (2000) **E 1966**
- fire stop**—a through-penetration fire stop is a specific construction consisting of the materials that fill the opening around penetrating items such as cables, cable trays, conduits, ducts, and pipes and their means of support through the wall or floor opening to prevent spread of fire. (1997) **E 814**
- fire test**, *n*—a procedure, not necessarily a standard test method, in which the response of materials to heat or flame (or both) under controlled conditions is measured or otherwise described. (1981) **E 800**
- fire-test-response-characteristic index**, *n*—a single quantitative measure that combines two or more fire-test-response characteristics for a material, product, or assembly, all developed under test conditions compatible with a common fire scenario, addressing collectively the corresponding threat. See also *fire-test-response-characteristic profile*, *fire hazard*, *fire risk*, *fire-test-response characteristic*. (1996) **E 1776**
- fire-test-response-characteristic profile**, *n*—array of fire-test-response characteristics for a material, product, or assembly, all developed under test conditions compatible with a common fire scenario, addressing collectively the corresponding threat. See also *fire hazard*, *fire risk*, *fire-test-response characteristic*. (1996) **E 1776**
- fire window assembly**, *n*—a window or glass block configuration, intended for use in walls or partitions, for which a fire endurance rating has been determined in accordance with this fire-test-response standard. (1999) **E 2010**
- flame-out**, *n*—the time at which the last vestige of flame or glow disappears from the surface of the test specimen, frequently accompanied by a final puff of smoke; Time 0 is the time at which the specimen is moved into the chamber and the door closed. (1997) **E 648**
- flaming mode**, *n*—the mode of testing that uses a pilot flame. (1998) **E 1995**
- flashing**, *n*—existence of flame on or over the surface of the specimen for periods of less than 1 s. (2000) **E 2102**
- flashover**, *n*—the rapid transition to a state of total surface involvement in a fire of combustible materials within an

 E 176 – 02

- enclosure. (2000) **E 2061**
- floor covering**, *n*—an essentially planar material having a relatively small thickness in comparison to its length or width, which is laid on a floor to enhance the beauty, comfort, and utility of the floor. (1999) **E 648**
- floor covering system**, *n*—a single material, composite or assembly comprised of the floor covering and related installation components (adhesive, cushion, etc.) if any. (1999) **E 648**
- flux profile**, *n*—the curve relating incident radiant heat energy on the specimen plane to distance from the point of initiation of flaming ignition, that is, 0 cm. (1997) **E 648**
- fractional exposure dose (FED)**, *n*—the ratio of the Ct product for a gaseous toxicant produced in a given test to that Ct product of the toxicant which has been determined statistically from independent experimental data to produce lethality in 50 % of test animals within a specified exposure and postexposure time. Since the time values in this ratio numerically cancel, the FED also is simply the ratio of the average concentration of a gaseous toxicant to its LC<sub>50</sub> value for the same exposure time. When not used with reference to a specific toxicant, the term FED represents the summation of FEDs for individual toxicants in a combustion atmosphere. (1996) **E 1678**
- full scale test**, *n*—a test in which the product(s) to be tested is utilized in the same size as its end use.
- DISCUSSION—In practical applications, this term is usually applied to tests where the item to be tested is larger than would fit in a bench-scale test. (1998) **E 603**
- fume stack**, *n*—a box-like duct with thermocouples and baffles through which flames and hot fumes from a burning specimen pass whose purpose is to permit measurement of the heat release from the burning specimen. (1997) **E 1317**
- furniture mock-up or assembly**, *n*—a representation of production furniture that uses the same upholstery cover material and upholstery material, constructed in the same manner as in production furniture, but with straight, vertical sides. (1994) **E 1352**
- gas phase ignition**, *n*—ignition of pyrolysis products leaving a heated surface by a pilot flame or other ignition source that does not impinge on nor significantly affect (by re-radiation) the heated surface. (1997) **E 906**
- glass block assembly**, *n*—a light transmitting configuration constructed of glass block held together with mortar or other suitable materials. (1999) **E 2010**
- glazing material**, *n*—transparent or translucent material used in fire window assemblies. (1999) **E 2010**
- heat for ignition**, *n*—the product of time from initial specimen exposure until the flame front reaches the 150-mm position and the flux level at this position, the latter obtained in prior calibration of the apparatus. (1997) **E 1317**
- heat for sustained burning**, *n*—the product of time from initial specimen exposure until the arrival of the flame front, and the incident flux level at that same location as measured with a dummy specimen during calibration. (1997) **E 1317**
- heat release rate**, *n*—the calorific energy released per unit time by the combustion of a material under specified test conditions. (2001) **E 2061**
- heat release rate**, *n*—the heat evolved from the specimen, expressed per unit area of exposed specimen area per unit of time. (2000) **E 1354, E 1740**
- heat release rate**, *n*—the heat evolved from the specimen, per unit of time. (2000) **E 2067**
- heat release rate**, *n*—the heat evolved from the specimen per unit of time and area. (1994) **E 1623**
- heating flux**, *n*—the prescribed incident flux imposed externally from the heater onto the specimen at the initiation of the test. (2000) **E 1354, E 1740**
- heating flux**, *n*—the incident flux imposed externally from the heater on the specimen at the initiation of the test. (1996) **E 1623, E 1474**
- DISCUSSION—The specimen, once ignited, also is heated by its own flame.
- ignitability**, *n*—the propensity to ignition, as measured by the time to sustained flaming, in seconds, at a specified heating flux. (1997) **E 1623, E 1354**
- ignitability**, *n*—the propensity for ignition, as measured by the time to sustained flaming at a specified heating flux. (1996) **E 1474, E 1740**
- ignition**, *n*—the initiation of combustion. (2000) **E 1995, D 2067**
- insulation**, *n*—a material that is normally added to an assembly to provide resistance to heat flow for purpose of energy conservation. (1999) **E 2032**
- integrity**, *n*—the ability of a test assembly, when exposed to fire from one side, to prevent the passage of flame and hot gases through it or the occurrence of flames on its unexposed side. (2000) **E 2074**
- irradiance** (at a point of a surface), *n*—ratio of the radiant flux incident on a small but measurable element of surface containing the point, by the area of that element. (2000) **E 2102**
- joint**, *n*—the linear void located between juxtaposed fire-separating elements. (2000) **E 1966**
- LC<sub>50</sub>**, *n*—a measure of lethal toxic potency; the concentration of gas or smoke calculated statistically from concentration-response data to produce lethality in 50 % of test animals within a specified exposure and postexposure time. (1996) **E 1678**
- light flame**, *n*—a flame approximately 6 in. (152 mm) long. (1999) **E 2010**
- lightweight aggregate concrete**, *n*—concrete made with aggregates of expanded clay, shale, slag, or slate or sintered fly ash, and weighing 1360 to 1840 kg/m<sup>3</sup> (85 to 115 pcf). (1999) **E 2032**
- marine board**, *n*—an insulation board of 750 ± 100 kg/m<sup>3</sup> density that meets the noncombustibility criteria of 46 CFR 164.009. (1997) **E 1317**
- mass loss concentration**, *n*—the mass loss of a test specimen per unit exposure chamber volume in g · m<sup>-3</sup>. (1996) **E 1678**
- mass optical density**, *n*—the ratio of the optical density of smoke and the mass loss of the test specimen, multiplied by the volume of the test chamber and divided by the length of the light path. (1998) **E 1995**
- material**, *n*—single substance, or uniformly dispersed mixture,



- for example metal, stone, timber, concrete, mineral fiber, or polymer. (2000) **E 2102**
- material, generic**, *n*—is one for which a nationally recognized Standard Specification exists. (1999) **E 2032**
- material proprietary**, *n*—is one whose fire performance characteristics are determined in consideration of a formulation or process of production that is proprietary. (1999) **E 2032**
- mattress**, *n*—a mattress is a ticking (outermost layer of fabric or related material) filled with a resilient material, used alone or in combination with other products, intended or promoted for sleeping upon. (1996) **E 1474**
- maximum joint width**, *n*—the widest opening of an installed joint system. (2000) **E 1966**
- mineral fiber insulation**, *n*—insulation composed principally of fibers manufactured from rock, slag, or glass processed from molten state into fibrous form to comprise flexible batts or blankets, rigid or semi-rigid blocks and boards, or loose fill insulations, with or without binder. (1999) **E 2032**
- minimum joint width**, *n*—the narrowest opening of an installed joint system. (2000) **E 1966**
- measured heat release of specimen**, *n*—the observed heat release under the variable flux field imposed on the specimen and measured. (1997) **E 1317**
- mirror assembly**, *n*—a mirror, marked and aligned with the viewing rakes, used as an aid in quickly identifying and tracking the flame front progress. (1997) **E 1321, E 1317**
- model evaluation**, *n*—the process of quantifying the accuracy of chosen results from a model when applied for a specific use. (1997) **E 1355**
- model validation**, *n*—the process of determining the correctness of the assumptions and governing equations implemented in a model when applied to the entire class of problems addressed by the model. (1997) **E 1355**
- model verification**, *n*—the process of determining the correctness of the solution of a system of governing equations in a model. With this definition, verification does not imply the solution of the correct set of governing equations, only that the given set of equations is solved correctly. (1997) **E 1355**
- movement cycle**, *n*—the change between the minimum and the maximum joint widths of a joint system. (2000) **E 1966**
- net heat of combustion**, *n*—the oxygen bomb (see Test Method D 3286) value for the heat of combustion, corrected for gaseous state of product water. (1997) **E 1623, E 1354**
- net heat of combustion**, *n*—the oxygen bomb calorimeter value for the heat of combustion, corrected for the gaseous state of product water. (2000) **E 1740**
- nominal joint width**, *n*—the specified opening of a joint in practice that is selected for test purposes. (2000) **F 1966**
- non-composite**, *n*—as applied to loadbearing elements, structural interaction between contiguous elements is assumed not to exist in the evaluation of load capacity. (1999) **E 2032**
- Nonflaming mode**, *n*—the mode of testing that does not use a pilot flame. (1998) **E 1995**
- obvious ignition**, *n*—pronounced continuous and self-sustaining combustion of the test system accompanied by rapid generation of heat and smoke. It is a matter of operator judgment based upon experience in this type of operation. (1994) **E 1353**
- orientation**, *n*—the plane in which the exposed face of the specimen is located during testing, either vertical or horizontal facing up. (1997) **E 1354**
- orientation**, *n*—the plane in which the exposed face of the specimen is located during testing, which is horizontal facing up for this test. (2000) **E 1740**
- orientation**, *n*—the plane in which the exposed face of the specimen is located during testing. (2000) **E 2102**
- orientation**, *n*—plane in which the exposed face of the specimen is located during testing, either vertical or horizontally face upwards. (1999) **E 906**
- orientation**, *n*—the plane on which the exposed face of the specimen is located during testing, which is horizontal facing up for this test. (1996) **(E 1474)**
- oxygen consumption principle**, *n*—the expression of the relationship between the mass of oxygen consumed during combustion and the heat released. (2000) **, E 1354, E 1740, E 2067, E 603, E 1474, E 1623**
- post-flashover**, *adj*—the stage of a fire at which the average air temperature in the upper half of the room exceeds 600°C. (1996) **E 1678**
- product**, *n*—the upholstered furniture for which information is required. (1996) **E 1537**
- product**, *n*—mattress, or mattress with foundation, for which fire-test-response characteristics are to be measured. (1996) **E 1590**
- product**, *n*—material, component, or complete end-use product, in use in fixed guideway transportation vehicles. (2001) **E 2061**
- quilted**, *n*—fused or stitched with thread through the upholstery cover material and one or more layers of upholstery material. (1994) **E 1352**
- radiant flux profile**, *n*—the graph relating incident radiant heat energy on the specimen plane to distance from the point of initiation of flaming ignition, that is, 0 mm. (1996) **E 970**
- reverberatory wires**, *n*—a wire mesh located in front of, but close to, the radiating surface of the panel heat source which serves to enhance the combustion efficiency and increase the radiance of the panel. (1997) **E 1317**
- sample**, *n*—an amount of the material, product, or assembly, to be tested, which is representative of the item as a whole. (1998) **E 1995, E 2067, E 2102**
- sample integrity**—the unimpaired chemical composition of a test sample upon the extraction of said test sample for analysis. (1981) **E 800**
- sampling**—a process whereby a test sample is extracted from a fire test environment. (1981) **E 800**
- sand-lightweight concrete**, *n*—concrete made with a combination of expanded clay, shale, slag, or slate or sintered fly ash and natural sand and generally weighing between 1680 and 1920 kg/m<sup>3</sup> (105 to 120 pcf). (1999) **E 2032**

- smoke**, *n*—the airborne solid and liquid particulates and gases evolved when a material undergoes pyrolysis or combustion. (2001) **E 2061, E 2067**
- smoke developed index**, *n*—a number or classification indicating a comparative measure derived from smoke obscuration data collected during the test for surface burring characteristics. **E 84**
- smoke obscuration**, *n*—reduction of light transmission by smoke, as measured by light attenuation. (2000) **E 1354, E 2067, E 1623**
- smoke obscuration**, *n*—the reduction in visibility due to smoke (ISO Guide 52). (1998) **E 603, 1995**
- SMOKE unit**, *n*—the concentration of smoke particulates in a cubic metre of air that reduces the percent transmission of light through a 1-m path to 10 %. SMOKE = standard metric optical kinetic emission. (1997) **E 906**
- special calibration board**, *n*—a specially assembled noncombustible insulating board used for standardizing the operating condition of the equipment which is used only to measure the flux distribution at specified intervals along the specimen surface. It shall be roughly  $20 \pm 5$  mm in thickness with a density of  $750 \pm 100$  kg/m<sup>3</sup>. (1997) **E 1321**
- special calibration dummy specimen**, *n*—a dummy specimen made of the same material as the dummy specimen, intended only for use in calibration of flux gradient along the specimen. (1997) **E 1317**
- specified load**, *n*—as applied to loadbearing elements, the test load applied to the element in a Test Method E 119 test. (1999) **E 2032**
- specimen**, *n*—representative piece of the product which is to be tested together with any substrate or treatment. (2000) **E 2067, E 2103**
- specimen**, *n*—the actual section of material, product, or assembly, to be placed in the test apparatus. (1998) **E 1995**
- specimen**, *n*—manufactured item of the product, representative prototype of the product, or mock-up of the product. (1996) **E 1537**
- specimen**, *n*—the manufactured item of the product, or representative prototype of the product. (1996) **E 1590**
- specimen**, *n*—a construction consisting of electrical system components and a fire-resistive barrier system. (1995) **E 1725**
- splice**, *n*—the connection or junction within the length of a joint system. (2000) **E 1966**
- stacking chair**, *n*—chair that is intended to be stacked when not in use. (1999) **E 1822**
- supporting construction**, *n*—the arrangement of building sections forming the fire-separating elements into which the joint systems are installed. (2000) **E 1966**
- surface flame spread**, *n*—the propagation of a flame away from the source of ignition across the surface of the specimen. (2000) **E 84**
- sustained flaming**, *n*—the existence of flame on or over the surface of the specimen for periods of 4 s or more. (2000) **E 1474, E 1740, E 2102**
- sustained flaming**, *n*—existence of flame on or over most of the specimen surface for periods of at least 4 s. (1997) **E 1354**
- DISCUSSION—Flaming of less than 4 s duration is identified as flashing or transitory flaming.
- sustained flaming**, *n*—existence of flame on or over the surface of the specimen for periods of 5 s. (1994) **E 1623**
- DISCUSSION—Flaming of less than 4 s duration is identified as flashing or transitory flaming.
- sustained flaming**, *n*—the existence of flame on or over the majority of the surface of the specimen for a period of 4 s or more. (1999) **E 906**
- test assembly**, *n*—the complete assembly of test specimens together with their supporting construction. (2000) **E 1966**
- test assembly**—the wall or floor into which the test sample(s) is (are) mounted or installed. (1981) **E 814**
- test assembly**, *n*—horizontal or vertical construction on which test specimens are to be mounted together with associated instrumentation. (1995) **E 1725**
- test sample**—a representative part of the experimental environment (gases, liquids, or solids) for purposes of analysis. (1981) **E 800**
- test specimen**, *n*—the specific construction assembly that was tested in accordance with Test Method E 119. (1999) **E 2032**
- test specimen**, *n*—a joint system of a specific material(s), design, and width. (2000) **E 1966**
- test specimen**, *n*—the fire stop being tested. (1997) **E 814**
- test specimen**, *n*—stack of five identical stacking chairs. (1999) **E 1822**
- thermal operating level**, *n*—the operating condition at which the radiance of the heat source produces a specified constant heat flux to some specified position at the specimen surface. (1997) **E 1321**
- thermally thick**, *n*—the thickness of a medium that is large enough to have the predominate thermal (temperature) effects experienced within that distance, that is, negligible heat is lost from its unexposed side. (1997) **E 1321**
- through-opening**, *n*—a uninterrupted hole in the test assembly that is seen from the unexposed side when viewing the suspected hole from a position perpendicular to the plane of the test assembly. (1999) **E 2010, E 2074**
- time to ignition**, *n*—time between the start of the test and the presence of a flame on the specimen surface for a period of at least 4s. (1998) **E 1995**
- time to ignition**, *n*—time between the start of the test and the presence of a flame on or over most of the specimen surface for a period of at least 4 s. (2000) **E 2102, E 906**
- time to sustained flaming**, *n*—time to ignition. (2000) **E 2102, E 906**
- total cold wall heat flux**, *n*—the heat flux that would be transferred to an object whose temperature is 70°F (21°C). (1993) **1529**
- total flux meter**, *n*—the instrument used to measure the level of radiant heat energy incident on the specimen plane at any point. (1997) **E 970, E 648**
- transfer**, *n*—the process of substituting a loadbearing element from one test specimen for the loadbearing element in another test specimen, or utilizing a loadbearing element

from one test specimen for use in another test specimen that does not include a loadbearing element. (1999) **E 2032**

**transitory flaming**, *n*—the existence of flame on or over the surface of the specimen for periods of between 1 and 4 s. (2000) **E 2102**

**tufted**, *n*—buttoned or laced through the upholstery cover material and upholstery material. (1999) **E 1352**

**ultimate capacity**, *n*—as applied to loadbearing elements, the actual maximum load carrying capacity of an element based on properties specific to the material constituting the element. (1999) **E 2032**

**unit weight**, *n*—as applied to concrete, weight per unit volume. (1999) **E 2032**

**upholstered**, *n*—covered with material (as fabric or padding) to provide a soft surface. (1994) **E 1353**

**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 item. (1994) **E 1352, E 1353**

**upholstered furniture**, *n*—a unit of interior furnishing that (1) contains any surface that is covered, in whole or in part, with a fabric or related upholstery cover material, (2) contains upholstery material, and (3) is intended or promoted for sitting or reclining upon. (1994) **E 1353, E 1352**

**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. (1999) **E 1537, E 1822**

**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 item. (1999) **E 1352, E 1353, E 1474, E 1537, E 1822**

**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. (This includes, but is not limited to, material, such as foams, cotton batting, polyester fiberfill, bonded cellulose, or down). (1994) **E 1353, E 1352, E 1474, E 1537, E 1822**

**viewing rakes**, *n*—a set of bars with wires spaced at 50-mm intervals for the purpose of increasing the precision of timing the flame front progress along the specimen. (1997) **E 1321, E 1317**

**wallcovering**, *n*—a fabric, vinyl, or paper-based product designed to be attached to a vertical wall surface for decorative or acoustical purposes. (2000) **E 1740**

**wallcovering composite**, *n*—an assembly of a wallcovering, adhesive (if used), and substrate used as a vertical wall treatment for decorative or acoustical purposes. (2000) **E 1740**

**welt**, *n*—the piping effect produced when welt cord and cover fabrics are sewn together for ornamental purposes to finish the edges between intersecting surfaces of upholstered furniture cushions, pillows, arms, or backs. (1994) **E 1353, E 1352**

**welt cord**, *n*—the continuous small-diameter cylindrical material that is wrapped in fabric and sewn as part of the cover to make a welt edge on upholstered furniture. (1994) **E 1352**

**window assembly**, *n*—an integrally fabricated unit containing a glazed light(s) placed in an opening in a wall or partition and that is intended primarily for the transmission of light, or light and air, and not primarily as an entrance or exit. (1999) **E 2010**

## APPENDIXES

### (Nonmandatory Information)

#### X1. HISTORICAL COMMENTARY

X1.1 In the 1970's ASTM decided to develop a Policy on Fire Standards. At the same time, the ASTM Committee on Terminology (COT) created a Terminology Coordinating Group under its auspices. This Terminology Coordinating Group was designated TCG-01. It consisted of representatives of Committee E05 on Fire Standards, COT and other interested technical committees.

X1.2 The responsibility of TCG-01 was to consider and recommend terms and definitions in the field of fire technology for the purpose of minimizing redundancies and eliminating conflicts in such terminology.

X1.3 That committee recommended several definitions, many of which have been amended over the years. Such definitions have included: afterglow, char (both as a noun and as a verb), fire exposure, fire gases, fire resistant (inappropriate and misleading), fire resistive, flame, flame front, flame resistance, flame resistant, flame resistive (as a less satisfactory alternative to flame resistant), flash point, glow, ignition, mass burning rate, optical density of smoke, piloted ignition, smoke, spontaneous ignition, surface flame spread rate, temperature and unpiloted ignition. Not all of these terms are still included in Terminology E 176 and some of the definitions have since been amended.

## **X2. KEYWORDS**

### **X2.1 Scope**

X2.1.1 This appendix of keywords is provided as a resource and a convenience to aid in providing index and keyword items for fire standards of Committee E-5 as well as other ASTM Committees preparing fire standards. The list has been compiled from a list prepared by the Subcommittee at the time when mandatory keyword sections were first being added to most ASTM standards. Other appropriate keywords may apply.

### **X2.2 Guidelines**

X2.2.1 Keywords should be selected on the basis of those that best represent the technical information presented in the standard.

X2.2.2 Select the keywords from the title and body of the standard and include general, vernacular and trade terms.

X2.2.3 Select three or more keywords that describe the names of tests, procedures, special materials, or the specific application(s) that will facilitate the identification and retrieval of the standard.

X2.2.4 All selected keywords should be stand-alone terms; the type of standard, incomplete phrases, unattached adjectives, and so forth should not be used.

### **X2.3 Resource List of Keywords**

acid gases  
activation energy  
acute toxicity  
afterburner  
afterburning  
afterglow  
air leakage  
air mixtures  
air ratio  
air movement  
air velocity  
analyzer  
anhydrous fuels  
animal models atmospheric  
animal atmosphere  
anoxia  
asphyxia  
autoignition  
autoignition temperature  
autoxidation  
axisymmetric  
behavior models  
bench scale tests  
blackbody  
blackbody temperature  
building code  
buoyant flumes  
buoyant flow  
burn room  
burnout parameter  
burnout

burn through  
burner  
burning  
burning velocity  
burning rate  
burning brand test  
cable insulation  
cable jacket  
cable trays  
cable sheath  
calibrate  
calibration burner  
calorimeter  
calorimetry  
candle  
carbon monoxide  
carbon balance method  
carbon dioxide  
carboxyhemoglobin  
ceiling jet  
cellulosic fuel  
chamber  
char  
char depth characteristic  
characteristic time  
charring  
chimney  
cigarette ignition  
cigarette test method  
combustibility  
combustible properties  
combustible elements  
combustible  
combustion gases  
combustion toxicity  
combustion efficiency  
combustion products  
combustion rate  
combustion theory  
combustion temperature  
combustion toxicology  
combustion test  
combustion  
cumulative smoke release  
compartment fire  
compartment  
conductive heat transfer  
conduction  
conductivity  
cone calorimeter  
cone corrosimeter  
confined conical heater  
conical heater  
containment  
convection

convective heat transfer	extinguisher
corner test	fabric flammability
corridor test	fabric flammability testing
corridor test, quarter scale	false alarm
crib fire	fatality
crib test	fault trees
crib	field models
critical temperature	fire
critical radiant flux	fire area
critical flux for spread	fire behavior
critical irradiance	fire brand
critical temperature ignition	fire chemistry
critical flux for ignition	fire code
damper	fire containment
decomposition	fire containment walls
deformation	fire characteristic index
degradation	fire characteristic profile
deluge	fire control
detection systems	fire effect
differential pressure	fire effluent
diffusion fire	fire endurance
diffusion flame	fire endurance test
diffusivity	fire exposure
door assemblies	fire gases
dosage	fire hazard
dosimeter	fire hazard analysis
drape	fire hazard assessment
dual lcs0	fire incident
dummy specimen	fire model
effective heat of combustion	fire penetrations
effective thermal properties	fire performance
egress	fire physics
electrical cable	fire point
emission	fire prediction
emissivity	fire prevention
emittance	fire propagation
enclosure environment	fire propagation index
enclosure fire	fire properties
endothermic	fire protection
energy balance	fire research
enthalpy	fire resistance
entrainment	fire resistive
entropy	fire resistive material
evacuation	fire retardant barrier
event	fire retardant chemical
exhaust duct	fire retardant coating
exhaust gases	fire retardant treatment
exhaust velocity	fire risk
exit	fire risk analysis
exothermic	fire risk assessment
experimental animals	fire risk assessment standard
experimental design	fire safety
explosion	fire scenario
exposure	fire severity
extinction	fire simulation
extinction coefficient	fire size
extinction time	fire spread
extinguish	fire statistic

 **E 176 – 02**

fire stop	flux
fire test	flux distribution
fire test chamber	flux gage
fire test response	flux profile
fire test response standard	flux time products
fire tube apparatus	flux uniformity
fire tube assembly	fluxmeter
fire test response	flying brand test
fire test response standard	forest fuels
fire wall	fractional radiation
fireball	free burning fires
firebox	free convection
firestop	free radical
flame	free ventilation
flame emissivity	froude number
flame entrainment coefficient	fuel
flame extinction coefficient	fuel-air
flame front	fuel-air ratio
flame heating parameter	fuel-contributed index
flame heat transfer factor	fuel load
flame propagation	full-scale fire tests
flame radiation	furnace
flame region	furniture calorimeter
flame resistance	gas air
flame resistant	gases
flame retardant chemical	gas density
flame retardant coating	gas phase ignition
flame retardant treatment	gas velocity
flame speed	gasification
flame spread	glow
flame spread rate	gravimetric soot sampler
flame spread test	graybody radiation
flame temperature	halon
flame travel rate	hazard
flame spread classification	hazard analysis
flame spread index	hazard assessment
flame velocity	hazardous materials
flameless	hazardous vapors
flameout	heat
flameover	heat balance
flameproofing	heat capacity
flaming	heat feedback
flaming combustion	heat flow
flaming ignition	heat flux coefficient
flammability	heat loss
flammability apparatus	heat of activation
flammability limits	heat of combustion
flammability measurements	heat of gasification
flammability tests	heat of pyrolysis
flammable gases	heat of reaction
flammable liquids	heat of solution
flammable materials	heat of vaporization
flammable solids	heat release
flashpoint	heat release fraction
flashback	heat release rate
flashover	heat resistant coatings
floor radiant panel tests	heat resistant materials
flue	heat resistant plastics

heat transfer	laminar heat transfer
heat transfer coefficient	laminar jet flames
heat transport	laminar mixing
heater	large scale tests
heating	laser extinction beam
heating flux	latent heat
heating tests	lateral flame spread
homogeneous gas reactions	lc50
homogeneous mixtures	lc (ct) 50
hose stream test	life hazards
hydrant	life safety
hydrocarbon combustion	lift apparatus
hydrocarbon fuel	light
hydrocarbon pool fires	light absorption
hyperbaric	light extinction beam
hyperoxia	light intensity
hypoxemia	light path
hypoxia	limiting oxygen index
ic50	liquid fuel
ideal gas law	luminous flames
ignitability	mass burning rate
igniter	mass flow
igniting burner	mass loss
ignition burner	mass loss rate
ignition	mass optical density
ignition circuit	mass transfer
ignition correlation parameter	mass transfer rate
ignition resistance	mathematical models
ignition source	measurement methods
ignition temperature	medium scale tests
ignition tests	melting point
ignition time	methenamine pill
incandescence	methodology
incendiary	model
incinerator	model validation
index	model verification
induction	modeling
inert	moisture
infrared	mortality
inhalation toxicity	mounting methods
input	multiple lc50
intensity	multiroom fires
interior finish	multiventilation
intermittent flame exposure	national fire incident
intumescence test	reporting system (nfirs)
intumescent	net heat of combustion
intumescent coatings	noncombustibility
irradiance	noncombustibles
irradiation isothermal	nonconductor
jet entrainment	nonflaming
jet flames	nonflaming combustion
kindling	nonignition
kinetic	non-load bearing
laminar burning	nonluminous
laminar burning velocity	nonthermal damage
laminar flame propagation	occupational hazards
laminar flames	occupancy
laminar flow	occupancy classification

offgassing  
Ohio State University  
Ohio State University model  
opacity  
optical calibration filters  
optical density  
optical path length  
optical properties  
output  
oven  
overheating  
oxygen concentration  
oxygen consumption  
oxygen consumption calorimeter  
oxygen consumption principle  
oxygen index  
oxygen index test  
particulate mass concentration  
party-wall  
pathological effects  
permeability  
photochemical oxidation  
photochemical reaction  
photometer  
physiological effects  
pill test  
pilot  
pilot burner  
pilot flame  
pilot source of ignition  
piloted ignition  
plasma  
plenum cable  
plume  
plume entrainment coefficient  
pool fire  
post-fire  
post-flashover  
post-ignition  
postheating  
potential heat  
precombustion  
prefire  
preflashover  
preignition  
propagation  
purposeful ignition  
pyrolysis  
pyrolysis front  
pyrolysis temperature  
pyrometer  
radiant combustion apparatus  
radiant energy  
radiant flux  
radiant flux profile  
radiant heat  
radiant heat fill  
radiant heat furnace  
radiant heat source  
radiant heat transfer  
radiant panel test method  
radiation  
radiation absorption  
radiation exposure  
radiometer  
rate of heat release  
rate of mass loss  
rate of smoke release  
refractory tube method  
release rates  
residence time  
residual flame time  
residue  
response surface method  
response time  
restraint  
reynolds number  
risk  
risk analysis  
risk assessment  
risk elements  
risk rating factors  
room burns  
room fire tests  
room fires  
scale effect  
scaling  
scenario  
scorching  
screening test  
self propagating flux  
self extinguishment  
self-heating  
side wall sprinkler systems  
skin burns  
small scale fire test  
smoke  
smoke control  
smoke corrosivity  
smoke damage  
smoke density  
smoke density chamber (e 662)  
smoke density index  
smoke emission factor  
smoke filling  
smoke flow  
smoke generations  
smoke measurement  
smoke movement  
smoke obscuration  
smoke opacity  
smoke penetration  
smoke release  
smoke release rate  
smoke toxicity  
smoke unit



smoke yield	thermal decomposition
smoldering	thermal degradation
smoldering combustion	thermal draft coefficient
smoldering ignition	thermal effects
solid fuels	thermal equilibrium
solid propellant ignition	thermal inertia
soot	thermal operating level
soot formation	thermal properties
soot sampling	thermally thick
spark	thermally thin
specific extinction area	thermochemistry
specific heat	thermocouple
specific optical density	thermogravimetric analysis
specific smoke extinction area	thermometer
spontaneous combustion	thermopile
spontaneous ignition	through penetration fire stop
sprinkler	time to ignition
sprinkler system	time to sustained burning
stack	torch
stack action	total flux meter
stack effect	total heat flux
stagnation	total heat release
standard fire tests	total smoke release
standard flammability apparatus	toxic fire hazard
standard temperature time curve	toxic hazard
steady state combustion	toxic potency
steady state gasification	toxic potency test
steiner tunnel	toxicity
stephan-boltzman constant	toxicity tests
stoichiometric ratio	tunnel furnace
stove	tunnel tests
stratification	turbulent burning
stratified flow	turbulent burning velocity
sublimation	turbulent combustion
substrate	turbulent flames
superimposed load	turbulent jet flames
suppression	two stage ignition
suppression devices	University of Pittsburgh
surface emissivity	unpiloted ignition
surface flame spread	unpiloted ignition toxicity
surface flame spread rate	urban fires test (upitt)
sustained flaming	urban fuels
temperature	van der waals effects
temperature effects	vertical furnace
temperature gradients	visible smoke
temperature measurements	volume flame spread
temperature rise	wall fires
temperature tests	weight loss rate
thermal analysis	wood smoke
thermal conductivity	xp2 chamber test
thermal damage	zone models

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