



Standard Terminology Relating to The Burning Behavior of Textiles¹

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The definitions in this standard have been approved by the Society and are included in D 123 “Terminology Relating to Textiles”. They are published as a separate collection for the convenience of persons interested in the burning behavior of textiles. A bibliography of related literature is given in Appendix X1.

afterglow, *n*—glow in material after the removal of an external ignition source or after the cessation (natural or induced) of flaming of the material. (See also **flame**, **glow**, and **smoldering**.)

burning behavior, *n*—all the changes that take place when materials or products are exposed to a specified ignition source.

charring, *n*—the formation of carbonaceous residue as the result of pyrolysis or incomplete combustion.

combustible textile, *n*—a textile that will ignite and burn or that will give off vapors that will ignite and burn when subjected to external sources of ignition. (Compare **flam- mable textile**, **noncombustible textile**.)

combustion, *n*—a chemical process of oxidation that occurs at a rate fast enough to produce heat and usually light either as glow or flames.

DISCUSSION—Some oxidation such as that of hydrogen emits radiation outside the visible spectrum.

dangerously flammable textile, *n*—not defined. This term is implied in the Standard for the Flammability of Clothing Textiles (16 CFR Part 1610) under the Flammable Fabrics Act (15 USC 1191, et seq.) from which a meaning can be inferred. (See also **flammable textile**.)

embrittlement, *n*—the formation of a brittle residue as the result of pyrolysis or incomplete combustion.

fire, *n*—*as related to textile flammability*, an uncontrolled conflagration in which materials are destroyed by burning as evidenced by flames of varying size and shape, and a high intensity heat source of 5 kw or greater, such as a burning waste basket, grease-fire on a stove, burning building or forest fire.

flame, *n*—*as related to textile flammability*, a hot luminous zone of gas or matter in gaseous suspension, or both, that is undergoing combustion, that is relatively constant in size and shape, and that produces a relatively low heat flux. (Compare **fire**.)

DISCUSSION—Examples are a match flame, candle flame, or a Bunsen burner gas flame.

flame resistance, *n*—the property of a material whereby flaming combustion is prevented, terminated, or inhibited following application of a flaming or nonflaming source of ignition, with or without subsequent removal of the ignition source.

DISCUSSION—Flame resistance can be an inherent property of the basic material or product, or it may be imparted by specific treatment. The degree of flame resistance exhibited by a specific material during testing may vary with different test conditions.

flame resistant, *adj*—having flame resistance.

DISCUSSION—“Flame resistant” is the government mandated description for certain products that meet established governmental conformance standards or specifications when the product is tested by a specific method. Where no conformance standards exist, “flame resistant” is a relative term and is used to compare one material to another.

flame retardant, *adj*—not defined. This term should not be used as an adjective except in the terms “flame-retardant-treated” and “flame-retardant treatment”.

flame retardant, *n*—a chemical used to impart flame resistance.

flame-retardant-treated, *adj*—having received a flame-retardant treatment.

DISCUSSION—The term “flame-retardant-treated” does not apply to textiles that are inherently-flame-resistant due to the intrinsic properties of the material or the fiber-forming polymer.

flame-retardant treatment, *n*—a process for incorporating or adding flame retardant(s) to a material or product.

DISCUSSION—The term “flame-retardant treatment” does not apply to textiles that are inherently flame resistant due to the intrinsic properties of the material or the fiber-forming polymer.

flammability, *n*—those characteristics of a material that pertain to its relative ease of ignition and relative ability to sustain combustion.

flammable textile, *n*—any combustible textile that burns with a flame. (See also **flammability**.) (Compare **combustible textile**, **noncombustible textile**.)

glow, *n*—visible, flameless combustion of the solid phase of a

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material. (See also **afterglow** and **smoldering**.)

DISCUSSION—A solid may both glow and give off combustibles that burn in the gas phase (that is, flame) but the two are not necessarily interdependent. Aspects of glow not involving combustion are defined in dictionaries of general terms.

heat durability, *n*—the extent to which a material retains its useful properties at ambient air conditions, following its exposure to a specified temperature and environment for a specified time and its return to the ambient air conditions. (Compare **heat resistance**.)

heat durable, *adj*—having heat durability.

heat flux, *n*—the thermal intensity indicated by the amount of power per unit area.

DISCUSSION—The SI unit for heat flux is watts per square meter (W/m²).

heat resistance, *n*—the extent to which a material retains useful properties as measured during exposure of the material to a specified temperature and environment for a specified time. (Compare **heat durability**.)

heat resistant, *adj*—having heat resistance.

ignition, *n*—the initiation of combustion.

inherent flame-resistance, *n*—*as applied to textiles*, flame resistance that derives from an essential characteristic of the fiber from which the textile is made. (Compare **flame resistance**.)

inherently-flame-resistant, *adj*—having inherent flame-resistance.

noncombustible textile, *n*—a textile that will neither ignite nor give off vapors that will ignite when subjected to external sources of ignition. (Compare **combustible textile**.)

nonflammable textile, *n*—any combustible textile that burns without a flame. (See also **glow**, **smoldering**.) (Compare **flammable textile**, **combustible textile**, **noncombustible textile**.)

self-extinguishing, *n*—not defined. The Board of Directors of ASTM has ruled that the term “self-extinguishing” shall not be used in ASTM standards. It has no meaning except in association with a specific test method or specific conditions of burning.

shrinkage, *n*—a decrease in one or more dimensions of an object or material.

smoldering, *n*—the combustion of a solid material without accompaniment of flame but generally with the production of smoke. (See also **afterglow** and **glow**.)

DISCUSSION—Smoldering can be initiated by small or low temperature sources of ignition, especially in loose materials, and may be present for an extended period of time after which a flame might be produced.

INDEXING TERMS

This standard is indexed under the following terms: burning behavior, flammability, and terminology.

APPENDIX

(Nonmandatory Information)

X1. RELATED LITERATURE

(1) “Establishing World Flammability Terms”, *Textile World* Vol 126 No. 6, June 1975, pp. 107–109.

(2) ASTM Standard E 176 “Terminology Relating to Fire Standards.”

(3) Gaskill, James R., “Concept of Smoke and Fire Gases,” *Standardization News* Vol 7 No. 12, December 1979, pp. 23–24.

(4) “Burning Behavior of Textiles and Textile Products—Vocabulary: Part 1” Draft International Standard ISO/DIS 4880/1.

(5) “Burning Behavior of Textiles and Textile Products—Vocabulary: Part 2” Draft International Standard ISO/DIS

4880/2.

(6) Warren Y. Kimbal, *Fire Department Terminology*, 4th ed., National Fire Protection Association, Boston (1970).

(7) Kuvshinoff, B. W., *Fire Sciences Dictionary*, John Wiley & Sons, Inc., New York 1977.

(8) Sanders, Howard J., “Flame Retardants”, *Chemical & Engineering News*, Vol 56 No 17, April 24, 1978, pp. 22–40.

(9) *Symposium on Standardization of Technical Terminology: Principles and Practice*, ASTM STP 806, ASTM, 1983.

(10) ASTM Standard D 4108 “Test Method for Thermal Protective Performance of Materials for Clothing by Open Flame Method.”

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 **D 4391**

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