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Standard Terminology Relating to The Burning Behavior of Textiles¹

This standard is issued under the fixed designation D4391; 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.

The definitions in this standard have been approved by the Society and are included in D123 “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](#).

^{ε1} NOTE—The term “exposure energy to thermal end point” was added editorially in May 2013.

^{ε2} NOTE—The terms “critical sewn seams” and “retained sewn seam strength” were added editorially in September 2014.

afterflame, *n*—persistent flaming of a material after the ignition source has been removed. [D13.92] D4391

after-flame time, *n*—the length of time for which a material continues to flame after the ignition source has been removed. [D13.92] D4391

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**.)

afterglow time, *n*—the time afterglow continues after the cessation of flaming or after removal of the ignition source. [D13.92] D4391

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 **flammable 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.

¹ This terminology is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.92 on Terminology. Current edition approved Jan. 1, 2013. Published January 2013. Originally approved in 1984. Last previous edition approved in 2006 as D4391 – 93(2006)^{ε1}. DOI: 10.1520/D4391-93AR13E01; 10.1520/D4391-93AR13E02.

DISCUSSION—

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

critical sewn seams, *n*—*in assembly of flame resistant textiles*, those sewn junctions where failure would result in immediate danger or injury.

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.

exposure energy to thermal end point, *n*—the thermal energy transferred through a specimen that is sufficient to cause ignition of contiguous materials. [D13.92] D7140

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.

flame spread, *n*—the propagation of a flame away from the source of ignition. [D13.92] D4391

flame spread time, *n*—the time taken by a flame on a burning material to travel a specified distance under specified conditions. [D13.92] D4391

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**.)

flaming debris, *n*—material which continues to flame as it separates and moves away from the flaming source. [D13.92] D4391

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