

INTERNATIONAL
STANDARD

ISO
13943

Third edition
2017-07

Fire safety — Vocabulary

Sécurité au feu — Vocabulaire

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Reference number
ISO 13943:2017(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 92, *Fire safety*.

This third edition cancels and replaces the second edition (ISO 13943:2008), which has been technically revised.

Introduction

Over the last two decades, there has been a significant growth in the field of fire safety. There has been a considerable development of fire safety engineering design, especially as it relates to construction projects, as well as the development of concepts related to performance-based design. With this continuing evolution, there is an increasing need for agreement on a common language in the broad and expanding area of fire safety, beyond what traditionally has been limited to the field of fire testing.

The first edition of this vocabulary, ISO 13943:2000, contained definitions of about 180 terms. However, the areas of technology that are related to fire safety have continued to evolve rapidly and this edition contains many new terms and their definitions, as well as revised definitions of some of the terms that were in earlier editions.

This document defines general terms to establish a vocabulary applicable to fire safety, including fire safety in buildings and civil engineering works and other elements within the built environment. It will be updated as terms and definitions for further concepts in the field of fire safety are agreed upon and developed.

It is important to note that, it is possible that, when used for regulation, some fire safety terms may have a somewhat different interpretation than the one used in this document and, in that case, the definition given in this document may not apply.

The terms in this document are

- fundamental concepts,
- more specific concepts, such as those used specifically in fire testing or in fire safety engineering and may be used in ISO or IEC fire standards, and
- related concepts, as exemplified by terms used in building and civil engineering.

Annex A provides an index of deprecated terms.

The layout is designed according to ISO 10241-1, unless otherwise specified. The terms are presented in English alphabetical order and are in **bold type** except for deprecated terms, which are in normal type.

Use of the term “item”

For the purposes of this document, in the English version, the term “item” (and in French “objet”) is used in a general meaning to represent any single object or assembly of objects, and may cover, for example, material, product, assembly, structure or building, as required in the context of any individual definition.

If the “item” under consideration is a test specimen, then the term “test specimen” is used.

The German version uses terminology such as material, product, kit, assembly and/or building to clarify the meaning of each definition.

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Fire safety — Vocabulary

1 Scope

This document defines terminology relating to fire safety as used in ISO and IEC fire standards.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

abnormal heat

<electrotechnical> heat that is additional to that resulting from use under normal conditions, up to and including that which causes a *fire* (3.114)

3.2

absorptivity

ratio of the absorbed *radiant heat flux* (3.319) to the incident *radiative heat flux* (3.321)

Note 1 to entry: The absorptivity is dimensionless.

3.3

acceptance criteria

criteria that form the basis for assessing the acceptability of the safety of a design of a *built environment* (3.32)

Note 1 to entry: The criteria can be qualitative, quantitative or a combination of both.

3.4

accuracy

closeness of the agreement between the result of a measurement and the true value of the measurand

[SOURCE: ASTM E176:2015]

3.5

activation time

time interval from response by a sensing device until the *suppression system* (3.375), *smoke* (3.347) control system, alarm system or other fire safety system is fully operational

3.6

active fire protection

method(s) used to reduce or prevent the spread and effects of *fire* (3.114), heat or *smoke* (3.347) by virtue of detection and/or suppression of the fire and which require a certain amount of motion and/or response to be activated

EXAMPLE The application of agents (e.g. halon gas or water spray) to the fire or the control of ventilation and/or smoke.

Note 1 to entry: Compare with the terms *passive fire protection* (3.293) and *suppression systems* (3.375).

**3.7
actual delivered density**

ADD

volumetric flow rate of water per unit area that is delivered onto the top horizontal surface of a simulated burning *combustible* (3.52) array

Note 1 to entry: ADD is typically determined relative to a specific *heat release rate* (3.206) of a *fire* (3.114).

Note 2 to entry: ADD can be measured according to ISO 6182-7.

Note 3 to entry: The typical unit is mm·min⁻¹.

**3.8
acute toxicity**

toxicity (3.405) that causes rapidly occurring *toxic* (3.399) effects

Note 1 to entry: Compare with the term *toxic potency* (3.402).

**3.9
aerosol**

suspension of *droplets* (3.84) and/or solid particles in a gas phase which are generated by *fire* (3.114)

Note 1 to entry: The size of the droplets or particles typically ranges from under 10 nm to over 10 µm.

Note 2 to entry: Compare with the term **droplets**.

**3.10
aerosol particle**

individual piece of solid material that is part of the dispersed phase in an *aerosol* (3.9)

Note 1 to entry: There are two categories of fire aerosol particles: unburned or partially burned particles containing a high proportion of carbon (i.e. "soot"), and relatively completely combusted, small particle sized "ashes". *Soot* (3.354) particles of small diameter, (i.e. about 1 µm), typically consist of small elementary spheres of between 10 nm and 50 nm in diameter. Formation of soot particles is dependent on many parameters including nucleation, agglomeration and surface growth. *Oxidation* (3.289) of soot particles, i.e. further *combustion* (3.55), is also possible.

**3.11
afterflame**

flame (3.159) that persists after the *ignition source* (3.219) has been removed

**3.12
afterflame time**

length of time for which an *afterflame* (3.11) persists under specified conditions

Note 1 to entry: Compare with the term *duration of flaming* (3.85).

**3.13
afterglow**

persistence of *glowing combustion* (3.197) after both removal of the *ignition source* (3.219) and the cessation of any *flaming combustion* (3.175)

**3.14
afterglow time**

length of time for which an *afterglow* (3.13) persists under specified conditions

**3.15
agent outlet**

orifice of a piping system by means of which an extinguishing fluid can be applied towards the source of a *fire* (3.114)

3.16**alarm time**

time interval between *ignition* (3.217) of a *fire* (3.114) and activation of an alarm

Note 1 to entry: The time of ignition may be known, e.g. in the case of a *fire model* (3.136) or a *fire test* (3.157), or it may be assumed, e.g. it may be based upon an estimate working back from the time of detection. The basis on which the time of ignition is determined is always stated when the alarm time is specified.

3.17

alight, adj.

lit, adj. CA, US

lighted, adj.

undergoing *combustion* (3.55)

3.18**analyte**

substance that is identified or quantified in a specimen during an analysis

3.19**arc resistance**

<electrotechnical> ability of an electrically insulating material to resist the influence of an electric arc, under specified conditions

Note 1 to entry: The arc resistance is identified by the length of the arc, the absence or presence of a conducting path, and the burning or damage of the *test specimen* (3.384).

3.20**area burning rate**

DEPRECATED: burning rate

DEPRECATED: rate of burning

area of material *burned* (3.34) per unit time under specified conditions

Note 1 to entry: The typical unit is $\text{m}^2\cdot\text{s}^{-1}$.

3.21**arson**

crime of setting a *fire* (3.114), usually with intent to cause damage

3.22**ash****ashes**

mineral residue resulting from *complete combustion* (3.59)

3.23**asphyxiant**

toxicant (3.404) that causes hypoxia, which can result in central nervous system depression or cardiovascular effects

Note 1 to entry: Loss of consciousness and ultimately, death may occur.

3.24**auto-ignition****spontaneous ignition****self-ignition****unpiloted ignition**

DEPRECATED: spontaneous combustion

ignition (3.217) caused by an internal exothermic reaction

Note 1 to entry: The ignition may be caused either by *self-heating* (3.341) or, in the case of **unpiloted ignition**, by heating from an external source, as long as the external source does not include an open flame

Note 2 to entry: In North America, “**spontaneous ignition**” is the preferred term used to designate ignition caused by self-heating.

Note 3 to entry: Compare with the terms *piloted ignition* (3.299) and *spontaneous ignition temperature* (3.363).

3.25

auto-ignition temperature

minimum temperature at which *auto-ignition* (3.24) is obtained in a *fire test* (3.157)

Note 1 to entry: The typical unit is °C.

Note 2 to entry: Compare with the term *spontaneous ignition temperature* (3.363).

3.26

available safe escape time

ASET

time available for escape

calculated time interval between the time of *ignition* (3.217) and the time at which conditions become such that the occupant is estimated to be incapacitated, i.e. unable to take effective action to *escape* (3.99) to a *safe refuge* (3.333) or *place of safety* (3.300)

Note 1 to entry: The time of ignition may be known, e.g. in the case of a *fire model* (3.136) or a *fire test* (3.157), or it may be assumed, e.g. it may be based upon an estimate working back from the time of detection. The basis on which the time of ignition is determined needs to be stated.

Note 2 to entry: This definition equates *incapacitation* (3.225) with failure to escape. Other criteria for ASET are possible. If an alternate criterion is selected, it needs to be stated.

Note 3 to entry: Each occupant may have a different value of ASET, depending on that occupant's personal characteristics.

3.27

backdraft

rapid *flaming combustion* (3.175) caused by the sudden introduction of air into a confined oxygen-deficient space that contains hot products of incomplete *combustion* (3.55)

Note 1 to entry: In some cases, these conditions may result in an *explosion* (3.105).

3.28

behavioural scenario

description of the behaviour of occupants during the course of a *fire* (3.114)

3.29

black body

form that completely absorbs any electromagnetic radiation falling upon it

3.30

black body radiation source

ideal thermal radiation source which completely absorbs all incident heat radiation, whatever wavelength and direction

Note 1 to entry: The *emissivity* (3.89) of a black body radiant source is unity.

Note 2 to entry: A black body can also be an ideal radiator of energy.

[SOURCE: ISO 14934-1:2010, 3.1.7]

3.31

building element

integral part of a *built environment* (3.32)

Note 1 to entry: This includes floors, walls, beams, columns, doors, and penetrations, but does not include contents.

Note 2 to entry: This definition is wider in its scope than that given in ISO 6707-1.

3.32

built environment

building or other structure

EXAMPLE Off-shore platforms, civil engineering works such as tunnels, bridges and mines, and means of transportation such as motor vehicles and marine vessels.

Note 1 to entry: ISO 6707-1 contains a number of terms and definitions for concepts related to the built environment.

3.33

buoyant plume

convective updraft of fluid above a heat source

Note 1 to entry: Compare with the term *fire plume* (3.138).

3.34

burn, intransitive verb

undergo *combustion* (3.55)

3.35

burn, transitive verb

cause *combustion* (3.55)

3.36

burned area

that part of the *damaged area* (3.72) of a material that has been destroyed by *combustion* (3.55) or *pyrolysis* (3.316), under specified conditions

Note 1 to entry: The typical unit is m².

3.37

burned length

maximum extent in a specified direction of the *burned area* (3.36)

Note 1 to entry: The typical unit is m.

Note 2 to entry: Compare with the term *damaged length* (3.73).

3.38

burning behaviour

<fire tests> response of a *test specimen* (3.384), when it burns under specified conditions, to examination of *reaction to fire* (3.324) or *fire resistance* (3.141)

3.39

burning debris

burning material, other than drops, which has detached from a *test specimen* (3.384) during a *fire test* (3.157) and continues to *burn* (3.34) on the floor

Note 1 to entry: Compare with the terms *burning droplets* (3.40), *flaming debris* (3.176) and *flaming droplets* (3.177).

3.40

burning droplets

flaming molten or flaming liquefied drops which fall from a *test specimen* (3.384) during a *fire test* (3.157) and continue to *burn* (3.34) on the floor

Note 1 to entry: Compare with the terms *flaming droplet* (3.177), *flaming debris* (3.176) and *burning debris* (3.39).

3.41

bursting

violent rupture of an object due to an overpressure within it or upon it

3.42

calibration

<fire models> process of adjusting modelling parameters in a computational *fire model* (3.136) for the purpose of improving agreement with experimental data

3.43

calorimeter

apparatus that measures heat

Note 1 to entry: Compare with the terms *heat release rate calorimeter* (3.207) and *mass calorimeter* (3.257).

3.44

carboxyhaemoglobin

compound formed when CO combines with **haemoglobin**

Note 1 to entry: **Haemoglobin** has an affinity for binding to CO that is approximately 245 times higher than that for binding to oxygen; thereby, the ability of haemoglobin to carry oxygen is seriously compromised during CO poisoning.

3.45

carboxyhaemoglobin saturation

percentage of blood haemoglobin converted to carboxyhaemoglobin from the reversible reaction with inhaled carbon monoxide

3.46

ceiling jet

gas motion in a hot gas layer near a ceiling that is generated by the buoyancy of a *fire plume* (3.138) that is impinging upon the ceiling

3.47

char, noun

carbonaceous residue resulting from *pyrolysis* (3.316) or incomplete *combustion* (3.55)

3.48

char, verb

form *char* (3.47)

3.49

char length

length of charred area

Note 1 to entry: Compare with the terms *burned length* (3.37) and *damaged length* (3.73).

Note 2 to entry: In some standards, char length is defined by a specific test method.

3.50

chimney effect

upward movement of hot *fire effluent* (3.123) caused by *convection* (3.66) currents confined within an essentially vertical *enclosure* (3.92)

Note 1 to entry: This usually draws more air into the *fire* (3.114).

3.51

clinker

solid agglomerate of residues formed by either *complete combustion* (3.59) or *incomplete combustion* (3.55) and which may result from complete or partial melting

3.52**combustible**, adj.capable of being *ignited* (3.216) and *burned* (3.34)**3.53****combustible**, nounitem capable of *combustion* (3.55)**3.54****combustible load**theoretical mass that would be lost from a *test specimen* (3.384) when it is assumed to have undergone *complete combustion* (3.59) in a *fire test* (3.157)**3.55****combustion**exothermic reaction of a substance with an *oxidizing agent* (3.290)

Note 1 to entry: Combustion generally emits *fire effluent* (3.123) accompanied by *flames* (3.159) and/or *glowing* (3.196).

3.56**combustion efficiency**ratio of the amount of *heat release* (3.205) in incomplete *combustion* (3.55) to the theoretical heat of *complete combustion* (3.59)

Note 1 to entry: Combustion efficiency can be calculated only for cases where complete combustion can be defined.

Note 2 to entry: Combustion efficiency is usually expressed as a percentage.

Note 3 to entry: The combustion efficiency is dimensionless.

3.57**combustion product****product of combustion**solid, liquid and gaseous material resulting from *combustion* (3.55)

Note 1 to entry: Combustion products may include *fire effluent* (3.123), *ash* (3.22), *char* (3.47), *clinker* (3.51) and/or *soot* (3.354).

3.58**common mode failure**

failure involving a single source that affects more than one type of safety system simultaneously

3.59**complete combustion***combustion* (3.55) in which all the *combustion products* (3.57) are fully oxidized

Note 1 to entry: This means that, when the *oxidizing agent* (3.290) is oxygen, all carbon is converted to carbon dioxide and all hydrogen is converted to water.

Note 2 to entry: If elements other than carbon, hydrogen and oxygen are present in the *combustible* (3.52) material, those elements are converted to the most stable products in their standard states at 298 K.

3.60**computerized model**operational computer programme that implements a *conceptual model* (3.64)**3.61****composite material**

structured combination of two or more discrete materials

3.62

concentration

mass of a dispersed or dissolved material in a given volume

Note 1 to entry: For *fire effluent* (3.123), the typical unit is $\text{g}\cdot\text{m}^{-3}$.

Note 2 to entry: For *toxic gas* (3.400), concentration is usually expressed as a *volume fraction* (3.421) at $T = 298 \text{ K}$ and $P = 1 \text{ atm}$, with typical units of $\mu\text{L}/\text{L}$ ($= \text{cm}^3/\text{m}^3 = 10^{-6}$).

Note 3 to entry: The concentration of a gas at a temperature, T , and a pressure, P , can be calculated from its volume fraction (assuming ideal gas behaviour) by multiplying the volume fraction by the density of the gas at that temperature and pressure.

Note 4 to entry: Pascal (Pa) is the SI unit for pressure; however, atmosphere (atm) is typically used in this context, where $1 \text{ atm} = 101,3 \text{ kPa}$.

3.63

concentration-time curve

<toxicology> plot of the *concentration* (3.62) of a *toxic gas* (3.400) or *fire effluent* (3.123) as a function of time

Note 1 to entry: For fire effluent, concentration is usually measured in units of $\text{g}\cdot\text{m}^{-3}$.

Note 2 to entry: For toxic gas, concentration is usually expressed as a *volume fraction* (3.421) at $T = 298 \text{ K}$ and $P = 1 \text{ atm}$, with typical units of $\mu\text{L}/\text{L}$ ($= \text{cm}^3/\text{m}^3 = 10^{-6}$).

Note 3 to entry: Pascal (Pa) is the SI unit for pressure; however, atmosphere (atm) is typically used in this context, where $1 \text{ atm} = 101,3 \text{ kPa}$.

3.64

conceptual model

information, mathematical modelling, data, assumptions, boundary conditions and mathematical equations that describes the (physical) system or process of interest

3.65

controlled burn

operational strategy where the application of firefighting media such as water or foam is restricted or avoided

Note 1 to entry: Controlled burns are often conducted to minimize damage to public health and the environment. Other motivations for controlled burn may include limited danger of fire spread, concerns about firefighter safety, or limited capacity and resources at hand for firefighting operations.

Note 2 to entry: The strategy would normally be used to try and prevent water pollution by contaminated firewater. It can also reduce air pollution due to the better *combustion* (3.55) and dispersion of pollutants. But it may also have adverse impacts such as allowing or increasing the formation of hazardous gaseous by-products. It may also have benefits for fire fighter safety and public health.

3.66

convection

transfer of heat by movement of a fluid

3.67

convective heat flux

heat flux (3.201) caused by *convection* (3.66)

3.68

convective heat transfer

transfer of heat to a surface from a surrounding fluid by *convection* (3.66)

Note 1 to entry: The amount of heat transfer depends on the temperature difference between the fluid and the surface, the fluid properties and the fluid velocity and direction.

Note 2 to entry: The fundamental modes of heat transfer are conduction or diffusion, convection and radiation.

3.69

corrosion damage

physical and/or chemical damage or impaired function caused by chemical action

3.70

corrosion target

sensor used to determine the degree of *corrosion damage* (3.69), under specified conditions

Note 1 to entry: The sensor may be a product or a component. It may also be a reference material or object used to simulate the behaviour of a product or a component.

3.71

critical fire load

fire load (3.134) required in a *fire compartment* (3.120) to produce a *fire* (3.114) of sufficient severity to cause failure of a *fire barrier(s)* (3.117) or structural member(s) located within or bounding the fire compartment

3.72

damaged area

total of those surface areas which have been affected permanently by *fire* (3.114) under specified conditions

Note 1 to entry: Compare with the term *burned area* (3.36).

Note 2 to entry: Users of this term should specify the types of damage to be considered. This could include, for example, loss of material, deformation, softening, *melting behaviour* (3.270), *char* (3.47) formation, *combustion* (3.55), *pyrolysis* (3.316) or chemical attack.

Note 3 to entry: The typical unit is m².

3.73

damaged length

maximum extent in a specified direction of the *damaged area* (3.72)

Note 1 to entry: Compare with the terms *char length* (3.49) and *burned length* (3.37).

3.74

defend in place

life safety strategy in which occupants are encouraged to remain in their current location rather than to attempt *escape* (3.99) during a *fire* (3.114)

3.75

deflagration

combustion (3.55) wave propagating at subsonic velocity

Note 1 to entry: If within a gaseous medium, deflagration is the same as a *flame* (3.159).

3.76

design density

measured volumetric flow rate of water from sprinklers, per unit area, that is delivered in the absence of a *fire* (3.114)

Note 1 to entry: The typical unit is mm·min⁻¹.

3.77

design fire

quantitative description of assumed *fire* (3.114) characteristics within the *design fire scenario* (3.78)

Note 1 to entry: Design fire is, typically, an idealized description of the variation with time of important fire variables such as *heat release rate* (3.206), *flame spread rate* (3.169), *smoke production rate* (3.351), **toxic gas yields**, and temperature.

3.78

design fire scenario

specific *fire scenario* (3.152) on which a deterministic *fire safety engineering* (3.149) analysis will be conducted

3.79

detection time

time interval between *ignition* (3.217) of a *fire* (3.114) and its detection by an automatic or manual system

3.80

deterministic model

fire model (3.136) that uses science-based mathematical expressions to produce the same result each time the method is used with the same set of input data values

3.81

detonation

reaction characterized by a shock wave propagating at a velocity greater than the local speed of sound in the unreacted material

3.82

diffusion flame

flame (3.159) in which *combustion* (3.55) occurs in a zone where the *fuel* (3.189) and the *oxidizing agent* (3.290) mix, having been initially separate

Note 1 to entry: Compare with the term *pre-mixed flame* (3.307).

3.83

draught-free environment

space in which the results of experiments are not significantly affected by the local air speed

Note 1 to entry: A qualitative example is a space in which a wax candle *flame* (3.159) remains essentially undisturbed. Quantitative examples are *small-scale fire tests* (3.346) in which a maximum air speed of 0,1 m·s⁻¹ or 0,2 m·s⁻¹ is sometimes specified.

3.84

droplets

aerosol droplets

liquid-phase products, typically generated through *pyrolysis* (3.316) (reduced oxygen combustion conditions) from both flaming and smouldering fires and which may condense into tarrylike, spherically-shaped liquid beads

Note 1 to entry: Water produced from combustion may also condense around particles forming aerosol droplets.

3.85

duration of flaming

length of time for which *flaming combustion* (3.175) persists under specified conditions

Note 1 to entry: Compare with the term *afterflame time* (3.12).

3.86

effective concentration 50

EC₅₀

concentration (3.62) of a *toxic gas* (3.400) or *fire effluent* (3.123), statistically calculated from concentration-response data, that causes a specified effect in 50 % of a population of a given species within a specified *exposure time* (3.108) and *post-exposure time* (3.302)

Note 1 to entry: Compare with the term **IC₅₀** (0).

Note 2 to entry: For fire effluent, typical unit is g·m⁻³.

Note 3 to entry: For toxic gas, typical unit is µL/L (T = 298 K and P = 1 atm); see *volume fraction* (3.421).

Note 4 to entry: The observed effect is usually a behavioural response, *incapacitation* (3.225), or death. The **EC₅₀** for incapacitation is termed the *IC₅₀* (3.211). The **EC₅₀** for lethality is termed the *LC₅₀* (3.241).

3.87

effective exposure dose 50

Ect₅₀

product of *EC₅₀* (3.86) and the *exposure time* (3.108) over which it was determined

Note 1 to entry: Compare with the term *exposure dose* (3.107).

Note 2 to entry: For *fire effluent* (3.123), typical unit is g·min·m⁻³.

Note 3 to entry: For *toxic gas* (3.400), typical unit is μL·min·L⁻¹ (T = 298 K and P = 1 atm); see *volume fraction* (3.421).

Note 4 to entry: Ect₅₀ is a measure of *toxic potency* (3.402).

3.88

effective heat of combustion

heat released (3.205) from a burning *test specimen* (3.384) in a given time interval divided by the mass lost from the test specimen in the same time period

Note 1 to entry: Effective heat of combustion is the same as the *net heat of combustion* (3.280) if all the test specimen is converted to volatile *combustion products* (3.57) and if all the combustion products are fully oxidized.

Note 2 to entry: The typical unit is kJ·g⁻¹.

3.89

emissivity

ratio of the radiation emitted by a radiant source to the radiation that would be emitted by a *black body radiant source* (3.30) at the same temperature

Note 1 to entry: The emissivity is dimensionless.

3.90

empirical formula

chemical formula of a substance in which the relative numbers of atoms of each type are given

Note 1 to entry: Typically, the number for one type of atom is chosen to be an integer (usually C or O), e.g. a particular sample might be represented as C₆H_{8,9}O_{4,1}N_{0,3}Cl_{0,01}.

3.91

enclosed fire

fire (3.114) which takes place and has been *ignited* (3.216) inside an *enclosure* (3.92)

Note 1 to entry: This term is particularly important when defining the ventilation conditions in the fire.

3.92

enclosure

<built environment> volume defined by bounding surfaces, which may have one or more openings

3.93

enclosure

<electrotechnical> external casing protecting the electrical and mechanical parts of apparatus

Note 1 to entry: This term excludes cables.

3.94

end-use conditions

intended conditions to which an item will be subjected during its normal working life, when used in accordance with the manufacturer's instructions

3.95

environment

<fire> conditions and surroundings that may influence the behaviour of an item or persons when exposed to *fire* (3.114)

3.96

environmental impact

significant change to the natural environment, whether adverse or beneficial, wholly or partially resulting from a *fire* (3.114)

3.97

equivalence ratio

fuel (3.189)/air ratio divided by the fuel/air ratio required for a *stoichiometric mixture* (3.370)

Note 1 to entry: Compare with the terms *fuel-lean combustion* (3.190), *fuel-rich combustion* (3.191), *stoichiometric combustion* (3.367), and stoichiometric mixture.

Note 2 to entry: Standard dry air contains 20,95 % oxygen by volume. In practice, the oxygen concentration (3.62) in entrained air may vary and calculation of the equivalence ratio to a standard dry air basis will be required.

Note 3 to entry: The equivalent ratio is dimensionless.

3.98

error

recognizable deficiency in any phase or activity of assessment that is not due to lack of knowledge

Note 1 to entry: Error is seen not only as an error in any calculation method, but also as measurement error.

3.99

escape

effective action taken to reach a *safe refuge* (3.333) or *place of safety* (3.300)

3.100

evacuation behaviour

behaviour which enables occupants of a building to reach a *place of safety* (3.300)

Note 1 to entry: Compare with the terms *movement behaviour* (3.276) and *pre-movement behaviour* (3.308).

3.101

evacuation time

time interval between the time of a warning of *fire* (3.114) being transmitted to the occupants and the time at which the occupants of a specified part of a building or all of the building are able to enter a *place of safety* (3.300)

Note 1 to entry: Compare with the term *available safe escape time* (3.26).

3.102

event tree

depiction of temporal, causal sequences of events, built around a single initiating condition

3.103

exit

designated point of departure from a building or from an *enclosure* (3.92)

3.104

expanded uncertainty

quantity defining an interval for the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand

Note 1 to entry: The fraction may be viewed as the coverage probability or level of confidence of the interval.

Note 2 to entry: Compare with the term *uncertainty* (3.413). **Expanded uncertainty** requires explicit or implicit assumptions regarding the probability distribution characterized by the measurement result and its combined standard uncertainty. The level of confidence that may be attributed to this interval can be known only to the extent to which such assumptions may be justified.

Note 3 to entry: Expanded uncertainty is termed overall uncertainty in some documents.

[SOURCE: ISO/IEC Guide 98-3:2008, 2.3.5]

3.105 explosion

<chemical> abrupt expansion of gas which may result from a rapid *oxidation* (3.289) or decomposition reaction, with or without an increase in temperature

3.106 exposed surface

surface of a *test specimen* (3.384) subjected to the heating conditions of a *fire test* (3.157)

Note 1 to entry: The surface of the test specimen could also be exposed to the heat generated by the output from the test specimen itself.

3.107 exposure dose

measure of the maximum amount of a *toxic gas* (3.400) or *fire effluent* (3.123) which is available for inhalation, calculated by integration of the area under a *concentration-time curve* (3.63)

Note 1 to entry: For fire effluent, typical unit is g·min·m⁻³.

Note 2 to entry: For toxic gas, typical unit is µL·min·L⁻¹ (T = 298 K and P = 1 atm); see *volume fraction* (3.421).

3.108 exposure time

length of time for which people, animals or *test specimens* (3.384) are exposed under specified conditions

3.109 extent of combustion

<electrotechnical> maximum length of a *test specimen* (3.384) that has been destroyed by *combustion* (3.55) or *pyrolysis* (3.316), under specified test conditions, excluding any region damaged only by deformation

3.110 extinction area of smoke

product of the volume occupied by *smoke* (3.347) and the *extinction coefficient* (3.111) of the smoke

Note 1 to entry: The extinction area of smoke is a measure of the amount of smoke. The typical unit is m².

3.111 extinction coefficient

natural logarithm of the ratio of incident light intensity to transmitted light intensity, per unit light path length

Note 1 to entry: The typical unit is m⁻¹.

3.112 F factor

minimum *concentration* (3.62) of a *toxic gas* (3.400) *irritant* (3.237) that is expected to seriously compromise the ability to *escape* (3.99) from a *fire* (3.114)

Note 1 to entry: Compare with the term *fractional effective concentration* (3.187).

Note 2 to entry: The concentration is usually expressed as a *volume fraction* (3.421) (0) at T = 298 K and P = 1 atm, in which case the typical unit is µL/L (= cm³/m³ = 10⁻⁶).

3.113

fault tree

depiction of the logical dependencies of events on one another, built around a critical resulting event, which usually has an unacceptable level of consequence and may be described as a failure

3.114

fire

<general> process of *combustion* (3.55) characterized by the emission of heat and *fire effluent* (3.123) and usually accompanied by *smoke* (3.347), *flame* (3.159) or *glowing* (3.196) or a combination thereof

Note 1 to entry: In the English language, the term “fire” is used to designate three concepts, two of which relate to specific types of self-supporting combustion with different meanings. Of these three, two of them are designated using two different terms in both French and German.

3.115

fire

<controlled> self-supporting *combustion* (3.55) that has been deliberately arranged to provide useful effects and is limited in its extent in time and space

3.116

fire

<uncontrolled> self-supporting *combustion* (3.55) that has not been deliberately arranged to provide useful effects and is not limited in its extent in time and space

3.117

fire barrier

fire separation, noun

separating element (3.345) that exhibits *fire integrity* (3.133) or *fire stability* (3.156) or *thermal insulation* (3.391), or a combination thereof, for a period of time under specified conditions

3.118

fire behaviour

change in, or maintenance of, the physical and/or chemical properties of an item and/or structure exposed to *fire* (3.114)

Note 1 to entry: Compare with the term *fire performance* (3.137).

Note 2 to entry: This concept covers both *reaction to fire* (3.324) and *fire resistance* (3.141).

Note 3 to entry: In English, this term may also be used to describe the behaviour of a fire.

3.119

fire classification

standardized system of classifying *fires* (3.114) in terms of the nature of the *fuel* (3.189)

EXAMPLE In Europe and Australasia, there are six classes:

- Class A: fire involving solid materials, usually of an organic nature, in which *combustion* (3.55) normally takes place with the formation of *glowing* (3.196) embers;
- Class B: fires involving liquids or liquefiable solids;
- Class C: fires involving gases;
- Class D: fires involving metals;
- Class E: fires involving electrical hazards;
- Class F: fires involving cooking oil or fat.

3.120

fire compartment

enclosed space, which may be subdivided, separated from adjoining spaces by *fire barriers* (3.117)

3.121**fire danger**

concept including both *fire hazard* (3.131) and *fire risk* (3.145)

Note 1 to entry: See fire hazard and fire risk.

3.122**fire decay**

stage of fire development after a *fire* (3.114) has reached its maximum intensity and during which the *heat release rate* (3.206) and the temperature of the fire are decreasing

3.123**fire effluent**

all gases and aerosols, including suspended particles, created by *combustion* (3.55) or *pyrolysis* (3.316) and emitted to the *environment* (3.95)

[SOURCE: ISO 26367-1:2011, 3.4, modified — “and emitted to the environment” has been added.]

3.124**fire effluent decay characteristic**

physical and/or chemical change in *fire effluent* (3.123) caused by ageing and transport

3.125**fire effluent transport**

movement of *fire effluent* (3.123) from the location of a *fire* (3.114)

3.126**fire exposure**

extent to which persons, animals or items are subjected to the conditions created by *fire* (3.114)

3.127**fire extinguishment**

process that eliminates *combustion* (3.55)

3.128**fire gases**

gaseous part of *combustion products* (3.57)

Note 1 to entry: Compare with the term *fire effluent* (3.123).

Note 2 to entry: In French, the term **gaz de combustion** also applies to engine exhaust gas and may then include particles.

3.129**fire growth**

stage of *fire* (3.114) development during which the *heat release rate* (3.206) and the temperature of the fire are increasing

3.130**fire growth rate**

rate of change of the fire *heat release rate* (3.206)

Note 1 to entry: Some factors that affect the fire growth rate are exposure, geometry, *flame spread* (3.168) and *fire barriers* (3.117).

Note 2 to entry: The typical unit is W/s.

3.131

fire hazard

potential for harm associated with *fire* (3.114)

Note 1 to entry: Alternatively, fire hazard can be a physical object or condition with a potential for an undesirable consequence from fire.

3.132

fire hazard analysis

fire hazard assessment

evaluation of the possible causes of *fire* (3.114), the possibility and nature of subsequent fire growth, and the possible consequences of fire

Note 1 to entry: Other definitions of fire hazard assessment specifically point out a relationship to the (extent of) fire safety measures present or foreseen.

3.133

fire integrity

integrity

ability of a *separating element* (3.345), when exposed to *fire* (3.114) on one side, to prevent the passage of *flames* (3.159) and hot gases or the occurrence of flames on the unexposed side for a stated period of time in a standard *fire resistance* (3.141) test

Note 1 to entry: Compare with the term *integrity criterion "E"* (3.232).

3.134

fire load

quantity of heat which could be released by the *complete combustion* (3.59) of all the *combustible* (3.52) materials in a volume, including the facings of all bounding surfaces

Note 1 to entry: Fire load may be based on *effective heat of combustion* (3.88), *gross heat of combustion* (3.198), or *net heat of combustion* (3.280) as required by the specifier.

Note 2 to entry: The word "load" can be used to denote to entry force or power or energy. In this context, it is used to denote "entry energy."

Note 3 to entry: The typical unit is kJ or MJ.

3.135

fire load density

fire load (3.134) per unit area

Note 1 to entry: The typical unit is kJ·m⁻².

3.136

fire model

fire simulation

calculation method that describes a system or process related to *fire* (3.114) development, including fire dynamics and the effects of fire

Note 1 to entry: Compare with the terms *deterministic model* (3.80), *numerical fire model* (3.285), *physical fire model* (3.298) and *probabilistic model* (3.314).

3.137

fire performance

response of a material, product or assembly in a *fire* (3.114)

Note 1 to entry: It is often important to understand how materials, products or assemblies behave in real fires as opposed to in *fire tests* (3.157) under controlled conditions. *Improved fire performance* (3.223) can be exhibited in a variety of ways. For example, longer times to *ignition* (3.217), lower *heat release* (3.205), lower *flame spread* (3.168) or lower smoke release could all be evidence of improvements in fire performance.

Note 2 to entry: Compare with the term *fire behaviour* (3.118).

3.138**fire plume
plume**

buoyant gas stream and any materials transported within it, above a *fire* (3.114)

Note 1 to entry: Compare with the term *buoyant plume* (3.33).

3.139**fire point**

minimum temperature at which a material *ignites* (3.214) and continues to *burn* (3.34) for a specified time after a standardized small *flame* (3.159) has been applied to its surface under specified conditions

Note 1 to entry: Compare with the term *flash point* (3.182).

Note 2 to entry: In some countries, the term “fire point” has an additional meaning: a location where firefighting equipment is located, which may also comprise a fire alarm call point and fire instruction notices.

Note 3 to entry: The typical unit is °C.

3.140**fire propagation**

combination of *flame spread* (3.168) and spread of *fire effluent* (3.123)

3.141**fire resistance**

ability of a *test specimen* (3.384) to withstand *fire* (3.114) or give protection from it for a period of time

Note 1 to entry: Typical criteria used to assess fire resistance in a standard *fire test* (3.157) are *fire integrity* (3.133), *fire stability* (3.156) and *thermal insulation* (3.391).

Note 2 to entry: “Fire resistant” (adj.) refers only to this ability.

3.142

DEPRECATED: fire retardance

Note 1 to entry: Reference to this term should be replaced by a reference to *improved fire performance* (3.223) since there is no absolute level of fire retardance and what is referred to in this context is a means of imparting better *fire performance* (3.137).

Note 2 to entry: **Improved fire performance** can be an inherent property of the material or a property that is imparted by a specific treatment.

Note 3 to entry: The degree of **fire performance** is a function of the test conditions.

Note 4 to entry: Compare with the terms **fire performance** and **improved fire performance**.

3.143**fire retardant**, noun

substance added, or a treatment applied, to a material in order to delay *ignition* (3.217) or to reduce the rate of *combustion* (3.55)

Note 1 to entry: Compare with the term *flame retardant* (3.165).

Note 2 to entry: The use of a fire retardant(s) does not necessarily suppress *fire* (3.114) or terminate combustion.

3.144**fire retarded**

treated with a *fire retardant* (3.143)

3.145

fire risk

estimation of expected fire loss that combines the potential for harm in various *fire scenarios* (3.152) that can occur with the probabilities of occurrence of those scenarios

Note 1 to entry: An alternate definition of fire risk is, "combination of the probability of a *fire* (3.114) and a quantified measure of its consequence".

Note 2 to entry: Fire risk is often calculated as the product of probability and consequence.

3.146

fire risk assessment

procedure for assembling a compilation of information relevant to a certain *fire risk* (3.145) under specific conditions of use within the range of all relevant *fire scenarios* (3.152)

Note 1 to entry: Fire risk assessment is the process by which fire risk is assessed.

3.147

fire risk curve

graphical representation of *fire risk* (3.145)

Note 1 to entry: It is normally a log/log plot of cumulative probability versus cumulative consequence.

3.148

fire safety design

quantitative description of the development of a *built environment* (3.32) intended to meet *fire safety objectives* (3.151)

3.149

fire safety engineering

application of engineering methods to the development or assessment of designs in the *built environment* (3.32) through the analysis of specific *fire scenarios* (3.152) or through the quantification of risk for a group of fire scenarios

3.150

fire safety management

application and service life maintenance of procedures to achieve *fire safety objectives* (3.151)

Note 1 to entry: Procedures include *fire* (3.114) protection measures, evacuation plans and the training of occupants to use such measures and plans.

3.151

fire safety objective

desired outcome with respect to the probability of an unwanted *fire* (3.114), relative to essential aspects of the *built environment* (3.32)

Note 1 to entry: The essential aspects typically relate to the issues of life safety, conservation of property, continuity of operations, protection of the *environment* (3.95) and preservation of heritage.

3.152

fire scenario

qualitative description of the course of a *fire* (3.114) with respect to time, identifying key events that characterize the studied fire and differentiate it from other possible fires

Note 1 to entry: See *fire scenario cluster* (3.154) and *representative fire scenario* (3.153).

Note 2 to entry: It typically defines the *ignition* (3.217) and *fire growth* (3.129) processes, the *fully developed fire* (3.192) stage, the *fire decay* (3.122) stage, and the *environment* (3.95) and systems that will impact on the course of the fire.

Note 3 to entry: Unlike deterministic fire analysis, where fire scenarios are individually selected and used as *design fire scenarios* (3.78), in *fire risk assessment* (3.146), fire scenarios are used as representative fire scenarios within fire scenario clusters.

3.153**representative fire scenario**

specific *fire scenario* (3.152) selected from a *fire scenario cluster* (3.154) from which the consequence can be used as a reasonable estimate of the average consequence of scenarios in the fire scenario cluster

3.154**fire scenario cluster**

subset of *fire scenarios* (3.152), usually defined as part of a complete partitioning of the universe of possible fire scenarios

Note 1 to entry: The subset is usually defined so that the calculation of *fire risk* (3.145) as the sum over all fire scenario clusters of fire scenario cluster frequency multiplied by representative fire scenario consequence does not impose an undue calculation burden.

3.155**fire severity**

capacity of a *fire* (3.114) to cause damage

Note 1 to entry: Methods of quantifying fire severity are usually based on the temperature of the fire as a function of time.

3.156**fire stability**

<fire resistance> ability of a *building element* (3.31) to resist collapse for a stated period of time in a standard *fire resistance* (3.141) test

Note 1 to entry: The building element may or may not be load-bearing.

3.157**fire test**

test that measures *fire behaviour* (3.118) or exposes an item to the effects of a *fire* (3.114)

Note 1 to entry: The results of a fire test can be used to quantify *fire severity* (3.155) or determine the *fire resistance* (3.141) or *reaction to fire* (3.324) of the *test specimen* (3.384).

3.158

DEPRECATED: fireproof

Note 1 to entry: This term has been used to describe buildings with *non-combustible* (3.282) structural elements and high levels of *fire resistance* (3.141). However, the term is often misunderstood to mean an absolute or unconditional property, and therefore the use of the term, fireproof, is inappropriate and misleading.

3.159**flame**, noun

rapid, self-sustaining, sub-sonic propagation of *combustion* (3.55) in a gaseous medium, usually with emission of light

3.160**flame**, verb

produce *flame* (3.159)

3.161**flame application time**

period of time for which a burner *flame* (3.159) is applied to a *test specimen* (3.384)

3.162**flame front**

boundary of *flaming combustion* (3.175) at the surface of a material or propagating through a gaseous mixture

3.163

DEPRECATED: flame resistance

3.164

DEPRECATED: flame retardance

Note 1 to entry: Reference to this term should be replaced by a reference to *improved fire performance* (3.223) since there is no absolute level of flame retardance and what is referred to in this context is a means of imparting better *fire performance* (3.137).

Note 2 to entry: Improved fire performance can be an inherent property of the material or a property that is imparted by a specific treatment.

Note 3 to entry: The degree of fire performance is a function of the test conditions.

Note 4 to entry: Compare with the term fire performance.

3.165

flame retardant, noun

substance added, or a treatment applied, to a material in order to suppress or delay the appearance of a *flame* (3.159) and/or reduce the *flame spread rate* (3.169)

Note 1 to entry: Compare with the term *fire retardant* (3.143).

Note 2 to entry: The use of a flame retardant(s) does not necessarily suppress *fire* (3.114) or terminate *combustion* (3.55).

3.166

flame retardant treatment

process whereby *improved fire performance* (3.223) is imparted to a material or product

3.167

flame retarded

treated with a *flame retardant* (3.165)

Note 1 to entry: Treatment with a flame retardant may not always ensure the required *improved fire performance* (3.223) since that is a function of the test conditions.

3.168

flame spread

propagation of a *flame front* (3.162)

3.169

flame spread rate

DEPRECATED: burning rate

DEPRECATED: rate of burning

distance travelled by a *flame front* (3.162) during its propagation, divided by the time of travel, under specified conditions

Note 1 to entry: The typical unit is m·s⁻¹.

3.170

flame spread time

time taken by a *flame front* (3.162) on a burning material to travel a specified distance on the surface, or to cover a specified surface area under specified conditions

3.171

DEPRECATED: flameproof

Note 1 to entry: Deprecated, except in the context of the classification of methods used to prevent *ignition* (3.217) by electrical equipment of explosive atmospheres; see *flameproof enclosure* (3.172).

3.172**flameproof enclosure**

<electrotechnical> *enclosure* (3.92) that can withstand the pressure developed during an *explosion* (3.105) of the atmosphere within the enclosure and can prevent the transmission of the explosion to the atmosphere surrounding the enclosure

3.173**flame stabilizer**

assembly normally fitted to the top of a standard laboratory Bunsen or Tirrill burner intended to mitigate the destabilizing effect of the turbulent mixing of flame gases with the ambient air, by providing an intervening layer of gas having an intermediate velocity between the ambient still air and the faster flame gases

3.174**flaming**, noun

continuation of the presence of a *flame* (3.159) after its first appearance

3.175**flaming combustion**

combustion (3.55) in the gaseous phase, usually with emission of light

3.176**flaming debris**

burning material separating from a burning item and continuing to *flame* (3.160) on the floor, during a *fire* (3.114) or *fire test* (3.157)

Note 1 to entry: Alternatively, flaming debris can be burning material, other than drops, which has detached from a *test specimen* (3.384) during a fire or fire test and continues to burn.

Note 2 to entry: Compare with the terms *burning droplets* (3.40), *burning debris* (3.39) and *flaming droplets* (3.177).

3.177**flaming droplets**

flaming molten or flaming liquefied drops which fall from the *test specimen* (3.384) during the *fire test* (3.157) and continue to *burn* (3.34) on the floor

Note 1 to entry: Compare with the terms *burning droplets* (3.40), *burning debris* (3.39) and *flaming debris* (3.176).

3.178**flammability**

ability of a material or product to *burn* (3.34) with a *flame* (3.159) under specified conditions

3.179**flammability limit**

concentration (3.62) of *fuel* (3.189) vapour in air above and below which propagation of a *flame* (3.159) will not occur in the presence of an *ignition source* (3.219)

Note 1 to entry: Compare with the terms *lower flammability limit* (3.253) and *upper flammability limit* (3.415).

Note 2 to entry: The concentrations are usually expressed as a *volume fraction* (3.421) at a defined temperature and pressure, and expressed as a percentage.

3.180

flammable

capable of *flaming combustion* (3.175) under specified conditions

3.181

flash-ignition temperature

minimum temperature at which, under specified test conditions, sufficient *flammable* (3.180) gases are emitted to *ignite* (3.214) momentarily on application of a pilot flame

Note 1 to entry: Compare with the terms *ignitability* (3.212), *minimum ignition temperature* (3.273) and *spontaneous ignition temperature* (3.363).

Note 2 to entry: Flash ignition temperature refers to the ignition temperature determined for solid specimens on application of a *flame* (3.159) to the specimen, for example, in a test method such as ISO 871. Flash point refers to the temperature to which a flammable liquid must be heated for its vapours to ignite.

Note 3 to entry: The typical unit is °C.

[SOURCE: ISO 871:2006, 3.1]

3.182

flash point

minimum temperature to which a material or a product must be heated for the vapours emitted to *ignite* (3.214) momentarily in the presence of *flame* (3.159) under specified conditions

Note 1 to entry: Flash point refers to the temperature to which a *flammable* (3.180) liquid must be heated for its vapours to ignite. *flash ignition temperature* (3.181) refers to the ignition temperature determined for solid specimens on application of a flame to the specimen, for example, in a test method such as ISO 871.

Note 2 to entry: The typical unit is °C.

3.183

flashing

existence of *flame* (3.159) repeated for short periods of time on or over the surface of a *test specimen* (3.384)

Note 1 to entry: The short periods of time are typically of less than 1 s duration.

Note 2 to entry: Compare with the term *surface flash* (3.377).

3.184

flashover

<stage of fire> transition to a state of total surface involvement in a *fire* (3.114) of *combustible* (3.52) materials within an *enclosure* (3.92)

3.185

flashover

<electrotechnical> electrical discharge which occurs over the surface of a solid dielectric in a gaseous or liquid medium

3.186

Fourier transform infra-red spectroscopy

FTIR

analytical chemical technique, based on *spectroscopy* (3.362), in which a gaseous sample is subjected to excitation of molecular bonds by pulsed, broad-band infrared radiation, and the Fourier transform mathematical method is used to obtain an absorption spectrum

Note 1 to entry: FTIR can be used for the simultaneous measurement of the *concentrations* (3.62) of component gases in a gas mixture and is thus a useful method for the analysis of gaseous *fire effluent* (3.123).

3.187**fractional effective concentration****FEC**

ratio of the *concentration* (3.62) of an *irritant* (3.237) to that concentration expected to produce a specified effect on an exposed subject of average susceptibility

Note 1 to entry: Compare with the terms *F factor* (3.112).

Note 2 to entry: As a concept, FEC may refer to any effect, including *incapacitation* (3.225), lethality or other end points.

Note 3 to entry: When not used with reference to a specific irritant, the term FEC represents the summation of FEC values for all irritants in a fire-generated atmosphere.

Note 4 to entry: The FEC is dimensionless.

3.188**fractional effective dose****FED**

ratio of the *exposure dose* (3.107) for an *asphyxiant* (3.23) to that exposure dose of the asphyxiant expected to produce a specified effect on an exposed subject of average susceptibility

Note 1 to entry: As a concept, FED may refer to any effect, including *incapacitation* (3.225), lethality or other end points.

Note 2 to entry: When not used with reference to a specific asphyxiant, the term FED represents the summation of FED values for all asphyxiants in a *combustion* (3.55) atmosphere.

Note 3 to entry: The FED is dimensionless.

3.189**fuel**

substance which can react exothermically with an *oxidizing agent* (3.290)

3.190**fuel-lean combustion**

combustion (3.55) in which the *equivalence ratio* (3.97) is less than unity

Note 1 to entry: In well-ventilated *fires* (3.114), the *fuel* (3.189)/air mixture is fuel-lean and *complete combustion* (3.59) will tend to occur.

3.191**fuel-rich combustion**

combustion (3.55) in which the *equivalence ratio* (3.97) is greater than unity

Note 1 to entry: In *ventilation-controlled fires* (3.418), the *fuel* (3.189)/air mixture is fuel-rich, and relatively high *concentrations* (3.62) of *pyrolysis* (3.316) products and incomplete *combustion* (3.55) gases will result.

3.192**fully developed fire**

state of total involvement of *combustible* (3.52) materials in a *fire* (3.114)

3.193**gasify**

transform a solid and/or liquid material into a gaseous state

3.194**global equivalence ratio**

<fire compartment tests> mass lost from the *combustible(s)* (3.53) divided by the mass of air introduced into the *fire compartment* (3.120) and divided by the stoichiometric *fuel* (3.189)/air mass ratio

Note 1 to entry: Compare with the term *equivalence ratio* (3.97).

Note 2 to entry: It can be determined continuously or as a test average, depending on the instrumentation in place.

Note 3 to entry: For gaseous fuels, an alternative expression of the global equivalence ratio can be based on the fuel/air volume ratio.

Note 4 to entry: The global equivalence ratio is dimensionless.

3.195
global equivalence ratio

<bench-scale fire tests> mass lost from the *test specimen* (3.384) divided by the mass of air in the system (closed systems) or introduced into the system (open systems) and divided by the stoichiometric *fuel* (3.189)/air mass ratio

Note 1 to entry: Compare with the term *equivalence ratio* (3.97).

Note 2 to entry: It can be determined continuously or as a test average, depending on the instrumentation in place.

Note 3 to entry: For gaseous fuels, an alternative expression of the global equivalence ratio can be based on the fuel/air volume ratio.

Note 4 to entry: The global equivalence ratio is dimensionless.

3.196
glowing, noun
luminosity caused by heat

Note 1 to entry: Compare with the term *incandescence* (3.224).

3.197
glowing combustion

combustion (3.55) of a material in the solid phase without *flame* (3.159) but with emission of light from the combustion zone

Note 1 to entry: Compare with the term *incandescence* (3.224).

3.198
gross heat of combustion

heat of combustion (3.203) of a substance when the *combustion* (3.55) is complete and any produced water is entirely condensed under specified conditions

Note 1 to entry: Compare with the term *complete combustion* (3.59).

Note 2 to entry: The typical unit is $\text{kJ}\cdot\text{g}^{-1}$.

3.199
heat capacity
amount of thermal energy required to raise the temperature of an object by 1 K

Note 1 to entry: Compare with the term *specific heat capacity* (3.359).

Note 2 to entry: The typical unit is $\text{J}\cdot\text{K}^{-1}$.

3.200
heat flow rate
amount of thermal energy transferred per unit of time

Note 1 to entry: The typical unit is W.

3.201
heat flux
amount of thermal energy emitted, transmitted or received per unit area and per unit of time

Note 1 to entry: Compare with the terms *incident heat flux* (3.226) and *initial test heat flux* (3.227).

Note 2 to entry: The typical unit is $W \cdot m^{-2}$.

3.202

heat flux meter

metering instrument responding to incident *radiative heat transfer* (3.322), or *convective heat transfer* (3.68) to a cooled surface, or both

Note 1 to entry: Compare with the term *radiometer* (3.323).

3.203

heat of combustion

DEPRECATED: calorific potential

DEPRECATED: calorific value

thermal energy produced by *combustion* (3.55) of unit mass of a given substance

Note 1 to entry: Compare with the terms *effective heat of combustion* (3.88), *gross heat of combustion* (3.198) and *net heat of combustion* (3.280).

Note 2 to entry: The typical unit is $kJ \cdot g^{-1}$.

3.204

heat of gasification

thermal energy required to change a unit mass of material from the condensed phase to the vapour phase at a given temperature

Note 1 to entry: The typical unit is $kJ \cdot g^{-1}$.

3.205

heat release

thermal energy produced by *combustion* (3.55)

Note 1 to entry: The typical unit is J.

3.206

heat release rate

DEPRECATED: burning rate

DEPRECATED: rate of burning

rate of thermal energy production generated by *combustion* (3.55)

Note 1 to entry: The typical unit is W.

3.207

heat release rate calorimeter

apparatus that measures *heat release rate* (3.206) by measuring species concentrations, temperature and the flow rate of *fire effluent* (3.123) drawn through a test duct

Note 1 to entry: Compare with the terms *calorimeter* (3.43) and *mass calorimeter* (3.257).

3.208

heat stress

condition caused by exposure to elevated or reduced temperature, *radiant heat flux* (3.319), or a combination of these factors

Note 1 to entry: These conditions can apply to people or to products. In the case of a product, the heat stress can occur within the product during its normal use, or it can be caused by external influence.

3.209

heat transfer

exchange of thermal energy within a physical system or between physical systems, depending on the temperature and pressure, by dissipating heat

Note 1 to entry: The fundamental modes of heat transfer are conduction or diffusion, *convection* (3.66) and radiation.

Note 2 to entry: Compare with the terms *convective heat transfer* (3.68) and *radiative heat transfer* (3.322).

3.210

hyperventilation

rate and/or depth of breathing which is greater than normal

3.211

incapacitation concentration 50 %

IC₅₀

concentration (3.62) of a *toxic gas* (3.400) or *fire effluent* (3.123), statistically calculated from concentration-response data, that causes *incapacitation* (3.225) of 50 % of a population of a given species within a specified *exposure time* (3.108) and *post-exposure time* (3.302)

Note 1 to entry: Compare with the term *effective concentration 50* (3.86).

Note 2 to entry: For fire effluent, typical unit is g·m⁻³.

Note 3 to entry: For **toxic gas**, the typical unit is µL/L (T = 25 °C and P = 1 atm); see *volume fraction* (3.421).

3.212

ignitability

ease of ignition

measure of the ease with which a *test specimen* (3.384) can be *ignited* (3.216), under specified conditions

Note 1 to entry: Compare with the term *ignition time* (3.220).

Note 2 to entry: See also **ignition temperature**, *flash ignition temperature* (3.181), *minimum ignition temperature* (3.273) and *spontaneous ignition temperature* (3.363).

3.213

ignitable

capable of being *ignited* (3.216)

3.214

ignite, intransitive verb

catch *fire* (3.114) with or without the application of an external heat source

3.215

ignite, transitive verb

initiate *combustion* (3.55)

Note 1 to entry: Compare with the term *light* (3.245).

3.216

ignited

caused to be in a state of undergoing *combustion* (3.55)

3.217

ignition

DEPRECATED: sustained ignition

<general> initiation of *combustion* (3.55)

3.218

ignition

DEPRECATED: sustained ignition

<flaming combustion> initiation of *sustained flame* (3.380)

3.219

ignition source

source of energy that initiates *combustion* (3.55)

3.220
ignition time
time to ignition

duration of exposure of a *test specimen* (3.384) to a defined *ignition source* (3.219) required for the initiation of *sustained combustion* (3.379) under specified conditions

Note 1 to entry: Compare with the terms *ease of ignition* (3.212), *ignitability* (3.212) and *exposure time* (3.108).

3.221
impaired escape capability

effects on willingness and efficiency of *escape* (3.99) actions, which may delay, slow or prevent evacuation

3.222
imposed load
superimposed load

force applied to an item other than that associated with its own mass

Note 1 to entry: Compare with the term *load-bearing criterion "R"* (3.252).

Note 2 to entry: The typical unit is N.

3.223
improved fire performance

improvement in one or more fire properties of a material, product or assembly when exposed to a source of heat or *flame* (3.159)

Note 1 to entry: Examples of fire properties that can result in improved fire performance include *heat release* (3.205), *ignitability* (3.212) and *flame spread* (3.168).

Note 2 to entry: Reference to this term should replace a reference to the deprecated term *fire retardance* since there is no absolute level of fire retardance and what is referred to in this context is a means of imparting better *fire performance* (3.137).

Note 3 to entry: **Improved fire performance** can be an inherent property of the material or a property that is imparted by a specific treatment.

Note 4 to entry: The degree of **fire performance** is a function of the test conditions.

Note 5 to entry: Compare with the term **fire performance**.

3.224
incandescence
emission of light produced by a material when intensely heated

Note 1 to entry: Compare with the term *glowing* (3.196).

Note 2 to entry: It can be produced by materials in liquid or solid states, with or without *combustion* (3.55).

3.225
incapacitation
state of physical inability to accomplish a specific task

Note 1 to entry: An example of a specific task is to accomplish *escape* (3.99) from a *fire* (3.114).

3.226
incident heat flux
heat flux (3.201) received by (or falling on) the surface of a *test specimen* (3.384)

Note 1 to entry: Compare with the terms **heat flux** and *initial test heat flux* (3.227).

3.227

initial test heat flux

heat flux ([3.201](#)) set on the test apparatus at the initiation of the test

Note 1 to entry: Compare with the terms **heat flux** and *incident heat flux* ([3.226](#)).

Note 2 to entry: The initial test heat flux is the heat flux value commonly used when describing or setting test conditions.

3.228

individual risk

measure of *fire risk* ([3.145](#)) limited to consequences experienced by an individual and based on the individual's pattern of life

3.229

DEPRECATED: inflammability

Note 1 to entry: Compare with the term *flammability* ([3.178](#)).

3.230

DEPRECATED: inflammable

Note 1 to entry: Compare with the term *flammable* ([3.180](#)).

3.231

**insulation criterion "I"
"I" criterion**

criterion by which *thermal insulation* ([3.391](#)) is assessed

Note 1 to entry: The "I" criterion is based on the measurement of temperature rise on the surface away from *fire* ([3.114](#)).

Note 2 to entry: The insulation criterion can vary and will depend on the *fire safety objective(s)* ([3.151](#)).

3.232

**integrity criterion "E"
"E" criterion**

criterion by which the ability of a *separating element* ([3.345](#)) to prevent the passage of *flames* ([3.159](#)) and hot gases is assessed

Note 1 to entry: Compare with the terms *fire integrity* ([3.133](#)) and *fire resistance* ([3.141](#)).

3.233

intermediate-scale fire test

fire test ([3.157](#)) performed on a *test specimen* ([3.384](#)) of medium dimensions

Note 1 to entry: A fire test performed on a test specimen for which the maximum dimension is between 1 m and 3 m is usually called an intermediate-scale fire test.

Note 2 to entry: The dimensions in Note 1 to entry usually refer to reaction-to-fire testing and not to fire resistance testing.

Note 3 to entry: ISO 29903 considers medium dimensions to be those with a maximum dimension between 1 m and 3 m.

3.234

intrinsically safe circuit

<electrotechnical> circuit in which any spark or thermal effect is incapable of causing *ignition* ([3.217](#)) of a mixture of *flammable* ([3.180](#)) or *combustible* ([3.52](#)) material in air under specified test conditions

Note 1 to entry: The specified conditions include normal operation and specified fault conditions.

3.235**intrinsically safe system**

<electrotechnical> assembly in which all electrical circuits that might be used in hazardous (classified) locations are *intrinsically safe circuits* (3.234)

3.236**irradiance**

ratio of the radiant flux incident on a small but measurable element of surface containing the point, by the area of that element

Note 1 to entry: The irradiance is expressed in W/m².

[SOURCE: ASTM E176:2015]

3.237**irritant**, noun

<sensory/upper respiratory> gas or aerosol that stimulates nerve receptors in the eyes, nose, mouth, throat and respiratory tract, causing varying degrees of discomfort and pain with the initiation of numerous physiological defence responses

Note 1 to entry: Physiological defence responses include reflex eye closure, tear production, coughing, and bronchoconstriction.

3.238**irritant**, noun

<pulmonary> gas or aerosol that stimulates nerve receptors in the lower respiratory tract, which may result in breathing discomfort

Note 1 to entry: Examples of breathing discomfort are dyspnoea and an increase in respiratory rate. In severe cases, pneumonitis or pulmonary oedema (which may be fatal) may occur some hours after exposure.

3.239**large-scale fire test**

fire test (3.157), that cannot be carried out in a typical laboratory chamber, performed on a *test specimen* (3.384) of large dimensions

Note 1 to entry: A fire test performed on a test specimen of which the maximum dimension is greater than 3 m is usually called a large-scale fire test.

3.240**lateral spread of flame**

sideways progression of a *flame front* (3.162)

3.241**lethal concentration 50****LC₅₀**

concentration (3.62) of a *toxic gas* (3.400) or *fire effluent* (3.123), statistically calculated from concentration-response data, that causes death of 50 % of a population of a given species within a specified *exposure time* (3.108) and *post-exposure time* (3.302)

Note 1 to entry: Compare with the term *effective concentration 50* (3.86).

Note 2 to entry: For fire effluent, typical unit is g·m⁻³.

Note 3 to entry: For toxic gas, the typical unit is µL/L (T = 25 °C and P = 1 atm); see *volume fraction* (3.421).

3.242

lethal exposure dose 50

LC_{t50}

product of *LC50* (3.241) and the *exposure time* (3.108) over which it was determined

Note 1 to entry: Compare with the terms *concentration* (3.62), *effective exposure dose 50* (3.87), *exposure dose* (3.107) and *lethal exposure time 50* (3.243)

Note 2 to entry: LC_{t50} is a measure of *lethal toxic potency* (3.244).

Note 3 to entry: For *fire effluent* (3.123), the typical unit is g·min·m⁻³.

Note 4 to entry: For *toxic gas* (3.400), typical unit is μL·min·L⁻¹ (T = 25 °C and P = 1 atm); see *volume fraction* (3.421).

3.243

lethal exposure time 50

t_{L50}

exposure time (3.108) to a fixed *concentration* (3.62) of *toxic gas* (3.400) or *fire effluent* (3.123), that causes death to 50 % of a population of a given species

3.244

lethal toxic potency

toxic potency (3.402) where the specific toxic effect is death

Note 1 to entry: Compare with the terms *lethal concentration 50 (LC₅₀)* (3.241) and *lethal exposure dose 50 (LC_{t50})* (3.242).

3.245

light, transitive verb

initiate *combustion* (3.55)

Note 1 to entry: Compare with the term *ignite* (3.214).

3.246

light, transitive verb

<open flame> initiate *flaming combustion* (3.175)

Note 1 to entry: Compare with the alternate term *light* (3.245), as related to any type of *combustion* (3.55)

3.247

lighting, noun

first appearance of *flame* (3.159)

3.248

lighting, verb

initiating *flaming combustion* (3.175)

3.249

limit of detection

smallest quantity of an analyte in a sample that can be detected and considered with a stated probability as different from the detector output from a blank sample

3.250

limit of quantification

smallest quantity of an analyte which is possible to quantify under the specific experimental conditions described in the chosen method, where the variability of the method has been defined

Note 1 to entry: The determination of a limit of quantification means that a variation coefficient has been measured.

3.251**linear burning rate**

DEPRECATED: burning rate

DEPRECATED: rate of burning

length of material *burned* (3.34) per unit time under specified conditionsNote 1 to entry: The typical unit is m·s⁻¹.**3.252****load-bearing criterion “R”****load-bearing capacity**criterion by which the ability of a *building element* (3.31) or structure to sustain an imposed load when exposed to *fire* (3.114) is assessed

Note 1 to entry: This term is preferred to “load-bearing capacity” within the European Community. It is used by the European fire testing and construction industry and by those who use European standards both inside and outside the EC.

Note 2 to entry: The term “load-bearing capacity” is preferred within North America. It is used by the American and Canadian fire testing and construction industry and by those who use American and Canadian standards both inside and outside North America.

3.253**lower flammability limit****LFL**minimum *concentration* (3.62) of *fuel* (3.189) vapour in air below which propagation of a *flame* (3.159) will not occur in the presence of an *ignition source* (3.219)Note 1 to entry: The concentration is usually expressed as a *volume fraction* (3.421) at a defined temperature and pressure. LFL is expressed as a percentage.**3.254****lowest observed adverse effect level****LOAEL**lowest *exposure dose* (3.107) of a chemical at which there are statistically or biologically significant increases in frequency or severity of adverse effects seen between the exposed population and its appropriate control**3.255****major accident**significant emission, *fire* (3.114) or *explosion* (3.105) resulting from uncontrolled developments in the course of the operation of any establishment, and leading to serious danger to human health and/or the *environment* (3.95), immediate or delayed, inside or outside the establishment

Note 1 to entry: This definition is based on the Seveso II Directive [96/82/EC], Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances. The directive adds a clause, at the end, as follows: “and involving environmentally hazardous materials”.

3.256**mass burning rate**

DEPRECATED: burning rate

DEPRECATED: rate of burning

mass of material *burned* (3.34) per unit time under specified conditionsNote 1 to entry: The typical unit is kg·s⁻¹.**3.257****mass calorimeter**

apparatus that measures heat by detecting the change in temperature of a specified mass over time

Note 1 to entry: Compare with the terms *calorimeter* (3.43) and *heat release rate calorimeter* (3.207).

3.258

mass charge concentration

<closed system> mass of the *test specimen* (3.384) placed in a *combustion* (3.55) chamber divided by the chamber volume

Note 1 to entry: The typical unit is $\text{g}\cdot\text{m}^{-3}$.

3.259

mass charge concentration

<open system> mass of the *test specimen* (3.384) divided by the total volume of air passed through the test apparatus

Note 1 to entry: The definition assumes that the mass is dispersed in the airflow uniformly over time.

Note 2 to entry: The typical unit is $\text{g}\cdot\text{m}^{-3}$.

3.260

mass concentration of gas

mass of gas in a gas mixture per unit volume of the gas mixture

Note 1 to entry: The mass concentration of a gas at a temperature, T , and a pressure, P , can be calculated from its *volume fraction* (3.421) (assuming ideal gas behaviour) by multiplying the volume fraction by the density of the gas at that temperature and pressure or it can be measured directly.

Note 2 to entry: The mass concentration of *fire effluent* (3.123) is typically expressed in units of g/m^3 .

3.261

mass concentration of particles

mass of solid and liquid particles in *fire effluent* (3.123) per unit volume of the fire effluent

Note 1 to entry: Typical unit is g/m^3 .

3.262

mass loss concentration

<closed system> mass of the *test specimen* (3.384) consumed during *combustion* (3.55) divided by the test chamber volume

Note 1 to entry: The typical unit is $\text{g}\cdot\text{m}^{-3}$.

3.263

mass loss concentration

<open system> mass of the *test specimen* (3.384) consumed during *combustion* (3.55) divided by the total volume of air passed through the test apparatus

Note 1 to entry: The definition assumes that the mass is dispersed in the airflow uniformly over time.

Note 2 to entry: The typical unit is $\text{g}\cdot\text{m}^{-3}$.

3.264

mass loss rate

test specimen (3.384) mass loss per unit time under specified conditions

Note 1 to entry: The typical unit is $\text{g}\cdot\text{s}^{-1}$.

3.265

mass optical density of smoke

optical density of smoke (3.288) multiplied by a factor which is the volume of the test chamber divided by the product of the mass lost from the *test specimen* (3.384) and the light path length

Note 1 to entry: The typical unit is $\text{m}^2\cdot\text{g}^{-1}$.

Note 2 to entry: Optical density of smoke = $V/(\Delta m L)$, where V is test chamber volume, Δm is test specimen mass loss and L is light path length

3.266**means of escape**

structural means whereby routes intended to be safe are provided for persons to travel from any point in a *built environment* (3.32) to a *place of safety* (3.300)

3.267**measurand**

quantity subject to measurement

[SOURCE: ASTM E176:2015]

3.268**mechanical response**

<building element> measure of fire-induced changes to the deflection, stiffness and *load-bearing capacity* (3.252) of *building elements* (3.31) and the development of openings (cracks) in building elements during *fire exposure* (3.126) as a result of the shrinkage or expansion of materials, spalling, or delamination

3.269**medium-scale fire test**

fire test (3.157) performed on a *test specimen* (3.384) of small-medium size dimensions

Note 1 to entry: A fire test performed on a test specimen of which the maximum dimension is between 0,5 m and 1,0 m is often called a medium-scale fire test.

Note 2 to entry: The dimensions referenced in Note 1 to entry usually refer to reaction-to-fire testing and not to fire resistance testing, where a maximum dimension of 1 m corresponds to a small-scale test.

3.270**melting behaviour**

phenomena accompanying the liquefaction of a material under the influence of heat

Note 1 to entry: This includes deforming and dripping, but not flaming.

3.271**minimum critical relative humidity**

<electrotechnical> relative humidity that causes leakage current to exceed a defined level under specified test conditions

3.272**minimum detection limit****MDL**

theoretical lowest measurable *concentration* (3.62)

3.273**minimum ignition temperature****ignition point**

minimum temperature at which *sustained combustion* (3.379) can be initiated under specified test conditions

Note 1 to entry: Compare with the terms *flash ignition temperature* (3.181) and *spontaneous ignition temperature* (3.363).

Note 2 to entry: The minimum ignition temperature implies the application of a thermal stress for an infinite length of time.

Note 3 to entry: The typical unit is °C.

3.274

molar mass

mass of 1 mol

Note 1 to entry: The molar mass is normally expressed in units of g/mol.

3.275

molten drip, noun

falling *droplet* (3.84) of material which has been softened or liquefied by heat

Note 1 to entry: The droplets can be flaming or not flaming.

3.276

movement behaviour

behaviour which enables occupants of a *built environment* (3.32) to reach a *place of safety* (3.300) or *safe refuge* (3.333) once they have begun to evacuate

3.277

movement time

time needed for all of the occupants of a specified part of a *built environment* (3.32) to move to an *exit* (3.103) and pass through it and into a *place of safety* (3.300)

3.278

narcosis

depression of the central nervous system causing reduced awareness and/or impaired physical capability

Note 1 to entry: In extreme cases, unconsciousness and finally, death may occur.

3.279

narcotic

toxicant (3.404) that causes narcosis

3.280

net heat of combustion

heat of combustion (3.203) when any water produced is considered to be in the gaseous state

Note 1 to entry: The net heat of combustion is always smaller than the *gross heat of combustion* (3.198) because the *heat released* (3.205) by the condensation of water vapour is not included.

Note 2 to entry: The typical unit is kJ·g⁻¹.

3.281

no observed adverse effect level

NOAEL

exposure dose (3.107) of a chemical at which there are no statistically or biologically significant increases in frequency or severity of adverse effects seen between the exposed population and its appropriate control

Note 1 to entry: Effects may be produced at this exposure dose, but they are not considered to be adverse.

3.282

non-combustible

not capable of undergoing *combustion* (3.55) under specified conditions

Note 1 to entry: In some regulations, a material is classified as being “non-combustible” even if it is capable of combustion, provided that its *heat of combustion* (3.203) is less than a defined amount.

3.283

non-flammable

not capable of burning with a *flame* (3.159) under specified conditions

3.284**notional yield**

yield (3.426) of a combustion product (3.57) in stoichiometric combustion (3.367)

3.285**numerical fire model**

mathematical representation of one or more of different interconnected phenomena governing the development of a fire (3.114)

3.286**obscuration of smoke**

reduction in the intensity of light due to its passage through smoke (3.347)

Note 1 to entry: Compare with the terms *extinction area of smoke* (3.110), *extinction coefficient* (3.111), *opacity of smoke* (3.287), *optical density of smoke* (3.288), *smoke obscuration* (3.349), *specific extinction area of smoke* (3.358) and *specific optical density of smoke* (3.360)

Note 2 to entry: In practice, obscuration of smoke is usually measured as the *transmittance* (3.409) which is normally expressed as a percentage.

Note 3 to entry: The obscuration of smoke causes a reduction in *visibility* (3.420).

3.287**opacity of smoke**

ratio of incident light intensity to transmitted light intensity through smoke (3.347), under specified conditions

Note 1 to entry: Also, *obscuration of smoke* (3.286), *smoke obscuration* (3.349).

Note 2 to entry: The opacity of smoke is the reciprocal of *transmittance* (3.409).

Note 3 to entry: The opacity of smoke is dimensionless.

3.288**optical density of smoke**

measure of the attenuation of a light beam passing through smoke (3.347) expressed as the logarithm to the base 10 of the *opacity of smoke* (3.287)

Note 1 to entry: Compare with the term *specific optical density of smoke* (3.360).

Note 2 to entry: The optical density of smoke is dimensionless.

3.289**oxidation**

chemical reaction in which the proportion of oxygen or other electronegative element in a substance is increased

Note 1 to entry: In chemistry, the term has the broader meaning of a process, which involves the loss of an electron or electrons from an atom, molecule or ion.

3.290**oxidizing agent**

substance capable of causing *oxidation* (3.289)

Note 1 to entry: *Combustion* (3.55) is an oxidation.

3.291**oxygen consumption principle**

proportional relationship between the mass of oxygen consumed during *combustion* (3.55) and the *heat released* (3.205)

Note 1 to entry: A value of 13,1 kJ·g⁻¹ is commonly used.

3.292

oxygen index

OI

limiting oxygen index

LOI

minimum *volume fraction* (3.421) of oxygen in a mixture of oxygen and nitrogen, at $23\text{ °C} \pm 2\text{ °C}$, that will just support *flaming combustion* (3.175) of a material under specified test conditions

Note 1 to entry: OI/LOI is usually expressed as a percentage.

3.293

passive fire protection

method used to reduce or prevent the spread and effects of *fire* (3.114), heat or *smoke* (3.347) by means of design and/or the appropriate use of materials and not requiring detection and/or activation upon detection

EXAMPLE 1 The division of a space into compartments using materials with inherent fire resistance to fabricate walls, floors, doors and other barriers.

EXAMPLE 2 The use of materials with good *fire behaviour* (3.118).

Note 1 to entry: Compare with the terms *active fire protection* (3.6) and *suppression systems* (3.375).

3.294

performance criteria

quantitative criteria which form an acceptable basis for assessing the safety of a design for a *built environment* (3.32)

Note 1 to entry: The performance criteria are usually ones that have been agreed by an authority having jurisdiction or by codes or standardization committee.

3.295

performance-based design

design that is engineered to achieve specified objectives and performance criteria

3.296

performance-based regulation

regulation in which compliance is specified in terms of performance criteria

3.297

phased evacuation

process by which different parts of a *built environment* (3.32) are evacuated in a controlled sequence

EXAMPLE In a multi-storey building, the initially evacuated floors are usually the *fire* (3.114) floor, the floor immediately above, the floor immediately below and all basement floors.

Note 1 to entry: Those parts expected to be at greatest risk are evacuated first.

3.298

physical fire model

laboratory process, including the apparatus, the *environment* (3.95) and the *fire test* (3.157) procedure intended to represent a certain phase of a *fire* (3.114)

3.299

piloted ignition

pilot ignition

ignition (3.217) of *combustible* (3.52) gases or vapours by a secondary source of energy such as a *flame* (3.159), spark, electrical arc or *glowing* (3.196) wire

3.300**place of safety**

location which is free from danger and from which it is possible to move freely without threat from a *fire* (3.114)

Note 1 to entry: Compare with the term *safe refuge* (3.333).

Note 2 to entry: In the case of a building fire, it is typically a place outside the building.

Note 3 to entry: Places of safety within a building may be places of relative safety before evacuation from the building

3.301**polymeric materials**

materials composed of large molecules made up of smaller repeating chemical units bonded together, known as polymers

Note 1 to entry: A polymer is a large molecule made up of many smaller repeating chemical units bonded together. These units are known as monomers. Some polymers are naturally occurring, while others are synthetically manufactured.

3.302**post-exposure time**

period of time after the *exposure time* (3.108), during which the effects of exposure are assessed

3.303

DEPRECATED: ppm

Note 1 to entry: Compare with the terms *concentration* (3.62), *volume fraction* (3.421) and "ppm by volume".

Note 2 to entry: The numerical value of a concentration in ppm is identical to that for a concentration in $\mu\text{L/L}$.

3.304

DEPRECATED: ppm by volume

Note 1 to entry: Compare with the terms *concentration* (3.62), *volume fraction* (3.421) and "ppm".

3.305**predicted LC₅₀**

LC₅₀ (3.241) value for the *fire effluent* (3.123) from a burned *test specimen* (3.384), calculated from *combustion* (3.55) atmosphere analytical chemical data as that **fire effluent concentration** that would yield a *FED* (3.188) value equal to 1 within a specified *exposure time* (3.108) and *post-exposure time* (3.302)

Note 1 to entry: The typical unit is $\text{g}\cdot\text{m}^{-3}$.

3.306**predicted toxic potency**

calculated value of the *toxic potency* (3.402) of *fire effluent* (3.123) from a burned *test specimen* (3.384)

Note 1 to entry: The value is calculated from chemical analysis of the fire effluent and existing toxic potency data for the relevant constituents.

3.307**pre-mixed flame**

flame (3.159) in which *combustion* (3.55) occurs in an intimate mixture of *fuel* (3.189) and *oxidizing agent* (3.290)

Note 1 to entry: Compare with the term *diffusion flame* (3.82).

3.308

pre-movement behaviour

behaviour occurring during the *pre-movement time* (3.309)

Note 1 to entry: Compare with the terms *recognition behaviour* (3.326) and *response behaviour* (3.331).

3.309

pre-movement time

time period after an alarm or *fire* (3.114) cue is transmitted and before occupants first move (or travel) towards an *exit* (3.103)

3.310

pre-wetting

application of water to *fuel* (3.189) surfaces that are in the path of an advancing *flame front* (3.162)

3.311

prescriptive regulation

regulation in which the means and approach for compliance are completely or mostly specified

3.312

primary fire effluent

fire effluent (3.123) released directly from the fire source

3.313

primary standard

absolute standard to which other related calibrated measuring instruments can be traced

3.314

probabilistic model

fire model (3.136) that treats phenomena as a series of sequential events or states, with mathematical rules to govern the transitions from one event to another and with probabilities assigned to each transfer point

Note 1 to entry: An example of a transition is that of *ignition* (3.217) becoming *sustained combustion* (3.379).

3.315

progressive smouldering

self-propagating exothermic *oxidation* (3.289) which is not accompanied by *flaming combustion* (3.175)

Note 1 to entry: Progressive smouldering may be accompanied by *glowing* (3.196), in which case, there will be visible light.

3.316

pyrolysis

chemical decomposition of a substance by the action of heat

Note 1 to entry: Pyrolysis is often used to refer to a stage of *fire* (3.114) before *flaming combustion* (3.175) has begun.

Note 2 to entry: In fire science, no assumption is made about the presence or absence of oxygen.

3.317

pyrolysis front

boundary between the region of *pyrolysis* (3.316) and the region of unaffected material at the surface of the material

3.318

pyrophoric material

material capable of *auto-ignition* (3.24) when brought into contact with air

3.319**radiant heat flux**

power per unit area emitted, transferred or received in the form of heat radiation

Note 1 to entry: The typical unit is kW/m².

3.320**radiation**

heat transfer (3.209) by way of electromagnetic energy

Note 1 to entry: Absorbed heat radiation is radiative heat absorbed by a surface and emitted heat radiation is radiant heat emitted from a surface. Incoming radiative heat is incident heat radiation.

[SOURCE: NFPA Glossary of Terms (2014)]

3.321**radiative heat flux**

heat flux (3.201) by *radiative heat transfer* (3.322)

Note 1 to entry: The typical unit is kW/m².

3.322**radiative heat transfer**

transmission of heat by electromagnetic radiation or *heat transfer* (3.209) by radiation

Note 1 to entry: The typical unit is W.

3.323**radiometer**

heat flux meter (3.202) that responds to incident *radiative heat flux* (3.321) only

Note 1 to entry: A radiometer converts *radiant heat flux* (3.319) into an electrical signal.

Note 2 to entry: Compare with the terms *heat flux meter* and *total heat flux meter* (3.398).

3.324**reaction to fire**

response of a *test specimen* (3.384) when it is exposed to *fire* (3.114) under specified conditions in a *fire test* (3.157)

Note 1 to entry: *Fire resistance* (3.141) is regarded as a special case and is not normally considered as a "reaction to fire" property.

3.325**real-scale fire test**

fire test (3.157) that simulates a given application, taking into account the real scale, the real way the item is installed and used, and the *environment* (3.95)

Note 1 to entry: Such a fire test normally assumes that the products will be used in accordance with the conditions laid down by the specifier and/or in accordance with normal practice.

3.326**recognition behaviour**

behaviour occurring during the time period after an alarm or cue of *fire* (3.114) is evident and before occupants begin to respond

Note 1 to entry: Compare with the terms *pre-movement behaviour* (3.308) and *response behaviour* (3.331).

3.327**reference fire scenario**

fire scenario (3.152) used as the basis of a *fire test* (3.157) which is intended to reproduce specific aspects of a *fire* (3.114) in the *built environment* (3.32)

3.328

relative atomic mass

average mass of one atom of an element divided by one twelfth of the mass of one atom of carbon (isotope ^{12}C)

3.329

required delivered density

RDD

volumetric flow rate of water per unit area that is delivered onto the top horizontal surface of a simulated burning *combustible* (3.52) array, sufficient to cause the *heat release rate* (3.206) of the *fire* (3.114) to decay to a defined low level

Note 1 to entry: The typical unit is $\text{mm}\cdot\text{min}^{-1}$.

3.330

required safe escape time

RSET

time required for escape

calculated time period required for an individual occupant to travel from their location at the time of *ignition* (3.217) to a *safe refuge* (3.333) or *place of safety* (3.300)

Note 1 to entry: Compare with the terms *available safe escape time* (3.26) and *evacuation time* (3.101).

3.331

response behaviour

behaviour occurring after occupants recognize alarms or cues of *fire* (3.114), and begin to respond to them, but before they begin to evacuate

Note 1 to entry: Compare with the terms *pre-movement behaviour* (3.308) and *recognition behaviour* (3.326).

3.332

risk acceptance

decision to accept an estimated level of *fire risk* (3.145), based on either compliance with *acceptance criteria* (3.3) or an explicit decision to modify those criteria

3.333

safe refuge

temporary location which is free from immediate danger from the effects of *fire* (3.114)

Note 1 to entry: It is, for example, a place where a wheelchair user can wait in relative safety for further assistance. It can also be a waiting area in high-rise buildings which gives people a chance to rest before continuing their *escape* (3.99) to a *place of safety* (3.300).

3.334

sample

amount of the material, product, or assembly, to be tested, which is representative of the item as a whole

Note 1 to entry: Compare with the term *specimen* (3.357).

3.335

scorch, verb

modify the surface of material by limited carbonization due to heat

3.336

screening test

preliminary test used for ascertaining whether a *test specimen* (3.384) is likely to exhibit, or not exhibit, certain characteristics according to a standardized test method

3.337

secondary standard

standard instrument with a calibration traceable to a *primary standard* (3.313)

3.338**self-extinguish**, verb**auto-extinguish**, verbcease *combustion* (3.55) without being affected by any external agent**3.339**

DEPRECATED: self-extinguishibility

DEPRECATED: auto-extinguishibility

3.340

DEPRECATED: self-extinguishing

DEPRECATED: auto-extinguishing

3.341**self-heating**

<chemical> rise in temperature in a material resulting from an exothermic reaction within the material

3.342**self-heating**

<electrotechnical> heat generated by a powered electrotechnical product resulting in a rise in temperature in the product

3.343

DEPRECATED: self-ignition temperature

Note 1 to entry: Compare with the term *auto-ignition temperature* (3.25).**3.344****self-propagation of flame**propagation of a *flame front* (3.162) after the removal of any applied energy source**3.345****separating element**physical barrier intended to resist the passage of *fire* (3.114) from one side of the barrier to the other side**3.346****small-scale fire test***fire test* (3.157) performed on a *test specimen* (3.384) of small dimensions

Note 1 to entry: There is no clear upper limit for the dimensions of the test specimen in a small-scale fire test. In some instances, a fire test performed on a test specimen with a maximum dimension of less than 1 m is called a small-scale fire test. However, a fire test performed on a test specimen of which the maximum dimension is between 0,5 m and 1,0 m is often called a medium-scale fire test.

3.347**smoke**visible part of a *fire effluent* (3.123)**3.348****smoke layer**relatively homogeneous volume of *smoke* (3.347) that forms and accumulates beneath the boundary having the highest elevation in an *enclosure* (3.92) as a result of a *fire* (3.114)

Note 1 to entry: Smoke layer is also referred to as the hot upper layer and the hot gas layer.

3.349

smoke obscuration

reduction of light transmission by *smoke* (3.347), as measured by light attenuation

Note 1 to entry: Compare with the terms *extinction area of smoke* (3.110), *extinction coefficient* (3.111), *obscuration of smoke* (3.286), *opacity of smoke* (3.287), *optical density of smoke* (3.288), *specific extinction area of smoke* (3.358) and *specific optical density of smoke* (3.360).

3.350

smoke production

amount of *smoke* (3.347) which is produced in a *fire* (3.114) or *fire test* (3.157)

Note 1 to entry: Compare with the term *extinction area of smoke* (3.110).

Note 2 to entry: The typical unit is m².

3.351

smoke production rate

amount of *smoke* (3.347) produced per unit time in a *fire* (3.114) or *fire test* (3.157)

Note 1 to entry: The smoke production rate is calculated as the product of the volumetric flow rate of **smoke** and the *extinction coefficient* (3.111) of the smoke at the point of measurement.

Note 2 to entry: The typical unit is m²·s⁻¹.

3.352

smouldering combustion

smoldering combustion

combustion (3.55) of a material without *flame* (3.159)

Note 1 to entry: Compare with the term *glowing combustion* (3.197).

Note 2 to entry: Smouldering combustion is generally evidenced by an increase in temperature and/or by *fire effluent* (3.123).

3.353

societal risk

measure of *fire risk* (3.145) combining consequences experienced by every affected person and group

3.354

soot

particulate matter produced and deposited during or after *combustion* (3.55)

Note 1 to entry: Soot usually consists of finely divided particles, mainly carbon, produced by the incomplete combustion of organic materials.

3.355

spark, noun

<thermal> incandescent particle

3.356

spark, noun

<electrotechnical> luminous discharge resulting from the dielectric breakdown of a gas between two electrodes

3.357

specimen

representative piece of the material, product or assembly which is to be tested together with any substrate or treatment

Note 1 to entry: Often, the term specimen is replaced by *test specimen* (3.384).

Note 2 to entry: Compare with the term *sample* (3.334).