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Fire safety — Vocabulary

Sécurité au feu — Vocabulaire

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 13943 was prepared by Technical Committee ISO/TC 92, *Fire safety*, in cooperation with Technical Committee IEC/TC 89, *Fire hazard testing*.

This second edition cancels and replaces the first edition (ISO 13943:2000), which has been technically revised.

Introduction

Over the last two decades, there has been significant growth in the subject 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 large domain of fire safety, beyond what traditionally has been limited to the subject field of fire hazard testing.

The first edition of ISO 13943 contained definitions of about 180 terms. However, the area of technology that is related to fire safety has continued to evolve rapidly and this second edition contains many new terms as well as new definitions of some of the terms that were in the first edition.

This International Standard 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 subject field of fire safety are agreed upon and developed.

It is important to note that when used in legislation, some general fire safety terms have a narrower interpretation and hence the definition given in this International Standard does not apply.

The terms in this International Standard are

— fundamental concepts, which may be the starting point for other, more specific, definitions,

— more specific concepts, used in several areas of fire safety such as fire testing and fire safety engineering used in ISO and IEC fire standards, and

— related concept fields, designated by borrowed terms used in building and civil engineering.

The layout is in accordance with ISO 10241, unless otherwise specified. Thus, the elements of an entry appear in the following order:

a) entry number;

b) preferred term(s);

c) admitted term(s);

d) deprecated term(s);

e) definition;

f) example(s);

g) note(s).

The terms are presented in English alphabetical order and are in bold type except for accepted but non-preferred terms and deprecated terms, which are in normal type.

In a definition, example or note, reference to another entry in bold face is followed by the entry number in brackets, when it is first mentioned.

Entry number, preferred term and definition are the mandatory elements of each entry. Other elements appear only when appropriate.

Where a given term designates more than one concept, the concepts are listed in separate consecutive entries and the terms individually numbered.

If the term has a general meaning but is being used in a specific subject field, that subject field is indicated in angled brackets, 〈 〉, at the beginning of the definition.

Word class, e.g. “noun”, “adj.”, “verb”, is indicated if there is a risk of misunderstanding.

Where the term describes a physical quantity, a note is given to indicate the typical units that are used (except in cases where the unit is a single dimension such as mass, time or length).

Where a national variant in English is preferred or another equivalent exists, this has been given in bold face following the preferred term and annotated by the respective country code. Where no other country code or other equivalent is given in bold, this signifies that the preferred term is the accepted term in English-speaking countries.

A term following the preferred term not given in boldface type is a non-preferred synonym.

To facilitate the location of any term given in this International Standard, irrespective of preference or country of origin, the alphabetical index lists all preferred and non-preferred synonyms, without the respective country code being indicated. There is also a systematic index and an index of deprecated terms.

Fire safety — Vocabulary

1 Scope

This International Standard defines terminology relating to fire safety as used in International Standards and other documents of the International Standardization Organization and the International Electrotechnical Committee.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6707-1:2004, *Building and civil engineering — Vocabulary — Part 1: General terms*

ISO 10241:1992, *International terminology standards — Preparation and layout*

3 Definition of the term “item”

For the purposes of this International Standard, the English term “item” 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.

4 Terms and definitions

4.1
abnormal heat
⟨electrotechnical⟩ heat that is additional to that resulting from use under normal conditions, up to and including that which causes a **fire** (4.96)

4.2
acceptance criteria
criteria that form the basis for assessing the acceptability of the safety of a design of a **built environment** (4.26)

NOTE The criteria can be qualitative, quantitative or a combination of both.

4.3
activation time
time interval from response by a sensing device until the **suppression system** (4.314), smoke control system, alarm system or other fire safety system is fully operational

4.4
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** (4.43) array

NOTE 1 It is typically determined relative to a specific **heat release rate** (4.177) of a **fire** (4.98).

NOTE 2 ADD can be measured as described in ISO 6182-7.

NOTE 3 The typical units are millimetres per minute ($mm \cdot min^{-1}$).

4.5
acute toxicity
toxicity (4.341) that causes rapidly occurring **toxic** (4.335) effects

cf. **toxic potency** (4.338)

4.6
afterflame
flame (4.133) that persists after the **ignition source** (4.189) has been removed

4.7
afterflame time
length of time for which an **afterflame** (4.6) persists under specified conditions

cf. **duration of flaming** (4.71)

4.8
afterglow
persistence of **glowing combustion** (4.169) after both removal of the **ignition source** (4.189) and the cessation of any **flaming combustion** (4.148)

4.9
afterglow time
length of time during which an **afterglow** (4.8) persists under specified conditions

4.10
agent outlet
orifice of a piping system by means of which an extinguishing fluid can be applied towards the source of a **fire** (4.98)

4.11
alarm time
time interval between **ignition** (4.187) of a **fire** (4.98) and activation of an alarm

NOTE The time of **ignition** can be known, e.g. in the case of a **fire model** (4.116) or a **fire test** (4.132), 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.

4.12
alight, adj.
lit, adj. CA, US
lighted, adj.
undergoing **combustion** (4.46)

4.13
arc resistance
⟨electrotechnical⟩ ability of an electrically insulating material to resist the influence of an electric arc, under specified conditions

NOTE 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** (4.321).

4.14
area burning rate
burning rate (deprecated)
rate of burning (deprecated)
area of material **burned** (4.28) per unit time under specified conditions

NOTE The typical units are square metres per second ($m^2 \cdot s^{-1}$).

4.15
arson
crime of setting a **fire** (4.98), usually with intent to cause damage

4.16
ash
ashes
mineral residue resulting from **complete combustion** (4.50)

4.17
asphyxiant
toxicant (4.340) that causes hypoxia, which can result in central nervous system depression or cardiovascular effects

NOTE Loss of consciousness and ultimately death can occur.

4.18
auto-ignition
spontaneous ignition
self-ignition CA, US
unpiloted ignition CA, US
spontaneous combustion (deprecated)
ignition (4.187) resulting from a rise of temperature without a separate **ignition source** (4.189)

NOTE 1 The **ignition** can be caused either by **self-heating** (4.287, 4.288) or by heating from an external source.

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

4.19
auto-ignition temperature
spontaneous ignition temperature
minimum temperature at which **auto-ignition** (4.18) is obtained in a **fire test** (4.132)

NOTE The typical units are degrees Celsius (°C).

4.20
available safe escape time
ASET
time available for escape
for an individual occupant, the calculated time interval between the time of **ignition** (4.187) 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** (4.82) to a **safe refuge** (4.280) or **place of safety** (4.253)

NOTE 1 The time of **ignition** can be known, e.g. in the case of a **fire model** (4.116) or a **fire test** (4.132), 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.

NOTE 2 This definition equates **incapacitation** (4.194) with failure to escape. Other criteria for ASET are possible. If an alternate criterion is selected, it is necessary that it be stated.

NOTE 3 Each occupant can have a different value of ASET, depending on that occupant's personal characteristics.

4.21
backdraft
rapid **flaming combustion** (4.148) caused by the sudden introduction of air into a confined oxygen-deficient space that contains hot products of incomplete **combustion** (4.46)

NOTE In some cases, these conditions can result in an **explosion** (4.87).

4.22
behavioural scenario
description of the behaviour of occupants during the course of a **fire** (4.98)

4.23
black body
form that completely absorbs any electromagnetic radiation falling upon it

4.24
black-body radiant source
radiant source that produces electromagnetic radiation as described by Planck's distribution function

NOTE The **emissivity** (4.75) of a black body radiant source is unity.

4.25
building element
integral part of a **built environment** (4.26)

NOTE 1 This includes floors, walls, beams, columns, doors, and penetrations, but does not include contents.

NOTE 2 This definition is wider in its scope than that given in ISO 6707-1.

4.26
built environment
building or other structure

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

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

4.27
buoyant plume
convective updraft of fluid above a heat source

cf. **fire plume** (4.118)

4.28
burn, intransitive verb
undergo **combustion** (4.46)

4.29
burn, transitive verb
cause **combustion** (4.46)

4.30
burned area
that part of the **damaged area** (4.59) of a material that has been destroyed by **combustion** (4.46) or **pyrolysis** (4.266), under specified conditions

NOTE The typical units are square metres (m^2).

4.31
burned length
maximum extent in a specified direction of the **burned area** (4.30)

NOTE The typical units are metres (m).

cf. **damaged length** (4.60)

4.32
burning behaviour
⟨fire tests⟩ response of a **test specimen** (4.321), when it burns under specified conditions, to examination of **reaction to fire** (4.272) or **fire resistance** (4.121)

4.33
bursting
violent rupture of an object due to an overpressure within it or upon it

4.34
calibration
⟨fire modelling⟩ process of adjusting modelling parameters in a computational model for the purpose of improving agreement with experimental data

4.35
calorimeter
apparatus that measures heat

cf. **heat release rate calorimeter** (4.178) and **mass calorimeter** (4.219).

4.36
carboxyhaemoglobin saturation
percentage of blood haemoglobin converted to carboxyhaemoglobin from the reversible reaction with inhaled carbon monoxide

4.37
ceiling jet
gas motion in a hot gas layer near a ceiling that is generated by the buoyancy of a **fire plume** (4.118) that is impinging upon the ceiling

4.38
char, noun
carbonaceous residue resulting from **pyrolysis** (4.266) or incomplete **combustion** (4.46)

4.39
char, verb
form **char** (4.38)

4.40
char length
length of charred area

cf. **burned length** (4.31) and **damaged length** (4.60)

NOTE In some standards, char length is defined by a specific test method.

4.41
chimney effect
upward movement of hot **fire effluent** (4.105) caused by **convection** (4.54) currents confined within an essentially vertical **enclosure** (4.77)

NOTE This usually draws more air into the **fire** (4.96).

4.42
clinker
solid agglomerate of residues formed by either **complete combustion** (4.50) or incomplete **combustion** (4.46) and which can result from complete or partial melting

4.43
combustible, adj.
capable of being **ignited** (4.186) and burned

4.44
combustible, noun
item capable of **combustion** (4.46)

4.45
combustible load
theoretical mass that would be lost from a **test specimen** (4.321) if it were to undergo **complete combustion** (4.50) in a **fire test** (4.132)

4.46
combustion
exothermic reaction of a substance with an **oxidizing agent** (4.246)

NOTE Combustion generally emits **fire effluent** (4.105) accompanied by **flames** (4.133) and/or **glowing** (4.168).

4.47
combustion efficiency
ratio of the amount of **heat release** (4.176) in incomplete **combustion** (4.46) to the theoretical heat of **complete combustion** (4.50)

NOTE 1 Combustion efficiency can be calculated only for cases where **complete combustion** can be defined.

NOTE 2 Combustion efficiency is dimensionless and is usually expressed as a percentage.

4.48
combustion product
product of combustion
solid, liquid and gaseous material resulting from **combustion** (4.46)

NOTE Combustion products can include **fire effluent** (4.105), **ash** (4.16), **char** (4.38), **clinker** (4.42) and/or **soot** (4.298).

4.49
common mode failure
failure involving a single source that affects more than one type of safety system simultaneously

4.50
complete combustion
combustion (4.46) in which all the **combustion products** (4.48) are fully oxidized

NOTE 1 This means that, when the **oxidizing agent** (4.246) is oxygen, all carbon is converted to carbon dioxide and all hydrogen is converted to water.

NOTE 2 If elements other than carbon, hydrogen and oxygen are present in the **combustible** (4.43) material, those elements are converted to the most stable products in their standard states at 298 K.

4.51
composite material
structured combination of two or more discrete materials

4.52
concentration
mass per unit volume

NOTE 1 For a **fire effluent** (4.105) the typical units are grams per cubic metre ($g \cdot m^{-3}$).

NOTE 2 For a **toxic gas** (4.336), concentration is usually expressed as a **volume fraction** (4.351) at $T = 298$ K and $P = 1$ atm, with typical units of microlitres per litre (µL/L), which is equivalent to cm^3/m^3 or 10^{-6}.

NOTE 3 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.

4.53
concentration-time curve
⟨toxicology⟩ plot of the **concentration** (4.52) of a **toxic gas** (4.336) or **fire effluent** (4.105) as a function of time

NOTE 1 For fire effluent, concentration is usually measured in units of grams per cubic metre ($g \cdot m^{-3}$).

NOTE 2 For a toxic gas, concentration is usually expressed as a **volume fraction** (4.351) at $T = 298$ K and $P = 1$ atm, with typical units of microlitres per litre (µL/L), which is equivalent to cm^3/m^3 or 10^{-6}.

4.54
convection
transfer of heat by movement of a fluid

4.55
convective heat flux
heat flux (4.173) caused by **convection** (4.54)

4.56
corrosion damage
physical and/or chemical damage or impaired function caused by chemical action

4.57
corrosion target
sensor used to determine the degree of **corrosion damage** (4.56), under specified conditions

NOTE 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.

4.58
critical fire load
fire load (4.114) required in a **fire compartment** (4.102) to produce a **fire** (4.98) of sufficient severity to cause failure of a **fire barrier(s)** (4.99) or structural member(s) located within or bounding the fire compartment

4.59
damaged area
total of those surface areas that have been affected permanently by **fire** (4.97) under specified conditions

cf. **burned area** (4.30)

NOTE 1 Users of this term should specify the types of damage to be considered. This can include, for example, loss of material, deformation, softening, **melting behaviour** (4.228), **char** (4.38) formation, **combustion** (4.46), **pyrolysis** (4.266) or chemical attack.

NOTE 2 The typical units are square metres (m^2).

4.60
damaged length
maximum extent in a specified direction of the **damaged area** (4.59)

cf. **char length** (4.40) and **burned length** (4.31)

4.61
defend in place
life safety strategy in which occupants are encouraged to remain in their current location rather than to attempt **escape** (4.82) during a **fire** (4.98)

4.62
deflagration
combustion (4.46) wave propagating at subsonic velocity

NOTE If within a gaseous medium, deflagration is the same as a **flame** (4.133).

4.63
design density
measured volumetric flow rate of water from sprinklers, per unit area, that is delivered in the absence of a **fire** (4.98)

NOTE The typical units are millimetres per minute ($mm \cdot min^{-1}$).

4.64
design fire
quantitative description of assumed **fire** (4.98) characteristics within the **design fire scenario** (4.65)

NOTE It is, typically, an idealized description of the variation with time of important **fire** (4.98) variables, such as **heat release rate** (4.177), **flame spread rate** (4.143), **smoke production rate** (4.295), **toxic gas** (4.336) **yields** (4.354), and temperature.

4.65
design fire scenario
specific **fire scenario** (4.129) on which a deterministic **fire-safety engineering** (4.126) analysis is conducted

4.66
detection time
time interval between **ignition** (4.187) of a **fire** (4.98) and its detection by an automatic or manual system

4.67
deterministic model
fire model (4.116) 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

4.68
detonation
reaction characterized by a shock wave propagating at a velocity greater than the local speed of sound in the unreacted material

4.69
diffusion flame
flame (4.133) in which **combustion** (4.46) occurs in a zone where the **fuel** (4.161) and the **oxidizing agent** (4.246) mix, having been initially separate

cf. **pre-mixed flame** (4.259)

4.70
draught-free environment
space in which the results of experiments are not significantly affected by the local air speed

NOTE A qualitative example is a space in which a wax candle **flame** (4.133) remains essentially undisturbed. Quantitative examples are **small-scale fire tests** (4.292) in which a maximum air speed of 0,1 $m \cdot s^{-1}$ or 0,2 $m \cdot s^{-1}$ is sometimes specified.

4.71
duration of flaming
length of time for which **flaming combustion** (4.148) persists under specified conditions

cf. **afterflame time** (4.7)

4.72
effective concentration 50
EC_{50}
concentration (4.52) of a **toxic gas** (4.336) or **fire effluent** (4.105), 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** (4.90) and **post-exposure time** (4.254)

cf. **IC_{50}** (4.181)

NOTE 1 For fire effluent, typical units are grams per cubic metre ($g \cdot m^{-3}$).

NOTE 2 For a toxic gas, typical units are microlitres per litre (µL/L) (at $T = 298$ K and $P = 1$ atm); see **volume fraction** (4.351).

NOTE 3 The observed effect is usually a behavioural response, **incapacitation** (4.194), or death. The EC_{50} for incapacitation is termed the IC_{50} (4.181). The EC_{50} for lethality is termed the LC_{50} (4.207).

4.73
effective exposure dose 50
ECt_{50}

product of **EC_{50}** (4.72) and the **exposure time** (4.90) over which it is determined

cf. **exposure dose** (4.89)

NOTE 1 For **fire effluent** (4.105), typical units are grams times minutes per cubic metre ($g \cdot min \cdot m^{-3}$).

NOTE 2 For a **toxic gas** (4.336), typical units are microlitres times minutes per litre ($\mu L \cdot min \cdot L^{-1}$) (at $T = 298$ K and $P = 1$ atm); see **volume fraction** (4.351).

NOTE 3 ECt_{50} is a measure of **toxic potency** (4.338).

4.74
effective heat of combustion
heat released (4.176) from a burning **test specimen** (4.321) in a given time interval divided by the mass lost from the test specimen in the same time period

NOTE 1 It is the same as the **net heat of combustion** (4.237) if all the test specimen is converted to volatile **combustion** (4.46) products and if all the **combustion products** (4.48) are fully oxidized.

NOTE 2 The typical units are kilojoules per gram ($kJ \cdot g^{-1}$).

4.75
emissivity
ratio of the radiation emitted by a radiant source to the radiation that would be emitted by a **black body radiant source** (4.24) at the same temperature

NOTE Emissivity is dimensionless.