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Fire safety — Vocabulary

Sécurité au feu — Vocabulaire

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

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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).

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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.

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 $m^2 \cdot s^{-1}$.

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 m^2.

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, noun
item 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 g·m^{-3}.

Note 2 to entry: For *toxic gas* (3.400), concentration is usually expressed as a *volume fraction* (3.421) at T = 298 K and *P* = 1 atm, with typical units of μL/L (= cm^3/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 atm = 101,3 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 g·m^{-3}.

Note 2 to entry: For toxic gas, concentration is usually expressed as a *volume fraction* (3.421) at T = 298 K and *P* = 1 atm, with typical units of μL/L (= cm^3/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 atm = 101,3 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 m^2.

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 $mm \cdot min^{-1}$.

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.