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Vgrajeni gasilni sistemi - Sistemi za gašenje s plinom - 1. del: Načrtovanje, vgradnja in vzdrževanje (ISO 14520-1:2023, modified)

Fixed firefighting systems - Gas extinguishing systems - Part 1: Design, installation and maintenance (ISO 14520-1:2023, modified)

Ortsfeste Brandbekämpfungsanlagen - Löschanlagen mit gasförmigen Löschmitteln - Teil 1: Planung, Installation und Instandhaltung (ISO 14520-1:2023, modifiziert)

Installations fixes de lutte contre l'incendie - Installations d'extinction à gaz - Partie 1 : Calcul, installation et maintenance (ISO 14520-1:2023, modifiée)

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**Fixed firefighting systems - Gas extinguishing systems -
Part 1: Design, installation and maintenance (ISO 14520-
1:2013, modified)**

Installations fixes de lutte contre l'incendie -
Installations d'extinction à gaz - Partie 1 : Calcul,
installation et maintenance (ISO 14520-1:2023,
modifiée)

Ortsfeste Brandbekämpfungsanlagen - Löschanlagen
mit gasförmigen Löschmitteln - Teil 1: Planung,
Installation und Instandhaltung (ISO 14520-1:2023,
modifiziert)

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 191.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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European foreword

This document (prEN 15004-1:2023) has been prepared by Technical Committee CEN/TC 191 "Fixed firefighting systems", the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15004-1:2019.

In comparison with the previous edition, the following technical modifications have been made:

- the normative references have been updated;
- in Clause 3, the terms "lock-off device" and "regulated systems" have been included;
- in Clause 4.2.2, "Environmental properties" has been included;
- in Clause 5 "Safety", a table and equations for the maximum inert gas agent concentration at the NOAEL and LOAEL limits as a function of altitude have been included;
- Clause 6.3 "Distribution" has been revised;
- Clause 9.3 "Maintenance" has been revised;
- in Annex B "Determination of flame-extinguishing concentration of gaseous extinguishants by the cup burner method", the procedures for flammable liquids and gases have been replaced by the procedures for flammable liquids and gases and the reporting of results has been revised;
- Annex C "Fire extinguishment/area coverage fire test procedure for engineered and pre-engineered extinguishing units" has been revised;
- in Annex E "Door fan test for determining of minimum hold time", the values for Interface Thickness (Ip) and Interface Position (It) have been included and the method of estimating F has been revised;
- in Annex G "Safe personnel exposure guidelines", the extinguishant HFC 236fa and CF3I have been deleted;
- Annex H "Flow calculation implementation method and flow calculation verification and testing for approvals" has been revised;
- the standard has been editorially revised.

The text of the International Standard ISO 14520-1:2023 from Technical Committee ISO/TC 21 "Equipment for fire protection and firefighting" of the International Organization for Standardization (ISO) has been taken over as a European Standard by Technical Committee CEN/TC 191 "Fixed firefighting systems", the secretariat of which is held by BSI, with common modifications which are indicated by a straight line in the margin of the text.

This European Standard will consist of the following parts, under the general title *Fixed firefighting systems – Gas extinguishing systems*:

- *Part 1: Design, installation and maintenance;*
- *Part 2: Physical properties and system design of gas extinguishing systems for FK-5-1-12 extinguishant;*
- *Part 4: Physical properties and system design of gas extinguishing systems for HFC 125 extinguishant;*
- *Part 5: Physical properties and system design of gas extinguishing systems for HFC 227ea extinguishant;*
- *Part 6: Physical properties and system design of gas extinguishing systems for HFC 23 extinguishant;*
- *Part 7: Physical properties and system design of gas extinguishing systems for IG-01 extinguishant;*
- *Part 8: Physical properties and system design of gas extinguishing systems for IG-100 extinguishant;*
- *Part 9: Physical properties and system design of gas extinguishing systems for IG-55 extinguishant;*
- *Part 10: Physical properties and system design of gas extinguishing systems for IG-541 extinguishant;*

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— *Part 11: Physical properties and system design of gas extinguishing systems for Halocarbon Blend 55 extinguishant.*

The International Standards ISO 14520-2 and ISO 14520-11, which dealt with CF₃I and HFC 236fa extinguishants, respectively, have not been implemented by CEN, as CF₃I is only valid for local application and HFC 236fa extinguishant is only applicable for portable fire extinguishers and local application, respectively, which is not covered by the scope.

The international Standard ISO 14520-6 and therefor also EN 15004-3, which dealt with HCFC Blend A extinguishant was withdrawn.

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Introduction

Extinguishing systems covered in this document are designed to provide a supply of gaseous extinguishing medium for the extinction of fire.

Several different methods of supplying extinguishant to, and applying it at, the required point of discharge for fire extinction have been developed in recent years, and there is a need for dissemination of information on established systems and methods. This document has been prepared to meet this need.

The requirements of this document are made in the light of the best technical data known to the working group at the time of writing but, since a wide field is covered, it has been impracticable to consider every possible factor or circumstance that might affect implementation of the recommendations.

It has been assumed in the preparation of this document that the execution of its provisions is entrusted to people appropriately qualified and experienced in the specification, design, installation, testing, approval, inspection, operation and maintenance of systems and equipment, for whose guidance it has been prepared, and who can be expected to exercise a duty of care to avoid unnecessary release of extinguishant.

Attention is drawn to the Montreal Protocol on substances that deplete the ozone layer and those that contribute towards climate change.

It is important that the fire protection of a building or plant be considered as a whole. Gaseous extinguishant systems form only a part of the available facilities. It should not be assumed that their adoption necessarily removes the need to consider supplementary measures, such as the provision of portable fire extinguishers or other mobile appliances for first aid, emergency use or to deal with special hazards.

Gaseous extinguishants have been a recognized effective medium for the extinction of flammable liquid fires and fires in the presence of electrical and ordinary Class A hazards for many years. However, in the planning of comprehensive schemes, it should be remembered, that these media are not suitable for all hazards. Additionally in certain circumstances or situations there can be dangers related to their use requiring special precautions.

Advice on these matters can be obtained from the appropriate manufacturer of the extinguishant or the extinguishing system. Information may also be sought from the appropriate fire authority, the health and safety authorities and insurers. Also, reference should be made as necessary to other national standards and statutory regulations of the particular country.

It is essential that extinguishing systems be carefully maintained to ensure instant readiness when required. Maintenance measures is liable to be overlooked or given insufficient attention by the owner of the system. It is, however, neglected at peril to the lives of occupants of the premises and the risk of crippling financial loss. The importance of maintenance cannot be too highly emphasized. Installation and maintenance should only be done by qualified personnel.

Inspection preferably by a third party, should include an evaluation that the extinguishing system continues to provide adequate protection for the risk (protected zones, as well as state of the art can change over time).

1 Scope

This document specifies requirements and gives recommendations for the design, installation, testing, maintenance and safety of gas extinguishing systems in buildings, plants or other structures, and the characteristics of the various extinguishants and types of fire for which they are a suitable extinguishing medium.

This document describes total flooding systems primarily related to buildings, plants and other specific applications, utilizing electrically non-conducting gaseous fire extinguishants that do not leave a residue after discharge and for which there are sufficient data currently available to enable validation of performance and safety characteristics by an appropriate independent authority. This document is not applicable to explosion suppression.

This document is not intended to indicate approval of the extinguishants listed therein by the appropriate authorities, as other extinguishants may be equally acceptable. CO₂ is not included as it is covered by other European standards.

This document is applicable to the extinguishants listed in Table 1. This document is intended to be used in conjunction with the given parts of EN 15004 for fire extinguishing agents in Table 1.

Table 1 — Listed extinguishant

Extinguishant	Chemical	Formula	CAS No.	European Standard
FK-5-1-12	Dodecafluoro-2-methylpentan-3-one	CF ₃ CF ₂ C(O)CF(CF ₃) ₂	756-13-8	EN 15004-2
HCFC-123	Dichlorotrifluoroethane	CHCl ₂ CF ₃	306-83-2	
HCFC-22	Chlorodifluoromethane	CHClF ₂	75-45-6	
HCFC-124	Chlorotetrafluoroethane	CFC ₂ CF ₃	2837-89-0	
	Isopropenyl-1-methylcyclohexene	C ₁₀ H ₁₆	5989-27-5	
HFC 125	Pentafluoroethane	CHF ₂ CF ₃	354-33-6	EN 15004-4
HFC 227ea	Heptafluoropropane	CF ₃ CHFCF ₃	2252-84-8	EN 15004-5
HFC 23	Trifluoromethane	CHF ₃	75-46-7	EN 15004-6
IG-01	Argon	Ar	74040-37-1	EN 15004-7
IG-100	Nitrogen	N ₂	7727-37-9	EN 15004-8
	Nitrogen (50 %)	N ₂	7727-37-9	
IG-55	Argon (50 %)	Ar	74040-37-1	EN 15004-9
	Nitrogen (52 %)	N ₂	7727-37-9	
IG-541	Argon (40 %)	Ar	74040-37-1	EN 15004-10
	Carbon dioxide (8 %)	CO ₂	124-38-9	
Halocarbon Blend 55	E-1-chloro-3,3,3-trifluoropropene (50 % by mass)	CF ₃ CHCHCl	102687-65-0	EN 15004-11
	Dodecafluoro-2-methylpentan-3-one (50% by mass)	CF ₃ CF ₂ C(O)CF(CF ₃) ₂	756-13-8	

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 54 (all parts), *Fire detection and fire alarm systems*

EN 12094 (all parts), *Fixed firefighting systems — Components for gas extinguishing systems*

EN 15004-2, *Fixed firefighting systems — Gas extinguishing systems — Part 2: Physical properties and system design of gas extinguishing systems for FK-5-1-12 extinguishant (ISO 14520-5, modified)*

EN 15004-4, *Fixed firefighting systems — Gas extinguishing systems — Part 4: Physical properties and system design of gas extinguishing systems for HFC 125 extinguishant (ISO 14520-8, modified)*

EN 15004-5, *Fixed firefighting systems — Gas extinguishing systems — Part 5: Physical properties and system design of gas extinguishing systems for HFC 227ea extinguishant (ISO 14520-9, modified)*

EN 15004-6, *Fixed firefighting systems — Gas extinguishing systems — Part 6: Physical properties and system design of gas extinguishing systems for HFC 23 extinguishant (ISO 14520-10, modified)*

EN 15004-7, *Fixed firefighting systems — Gas extinguishing systems — Part 7: Physical properties and system design of gas extinguishing systems for IG-01 extinguishant (ISO 14520-12, modified)*

EN 15004-8, *Fixed firefighting systems — Gas extinguishing systems — Part 8: Physical properties and system design of gas extinguishing systems for IG-100 extinguishant (ISO 14520-13, modified)*

EN 15004-9, *Fixed firefighting systems — Gas extinguishing systems — Part 9: Physical properties and system design of gas extinguishing systems for IG-55 extinguishant (ISO 14520-14, modified)*

EN 15004-10, *Fixed firefighting systems — Gas extinguishing systems — Part 10: Physical properties and system design of gas extinguishing systems for IG-541 extinguishant (ISO 14520-15, modified)*

EN 15004-11, *Fixed firefighting systems — Gas extinguishing systems — Part 11: Physical properties and system design of gas extinguishing systems for Halocarbon Blend 55 extinguishant (ISO 14520-17, modified)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1

approved

acceptable to a relevant authority

Note 1 to entry: In determining the acceptability of installations or procedures, equipment, or materials, the authority can base acceptance on compliance with the appropriate International Standards.

3.2

authority

organization, office, or individual responsible for approving equipment, installations, or procedures

prEN 15004-1:2023 (E)**3.3****automatic/manual switch**

means of converting the system from automatic to manual actuation

Note 1 to entry: This can be in the form of a manual switch on the control panel or other units, or a personnel door interlock. In all cases, this changes the actuation mode of the system from automatic and manual to manual only or vice versa.

3.4**competent person**

designated person, suitably trained, qualified by knowledge and practical experience and with the necessary instructions to enable the required tests and examinations to be carried out

3.5**disable device**

manual shut-off valve installed into the discharge piping downstream of the agent containers; or another type of device that mechanically prevents agent container actuation

Note 1 to entry: The actuation of this device provides an indication of system isolation.

Note 2 to entry: The intent is to prevent the discharge of agent into the hazard area when the disable device is activated.

3.6**extinguishant**

electrically non-conducting gaseous extinguishing agent that, upon evaporation, does not leave a residue

Note 1 to entry: See Table 1.

Note 2 to entry: The terms “extinguishant” and “agent” are used interchangeably throughout in this document.

3.7**clearance**

air gap between equipment, including piping and nozzles and unenclosed or uninsulated live electrical components at other than ground potential

3.8**terms relating to concentration****3.8.1****design concentration**

concentration of extinguishant, including a safety factor, required for system design purposes

3.8.2**maximum concentration**

concentration achieved from the actual extinguishant quantity at the maximum ambient temperature in the protected area

3.8.3**extinguishing concentration**

minimum concentration of extinguishant required to extinguish a fire involving a particular fuel under defined experimental conditions excluding any safety factor

3.9 engineered system

system in which the supply of extinguishant stored centrally is discharged through a system of pipes and nozzles in which the size of each section of pipe and nozzle orifice has been calculated in accordance with a specific method

Note 1 to entry: The specific method used for calculating the size of each section of pipe and nozzle orifice is provided in Annex H.

3.10 fill density

mass of extinguishant per unit volume of container

3.11 flooding quantity

mass or volume of extinguishant required to achieve the design concentration within the protected volume

3.12 net volume

volume enclosed by the building elements around the protected enclosure, minus the volume of any permanent impermeable building elements within the enclosure

3.13 hold time

period of time during which a concentration of extinguishant, not less than 85 % of the design concentration surrounds the hazard

3.14 inspection

visual check to give reasonable assurance that the extinguishing system is fully charged and operable

Note 1 to entry: This is done by seeing that the system is in place, that it has not been activated or tampered with, and that there is no obvious physical damage or condition to prevent operation.

3.15 installer

legal person that is responsible for the design and installation and is able to ensure that the quality assurance is exercised

3.16 liquefied gas

gas or gas mixture (normally a halocarbon), which is liquid at the container pressurization level at room temperature (20 °C)

3.17 lock-off device

manual shut-off valve installed in the discharge piping downstream of the agent containers or another type of device that mechanically prevents agent container actuation

Note 1 to entry: The actuation of this device indicates system isolation.

Note 2 to entry: The intent is to prevent the discharge of agent into the hazard area when the lock-off device is activated.

3.18 lowest observed adverse effect level LOAEL

lowest concentration at which an adverse toxicological or physiological effect has been observed