SLOVENSKI STANDARD
SIST EN 15004-5:2020

01-december-2020

Nadomešča:
SIST EN 15004-5:2008

Vgrajeni gasilni sistemi - Sistemi za gašenje s plinom - 5. del: Fizikalne lastnosti in načrtovanje sistema za gašenje s plinom za gasilo HFC 227ea (ISO 14520-9:2019, spremenjen)

Fixed firefighting systems - Gas extinguishing systems - Part 5: Physical properties and system design of gas extinguishing systems for HFC 227ea extinguishant (ISO 14520-9:2019, modified)

Installations fixes de lutte contre l'incendie - Installations d'extinction à gaz - Partie 5 : Propriétés physiques et conception des systèmes pour agent extincteur HFC 227ea (ISO 14520-9:2019, modifiée)

Installations fixes de lutte contre l'incendie - Installations d'extinction à gaz - Partie 5 : Propriétés physiques et conception des systèmes pour agent extincteur HFC 227ea (ISO 14520-9:2019, modifiée)

Ta slovenski standard je istoveten z: **EN 15004-5:2020**

ICS:

13.220.10	Gašenje požara	Fire-fighting

SIST EN 15004-5:2020 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15004-5

October 2020

ICS 13.220.20

Supersedes EN 15004-5:2008

English Version

Fixed firefighting systems - Gas extinguishing systems - Part 5: Physical properties and system design of gas extinguishing systems for HFC 227ea extinguishant (ISO 15420-9:2019, modified)

Installations fixes de lutte contre l'incendie - Installations d'extinction à gaz - Partie 5 : Propriétés physiques et conception des systèmes pour agent extincteur HFC 227ea (ISO 15420-9:2019, modifiée)

Ortsfeste Brandbekämpfungsanlagen - Löschanlagen mit gasförmigen Löschmitteln - Teil 5: Physikalische Eigenschaften und Anlagenauslegung für Feuerlöschmittel HFC 227ea (ISO 15420-9:2019, modifiziert)

This European Standard was approved by CEN on 1 September 2020.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 15004-5:2020 E

Contents

Page

European foreword

This document (EN 15004-5:2020) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2021, and conflicting national standards shall be withdrawn at the latest by April 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 15004-5:2008.

The main changes in EN 15004-5:2020 compared to EN 15004-5:2008 are the following:

— European foreword: Part 3 was removed from the list;

— Foreword of ISO 14520-9 was removed;

— Scope: Nominal pressure level 50 bar was added;

— 6.1, Fill density: 50 bar storage container were added;

— 6.4, Other fill density and superpressurization levels: new sub-clause added;

— Clause 7, Environmental properties: new clause added.

The text of the International Standard ISO 14520-9:2019 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.

EN 15004 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*.

The International Standards ISO 14520-2 and ISO 14520-11, which dealt with CF_3I and HFC 236fa extinguishants, respectively, have not been implemented by CEN, as CF_3I 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.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document contains specific requirements for gaseous fire-extinguishing systems, with respect to the HFC 227ea extinguishant. It includes details of physical properties, specification, usage and safety aspects.

This document covers systems operating at nominal pressures of 25 bar, 42 bar and 50 bar with nitrogen propellant. This does not preclude the use of other systems.

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 15004-1:2019, *Fixed firefighting systems — Gas extinguishing systems — Part 1: Design, installation and maintenance (ISO 14520-1:2015, modified)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15004-1 apply.

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

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Characteristics and uses

4.1 General

Extinguishant HFC 227ea shall comply with the specification shown in Table 1.

HFC 227ea is a colourless, almost odourless, electrically non-conductive gas, with a density approximately six times that of air.

The physical properties are shown in Table 2.

HFC 227ea extinguishes fires mainly by physical means, but also by some chemical means.

Table 1 — Specification for HFC 227ea

Property	Requirement
Purity	99,6 % by mass, min.
Acidity	3×10^{-6} by mass, max.
Water content	10×10^{-6} by mass, max.
Non-volatile residue	0,01 % by mass, max.
Suspended matter or sediment	None visible

Table 2 — Physical properties of HFC 227ea

Property	Units	Value
Molecular mass	—	170
Boiling point at 1,013 bar (absolute)	°C	−16,4
Freezing point	°C	−127
Critical temperature	°C	101,7
Critical pressure	bar abs	29,26
Critical volume	cm^3/mol	274
Critical density	kg/m^3	573
Vapour pressure 20 °C	bar abs	3,90
Liquid density 20 °C	kg/m^3	1 410
Saturated vapour density 20 °C	kg/m^3	31,035
Specific volume of superheated vapour at 1,013 bar and 20 °C	m^3/kg	0,137 4
Chemical formula	CF_3CHFCF_3	
Chemical name	Heptafluoropropane	

4.2 Use of HFC 227ea systems

HFC 227ea total flooding systems can be used for extinguishing fires of all classes within the limits specified in EN 15004-1:2019, Clause 4.

The extinguishant requirements per volume of protected space are shown in Table 3 for various levels of concentration. These are based on methods shown in EN 15004-1:2019, 7.6.

The extinguishing concentrations and design concentrations for n-heptane and surface class A hazards are shown in Table 4.

Table 3 — HFC 227ea total flooding quantity

Temperature T °C	Specific vapour volume S	HCF 227ea mass requirements per unit volume of protected space, m/V (kg/m^3)									
		Design concentration (by volume)									
	m^3/kg	6 %	7 %	8 %	9 %	10 %	11 %	12 %	13 %	14 %	15 %
−10	0,121 5	0,525 4	0,619 6	0,715 8	0,814 2	0,914 7	1,017 4	1,122 5	1,230 1	1,340 1	1,452 7
−5	0,124 1	0,514 2	0,606 4	0,700 5	0,796 7	0,895 1	0,995 7	1,098 5	1,203 8	1,311 4	1,421 6
0	0,126 8	0,503 4	0,593 6	0,685 8	0,780 0	0,876 3	0,974 8	1,075 5	1,178 5	1,283 9	1,391 8
5	0,129 4	0,493 2	0,581 6	0,671 9	0,764 2	0,858 6	0,955 0	1,053 7	1,154 6	1,257 9	1,363 6
10	0,132 0	0,483 4	0,570 0	0,658 5	0,749 0	0,841 4	0,936 0	1,032 7	1,131 6	1,232 8	1,336 4
15	0,134 7	0,474 0	0,558 9	0,645 7	0,734 4	0,825 1	0,917 8	1,012 6	1,109 6	1,208 9	1,310 5

Temperature T °C	Specific vapour volume S	HCF 227ea mass requirements per unit volume of protected space, m/V (kg/m^3)									
		Design concentration (by volume)									
	m^3/kg	6 %	7 %	8 %	9 %	10 %	11 %	12 %	13 %	14 %	15 %
20	0,137 3	0,465 0	0,548 3	0,633 5	0,720 5	0,809 4	0,900 4	0,993 4	1,08 86	1,185 9	1,285 6
25	0,139 9	0,456 4	0,538 2	0,621 7	0,707 1	0,794 4	0,883 7	0,975 0	1,068 4	1,164 0	1,261 8
30	0,142 5	0,448 1	0,528 4	0,610 4	0,694 3	0,780 0	0,867 6	0,957 3	1,049 0	1,142 8	1,238 8
35	0,145 0	0,440 1	0,519 0	0,599 6	0,681 9	0,766 1	0,852 2	0,940 2	1,030 3	1,122 4	1,216 8
40	0,147 6	0,432 4	0,509 9	0,589 1	0,670 1	0,752 8	0,837 4	0,923 9	1,012 4	1,102 9	1,195 6
45	0,150 2	0,425 0	0,501 2	0,579 0	0,658 6	0,739 9	0,823 0	0,908 0	0,995 0	1,084 0	1,175 1
50	0,152 7	0,418 0	0,492 9	0,569 4	0,647 6	0,727 6	0,809 3	0,892 9	0,978 4	1,066 0	1,155 5
55	0,155 3	0,411 1	0,484 7	0,560 0	0,636 9	0,715 6	0,796 0	0,8782	0,962 3	1,048 4	1,136 5
60	0,157 8	0,404 5	0,477 0	0,551 0	0,626 7	0,704 1	0,783 2	0,864 1	0,946 9	1,031 6	1,118 3
65	0,160 4	0,398 0	0,469 4	0,542 3	0,616 7	0,6929	0,770 7	0,850 4	0,931 8	1,015 2	1,100 5
70	0,162 9	0,391 9	0,462 1	0,533 8	0,607 2	0,6821	0,758 8	0,837 1	0,917 3	0,999 4	1,083 4
75	0,165 4	0,385 9	0,455 0	0,525 7	0,597 9	0,6717	0,747 1	0,824 3	0,903 3	0,984 1	1,066 8
80	0,167 9	0,380 1	0,448 2	0,517 8	0,589 0	0,6617	0,736 0	0,812 0	0,889 8	0,969 4	1,050 9
85	0,170 4	0,374 5	0,441 6	0,510 2	0,580 3	0,6519	0,725 1	0,800 0	0,876 7	0,955 1	1,035 4
90	0,173 0	0,369 0	0,435 1	0,502 7	0,571 7	0,642 3	0,714 5	0,788 3	0,863 8	0,941 1	1,020 2
95	0,175 5	0,363 8	0,429 0	0,495 6	0,563 6	0,633 2	0,704 4	0,777 1	0,851 6	0,927 7	1,005 7
100	0,178 0	0,358 7	0,422 9	0,488 6	0,555 7	0,624 3	0,694 5	0,766 2	0,839 6	0,914 7	0,991 6

NOTE This information refers only to the product HFC-227ea and does not represent any other products containing 1,1,1,2,3,3,3-heptafluoropropane as a component.

Symbols:

m/V is the agent mass requirements (kg/m^3); i.e. mass, m, in kilograms of agent required per cubic metre of protected volume, V, to produce the indicated concentration at the temperature specified;

V is the net volume of hazard (m^3); i.e. the enclosed volume minus the fixed structures impervious to extinguishant

$$m = \left(\frac{c}{100 - c} \right) \frac{V}{S}$$

T is the temperature (°C); i.e. the design temperature in the hazard area;

S is the specific volume (m^3/kg); the specific volume of superheated HFC 227ea vapour at a pressure of 1,013 bar may be approximated by the formula

$S = k_1 + k_2 T$

where

$k_1 = 0{,}126\ 9$;

$k_2 = 0{,}000\ 513$.

c is the concentration (%); i.e. the volumetric concentration of HFC 227ea in air at the temperature indicated and a pressure of 1,013 bar absolute.