
**Gaseous fire-extinguishing systems —
Physical properties and system
design —**

**Part 17:
Halocarbon Blend 55**

*Systèmes d'extinction d'incendie utilisant des agents gazeux —
Propriétés physiques et conception des systèmes —
Partie 17: Mélange d'hydrocarbures halogénés 55*

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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 of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and firefighting*, Subcommittee SC 8, *Gaseous media and firefighting systems using gas*.

A list of all parts in the ISO 14520 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 14520 series consists of the following parts, under the general title *Gaseous fire-extinguishing systems — Physical properties and system design*:

- Part 1: General requirements
- Part 2: Withdrawn
- Part 3: Withdrawn
- Part 4: Withdrawn
- Part 5: FK-5-1-12 extinguishant
- Part 6: Withdrawn
- Part 7: Withdrawn
- Part 8: HFC 125 extinguishant
- Part 9: HFC 227ea extinguishant
- Part 10: HFC 23 extinguishant
- Part 11: To be withdrawn
- Part 12: IG-01 extinguishant
- Part 13: IG-100 extinguishant
- Part 14: IG-55 extinguishant
- Part 15: IG-541 extinguishant
- Part 16: Withdrawn
- Part 17 (this document): Halocarbon Blend 55

Gaseous fire-extinguishing systems — Physical properties and system design —

Part 17: Halocarbon Blend 55

1 Scope

This document provides specific requirements for gaseous fire-extinguishing systems with respect to the Halocarbon Blend 55 extinguishant. It includes details of physical properties, specification, usage and safety aspects. It also covers systems operating at nominal pressures of 25 bar, 35 bar and 42 bar, superpressurized with nitrogen. This document does not preclude the use of other systems.

NOTE 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm².

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.

ISO 14520-1:—¹⁾, *Gaseous fire-extinguishing systems — Physical properties and system design — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14520-1 apply.

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

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

4 Characteristics and uses

4.1 General

Extinguishant Halocarbon Blend 55 shall comply with the specifications shown in [Table 1](#).

Halocarbon Blend 55 [blend of 50 ± 3 % HFO-1233zd(E) and 50 ± 3 % FK-5-1-12 (by mass)] is a colourless, almost odourless, electrically non-conductive gas, with a density approximately 6,38 times that of air.

Its physical properties are shown in [Table 2](#).

Halocarbon Blend 55 extinguishes fires mainly by physical means, but also by some chemical means.

1) Under preparation. Stage at the time of publication ISO/DIS 14520-1:2022.

Table 1 — Specifications for Halocarbon Blend 55

Property	Requirement
Purity	99,5 % by mass, min.
Acidity	3×10^{-4} % by mass, max.
Water content	10×10^{-4} % by mass, max.
Non-volatile residue	300×10^{-4} % by mass, max.
Suspended matter or sediment	None visible
Kinetic dimers of HFP ^a	< 5 600 mg/kg
Thermodynamic dimer of HFP + HF adduct ^b	< 190 mg/kg
^a Kinetic dimers of HFP (CAS 2070-70-4).	
^b Thermodynamic dimer of HFP (CAS 1584-03-8) + its HF adduct (CAS 30320-28-6).	

Table 2 — Physical properties of Halocarbon Blend 55

Property	Units	Value
Molecular mass	—	184,72
Boiling point at 1,013 bar (absolute)	°C	20,7
Freezing point	°C	-107
Critical temperature	°C	159,2
Critical pressure	bar (absolute)	28,92
Critical volume	cm ³ /mol	354,2
Critical density	kg/m ³	521,6
Vapour pressure 20 °C	bar (absolute)	0,988 0
Liquid density 20 °C	kg/m ³	1 431,6
Saturated vapour density 20 °C	kg/m ³	6,67
Specific volume of vapour at 1,013 bar (absolute) and 20,0 °C	m ³ /kg	0,125 6
Chemical formula	CF ₃ CH=CClH/C ₆ F ₁₂ O	
Chemical name	50/50 % (by mass) Trans-1-chloro-3,3,3-trifluoroprop-1-ene/ 1,1,1,2,2,4,5,5,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	
NOTE	1 bar = 0,1 MPa = 10 ⁵ Pa; 1 MPa = 1 N/mm ² .	

4.2 Use of Halocarbon Blend 55

Halocarbon Blend 55 total flooding systems may be used for extinguishing fires of all classes within the limits specified in ISO 14520-1:—²⁾, 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 ISO 14520-1:—, 7.7.

The extinguishing concentrations and design concentrations for *n*-heptane and surface class A hazards are shown in [Table 4](#). Concentrations for other fuels are shown in [Table 4](#).

2) Under preparation. Stage at the time of publication ISO/DIS 14520-1:2022.

Table 3 — Extinguishant requirements per volume of protected space

Temperature <i>T</i> °C	Specific vapour volume <i>S</i> m ³ /kg	HFO-1233zd(E)/FK-5-1-12 mass requirements per unit volume of protected space, <i>m</i> / <i>V</i> (kg/m ³)						
		Design concentration (by volume)						
		4 %	5 %	6 %	7 %	8 %	9 %	10 %
-10	0,112 2	0,371 3	0,469 0	0,568 8	0,670 7	0,774 8	0,881 3	0,990 1
-5	0,114 5	0,364 0	0,459 9	0,557 7	0,657 6	0,759 8	0,864 1	0,970 8
0	0,116 7	0,357 1	0,451 1	0,547 0	0,645 1	0,745 2	0,847 6	0,952 3
5	0,118 9	0,350 4	0,442 6	0,536 8	0,633 0	0,731 3	0,831 7	0,934 4
10	0,121 1	0,344 0	0,434 5	0,526 9	0,621 4	0,717 8	0,816 4	0,917 2
15	0,123 4	0,337 8	0,426 6	0,517 4	0,610 1	0,704 9	0,801 7	0,900 7
20	0,125 6	0,331 8	0,419 1	0,508 2	0,599 3	0,692 4	0,787 5	0,884 7
25	0,127 8	0,326 0	0,411 8	0,499 4	0,588 9	0,680 3	0,773 8	0,869 3
30	0,130 0	0,320 4	0,404 7	0,490 8	0,578 8	0,668 7	0,760 5	0,854 4
35	0,132 3	0,315 0	0,397 9	0,482 6	0,569 0	0,657 4	0,747 7	0,840 0
40	0,134 5	0,309 8	0,391 3	0,474 6	0,559 6	0,646 5	0,735 3	0,826 1
45	0,136 7	0,304 7	0,384 9	0,466 8	0,550 5	0,636 0	0,723 3	0,812 6
50	0,139 0	0,299 9	0,378 8	0,459 4	0,541 7	0,625 8	0,711 7	0,799 6
55	0,141 2	0,295 1	0,372 8	0,452 1	0,533 1	0,615 9	0,700 5	0,787 0
60	0,143 4	0,290 5	0,367 0	0,445 1	0,524 8	0,606 3	0,689 6	0,774 8
65	0,145 6	0,286 1	0,361 4	0,438 3	0,516 8	0,597 1	0,679 1	0,762 9
70	0,147 9	0,281 8	0,355 9	0,431 7	0,509 0	0,588 1	0,668 9	0,751 4
75	0,150 1	0,277 6	0,350 7	0,425 3	0,501 5	0,579 3	0,658 9	0,740 3
80	0,152 3	0,273 5	0,345 5	0,419 0	0,494 1	0,570 9	0,649 3	0,729 5
85	0,154 5	0,269 6	0,340 5	0,413 0	0,487 0	0,562 6	0,639 9	0,718 9

NOTE 1 This information refers only to the product Halocarbon Blend 55 and does not represent any other products containing HFO-1233zd(E) or FK-5-1-12 as components.

Key

m/V is the agent mass requirements (kg/m³); i.e. mass, *m*, in kg of agent required per m³ of protected volume, *V*, to produce the indicated concentration at the temperature specified;

V is the net volume of hazard (m³); 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 (m³/kg); the specific volume of superheated Halocarbon Blend 55 vapour at a pressure of 1,013 bar (absolute) may be approximated by the formula:

$$S = k_1 + k_2 T$$

where

$$k_1 = 0,116 7$$

$$k_2 = 0,000 445$$

c is the concentration (%); i.e. the volumetric concentration of Halocarbon Blend 55 in air at the temperature indicated, and a pressure of 1,013 bar (absolute).

NOTE 2 1 bar = 0,1 MPa = 10⁵ Pa; 1 MPa = 1 N/mm².

Table 4 — Halocarbon Blend 55 reference extinguishing and design concentrations

Fuel ^a	Extinguishment ^b % by volume	Minimum design ^b % by volume
Class B^{c, d}		7,8
Heptane (cup burner)	5,5	
Heptane (room test)	6,0	
Surface Class A^{c, e}		7,8
Wood Crib	6,0	
PMMA	5,4	
PP	5,4	
ABS	5,4	
Higher Hazard Class A	f	7,8

^a See ISO 14520-1:—, 7.6.1.3 for guidance on Class A fuels.

^b The extinguishing and design concentrations for room-scale test fires are for informational purposes only. Lower and higher extinguishing concentrations than those shown for room-scale test-fires may be achieved and allowed when validated by test reports from internationally recognized laboratories.

^c The extinguishment values for the Class B and the Surface Class A fuels are determined by testing in accordance with ISO 14520-1:—, Annex B and Annex C.

^d The minimum design concentration for the Class B fuel is the higher value of the heptane cup burner or room test heptane extinguishment concentration multiplied by 1,3.

^e The minimum design concentration for Surface Class A fuel is the highest value of the wood crib, PMMA, PP or ABS extinguishment concentrations multiplied by 1,30. In the absence of any of the four extinguishment values, the minimum design concentration for Surface Class A is that of Higher Hazard Class A.

^f The minimum design concentration for Higher Hazard Class A fuels shall be the higher of the Surface Class A or 95 % of the Class B minimum design concentration.

5 Safety of personnel

Any hazard to personnel created by the discharge of Halocarbon Blend 55 shall be considered in the design of the system.

Potential hazards can arise from the following:

- a) the extinguishant itself;
- b) the combustion products of the fire; and
- c) breakdown products of the extinguishant resulting from exposure to fire.

For minimum safety requirements, see ISO 14520-1:—, Clause 5.

Toxicological information for Halocarbon Blend 55 is shown in [Table 5](#).

Table 5 — Cardiac toxicological information for Halocarbon Blend 55

Property	Value % by volume
4hr-LC ₅₀	> 11
No observed adverse effect level (NOAEL)	8,7
Lowest observed adverse effect level (LOAEL)	> 8,7