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

**Part 6:  
HCFC Blend A extinguishant**

**iTeh STANDARD PREVIEW**  
*Systemes d'extinction d'incendie utilisant des agents gazeux —  
Propriétés physiques et conception des systèmes —  
(standards.iteh.ai)  
Partie 6: Agent extincteur HCFC, mélange A*

[ISO 14520-6:2016](https://standards.iteh.ai/catalog/standards/sist/74a279f0-b68c-4dad-8ff8-98f574445334/iso-14520-6-2016)

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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

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](http://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](http://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 on 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](http://www.iso.org/iso/foreword.html).

The committee responsible for this document is ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 8, *Gaseous media and firefighting systems using gas*.

This third edition cancels and replaces the second edition (ISO 14520-6:2006), which has been technically revised with the following changes:

- changed the superpressurization value from 42 bar to 40 bar in [Table 9](#) and [Figure 2](#);
- added [Clause 7](#).

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

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

## Part 6: HCFC Blend A extinguishant

### 1 Scope

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

This document covers systems operating at nominal pressures of 25 bar or 40 bar, superpressurized with nitrogen. 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.

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

ISO 14520-6:2016

<https://standards.iteh.ai/catalog/standards/sist/74a279f0-b68c-4dad-8ff8-98f574445334/iso-14520-6-2016>

### 3 Terms and definitions

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

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>

### 4 Characteristics and uses

#### 4.1 General

Extinguishant HCFC Blend A shall comply with the specification shown in [Table 1](#) and its components with the tolerances specified in [Table 2](#).

HCFC Blend A is a colourless, electrically non-conductive gas with a citrus-like odour and a density approximately three times that of air.

The physical properties are shown in [Table 3](#).

HCFC Blend A extinguishes fires mainly by physical means but also by some chemical means.

**Table 1 — Specification for HCFC Blend A**

Property	Requirement
Purity	99,6 % by mass, min.
Acidity	$3 \times 10^{-4}$ % by mass (3 parts per million), max.
Water content	$10 \times 10^{-4}$ % by mass (10 parts per million), max.
Non-volatile residue	0,01 % by mass, max.
Suspended matter or sediment	None visible

**Table 2 — HCFC Blend A component specification**

Component	Tolerance (by mass)
CHCl <sub>2</sub> CF <sub>3</sub>	±0,5 %
CHClF <sub>2</sub>	±0,8 %
CHClFCF <sub>3</sub>	±0,9 %
C <sub>10</sub> H <sub>16</sub>	±0,5 %

**Table 3 — Physical properties of HCFC Blend A**

Property	Units	Value
Molecular mass		92,9
Boiling point at 1,013 bar (absolute)	°C	-38,3
Freezing point	°C	<-107,2
Critical temperature	°C	125
Critical pressure	bar abs	66,50
Critical volume	cm <sup>3</sup> /mol	170
Critical density	kg/m <sup>3</sup>	580
Vapour pressure 20 °C	bar abs	8,25
Liquid density 20 °C	kg/m <sup>3</sup>	1 200
Saturated vapour density 20 °C	kg/m <sup>3</sup>	31
Specific volume of superheated vapour at 1,013 bar and 20 °C	m <sup>3</sup> /kg	0,259
Chemical formulae	<b>Component</b>	<b>Percentage</b>
	CHCl <sub>2</sub> CF <sub>3</sub>	4,75 %
	CHClF <sub>2</sub>	82 %
	CHClFCF <sub>3</sub>	9,5 %
	C <sub>10</sub> H <sub>16</sub>	3,75 %

#### 4.2 Use of HCFC Blend A systems

HCFC Blend A total flooding systems may be used for extinguishing fires of all classes within the limits specified in ISO 14520-1:2015, Clause 4.

The extinguishant requirements per volume of protected space are shown in [Table 4](#) for various levels of concentration. These are based on methods shown in ISO 14520-1:2015, 7.6.

The extinguishing concentrations and design concentrations for heptane and Surface Class A hazards are shown in [Table 5](#). Inerting concentrations are shown in [Table 6](#).

## 5 Safety of personnel

Any hazard to personnel created by the discharge of HCFC Blend A 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;
- c) the breakdown products of the extinguishant resulting from exposure to fire.

When the design concentration exceeds the LOAEL, HCFC Blend A shall be used only for total flooding in normally unoccupied areas. For minimum safety requirements, see ISO 14520-1:2015, Clause 5.

Toxicological information for HCFC Blend A is shown in [Table 7](#).

## 6 System design

### 6.1 Fill density

The fill density of the container shall not exceed the values given in [Table 8](#) for 25 bar systems and [Table 9](#) for 40 bar systems.

Exceeding the maximum fill density may result in the container becoming "liquid full", with the effect that an extremely high rise in pressure occurs with small increases in temperature, which could adversely affect the integrity of the container assembly.

The relationships between pressure and temperature are shown in [Figures 1](#) and [2](#) for maximum fill density.

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### 6.2 Superpressurization

Containers shall be superpressurized with nitrogen with a moisture content of not more than  $60 \times 10^{-4}$  (60 parts per million) by mass to an equilibrium pressure of  $(25 \pm 1,25)$  bar and  $(40 \pm 1,25)$  bar at a temperature of 20 °C.

### 6.3 Extinguishant quantity

The quantity of extinguishant shall be the minimum required to achieve the design concentration within the hazard volume at the minimum expected temperature, determined using [Table 4](#) and the method specified in ISO 14520-1:2015, 7.6.

The design concentrations shall be that specified for relevant hazards shown in [Table 5](#). This includes at least a 1,3 safety factor on the extinguishing concentration.

Consideration should be given to increasing this for particular hazards and seeking advice from the relevant authority.

Table 4 — HCFC Blend A total flooding quantity

Temperature <i>T</i> °C	Specific vapour volume <i>S</i> m <sup>3</sup> /kg	HCFC Blend A mass requirements per unit volume of protected space, <i>m/V</i> (kg/m <sup>3</sup> )									
		Design concentration (by volume)									
		7 %	8 %	9 %	10 %	11 %	12 %	13 %	14 %	15 %	16 %
-35	0,210	0,358	0,413	0,470	0,528	0,588	0,648	0,710	0,774	0,839	0,906
-30	0,215	0,351	0,405	0,461	0,517	0,576	0,635	0,696	0,758	0,822	0,887
-25	0,219	0,343	0,397	0,451	0,507	0,564	0,622	0,682	0,743	0,805	0,869
-20	0,224	0,337	0,389	0,442	0,497	0,553	0,610	0,668	0,728	0,790	0,852
-15	0,228	0,330	0,381	0,434	0,487	0,542	0,598	0,655	0,714	0,774	0,835
-10	0,232	0,324	0,374	0,426	0,478	0,532	0,587	0,643	0,700	0,760	0,819
-5	0,237	0,318	0,367	0,418	0,469	0,522	0,576	0,631	0,687	0,745	0,804
0	0,241	0,312	0,360	0,410	0,461	0,512	0,565	0,619	0,675	0,731	0,789
5	0,246	0,306	0,354	0,403	0,452	0,503	0,555	0,608	0,663	0,718	0,775
10	0,250	0,301	0,348	0,396	0,444	0,494	0,545	0,598	0,651	0,706	0,762
15	0,254	0,296	0,342	0,389	0,437	0,486	0,536	0,587	0,640	0,693	0,748
20	0,259	0,291	0,336	0,382	0,429	0,477	0,527	0,577	0,629	0,682	0,736
25	0,263	0,286	0,330	0,376	0,422	0,469	0,518	0,568	0,618	0,670	0,723
30	0,268	0,281	0,325	0,369	0,415	0,462	0,509	0,558	0,608	0,659	0,711
35	0,272	0,277	0,320	0,363	0,408	0,454	0,501	0,549	0,598	0,648	0,700
40	0,277	0,272	0,314	0,358	0,402	0,447	0,493	0,540	0,589	0,638	0,689
45	0,281	0,268	0,310	0,352	0,395	0,440	0,485	0,532	0,579	0,628	0,678
50	0,285	0,264	0,305	0,347	0,389	0,433	0,478	0,524	0,570	0,618	0,667
55	0,290	0,260	0,300	0,341	0,383	0,427	0,471	0,516	0,562	0,609	0,657
60	0,294	0,256	0,296	0,336	0,378	0,420	0,463	0,508	0,553	0,600	0,647



Table 4 (continued)

Temperature <i>T</i> °C	Specific vapour volume <i>S</i> m <sup>3</sup> /kg	HCFC Blend A mass requirements per unit volume of protected space, <i>m/V</i> (kg/m <sup>3</sup> )									
		Design concentration (by volume)									
		7 %	8 %	9 %	10 %	11 %	12 %	13 %	14 %	15 %	16 %
65	0,299	0,252	0,291	0,331	0,372	0,414	0,457	0,500	0,545	0,591	0,638
70	0,303	0,248	0,287	0,326	0,367	0,408	0,450	0,593	0,537	0,582	0,628
75	0,307	0,245	0,283	0,322	0,361	0,402	0,444	0,486	0,529	0,573	0,620
80	0,312	0,241	0,279	0,317	0,356	0,396	0,437	0,479	0,522	0,566	0,611
85	0,317	0,238	0,275	0,313	0,351	0,391	0,432	0,472	0,515	0,558	0,602
90	0,321	0,235	0,271	0,308	0,346	0,385	0,425	0,466	0,508	0,550	0,594
95	0,325	0,232	0,267	0,304	0,342	0,380	0,419	0,460	0,501	0,543	0,586

NOTE This information refers only to the product HCFC Blend A and does not represent any other products containing dichlorotrifluoroethane, chlorodifluoromethane, chlorotetrafluoroethane or isopropenyl-1-methylcyclohexane as components.

Symbols:

*m/V* is the agent mass requirements (kg/m<sup>3</sup>), 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<sup>3</sup>), 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<sup>3</sup>/kg); the specific volume of superheated HCFC Blend A vapour at a pressure of 1,013 bar may be approximated by the formula

$$S = k_1 + k_2 T$$

where

$$k_1 = 0,241 \ 3$$

$$k_2 = 0,000 \ 88$$

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