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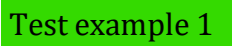


## **Fixed firefighting systems – Gas extinguishing systems**

Part 1: Design, installation and maintenance (ISO 14520-1:2015, modified)

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**About tracked changes**

This document is a combined PDF containing a “tracked changes” version of BS EN 15004-1, which compares BS EN 15004-1:2019 with BS EN 15004-1:2008.

The original version of BS EN 15004-1:2019, appended at the end of this document, should be considered the version of record for this publication.

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**Amendments/corrigenda issued since publication**

Date	Text affected
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# Fixed firefighting systems – Gas extinguishing systems

Part 1: Design, installation and maintenance (ISO 14520-1:2015, modified)

## Version comparison

This version comparison compares where new and revised clauses are located between BS EN 15004-1:2019 and BS EN 15004-1:2008.

### BS EN 15004-1:2019 to BS EN 15004-1:2008

BS EN 15004-1:2019		BS EN 15004-1:2008	
	European foreword		Foreword
	Introduction		Introduction
1	Scope	1	Scope
2	Normative references	2	Normative references
3	Terms and definitions	3	Terms and definitions
4	Use and limitations	4	Use and limitations
4.1	General	4.1	General
4.2	Extinguishants	4.2	Extinguishants
4.3	Electrostatic discharge	4.3	Electrostatic discharge
4.4	Compatibility with other extinguishants	4.4	Compatibility with other extinguishants
4.5	Temperature limitations	4.5	Temperature limitations
5	Safety	5	Safety
5.1	Hazard to personnel	5.1	Hazard to personnel
5.2	Safety precautions	5.2	Safety precautions
5.3	Occupiable areas	5.3	Occupiable areas
5.4	Electrical hazards	5.4	Electrical hazards
5.5	Electrical earthing	5.5	Electrical earthing
5.6	Electrostatic discharge	5.6	Electrostatic discharge

This is a preview of "BS EN 15004-1:2019 -...". [Click here to purchase the full version from the ANSI store.](#)

6.1	General	6.1	General
6.2	Extinguishant supply	6.2	Extinguishant supply
6.3	Distribution	6.3	Distribution
6.4	Detection, actuation and control systems	6.4	Detection, actuation and control systems
7	Extinguishant system design	7	Extinguishant
7.1	General	7.1	General
7.2	Specifications, plans and approvals	7.2	Specifications, plans and approvals
7.3	System flow calculations	7.3	System flow calculations
7.4	Enclosures	7.4	Enclosures
7.5	Extinguishant concentration requirements	7.5	Extinguishant concentration requirements
7.6	Total flooding quantity	7.6	Total flooding quantity
7.7	Altitude adjustment	7.7	Altitude adjustment
7.8	Duration of protection	7.8	Duration of protection
7.9	System performance	7.9	System performance
8	Commissioning and acceptance	8	Commissioning and acceptance
8.1	General	8.1	General
8.2	Tests	8.2	Tests
8.3	Completion certificate and documentation	8.3	Completion certificate and documentation
9	Inspection, maintenance, testing and training	9	Inspection, maintenance, testing and training
9.1	General	9.1	General
9.2	Inspection	9.2	Inspection
9.3	Maintenance	9.3	Maintenance
9.4	Training	9.4	Training
Annex A (normative) Working documents		Annex A (normative) Working documents	
Annex B (normative) Determination of flame-extinguishing concentration of gaseous extinguishants by the cup burner method		Annex B (normative) Determination of flame-extinguishing concentration of gaseous extinguishants by the cup burner method	

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engineered extinguishing units	engineered extinguishing units
Annex D (normative) Method of evaluating inerting concentration of a fire extinguishant	Annex D (normative) Method of evaluating inerting concentration of a fire extinguishant
Annex E (normative) Door fan test for determining of minimum hold time	Annex E (normative) Door fan test for determination of minimum hold time
Annex F (informative) System performance verification	Annex F (informative) System performance verification
Annex G (informative) Safe personnel exposure guidelines	Annex G (informative) Safe personnel exposure guidelines
Annex H (informative) Flow calculation implementation method and flow calculation verification and testing for approvals	Annex H (informative) Flow calculation implementation method and flow calculation verification and testing for approvals
Bibliography	Bibliography

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**NATIONAL FOREWORD**

This British Standard is the UK implementation of EN 15004-1:2008 EN 15004-1:2019. It is derived from ISO 14520-1:2015 (for details see the European Foreword). It supersedes BS ISO 14520-1:2006 BS EN 15004-1:2008, which is withdrawn.

The UK participation in its preparation was entrusted by to Technical Committee FSH/18, Fixed firefighting systems, to Subcommittee FSH/18/6, Gaseous extinguishing media Extinguishing Media and systems Systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EUROPÄISCHE NORM

June 2008 March 2019

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Supersedes EN 15004-1:2008

English Version

## Fixed firefighting systems - Gas extinguishing systems - Part 1: Design, installation and maintenance (ISO 14520- 1:20062015, modified)

Installations fixes de lutte contre l'incendie -  
Installations d'extinction à gaz - Partie 1 : Calcul,  
installation et maintenance  
(ISO 14520-1:20062015, modifiée)

Ortsfeste Brandbekämpfungsanlagen - Löschanlagen  
mit gasförmigen Löschmitteln - Teil 1: Planung,  
Installation und Instandhaltung  
(ISO 14520-1:20062015, modifiziert)

This European Standard was approved by CEN on ~~26 April 2008~~ 28 May 2018.

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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<b>Contents</b>	<b>Page</b>
European foreword .....	5
Introduction .....	9
1 Scope .....	11
2 Normative references .....	12
3 Terms and definitions .....	14
4 Use and limitations .....	18
4.1 General .....	18
4.2 Extinguishants .....	18
4.2.1 General .....	18
4.2.2 Environmental properties .....	19
4.3 Electrostatic discharge .....	19
4.4 Compatibility with other extinguishants .....	19
4.5 Temperature limitations .....	20
5 Safety .....	20
5.1 Hazard to personnel .....	20
5.2 Safety precautions .....	20
5.2.1 General .....	20
5.2.2 For normally occupied areas .....	21
5.2.3 For normally unoccupied areas .....	22
5.2.4 For unoccupiable areas .....	22
5.3 Occupiable areas .....	22
5.4 Electrical hazards .....	23
5.5 Electrical earthing .....	24
5.6 Electrostatic discharge .....	24
6 System design .....	24
6.1 General .....	24
6.2 Extinguishant supply .....	25
6.2.1 Quantity .....	25
6.2.2 Quality .....	25
6.2.3 Container arrangement .....	25
6.2.4 Storage containers .....	25
6.3 Distribution .....	26
6.3.1 General .....	26
6.3.2 Piping .....	27
6.3.3 Fittings .....	28
6.3.4 Pipe and valve supports .....	28
6.3.5 Valves .....	29
6.3.6 Nozzles .....	29
6.3.7 Pressure reducing orifice assembly .....	30
6.4 Detection, actuation and control systems .....	30
6.4.1 General .....	30
6.4.2 Automatic detection .....	31
6.4.3 Operating devices .....	31
6.4.4 Control equipment .....	32
6.4.5 Operating alarms and indicators .....	32
6.4.6 Stop device .....	32



This is a preview of "BS EN 15004-1:2019 -...". Click here to purchase the full version from the ANSI store.

7	<b>Extinguishant system design</b> .....	32
7.1	<b>General</b> .....	32
7.2	<b>Specifications, plans and approvals</b> .....	33
7.2.1	<b>Specifications</b> .....	33
7.2.2	<b>Working documents</b> .....	33
7.3	<b>System flow calculations</b> .....	33
7.3.1	<b>General</b> .....	33
7.3.2	<b>Balanced and unbalanced system</b> .....	33
7.3.3	<b>Friction losses</b> .....	35
7.3.4	<b>Pressure drop</b> .....	35
7.3.5	<b>Valves and fittings</b> .....	36
7.3.6	<b>Piping length</b> .....	36
7.3.7	<b>Drawings</b> .....	36
7.3.8	<b>Liquefied gases — Specific requirements</b> .....	36
7.4	<b>Enclosures</b> .....	36
7.5	<b>Extinguishant concentration requirements</b> .....	37
7.5.1	<b>Flame extinguishment</b> .....	37
7.5.2	<b>Inerting</b> .....	38
7.6	<b>Total flooding quantity</b> .....	38
7.6.1	<b>General</b> .....	38
7.6.2	<b>Liquefied gases</b> .....	39
7.6.3	<b>Non-liquefied gas</b> .....	39
7.7	<b>Altitude adjustment</b> .....	40
7.8	<b>Duration of protection</b> .....	40
7.9	<b>System performance</b> .....	41
7.9.1	<b>Discharge time</b> .....	41
7.9.2	<b>Extended discharge</b> .....	41
8	<b>Commissioning and acceptance</b> .....	41
8.1	<b>General</b> .....	41
8.2	<b>Tests</b> .....	42
8.2.1	<b>General</b> .....	42
8.2.2	<b>Enclosure check</b> .....	42
8.2.3	<b>Review of mechanical components</b> .....	42
8.2.4	<b>Review of enclosure integrity</b> .....	43
8.2.5	<b>Review of electrical components</b> .....	43
8.2.6	<b>Preliminary functional tests</b> .....	44
8.2.7	<b>System functional operational test</b> .....	45
8.2.8	<b>Remote monitoring operations (if applicable)</b> .....	45
8.2.9	<b>Control panel primary power source</b> .....	45
8.2.10	<b>Completion of functional tests</b> .....	45
8.3	<b>Completion certificate and documentation</b> .....	45
9	<b>Inspection, maintenance, testing and training</b> .....	46
9.1	<b>General</b> .....	46
9.2	<b>Inspection</b> .....	46
9.2.1	<b>General</b> .....	46
9.2.2	<b>Container</b> .....	46
9.2.3	<b>Hose</b> .....	46
9.2.4	<b>Enclosures</b> .....	47
9.3	<b>Maintenance</b> .....	47
9.3.1	<b>General</b> .....	47
9.3.2	<b>User's programme of inspection</b> .....	47
9.3.3	<b>Service schedule</b> .....	47

This is a preview of "BS EN 15004-1:2019 -...". Click here to purchase the full version from the ANSI store.

9.4	Training .....	48
	Annex A (normative) Working documents .....	49
	Annex B (normative) Determination of flame-extinguishing concentration of gaseous extinguishants by the cup burner method .....	51
	Annex C (normative) Fire extinguishment/area coverage fire test procedure for engineered and pre-engineered extinguishing units .....	58
	Annex D (normative) Method of evaluating inerting concentration of a fire extinguishant .....	95
	Annex E (normative) Door fan test for determining of minimum hold time .....	97
	Annex F (informative) System performance verification .....	116
	Annex G (informative) Safe personnel exposure guidelines .....	117
	Annex H (informative) Flow calculation implementation method and flow calculation verification and testing for approvals .....	124
	Bibliography .....	128

This is a preview of "BS EN 15004-1:2019 -...". Click here to purchase the full version from the ANSI store.

## European foreword Foreword

This document (EN 15004-1:2008/2019) 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 ~~December 2008~~ September 2019, and conflicting national standards shall be withdrawn at the latest by ~~December 2008~~ September 2019.

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

This document supersedes EN 15004-1:2008.

This document contains the following technical changes in comparison to EN 15004-1:2008:

- 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 inflammable 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 14520-1:2015 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*;

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- Part 3: Physical properties and system design of gas extinguishing systems for HCFC Blend A 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<sub>3</sub>I and HFC 236fa extinguishants, respectively, have not been implemented by CEN, as CF<sub>3</sub>I 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 organizations/organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

~~The text of the International Standard ISO 14520-1:2006 from Technical Committee ISO/TC 21 "Equipment for fire protection and fire fighting" 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. Where the text in ISO 14520-1 gives the reference to "ISO 14520-1" or "this part of ISO 14520" this document refers only to "this document" and is not marked by a straight line.~~

~~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 (ISO 14520-1, modified)~~
- ~~— Part 2: Physical properties and system design of gas extinguishing systems for FK-5-1-12 extinguishant (ISO 14520-5, modified)~~
- ~~— Part 3: Physical properties and system design of gas extinguishing systems for HCFC Blend A extinguishant (ISO 14520-6, modified)~~
- ~~— Part 4: Physical properties and system design of gas extinguishing systems for HFC 125 extinguishant (ISO 14520-8, modified)~~
- ~~— Part 5: Physical properties and system design of gas extinguishing systems for HFC 227ea extinguishant (ISO 14520-9, modified)~~
- ~~— Part 6: Physical properties and system design of gas extinguishing systems for HFC 23 extinguishant (ISO 14520-10, modified)~~

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~~(ISO 14520-12, modified)~~

~~— Part 8: Physical properties and system design of gas extinguishing systems for IG-100 extinguishant  
(ISO 14520-13, modified)~~

~~— Part 9: Physical properties and system design of gas extinguishing systems for IG-55 extinguishant  
(ISO 14520-14, modified)~~

~~— Part 10: Physical properties and system design of gas extinguishing systems for IG-541 extinguishant  
(ISO 14520-15, modified)~~

ISO 14520-1:2006 has the following 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.~~

~~International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.~~

~~The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.~~

~~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.~~

~~ISO 14520-1 was prepared by Technical Committee ISO/TC 21, Equipment for fire protection and fire fighting, Subcommittee SC 8, Gaseous media and firefighting systems using gas.~~

~~This second edition cancels and replaces the first edition (ISO 14620-1:2000), which has been technically revised.~~

~~Annex C has been extensively revised to include polymeric sheet fuel array fire tests [polymethyl methacrylate (PMMA)], [polypropylene (PP)] and [acrylonitrile butadiene styrene (ABS)]. These tests are designed to more closely represent plastic fuel hazards such as may be encountered in information technology, telecommunications and process control facilities.~~

~~Annex E has been re-structured to accommodate lighter-than-air gases and to provide means for dealing with non-standard (as opposed to geometrically regular) hazard enclosures.~~

~~Also incorporated in this revision of ISO 14520-1 are safe personnel exposure guidelines, Annex G, recognizing physiologically based pharmacokinetic (PBPK) modelling and hypoxic guidelines to define safe human exposure limits.~~

~~ISO 14520 consists of the following parts, under the general title Gaseous media fire extinguishing systems — Physical properties and system design:~~

~~— Part 1: General requirements~~

~~— Part 2:  $CF_3I$  extinguishant~~

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~~— Part 6: HCFC Blend A extinguishant~~

~~— Part 8: HFC 125 extinguishant~~

~~— Part 9: HFC 227ea extinguishant~~

~~— Part 10: HFC 23 extinguishant~~

~~— Part 11: HFC 236fa extinguishant~~

~~— Part 12: IG-01 extinguishant~~

~~— Part 13: IG-100 extinguishant~~

~~— Part 14: IG-55 extinguishant~~

~~— Part 15: IG-541 extinguishant~~

~~Parts 3, 4 and 7, which dealt with FC-2-1-8, FC-3-1-10 and HCFC 124 extinguishants, respectively, have been withdrawn, as these types are no longer manufactured.~~

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## Introduction

~~Firefighting~~ **Extinguishing** systems covered in this ~~document~~ **part of EN 15004** 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~~ **part of EN 15004** has been prepared to meet this need.

~~In particular, new requirements to eliminate the need to release extinguishants during testing and commissioning procedures are included. These are linked to the inclusion of enclosure integrity testing.~~

The requirements of this ~~document~~ **part of EN 15004** 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~~ **part of EN 15004** 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.

It is important that the fire protection of a building or plant be considered as a whole. Gaseous extinguishant systems form only a part, though an important part, of the available facilities, but 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 or emergency use, or to deal with special hazards.

Gaseous extinguishants have for many years been a recognized effective medium for the extinction of inflammable liquid fires and fires in the presence of electrical and ordinary Class A hazards, but it should not be forgotten, in the planning of comprehensive schemes, that there may be hazards for which these media are not suitable, or that in certain circumstances or situations there may be dangers in 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. In addition, reference should be made as necessary to other national standards and statutory regulations of the particular country.

It is essential that ~~fire fighting equipment~~ **extinguishing systems** be carefully maintained to ensure instant readiness when required. ~~Routine maintenance~~ **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 at 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).

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~~group of ISO/TC 21/SC 8. Annex C deals with the tests for determination of the extinguishing concentrations and system performance and they are designed in such a way to allow individual installers to use his/her system and carry out all of the extinguishing tests. The need for the tests presented in Annex C was established by the fact that the previously used Class A fire test involved wood crib, heptane pan and heptane can test fires in an enclosure of minimum 100 m<sup>3</sup>, and did not necessarily indicate extinguishing concentrations suitable for the protection of plastic fuel hazards such as may be encountered in information technology, telecommunications and process control facilities.~~

~~As a consequence of the above, the current Annex C of this document has been revised as described in the Foreword.~~



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## 1 Scope

This document specifies requirements and gives recommendations for the design, installation, testing, maintenance and safety of **gaseous fire fighting 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.

**It covers** 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** part of EN 15004 is not intended to indicate approval of the extinguishants listed therein by the appropriate authorities, as other extinguishants may be equally acceptable. CO<sub>2</sub> is not included as it is covered by other International Standards.

This **document** part of EN 15004 is applicable to the extinguishants listed in Table 1. **It** This document is intended to be used in conjunction with the **separate** given parts of EN 15004 for **specific extinguishants, as cited** fire extinguishing agents in Table 1.

**Table 1 — Listed **extinguishants** extinguishant**

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