

INTERNATIONAL  
STANDARD

**ISO**  
**7203-1**

First edition  
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**Fire extinguishing media — Foam  
concentrates —**

**Part 1:**

Specification for low expansion foam  
concentrates for top application to  
water-immiscible liquids

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*Agents extincteurs — Émulseurs —*

*Partie 1: Spécifications pour les émulseurs bas foisonnement destinés à  
une application par le haut sur les liquides non miscibles à l'eau*



Reference number  
ISO 7203-1:1995(E)

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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.

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.

International Standard ISO 7203-1 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 6, *Extinguishing media for fire fighting*.

[ISO 7203-1:1995](#)

ISO 7203 consists of the following parts under the general title *Fire extinguishing media — Foam concentrates*:

- *Part 1: Specification for low expansion foam concentrates for top application to water-immiscible liquids*
- *Part 2: Specification for medium and high expansion foam concentrates for top application to water-immiscible liquids*
- *Part 3: Specification for low expansion foam concentrates for top application to water-miscible liquids*

Annexes A, B, C, D, E, F and G form an integral part of this part of ISO 7203. Annexes H, J and K are for information only.

## Introduction

Firefighting foams are widely used to control and extinguish fires of flammable liquids and for inhibiting reignition. They may also be used to prevent ignition of flammable liquids and, in certain conditions, extinguish fires of solid combustibles.

Foams may be used in combination with other extinguishing media, particularly halons, carbon dioxide and powders, which are the subject of other International Standards including those listed below:

ISO 5923:1989, *Fire protection — Fire extinguishing media — Carbon dioxide*.

ISO 6183:1990, *Fire protection equipment — Carbon dioxide extinguishing systems for use on premises — Design and installation*.

ISO 7201-1:1989, *Fire protection — Fire extinguishing media — Halogenated hydrocarbons — Part 1: Specifications for halon 1211 and halon 1301*.

ISO 7201-2:1991, *Fire extinguishing media — Halogenated hydrocarbons — Part 2: Code of practice for safe handling and transfer procedures of halon 1211 and halon 1301*.

ISO 7202:1987, *Fire protection — Fire extinguishing media — Powder*.

A specification for foam systems designed in accordance with this part of ISO 7203 is being prepared and will be published as:

ISO 7076:—<sup>1)</sup>, *Fire protection equipment — Automatic extinguishing systems for applying low, medium and high expansion foam*.

Attention is drawn to annex J which deals with the compatibility of foam concentrates, and the compatibility of foams and powders.

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# Fire extinguishing media — Foam concentrates —

## Part 1:

Specification for low expansion foam concentrates for top application to water-immiscible liquids

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#### 1 Scope

This part of ISO 7203 specifies the essential properties and performance of liquid foam concentrates used to make low expansion foams for the control, extinction and inhibition of reignition of fires of water-immiscible liquids. Minimum performance on certain test fires is specified.

The foams are suitable for top application to fires of water-immiscible liquids. Those which will also comply with ISO 7203-3: *Fire extinguishing media — Foam concentrates — Part 3: Specifications for low expansion foam concentrates for top application to water-miscible liquids*, which is being prepared, will also be suitable for top application to fires of water-miscible liquids.

The foam concentrates might be suitable for use in non-aspirating sprayers or for subsurface application to liquid fires, but requirements specific to those applications are not included in this part of ISO 7203.

#### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 7203. At the time of publication, the editions indicated were valid. All standards are subject

to revision, and parties to agreements based on this part of ISO 7203 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 304:1985, *Surface active agents — Determination of surface tension by drawing up liquid films*.

ISO 3310-1:1990, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*.

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*.

ISO 3734:1976, *Crude petroleum and fuel oils — Determination of water and sediment — Centrifuge method*.

ISO 7203-2:1995, *Fire extinguishing media — Foam concentrates — Part 2: Specification for medium and high expansion foam concentrates for top application to water-immiscible liquids*.

BS 5117:1989, *Testing corrosion inhibiting, engine coolant concentrate (antifreeze) — Part 1: Methods of test for determination of physical and chemical properties — Section 1.3: Determination of freezing point*.

### 3 Definitions

For the purposes of this part of ISO 7203, the following definitions apply.

**3.1 characteristic values:** Values declared by the foam concentrate supplier for the chemical and physical properties and the performances of the foam and foam solution.

**3.2 25 % drainage time:** Time for 25 % of the liquid content of a foam to drain out.

**3.3 50 % drainage time:** Time for 50 % of the liquid content of a foam to drain out.

**3.4 expansion:** Ratio of the volume of foam to the volume of the foam solution from which it was made.

**3.5 low expansion:** Applied to foam with expansion in the range 1 to 20, and to associated equipment, systems and concentrates.

**3.6 medium expansion:** Applied to foam with expansion in the range 21 to 200 and to associated equipment, systems and concentrates.

**3.7 high expansion:** Applied to foam with expansion greater than 201 and to associated equipment, systems and concentrates.

**3.8 foam (firefighting):** Aggregate of air-filled bubbles formed from an aqueous solution of a suitable foam concentrate.

**3.9 (foam) concentrate:** Liquid which, when mixed with water in the appropriate concentration, gives a foam solution.

**3.10 protein foam concentrate (P):** Foam concentrate derived from hydrolyzed protein materials.

**3.11 fluoroprotein foam concentrate (FP):** Protein foam concentrate with added fluorinated surface active agents.

**3.12 synthetic foam concentrate (S):** Foam concentrate based on a mixture of hydrocarbon surface active agents and which may contain fluorocarbons with additional stabilizers.

**3.13 alcohol-resistant foam concentrate (AR):** Foam concentrate resistant to breakdown when applied to the surface of alcohol or other polar solvents.

**3.14 aqueous film-forming foam concentrate (AFFF):** Foam concentrate based on a mixture of hydrocarbon and fluorinated surface active agents

with the ability to form an aqueous film on the surface of some hydrocarbons.

**3.15 film-forming fluoroprotein foam concentrate (FFFP):** Fluoroprotein foam concentrate which has the ability to form an aqueous film on the surface of some hydrocarbons.

**3.16 foam solution:** Solution of foam concentrate and water.

**3.17 forceful application:** Application of foam to fall directly onto the surface of a liquid fuel.

**3.18 gentle application:** Application of foam indirectly to the surface of a liquid fuel via a backboard, tank wall or other surface.

**3.19 sediment:** Insoluble particles in the foam concentrate.

**3.20 spreading coefficient:** Measure of the ability of one liquid to spontaneously spread across the surface of another.

## 4 Grades and uses of foam concentrates

### 4.1 Grade

The foam concentrate shall be graded

— for extinguishing performance as class I, II or III;

— for burnback resistance as level A, B, C or D;

according to its test fire performance (see clause 13).

NOTE 1 Typical anticipated extinguishing performance classes and burnback resistance levels for AFFF, FFFP, FP, P and S foam concentrates are given in annex K.

### 4.2 Use with sea water

If a foam concentrate is marked as suitable for use with sea water, the recommended concentrations for use with fresh water and sea water shall be identical.

## 5 Tolerance of the foam concentrate to freezing and thawing

Before and after temperature conditioning in accordance with A.2, the foam concentrate, if claimed by the supplier not to be adversely affected by freezing and thawing, shall show no visual sign of stratification and non-homogeneity, when tested in accordance with annex B.



Foam concentrates complying with this clause shall be tested for compliance with the appropriate requirements given in other clauses of this part of ISO 7203 after freezing and thawing in accordance with A.2.1.

## 6 Sediment in the foam concentrate

### 6.1 Sediment before ageing

Any sediment in the concentrate prepared in accordance with A.1 shall be dispersible through a 180 µm sieve, and the percentage volume of sediment shall be not more than 0,25 %, when tested in accordance with annex C.

### 6.2 Sediment after ageing

Any sediment in the concentrate aged in accordance with C.1 shall be dispersible through a 180 µm sieve, and the percentage volume of sediment shall be not more than 1,0 %, when tested in accordance with annex C.

## 7 Comparative fluidity of the foam concentrate

Before and after temperature conditioning in accordance with A.2, the flow rate of the concentrate shall be not less than the flow rate achieved with a reference liquid of kinematic viscosity 200 mm<sup>2</sup>/s, when tested in accordance with annex D.

## 8 pH of the foam concentrate

### 8.1 pH limits

The pH of the foam concentrate, before and after temperature conditioning in accordance with A.2, shall be not less than 6,0 and not more than 9,5 at (20 ± 2) °C.

### 8.2 Sensitivity to temperature

If there is a difference of more than 0,5 pH unit between the two values (before and after temperature conditioning), the foam concentrate shall be designated as temperature sensitive.

## 9 Surface tension of the foam solution

### 9.1 Before temperature conditioning

The surface tension of the foam solution prepared from the concentrate, before temperature condition-

ing in accordance with A.2, at the supplier's recommended concentration, shall be within ± 10 % of the characteristic value when determined in accordance with E.2.

### 9.2 Temperature sensitivity

The surface tension of the foam solution prepared from the concentrate, after temperature conditioning in accordance with A.2, at the supplier's recommended concentration, shall be determined in accordance with E.2.

If the value obtained after temperature conditioning is less than 0,95 times, or more than 1,05 times, the value obtained before temperature conditioning, the foam concentrate shall be designated as temperature sensitive.

## 10 Interfacial tension between the foam solution and cyclohexane

### 10.1 Before temperature conditioning

The difference between the interfacial tension between the foam solution prepared from the foam concentrate, before temperature conditioning in accordance with A.2, and cyclohexane (when determined in accordance with E.3) and the characteristic value, shall not exceed 1,0 mN/m or 10 % of the characteristic value, whichever is the greater.

### 10.2 Temperature sensitivity

The interfacial tension between the foam solution prepared from the foam concentrate, after temperature conditioning in accordance with A.2, and cyclohexane shall be determined in accordance with E.3.

If the two values obtained before and after temperature conditioning differ by more than 0,5 mN/m or if the value obtained after temperature conditioning is less than 0,95 times, or more than 1,05 times, the value obtained before temperature conditioning, whichever is the greater, the foam concentrate shall be designated as temperature sensitive.

## 11 Spreading coefficient of the foam solution on cyclohexane

The spreading coefficient of the foam solution prepared from a concentrate claimed by the supplier to be "film-forming", before and after temperature conditioning in accordance with A.2, calculated in accordance with E.4, shall be positive.

NOTE 2 Foam concentrates complying with this clause are more likely to be of type AFFF or FFFP than of type FP, P or S.

## 12 Expansion and drainage of foam

### 12.1 Expansion

#### 12.1.1 Limits

The foam produced from the foam concentrate, before and after temperature conditioning in accordance with A.2, with potable water and, if appropriate, with the synthetic sea water of G.1.4, shall have an expansion within either  $\pm 20\%$  of the characteristic value or  $\pm 1,0$  of the characteristic value, whichever is the greater, when tested in accordance with annex F.

#### 12.1.2 Temperature sensitivity

If any of the values for expansion obtained after temperature conditioning is less than 0,85 times, or more than 1,15 times, the corresponding value obtained before temperature conditioning, the foam concentrate shall be designated as temperature sensitive.

### 12.2 Drainage

#### 12.2.1 Limits

The foam produced from the foam concentrate, before and after temperature conditioning in accordance with A.2, with potable water and, if appropriate, with the synthetic sea water of G.1.4, shall have a 25 % drainage time within  $\pm 20\%$  of the characteristic value when tested in accordance with annex F.

#### 12.2.2 Temperature sensitivity

If any of the values for 25 % drainage time obtained after temperature conditioning is less than 0,8 times, or more than 1,2 times, the corresponding value obtained before temperature conditioning, the foam concentrate shall be designated as temperature sensitive.

## 13 Test fire performance

The foam produced from the foam concentrate, before and, if the foam concentrate is designated as

temperature sensitive, after temperature conditioning in accordance with A.2, with potable water and, if appropriate, with the synthetic sea water of G.1.4, shall have an extinguishing performance class and burnback resistance level as specified in table 1, when tested in accordance with G.1 and G.2 and/or G.3, as appropriate.

## 14 Marking, packaging and specification sheet

**14.1** The following information shall be provided by the supplier as a specification sheet either supplied with or marked on the shipping container:

- a) the designation (identifying name) of the concentrate and the words "low expansion foam concentrate";
- b) the class (I, II or III) and level (A, B, C or D) of the foam concentrate and, if the concentrate complies with clause 11, the words "film-forming";
- c) recommended usage concentration for use (most commonly 1 %, 3 % or 6 %);
- d) any tendency of the foam concentrate to cause harmful physiological effects, the methods required to avoid them and the first aid treatment if they should occur;
- e) recommended storage temperature and temperature of use;
- f) if the concentrate complies with clause 5, the words "Not affected by freezing and thawing" or, if the foam concentrate does not comply with clause 5, the words "Do not freeze";
- g) the nominal quantity in the container;
- h) the supplier's name and address;
- i) the batch number;
- j) the words "Not suitable for use with sea water" or "Suitable for use with sea water", as appropriate;
- k) any corrosiveness of the concentrate, both in storage and in use, which significantly exceeds that of potable water;

**Table 1 — Maximum extinction times and minimum burnback times**

Times in minutes

Extinguishing performance class	Burnback resistance level	Gentle application test (G.2)		Forceful application test (G.3)	
		Extinction time not more than	Burnback time not less than	Extinction time not more than	Burnback time not less than
I	A	Not applicable		3	10
	B	5	15	3	Not tested
	C	5	10	3	
	D	5	5	3	
II	A	Not applicable		4	10
	B	5	15	4	Not tested
	C	5	10	4	
	D	5	5	4	
III	B	5	15	Not tested	
	C	5	10		
	D	5	5		

NOTES

- There is no burnback resistance level A for class III.
- Typical extinguishing performance classes and burnback resistance levels for different types of foam concentrate are given in annex K.
- For extinguishing performance, class I is the highest class and class III the lowest. For burnback resistance, level A is the highest level and level D the lowest. Foam concentrates can be compared for each factor separately but not necessarily in combination. For example, a IC concentrate is superior to a ID or a IIC concentrate, but it is not possible to say that it is superior to a IIB concentrate, since it is superior in extinguishing performance but inferior in burnback resistance.

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l) suitable materials for storage containers and equipment, both for the concentrate and the foam solution.

**WARNING — It is extremely important that the foam concentrate, after dilution with water to the recommended concentration, must not, in normal usage, present a significant toxic hazard to life in relation to the environment.**

The packaging of the foam concentrate shall ensure that the essential characteristics of the concentrate are preserved when stored and handled in accordance with the supplier's recommendations.

Markings on shipping containers shall be permanent and legible.

It is recommended that non-Newtonian concentrates are appropriately identified.

Foam concentrates complying with ISO 7203-2 shall also be marked "medium expansion" and/or "high expansion".

**14.2** If requested by the user, the supplier shall provide a list of the characteristic values.

## Annex A (normative)

### Preliminary sampling and conditioning of the foam concentrate

#### A.1 Preliminary sampling

The sampling method shall ensure representative samples, whether taken from a bulk container or a number of individual packages.

Store samples in full closed containers.

NOTE 3 Containers of capacity 20 litres are suitable.

#### A.2 Conditioning of foam concentrate

**A.2.1** If the supplier claims that the concentrate is not adversely affected by freezing and thawing, condition the concentrate sample through four cycles of

freezing and thawing, generally as described in B.2, before conditioning in accordance with A.2.2.

**A.2.2** Condition the concentrate in the sealed container for 7 days at  $(60 \pm 2)$  °C, followed by 1 day at  $(20 \pm 5)$  °C.

#### A.3 Subsequent testing

Test samples prepared in accordance with A.1, or A.1 and A.2 as appropriate. Agitate the sample container before sampling for further tests.

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