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**Fire extinguishing media — Foam
concentrates —**

**Part 4:
Specification for Class A foam
concentrates for application on Class
A fires**

Agents extincteurs — Émulseurs —

*Partie 4: Spécifications pour les agents émulseurs destinés à une
application par les matières solide combustible*

ISO 7203-4:2022

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: 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).

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 fire fighting*, Subcommittee SC 6, *Foam and powder media and firefighting system using foam and powder*.

This corrected version of ISO 7203-4:2022 incorporates the following corrections: [a48e8/iso-7203-4-2022](https://www.iso.org/standard/448e8/iso-7203-4-2022)

— the publication year included on the cover page and in the headers and footers of the document has been corrected from 2021 to 2022.

A list of all parts in the ISO 7203 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

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

Foams can be used in combination with other extinguishing media, particularly halocarbons, carbon dioxide and powders, which are the subject of other International Standards, including ISO 6183, ISO 7201-1, ISO 7201-2 and ISO 7202. A specification for foam systems can be found in the ISO 7076 series.

Attention is drawn to [Annex I](#), which deals with the compatibility of foam concentrates.

Attention is also drawn to [Annex J](#), which contains information previously included ISO 3219:1993¹⁾ that is considered relevant to this document.

NOTE ISO 3219:1993 is currently under revision with a view to expansion into a series. The content included in [Annex J](#) has not yet been incorporated into a new Part.

A specification for portable extinguishers can be found in ISO 7165.

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1) Cancelled and replaced by ISO 3219-1:2021 and ISO 3219-2:2021.

Fire extinguishing media — Foam concentrates —

Part 4: Specification for Class A foam concentrates for application on Class A fires

1 Scope

This document specifies the essential properties and performance of liquid foam concentrates used to make foams for the extinguishment and inhibition of reignition of fires of Class A fuels. Minimum performance on certain test fires is specified.

NOTE 1 Class A fires are fires involving solid materials, usually of an organic nature, in which combustion normally takes place with the formation of glowing embers (see 3.16).

NOTE 2 Class A fuels can include materials such as vegetation, wood, cloth, paper, rubber and some plastics (see 3.17).

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

ISO 3104, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity*

ISO 3219-2, *Rheology — Part 2: General principles of rotational and oscillatory rheometry*

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

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

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

ISO 7203-3, *Fire extinguishing media — Foam concentrates — Part 3: Specification for low-expansion foam concentrates for top application to water-miscible liquids*

EN 1568-3:2018, *Fire extinguishing media — Foam concentrates — Part 3: Specification for low expansion foam concentrates for surface application to water-immiscible liquids*

UNITED NATIONS (UN), *Globally Harmonized System of Classification and Labelling of Chemicals*, 4th revised edition (2011)²⁾

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2) Available at: https://unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev04/English/ST-SG-AC10-30-Rev4e.pdf.

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/>

**3.1
characteristic value**

value declared by the *foam* (3.7) concentrate supplier for the chemical and physical properties and the performances of the foam, *foam solution* (3.11), and *foam concentrate* (3.8)

**3.2
25 % drainage time**

time for 25 % of the liquid content of a *foam* (3.7) to drain out

**3.3
expansion**

ratio of the volume of *foam* (3.7) to the volume of the *foam solution* (3.11) from which it was made

**3.4
low-expansion**

with *expansion* (3.3) in the range 1 to 20, as applied to *foam* (3.7) and to associated equipment, systems and concentrates

**3.5
medium-expansion**

with *expansion* (3.3) in the range greater than 20 to 200, as applied to *foam* (3.7) and to associated equipment, systems and concentrates

**3.6
high-expansion**

with *expansion* (3.3) greater than 200, as applied to *foam* (3.7) and to associated equipment, systems and concentrates

**3.7
foam**

<firefighting> aggregate of air-filled bubbles formed from an aqueous solution of a suitable *foam concentrate* (3.8)

**3.8
foam concentrate**

liquid that, when mixed with water in the appropriate concentration, gives a *foam solution* (3.11)

**3.9
protein foam concentrate**

P
foam concentrate (3.8) derived from hydrolysed protein materials

**3.10
fluoroprotein foam concentrate**

FP
protein foam concentrate (3.9) with added fluorinated surface-active agents

**3.11
foam solution**

solution of *foam concentrate* (3.8) and water

**3.12
sediment**

insoluble particles in the *foam concentrate* (3.8)

3.13**spreading coefficient**

value calculated from the measured surface and interfacial tensions to indicate the ability of one liquid to spontaneously spread across the surface of another

3.14**temperature for use**

maximum and minimum temperature claimed by the manufacturer between which the *foam concentrate* (3.8) is ready for use

3.15**Class A foam concentrate**

foam concentrate (3.8) for use on *Class A fire* (3.16)

Note 1 to entry: *Protein foam concentrate* (3.9) and *fluoroprotein foam concentrate* (3.10) describe types of foam which can be used in Class A applications.

3.16**Class A fire**

fires involving solid materials, usually of an organic nature, in which combustion normally takes place with the formation of glowing embers

Note 1 to entry: See ISO 3941.

3.17**Class A fuel**

solid materials, usually of an organic nature (such as vegetation, wood, cloth, paper, rubber, and some plastics), in which combustion can occur at or below the surface of the material, with or without the formation of glowing embers

3.18**freezing point**

temperature at which the first ingredient of a mixture starts to solidify or freeze out

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4 Type and use of Class A foam concentrates**4.1 General**

Foam concentrates capable of providing positive fire testing results if tested in accordance with [Annex G](#) are considered Class A foam concentrates.

4.2 Use with sea water

If a Class 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. Consider increased corrosiveness on equipment used if foam solution is prepared using sea water.

5 Tolerance of the foam concentrate to freezing and thawing

Before and after temperature-conditioning in accordance with [A.2](#), the foam concentrate, if it is 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 conforming to [Annex B](#) shall be tested for conformance with the appropriate requirements given in other clauses and subclauses of this document 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 sampled in accordance with [A.1](#) shall be dispersible through a 180 µm sieve. The percentage volume of the 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 [B.2](#) shall be dispersible through a 180 µm sieve. The percentage volume of sediment shall be not more than 1,0 % when tested in accordance with [Annex C](#).

7 Determination of viscosity

7.1 Newtonian foam concentrates

The viscosity of the foam concentrate at the lowest temperature for use claimed by the manufacturer shall be determined in accordance with ISO 3104. If the viscosity is $> 200 \text{ mm}^2\text{s}^{-1}$, the container shall be marked: "This concentrate can require special proportioning equipment".

7.2 Pseudo-plastic foam concentrates

The viscosity of the foam concentrate shall be determined in accordance with [Annex D](#). If the viscosity at the lowest temperature for use is greater than or equal to 120 mPa·s at 375 s^{-1} , the container shall be marked: "This concentrate can require special proportioning equipment."

NOTE Pseudo-plastic foam concentrates are a particular class of non-Newtonian foam concentrate and have a viscosity that decreases with increasing shear rate at constant temperature.

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 8,5 at $(20 \pm 2) \text{ }^\circ\text{C}$.

8.2 Sensitivity to temperature

The difference in pH between before and after temperature conditioning shall not be greater than 1,0 pH units.

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 conditioning in accordance with [A.2](#) at the supplier's recommended concentration, shall be within $\pm 10 \%$ 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](#).

The value obtained after temperature conditioning shall not be less than 0,95 times or more than 1,05 times the value obtained before temperature conditioning.

10 Expansion and drainage of foam

10.1 Expansion

10.1.1 Limits

The difference between the expansion of the foam produced from the foam concentrate, before and after temperature conditioning in accordance with [A.2](#), with potable water and, if appropriate, with synthetic sea water in accordance with [F.4](#), and the characteristic value shall be 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](#).

10.2 Drainage

10.2.1 Limits

The difference between the drainage time of the foam produced from the foam concentrate, before and after temperature conditioning in accordance with [A.2](#), with potable water and, if appropriate, with synthetic sea water in accordance with [F.4](#), and the characteristic value shall be within $\pm 20\%$ of the characteristic value when tested in accordance with [Annex F](#).

11 Test fire performance

Class A foam concentrate shall extinguish a wood crib fire according to [G.1.1](#) and pass the test for extinguishment of deep-seated fires according to [G.1.2](#).

12 Corrosion

Where used in aircraft or other applications involving corrosion-sensitive technologies, it is recommended to conduct appropriate corrosion tests and provide the information to end users.

13 Toxicology and environmental information

Manufacturers of concentrates shall provide information about the toxicological and ecotoxicological impact of their product at its highest recommended concentration in accordance with [Annex H](#).

14 Marking, packaging and specification sheet

14.1 Marking

14.1.1 The following information shall be marked on the shipping container:

- a) designation (identifying name) of the concentrate and the words "Class A foam concentrate";
- b) recommended usage concentration for use (most commonly 1 %, 3 % or 6 %);

- c) any tendency of the foam concentrate to cause harmful physical effects, the methods required to avoid them and the first aid treatment if they occur;
- d) recommended storage temperature and temperature of use;
- e) if the concentrate conforms with [Clause 5](#), it shall be marked with the words “Not affected by freezing and thawing” or, if the foam concentrate does not conform with [Clause 5](#), the words “Do not freeze”;
- f) nominal quantity in the container;
- g) supplier’s name and address;
- h) batch number;
- i) the words “Not suitable for use with sea water” or “Suitable for use with sea water”, as appropriate.

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

14.1.2 Markings on shipping containers shall be permanent and legible.

14.1.3 Non-Newtonian concentrates should be appropriately identified.

14.1.4 Foam concentrates in accordance with ISO 7203-1 shall also be marked “low-expansion”.

14.1.5 Foam concentrates in accordance with ISO 7203-2 shall also be marked “medium-expansion” or “high-expansion” or both.

14.1.6 Foam concentrates in accordance with ISO 7203-3 shall also be marked “alcohol resistant”.

14.2 Packaging

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.

14.3 Specification sheet

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

14.3.2 If the foam concentrate is Newtonian and the viscosity at the lowest temperature for use is more than 200 mm²/s when measured in accordance with ISO 3104, it shall be marked with the words “This concentrate can require special proportioning equipment.”.

14.3.3 If the foam concentrate is pseudo-plastic and the viscosity at the lowest temperature for use is greater than or equal to 120 mPa·s at 375 s⁻¹, it shall be marked with the words “Pseudo-plastic foam concentrate. This concentrate can require special proportioning equipment.”.

14.3.4 Non-Newtonian concentrates should be appropriately identified.