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Gasila - Penila - 4. del: Specifikacija za penila za težko peno za površinsko uporabo pri tekočinah, topnih v vodi

Fire extinguishing media - Foam concentrates - Part 4: Specification for low expansion foam concentrates for surface application to water-miscible liquids

Feuerlöschmittel - Schaummittel - Teil 4: Anforderungen an Schaummittel zur Erzeugung von Schwertschaum zum Aufgeben auf mit Wasser mischbare Flüssigkeiten

Agents extincteurs - Émulseurs - Partie 4 : Spécifications pour les émulseurs bas foisonnement destinés à une application à la surface de liquides ayant une affinité pour l'eau

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Fire extinguishing media - Foam concentrates - Part 4: Specification for low expansion foam concentrates for surface application to water-miscible liquids

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Schwerschaum zum Aufgeben auf mit Wasser
mischbare Flüssigkeiten

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 191.

If this draft becomes a European Standard, 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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

European foreword.....	5
Introduction.....	6
1 Scope	7
2 Normative references	7
3 Terms and definitions.....	8
4 Sediment in the foam concentrate.....	10
4.1 Sediment before ageing.....	10
4.2 Sediment after ageing	10
5 Freezing point.....	10
6 Viscosity of the foam concentrate.....	10
6.1 Test temperatures.....	10
6.2 Newtonian foam concentrates	10
6.3 Pseudo-plastic foam concentrates	10
7 pH of the foam concentrate.....	10
8 Surface tension of the foam solution	10
9 Stability/separation test of foam concentrate.....	11
10 Determination of expansion and drainage time	11
10.1 Before temperature conditioning.....	11
10.2 After temperature conditioning.....	11
11 Test fire performance	11
12 Occupation health and ecotoxicological information	12
13 Annual foam quality check.....	12
13.1 General	12
13.2 Principles.....	13
13.3 Types of analysis.....	13
14 Expansion performance comparison test.....	14
15 Technical information sheet.....	14
16 Container marking	14
Annex A (informative) Grades of foam concentrate	16
Annex B (normative) Sampling of foam concentrates	17
Annex C (normative) Determination of percentage sediment.....	18
C.1 Sampling	18
C.2 Apparatus	18
C.3 Procedure	18
Annex D (normative) Freezing point determination.....	19
D.1 General	19
D.2 Apparatus	19
D.3 Procedure	19
D.4 Example of a temperature against time curve for evaluation.....	20
Annex E (normative) Determination of viscosity for pseudo-plastic foam concentrates.....	21

E.1	Pseudo-plastic foam concentrates	21
E.2	Viscosity determination.....	21
Annex F (normative)	Temperature conditioning of foam concentrates	23
F.1	General	23
F.2	Low temperature conditioning	23
F.3	High-temperature conditioning.....	23
F.4	Division into top and bottom half-samples.....	24
Annex G (normative)	Determination of surface tension.....	26
G.1	Solution of foam concentrate	26
G.2	Procedure — Surface tension.....	26
Annex H (normative)	Stability/Separation test of foam concentrate	27
H.1	General	27
H.2	Apparatus.....	27
H.3	Procedure.....	27
Annex I (normative)	Determination of expansion and drainage time	28
I.1	Apparatus.....	28
I.2	Temperature conditions.....	28
I.3	Procedure.....	28
I.4	Simulated fresh and sea water	29
Annex J (normative)	Determination of test fire performance	34
J.1	General	34
J.2	General conditions.....	34
J.3	Fire test	36
Annex K (normative)	Occupational health and ecotoxicological testing.....	38
Annex L (informative)	Description of a radiation measurement method.....	39
L.1	Evaluation	39
L.2	General arrangement of test	39
L.3	Technical data for radiometers.....	40
L.4	Procedure.....	41
Annex M (informative)	Small-scale fire test.....	43
M.1	Apparatus.....	43
M.2	Test procedure	44
Annex N (informative)	Annual foam quality check.....	53
N.1	Visual examination	53
N.2	Density.....	53
N.3	pH-value.....	53
N.4	Sediment.....	55
N.5	Viscosity	55

prEN 1568-4:2025 (E)

N.6	Refractive index	55
N.7	25 %-drainage time and expansion ratio	56
N.8	Resistance to isopropanol	56
Annex O (normative)	Determination of foam expansion sensitivity.....	57
0.1	General	57
0.2	General conditions	57
0.3	Apparatus	58
0.4	Test procedure	59
0.5	Test report	59
0.6	Figures	60
Annex P (informative)	Example of a technical information sheet.....	69
Annex Q (informative)	A-Deviations	72
Bibliography		74

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European foreword

This document (prEN 1568-4:2025) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1568-4:2018.

This document includes the following significant technical changes with respect to EN 1568-4:2018:

- Determination of solid deposits for synthetic foams and protein foams clarified;
- Optional annual foam quality check introduced;
- Temperature and wind speed measurements for performance fire test clarified;
- Stainless steel as optional material for small-scale fire test fire tray introduced;
- Foam expansion performance test introduced;
- Some test procedures clarified.

This document is Part 4 of EN 1568 which has the general title *Fire extinguishing media — Foam concentrates*. The other parts are:

- *Part 1: Specification for medium expansion foam concentrates for surface application to water-immiscible liquids;*
- *Part 2: Specification for high expansion foam concentrates for surface application to water-immiscible liquids;*
- *Part 3: Specification for low expansion foam concentrates for surface application to water-immiscible liquids.*

This European Standard is one of a series of standards specifying requirements for fire extinguishing media in common use. This series includes the following standards:

- EN ISO 5923, Equipment for fire protection and fire fighting — Fire extinguishing media — Carbon dioxide (*ISO 5923*);
- EN 27201-1, Fire protection — Fire extinguishing media — Halogenated hydrocarbons — Part 1: Specifications for halon 1211 and halon 1301 (*ISO 7201-1*);
- EN 27201-2, Fire protection — Fire extinguishing media — Halogenated hydrocarbons — Part 2: Code of practice for safe handling and transfer procedures (*ISO 7201-2*);
- EN 615, *Fire protection — Fire extinguishing media — Specifications for powders (other than class D powders).*

prEN 1568-4:2025 (E)

Introduction

As fire-fighting foams are chemical agents or chemical preparations, Commission Directive 2006/60/CE and Regulations (EC) No 1272/2008 (CLP) and No 1907/2006 (REACH) apply and need to be taken into account.

Classes of fire are defined in EN 2 as follows:

- Class A: fires involving solid materials, usually of an organic nature, in which combustion normally takes place with the formation of glowing embers;
- Class B: fires involving liquids or liquefiable solids;
- Class C: fires involving gases;
- Class D: fires involving metals;
- Class F: fires involving cooking media (vegetable or animal oils and fats) in cooking appliances.

Fire-fighting foams are widely used to control and extinguish Class B fires and to inhibit re-ignition. These foams can also be used for prevention of ignition of flammable liquids and, in certain conditions, to extinguish Class A fires.

Foams can be used in combination with other extinguishing media, particularly gaseous media and powders, which are the subject of other European Standards (see the European foreword).

These specifications have been designed to ensure that fire extinguishing media have the minimum useful fire fighting capability. The user should ensure that the foam concentrates are used accurately at the concentration recommended by the manufacturer. Fire performances indicated by this standard cannot replicate practical fire situations.

Foam concentrates of different types and manufacture should not be mixed.

Some combinations of extinguishing powder and foam can lead to unacceptable loss of efficiency, caused by unfavourable interaction of the chosen media when applied simultaneously or successively to the fire.

It is extremely important that the foam concentrate after dilution with water to the recommended concentration does not in normal usage present a significant toxic hazard to life in relation to the environment. Commission Directive 2006/60/CE and Regulations (EC) No 1272/2008 (CLP) and No 1907/2006 (REACH) apply when considering the testing of ecotoxicological properties and safety in the work environment.

A special quality characteristic is the type test conducted by an independent testing laboratory accredited to EN ISO/IEC 17025.

1 Scope

This document specifies requirements for chemical and physical properties, and minimum performance requirements of low expansion foams suitable for surface application to water-miscible liquids. Requirements are also specified for marking.

IMPORTANT — The fire performance is tested using acetone and isopropanol as the fuel, which also forms the basis for the performance classification. However, there are a large number of water-miscible liquids which have more or less different properties to acetone and isopropanol. It has been shown by tests using other fuels that the performance of various foams can differ considerably. Examples of such fuel is Methyl Ethyl Ketone (MEK). It is therefore essential that the user checks for any unfavourable or unacceptable loss of efficiency when the foam is used against fires in any other water-miscible fuels than acetone and isopropanol respectively. The fire test conditions and procedure given in Clause J.2 can be used in order to achieve results comparative with acetone and isopropanol respectively and related requirements.

It is also essential for the user to note that other fuel depths and methods of application than those specified in Clause J.2 can cause considerable loss of efficiency and these matters should be carefully considered by the user when assessing the suitability for particular applications.

WARNING — Any type approval according to this standard is invalidated by any change in composition of the approved product.

NOTE Some concentrates conforming to this document can also conform to other parts and therefore can also be suitable for application as medium and/or high expansion foams.

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.

EN 13565 (all parts), *Fixed firefighting systems — Foam systems*

EN ISO 2811-1, *Paints and varnishes - Determination of density - Part 1: Pycnometer method (ISO 2811-1)*

EN ISO 3104, *Petroleum products - Transparent and opaque liquids - Determination of kinematic viscosity and calculation of dynamic viscosity (ISO 3104)*

EN ISO 3219-2:2021, *Rheology - Part 2: General principles of rotational and oscillatory rheometry (ISO 3219-2:2021)*

EN ISO 3675, *Crude petroleum and liquid petroleum products - Laboratory determination of density - Hydrometer method (ISO 3675)*

EN ISO 11348-2, *Water quality - Determination of the inhibitory effect of water samples on the light emission of *Vibrio fischeri* (Luminescent bacteria test) - Part 2: Method using liquid-dried bacteria (ISO 11348-2)*

EN ISO 23753-1, *Soil quality - Determination of dehydrogenases activity in soils - Part 1: Method using triphenyltetrazolium chloride (TTC) (ISO 23753-1:2019)*

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

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

prEN 1568-4:2025 (E)

OECD 201, *Test No. 201: Freshwater Alga and Cyanobacteria, Growth Inhibition Test*

OECD 202, *Test No. 202: Daphnia sp. Acute Immobilisation Test*

OECD 203, *Test No. 203: Fish, Acute Toxicity Test*

OECD 301, *Test No. 301: Ready Biodegradability*

OECD 404, *Test No. 404: Acute Dermal Irritation/Corrosion*

OECD 405, *Test No. 405: Acute Eye Irritation/Corrosion*

OECD 420, *Test No. 420: Acute Oral Toxicity – Fixed Dose Procedure*

3 Terms and definitions

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

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

— IEC Electropedia: available at <https://www.electropedia.org/>

— ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1**25 %/50 % drainage time**

time taken for 25 %/50 % of the volume of the original foam solution to drain out of the generated foam

3.2**expansion (E)****expansion value****expansion ratio**

ratio of the volume of foam to the volume of the foam solution from which it was made

3.3**low expansion foam**

foam which has an expansion ratio less than 20

3.4**medium expansion foam**

foam which has an expansion ratio greater than or equal to 20 but less than 200

3.5**high expansion foam**

foam which has an expansion ratio greater than or equal to 200

3.6**fire-fighting foam**

aggregate of air-filled bubbles formed from a foam solution used for fire fighting

3.7**foam concentrate**

liquid which is diluted with water to produce foam solution

Note 1 to entry: Annex A gives information on grades of foam concentrate.

3.8**foam solution**

homogeneous mixture of foam concentrate and water in the proportions as specified by the foam concentrate manufacturer

3.9**premix**

foam solution prepared in a batch process by introducing a measured amount of foam concentrate into a given amount of water in a storage

3.10**sediment**

insoluble particles in the foam concentrate

3.11**Newtonian foam concentrates**

foam concentrates which have a viscosity which is independent of the shear rate

3.12**pseudo-plastic foam concentrates**

foam concentrates which have a viscosity which decreases with increasing shear rate

3.13**surface tension**

tension within the interface between a liquid and air

3.14**freezing point**

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

3.15**designation****identifying name**

name that corresponds to a chemical formulation and a specific production process

Note 1 to entry: The designation guarantees consistency of the characteristics, performance and conditions of use of the foam concentrate.

3.16**demineralized water**

water conforming to EN ISO 3696 (Grade 3), or having a surface tension greater than $70 \text{ mN}\cdot\text{m}^{-1}$ and a conductivity of $\leq 5 \mu\text{S}\cdot\text{cm}^{-1}$

Note 1 to entry: Surface tension tested in accordance with Clause G.2.

3.17**qualified personnel**

designated individual, suitably trained, competent through knowledge and practical experience and with the necessary instruction to enable the tests and examinations to be carried out

3.17**gentle application**

application (of foam from the test nozzle) indirectly to the surface of the fuel from a backboard

prEN 1568-4:2025 (E)

Note 1 to entry: This definition of gentle application relates to the fire test procedures used in EN 1568-3 and EN 1568-4. In practice fire-fighting systems foam can also be applied gently by fixed foam pourers or by indirect application via a tank wall or other surface.

4 Sediment in the foam concentrate**4.1 Sediment before ageing**

Any sediment in the foam concentrate sampled in accordance with Annex B, but not aged in accordance with Clause C.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.

4.2 Sediment after ageing

Any sediment in the foam concentrate sampled in accordance with Annex B, and aged in accordance with Clause 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.

5 Freezing point

The freezing point of the foam concentrate sampled in accordance with Annex B shall be determined in accordance with Annex D.

6 Viscosity of the foam concentrate**6.1 Test temperatures**

The viscosity of the foam concentrate shall be measured from 20 °C up to and including the lowest temperature for use claimed by the manufacturer in steps of 10 °C. Use a fresh sample for each temperature.

6.2 Newtonian foam concentrates

The viscosity of the foam concentrate shall be determined in accordance with EN ISO 3104. If the viscosity is $> 200 \text{ mm}^2 \text{ s}^{-1}$, the container shall be marked in accordance with Clause 14, item j).

6.3 Pseudo-plastic foam concentrates

The viscosity of the foam concentrate shall be determined in accordance with Annex E. 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 in accordance with Clause 14, item k).

7 pH of the foam concentrate

The pH of the foam concentrate sampled in accordance with Annex B shall be not less than 6,0 and not more than 9,5 at $(20 \pm 1) \text{ °C}$.

8 Surface tension of the foam solution

The surface tension (determined in accordance with Clause G.2) of the foam solutions prepared using top and bottom half-samples (see Clause F.4) of the foam concentrate sampled in accordance with Annex B and conditioned in accordance with Annex F shall be not less than 0,95 times and not more than 1,05 times the surface tension of the foam solution prepared using the sampled foam concentrate.

9 Stability/separation test of foam concentrate

The foam concentrate shall not separate, stratify or precipitate as indicated by two or more distinct layers when tested in accordance with Annex H.

The amount of solid deposits of the aged sample determined according to Annex C at 20 °C in synthetic foams shall not increase from the fresh sample.

The amount of solid deposits of the aged sample determined according to Annex C at 20 °C in protein foams shall not increase by more than 4 times the amount obtained from the fresh sample, and shall not exceed a volume fraction of 1 % in total.

10 Determination of expansion and drainage time

10.1 Before temperature conditioning

The foam produced from the foam solution prepared from the foam concentrate sampled in accordance with Annex B, at the supplier's recommended concentration with simulated fresh water in accordance with Clause I.4, shall be tested in accordance with Annex I and give an expansion according to 3.3. If appropriate, a further sample of the same concentration made with the simulated sea water in accordance with Clause I.4 shall also be tested.

10.2 After temperature conditioning

The foams produced from the solutions prepared with simulated fresh water by using top and bottom half-samples (see Clause F.4) of foam concentrate sampled in accordance with Annex B at the supplier's recommended concentration, when tested in accordance with Annex I, shall have the following:

- a) expansions which do not differ from each other or from the value obtained according to 10.1 using simulated fresh water (i.e. before temperature conditioning) by more than 20 % of the value obtained according to 10.1 using simulated fresh water; and
- b) 25 % drainage times which do not differ from each other or from the value obtained according to 10.1 using simulated fresh water (i.e. before temperature conditioning) by more than 20 % of the value obtained according to 10.1 using simulated fresh water.

If appropriate, the tests shall be repeated using top and bottom half-samples (see Clause F.4) of foam concentrate, sampled in accordance with Annex B at the supplier's recommended concentration, using foam solutions prepared with the simulated sea water in accordance with Clause I.4. These foam solutions shall have the following:

- c) expansions which do not differ from each other or from the value obtained according to 10.1 using the simulated sea water (i.e. before temperature conditioning) by more than 20 % of the value obtained according to 10.1 using the simulated sea water in accordance with Clause I.4; and
- d) 25 % drainage times which do not differ from each other or from the value obtained according to 10.1 using the simulated sea water (i.e. before temperature conditioning) by more than 20 % of the value obtained according to 10.1 using the simulated sea water in accordance with Clause I.4.

NOTE Expansion is dependent on the foam concentrate and the equipment used to make the foam.

11 Test fire performance

The foam produced from the foam solutions prepared using the foam concentrate sampled in accordance with Annex B at the supplier's recommended concentration with simulated fresh water in accordance

prEN 1568-4:2025 (E)

with Clause I.4, and if appropriate at the same concentration with the simulated sea water in accordance with Clause I.4, shall have an extinguishing performance class and burn-back resistance level as specified in Table 1 when tested in accordance with Clause J.2 and Clause J.3.

NOTE 1 The values obtained with sea water can differ from those obtained with simulated fresh water.

NOTE 2 Annex M describes a small-scale fire test which can be suitable for quality control purposes.

NOTE 3 The lack of homogeneity of the premix can influence the firefighting performance of the foam generated from it.

Table 1 — Extinguishing performance classes and burn-back resistance levels

Extinguishing performance class	25 % Burn-back resistance level	Extinction time not more than min	25 % Burn-back time not less than min
I	A	3	15
	B	3	10
	C	3	5
II	A	5	15
	B	5	10
	C	5	5

12 Occupation health and ecotoxicological information

The manufacturer shall provide information as specified in Annex K.

If the data for the ecotoxicological report was generated by a third party, this data may be added to the test report or may added as a reference. If the data for the ecotoxicological report was generated by mathematical means (or as a reference) it shall be added to the test report.

If the toxicological/ecotoxicological data were generated by application of mathematical methodologies in accordance with Annex K the corresponding report shall be added to the report confirming conformity with this document.

If the toxicological/ecotoxicological data were generated by an independent third party the data may be added to the report confirming conformity to this document either as a report or as a reference to the report-ID given by the third party.

13 Annual foam quality check

13.1 General

Firefighting foam concentrates are recommended to be checked annually for their quality, indicating their functionality. The test program described in 13.2 is considered to be a collection of analytical methods which in its entirety is suitable to detect degradation or a declining function of a foam concentrate.

The outcome of the annual foam quality check described in 13.2 is intended to be used to qualify or disqualify a foam concentrate for its further usability. Therefore, the quality of testing and evaluation of test data is a special quality characteristic of the body executing the foam quality check.