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Fire extinguishing media - Foam concentrates - Part 1: Specification for medium expansion foam concentrates for surface application to water-immiscible liquids

Feuerlöschmittel - Schaummittel - Teil 1: Anforderungen an Schaummittel zur Erzeugung von Mittelschaum zum Aufgeben auf nicht-polare Flüssigkeiten

Agents extincteurs - Emulseurs - Partie 1: Spécifications pour les émulseurs moyen foisonnement destinés a une application a la surface de liquides n'ayant pas d'affinité pour l'eau

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Fire extinguishing media - Foam concentrates - Part 1: Specification for medium expansion foam concentrates for surface application to water-immiscible liquids

Agents extincteurs - Emulseurs - Partie 1: Spécifications pour les émulseurs moyen foisonnement destinés à une application à la surface de liquides n'ayant pas d'affinité pour l'eau

Feuerlöschmittel - Schaummittel - Teil 1: Anforderungen an Schaummittel zur Erzeugung von Mittelschaum zum Aufgeben auf nicht-polare (mit Wasser nicht mischbare) Flüssigkeiten

This European Standard was approved by CEN on 5 January 2008.

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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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Foreword

This document (EN 1568-1:2008) 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of an identical text or by endorsement, at the latest by September 2008, and conflicting national standards shall be withdrawn at the latest by September 2008.

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 1568-1:2000.

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

EN 25923, Fire protection — Fire extinguishing media — Carbon dioxide (ISO 5923:1989)

EN 27201-1, Fire protection — Fire extinguishing media — Halogenated hydrocarbons — Part 1: Specifications for halon 1211 and halon 1301 (ISO 7201-1:1989)

EN 27201-2, Fire protection — Fire extinguishing media - Halogenated hydrocarbons — Part 2: Code of practice for safe handling and transfer procedures (ISO 7201-2:1991)

EN 615, Fire protection — Fire extinguishing media — Specification for powders (other than Class D powders)

This standard is Part 1 of EN 1568 which has the general title "*Fire extinguishing media - Foam concentrates*". The other parts are:

— 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

— Part 4: Specification for low expansion foam concentrates for surface application to water-miscible liquids.

As fire fighting foams are chemical agents or chemical preparations EC directives 1967/548/EEC, 1999/45/EEC, Regulation (EC) 1907/2006 (REACH) and 2006/60/EEC apply and should be taken into account.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

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 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 manufacturers should not be mixed.

It should be noted that 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 should not in normal usage present a significant toxic hazard to life in relation to the environment. The current versions of EC directives 67/548/EEC, 2006/60/EEC, 1999/45/EEC and Regulation (EC) 1907/2006 apply when considering the testing of ecotoxicological properties and safety in the work environment.

1 Scope

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

NOTE Some concentrates conforming to this part of EN 1568 can also conform to other parts and therefore can also be suitable for application as low and/or high expansion foams.

2 Normative references

The following referenced documents are indispensable for the application 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 ISO 3104, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity (ISO 3104:1994)*

EN ISO 3219, *Plastics - Polymers/resins in the liquid state or as emulsions or dispersions - Determination of viscosity using a rotational viscometer with defined shear rate (ISO 3219:1993)*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696:1987)*

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*

3 Terms and definitions

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

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
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 Annex A gives information on grades of foam concentrate.

3.8
foam solution
solution of foam concentrate in water

3.9
sediment
insoluble particles in the foam concentrate

3.10
spreading coefficient
value which indicates the ability of one liquid to spread spontaneously across the surface of another

NOTE The spreading coefficient indicates the possibility of film forming, but it does not measure its quality.

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
interfacial tension
tension within the interface between two immiscible liquids

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 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 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 Viscosity of the foam concentrate

5.1 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 EN ISO 3104. If the viscosity is >200 $mm^2 s^{-1}$, the container shall be marked in accordance with Clause 11 l).

5.2 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 in accordance with Clause 11 m).

6 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 ± 1) °C.

7 Surface tension of the foam solution

The surface tension (determined in accordance with F.2.1) of the foam solutions prepared using top and bottom half-samples (see E.4) of the foam concentrate sampled in accordance with Annex B and conditioned in accordance with Annex E 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.

8 Spreading coefficient of the foam solutions

NOTE The spreading coefficient indicates the possibility of film-forming, but it does not measure its quality. Certain properties of film-forming foams are not defined are note defined by this standard.

8.1 Before temperature conditioning

The foam solution prepared using the concentrate, if it is claimed by the supplier to be "aqueous film-forming", sampled in accordance with Annex B shall have a positive spreading coefficient over cyclohexane when tested in accordance with F.2.2.

8.2 After temperature conditioning

The foam solution prepared using top and bottom half-samples, see E.4, of the foam concentrate, if it is claimed by the supplier to be "aqueous film-forming", sampled in accordance with Annex B and conditioned in accordance with Annex E, shall have a positive spreading coefficient over cyclohexane when tested in accordance with F.2.2.

9 Expansion and drainage of foam

9.1 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 potable water shall be

tested in accordance with Annex G. If appropriate, a further sample of the same concentration made with simulated sea water in accordance with G.4 shall also be tested.

NOTE Expansion is dependent on the foam concentrate and the equipment used to make the foam. The test equipment of G.1 tends to give expansions higher than some other equipment so the expansion limit is above the 20 limit for medium expansion (see 3.4).

9.2 After temperature conditioning

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

a) expansions which do not differ from each other or from the value obtained in 9.1 using potable water (i.e. before temperature conditioning) by more than 20 % of the value obtained in 9.1 using potable water; and

b) 25 % drainage times which do not differ from each other or from the value obtained in 9.1 using potable water (i.e. before temperature conditioning) by more than 20 % of the value obtained in 9.1 using potable water.

If appropriate repeat the tests using top and bottom half-samples, see E.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 G.4. These foam solutions shall have the following:

c) expansions which do not differ from each other or from the value obtained in 9.1 using the simulated sea water (i.e. before temperature conditioning) by more than 20 % of the value obtained in 9.1 using the simulated sea water in accordance with G.4; and,

d) 25 % drainage times which do not differ from each other or from the value obtained in 9.1 using the simulated sea water (i.e. before temperature conditioning) by more than 20 % of the value obtained in 9.1 using the simulated sea water in accordance with G.4.

10 Test fire performance

The foam produced from foam solutions prepared using the foam concentrate sampled in accordance with Annex B at the supplier's recommended concentration with potable water, and if appropriate at the same concentration with the simulated sea water in accordance with G.4, shall have an extinction time not more than 120 s and a 1 % burn-back time not less than 30 s, when tested in accordance with H.1 and H.2.

NOTE The values obtained with sea water can differ from those obtained with potable water.

11 Container marking

Markings on shipping containers should be permanent and legible. The following information shall be marked on the packaging or transport container:

a) the designation (identifying name) of the concentrate;

b) the words "medium expansion fire-fighting foam concentrate" and the number and date of this European Standard (i.e. EN 1568-1:2008);

NOTE For medium expansion concentrates which also conform to other parts of EN 1568 additional markings may be used as given in those parts.

c) if the concentrate conforms to Clause 8 the words "aqueous film-forming";

d) recommended usage concentration (most commonly 1 %, 3 % or 6 %);

e) any tendency of the foam concentrate to cause harmful physiological effects, the methods needed to avoid them and the first aid treatment if they should occur;

f) recommended maximum storage temperature and lowest temperature for use;

g) if the concentrate does not conform to Clause 7, 8.2 and 9.2 after conditioning in accordance with E.2, the words "Do not store below 0 °C";

h) the nominal quantity in the container;

i) the supplier's name and address;

j) the batch number and the date of manufacture;

k) the words "Not suitable for use with sea water" or "Suitable for use with sea water" as appropriate;

l) if the foam concentrate is Newtonian and the viscosity at the lowest temperature for use is more than 200 $mm^2 s^{-1}$ when measured in accordance with EN ISO 3104 the words ‘’This concentrate can require special proportioning equipment”;

m) 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} the words “Pseudo-plastic foam concentrate. This concentrate can require special proportioning equipment";

n) the lowest extinguishing performance class and the lowest burn-back resistance level obtained during testing to each part of EN 1568 (if tested to more than one part) with all fuels in potable water and sea water.

Annex A
(informative)

Grades of foam concentrate

Foam concentrates are graded as follows:

a) protein foam concentrates (P): these are liquids derived from hydrolysed protein materials;

b) fluoroprotein foam concentrates (FP): these are protein concentrates with added fluorinated surface active agents;

c) synthetic foam concentrates (S): these are based upon mixtures of hydrocarbon surface-active agents and can contain fluorinated surface-active agents with additional stabilisers;

d) alcohol resistant foam concentrates (AR): these can be suitable for use on hydrocarbon fuels, and additionally are resistant to breakdown when applied to the surface of water-miscible liquid fuels. Some alcohol resistant foam concentrates can precipitate a polymeric membrane on the surface of alcohol;

e) aqueous film-forming foam concentrates (AFFF): these are generally based on mixtures of hydrocarbon surfactants and fluorinated surface active agents and have the ability to form an aqueous film on the surface of some hydrocarbon fuels;

f) film-forming fluoroprotein foam concentrates (FFFP): these are fluoroprotein foam concentrates which have the ability to form an aqueous film on the surface of some hydrocarbon fuels.