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Specification for wetting agents for application on Class A fires

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Foreword

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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~~document 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).

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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~~systems using foam and powder*.

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 wetting agents are widely used to control and extinguish Class A fires and for inhibiting reignition.

Wetting agents 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](#).

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

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Specification for wetting agents for application on Class A fires

1 Scope

This document specifies the essential properties and performance of liquid wetting agent concentrates used to make wetting agents for the extinction and inhibition of reignition of fires of Class A fuels.

This document specifies the minimum performance on certain test fires.

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

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, *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, *Rheology*~~

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ISO 3310-1, *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 7165, *Fire fighting — Portable fire extinguishers — Performance and construction*~~

3 Terms and definitions

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

ISO and IEC maintain ~~terminological~~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 *wetting agent* (3.6) *concentrate* (3.2) manufacturer for the chemical and physical properties and the performances of the *wetting agent solution* (3.9), and wetting agent concentrate

3.2

concentrate

wetting agent (3.6) liquid that, when mixed with water in the appropriate concentration, gives a wetting agent solution (3.9)

3.3

sediment

insoluble particles in the wetting agent (3.6) concentrate (3.2)

3.4

temperature for use

maximum and minimum temperature claimed by the manufacturer between which the wetting agent (3.6) concentrate (3.2) is ready for use

3.5

Class A fire

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

[SOURCE: Note 1 to entry: See ISO 3941:2007, Clause 2] for the classification of fires.

3.6

wetting agent

liquid added to water to produce a solution with a surface tension less than that of water alone, which is capable of readily spreading across and penetrating into Class A fuels (3.7)

Note: wetting 1 to entry: Wetting agents are not required to produce foam.

3.7

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

3.8

freezing point

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

3.9

wetting agent solution

solution of wetting agent (3.6) concentrate (3.2) and water

4 Type and use of wetting agent concentrates

4.1 General

Wetting agent concentrates shall be capable of providing positive fire testing results if tested in accordance with Annex F. See also Annex H. Annex F are considered wetting agent concentrates.

4.2 Use with sea water

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

NOTE Increased corrosiveness can occur on equipment used if a wetting agent solution is prepared using sea water.

5 Tolerance of the wetting agent concentrate to freezing and thawing

The wetting agent concentrate shall be preliminarily sampled and conditioned in accordance with Annex A.

Before and after temperature conditioning in accordance with Clause A.2~~Clause A.2.~~, the wetting agent 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~~Annex B.~~

Wetting agent concentrates in conformance with Annex B~~Annex B~~ shall be tested for conformance with the appropriate requirements given in other clauses and subclauses of this document (indicated by the term “conditioning” in their respective headlines) after freezing and thawing in accordance with A.2.1~~A.2.1.~~

6 Sediment in the wetting agent concentrate

6.1 Sediment before conditioning

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

6.2 Sediment after conditioning

Any sediment in the concentrate aged in accordance with Clause A.2~~Clause A.2~~ 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~~Annex C.~~

7 Determination of viscosity

7.1 Newtonian wetting agent concentrates

The viscosity of the wetting agent 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 wetting agent concentrates

The viscosity of the wetting agent concentrate shall be determined in accordance with Annex D~~Annex D.~~. If the viscosity at the lowest temperature for use is greater than or equal to $120 \text{ mPa}\cdot\text{s}$ at 375 s^{-1} , the container shall be marked: “This concentrate can require special proportioning equipment.”.

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

8 pH of the wetting agent concentrate

8.1 pH limits

The pH of the wetting agent concentrate, before and after conditioning in accordance with [Clause A.2](#)~~Clause A.2~~, shall be not less than 6,0 and not more than 8,5 at (20 ± 2) °C.

~~8.2 After conditioning~~

8.2 After conditioning

The difference in pH between before and after conditioning according to [Clause A.2](#)~~Clause A.2~~ shall not be greater than 1,0 pH units.

9 Surface tension of the wetting agent solution

9.1 Before conditioning

The surface tension of the wetting agent solution prepared from the concentrate, before conditioning in accordance with [Clause A.2](#)~~Clause A.2~~ at the supplier's recommended concentration, shall be within ± 10 % of the characteristic value when determined in accordance with [Annex E](#)~~Clause E.2~~.

9.2 After conditioning

9.2.1 After conditioning

The surface tension of the wetting agent solution prepared from the concentrate, after conditioning in accordance with [Clause A.2](#)~~Clause A.2~~ at the supplier's recommended concentration, shall be determined in accordance with [Annex E](#)~~Clause E.2~~.

The value obtained after conditioning according to [Clause A.2](#)~~Clause A.2~~ shall not be less than 0,95 times, or more than 1,05 times the value obtained before conditioning.

10 Test fire performance

Wetting agent solutions shall extinguish a wood crib fire according to [Clause F.2](#)~~Clause F.2~~ and pass the test for extinguishment of deep-seated fires according to [Clause F.3](#)~~Clause F.3~~.

11 Corrosion

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

12 Toxicology and environmental Information

Manufacturers of concentrates shall provide information about the toxicological and eco toxicological impact of their product at its highest recommended concentration following [Annex G](#)~~Annex G~~.

13 Marking, packaging and specification sheet

13.1 Marking

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

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

13.1.2 Markings on shipping containers shall be permanent and legible.

13.1.3 ~~It is recommended that non~~Non-Newtonian concentrates should be appropriately identified.

13.2 Packaging

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

13.3 Specification sheet

13.3.1 The manufacturer shall provide a list of the characteristic values.

13.3.2 If the wetting agent 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.” ~~shall be marked.~~

13.3.3 If the wetting agent 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 wetting agent concentrate. This concentrate can require special proportioning equipment.”.

NOTE Refer to ISO 7076-1 for additional details on proportioning equipment.