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Fixed firefighting systems - Foam systems - Part 2: Design, construction and maintenance

Ortsfeste Brandbekämpfungsanlagen - Schaumlöschanlagen - Teil 2: Planung, Einbau und Wartung

Installations fixes de lutte contre lincendie - Systèmes à émulseurs - Partie 2: Calcul, installation et maintenance

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European foreword

This document (EN 13565-2:2018+AC:2019) 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of an identical text or by endorsement, at the latest by October 2019, and conflicting national standards shall be withdrawn at the latest by October 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document includes Corrigendum 1 issued by CEN on 17 April 2019.

This document supersedes AC EN 13565-2:2018 AC.

This document includes the corrigendum 1 which corrects Table 9, lines 1 and 2 and the key table of Figure 2.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags AC AC.

EN 13565, *Fixed firefighting systems — Foam systems* consists of the following parts:

— *Part 1: Requirements and test methods for components*

— *Part 2: Design, construction and maintenance*

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

Introduction

Foam systems are designed to provide a homogeneous layer of bubbles, of aerated fire fighting foam concentrate and water, over the surface of flammable liquids (Class B) and/or combustible materials (Class A). The layer of bubbles will suppress the release of flammable vapours, exclude air, and cool the fuel and hot surfaces.

Applications for foam systems can be diverse so no one type of foam system can be prescribed. In addition, High Expansion Foam may be used to provide total flooding of enclosures with 3 dimensional hazards of either Class A and/or Class B fuels. Examples of the various types of foam system are set out in Table 1 below:

Table 1 — Typical uses of the various types of foam system

Hazard	Low expansion	Medium expansion	High expansion (indoors)
Flammable liquid storage tanks	Yes	No	No
Tank bunds/collecting areas	Yes	Yes	Yes + LNG/LPG
Process areas	Yes	Yes	Yes
Aircraft hangers	Yes	< 1 400 m² only	Yes
Fuel transfer areas	Yes	Yes	Yes
Plastic packaging and storage	Yes	No	Yes
Plastic recycling	Yes	No	No
Refuse handling and storage	Yes	No	No
Liquefied Natural Gas	No	No	Yes (and outdoors)
Tyre storage	Yes	No	Yes
Rolled paper	No	No	Yes
Marine jetties	Yes	Yes	No
Oil filled transformers and switchgear	Yes	No	Yes
Cable tunnels	No	No	Yes
LPG (Liquefied Petroleum Gas)	No	Yes	Yes (and outdoors)
Warehouses – Class A and B fuels	Yes	No	Yes

NOTE These examples are not prescriptive and do not preclude other uses, providing there is a fire engineering basis.

Foam systems reduce the environmental impact of fire by reducing fire effluent both into the atmosphere and onto the ground. This is achieved through a more efficient application of fire extinguishing agent onto the seat of fire. Compared to other extinguishing systems, the necessary application rate is significantly reduced by using foam systems. Lower fire water damages and a reduced application of contaminated fire water in the environment are also important advantages. Foam extinguishing systems give increased safety for the fire fighting personnel and neighbouring communities.

1 Scope

This document specifies the requirements and describes the methods for design, installation, testing and maintenance of low, medium, and high expansion foam fire extinguishing systems.

Foam systems may be used to suppress the release of toxic vapours but this application is outside the scope of this document.

This document provides guidance for the design of various foam systems available to persons with knowledge and experience in determining the selection of foam fire extinguishing systems which will be effective in protecting specific hazard configurations. For the application of this standard, a risk assessment by a qualified and experienced person should be performed for both new and existing systems, however the risk assessment is outside the scope of this document.

This document does not cover a risk analysis carried out by a competent person.

Nothing in this document is intended to restrict new technologies or alternative arrangements, provided that the level of foam system performance prescribed in this standard is not lowered, and supported by documented evidence/test reports.

All foam systems are generally unsuitable for the following:

— chemicals, such as cellulose nitrate, that release sufficient oxygen or other oxidizing agents which can sustain combustion;

— energized unenclosed electrical equipment;

— metals such as sodium, potassium and sodium-potassium alloys which are reactive to water;

— hazardous, water–reactive materials such as triethyl-aluminium and phosphorous pentoxide;

— combustible metals such as aluminium and magnesium.

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 54 (all parts), *Fire detection and fire alarm systems*

EN 1568 (all parts), *Fire extinguishing media — Foam concentrates*

EN 12094-1, *Fixed firefighting systems — Components for gas extinguishing systems — Part 1: Requirements and test methods for electrical automatic control and delay devices*

EN 12259-1, *Fixed firefighting systems — Components for sprinkler and water spray systems — Part 1: Sprinklers*

EN 12845:2015, *Fixed firefighting systems — Automatic sprinkler systems — Design, installation and maintenance*

prEN 13565-1:2016, *Fixed firefighting systems — Foam systems — Part 1: Requirements and test methods for components*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 13565-1:2016 and the following apply.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Definitions

3.1.1
mode of application
method for the transportation of the foam onto the surface to be protected

Note 1 to entry: 3.1.2, 3.1.3 and 3.1.4 are subdivisions of the mode of application.

3.1.2
semi-subsurface
system where foam is delivered under the surface of the fuel and directed by a floating hose onto the surface to be protected

3.1.3
subsurface
system where foam is delivered under the surface of the liquid

3.1.4
top pouring
system where foam is delivered onto the surface to be protected

3.1.5
application rate
calculated amount of foam solution in litres per square metre per minute

3.1.6
type of foam extinguishing systems
a fixed, semi-fixed or mobile foam extinguishing system

3.1.7
semi-fixed foam extinguishing system
system where extinguishing foam is delivered through a fixed installed pipework and stationery foam making components whilst the foam concentrate only, or both the foam concentrate and water, are supplied from mobile appliances

3.1.8
fixed foam extinguishing system
system where all components of the foam extinguishing system and the foam solution supply are permanently installed to provide protection of a facility

3.1.9
area of operation
minimum area for the design of the water and foam concentrate supplies

3.1.10
operation time
minimum time for the supply of the extinguishing system with water

3.1.11
fire-fighting foam
complex medium of air filled bubbles formed from a foam solution

3.1.12
aspirating component
component within which air and foam solution are mixed to make foam

3.1.13
branchpipe
component which projects foam in the form of a jet or spray

3.1.14
component
item or piece of equipment conforming to prEN 13565-1 and intended for use in a fixed foam fire extinguishing system

3.1.15
high back pressure foam generator
component which introduces air into the foam solution stream for delivery against a high back pressure, for example, as is found in tank sub-surface mode

3.1.16
high expansion foam
foam which has an expansion ratio greater than 200:1

3.1.17
foam generator
component which introduces air into the foam solution stream for delivery against a low back pressure, i.e. discharging against atmospheric pressure

3.1.18
low expansion foam
foam which has an expansion ratio not greater than 20:1

3.1.19
foam chamber
component that incorporates a vapour seal, a foam expansion chamber, and which delivers foam into a flammable or combustible liquid storage tank

Note 1 to entry: A foam generator can be connected to the foam chamber inlet.

3.1.20
medium expansion foam
foam which has an expansion ratio greater than 20:1 but not greater than 200:1

3.1.21
monitor
component consisting of a branchpipe and turret

3.1.22
non-aspirating
components which discharge a spray of foam solution so that mixing with air and formation of foam takes place outside the component

3.1.23
fixed foam pourer (foam discharge outlet)
component which discharges foam gently and indirectly onto the fuel surface

Note 1 to entry: Some pourers are designed to discharge the foam tangentially in order to create a circular motion, and thus promote foam distribution.

3.1.24
proportioning component
component which controls the mixing of foam concentrate into a water flow, at a predetermined ratio, to produce a foam solution

Note 1 to entry: Proportioning components are variously described as inline, bypass and round the pump inductors, injectors, eductors, proportioners, venturis, constant and variable flow valves, orifice plates, water powered foam pumps and displacement proportioners.

3.1.25
semi-subsurface hose unit
component which delivers foam below the surface of a flammable liquid so that it rises to the liquid surface within a flexible hose and spreads over the liquid surface

3.1.26
sprayer
open sprinkler, sprayer, or nozzle without integral air aspiration

3.1.27
sprinkler/sealed sprayer
nozzle with a thermally sensitive sealing device which opens to discharge foam solution or water for fire fighting

Note 1 to entry: See EN 12259-1.

3.1.28
foam water sprinkler/sprayer
aspirating nozzle with or without a thermal release element

3.1.29
vapour seal
frangible component designed to prevent tank contents vapours entering the foam pipework system while allowing foam to flow into the tank during system operation

3.1.30
working pressure
pressure at which the component is used in the system

3.1.31
pipework
pipes and connections including fittings and supports for the transportation of water, foam concentrate, foam solution and sometimes foam

3.1.32
foam extinguishing system
installation comprising components, devices, and pipework configured to produce and disperse low, medium or high expansion foam to extinguish fire

Note 1 to entry: A foam extinguishing system comprises foam/water proportioning components, foam concentrate tank, foam generating/discharge components, pipework, and the associated water supply. Foam extinguishing systems can be fixed, semi- fixed or mobile.

3.1.33
medium expansion foam extinguishing system
system producing medium expansion foam as firefighting agent

3.1.34
low expansion foam extinguishing system
system producing low expansion foam as firefighting agent

3.1.35
foam concentrate
liquid that is diluted with water to produce foam solution

3.1.36
foam solution
solution of foam concentrate in water

3.1.37
expansion ratio
ratio of the volume of foam to the volume of the foam solution

3.1.38
premixed solution
foam solution stored at nominal concentration

3.1.39
operating time
minimum time for the supply of the foam extinguishing system with foam concentrate

3.1.40
spill hazard
shallow depth of flammable liquid

Note 1 to entry: For the purpose of this standard a spill hazard is one where an ignited spill of limited quantity resulting in a fuel depth of 25 mm or less over the majority of the spill area although it is recognized that, due to ground topography or features such as drain sumps, the depth of fuel may be greater in places.

EXAMPLE An example of a spill hazard would be a fire resulting from the ignition of a flammable liquid spill at a road tanker loading facility.

3.1.41
fuel in depth hazard
significant depth of flammable liquid

Note 1 to entry: For the purpose of this standard a fuel in depth hazard is one where an ignited fuel may be of large quantity resulting in a fuel depth of 25 mm or more over the majority of the ignited area.