SLOVENSKI STANDARD
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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 l'incendie - Systèmes à émulseurs - Partie 2: Calcul, installation et maintenance

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Foreword

This document (EN 13565-2:2009) 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of an identical text or by endorsement, at the latest by November 2009, and conflicting national standards shall be withdrawn at the latest by November 2009.

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 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 United Kingdom.

Introduction

It has been assumed by the drafting of this European Standard, that the application of the contained requirements shall be given to qualified and experienced personnel only. It is considered to apply to new foam systems and so it is not considered to apply to existing foam systems.

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.

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.

Prior to the selection and design of foam systems the hazards should undergo a risk assessment; however this is outside the scope of this European Standard. Applications for foam systems can be diverse so no one type of foam system can be prescribed. This European Standard 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. The requirement for foam systems derives from risk assessment by those competent to carry out such assessments which are outside the scope of this European Standard. Nothing in this European Standard is intended to restrict new technologies or alternative arrangements, provided the level of safety prescribed by this European Standard is not lowered.

Typical uses 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 m^2 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 typical uses are not prescriptive and do not preclude other uses, providing there is a fire engineering basis.

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

The engineering of foam systems is deemed to utilise proportioners and discharge devices evaluated and tested in accordance with EN 13565-1 using foam concentrates complying with EN 1568.

Low and Medium Expansion Foam Systems are not suitable for fire extinguishment of cascading fuel or spray fires, however, they will/may be of value in the control of resultant spill fires.

All foam systems are generally unsuitable for the following:

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

— energised 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.

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 the fire. Such systems also provide increased safety for fire fighting personnel and neighbouring communities.

1 Scope

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

This European Standard 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.

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

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

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 54, *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 12845:2003, *Fixed firefighting systems — Automatic sprinkler systems — Design, installation and maintenance*

EN 13565-1:2003, *Fixed firefighting systems — Foam systems — Requirements and test methods for components*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13565-1:2003 and the following apply.

3.1
mode of application
method for the transportation of the foam onto the surface to be protected with the following subdivisions

3.2
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

3.3
subsurface
system where foam is delivered under the surface of the liquid

3.4
conventional (top pouring)
system where foam is delivered onto the surface to be protected

3.5
density/application rate
calculated amount of foam solution in litres per square metre per minute

3.6
type of foam extinguishing systems
subdivided into fixed, semi-fixed and mobile systems

3.7
mobile foam extinguishing system
system where all components are mobile (portable/transportable) and handled, positioned and directed by authorised personnel

3.8
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 by authorised personnel

3.9
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

3.10
area of operation
minimum area for the design of the water and foam concentrate supplies

3.11
operation time
minimum time for the supply of the extinguishing system with water

3.12
fire-fighting foam
complex medium of air filled bubbles formed from a foam solution

3.13
aspirating component
component within which air and foam solution are mixed to make foam

3.14
branchpipe
component which projects foam in the form of a jet or spray

3.15
component
item or piece of equipment conforming to EN 13565-1 and intended for use in a fixed foam fire extinguishing system

3.16
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

3.17
high expansion foam
foam which has an expansion ratio greater than 200:1

3.18
foam generator
component which introduces air into the foam solution stream for delivery against a low back pressure, i.e. discharging against atmospheric pressure

3.19
low expansion foam
foam which has an expansion ratio not greater than 20:1

3.20
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 A foam generator may be connected to the foam chamber inlet

3.21
medium expansion foam
foam which has an expansion ratio greater than 20:1 but not greater than 200:1

3.22
monitor
component consisting of a branchpipe and turret

3.23
non-aspirating
components which discharge a spray of foam solution so that mixing with air and formation of foam takes place outside the component

3.24
fixed foam pourer (foam discharge outlet)
component which discharges foam gently and indirectly onto the fuel surface

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

3.25
proportioning component
component which controls the mixing of foam concentrate into a water flow, at a predetermined ratio, to produce a foam solution

NOTE 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.

3.26
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

3.27
sprayer
open sprinkler, sprayer, or nozzle without integral air aspiration

3.28
sprinkler/sealed sprayer
nozzle with a thermally sensitive sealing device which opens to discharge foam solution or water for fire fighting. (see EN 12259-1)

3.29
foam water sprinkler/sprayer
aspirating nozzle with or without a thermal release element

3.30
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

3.31
working pressure
pressure at which the component is used in the system

3.32
pipework
pipes and connections including fittings and supports for the transportation of water, foam concentrate, foam solution and sometimes foam

3.33
foam extinguishing system
installation comprising components, devices, and pipework configured to produce and disperse low, medium or high expansion foam to extinguish fire

NOTE 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

3.34
medium expansion foam extinguishing system
system producing medium expansion foam as firefighting agent

3.35
low expansion foam extinguishing system
system producing low expansion foam as firefighting agent

3.36
foam concentrate
liquid that is diluted with water to produce foam solution

[EN 1568]

3.37
foam solution
solution of foam concentrate in water

[EN 1568]

3.38
expansion ratio
ratio of the volume of foam to the volume of the foam solution

3.39
premixed solution
foam solution stored at nominal concentration

3.40
operating time
minimum time for the supply of the foam extinguishing system with foam concentrate

3.41
spill hazard
depth of flammable liquid less than or equal to 25 mm

3.42
fuel in depth hazard
depth of flammable liquid greater than 25 mm

3.43
high expansion foam extinguishing system
system, producing high expansion foam as firefighting agent

3.44
maximum flow demand (Q_{max})
flow at the point of intersection of the pressure-flow demand characteristic of the foam system and the water supply pressure-flow characteristic at maximum water level in the suction tank

4 Foam extinguishing systems

4.1 General

4.1.1 General requirements

The component materials of foam extinguishing systems shall be selected in such a way that they are resistant to the substances they come into contact with. Details of the foam concentrate used shall be kept – these shall include type, brand, proportioning rate, manufacturing date, batch numbers and EN 1586 classification. These records shall be updated as stocks are used and replaced.

Foam extinguishing systems shall be able to effectively cover the area/volume to be protected with due consideration of:

— type of fuel;

— spreading characteristics of the foam;

— type of application;

— obstacles;

— foam destruction due to burning, drainage, mechanical breakdown and leakage;

— foam losses due to wind and thermal updrafts.

The covering of the surface to be protected with foam can be done with fixed, semi-fixed or mobile foam generators.

Where foam-extinguishing systems are used for the fire prevention by the creation of a foam layer over a flammable liquid surface, the foam layer shall be maintained in order to prevent or suppress the release of flammable vapours to atmosphere. Any breakdown or destruction of the foam should be replenished by further foam application.

4.1.2 Environmental considerations

Fires where foam application is used can be of sufficient magnitude to produce significant quantities of fire-water run-off, and airborne pollution, which may be detrimental to the environment. This run-off is likely to contain fuel, combustion products, contaminated water and foam solution. It should be contained/collected for analysis and disposal in accordance with national environmental regulations.

NOTE Foam systems and the protected objects should be flushed with fresh water after system operation to minimise potential risk of corrosion.

4.1.3 Planning

Foam systems should not be considered in isolation, but as part of risk management along with process controls and manual fire fighting resources.

Planning, installation, alteration and extension of foam systems shall only be carried out under the responsible supervision of an expert, competent in the engineering of foam fire extinguishing systems.

The proportioning of foam concentrate with water may be carried out in an equipment room (central proportioning) or in the vicinity of the hazard to be protected (decentralised proportioning). For central proportioning the foam solution is fed through pipework and distribution valves to the foam generators. For decentralized proportioning the foam concentrate is proportioned directly into the foam distribution pipework serving the hazard.

If pumping-in connections for the fire brigade are provided at fixed foam extinguishing systems, the water demand of the foam extinguishing system shall be determined and marked at the connection.

In case of semi-fixed installations the mobile water supply as well as the pump and proportioning performance shall be in accordance with the maximum required foam extinguishing system demand.

The pumping-in connections shall be marked with the type of foam, the proportioning rate (%), and the minimum pumping-in pressure. A check valve shall be fitted upstream of the foam extinguishing system to prevent withdrawal of water.

4.1.4 Documentation

The installer shall provide the user of the foam extinguishing system with at least with the following documentation:

- operating instructions;
- general lay-out drawings;
- hydraulic calculation;
- design data (proportioning ratio, water demand, foam concentrate supply);
- list of components;
- water/foam concentrate tank drawings;
- foam concentrate material safety data sheet;
- programme for inspection and maintenance with time intervals;
- certification of conformity by the installer, declaring the conformity with the requirements of this European Standard.