SLOVENSKI STANDARD

SIST EN 12416-1:2001

01-oktober-2001

Vgrajeni gasilni sistemi - Sistemi s praškom - 1. del: Zahteve in prekusne metode za sestavne dele

Fixed firefighting systems - Powder systems - Part 1: Requirements and test methods for components

Ortsfeste Brandbekämpfungsanlagen - Pulverlöschanlagen - Teil 1: Anforderungen und Prüfverfahren für Bauteile

Installations fixes de lutte contre l'incendie - Systèmes d'extinction a poudre - Partie 1: Exigences et méthodes d'essais des éléments constitutifs

Ta slovenski standard je istoveten z: **EN 12416-1:2001**

ICS:

13.220.10 Gašenje požara Fire-fighting

SIST EN 12416-1:2001 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12416-1

March 2001

ICS 13.220.20

English version

Fixed firefighting systems - Powder systems - Part 1: Requirements and test methods for components

Installations fixes de lutte contre l'incendie - Systèmes d'extinction à poudre - Partie 1: Exigences et méthodes d'essais des éléments constitutifs

Ortsfeste Brandbekämpfungsanlagen - Pulverlöschanlagen - Teil 1: Anforderungen und Prüfverfahren für Bauteile

This European Standard was approved by CEN on 18 January 2001.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 12416-1:2001 E

Contents

Foreword

This European Standard 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 2001, and conflicting national standards shall be withdrawn at the latest by December 2002.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

This European Standard has the general title "Fixed firefighting systems - Powder systems" and consists of the following two parts:

Part 1 : Requirements and test methods for components
Part 2 : Design, construction and maintenance

Annex A to annex M are normative annexes.

This European Standard is included in a series of European Standards planned to cover also:

a) gas extinguishing systems (EN 12094);
b) sprinkler systems (EN 12259 and EN 12845);
c) smoke control systems (EN 12101);
d) explosion protection systems (EN 26184);
e) foam systems (EN 13565);
f) hydrant and hose reel systems (EN 671-1);
g) semi-rigid hose systems (EN 671-2);
h) water spray systems.

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

Introduction

It has been assumed in the preparation of this standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

1 Scope

This European Standard specifies requirements and test methods for materials, construction and performance of components intended for use in powder firefighting systems complying with prEN 12416-2:2000.

The components covered are as follows:

- powder containers
- expellant gas container assemblies
- pressure regulators and gauges
- actuators
- main isolating valves and selector valves
- nozzles.

The components are suitable for powder firefighting systems for general use in buildings and other construction works. In areas with a risk of explosion, earthquake zones, extreme environmental conditions e.g. marine, offshore, mining or aircraft additional considerations apply.

This standard covers components for use in powder extinguishing systems complying with prEN 12416-2:2000. It does not cover, for example, pipes and fittings which are covered by more general standards for which requirements and recommendations are given in prEN 12416-2:2000. Nor does it cover fire detectors or electrical control and indicating equipment.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited in the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications, apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 2, *Classification of fires*

EN 286-1:1998, *Simple unfired pressure vessels designed to contain air or nitrogen - Part 1: Pressure vessels for general purposes*

EN 615, *Fire protection - Fire extinguishing media - Specifications for powders (other than class D powders)*

EN 849, *Transportable gas cylinders - Cylinder valves - Specification and type testing*

EN 1964-1, *Transportable gas cylinders - Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litre up to and including 150 litres - Part 1: Cylinders made of seamless steel with an R_m value of less than 1100MPa*

prEN 1964-2:1998, *Transportable gas cylinders - Specification for the design and construction of refillable transportable seamless steel gas cylinders from 0,5 litre up to and including 150 litres - Part 2: Tensile strength (Rm max.) $\geq$ 1100 N/mm^2*

EN 1964-3, *Transportable gas cylinders - Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litre up to and including 150 litres - Part 3: Cylinders made of seamless stainless steel with an R_m value of less than 1100MPa*

prEN 12094-4:1998, Fixed firefighting systems - Components for $C0_2$ systems - Part 4: Requirements and test methods for high pressure container valve assemblies and their actuators

EN 12094-5:2000, *Fixed firefighting systems - Components for gas extinguishing systems - Part 5: Requirements and test methods for high and low pressure selector valves and their actuators for CO_2 systems*

EN 12094-8, *Fixed firefighting systems - Components for gas extinguishing systems - Part 8: Requirements and test methods for flexible connectors for CO_2 systems*

EN 12094-13:2001, Fixed firefighting systems - Components for gas extinguishing systems - Part 13: Requirements and test methods for check valves and non-return valves

EN 60068-2-6:1995, Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:1995 + Corrigendum 1995)

EN 60529:1991, Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)

ISO/DIS 4126-1, *Safety devices for the protection against excessive pressure - Part 1: Safety valves (Revision of ISO 4126-1:1991)*

ISO/DIS 4126-2, *Safety devices for the protection against excessive pressure - Part 2: Bursting disc safety devices*

ISO 3864, *Safety colour and safety signs*

3 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply:

3.1
actuator
component which when receiving a signal operates another component

3.2
bursting disc
diaphragm designed to burst at a predetermined pressure difference

3.3
calculation zone
zone for which the design quantity of the extinguishing media required is calculated separately

3.4
diptube (of the powder container)
tube through which powder from the lower part of the container is transported into the piping

3.5
equipment fire
fire of three dimensional objects, also subject to leakage, dripping or splashing

3.6
expellant gas container
high pressure container to store the expellant gas

3.7
expellant gas container valve
valve which retains the expellant gas in the expellant gas container, and which releases it when actuated

3.8
fill ratio (of the expellant gas container)
mass of an expellant gas relative to the net capacity of the expellant gas container, expressed in kilograms per litre (kg/l)

3.9
flooding zone
zone comprising all calculation zones to be flooded simultaneously with the extinguishing media via one selector valve

3.10
local application system
system to protect separate objects

3.11
maximum working pressure
pressure (at a temperature of 50 °C) at which the system or the component can still work and may be operated

3.12
minimum release energy
energy which is needed for the operation of a component

3.13
minimum working pressure
pressure (at a temperature of - 20 °C) at which the system or the component can still be operated

3.14
non-return valve
component permitting flow only in one direction

3.15
nozzle
component to achieve determined performance characteristics and a uniform distribution into or at a protected zone

3.16
pilot container
power source for a pneumatic alarm device and for actuation of the expellant gas container

3.17
(extinguishing) powder
extinguishing medium composed of finely divided solid chemical products consisting of one or more principle components, which are combined with additives to improve its characteristics [EN 615]

NOTE 1 In North America and some other countries, the term "dry powder" is used to denote special metal fire extinguishing agents and the term "dry chemical extinguishing agent" is used to denote the extinguishing medium specified in this European Standard.

NOTE 2 When it is useful to indicate the class of fire for which a powder is designed, capital letters may be added before the term. The letters used in this European Standard are those defined in EN 2.

EXAMPLE BC powder is designed to extinguish class B (liquids or liquefied solids) and class C (gases) fires; ABC powder is designed to extinguish class A (solids which form glowing members), class B and class C fires.

3.18
protected zone
the entire number of flooding zones protected by one system

3.19
selector valve
component which opens or prevents the flow of extinguishing media into a flooding zone

3.20
surface fire
fire spreading across horizontal surfaces. A surface fire may be a fire involving flammable liquids, gases or solids, not subjected to smouldering

3.21
total flooding system
system to protect the entire contents of an enclosed space

3.22
working pressure
pressure at which the component is used in the system

3.23
working temperature range
temperature range at which the system or the component can still work and may be operated

4 General requirements for components

4.1 Working temperature range

The components shall have a working temperature range of - 20 °C to + 50 °C.

If CO_2 pilot containers or CO_2 expellant gas containers are used the working temperature range shall be 0 °C to 40 °C.

4.2 General test facilities

It shall be ensured that the function of all actuators can be tested without discharging the expellant gas. Depending on the type of the system test connectors for an external test cylinder shall be available.

4.3 Stress corrosion test

If copper alloy parts are used they shall be subjected to the stress corrosion test in annex J.

5 Powder container

5.1 Capacity

The volume shall be not more than 4000 l.

5.2 Design

The powder container shall be designed in accordance with EN 286-1 and shall be made of steel.

5.3 Maximum working pressure

The maximum working pressure shall not exceed 25 bar.

5.4 Colour

The powder containers shall be coloured red in accordance with ISO 3864.

5.5 Fittings

5.5.1 Powder filling opening

The powder filling opening of the container shall be not less than DN 100.

Sight-holes, handholes, headholes and manholes may be used for filling in accordance with EN 286-1, if they are located on the top of the powder container.

5.5.2 Drain connection

For inspection of the interior of the container and testing of the powder, a drain connection to empty the powder container shall be provided.

Drain connections shall be not less than:

- for V up to 1000 l : R 1/2 or R_p1/2 or G 1/2;
- for V above 1000 l : R 1 or R_p1 or G 1.

5.5.3 Pressure relief device

The powder container shall be fitted with a pressure relief device. The set pressure of the pressure relief device is never greater than the maximum working pressure, but after pressure relief has commenced the pressure can exceed the maximum working pressure by 10 % maximum. The gas flow rate through the pressure relief device shall be greater than the maximum rate of expellant gas entering into the powder container.

5.5.4 Connection for the expellant gas tube

The expellant gas tube shall be fitted to the powder container discharging the gas below the powder surface. The system shall be designed to prevent powder entering the expellant gas system.

5.5.5 Powder diptube

The powder container shall be fitted with a powder diptube.

The diptube shall be fixed with sufficient strength to resist damage during operation (filling, emptying of the container or during the discharge of powder).

The distance between diptube and the base of the container shall be such that the highest point of the inlet of the diptube is not more than twice the internal diameter of the diptube, see Figure 1:

$$h \leq 2\,d.$$

where:

h is the distance between diptube inlet and container base, in millimetres (mm)
d is the internal diameter of the diptube, in millimetres (mm)

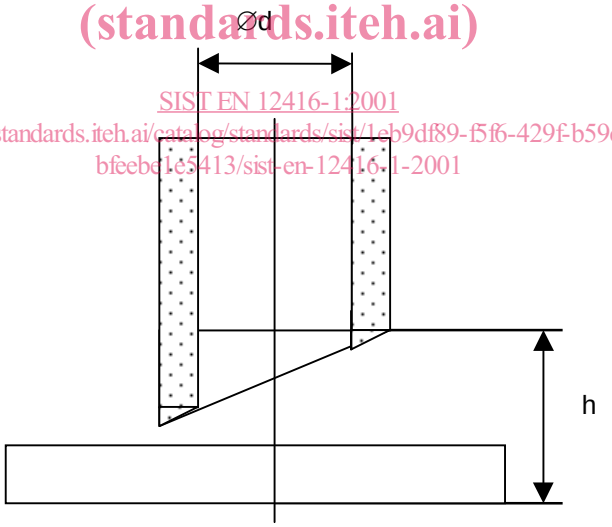

Figure 1 - Distance between diptube and base of container.

6 Expellant gas container assembly

6.1 Expellant gas containers

Expellant gas containers shall be constructed in accordance with EN 1964-1, prEN 1964-2:1998 and EN 1964-3.

To check the contents of the expellant gas container at any time, all individual containers shall be fitted with

a) a weighing device in case of pressure liquefied gases to weigh the contents;

b) in other cases with a working pressure gauge in accordance with Table 1 to indicate the internal pressure of the container.

6.2 Expellant gas valves

If the system has an automatic and a manual release, the expellant gas valve shall be in accordance with prEN 12094-4:1998 but without a diptube. If the system has a manual release only, an expellant gas container valve in accordance with EN 849 may be used, in this case CO_2 as expellant gas is not permitted and there is no need for any safety precautions, such as delay devices.

6.3 Actuators for expellant gas valves

Actuators for expellant gas valves shall comply with requirements for actuators in prEN 12094-4:1998.

6.4 Manifolds

Manifolds shall withstand a pressure of 1,5 times the maximum pressure of the gas used at a temperature of 50 °C when tested in accordance with annex B.

6.5 Flexible connectors and non-return valve

Expellant gas containers shall be fitted to the pipework or the manifold by flexible connectors in accordance with EN 12094-8.

When more than one container is used, each flexible connection to a manifold shall be fitted with a non-return valve in accordance with EN 12094-13:2001.

7 Pressure gauges

Pressure gauges shall be in accordance with Table 1.

Table 1 - Pressure gauges

Parameter	Pressure regulators		Expellant gas container
	A downstream	B upstream	
scale	0 to 1,5 times of the working pressure		
graduation	1 bar	5 bar	10 bar
accuracy	> 1,6%	> 2%	± 5%
diameter	>38 mm		

8 Pressure regulators

8.1 General

Powder containers with a capacity of more than 100 kg shall be fitted with a pressure regulator. A pressure regulator shall be fitted to build-up the necessary expellant gas pressure in the powder container and to maintain the working pressure of the powder system. The minimum setting of the pressure regulator shall be 10 % lower than the maximum working pressure. The pressure gauge shall be installed before (pressure gauge A) and after (pressure gauge B) the pressure regulator and in accordance with Table 1.

8.2 Material

All mechanical parts of the pressure regulator for the powder discharge valves and powder selector valves shall be made of metal or other materials which have at least the same performance characteristics.

Non-metallic materials and elastomers used in the pressure regulator shall not alter so that the operation is impaired before or after any of the tests. All materials shall be resistant to the media with which they come into contact.

If copper alloy is used the component shall be tested in accordance with annex J.

8.3 Corrosion resistance

The pressure regulator shall be tested in accordance with annex I.

8.4 Resistance to internal pressure

The regulator shall be tested in accordance with annex B.

8.5 Flow

The pressure regulator shall be designed so that the expellant gas flow ensures the required powder discharge in at least the minimum discharge time.

9 Actuators

9.1 General

9.1.1 Materials

All mechanical parts of the actuator for the powder discharge valves and powder selector valves shall be made of metal or other materials which have at least the same performance characteristics.

Non-metallic materials and elastomers used in the actuator shall not alter so that the operation is impaired before or after any of the tests. All materials shall be resistant to the media with which they come into contact.

If copper alloy is used the component shall be tested in accordance with annex J.

9.1.2 Vibration resistance

The valve assembly including accessories and actuator shall not operate or be damaged when tested in accordance with annex G.

9.1.3 Temperature resistance

The actuator shall be tested in accordance with annex E and F.

9.1.4 Operational reliability

Actuators shall operate together with the associated valve and shall be tested in accordance with annex H.

9.1.5 Corrosion resistance

Actuators shall operate together with the associated valve and shall be tested in accordance with annex I.

9.1.6 Operating force

Corresponding to an opening time of maximum 1 s the effective force of the actuator shall be at least two times and in the case of pyrotechnic actuators at least three times the force necessary to open the valve under the most severe conditions, when the component is tested as specified in annex C.

9.1.7 Electric switch and monitoring equipment

The degree of protection for enclosures of the switch and monitoring equipment as well as solenoid coils shall comply with class IP 54 according to EN 60529:1991.

9.2 Solenoid operated type actuators

9.2.1 The degree of protection for enclosures shall conform to a minimum classification of IP 54 in accordance with EN 60529:1991.

9.2.2 The solenoid operated type actuators shall be tested in accordance with annexes C, D, E, F, G, H and I.