SLOVENSKI STANDARD
SIST EN 12094-4:2004

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Vgrajeni gasilni sistemi – Sestavni deli sistemov za gašenje s plinom – 4. del: Zahteve in preskusne metode za ventile in prožilne naprave na visokotlačnih rezervoarjih

Fixed firefighting systems - Components for gas extinguishing systems - Part 4: Requirements and test methods for container valve assemblies and their actuators

Ortsfeste Brandbekämpfungsanlagen - Bauteile für Löschanlagen mit gasförmigen Löschmitteln - Teil 4: Anforderungen und Prüfverfahren für Behälterventilbaugruppen und zugehörige Auslöseeinrichtungen

Installations fixes de lutte contre l'incendie - Eléments constitutifs pour installations d'extinction a gaz - Partie 4: Exigences et méthodes d'essai pour les vannes de réservoir et leurs déclencheurs

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Fixed firefighting systems - Components for gas extinguishing systems - Part 4: Requirements and test methods for container valve assemblies and their actuators

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This European Standard was approved by CEN on 6 May 2004.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, 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

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Contents

Foreword

This document (EN 12094-4:2004) 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 January 2005, and conflicting national standards shall be withdrawn at the latest by July 2007.

This document 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 89/106/EEC.

For relationship with EU Directive, see informative annex ZA, which is an integral part of this document.

This part of EN 12094 is one of a number of European Standards prepared by CEN/TC 191 covering components for gas extinguishing systems.

They are included in a series of European Standards planned to cover:

— gas extinguishing systems (EN 12094)

— sprinkler systems (EN 12259)

— powder systems (EN 12416)

— explosion protection systems (EN 26184)

— foam systems (EN 13565)

— hose systems (EN 671)

— smoke and heat control systems (EN 12101)

— water spray systems (prEN 14816)

The following parts of this European Standard are planned:

— Part 1: Requirements and test methods for electrical automatic control and delay devices

— Part 2: Requirements and test methods for non-electrical automatic control and delay devices

— Part 3: Requirements and test methods for manual triggering and stop devices

— Part 4[1)]: Requirements and test methods for container valve assemblies and actuators

— Part 5: Requirements and test methods for high and low pressure selector valves and their actuators for CO2 systems

— Part 6: Requirements and test methods for non-electrical disable devices for CO_2 systems

— Part 7: Requirements and test methods for nozzles for CO_2 systems

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[1)] Under preparation.

— Part 8: Requirements and test methods for flexible connectors for CO_2 systems

— Part 9: Requirements and test methods for special fire detectors

— Part 10: Requirements and test methods for pressure gauges and pressure switches

— Part 11: Requirements and test methods for mechanical weighing devices

— Part 12: Requirements and test methods for pneumatic alarm devices

— Part 13: Requirements and test methods for check valves and non-return valves

— Part 16: Requirements and test methods for odorizing devices for CO_2 low pressure systems

— Part 17[1)]: Pipe hangers

— Part 20[1)]: Requirements and test methods for compatibility of components

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

[1)] Under preparation.

Introduction

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

All pressure data in this document are given as gauge pressures in bar, unless otherwise stated.

NOTE 1 bar = 10^5 N/m^2 = 100 kPa.

1 Scope

This document specifies requirements and describes test methods for container valve assemblies for CO_2-high-pressure-, Inert Gas- or Halocarbon Gas-fire extinguishing systems, which include a container valve, an actuator and possibly a diptube.

This document specifies requirements and describes test methods for features of the component relevant only for its use in fire extinguishing installations.

Diptubes not assembled to the container valves are not covered by this standard.

NOTE Valve assemblies can be equipped with additional components (e.g. gauges and switches).

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

EN 60529, *Degrees of protection provided by enclosures (IP-Codes) (IEC 60529:1989).*

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

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation (ISO 228-1:2000).*

EN ISO 4126-2, *Safety devices for protection against excessive pressure - Part 2: Bursting disc safety devices (ISO 4126-2:2003).*

EN ISO 9001:2000, *Quality management systems – Requirements (ISO 9001:2000).*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation.*

3 Terms and definitions

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

3.1
check valve
valve which is installed between container and manifold and which permits flow only in one direction

3.2
container valve
valve which retains the extinguishing medium in a container, releasing it when actuated

3.3
CO_2-high-pressure installation
fire extinguishing installation in which the CO_2 is stored at ambient temperature. For example, the pressure of the CO_2 in storage is p_{abs} = 58,6 bar at 21 °C

3.4
CO_2-low-pressure installation
fire extinguishing installation in which the CO_2 is stored at low temperature, normally –19 °C to –21 °C

3.5
diptube
pipe, connected to a container valve inlet, which allows the discharge of the liquid extinguishing medium out of a container with the valve at the top

3.6
fill ratio
mass of extinguishing medium related to the net capacity of a container, expressed as kilograms per litre

3.7
Halocarbon Gas
extinguishing agent which contains as primary components one or more organic compounds containing one or more of the elements fluorine, chlorine, bromine or iodine

3.8
Halocarbon Gas installation
fire extinguishing installation in which the Halocarbon Gas is stored at ambient temperature

3.9
Inert Gas
non liquefied gas or mixture of gases which extinguishes the fire mainly by reducing the oxygen-concentration in the protected zone, e.g. Argon, Nitrogen or CO_2 or mixtures of these gases

3.10
Inert Gas installation
fire extinguishing installation in which the Inert Gas is stored at ambient temperature

3.11
resistance coefficient
value for the calculation of the pressure drop in a component under flow conditions

3.12
type 1 valve
valve without pressure relief device

3.13
type 2 valve
valve with pressure relief device relieving other than into the valve discharge outlet

3.14
type 3 valve
valve with pressure relief device relieving into the valve discharge outlet

WARNING — Type 3 valves permit release of extinguishing media into the protected zone when pressure relief occurs. As this takes place without prior alarms a danger to personnel within the protected zone may arise.

3.15
working pressure
pressure at which the component is used in the system

4 Requirements

4.1 Compliance

The test sample shall comply with the technical description (drawings, parts list, description of functions, operating and installation instructions) when checked in accordance with 5.3.

4.2 General design

4.2.1 The valve body and its internal parts and mechanical parts of the actuator except seals shall be made of metal. Metal parts of the component shall be made of corrosion resistant materials, e.g. stainless steel, copper, copper alloy or corrosion-protected steel (e.g. galvanized steel).

The operation of the valve and actuator shall not be adversely affected during the tests, except the strength test.

NOTE prEN 12094-20 requires that pressure gauges and pressure switches are able to be checked separately.

4.2.2 Container valve assemblies shall be specified by the manufacturer for use at pressures at least corresponding to the working pressure as given in Table 1, which is taken as the basis for the tests.

Table 1 — Working pressure

working pressure in bar

Component	CO_2-high-pressure component	Inert Gas component	Halocarbon Gas component
Container valve	140	see [a]	see [a]
Pneumatic actuator	As specified by the manufacturer		

[a] This value is given as the developed pressure in the container at 50 °C, or at the maximum service temperature recommended by the manufacturer, whichever is the higher, with the highest fill ratio/superpressurization, where applicable.

NOTE Actuators may have a different working pressure than container valves.

4.2.3 The manufacturer shall specify the free cross-sectional area of the minimum flow way of the valve. In addition the manufacturer may specify the flow characteristics of the component either as an equivalent length or as a flow resistance coefficient.

4.2.4 The manufacturer shall specify the smallest container, the related minimum and maximum fill ratio and, if applicable, the related superpressurization the component shall be used for.

4.2.5 Where the component is assembled with a diptube, the diptube shall be made of metal, rigid or flexible, and shall be fixed to the container valve by mechanical means, e.g. a threaded connection. The geometry of the inlet of the diptube and the length of the diptube related to the container shall be specified

by the manufacturer. Torque and sealant shall be specified, if relevant. Rigid curved diptubes intended for use in containers not in the vertical position shall be provided with a means of alignment, via a mark on the valve, indicating the correct attitude for installation.

4.2.6 Where the component incorporates a pneumatic actuator, the manufacturer shall specify nominal, maximum and minimum triggering pressure and the minimum duration of the triggering pressure for the pressure supply.

4.2.7 Where the component incorporates a gravity powered actuator, the manufacturer shall specify the mass and the drop distance.

4.2.8 Where the component incorporates an electric powered actuator, the manufacturer shall specify the nominal, maximum and minimum voltage and current and the minimum duration of triggering signal. Electric powered actuators shall be specified for continuous duty.

4.2.9 Where the component incorporates a pyrotechnic powered actuator, the manufacturer shall specify the:

— minimum all-fire current with respect to the kind of electrical connection (serial or parallel) and its minimum duration and the form of the signal; and

— maximum monitoring current; and

— range of triggering voltage; and

— nominal resistance; and

— maximum storage time under specified storage conditions; and

— maximum life time under normal stand-by conditions (50 °C and 70 % relative humidity) or higher values specified by the manufacturer.

In addition data shall be provided by the manufacturer to show that:

a) the failure rate of the device in the energy transfer path does not exceed 1 in 10 000 at the recommended firing current; and

b) actuators will achieve the required power output after being subjected to a 30 day ageing test at a test temperature of (60 ± 2) °C; and

c) actuators will achieve the required power output at the end of their service life as recommended by the manufacturer.

4.2.10 Electric parts of the actuator shall be in accordance with at least class IP 54 of EN 60529 and pyrotechnic elements as per class IP X7.

4.2.11 Provision should be made for testing the actuator without actually releasing the extinguishing media.

NOTE If the component does not include such a test facility, prEN 12094-20 requires that the system includes a test facility which can be used to separately test each group of containers actuated at the same time, to verify that the necessary type and level of power is provided.

4.2.12 Where a pressure relief device is incorporated as part of a container valve, it shall be rated in accordance with European regulations or in their absence with national requirements valid in the place of use of the component. The integrity of the device, or in the case of a component family (see 7.1) the device with the highest rating, shall be maintained throughout the following tests:

— high temperature in accordance with 5.9.3;

— low temperature in accordance with 5.9.2;

— vibration in accordance with 5.13;

— corrosion in accordance with 5.11.

The operating pressure shall be verified in accordance with European regulations or in their absence with national requirements valid in the place of use of the component.

4.2.13 The manufacturer shall specify design details (e.g. threads, type of sealing) of all connections for accessories such as pressure gauges and pressure switches.

4.2.14 For Inert Gas or Halocarbon Gas components, the manufacturer may specify service temperatures below – 20 °C, and/or above + 50 °C.

4.2.15 Container valve assemblies shall have operating times (i.e. time between triggering of the actuator and fully open position of the valve) of 2 s maximum, when tested in accordance with 5.4.

4.2.16 Where the type 1 container valve incorporates a rupture disc for the activation of the valve by an actuator, the rupture disc shall be designed for at least 1,5 times the valve working pressure in accordance with Table 1.

4.2.17 Where the type 2 container valve incorporates a rupture disc for the activation of the valve by an actuator, the rupture disc shall be specified by the manufacturer in such way that the minimum rupture pressure (nominal value with minus tolerance) of the rupture disc is at least 5 %, subject to a minimum value of 10 bar, higher than the maximum rupture pressure (nominal value with plus tolerance) of the pressure relief device, or 1,5 times the valve working pressure in accordance with Table 1, whichever is the higher.

4.2.18 Where the type 3 container valve incorporates a common rupture disc for the activation of the valve by an actuator and pressure relief, the rupture disc shall be specified by the manufacturer for at least 1,15 times the valve working pressure in accordance with Table 1.

WARNING — Type 3 valves permit release of extinguishing media into the protected zone when pressure relief occurs. As this takes place without prior alarms a danger to personnel within the protected zone may arise.

4.3 Connection threads

Container and discharge outlet connection threads shall comply with European Standards or International Standards, e.g. ISO 7-1 and EN ISO 228-1.

4.4 Function and ambient temperature

4.4.1 Container valves shall remain in their fully open position at a maximum differential pressure between inlet and outlet of 3 bar. Container valve assemblies where the status of the valve depends on the differential pressure between inlet and outlet shall be tested in accordance with 5.4.3.

4.4.2 The container valve assemblies shall operate in an ambient temperature range encompassing - 20 °C to + 50 °C, or the service temperature range specified by the manufacturer, when tested as described in 5.9.2 and 5.9.3.

4.5 Resistance to internal pressure

The valve, except any rupture disc, shall not suffer any permanent deformation when tested as described in 5.5.2. Any rupture disc may deform but shall not rupture. After this, the valve shall not leak when tested as described in 5.5.4, i.e. no bubbles shall appear in one minute.

A pneumatic actuator shall not suffer any permanent deformation when tested as described in 5.5.3. The actuator shall not leak more than 20 ml (measured at atmospheric pressure) in (300^{+10}_{0}) s, when tested as described in 5.5.5.