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Components for fire-extinguishing systems using gas — Requirements and test methods — Container valve assemblies and their actuators; selector valves and their actuators; nozzles; flexible and rigid connectors; and check valves and non-return valves

Composants pour les systèmes d'extinction d'incendie utilisant des agents gazeux — Exigences et méthodes d'essai — Vannes de réservoir et leurs dispositifs d'asservissement; vannes de sélection et leurs dispositifs d'asservissement; diffuseurs; connecteurs flexibles et rigides; et vannes d'arrêt et clapets de retenue

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 16003 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 8, *Gaseous media and firefighting systems using gas*.

Introduction

This International Standard has been prepared by a specialist working group of ISO/TC 21/SC 8 as a companion document to ISO 14520 (all parts) and is compatible with corresponding documents prepared by CEN. It does not cover all components incorporated in gaseous fire extinguishing systems dealt with in ISO 14520 (all parts); rather, it is restricted to key components only, viz., container valve assemblies, flexible connectors, check valves and non-return valves, selector valves and associated actuators and discharge nozzles.

CO_2 system components are also covered by this International Standard (see ISO 6183).

NOTE The components requirements of this International Standard are also satisfied by the requirements of EN 12094 (all parts).

Components for fire-extinguishing systems using gas — Requirements and test methods — Container valve assemblies and their actuators; selector valves and their actuators; nozzles; flexible and rigid connectors; and check valves and non-return valves

1 Scope

This International Standard specifies requirements and describes test methods for the following components used in gaseous fire-extinguishing systems: container valve assemblies, which include container valve, actuator and, if applicable, a diptube; selector valves and their actuators; agent distribution nozzles; flexible connectors; and check and non-return valves.

Container valve assemblies are designed to control the extinguishant flow from the container to the distribution pipe work. They are normally in the closed position. The automatic control device triggers the actuator and the valve opens. Where applicable, the requirements contained in the test methods also apply to separate container valves.

The design of the nozzles influences the area coverage, the height limitations, the discharge rate and the flow rate.

This International Standard is applicable to check valves installed between container valve and manifold and non-return valves installed in pilot lines, except those valves that are tested in combination with non-electrical control devices. It is required that non-return and check valves allow the passage in the direction of flow and prevent flow in the reverse direction.

NOTE For the purpose of this International Standard, the pressure in megapascals (bars) means gauge pressure, unless otherwise indicated.

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.

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

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 7005 (all parts), *Metallic flanges*

ISO 14520-1:2006, *Gaseous fire-extinguishing systems — Physical properties and system design — Part 1: General requirements*

IEC 60068-2-6, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal)*

IEC 60730-2-14, *Automatic electrical controls for household and similar use — Part 2-14: Particular requirements for electric actuators*

ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*

3 Terms and definitions

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

3.1
actuator
component that causes a valve to operate

3.2
check valve
valve that is installed between container and manifold and that permits flow in only one direction

3.3
container valve
valve that retains the extinguishing agent in a container, releasing it when actuated

3.4
CO_2 high-pressure installation
fire-extinguishing installation in which the CO_2 is stored at ambient temperature

NOTE At 21 °C, the vapour pressure of CO_2 is 5,88 MPa (58,8 bar) absolute, or 5,88 MPa (57,8 bar) gauge.

3.5
CO_2 low-pressure installation
fire-extinguishing installation in which the CO_2 is stored at low temperature, normally –18 °C, at which the nominal pressure is 2,07 MPa (20,7 bar)

3.6
diptube
pipe connected to a container valve inlet that allows the discharge of a liquid extinguishing medium out of a vertical container with the valve at the top

3.7
distribution characteristics
limitations of enclosure dimensions within which a nozzle is approved for use

3.8
fill ratio
mass of extinguishing medium related to the net capacity of a container

NOTE The fill ratio is expressed in units of kilograms per litre.

3.9
filter
component to prevent blockage of nozzles or other operating components by foreign materials

3.10
flexible connector
link between two parts employed to compensate for installation spacing tolerances or to provide allowance for relative movement

3.10.1
type 1 flexible connector
flexible connector for connecting a container to a manifold

3.10.2
type 2 flexible connector
flexible connector for use in distribution pipe work downstream of the manifold

3.10.3
type 3 flexible connector
flexible connector for use in a pneumatic pilot line

3.10.4
type 4 flexible connector
flexible connector for use in distribution pipework downstream of the manifold/selector valve for the connection of moving parts, which allow for dimensional adjustments

3.10.5
type 5 rigid connector
rigid connector for connecting a container to a manifold

3.11
flow rate
mass flow of extinguishing agent per unit of time

3.12
functional reliability
ability to function under different working conditions

3.13
halocarbon gas
extinguishing agent that contains as primary components one or more organic compounds containing one or more of the agent's fluorine, chlorine, bromine or iodine

EXAMPLES Include, but are not limited to, halons, hydrofluorocarbons (HFCs), hydrochlorofluorocarbons (HCFCs), perfluorocarbons (PFCs) and fluoroketones (FKs).

3.14
halocarbon gas installation
fire-extinguishing installation in which the halocarbon gas is stored at ambient temperature

3.15
high-pressure container
container having a working pressure greater than 3,5 MPa (35 bar)

3.16
inert gas
non-liquefied gas or mixture of gases, such as argon, nitrogen, CO_2 or mixtures of these gases, that extinguishes fire mainly by reducing the oxygen-concentration in the protected space

3.17
inert gas installation
fire-extinguishing installation in which the inert gas is stored at ambient temperature

3.18
local application nozzle
nozzle from which the extinguishing agent is discharged onto the surface of a partially enclosed or open hazard

3.19
low-pressure container
container having a working pressure not greater than 3,5 MPa (35 bar)

NOTE For the purpose of this International Standard, the pressure in megapascals (bars) means gauge pressure, unless otherwise indicated.

3.20
manifold
pipe section connected to two or more extinguishing agent containers

3.21
non-return valve
component that permits flow in one direction only

NOTE This component is intended for installation in pilot lines.

3.22
nozzle
component to achieve a predetermined flow rate and a uniform distribution characteristic of the extinguishing agent into or onto a protected hazard

3.23
nozzle cover
component to prevent entry of foreign matter into a nozzle

3.24
pressure-relief device
device, such as a rupture disk, that protects an agent container against dangerous overpressure

3.25
pressure-relief valve
valve that protects a closed part of a pipe work against dangerous overpressure

3.26
resistance coefficient
factor used in calculating the pressure drop due to fluid flow through a component

3.27
selector valve
valve used to admit extinguishing agent into a section of a pipe system permitting the agent to flow to a specific hazard in a multi-hazard application

NOTE Also called a “directional” valve.

3.28 Valve

3.28.1
type 1 valve
valve without a pressure-relief device

3.28.2
type 2 valve
valve with a pressure-relief device relieving other than into the valve discharge outlet

3.28.3
type 3 valve
valve with a pressure-relief device relieving into the valve discharge outlet

3.29
working pressure
maximum pressure at which the component is used in the system

NOTE See Table 1.

4 Requirements

4.1 General design

4.1.1 Test samples

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

The body and internal parts of the component shall be made of materials of suitable strength and of corrosion resistance sufficient to satisfy the performance requirements of this International Standard.

4.1.1.2 All materials shall be chemically compatible with the agent(s) with which they come into contact.

4.1.1.3 The operation of a component shall not be adversely affected by ageing or environmental influences.

4.1.1.4 Non-metallic materials and elastomers shall not be altered, such that the operation of the component is impaired, after any of the tests or over the working life recommended by the manufacturer.

4.1.2 Maximum rated working pressure

Components subject to pressure, including flexible connectors of Type 1, shall be specified by the manufacturer for working pressure according to Table 1 or as otherwise specified by national standards.

Table 1 — Working pressure for components

Component	CO_2 high pressure component		CO_2 low pressure component		Inert gas component	Halocarbon gas component
	MPa	bar	MPa	bar		
Container valve [c], selector valve, non-return valve, check valve, type 1 flexible connector	14,0	140	[a]		[b]	[b]
Type 2 and type 4 flexible connectors	6,0	60	2,5	25	[a]	[a]
Type 5 connector	14,0	140	Not applicable		[a]	[a]
Pneumatic actuator [c], type 3 flexible connector	As specified by the manufacturer					

[a] To be determined.

[b] This value is given as the pressure developed in a container at its maximum fill ratio and developed pressure at 50 °C, where applicable.

[c] Actuators may have a different working pressure than container valves.

4.1.3 Selector valves

The operating positions of selector valves of the bimodal type (i.e. open or closed) shall be closed prior to actuation. The operating position of three-way fluid-flow directing ball valves, where used, shall be set to direct flow to the hazard to receive the fire-extinguishing agent prior to system actuation.

4.1.3.1 Valve operation

Selector valves shall be designed so that they change from the closed to the open position, only on operation of an actuator or by manual means. The design of three-way ball valves used to direct agent flow shall be such that the valve ball position occurs only on operation of an actuator or by manual means.

4.1.3.1.1 The closed position of a low-pressure valve shall not be maintained only by friction.

4.1.3.1.2 Selector valves shall be designed to operate over the approved operating pressure range and temperature range of the system.

NOTE A selector valve actuator can have a working pressure different from that of the selector valve it operates.

4.1.3.1.3 The open and closed position of a selector valve, or the operating position of a ball valve, shall be indicated at the valve and shall be defined by mechanical means at the valve actuator.

4.1.3.1.4 The pressure of the housing of a selector valve or a three-way flow-directing ball valve shall not exceed the working pressure in any operating condition.

NOTE Cold liquid CO_2 trapped in a closed, low-pressure CO_2 selector valve after flooding can cause pressures exceeding the working pressure when the temperature of the CO_2 and the valve increases.

4.1.4 Container-valve assemblies

4.1.4.1 Container

The system manufacturer shall specify the container sizes, the related minimum and maximum fill ratios or quantities and, for super-pressurized containers, the super-pressurization value at standard conditions.

4.1.4.2 Diptube

If the component incorporates a diptube, the diptube shall be made of materials of suitable strength, corrosion resistance and other performance requirements of this International Standard, and shall be fixed to the container valve by a threaded connection, using a suitable chemical sealant, or other mechanical means. Torque, sealant, geometry of the inlet of the diptube and the length of the diptube related to the container shall be specified by the manufacturer. Rigid, curved diptubes intended for use in containers not in the vertical position shall be provided with a means of alignment with a mark on the valve, indicating the correct attitude for installation.

Where cylinders intended for mounting in attitudes other than vertical are fitted with a curved rigid diptube, mounting instructions shall be affixed to the cylinder to indicate the correct attitude for installation.

4.1.4.3 Container-valve actuator

4.1.4.3.1 Pneumatic actuator

If the component incorporates a pneumatically powered actuator, the manufacturer shall specify nominal maximum and minimum values for the pressure supply.