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Fixed firefighting systems - Components for gas extinguishing systems - Part 8: Requirements and test methods for connectors

Ortsfeste Brandbekämpfungsanlagen - Bauteile für Löschanlagen mit gasförmigen Löschmitteln - Teil 8: Anforderungen und Prüfverfahren für Verbindungen

Installations fixes de lutte contre l'incendie - Éléments constitutifs des installations d'extinction à gaz - Partie 8 : Exigences et méthodes d'essai pour raccords

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Installations fixes de lutte contre l'incendie - Élements constitutifs des installations d'extinction à gaz - Partie 8 : Exigences et méthodes d'essai pour raccords

Ortsfeste Brandbekämpfungsanlagen - Bauteile für Löschanlagen mit gasförmigen Löschmitteln - Teil 8: Anforderungen und Prüfverfahren für Verbindungen

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European foreword

This document (prEN 12094-8:2016) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12094-8:2006.

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 Regulation (EU) 305/2011.

For relationship with Regulation (EU) 305/2011, see informative Annex ZA, which is an integral part of this document.

EN 12094, *Fixed firefighting systems - Components for gas extinguishing systems* consists of the following parts:

— *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: Requirements and test methods for container valve assemblies and their actuators*

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

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

— *Part 7: Requirements and test methods for nozzles*

— *Part 8: Requirements and test methods for connectors*

— *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*

NOTE This list includes standards that are in preparation and other standards may be added. For current status of published standards, refer to www.cen.eu.

1 Scope

This European Standard specifies product characteristics and describes test methods for flexible and rigid connectors intended to be used in gas extinguishing systems (i.e. CO_2, inert gas or halocarbon gas) installed in buildings as a part of a complete operating system.

This European Standard is applicable to the following connectors:

— Type 1 and Type 5: used between container valves and the manifold;

— Type 3: used in pneumatic pilot lines;

— Type 2 and Type 4: used in distribution pipework of fire extinguishing installations downstream of the manifold/selector valve.

2 Terms and definitions

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

2.1
CO_2-high-pressure installation
fire extinguishing installation in which the CO_2 is stored at ambient temperature

EXAMPLE The pressure of the CO_2 in storage is p_{abs} = 58,6 bar at 21 °C.

2.2
CO_2-low-pressure installation
fire extinguishing installation in which the CO_2 is stored at low temperature

Note 1 to entry: Normally −19 °C to −21 °C.

2.3
fill ratio
the mass of extinguishing medium related to the net capacity of a container

Note 1 to entry: Expressed as kilogram per litre (kg/l).

2.4
flexible connector
link between two parts which are subject to relative movement or subject to tolerances

2.5
halocarbon gas
extinguishing agent that contains as primary components one or more organic compounds containing one or more of the elements fluorine, chlorine, bromine or iodine

2.6
halocarbon gas installation
fire extinguishing installation in which the halocarbon gas is stored at ambient temperature

2.7
inert gas
non liquefied gas or mixture of gases which extinguish the fire mainly by reducing the oxygen-concentration in the protected zone

EXAMPLE Argon, nitrogen or mixtures of these gases with CO_2.

2.8
inert gas installation
fire extinguishing installation in which the inert gas is stored at ambient temperature

2.9
type 1 connector
flexible connector for connecting containers to a manifold

2.10
type 2 connector
flexible connector for use in distribution pipework downstream the manifold or selector valve for the connection of moving parts

2.11
type 3 connector
flexible connector for use in pneumatic pilot lines

2.12
type 4 connector
flexible connector for use in distribution pipework downstream the manifold or selector valve for the connection of non-moving parts which allow for dimensional adjustments

2.13
type 5 connector
rigid connector for connecting containers to a manifold

2.14
working pressure
pressure at which the component is used in the system

3 Product characteristics

3.1 Operational reliability and performance under fire condition

The manufacturer shall specify the type of the connector and the working pressure at least in accordance with Table 1.

Table 1 — Working pressure

Type	Working pressure in bar			
	CO_2-high-pressure component	**CO_2-low-pressure component**	**Inert gas component**	**Halocarbon gas component**
Type 1 connector	140	not applicable	see NOTE 1	see NOTE 1
Type 2 connector	60	25	as specified by the manufacturer	see NOTE 2
Type 3 connector	As specified by the manufacturer			
Type 4 connector	60	25	As specified by the manufacturer	see NOTE 2
Type 5 connector	140	not applicable	see NOTE 1	see NOTE 1

NOTE 1 This value is given as the developed pressure in the container at 50 °C with the highest fill ratio/ superpressurization, where applicable, or – for components specified for use in systems with reduced and controlled pressure only – as specified by the manufacturer.
NOTE 2 This value is given as the developed pressure in the container at 20 °C with the highest fill ratio/superpressurization, where applicable, or – for components specified for use in systems with reduced and controlled pressure only – as specified by the manufacturer.

Connectors shall not leak, and shall show no sign of damage which could impair proper function when pressurized up to 1,5 times the working pressure according to Table 1 when tested in accordance with 4.1.

The performance shall be declared as working pressure in bar.

3.2 Durability of Operational reliability and Performance under fire condition

3.2.1 Material specification (metal parts)

Metal parts of connectors shall be made of stainless steel, copper, copper alloy or corrosion-protected steel (e.g. galvanized) or other metal which has been proved to be equally suitable (regarding e.g. corrosion resistance, ductile strength).

The performance shall be declared as description of the metal.

3.2.2 Resistance to bursting (all types)

Connectors shall not burst when pressurized up to 3 times the working pressure according to Table 1 when tested in accordance with 4.5.2.

The performance shall be declared as "no bursting".

3.2.3 Resistance to pressure and heat (only type 2 and 4)

Type 2 and type 4 connectors shall show no sign of damage which could impair proper function when tested in accordance with 4.5.3 at the pressure and temperature conditions given in Table 2 and shall not leak when subsequently tested in accordance with 4.1.

Table 2 — Test pressure and temperature conditions for resistance of type 2 and type 4 connectors to pressure and heat

Test condition	Test pressure in bar	Test temperature in °C
CO_2-low pressure component	25	600
CO_2-high pressure component	60	600
Inert gas component	working pressure (see Table 1)	600
Halocarbon gas component	working pressure (see Table 1)	600

The performance shall be declared as "no damage and no leakage".

3.2.4 Resistance to heat and cold shock (only type 2 and 4 for CO_2)

Type 2 and type 4 connectors shall show no sign of damage which could impair proper function when tested in accordance with 4.5.4 and shall not leak when subsequently tested in accordance with 4.1.

The performance shall be declared as "no damage and no leakage".

3.2.5 Resistance to cold (only type 1, 2, 3 and 4)

Flexible connectors shall show no visible sign of damage when tested in accordance with 4.5.5.

The performance shall be declared as "no damage".

3.2.6 Resistance of type 2 connectors to flexing (only type 2)

Type 2 connectors shall not leak when tested in accordance with 4.1 after being tested in accordance with 4.5.6.

The performance shall be declared as “no leakage”.

4 Testing, assessment and sampling methods

4.1 Conditions

The components shall be assembled for test according to the manufacturer instructions. The tests shall be carried out at a temperature of (25 ± 10) °C, except when otherwise specified for a particular test.

The tolerance for all test parameters is ± 5 %, unless otherwise stated.

4.2 Samples

Test samples shall be submit for tests as follows: three samples for type 1, type 3 and type 5 connectors, six samples for type 2 and five samples for type 4 connectors. One of these samples is needed for reference.

If for type 2 or type 4 connectors the same materials and parts are used to provide a range of connectors, use six samples of 350 mm to 1 000 mm long. The sequence of tests is shown in Table 3 and is given by the numbers 1, 2, 3, etc. in the Table. A, B, etc. are the different samples.

Table 3 — Order of tests

Tests	**Order of tests for**						
	type 1, type 3 and type 5		**type 2 and type 4**				
	Sample A	Sample B	Sample A	Sample B	Sample C	Sample D[a]	Sample E[b]
4.1 Working pressure	-	2 and 4[c]	-	2 and 4	3	3	3
4.5.2 Resistance to bursting (all types)	2	-	2	-	-	-	-
4.5.3 Resistance to pressure and heat (only type 2 and 4)	-	-	-	-	2	-	-
4.5.4 Resistance to heat and cold shock (only type 2 and 4 for CO_2)	-	-	-	-	-	2[a]	-
4.5.5 Resistance to cold (only type 1, 2, 3 and 4)	-	3[c]	-	3	-	-	
4.5.6 Resistance to flexing (only type 2)	-	-	-	-	-	-	2[b]
Prior to the tests, all samples are checked according to 5.3. In addition, the documentation is checked according to 5.5.1, Material specification (metal parts).							

a Only for CO_2-components.

b Only for type 2 connectors.

c Not for type 5 connectors.

4.3 Compliance

A visual and measurement check shall be made to determine whether the test samples correspond to the manufacturer documentation (see Annex A).

4.4 Operational reliability and performance under fire conditions

Connect the inlet of the sample to a hydraulic pressure supply and block the outlet. Vent the system and increase the pressure by (2 ± 1) bar/s up to the test pressure $(^{+5}_{0})$ %.

Maintain this pressure for a period of $(10\ ^{+1}_{0})$ min. At the end of this period release the hydraulic pressure and examine the sample for damage.

4.5 Durability of Operational reliability and Performance under fire condition

4.5.1 Material specification (metal parts)

The documentation shall be checked to verify compliance with 3.2.1.

4.5.2 Resistance to bursting (all types)

Connect the inlet of the sample to a hydraulic pressure supply and block the outlet. Vent the system and increase the pressure at (5 ± 1) bar/s up to the test pressure $(^{+5}_{0})$ %.

Maintain this pressure for a period of $(10\ ^{+1}_{0})$ min. At the end of this period release the hydraulic pressure and examine the sample.

4.5.3 Resistance to pressure and heat (only type 2 and 4)

Connect the sample to a vessel delivering an absolute pressure in accordance with Table 2. Block the outlet. Subject the sample to a temperature of (600 ± 30) °C in a furnace for a period of 10 min. Then pressurize the heated sample for (30 ±5) s with gaseous CO_2, nitrogen or air at test pressure. Remove the sample from the furnace and allow it to cool at normal temperature.

Then examine the sample for visible evidence of damage. Subsequently test the sample in accordance with 4.4.

4.5.4 Resistance to heat and cold shock (only type 2 and 4 for CO_2)

Connect the sample to a CO_2 vessel which incorporates a diptube and is capable of delivering liquid CO_2 at an absolute pressure of (20 ± 1) bar. A 2 position, 3 port ball valve (by-pass-valve) shall be installed in the pipework between the vessel and the sample which allows to control the CO_2 -flow from the vessel. The nominal diameter of the pipework between the vessel and the by-pass-valve shall be at least 25 mm. The nominal diameter of the by-pass-valve and the connected pipe to the sample shall be 25 mm. The length of the connected pipe shall not exceed 1,1 m.

In one position, the test position, the by-pass-valve allows the CO_2 to pass through the sample. In the other position, the by-pass position, the outlet to the sample is closed and the CO_2 -flow is diverted via an appropriate pipework, which is dimensioned to reach a stable flow of liquid CO_2 at the by-pass-valve within 30 s. At the outlet of the sample connect a nozzle with a 10 mm orifice.

Subject the sample to a temperature of (600 ± 30) °C in a furnace for a period of $(10\ ^{+2}_{0})$ min. Just before completion of the heating period commence CO_2 flow through the by-pass. Upon stabilization of liquid CO_2 flow and completion of heating period divert flow through the sample for a period of $(30\ ^{+10}_{0})$ s. Remove the sample from the furnace and allow it to cool at normal temperature.

Then examine the sample for visible evidence of damage. Subsequently test the sample in accordance with 4.4.

4.5.5 Resistance to cold (only type 1, 2, 3 and 4)

Condition the sample for (4 ± 1) h at $(-20\ ^{0}_{-2})$ °C. With the sample at – 20 °C bend to the minimum radius and maximum angle of deflection as specified by the manufacturer. If the maximum angle of deflection is not specified, then bend the flexible connector along the whole length to the specified minimum radius.

Then examine the sample for visible evidence of deterioration or damage.

4.5.6 Resistance to flexing (only type 2)

Use a bending rig to bend the sample around the minimum radius specified by the manufacturer. One bending cycle consists of bending the sample from straight to the maximum angle of deflection specified by the manufacturer (or, if not specified, to the maximum possible angle of deflection), and back to straight. Carry out 3 000 bending cycles.

Subsequently test the sample in accordance with 4.4.

5 Marking, labelling and packaging

Connectors shall be marked with the following:

a) manufacturer's name or trademark;

b) model designation;

c) working pressure;

d) some mark(s) or code(s) (e.g. serial number or batch code), by which, at least, the date or batch and place of manufacture (if several places of manufacture) can be identified by the manufacturer.

The markings should be non-detachable, non-flammable (with exception of a) and c) when marked on the flammable hose material), permanent, and legible.

Where regulatory marking provisions require information on some or all items listed in this clause, the provisions of this clause concerning those common items are deemed to be met.

6 Assessment and verification of constancy of performance -AVCP

6.1 General

The compliance of connectors with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

— determination of the product type;

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

6.2 Type testing

6.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances.