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Fire protection — Automatic sprinkler systems —

Part 16: Requirements and test methods for fire pump relief valves

PROOF/ÉPREUVE

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 5, *Fixed firefighting systems using water*.

A list of all parts in the ISO 6182 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

 PROOF/ÉPREUVE

Fire protection — Automatic sprinkler systems —

Part 16: Requirements and test methods for fire pump relief valves

1 Scope

This document defines performance requirements, methods of testing and marking requirements for fire pump relief valves intended to rapidly relieve the excessive water pressure in the supply piping for standpipe systems or sprinkler systems or both. Performance and test requirements for other auxiliary components or attachments to fire pump relief valves are not covered by this standard.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread*

ISO 898-2, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 2: Nuts with specified property classes — Coarse thread and fine pitch thread*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
corrosion resistant material
bronze, brass, Monel®[1] metal, austenitic stainless steel, or equivalent, or plastic material conforming with the requirements of this document

3.2
main valve
part of the valve assembly that controls the flow of water

3.3
maximum set pressure rating
maximum pressure at which the valve is intended to be set to relieve pressure from a water supply system

1) Monel® is a trademark of Special Metals Corporation and is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product. Equivalent products may be used if they can be shown to lead to the same results.

3.4
pilot valve
part of the valve assembly that controls the operating of the *main valve* (3.2)

3.5
rated working pressure
maximum service pressure at which a valve is intended to operate

3.6
reseat pressure
pressure at which the relief valve is intended to prevent the flow of water

3.7
set pressure
pressure at which the *main valve* (3.2) is intended to start to allow the flow of water

4 Requirements

4.1 Nominal sizes and tolerances

4.1.1 The nominal size of a fire pump relief valve shall be the nominal diameter of the inlet and outlet connections, i.e. the pipe size for which the connections are intended. The sizes shall be 20 mm, 32 mm, 40 mm, 50 mm, 65 mm, 80 mm, 100 mm, 125 mm, 150 mm, 200 mm, 250 mm or 300 mm. The diameter of the waterway through the sealing assembly seat ring may be no more than one size smaller than the nominal size.

4.1.2 Unless otherwise noted in a specific clause of this document, tolerances shall be in accordance with Annex A.

4.2 Connections

4.2.1 All connections shall be designed for use at the rated working pressure of the valve.

4.2.2 The dimensions of all connections shall conform with the applicable requirements of relevant international standards. If international standards are not applicable, national standards may be used.

For example, ISO 6182-12 contains requirements for grooved-end components. Where there is not an ISO standard developed, a national standard may be used for other connection types (i.e. threaded, flanged, or other suitable connections).

4.3 Rated working pressure

4.3.1 The rated working pressure shall be not less than 1,2 MPa (12 bar).

4.3.2 Connections may be machined for lower working pressures to match installation equipment provided the valve is marked with the lower working pressure, as per 7.3, f).

4.4 Body and cover

4.4.1 The body and cover shall be made of a material with corrosion resistance at least equivalent to cast iron.

4.4.2 Cover fasteners shall be made of steel, stainless steel, titanium, or other materials with equivalent physical and mechanical properties.

4.4.3 Non-metallic materials other than gaskets, diaphragms and seals or metals with a melting point less than 800 °C shall not form part of the valve body or cover.

4.4.4 It shall not be possible to assemble the valve with the cover plate in a position which either improperly indicates flow direction or prevents proper operation of the valve.

4.5 Body strength (see 6.4)

An assembled fire pump relief valve with the sealing assembly blocked open shall withstand, without rupture, an internal hydrostatic pressure of four times the rated working pressure for a period of 5 min when tested as specified in 6.4.

If the test is not performed with standard production fasteners, the supplier shall provide documentation showing that the calculated design load of any fastener, neglecting the force required to compress the gasket, shall not exceed the minimum tensile strength specified in ISO 898-1 and ISO 898-2, when the valve is pressurized to four times the rated working pressure. The area of the application of pressure shall be calculated as follows.

a) If a full-face gasket is used, the area of application of pressure is that extending out to a line defined by the inner edge of the bolts.

b) If an “O”-ring seal or ring gasket is used, the area of application of force is that extending out to the centreline of the “O”-ring or gasket.

4.6 Access for maintenance

Means shall be provided to permit access to working parts and removal of the sealing assembly. Any method adopted should permit ready maintenance by one person.

4.7 Components

4.7.1 Any component that is normally disassembled during servicing shall be designed so that it cannot be reassembled improperly without providing an external visual indication when the valve is returned to service.

4.7.2 With the exception of valve seats, all parts intended for field replacement shall be capable of being disassembled and reassembled using tools normally employed by the trade.

4.7.3 All components shall be non-detachable during normal operation of the valve.

4.7.4 Failure of the sealing assembly diaphragms or seals shall not prevent the valve from opening.

4.7.5 Seat surfaces of sealing assemblies shall be made of a corrosion resistant material and have sufficient width of surface contact to withstand ordinary wear and tear, rough usage, compression stresses and damage due to pipe scale or foreign matter carried by water.

4.7.6 Springs shall not fracture or rupture when tested in accordance with 6.2.1.

4.7.7 Diaphragms shall not fracture or rupture when tested in accordance with 6.2.2.

4.7.8 There shall be no sign, on visual examination, of damage to the sealing assembly after testing for the operational requirements of 4.12 in accordance with 6.8.

4.7.9 When wide open, the sealing assembly shall bear against a definite stop. The opening of the valve or reaction of the water shall not permanently twist, bend or fracture valve parts.

4.7.10 Where rotation or sliding motion is required, the part or its bearing shall be made of a corrosion resistant material. Materials lacking corrosion resistance shall be fitted with bushings, inserts or other parts made of corrosion resistant materials at those points where freedom of movement is required.

4.8 Leakage and deformation (see 6.3)

4.8.1 There shall be no leakage, permanent distortion or rupture of a valve body when tested in accordance with 6.3.1.

4.8.2 There shall be no leakage of the sealing assembly when tested in accordance with 6.3.2.

4.9 Non-metallic components (excluding gaskets, diaphragms, seals and other elastomeric parts)

4.9.1 Non-metallic valve parts that affect proper valve function shall be subjected to the applicable ageing of their non-metallic parts, as described in 6.5 and 6.6, using separate sets of samples, as applicable. After ageing, a valve shall meet the requirements of 4.8, 4.13 and 4.14 when tested in accordance with the applicable tests described in 6.3, 6.9 and 6.10.

4.9.2 There shall be no cracking, warping, creep or other signs of deterioration that can prevent proper operation of the valve.

4.10 Sealing assembly elements (see 6.7)

A seal made of elastomeric or other resilient materials shall not adhere to the mating surface when tested in accordance with 6.7. Where the same design of seat is used for more than one size of valve, it shall be permitted to only test the size with the highest stress on the seating surface.

4.11 Clearances

The clearance between a valve disc or a part attached thereto and the inside walls of iron body castings in every position of the valve disc, except fully open, shall be not less than 12,7 mm. This clearance shall be not less than 6,4 mm for valves with bodies of bronze or equivalent corrosion resistant materials.

4.12 Operation and reseat (see 6.8)

The pressures at which the main valve opens, shall be not less than the set pressure nor more than 105 % of the set pressure when tested in accordance with 6.8.

4.13 Flow capacity (see 6.9)

For set pressures of 0,69 MPa (6,9 bar) and higher, the value of flow specified in Table 1 shall require an inlet pressure at the valve no greater than 125 % of the set pressure when tested in accordance with 6.9.

If the valve is tested with a flow capacity less than the values specified in Table 1, the valve shall be marked to indicate the maximum flow intended as per 7.3, j).

Table 1 — Flow capacity for fire pump relief valves

Relief valve size mm	Flow capacity l/min
20	95
32	190
40	380
50	945
65	1 135
80	1 890
100	3 785
125	6 625
150	9 450
200	18 900
250	As declared by manufacturer
300	

4.14 Endurance (see 6.10)

The valve and its moving parts shall show no sign of distortion, cracks, loosening, separation or other sign of failure, following 30 min of water flow in accordance with 6.10.

5 Production testing and quality control

5.1 It shall be the responsibility of the manufacturer to implement and maintain a quality control programme to ensure that production continuously meets the requirements of this document in the same manner as the originally tested samples.

5.2 Every manufactured valve shall pass a hydrostatic body test for a period of not less than 1 min at twice the rated working pressure without leakage.

5.3 Following the hydrostatic body test in 5.2, every manufactured valve shall pass an operation test for correct functioning. The valve shall be set at a predetermined pressure. The pressure shall be slowly increased until the valve opens. The valve shall open at a pressure not less than the set pressure, nor more than 105 % of the set pressure.

5.4 Every manufactured valve shall withstand, without leakage at the valve seat, an internal hydrostatic pressure of 90 % of the maximum set pressure rating for a period of not less than 1 min. There shall be no leakage through the body, or past the seat, and no distortion of the valve.

6 Tests

6.1 Samples

A representative sample of each size of valve shall be subjected to the following tests.