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Fire protection — Automatic sprinkler systems —

Part 3: Requirements and test methods for dry pipe valves

Protection contre l'incendie — Systèmes d'extinction automatiques du type sprinkler —
Partie 3: Exigences et méthodes d'essai des postes de contrôle sous air

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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 6182-3 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 5, *Fixed firefighting systems using water*.

This third edition cancels and replaces the second edition (ISO 6182-3:2005), which has been technically revised.

ISO 6182 consists of the following parts, under the general title *Fire protection — Automatic sprinkler systems*:

— *Part 1: Requirements and test methods for sprinklers*

— *Part 2: Requirements and test methods for wet alarm valves, retard chambers and water motor alarms*

— *Part 3: Requirements and test methods for dry pipe valves*

— *Part 4: Requirements and test methods for quick-opening devices*

— *Part 5: Requirements and test methods for deluge valves*

— *Part 6: Requirements and test methods for check valves*

— *Part 7: Requirements and test methods for early suppression fast response (ESFR) sprinklers*

— *Part 8: Requirements and test methods for pre-action dry alarm valves*

— *Part 9: Requirements and test methods for water mist nozzles*

— *Part 10: Requirements and test methods for domestic sprinklers*

— *Part 11: Requirements and test methods for pipe hangers*

— *Part 12: Requirements and test methods for grooved-end components for steel pipe systems*

Introduction

This part of ISO 6182 is one of a number of International Standards prepared by ISO/TC 21 covering components for automatic sprinkler systems, including the following:

a) Carbon dioxide systems (ISO 6183);

b) Explosion suppression systems (ISO 6184).

An International Standard covering foam systems is planned.

Fire protection — Automatic sprinkler systems —

Part 3:
Requirements and test methods for dry pipe valves

1 Scope

This part of ISO 6182 specifies performance, requirements, methods of test and marking requirements, for dry pipe valves and manufacturer's specified relevant trim used in dry pipe automatic fire protection systems.

Performance and test requirements for other auxiliary components or attachments to dry pipe valves are not covered by this part of ISO 6182. Quick opening devices, including accelerators, used with dry pipe valves are covered in 6182-4.

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 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.

3.1
alarm device
mechanical or electrical device to sound an alarm upon operation of the valve

3.2
automatic drain
normally open device that automatically drains water from and vents the intermediate chamber of a valve to the atmosphere when the valve is in the ready position, and limits water flow from the chamber after the valve has tripped

3.3
clapper
type of sealing element

NOTE See also 3.18.

3.4
corrosion-resistant material
metallic material of bronze, brass, Monel[1)] metal, austenitic stainless steel, or equivalent, or plastic material conforming with the requirements of this part of ISO 6182

1) Monel is an example of a suitable product available commercially. This information is given for the convenience of users of this part of ISO 6182 and does not constitute an endorsement by ISO of this product.

3.5
differential
ratio of service pressure to system air pressure (expressed as gauge pressures) at the trip point

NOTE See also 3.24.

3.6
differential-type valve
type of valve in which air pressure in the system acts directly and/or indirectly on the sealing assembly to maintain it in the closed position

NOTE The air seat of the sealing assembly is of equal or larger diameter than the diameter of the water seat of the sealing assembly, with the two separated by an intermediate chamber maintained at atmospheric pressure.

3.7
dry pipe system
automatic fire protection system in which the piping contains air or nitrogen under pressure, the release of which allows water from a water supply to discharge through the system

3.8
dry pipe valve
valve that controls the flow of water into a dry pipe sprinkler system and incorporates provision for actuation of an alarm under specified conditions

3.9
flow velocity
speed of water flow through a valve expressed as the equivalent water velocity through a pipe of the same nominal size as the valve

3.10
intermediate chamber
that part of a valve which separates the air and/or water sealing assembly seating surfaces and is at atmospheric pressure when the valve is in the ready condition

3.11
leak point
system air pressure for a specific service pressure at which water begins to flow from the intermediate chamber, automatic drain valve or alarm connection

3.12
mechanical-type valve
type of valve in which the air pressure in the system acts on the sealing assembly and linking mechanism to maintain it in the closed position

3.13
minimum opening pressure
minimum pressure when water begins to pass through the valve

3.14
priming water
water used to seal a sealing assembly and prevent cementation of working parts

3.15
rated working pressure
maximum service pressure at which a valve is intended to operate

3.16
ready (set) condition
state of a valve with the sealing assembly in the closed or set position with service and system pressure applied

3.17
reinforced elastomeric element
element of clapper, clapper assembly or seat seals in a composite of an elastomeric compound with one or more other components

3.18
sealing assembly
main movable sealing element (such as a clapper or diaphragm) of the valve which prevents the reverse flow of water and which maintains air pressure in the system piping

3.19
sealing assembly seat ring
main fixed sealing element of a valve which prevents the reverse flow of water and which maintains air pressure in the system piping

3.20
service pressure
static water pressure at the inlet to a valve when the valve is in the ready condition

3.21
system air pressure
static air pressure in the system piping when the valve is in the ready condition

3.22
system pressure
static water pressure at the main outlet of a valve when the valve is in the ready condition

3.23
trim
external equipment and pipework, excluding the main installation pipework, fitted to valve installation assembly

3.24
trip point
point at which a valve operates, admitting water into the system, measured in terms of the system air pressure at a given service pressure

3.25
water motor alarm
hydraulically driven device which provides a local audible alarm as a result of a flow through a valve

4 Requirements

4.1 Nominal sizes

The nominal size of a valve shall be the nominal diameter of the inlet and outlet connections, i.e. the pipe size for which the connections are intended. Sizes shall be 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 less than the nominal size.

4.2 Connections

4.2.1 All connections shall have been 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 International Standards. If International Standards are not applicable, national standards shall be permitted to be used.

4.2.3 An opening not smaller than 15 mm nominal diameter shall be provided for an alarm line connection.

4.2.4 If priming water is required to seal the downstream side of the sealing assembly, an external means shall be provided to introduce the priming water.

4.2.5 Means shall be provided to prevent or drain water columning and to check the level of priming water (if required).

4.2.6 Suitable means shall be provided to facilitate testing of alarms without tripping the valve.

4.2.7 For differential-type valves, suitable means shall be provided to vent water from the intermediate chamber and to prevent a partial vacuum between the upstream and downstream sealing elements of the sealing assembly.

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 Inlet and outlet connections shall be permitted to be machined for lower working pressures to match installation equipment provided the valve is marked with the lower working pressure. See 7.3 f).

4.4 Bodies and covers

4.4.1 The body and cover shall be made of a material having 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 Strength (see 6.9)

4.5.1 An assembled 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 6.9.

4.5.2 If the test in accordance with 6.9 is not done with standard production fasteners, the supplier shall provide documentation showing that the calculated design load of any standard production fastener, neglecting the force required to compress the gasket, does 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 center line 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 shall permit ready maintenance by one person with a minimum of down time.

4.7 Components

4.7.1 Any component which may normally be disassembled during servicing shall be designed so that it can not 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 Sealing surfaces of sealing assemblies, including the sealing assembly seat ring, shall have corrosion resistance equivalent to brass or bronze 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 the water.

4.7.6 Springs and diaphragms shall not fracture or rupture during 5 000 cycles of normal operation, when tested in accordance with 6.2.

4.7.7 There shall be no sign, on visual examination, of damage to the sealing assembly after testing for the operational requirements of 4.14 in accordance with 6.11 and 6.12.

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

4.7.9 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.

4.7.10 A valve having a differential of the sealing assembly exceeding 1,16 to 1 for a service pressure range of 0,14 MPa (1,4 bar) to rated working pressure shall be provided with an anti-seat latch that prevents the valve from resetting automatically. The valve shall require manual means to return the valve to the ready (set) condition. It shall not be possible to return the valve to the ready (set) condition before draining the pipe work.

4.7.11 A valve having a differential of 1,16 to 1 or less over a service pressure range of 0,14 MPa (1,4 bar) to rated working pressure shall be provided with means to prevent the valve from automatically returning to the ready (set) condition and to permit draining of the pipework after the valve has tripped. Manual or external means shall be provided to return the valve to the ready (set) condition.

4.8 Leakage (see 6.8)

4.8.1 There shall be no leakage, permanent distortion or rupture of a valve, when an internal pressure of twice the rated working pressure is applied for 5 min with the sealing assembly open in accordance with 6.8.1.

4.8.2 No leakage shall be permitted across the sealing assembly into the intermediate chamber or into the alarm port, when tested in accordance with 6.8.2. There shall be no leakage, permanent distortion or