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Fire protection — Automatic sprinkler systems —

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

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Protection contre l'incendie — Systèmes d'extinction automatique du type sprinkler —

Partie 8: Exigences et méthodes d'essai des postes de préalarme 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 6182-8 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 5, *Fixed firefighting systems using water*.

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

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— 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 pipe couplings*

— Part 13: *Requirements and test methods for extended coverage sprinklers*

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Introduction

This part of ISO 6182 is one of a number of ISO 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.

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Fire protection — Automatic sprinkler systems —

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

1 Scope

This part of ISO 6182 specifies performance requirements, methods of test and marking requirements for pre-action dry alarm valves and manufacturers' specified relevant trim used in non-interlock pre-action automatic fire protection systems. (See 3.24 for the principle modes of operation of pre-action dry alarm valves.)

Performance and test requirements for other auxiliary components or attachments to pre-action dry valves are not covered by this part of ISO 6182.

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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.

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

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 898–1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*

ISO 898–2, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse 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
anti-reseat latch
mechanical device that prevents the sealing assembly from returning to its closed position after operation

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3.3
automatic drain valve
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

3.4
auxiliary pressure
pressure acting against an auxiliary diaphragm or piston, taken from either the service pressure or an external source

3.5
clapper
type of sealing element

NOTE See 3.20.

3.6
corrosion-resistant material
bronze, brass, Monel[1)] metal, austenitic stainless steel, or equivalent, or plastic material conforming with the requirements of this document

3.7
differential
ratio of service pressure to system air pressure (expressed as gauge pressures) at the trip point

NOTE See 3.24.

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3.8
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

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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.

3.9
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

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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.

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3.13
non-interlock pre-action system
automatic fire protection system in which water is admitted to the system upon either activation of a supplemental detection system or loss of system pressure in combination with failure of the detection system

3.14
pre-action system
automatic fire protection system using a valve which is operated by an auxiliary means to admit water into a system of automatic sprinklers or nozzles, as shown in Figure 1

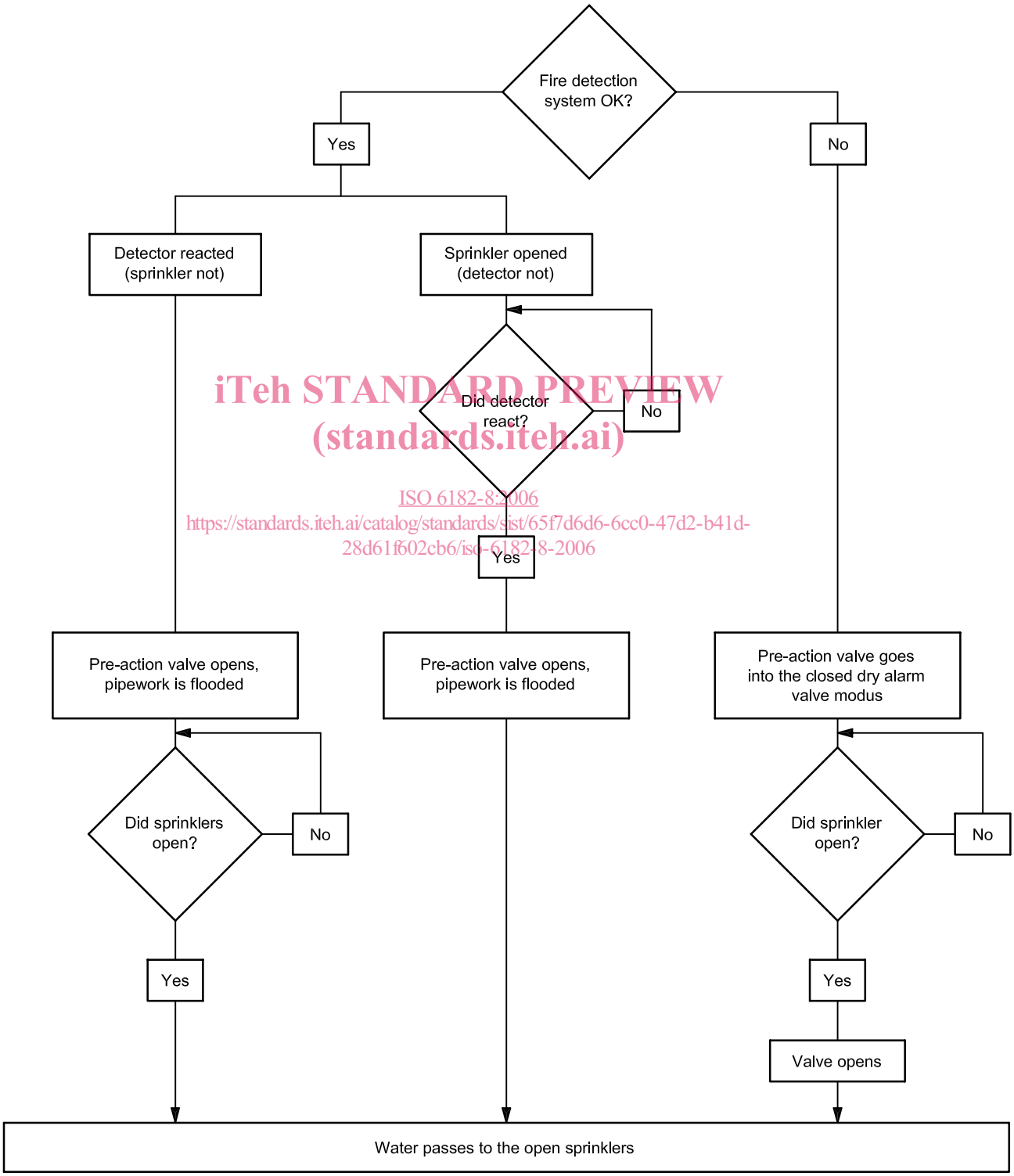

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Figure 1 — Operational flow chart for pre-action system

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3.15
pre-action dry alarm valve
valve of the check type in which air pressure in the sprinkler system prevents water from filling the system

NOTE Fire detection of auxiliary means causes automatic operation of the pre-action dry alarm valve. If there is any failure of the auxiliary means, the pre-action dry alarm valve shall operate as a dry valve (see ISO 6182-3).

3.16
priming water
water used to seal a sealing assembly and prevent cementation of working parts

3.17
rated working pressure
maximum service pressure at which a valve is intended to operate

3.18
ready condition
set condition
state of a valve with the sealing assembly in the closed and set position with service and system pressure applied

3.19
reinforced elastomeric element
element of clapper, clapper assembly or seat seals in a composite of an elastomeric compound with one or more other components

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3.20
sealing assembly
main movable sealing element (such as a clapper) of the valve which prevents the reverse flow of air and which maintains air pressure in the system piping

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3.21
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

3.22
service pressure
static water pressure at the inlet to a valve when the valve is in the ready condition

3.23
system pressure
pressure at the main outlet of a valve when the valve is in the ready condition

3.24
system air pressure
static air pressure in the system piping when the valve is in the ready condition

3.25
trim
external equipment and pipework, excluding the main installation pipework, fitted to valve installation assembly

3.26
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

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3.27
water-motor alarm
hydraulically actuated device which provides a local audible alarm as a result of a flow through a valve

3.28
water-motor transmitter
hydraulically actuated device which generates an electrical current for a remote alarm as a result of operation of the 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. The sizes shall be 40 mm, 50 mm, 65 mm, 80 mm, 100 mm, 125 mm, 150 mm, 200 mm, or 250 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 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 International Standards. If International Standards are not applicable, national standards shall be permitted to be used.

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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.

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4.2.5 Means shall be provided to prevent 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 Valves shall be provided with a means of sounding an alarm if water enters the downstream piping to an elevation exceeding 0,5 m above the sealing assembly unless the valve is provided with an automatic means for drainage.

4.2.8 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 may 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 Body and cover

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.

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4.4.3 If non-metallic materials, other than gaskets, and seals or metals with a melting point less than 800 °C form part of the body or cover, the valve assembly shall be subjected to a fire exposure test as specified in 6.9. Following the fire exposure test, the sealing assembly shall open freely and fully and the valve shall withstand a hydrostatic pressure test as specified in 6.7.1 without permanent deformation or failure.

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

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 6.7.1.

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 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.

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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 with a minimum of down time.

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4.7 Components

4.7.1 Any component that is normally 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 shall have corrosion resistance equivalent to 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 6.10 and 6.12.

4.7.8 When wide open, the sealing assembly shall bear against a definite stop. The point of contact shall be located so that impact or the reaction of the water flow does not permanently twist, bend or fracture valve parts.

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