



GUIDE
FOR
THE INVESTIGATION
OF
ALARM VALVES
FOR
FIRE-PROTECTION SERVICE

UNDERWRITERS' LABORATORIES OF CANADA

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OF
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FOR
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UNDERWRITERS' LABORATORIES OF CANADA

General Offices and Testing Station

7 CROUSE ROAD, SCARBOROUGH, ONTARIO

Telephone 757-3611 Area Code 416

In Replying
Please Refer to ULC Subject C193-1975

GUIDE FOR THE INVESTIGATION OF ALARM VALVES FOR FIRE-PROTECTION SERVICE

GENERAL

1. Scope

1.1 These requirements cover alarm valves for use in automatic wet-pipe sprinkler systems for fire-protection service. Alarm valves covered by these requirements are of either the variable- or constant-pressure type and are of the swing-check pattern. Ordinarily, variable-pressure alarm valves will prove suitable for constant-pressure service without alteration, but in certain designs that portion of the device which has to do with the delaying of alarms may be omitted.

1.2 Requirements for the installation and use of alarm valves are included in the Standard of the National Fire Protection Association for the Installation of Sprinkler Alarm Systems, NFPA No. 13-1972.

2. Glossary

2.1 FLEXIBILITY - May be defined in general terms as the apparent elasticity or resilience of the water column above the alarm device caused by air in the sprinkler piping. Specifically defined, the flexibility of a wet-pipe system at any stated pressure measured immediately above the alarm device is the number of gallons of water which must be withdrawn from the riser, when the main gate is tightly closed, in order to reduce the riser pressure 10 pounds per square inch (psi).

2.2 SOLID FLOW SYSTEM - May be defined in general terms as a system in which the flexibility feature is eliminated, i.e., no air is present in the sprinkler piping.

2.3 RETARDING FACTOR - The time in seconds which elapses while any specified rate-of-flow is being taken from the system between the first passage of water through the alarm port of the valve and the completion of the action which is required of the mechanism to actuate the alarm devices. It does not include the time required to withdraw excess pressure from the riser above the valve, nor the delay incident to transmission of water through the piping from the alarm valve to water-motor gongs or other alarm apparatus which may be installed at some distance from the valve.

2.4 SENSITIVENESS - Is defined as the minimum rate-of-flow from a system outlet, expressed in gallons per minute (gpm) which will open the alarm valve, as indicated by intermittent (for "flexible" system) or continuous operation (for "solid" systems), of both electrical and mechanical alarms. See Clause 2.8.

2.5 SLIGHT WEEPING - Is defined as leakage not exceeding one fluid ounce per hour per inch of nominal valve size.

2.6 READY CONDITION - An alarm valve is defined as in the ready condition when it is installed in a piping system that has been filled with water from an active water supply having a stable pressure, and there is no water flow from any outlet on the system downstream from the alarm valve.

2.7 WASTE OF WATER - Is defined as the discharge of any water from the alarm port of an alarm valve that is in the ready condition.

2.8 INTERMITTENT ALARM - Is defined as an alarm wherein the duration of the sound or signal produced exceeds any period of silence occurring after the initial sound or signal producing operation of the device.

2.9 SERVICE PRESSURE - Is defined as the static pressure at the inlet to an alarm valve when the valve is in the ready condition.

ASSEMBLY AND DESIGN

3. General

3.1 Auxiliary components or attachments to alarm valves, such as water-motor-driven alarm gongs, pressure-operated switches, pressure gauges, etc., are judged under the requirements for such devices or products and also with respect to their particular application.

4. Sizes

4.1 Alarm valves covered by these requirements include the sizes 2-1/2-, 3-, 4-, 5-, 6-, and 8-inch.

4.2 Valve sizes refer to the nominal diameter of the waterway through the inlet and outlet connections and to the pipe size for which the connections are intended. The diameter of the waterway through the water seat ring of a valve may be reduced below that of the waterway through the inlet and outlet connections.

5. Working Pressures

5.1 An alarm valve shall be designed for a maximum working pressure of 175 psi.

6. Positions

6.1 An alarm valve may be designed to operate as intended when installed in the horizontal position only or the vertical position only, or it may be designed to operate in either of these positions.

7. Instruction Charts

7.1 A copy of the manufacturer's instruction chart is to be furnished with each alarm valve assembly. This instruction chart is to be used as a guide in the examination and test of the valve and for this purpose need not be in final printed form. The chart is to include an illustration showing the valve trim as specified by the Standard for the Installation of Sprinkler Alarm Systems, NFPA No. 13-1972. The trim drawing is to specify the type of valves e.g., ball valve, gate valve, etc., to be used in the trim. Cross-sectional assembly views to explain the valve operation may also be supplied.

7.2 With reference to Clause 7.1, an alarm line shutoff valve and the main drain valve shall comply with the requirements for that component.

7.3 The instruction chart should show that an open drain cone and its connection for drain-piping should be provided to serve the alarm-valve main drain and should have sufficient capacity to take care of the maximum waste of water which is likely to occur, without spattering water upon the surroundings. Drain piping from the main drain and from other drain outlets, where open cones are not used, should be provided with sight drains or with plugged tees having plugs of brass.

7.4 The instruction chart is to clearly show the method of mounting the retarding chamber with respect to the alarm valve. If the piping to the inlet, outlet, or drain is to be used in any way for the support of the retarding chamber, the size and maximum lengths of such supporting piping are to be detailed.

7.5 The instruction chart shall include such directions and information as deemed by the manufacturer to be adequate to explain necessary care and maintenance. The information shall include the following or equivalent statement: "Where difficulty is experienced in obtaining proper performance in a specific field installation, the manufacturer or his authorized field representative shall be contacted if any field adjustment is to be made."

8. Bodies and Covers

8.1 A body and cover shall be made of a material having corrosion resistance equivalent to cast iron. If nonmetallic materials, e.g. plastics, are used, they are to be subjected to a design study to evaluate their resistance to external fire exposure and thermal shock.

8.2 A casting shall not be plugged or filled but may be impregnated to remove porosity.

8.3 The dimensions of all flanges, flange pipe joints, and threaded body openings shall conform, wherever possible, to the following Standards.

Pipe Threads - ANSI B2.1-1968

Pipe Threads (Dry Seal) -
ANSI B2.2-1968

Flanges - ANSI B16.1-1967
(125 psi rating or higher)

8.4 Provision shall be made in a valve body for connection of all external fittings and attachments specified by the Standard for the Installation of Sprinkler Systems, NFPA No. 13-1972.

8.5 The point of connection of the alarm piping shall be such that pressure sufficient to operate the alarm will be available at any velocity of flow through the valve of 1-20 feet per second, at service pressures of 20-175 psig, see Clause 2.9.

8.6 A tapped opening in a valve body for a retarding chamber connection shall be not less than 1/2-inch pipe size, and an opening used exclusively for a pressure gauge shall be not less than 1/4-inch pipe size.

8.7 A tapped opening in a valve body for main drain connection shall be not less than 1-1/4-inch pipe size for a 2-1/2- or 3-inch and not less than 2-inch pipe size for a 4-, 5-, 6-, or 8-inch valve.

8.8 Tapped openings provided for main drain piping shall be so located as to assist in carrying away sediment or foreign material likely to collect at the valve seat and to drain water from the system piping when the valve is installed in any intended position.

8.9 A body handhole opening shall be large enough to permit easy access to all working parts and to allow the removal of the clapper assembly. It shall be so located that, when the valve is installed in the intended position, the opening will be on the side or on the top.

8.10 A cover plate shall be attached to the body of a valve using bolts and nuts, or bolts alone, or studs and nuts, with the removable parts having external drive surfaces, such as a square or hexagonal head.

8.11 In the design of a 6-inch size or larger valve, no stud or bolt smaller than 1/2 inch shall be used to assemble castings subject to full water pressure. Sizes of studs or bolts used will be an item of design review for all sizes of valves.

8.12 Bolts, nuts, and studs employed for the bolting of pressure-holding castings shall comply with the applicable requirements for Grade A or Grade B bolts or better of ASTM A307-1968.

8.13 The load on any bolt, exclusive of the force required to compress the gasket, shall not exceed the minimum tensile strength specified in Table 2 of ASTM A307-1968, when the valve is pressurized to five times the rated working pressure for 6-inch or smaller valves and to four times the rated working pressure for 8-inch size valves. The area of the application of pressure is to be calculated as follows:

- A If a full-face gasket is used, the area of force application 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 force application is that extending out to the centre line of the "O" ring or gasket.

8.14 A handhole cover plate shall be designed so that it cannot be installed in such a manner as to adversely affect the operation of the valve.

9. Valve Mechanisms

9.1 The design of a valve part which may normally be disassembled in field servicing shall be such that it cannot be improperly reassembled.

9.2 There shall be no waste of water when the valve is in a "ready" condition. See Clauses 2.6, 2.7, 25.14 through 25.17 and 26.6.

9.3 A valve mechanism shall be designed to provide freedom of movement of operating parts.

9.4 The clapper assembly shall be hung in the interior of the valve body in such a manner that the clapper assembly will move toward the seat by gravity and seal properly when no water is flowing. For valves intended for horizontal installation, the use of springs to assure proper seating is acceptable.