



Pre-action alarm valve stations type A

Requirements and test methods

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VdS Guidelines for water extinguishing systems

Pre-action alarm valve stations type A

Requirements and test methods

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1 Scope

These guidelines define the requirements, test methods and performance characteristics for pre-action alarm valve stations type A (VTAVA) for the use in pre-action sprinkler systems type A according to VdS CEA 4001.

Note 1: A VTAVA is installed in the vertical water supply riser of a sprinkler system. After activation by the fire detection and alarm system the VTAVA release the water flow into the sprinkler piping which is filled with pressurized air or a suitable Inert gas (e.g. Nitrogen). Alarm equipment is operated simultaneously by a branch stream. No water must be allowed to enter the piping network if a sprinkler opens before a detector has responded. Should the fire detection and alarm system not be ready for operation or if it is defective, then the VTAVA shall operate like a pressure controlled dry alarm valve station according to VdS 2100-02, whereby no water may enter the piping network before a sprinkler opens.

Note 2: A water drain valve, pressure gauges for the water supply pressure and the air or inert gas pressure, an alarm test valve, an alarm pressure switch, a connection for air or inert gas supply and a pressure monitoring switch complete the valve to a VTAVA, together with the necessary connection piping. The valve stations shall be completely assembled by the manufacturer. Approval may be issued only for a VTAVA as complete unit.

These guidelines are applicable to VTAVA with and without accelerator that, for realisation of the special functions in interaction with the fire detection and alarm system, include two solenoid valves – an activation solenoid valve and a switch-over solenoid valve – or comparable electrical actuators with the same function in the trim.

2 Normative references

These Guidelines incorporate, by dated or undated references, provisions from other publications (e.g. European Standards EN or International Standards IEC), which are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to these Guidelines only when incorporated in them by amendment or revision. For undated references the latest edition of the publication referred to applies.

VdS CEA 4001	Guidelines for sprinkler systems – Planning and installation
VdS 2100-02	Guidelines for water extinguishing systems – dry alarm valve stations with and without accelerator – Requirements and test methods
VdS 2496	VdS Guidelines for the triggering of fire extinguishing systems
EN 12259-3	Fixed firefighting systems – Components for sprinkler and water spray systems – Part 3: dry alarm valve assemblies
ISO 7-1	Pipe threads where pressure-tight joints are made on the threads – Part 1: Dimensions, tolerances and designation
EN 1092-2 und -3	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated
EN 764-1	Pressure equipment – Part 1: Terminology – Pressure, temperature, volume, nominal size

3 Definitions

The definitions according to EN 12259-3 apply for the use of these guidelines.

Maximum allowable pressure: maximum pressure for which the device is designed according to the manufacturer specifications (EN 764-1).

Note: The maximum allowable pressure corresponds to the pressure specified as nominal working pressure in EN 12259-3.

Activation solenoid valve: Solenoid valve that causes the dry alarm valve to open when electrically actuated.

Switch-over solenoid valve: Solenoid valve that is permanently actuated and causes the switch-over when the electrical actuation is terminated.

Switch-over: Change of mode of the VTAVA from the pre-action mode to the pressure controlled mode.

Pre-action mode: Mode of the VTAVA, when the system pressures (water and Air/Inert gas) are within the specifications and the switch-over solenoid valve is actuated.

Note: In this mode the valve opens upon actuation of the activation solenoid valve independent from the decrease of the air/Inert gas pressure in the sprinkler piping network.

Pressure controlled mode: Mode of the VTAVA, when the system pressures (water and Air/Inert gas) are within the specifications and the switch-over solenoid valve is not actuated.

Note: In this mode the VTAVA operates like a pressure controlled dry alarm valve station according to VdS 2100-02.

4 Requirements

4.1 General, design, equipment

4.1.1 The design requirements of the VdS 2100-02 for dry alarm valve stations (without accelerator) do apply and, in addition, the requirements specified in the following sections.

4.1.2 The VTAVA shall be equipped with a pressure switch for monitoring of the air/Inert gas pressure in the sprinkler piping network. The pressure switch shall be VdS-approved. The pressure switch shall respond at a value of 0.5 bar below the normal air/Inert gas pressure in the piping network. The pressure switch shall be labelled with the response pressure and shall be secured to prevent maladjustment.

4.1.3 The VTAVA shall be equipped with a solenoid valve for switch-over (switch-over solenoid valve).

Note: Comparable electrical actuators with the same function are permitted.

4.1.4 The VTAVA shall be equipped with a solenoid valve for activation (activation solenoid valve). The activation solenoid valve shall be normally closed.

Note: Comparable electrical actuators with the same function are permitted.

4.2 Performance characteristics

4.2.1 In the **pressure controlled mode** the VTAVA shall fulfil the requirements for dry alarm valve stations according to VdS 2100-02 (see 5.2.1). VTAVA with accelerator shall fulfil the requirements for dry alarm valve stations with accelerator.

4.2.2 When tested in accordance with 5.2.2 the VTAVA shall open at the latest 15 s after actuation of the activation solenoid valve in the **pre-action mode**.

4.2.3 When tested in accordance with 5.2.3 the VTAVA shall not open in case of decrease of the air/Inert gas pressure in the sprinkler piping network in the **pre-action mode**. The pressure switch for monitoring of the air/Inert gas pressure in the sprinkler piping network shall respond as intended.

4.3 Activation by a fire detection and alarm system

4.3.1 The manufacturer shall provide the following specifications for the activation solenoid valve and for the switch-over solenoid valve:

- Type, model designation
- Manufacturer
- Nominal voltage
- Nominal power or nominal current
- Minimum and maximum voltage for function
- Current at minimum and maximum voltage
- Specified duty cycle
- Time of actuation (typically “undelayed”)
- Duration of actuation
- Essential dependencies or limitations (e.g. inhibition of reset)

4.3.2 The manufacturer shall specify at least one fire detection and alarm system control and indication equipment (CIE) or one electrical control device (ECD) for the activation of the VTAVA.

All specified CIE and ECD shall be VdS-approved for this application.

For each CIE and ECD, the manufacturer shall describe the necessary configuration and the connection to the VTAVA (especially activation solenoid valve, switch-over solenoid valve, pressure switch for monitoring of the air/Inert gas pressure in the sprinkler piping network).

The electric lines for the activation and for the monitoring of the VTAVA shall be designed as monitored lines (primary lines). Lines to solenoid valves do not need to be monitored if a line fault causes the switch-over of the VTAVA to the pressure controlled mode. In this case at least a visual indication of the switch-over to the pressure controlled mode is required.

4.3.3 The requirements regarding activation and switch-over of VTAVA result from VdS 2496 (triggering of fire extinguishing systems). A door contact of the ECD, if provided, shall not cause the switch-over of the VTAVA.

5 Test methods

5.1 Compliance test

A visual and dimensional check is made to determine whether the test samples correspond to the description in the technical documentation (drawings, parts list, functional descriptions, instructions for operation, maintenance and installation) and comply with the verifiable requirements of these guidelines.

5.2 Performance characteristics test

5.2.1 The test of the performance characteristics of the VTAVA in the **pressure controlled mode** is conducted in tests according to VdS 2100-02.

5.2.2 The function test with electrical activation in the **pre-action mode** is conducted

- with the switch-over solenoid valve actuated,
- with actuation of the activation solenoid valve by an adjustable power supply;
- with 80 % of the minimum voltage for function specified by the manufacturer;
- twice each with following supply pressures (tolerance each $\pm 0,1$ bar)
 - 1,4 bar or minimum supply pressure (if a minimum supply pressure $> 1,4$ bar is specified)
 - 3 bar
 - 6 bar
 - 10 bar
 - further pressures in steps of 6 bar until maximum allowable pressure
 - maximum allowable pressure
- with air/Inert gas pressure each according to the specification of the manufacturer.

The VTAVA shall open and release the water flow within 15 s after electrical activation under all conditions.

5.2.3 The test of non-opening in case of decrease of the air/Inert gas pressure in the sprinkler piping network in the **pre-action mode** is done by decreasing the air/Inert gas pressure, as in the function test in the pressure controlled mode but with the switch-over solenoid valve actuated.

The VTAVA shall not open under any condition. The pressure switch for monitoring of the air/Inert gas pressure in the sprinkler piping network shall respond as intended.

5.2.4 On basis of the technical documentation it is assessed whether the CIE and/or ECD specified according to 4.3.2 with configuration and connection as specified are suitable for the activation of the VTAVA. Moreover it is assessed whether the electrical activation has to be tested also with test samples of the specified CIE or ECD. If necessary, tests are conducted analogue to 5.2.1, 5.2.2 or 5.2.3.

5.3 Other tests

Where special designs or new manufacturing procedures make it necessary, additional tests will be conducted in agreement with the manufacturer.

