

Bermad 400Y – 4D Deluge Valve



Installation Operation Maintenance Manual (IOM)

Safety First

BERMAD believes that the safety of personnel working with and around our equipment is the most important consideration. Please read all safety information below and any other relevant source before attempting to perform any maintenance function. Comply with all approved and established precautions for working with your type of equipment and/or environment. Authorized personnel should perform all maintenance tasks. Prior to performing a procedure, read it through to the end and understand it. If anything is not clear, ask the appropriate authority. When performing a procedure, follow the steps in succession without omission.

1. General

The BERMAD 400Y Water Control Valve designed for vertical or horizontal installation and is used for Deluge, Pressure Control Deluge and Pre-action in Firewater or Foam systems.

The 400Y straight-through design provides high flow capabilities with minimum head loss and the removable cover enables quick in-line service. The elastomeric assembly can be easily removed from the valve body with no need for disassembling of the valve from the line. Deluge systems are commonly used where, when the system operates, it is desirable to simultaneously spray water or foam from all open nozzles on the system.

1.1 Approvals

The Bermad 400Y 4D Deluge Valve is UL Listed when installed with specific components & accessories. Refer to the current UL fire protection equipment directory. Consult Bermad for any component approval recently to appear in any equipment directory.

All solenoid valves shall be UL Listed for compatible pressure ratings of the deluge valve for which it is intended to be used.

1.2 Principle of Operation

The BERMAD model 400Y-4D is held closed by water pressure in the control chamber [1]. Upon release of pressure from the control chamber, the valve opens. Under NORMAL conditions, water pressure is supplied to the control chamber via the priming line [2] strainer [3] and restriction orifice [5], it is then trapped in the control chamber by a check valve [4], manual emergency release [6], and a relay valve (URV) [7] that is held closed by pneumatic pressure in the dry pilot line [E]. The water pressure trapped in the control chamber holds the diaphragm against the valve seat, sealing it drip-tight and keeping the system pipes dry.

Under FIRE conditions, water pressure is released from the control chamber, either with the manual emergency release, or by the URV opening in response to a decrease in pneumatic pilot-line pressure. This opens the 400Y-4D deluge valve, allowing water to flow into the system.

Warning: Whenever the handle of the Manual Emergency Release is pulled, pressure is released from the control chamber, the deluge valve will open, and water will flow into system piping and alarm devices.

Fig 1: Principle of Operation

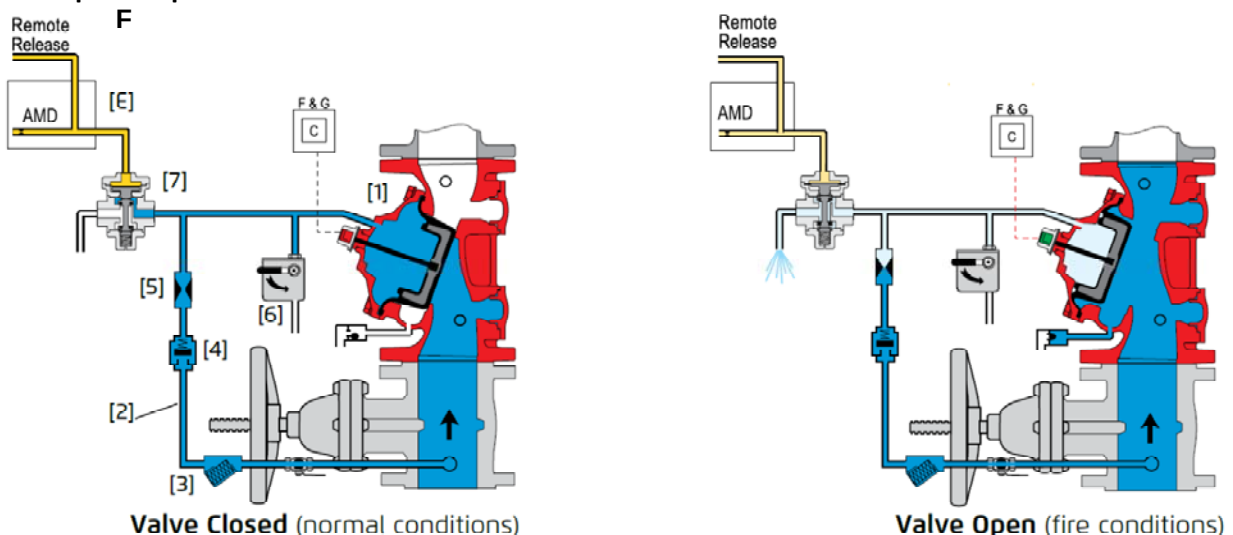


Table 1: Pressure and Flow Ratings

Valve Size in. (mm)	1.5" (40)	2-2.5" (50-65)	3" (80)	4" (100)	6" (150)	8" (200)	10" (250)	12" (300)	14" (350)	16" (400)
Max. Inlet pressure bar (psi)	25 (365)	25 (365)	25 (365)	25 (365)	25 (365)	25 (365)	25 (365)	21 (300)	21 (300)	21 (300)
Kv (Cv)	68 (79)	80-105 (92-121)	190 (219)	345 (398)	790 (912)	1160 (1340)	1355 (1652)	2370 (2737)	2850 (3292)	3254 (3758)
Leq m (ft) Note 1	2 (7)	4 - 7 (14-24)	8 (25)	8 (26)	13 (43)	27 (89)	55 (179)	38 (125)	66 (215)	115 (370)
Max. Recommended Flow-Rate m ³ /hr (GPM)	27 (119)	50 (300)	102 (450)	159 (700)	363 (1600)	644 (2836)	1006 (4431)	1450 (6380)	1972 (8684)	2400 (1052)
Pressure Control Pilot Valve, Note (2), (3)	2PBL	2PBL	2PBL	2PBL	2PBL	2PBL	2PBL	2HC	2HC	2HC
Pressure Differential Sensing Pilot Valve, Note (2), (4)	2PBL-D	2PBL-D	2PBL-D	2PBL-D	2PBL-D	2PBL-D	2PBL-D	2HC-D	2HC-D	2HC-D

Notes:

- 1) Valve Equivalent Length Value (Steel Pipe), for use in hydraulically calculated system.
- 2) Applicable for models: 1MC, 2MC, 3DC, 4DC, 5DC and 6DC pressure control deluge valves only.
- 3) Pressure Control downstream setting range: 4 – 15 bar (60-220 psi).
- 4) Pressure Differential Sensing (option code 06) with setting range: 0.5 – 3 bar (7-43 psi).

2. Installation

NOTES:

- Proper operation of the Bermad 400Y Deluge Valves depends upon their trim being installed.
- The 400Y valve shall be trimmed with specific trim components and accessories; it must be installed and maintained in compliance with the most recent Bermad publications.
- Any deviation in trim size or arrangement may adversely affect the proper operation of the deluge valve.

Warning: The deluge valve and trim must be installed only in areas where they will not be subject to freezing.

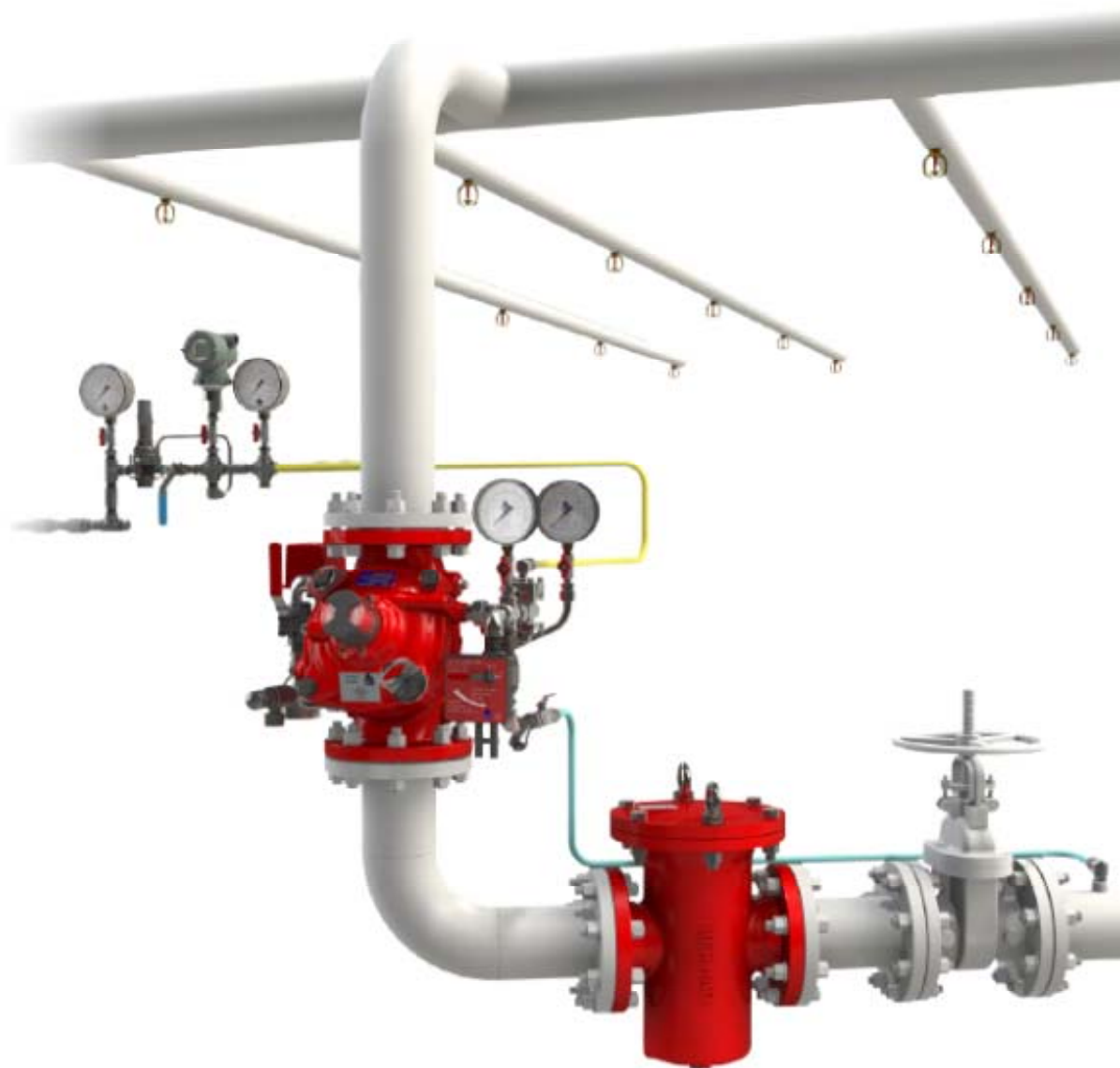
2.1 Installation Instructions

- 2.1.1 Allow enough room around the valve assembly for any adjustments and future maintenance.
- 2.1.2 Before the valve is installed, flush the pipeline to remove any dirt, scale, debris, etc.
Warning: not flushing the line may result in the valve being rendered inoperable.
- 2.1.3 Install the valve on the pipeline with valve flow arrow designated on the body points in the desired direction.
- 2.1.4 Install a listed / approved indicating valve upstream of the system (supervised "open").
- 2.1.5 All other components are positioned correctly as per the appropriate drawing.
- 2.1.6 The water supply priming line must be connected to the upstream of the system control valve.
- 2.1.7 For Hydraulic or Pneumatic trim: Install an "End of Line Release Valve" with maximum bore of 1/2", installed at the same level or higher than the highest fusible plug position and located at the remotest location on the system possible.
- 2.1.8 For pneumatic / Electro-Pneumatic trim: Install a pneumatic pressure supply system, see "Pneumatic System Pressure Requirements" below.
- 2.1.9 Pneumatic System Pressure Requirements: see "Placing in Service" section below prior to any air supply connection.
- 2.1.10 A Solenoid Valve shall be wired to the Releasing Control Panel according to information provided by the panel manufacturer.
- 2.1.11 All additional accessories, although not packed together with the BERMAD Deluge Valve, must be installed as shown in the relevant drawing and other illustrations.
- 2.1.12 After installation in the main line, carefully inspect/correct any damaged accessories, piping, tubing, or fittings, ensure that there are no leaks.

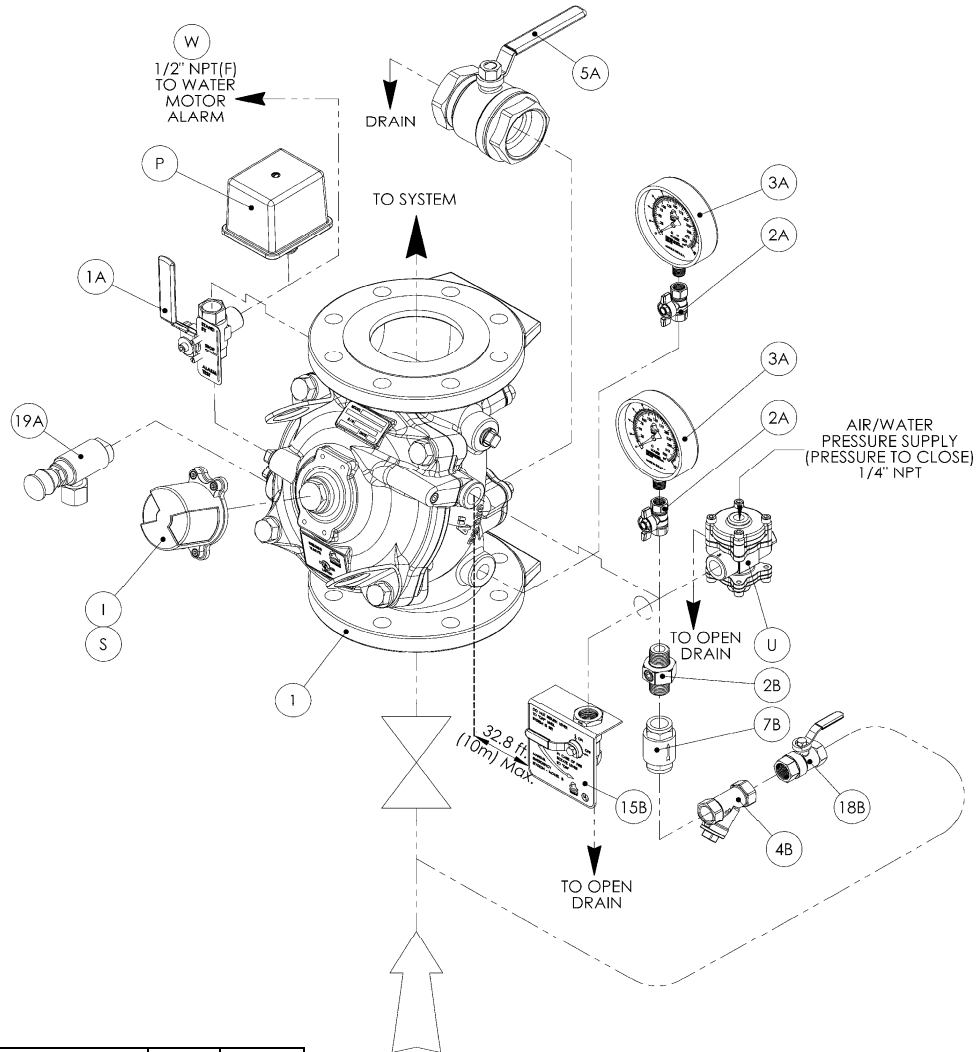
2.2 Optional Features

- 2.2.1 **Valve Position Indicator (code I):** for Visual Indicating of the Valve Position.
- 2.2.2 **Valve Position Limit Switch (code S or S9):** for Remote Indication of the Valve Position.
- 2.2.3 **Valve Seat Ring (code T):** corrosion Resistance Seat Ring Inserted to the main valve.
- 2.2.4 **Large Control Filter (code F):** provides extra capacity means for filtering of the water supplied to the pilot system.
- 2.2.5 **Pressure Differential Control (code 06):** to control according to differential pressure of 2 selected points in the piping system, refer to table 1 for applicable data.
- 2.2.6 **Opening and Closing Speed control Device (code):** Closing speed control (01), Opening speed control (02), Opening & Closing speed controls (03), refer to Appendix A for the Speed Controls installation data.

Fig 2: Typical Installation



Model 4D Trim Illustrations: Pneumatically Controlled On-Off Deluge Valve.



Item	Description	Qty	Note
1	400Y Deluge Valve	1	5
1A	Alarm Test Valve 1/2"	1	8
2A	Gauge Valve 1/4"	2	8
2B	Restriction Orifice	1	
3A	Pressure Gauge 4"	2	2, 8
4B	Priming Strainer 1/2"	1	
5A	Drain Valve	1	1, 4, 8
7B	Priming Check valve 1/2"	1	
15B	Manual Emergency Release	1	1, 9
18B	Priming Valve 1/2" Ball Valve	1	
19A	Drip Check Device 1/2"	1	8
F	Fittings and Tubing	Lot	6
U	Universal Relay Valve (URV)	1	

Optional System Items:

P	Pressure Switch
I	Valve Visual Position Indicator
S	Valve Limit Switch
W	Water Motor Alarm
01	Closing Speed Control (note 10)
02	Opening Speed Control (note 10)
03	Opening & Closing Speed Control (note 10)

Notes:

- (1) Shall be UL Listed in accordance with UL 258
- (2) Shall be UL Listed in accordance with UL 393
- (3) Shall be UL Listed in accordance with UL 753
- (4) For 1½ & 2": ¾" Drain Valve ; 2½ & 3": 1½" Drain Valve & 4" and larger: 2" Drain Valve
- (5) Shall be UL Listed for fire protection service
- (6) Construction material Brass/S.S 316 or corrosion resistant equivalent
- (7) Items marked by 'B' standard Trim components provided in the Trim package
- (8) Items marked by 'A' are required trim components for the proper installation and use of the deluge valve and are not provided in the Trim package.
- (9) Manual Emergency Release may be Model B (open Bracket) or Model D (with box)

3. Placing in Service/Resetting

The deluge valve and the control trim shall be placed in Service in accordance to the instructions below. After all relevant instructions are performed, slowly open the supply-isolating valve and check that no water flows into the system.

3.1 Electrical Detection System:

- 3.1.1 Place the detector circuit in service.
- 3.1.2 Reset the Solenoid Valve by resetting the releasing control panel.
- 3.1.3 Test supervisory circuits in releasing control panel.

3.2 Hydraulically Control / Wet Pilot Systems:

- 3.2.1 Open the pressure supply isolating valve, allowing release system pressure to build up, check the entire system for leaks.
- 3.2.2 Check the entire Wet Pilot line/Fusible Plugs for leaks; replace any fused temperature-release plugs.

Note: Any automatic air or nitrogen pressure supply must feed the system through an orifice restriction. If a low air pressure switch is utilized, test it by dropping the release line pressure, restore pressure after the test.

3.3 Pneumatic System Pressure Requirements:

- 3.3.1 Supply of day air or nitrogen is required to maintain a pneumatic pressure between 2.4-2.6 bar (35-38 psi).
- 3.3.2 The Pneumatic system shall use a clean, dependable and continuous compressed-air source using an independent air compressor or an AMD (Air Maintenance Device) supplied by a dry nitrogen-gas or external high air pressure source.

Note: Any event of an air supply failure, slow leakage of air from the pneumatic system, will result in activation of the Pneumatic Pilot Valve, causing the Deluge Valve to Open.

- 3.3.3 The Low-Pressure Alarm Switch is recommended and shall be set to operate at 2.2 bar (32 psi) with decreasing air pressure. If necessary, adjustments can be made by following the manufacturer's instructions.
- 3.3.4 Operate pneumatic pressure supply system, allowing release system pressure to build up to the above range of 20 to 30, check the entire system for leaks.
- 3.3.5 Check the entire Fusible Plugs/Dry Pilot line for leaks; replace any fused temperature-release plugs.

Note: Any automatic air or nitrogen pressure supply must feed the system through an orifice restriction. If a low air pressure switch is utilized, test it by dropping the release line pressure, restore pressure after the test.

3.4 Placing In Service

- 3.4.1 Close all emergency release valves.
- 3.4.2 Ensure that there is sufficient air pressure in the URV(U) control chamber
- 3.4.3 Open the priming-line valve .Check that there is no water flow from the Solenoid Valve.
- 3.4.4 When the main valve control chamber pressure gauge indicates full upstream pressure and is no longer rising, the release system is reset.
- 3.4.5 Slowly Open the supply Isolating Valve and check that no water flows into the system.
- 3.4.6 Depress the Drip Check and drain any water from the system side of the Deluge Valve.

Note: The system is now operational and in a standby mode, ensures that the following Set Conditions are met.

Table 3: Set Conditions (Normal Conditions)

Item	Status
All Main Isolating Valves	OPEN and sealed with tamperproof seals
All Manual Releases	CLOSE position and sealed
Alarm Shut-Off Valve (11A)	OPEN position
Priming Ball Valve (18B)	OPEN
Control-Chamber Gauge	OPEN gauge valve, the gauge indicates control-chamber pressure
Upstream Pressure Gauge	OPEN gauge valve, the gauge indicates the supply pressure
Drip-Check Device (19B)	VENTED: Push the knob to confirm that there is no seat leakage
Wet Pilot Line System	IN SERVICE: no leaks in the system
Control Panel & Detections	IN SERVICE and in there stand-by position.
Pneumatic Release System	ON , maintained to 2.4-2.6 bar (35-38 psi) and functioning properly
Releasing Devices	CLOSED with no leaks

4. Maintenance

Bermad Deluge Valves require no lubrication, packing or tightening and require minimum maintenance

WARNING: Do not turn off the water supply to make repairs without placing a roving fire patrol in the area covered by the system. The patrol should continue until the system is back in service.

- 1) Prior to turning off any valves or activating any alarms, notify local security guards and the central alarm station, if used, so that a false alarm will not be raised.
- 2) In any of the following inspections or testing procedures, if an abnormal condition exists, see "Abnormal Conditions" for possible cause and corrective action.
- 3) See NFPA Pamphlet No. 25 and also relevant publications by authorities having jurisdiction.

4.1 Removing the System from Service

WARNING: When taking a deluge system out of service, a fire patrol should be established in the system area. If automatic fire alarm signaling equipment is utilized, the proper authority should be notified that the system is being removed from service. The insuring body and owner's representative should also be notified when the system is being taken out of service.

- 4.1.1 Shut off the main supply-isolating valve.
- 4.1.2 Close the priming line valve to the deluge valve control chamber.
- 4.1.3 Open all drain valves to drain all the water from the system.
- 4.1.4 Release the water pressure from the control chamber of the deluge valve by pulling the manual emergency release, or by tripping the electrical circuit (de-energize the Solenoid Valve).
- 4.1.5 If auxiliary power is used, disconnect all power supply and batteries.
- 4.1.6 Place "Fire Protection System out of Service" signs in the area protected by the system.

4.2 Inspection

4.2.1 Weekly Inspection

- 4.2.1.1. The system should be checked for Set Condition. See above "Set Condition (Normal condition)".
- 4.2.1.2. Observe the upstream pressure gauge: it should indicate that the normal supply of water pressure to the Deluge Valve is maintained.

4.2.2 Monthly Inspection and Test

- 4.2.2.1. Complete Weekly Inspection.
- 4.2.2.2. Test the water-motor alarm and/or electric alarm, by turning the alarm test valve to the open position. The alarm should sound. Turn to closed position.
- 4.2.2.3. Depress the Drip Check to release accumulated water and to check main valve leakage (Significant water accumulation on the system side may indicate a sealing problem).

4.2.3 Semi-Annual Inspection

- 4.2.3.1. Complete Weekly and Monthly Inspection and Test.
- 4.2.3.2. Inspect the electric detection system and electric release control panel, as suggested by the release control panel manufacturer.

4.2.4 Annual Inspection and Test

- 4.2.4.1. Complete Weekly, Monthly and Semi-Annual inspections.
- 4.2.4.2. The Deluge Valve must be activated at full flow.
Note: The system will be flooded! Take all necessary precautions to drain water and prevent damage in the area protected by the system.
- 4.2.4.3. Trip-test the deluge system via the electric release control panel (if installed). The release may be tripped by the method suggested by the release control panel manufacturer.
- 4.2.4.4. Trip test the deluge system by decreasing pressure in the pneumatic release system (if installed).
- 4.2.4.5. The manual emergency release handle is to be pulled. The Deluge Valve should open and discharge water. Observe upstream Pressure Gauge while full flow is on. Inspect all system nozzles.
- 4.2.4.6. Take all additional measures as required by NFPA-25 "Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems".
- 4.2.4.7. Clean the priming strainer prior to resetting the Deluge Valve.
- 4.2.4.8. Place the system back in service. (See instructions "Placing in Service/Resetting").

4.2.5 Five-Years Inspection and Test

- 4.2.5.1. Complete Weekly, Monthly, Semi-Annual and Annual inspections.
- 4.2.5.2. Place the system out of service (See "Removing the System from Service" above).
- 4.2.5.3. The interior of the Deluge Valve should be cleaned and inspected.
- 4.2.5.4. The Elastomeric Diaphragm Assembly shall be inspected for wear and replaced if necessary.
- 4.2.5.5. Place the system back in service. (See instructions "Placing in Service/Resetting").
- 4.2.5.6. The valve and the pilot system must be activated at full flow.
- 4.2.5.7. Take all additional measures as required by NFPA-25 "Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems."

5. Abnormal Conditions

5.1 Alarm Pressure Switch Fails to Sound

- 5.1.1 Check for obstructions in the alarm test line.
- 5.1.2 Clean the alarm-line strainer (if a water motor alarm is installed).
- 5.1.3 Make certain the alarm is free to operate.
- 5.1.4 Test the electrical circuit to the electric alarm (if utilized).

5.2 False Trip:

- 5.2.1 Check and test the electrical circuit to the Solenoid Valve.
- 5.2.2 Check for Malfunctioning EMR device

5.3 Leakage through Deluge Valve

- 5.3.1 Check for clogged priming strainer
- 5.3.2 Leaking control trim system
- 5.3.3 Inadequate pneumatic pressure supply
- 5.3.4 Leaking Dry Pilot release system
- 5.3.5 Damaged deluge valve internal elastomer or seat

5.4 Deluge Valve Will Not Reset

- 5.4.1 The Pilot Valve is clogged or not reset properly
- 5.4.2 Inadequate Pneumatic Pressure supply
- 5.4.3 Check for clogged priming strainer, the screen should be properly cleaned
- 5.4.4 Closed priming valve
- 5.4.5 Check for Foreign object lodged between seal and valve seat
- 5.4.6 Control Panel is not reset. Check for Faulty circuits, using manufacturer instructions
- 5.4.7 Leak in Dry Pilot Line release system
- 5.4.8 Clogged orifice assy

5.5 Difficulty in Performance

Where difficulty in performance is experienced, the manufacturer or his authorized representative should be contacted if any field adjustment is to be made.