

Model - 400E-5DC

Hydraulic Pressure Controlled On Off Deluge Valve

Installation

Operation

Maintenance



Application Engineering
Bermad

1. 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 from 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”

2. Description

BERMAD Hydraulically Controlled Deluge valve with 5DC trim is actuated by an HRV - Hydraulic Relay Valve (26B), which permits local release of top chamber pressure (instead of the usual remote top chamber release by the hydraulic release system), in order to ensure quick opening even when the release device is distant.

The Deluge Valve requires a wet pilot line system including hydraulic releases.

The HRV (26B fig.1) is normally held closed by pressure maintained in the hydraulic release system.

The 5DC trim uses a Normally Closed hydraulic release system with thermostatic releases and/or fixed temperature releases to release water pressure directly from the Deluge Valve top chamber.

The specific trim for the hydraulic pressure controlled Deluge Valve Type 5DC includes a HRV(26B fig.1), normally held closed by pressure maintained in the hydraulic release system, a #2-UL Pressure Reducing Pilot Valve (PRPV) and a Manual Emergency Release (15B fig.1).

In fire conditions, the release device on the control trim releases the pressure from the upper chamber, allowing the Deluge Valve to modulate open allowing water to flow to the system at the preset pressure. Water flows from any open nozzles and to alarm devices. The Deluge Valve with Pressure Reducing Trim is recommended where it is necessary to guard against over-pressure while maintaining a preset discharge pressure during system operation. This feature allows regulation of total system demand and can be used to limit excess flow from deluge systems with high-pressure water supply, or to reduce outlet pressure to a constant value according to the system component pressure rating and design, regardless of changes in the deluge valve inlet pressure.

This feature is also recommended where a reduction of pressure surges and/or water hammer is desired.

Deluge Systems are commonly used where it is desirable to simultaneously spray water from all open sprinklers and/or nozzles while the system is operating.

In the SET position, the line pressure supplied to the main valve's control chamber via the priming line, and through a Check Valve, an Accelerator with a priming restriction is trapped by the Check Valve, by the closed HRV and by a closed Manual Emergency Release. The trapped pressure holds the main valve's diaphragm and plug against the valve seat, sealing it drip tight and keeping the system piping dry.

Under FIRE condition, hydraulic pressure is lost in the sensing line causing the HRV valve to open. Pressure is then released from the main valve's control chamber to the downstream, through the Pressure Reducing (PR) Pilot and the opened HRV. Should system pressure rise above PR pilot setting, the PR pilot throttles, thereby enabling pressure to accumulate in the valve control chamber. This causes the 400E-5DC to throttle closed, decreasing system pressure to PR pilot setting. The Manual Emergency Release (15B fig.1) overrides the PR pilot, causing the 400E-5DC to open fully.

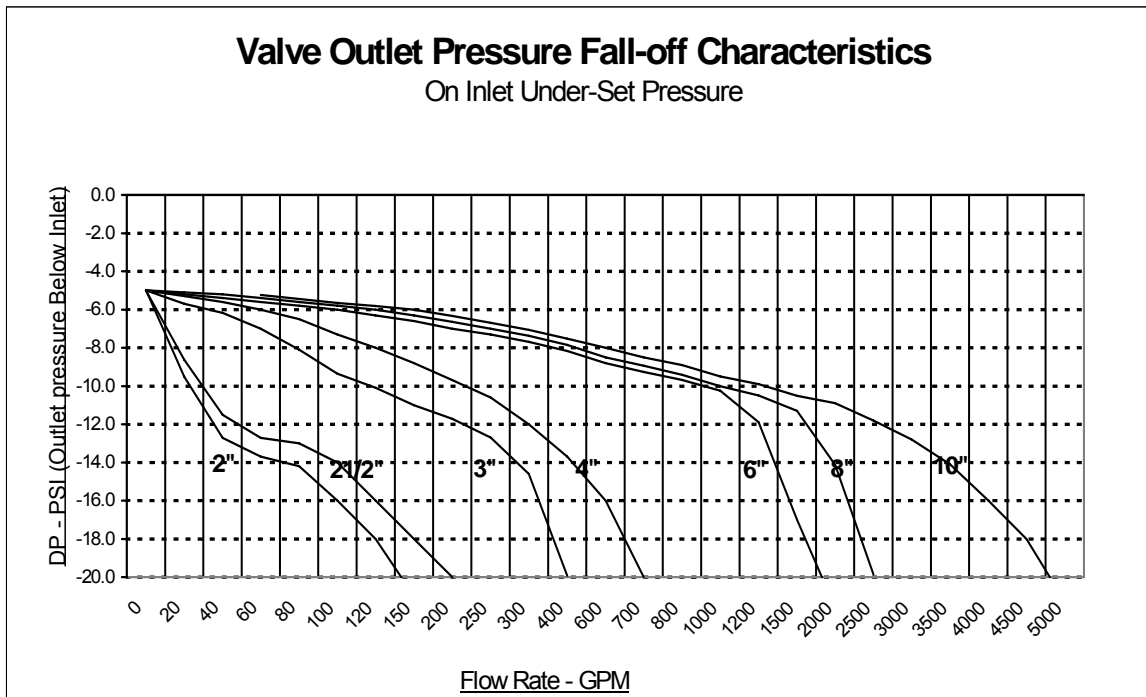
Flow and Pressure for Models 400E-2MC 2C, 3C, 3DC, 4C, 4DC, 5C, 5DC, 6C & 6DC

Valves sizes	2"	2½"	3"	4"	6"	8"	10"
Rated Inlet Pressure	250	250	250	250	250	250	250
Outlet Pressure Adjusting Range [psi (bar)]	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)
Minimum Flow-Rate [GPM (m ³ /hr)]	44 (10)	50 (11.5)	110 (25)	180 (401)	400 (91)	450 (102)	660 (150)
Maximum Flow-Rate [GPM (m ³ /hr)]	150 (34)	270 (61)	450 (102)	700 (159)	1600 (363)	3500 (795)	5000 (1136)



Attainable outlet pressure at inlet under-pressure

The following chart indicates the attainable outlet pressure available when the inlet pressure falls below the intended outlet pressure setting.



3. Australian Standard SSL

BERMAD 400E-5DC Deluge Valve is Australian Standard SSL when installed with specific components & accessories.

4. Installation

Subject to all other instructions, drawings and technical specifications, which describe the BERMAD 400E-5DC Deluge Valve, install in their proper positions the components comprising the Deluge Trim Package, according to the drawing relevant to the specific type, hereby enclosed.

- 4.1. Allow enough room around the valve assembly for any adjustments and future maintenance/disassembly work.
- 4.2. Before the valve is installed, flush the pipeline to remove any dirt, scale, debris, etc. Failure to do this might result in the valve being inoperable.
- 4.3. Install the valve in the pipeline with the valve flow arrow on the body casting in the proper direction. Ensure that the valve is positioned so that the cover/actuator can be easily removed for future maintenance.
- 4.4. Ensure that all other components are positioned correctly as per the appropriate drawing.
- 4.5. The water supply priming line must be connected to the upstream of the system control valve.
- 4.6. Subject to all other instructions, drawings and technical specifications, which describe Bermad Deluge Valve, install in their proper positions the components comprising the Deluge Trim Package, according to the drawing relevant to the specific type, hereby enclosed.
- 4.1. Install also the additional accessories, which appear in the drawing and which must be installed as shown in the schematic drawing.

Note: Pilot height value should not exceed that appearing on Table 1, "Maximum Allowed Elevation Above Valve".

WARNING: The Deluge Valve and trim must be installed only in areas where they will not be subjected to freezing temperatures.

Table 1:

Wet Pilot line Maximum Elevation Above Valve
 Bermad 400E with EasyLock Manual Reset

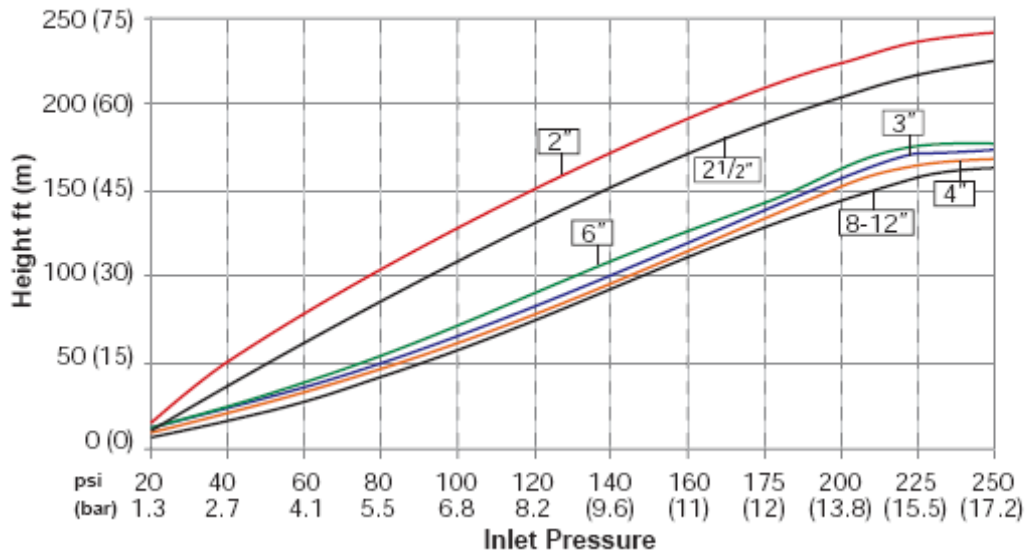
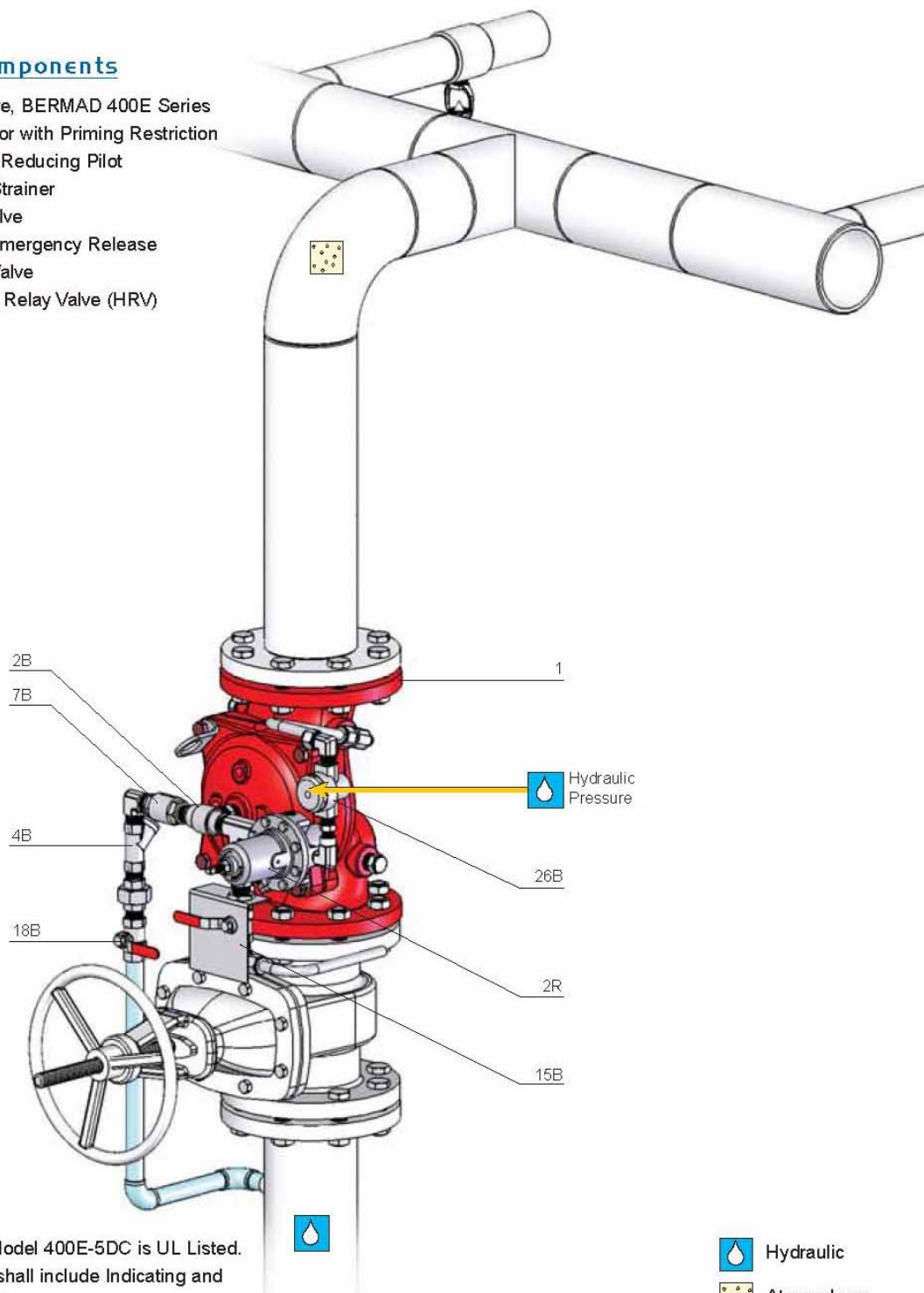




Figure 1: Installation Drawing

System Components

- 1 - Main Valve, BERMAD 400E Series
- 2B - Accelerator with Priming Restriction
- 2R - Pressure Reducing Pilot
- 4B - Priming Strainer
- 7B - Check Valve
- 15B - Manual Emergency Release
- 18B - Priming Valve
- 26B - Hydraulic Relay Valve (HRV)



Note
 The BERMAD Model 400E-5DC is UL Listed.
 The installation shall include Indicating and
 Drain Components.

 Hydraulic
 Atmosphere

5. Equivalent Length

Deluge Valve Equivalent Length Value (Steel Pipe), for use in hydraulically calculated systems

Valve Size	Equivalent Length Value Meter (Ft)
2"	9.1 (30) of 2" pipe
2½"	12.1 (40) of 2½" pipe
3"	13.7 (45) of 3" pipe
4"	14 (46) of 4" pipe
6"	27.4 (90) of 6" pipe
8"	45.7 (150) of 8" pipe

6. Optional Equipment

- 6.1 If required, provide an Alarm Pressure Switch, to either activate an electric alarm, or shut down desired equipment. Connect it according to manufacturer instructions.
- 6.2 If required, provide a Water Motor Alarm, it shall be assembled and installed according to instructions with in its package.
- 6.3 It is a recommended practice to provide an "Inspector's Test Connection" on the hydraulic release system. The inspector's Test Connection should be equipped with a ball valve (normally locked closed) capable of being opened to simulate the opening of a release.

7. Placing in Service/Resetting the System

- 7.1. Check the entire release system for leaks. Replace any fused thermostatic release, fixed-temperature-releases.
- 7.2. Check all emergency releases, making certain all valve handles are returned to the closed position.
- 7.3. Open priming-line valve (18B fig.1) and allow pressurized water to flow to the hydraulic release system, to the HRV (26B fig.1) and to the top chamber of the Deluge Valve.
- 7.4. When the pressure gauge on the top chamber indicates full service-line pressure and is no longer rising, the release system is reset.
- 7.5. Check the entire release system for leaks.
- 7.6. Open the system control valve slowly. No water should flow into system.
- 7.7. Depress the Drip Check and drain any water from the system side of the Deluge Valve.

The system is now operational and in a standby mode.
Ensure that the following Set Conditions are met.



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	OPEN position
Priming Ball Valve (18B fig.1)	OPEN
Control-Chamber Gauge	OPEN gauge valve, the Pressure Gauge indicates rate of pressure in Control-Chamber
Upstream Pressure Gauge	OPEN gauge valve, the Pressure Gauge indicates the upstream supply pressure to the Deluge Valve
Drip-Check Device	VENTED : Push the knob to confirm that there is no leakage.
Control Panel & Detections	Are in service and its stand-by position.
Releasing Devices	CLOSED with no leaking

8. Removing the System from Service

When taking 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 representative should also be notified when the system is taken out of service.

9. Removing Instructions

- 9.1. Shut off the main supply valve.
- 9.2. Priming- line valve (18B fig.1) to Deluge Valve should be closed.
- 9.3. Open all drain valves.
- 9.4. Release the water pressure from the hydraulic release system. This may be accomplished by opening the emergency release (15B fig.1).
- 9.5. Place "Fire Protection System Out of Service" signs in the area protected by the system.



10. Operation

The BERMAD Model 400E-5DC is suitable for systems that include wet pilot lines with closed fusible plugs (thermal releases), and piping systems with a wide variety of open nozzles. The typical wet pilot line is installed in the covered area and connected to the valve trim. Providing boosted local pressure release from its control chamber, the Model 400E-5DC is recommended for systems with remote and/or elevated pilot line fusible plugs. In the SET position line pressure, which is supplied to both the main valve's control chamber and a Hydraulic Relay Valve (HRV) by the priming line, through a Check Valve, an Accelerator with priming restriction and the wet pilot line restriction, is trapped by the Check Valve, by the closed HRV, by the closed wet pilot line and by a closed Manual Emergency Release. The trapped pressure holds the main valve's diaphragm and plug against the valve seat, sealing it drip tight and keeping the system piping dry. The HRV is held closed by the pressure in the wet pilot line.

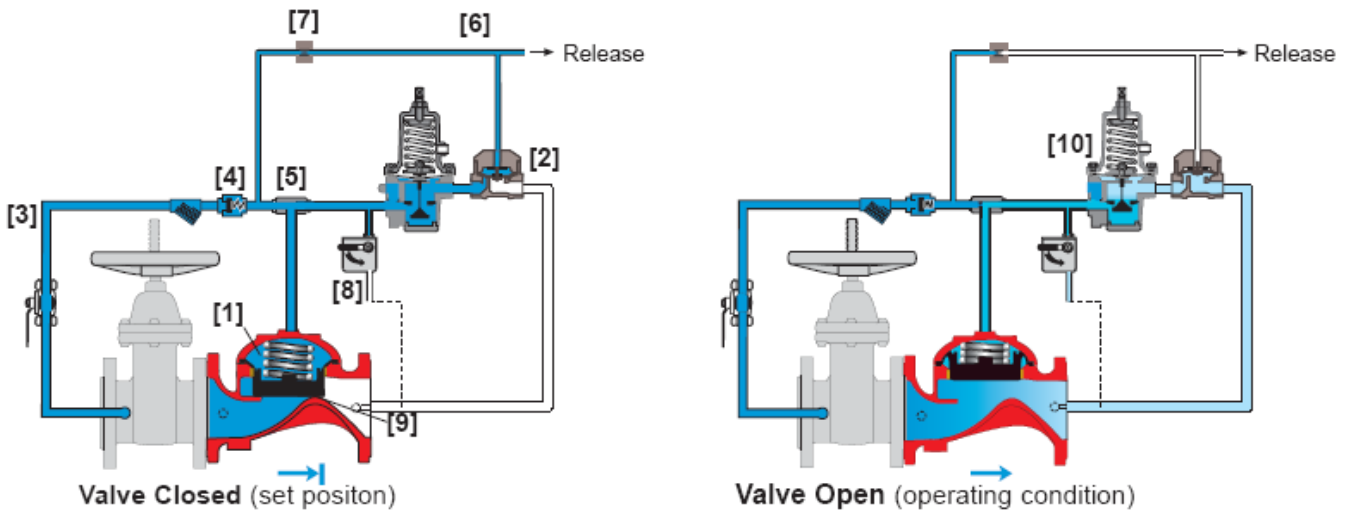
Under FIRE or TEST conditions, a pilot line hydraulic pressure drop opens the HRV causing water to exit through the Accelerator faster than it can be supplied. Pressure is then released from the main valve's control chamber through the opened HRV, or the Manual Emergency Release, allowing the main valve to fully open and water to flow into the system piping and to the alarm device (if mounted).

11. Manual Operation

Whenever the handle of the Manual Emergency Release is pulled, pressure is released from the top chamber, the Deluge Valve will open, and water will flow into system piping and alarm devices.

Note: The Manual Emergency Release (15B fig.1) overrides the PR pilot, causing the 400E-5DC to open fully.

Figure 2: Operation Drawing



12. Maintenance and Inspection Test

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.

- 12.1. 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 signaled.
- 12.2. In any of the following inspections or testing procedures, if an abnormal condition exists, see Abnormal Conditions (§17) for possible cause and corrective action.
- 12.3. See NFPA Pamphlet No.25.

Readjusting

The pilot valve is factory pre-set according to the stated demands of the customer. The pre-set is clearly indicated on the pilot valve tag.

If readjustment to either the pressure or valve response is required, follow the following steps.

1. Ensure that there is minimum flow through the main valve.(for Pilot setting flow rate see Table1, item Minimum flow rate for pilot setting.)
2. Free the tension between the adjusting screw on the pressure reducing pilot valve (2 in figure 2) and the fastening nut by turning the fastening nut counterclockwise.
3. By alternately turning the adjusting screw on the pilot valve a half turn and then reading the downstream pressure, gradually adjust the pressure:
 - Counterclockwise to decrease (-) the downstream pressure
 - Clockwise to increase (+) the downstream pressure.

13. Normal Conditions

- 13.1. All main control valves are open and sealed with tamperproof seals.
- 13.2. The alarm shut off valve is in the OPEN position.
- 13.3. The priming-line valve (18B fig.1) OPEN.
- 13.4. The priming-line gauge valve should be OPEN and gauge should reflect the hydraulic release system service pressure
- 13.5. Upstream pressure gauge valve OPEN and gauge should reflect the upstream pressure.
- 13.6. Hydraulic Release Systems – no leaks in system

14. Weekly Inspection

- 14.1. The system should be checked for normal condition.
- 14.2. Observe the upstream pressure gauge: it should indicate that the normal supply of water pressure to the Deluge Valve is maintained.

15. Monthly Inspection and Test

- 15.1. Complete Weekly Inspection.
- 15.2. Test the water-motor alarm or electric alarm (optional) by turning the alarm test valve to the open position. The alarm should sound. Turn to close position
- 15.3. Depress the Drip Check to release accumulation. (Significant water accumulation on the system side may indicate a sealing problem).

16. Annual Inspection and Test

- 16.1. Complete Weekly and Monthly inspections
- 16.2. Place the system out of service (See instructions above).
- 16.3. Trip the release-line system, clean all strainers, and priming-line restriction
- 16.4. The interior of the Deluge Valve should be inspected and cleaned.
- 16.5. The interior of the HRV, including its Diaphragm and Seal, should be inspected and cleaned.
- 16.6. Place the system back in service. (See instructions "Placing the System in Service").
- 16.7. The Deluge Valve, Trim, Auxiliary Devices and Manual Release must be activated at full flow.
- 16.8. Note: The system will be flooded! Take all necessary precautions to drain water and prevent damage in the area protected by the Deluge system.
- 16.9. Trip test the Deluge System with an Electric Release Control Panel. The release may be tripped by the method suggested by the Release Control Panel manufacturer. Reset the system.
- 16.10. The Manual Emergency Valve Release Handle is to be pulled and tested. The Deluge Valve should open and discharge water.
- 16.11. Observe pressure on the upstream Pressure Gauge while full flow is on. Inspect all nozzles in the system. Take all additional measures as required by NFPA 25 "Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems."

17. Abnormal Conditions

17.1. Alarm Pressure Switch Fails to Sound

- A. Clean the alarm-line strainer or water-motor alarm strainers.
- B. Test for obstructions in the alarm test line
- C. Make certain the water-motor alarm is free to operate.
- D. Test the electrical circuit to the electric alarm (if utilized).

17.2. False Trip

Check for any of the following possible causes:

- A. Plugged priming restriction or strainer.
- B. Plugged Orifice Assy. or strainer.
- C. Malfunction or leaking release system.
- D. HRV out of order.

17.3. Leakage through Deluge Valve

Check for any of the following possible causes:

- A. Partially plugged Priming Restriction.
- B. Leaking release system
- C. Leaking Release System.
- D. Damaged deluge valve seat HRV out of order.

17.4. Deluge Valve Will Not Reset

Check for any of the following possible causes:

- A. An open main control valve
- B. System not properly drained
- C. Closed priming-line valve.
- D. Damaged Deluge Valve seat or seal
- E. Foreign object lodged between seal disc and valve seat.
- F. HRV not properly sealed

17.5. Electric Release System Will Not Reset

- A. Leak in release line
- B. Plugged Orifice Assy..
- C. Thermostatic Release or Fixed-temperature release open.
- D. Manual Emergency Release open.
- E. HRV not properly sealed.

17.6. 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.