

Bermad Double Interlock Preaction Electric/Pneumatic Release System Model: 400E-7DM/700E-7DM

Installation, Operation & Maintenance

Safety First

BERMAD believes that the safety of personnel working with and around our equipment is the most important consideration, read all safety information below before attempting to perform any maintenance function. Only authorized personnel should perform all maintenance tasks. Comply with all approved and established precautions for working with the equipment and/or environment. When performing a procedure, follow the steps in succession without omission.

Description

The Bermad 7DM Double-Interlock Preaction System is best suited for water-sensitive areas that require the maximum protection against false actuation. Double-Interlock systems are defined as systems that admit water to sprinkler piping only upon operation of **both detection devices and automatic sprinklers**. The sprinkler piping and electric fire detection devices are automatically supervised.

The system include a Bermad Water Control Valve with double-interlock control trim, attached to dry sprinkler piping system with automatic sprinklers and a supplementary electric detection system installed in the same area (as defined by NFPA 13).

The Bermad Water Control Valve remains locked by water trapped in the control chamber. The closed valve prevents unintentional water flow into the sprinkler-system piping.

To flow water into the sprinkler piping, two operational requirements must be preformed:

- ◆ The fire-detection device must be activated
- ◆ The PORV, air pressure operated pilot valve must be activated by the loss of pneumatic system pressure due to sprinkler operation and pneumatic pressure release.

Causing the Bermad Water Control Valve to open and allow water flow into the piping system.

The Double-Interlock Preaction Systems are mostly used to protect computer & electronics rooms, libraries, museums & archives, telecommunication equipment, cable spreading rooms, transformer rooms and refrigerated areas where accidental water release before a sprinkler is open can cause ice blockage resulting in a useless sprinkler network and considerable damage to property.

This Bermad Valve is equipped with an EasyLock Manual Reset (EMR) device, which locks it into an open position during system activation. The Water Control Valve is operated by an electric Solenoid Valve and PORV pilot valve and requires a listed System Control Panel with a compatible electrical fire detection system.

Warning: Whenever either the Solenoid or the Manual Emergency Release (15B) is activated, the EMR locks the Bermad Water Control Valve in its open position. The Bermad Water Control Valve will close again only when the local reset button on the EMR is pressed.

Approvals/Listings

The Bermad 7DM Preaction System is UL Listed only when installed with specific components & accessories. Refer to current UL Directory. Consult the manufacturer for any component approval recently to appear in the UL fire protection equipment directory.

Installations

NOTES:

- ◆ Any deviation in trim size or arrangement may adversely affect the proper operation of the Preaction system.
- ◆ All initiating devices (detectors), indicating appliances, automatic sprinklers, as well as the Releasing control panel, must be compatible and UL listed for use with the particular Sprinkler System. Refer to current "UL Listed Fire Protection Equipment Directory". Refer also to NFPA 13 or the applicable installation standards, codes and authorities having jurisdiction.

Installation Instructions

1. Allow enough room around the valve assembly for any adjustments and future maintenance/disassembly work.
2. Before the valve is installed, flush the pipeline to remove any dirt, scale, debris, etc. Not flushing the line may result in the valve being inoperable.
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. Ensure that the EMR is Mounted Vertically (with the reset button up), and all other components are positioned correctly as per the appropriate drawing.
5. Install a Listed Indicating Valve as the main isolating valve upstream of the Preaction System (supervised "open").
6. Install also another Listed Indicating Valve downstream of the Preaction System (supervised "open") to shut off and isolate the sprinkler piping in order to allow **waterflow** testing and maintenance.
7. The water supply priming line must be connected to the upstream of the main isolating valve.
8. Subject to all other instructions, drawings and technical specifications, which describe Bermad Valve, install in their proper positions the components comprising the Water Control Trim Package, according to the drawing relevant to the specific type, hereby enclosed.
9. Install also the additional accessories, which appear in the drawing and which must be installed as shown in the drawing, although they are not packed together with the Bermad Valve itself.

Design Considerations

Electrical Requirements

All releasing and detection devices in the double-interlock system shall be controlled by a Releasing Control Panel. Wire all connections according to information and detailed wiring diagrams in publications provided by the releasing Control Panel manufacturer.

Connect the Low-Air-Supervised-Pressure Switch (P2) terminals Common and N.C. to the Control. These contacts must be in the open position when the system is pneumatically pressurized.

All system isolating valves must be equipped with a supervisory switch to monitor the normally open position. The switch must be wired to the Control Panel.

The Power Supply, the Standby Emergency Power Supply, the Battery Charger and the Rectifier circuitry are all contained within the Control Panel.

Standard Solenoid Valve Data (others are optional):

- ◆ Voltage: 24VDC
- ◆ Normally Position: NC
- ◆ Enclosure Type: 1,2,3,3S, 4 and 4X/IP-65 (For Hazardous Locations enclosure, see catalog)

Electrical Rating: 10.6 Watt / F (0.44 Amp) or less

Air-Pressure Requirements

In accordance with NFPA 13, Double-interlock Preaction systems require a minimum of 0.5 bar (7 psi) pneumatic pressure to regulate the sprinkler-piping network. The system shall maintain a pneumatic pressure between 1.4-1.6 bar (20-24 psi), requiring a dry nitrogen-gas supply or a clean, dependable and continuous compressed-air source using an independent air compressor or an Air Maintenance Device supplied by an external high pressure source.

The Low-Pressure Alarm Switch (P2) is factory-set to operate at 0.4 bar (6 psi) with decreasing air pressure. If necessary, adjustments can be made by following the manufacturer’s instructions.

NOTE: In refrigerated areas, the air's dew point must be maintained below the lowest ambient temperature to which the Double-Interlock System's piping might be exposed. Introducing moisture into system piping exposed to freezing temperatures can create ice blockage, which could interfere with the system's correct operation. At the least, the air supply should be taken from refrigerated areas at the lowest system temperature. The air supply must be carefully regulated to prevent clogging by frost deposits.

Temperature Considerations

The Water Control Valve, all interconnecting water piping and trim components must be installed in an accessible, clearly visible area maintained at a minimum temperature of 4°C.

NOTE: The Water Control Valve must be installed only in areas where it will not be subjected to freezing temperatures. No heat tracing is allowable for the Water Control Valve or for interconnecting piping.

Avoid situations in which the dry sprinkler network is exposed to extreme temperature variations. A rise in the temperature of the compressed air might increase pressure to more than that recommended.

Table 2: Bermad Valve Equivalent Length Value (Steel Pipe), for use in hydraulically calculated systems

400E		700E	
Valve Size	Equivalent Length Value In Meter (Ft)	Valve Size	Equivalent Length Value
2"	9.1 (30) of 2" pipe	2"	11 (36) of 2" pipe
2½"	12.1 (40) of 2½" pipe	2½"	26.2 (86) of 2½" pipe
3"	13.7 (45) of 3" pipe	3"	17.4 (57) of 3" pipe
4"	14 (46) of 4" pipe	4"	28.7 (94) of 4" pipe
6"	27.4 (90) of 6" pipe	6"	32.6 (107) of 6" pipe
8"	45.7 (150) of 8" pipe	8"	49.1 (161) of 8" pipe
		10"	64.3 (211) of 10" pipe

Ancillary/Optional Equipment

- ◆ Provide for a Waterflow Alarm Pressure Switch (P), (Model PS-10 or PS-40) to either activate an electric alarm, or shut down desired equipment. Connect it according to Figure 2.
- ◆ Provide for a suitable air compressor, nitrogen or an air maintenance device. See “System Air Pressure Requirements”.
- ◆ Provide Low-Air Pressure Switch (P2), (Model PS-10 or PS-40) to supervise the air pressure maintained in the sprinkler-piping network.
- ◆ For over 16 m3 (4000 gallon) volume of sprinkler piping network, it is recommended to install an Air Release Accelerator, consult Bermad for appropriate device.
- ◆ If required, provide a Water Motor Alarm, it shall be assembled and Installed according to instructions with in it’s package.

Operation

Principle of Operation

In the SET position, the line-pressure supplied to the main valve's control chamber via the priming line and through the EMR, is trapped by the EMR's internal check valve, Normally Closed solenoid valve (14B) and air pressure hold closed the PORV. The trapped pressure holds the main valve's diaphragm and plug against the valve seat, sealing it drip-tight and keeping the Bermad valve downstream side dry, the valve's downstream outlet is vented into the atmosphere by the Drip-Check Device (19B).

Air or Nitrogen pressure is maintained in the sprinkler piping and trapped in the system by the in-line Listed Swing-Check Valve ensuring that the piping and sprinklers are still closed and sealed.

In the event that the system piping is ruptured or a sprinkler head is accidentally opened, the low-air pressure switch will operate and an alarm will sound. The PORV will open but the main Water Control Valve, however, will not be released to flow water since the solenoid valve remains closed.

In the event that a fire detection device is falsely operated, the control panel will activate an alarm. The main Water Control Valve, however, will not be released to flow water since the solenoid valve remains closed due to the closed PORV.

If a fire-detection device is accidentally triggered, the Control Panel activates the solenoid, nevertheless, the Water Control Valve remains closed due to the closed PORV.

The requirement to activate both the Fire Detection Device and loss of air pressure before the Bermad Water Control Valve releases water assures maximum protection against unintentional waterflow.

In **FIRE** conditions, when both, the heat detecting system and the automatic sprinkler head operate, the pressure is released from the control chamber, by the energized solenoid valve through the opened PORV, the Main Valve opens and allows the inlet supply water to flow through the valve into the system piping and alarm devices. Water will flow and spray out from any open sprinkler on the system. The EMR prevents line-pressure from entering the control chamber, latching the main valve open.

WARNING: Whenever the handle of the Emergency Manual Release (15B) is pulled, the Bermad Valve opens, and water flows into the system's piping and to the alarm devices, the Valve will close again only when the handle of the Emergency Manual Release is returned to its original position and the local reset button on the EMR is manually pressed.

Placing in Service/Resetting the System

1. Place the Detecting System's circuit in service and test regulatory circuits in the Release Control Panel, locating and replacing any faulty items. Test supervisory circuits in releasing control panel.
2. Apply supervisory air pressure to the system's piping and set the pressure at 1.5 ± 0.1 bar.
3. De-energize the Solenoid Valve (14B) by resetting the Electric Control Panel.
4. **Close** all emergency release valves.
5. **Close** All Drain Valves (5A & 5H).
6. **Open** the priming-line valve (18B), **push** and hold the **EMR's** reset button, this allows upstream water pressure to fill the Water Control Valve's control chamber.
7. When the control chamber pressure gauge indicates full upstream pressure and is no longer rising, the release system is reset.
8. Slowly **Open** the supply Isolating Valve and check that no water flows into the system.
9. **Depress** the Drip-Check (19B) and drain any water from the downstream side of the valve.

- Test settings for the Low Air-Pressure Switch (P2) by releasing air from the Sprinkler Test Valve or gradually open the Sprinkler-System Drain Valve (5H).

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 (11A)	OPEN position
Priming Ball Valve (18B)	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 Water Control Valve
Drip-Check Device (19B)	VENTED : Push the knob to confirm that there is no leakage.
Control Panel & Detections	Are in service and its stand-by position.
Supervised Air System	The Pressure Gauge shows 1.5 ±0.1 bar (22-24 psi). There are no air leaks.
Releasing Devices	CLOSED with no leaking

Maintenance

Removing The System From Service

WARNING: When taking the Preaction System and its sprinkler network out of service, a roving fire patrol should survey the system area. If automatic fire-alarm equipment is in use, 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 being taken out of service.

Removing Instructions

- Shut off** the main supply-isolating valve.
- Close the pneumatic pressure supply to the system.
- Close** the Priming line valve (18B) to Bermad Valve Control chamber.
- Open** all drain valves (5A & 5H).
- Release** the water pressure from the control chamber of the Water Control Valve by pulling the Manual emergency release (15B).
- If auxiliary power is used, disconnect all power supply and batteries.
- Place "Fire Protection System Out of Service" signs in the area protected by the system.

Inspection and Testing

1. **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.
2. 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.
3. In any of the following inspections or testing procedures, if an abnormal condition exists, see Abnormal Conditions for possible cause and corrective action.
4. See NFPA Pamphlet No. 25 and also relevant publications by authorities having jurisdiction.

Weekly Inspection

1. The system should be checked for Set Condition. See above "*Set Condition (Normal condition)*".
2. Verify that the upstream Pressure is within the normal operating range.

Monthly Inspection and Test

1. Complete Weekly Inspection.
WARNING: Manually activating the alarm affects the Control Panel, which in turn can cause a general alarm. Take all of the necessary precautions in order to prevent causing a false general alarm.
2. Test the Electric Alarm Bell and the Water-Flow Alarm (if installed) by turning the Alarm-Test Valve (1A) to the open position. The alarm should sound.
3. Depress the Drip Check (19B) to release any accumulation of water. The dripping should stop completely.

Semi-Annual Inspection

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

Annual Inspection and Test

1. Complete Weekly, Monthly and Semi-Annual inspections.
2. Close the Sprinkler-System Isolating Valve, to isolate the sprinkler system.
3. The Water Control Valve trim, releasing devices such as Solenoid valve, PORV pilot valve and manual release must be activated at full flow.
4. Trip test the Preaction System with the electric and pneumatic system activation. Operate Control Panel by operating the Heat Detectors, also release air pressure to operate the PORV. The Control Panel shall be tripped according to the method suggested by the Panel manufacturer. Observe upstream Pressure Gauge while full flow is on.
Note: Water will be discharged to the drain. In cases where a Sprinkler- Piping Isolating Valve is not installed, another arrangement must be made in order to perform the trip test without causing water damage.
5. Place the system out of service. (See instructions above).
6. Clean the priming strainer (4B) prior to resetting the Water Control Valve.
7. Place the system back in service (See instructions in the section "Placing the System in Service").
8. Take all additional measures as required by NFPA-25 "Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems".

Every Five Years

During every fifth Annual Inspection, Open and clean the interior of the Water Control Valve and System Check Valve, replace all elastomers with original manufacturer's spare parts.

Abnormal Condition – Troubleshooting

1. Alarm Fails To Sound

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

2. False Trip

- A. Check and test the electrical circuit to the Solenoid Valve (14B)
- B. Check for Check for Malfunctioning EMR device.
- C. Check and test the PORV activation (while the solenoid valve is energized)

3. Leakage Through the Water Control Valve

- A. Check for clogged priming strainer (4B).
- B. Leaking control trim system.
- C. Damaged Water Control valve internal elastomer or seat

4. Water Control Valve Fail to Reset

- A. The EMR Device is clogged or not reset properly
- B. Check for clogged priming strainer (4A), the screen should be properly cleaned.
- C. Closed priming valve (18B).
- D. Check for Foreign object lodged between seal and valve seat.
- E. Control Panel is not reset. Check for Faulty circuits, using manufacturer instructions.

5. Difficulty in Performance

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