

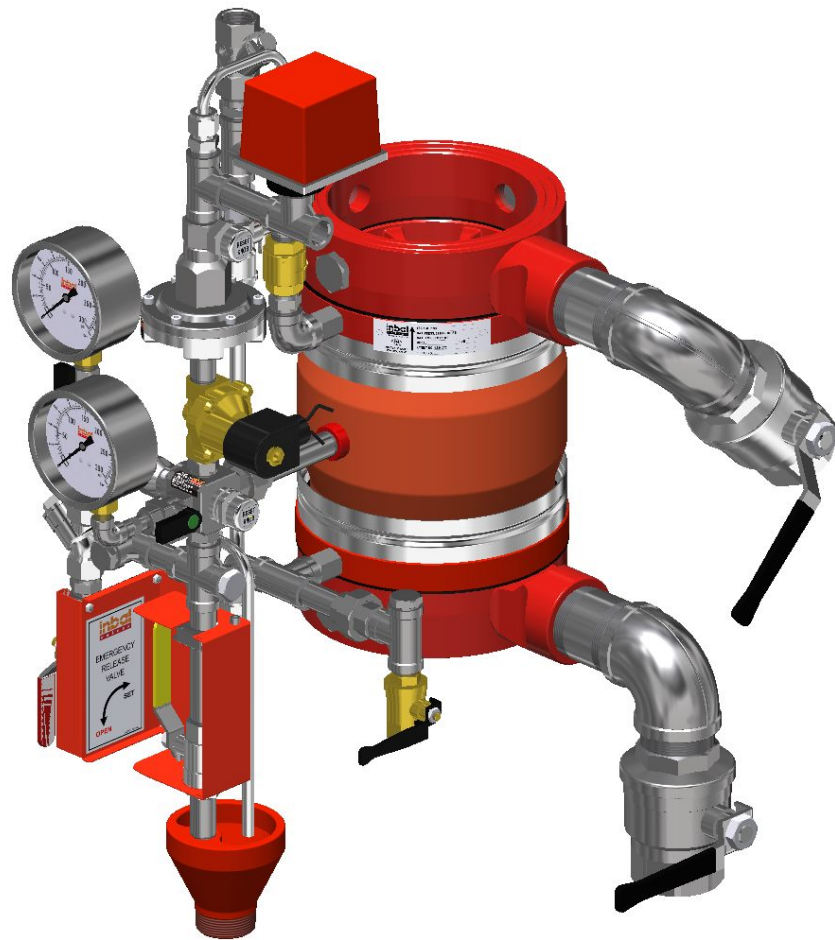
Inbal Preaction Valve, Double Interlock



Series 700D/DG/DX - 04/14/24K01

Electric Actuation

FM Approved



Model 799DG-04K01

General Description

The **Inbal** Electrically Actuated, Double Interlocked Preaction Valve affords fire protection in refrigerated rooms in buildings and warehouses. It includes special safeguards against accidental filling of water and subsequent freezing of the system. This system is also known as Refrigerated Area Sprinkler System and is approved by Factory Mutual (FM).

The **Inbal** Double Interlocked Preaction Valve requires the operation of both an electric release system and a decrease of the air pressure in the sprinkler piping before water flows through the control valve into the piping system. Activation of one without the other will only activate an alarm signal. As soon as the releasing system and the sprinkler piping are reset, the **Inbal** Double Interlocked Preaction Valve resetting is merely done by activating the reset knobs.

The primary control valve in the double interlocked preaction system is the **Inbal** Dry Pipe Valve controlled by an electric detection and release system. The electric system consists of heat, smoke, or flame detectors, a control (fire alarm & releasing) panel, and a solenoid valve.

The **Inbal** Valve used in this preaction system is a pressure operated, sleeve actuated, axial valve designed for use in fire protection systems.

The control trim includes pilot valves, actuators, accessories, fittings, and gauges to provide for proper operation, either by vertical or horizontal installation.

The standard material **Inbal** Preaction Valve is rated to 300 psi (21 bar), but actually is limited to the Solenoid Valve's pressure rating. It is available in sizes 1½" (40 mm) to 12" (300 mm) with threaded, flanged, grooved, or wafer inlet and outlet ends.

The only moving part in the **Inbal** Valve, when it operates, is the reinforced sleeve, which forms a drip-tight seal with the corrosion resistant core. It has a smooth opening to prevent any water hammer in the piping system.

The unique design and variety of materials and coatings make the **Inbal** Double Interlocked Preaction Valve dependable for prolonged periods of service, unaffected by various water qualities.

Technical Data

Approvals

The **Inbal** Refrigerated Area Sprinkler System models:

711D -24K01	733D -24K01	799D -24K01
711D -04K01	733D -04K01	799D -04K01
711DX -24K01	733DX -24K01	799DX -24K01
711DX -04K01	733DX -04K01	799DX -04K01
711DG -24K01	733DG -24K01	799DG -24K01
711DG -04K01	733DG -04K01	799DG -04K01

are FM Approved to 300 psi (21 bar) * in sizes 2", 3", 4", 6", 8", 10" and 12" (50, 80, 100, 150, 200, 250 and 300 mm), with threaded, flanged and wafer ends. Consult the FM Approval Guide for acceptable applications. **Inbal** Deluge Valves have Lloyd's, DNV-GL, and ABS Type Approvals for all sizes.

* Provided it is the pressure rating of the solenoid valve in use

Model Numbers

Inlet End	Outlet End	Model No.
Threaded	Threaded	711DX-04K01
Threaded	Grooved	716DX-04K01
Flanged	Flanged	733DX-04K01
Flanged	Grooved	736DX-04K01
Grooved	Grooved	766DX-04K01
Threaded	Threaded	799DX-04K01

"DX" can be replaced with "D" or "DG" depends on the **Inbal** Automatic Water Control Valve series in use. See bulletins F02-01, F02-02, and F02-03.

The above model numbers refer to potable water trimmed valves. For sea / brackish water control trim replace "04" with "24". For example: 799D-24K01 is a wafer type valve with sea water electrically actuated, double interlocked, preaction trim.

Sizes

Threaded End:

1½", 2", 2½" & 3" (40, 50, 65 & 80 mm).

Flanged and Grooved Ends:

1½", 2", 2½", 3", 4", 6", 8", 10" & 12" (40, 50, 65, 80, 100, 150, 200, 250 & 300 mm).

Wafer End:

3", 4", 6", 8", 10" & 12" (80, 100, 150, 200, 250 & 300 mm).

End Standards

Threaded End:

NPT or BSPT.

Flanged End:

ANSI B16.5 class 150 & 300;¹

ISO 7005 - PN10, 16 & 25;¹

BS 10 Table D & E;²

AS 2129 Table D & E;²

Jis B 2212, 2213, 2214.²

Wafer End:

Fits most of the above standards.

Grooved End:

ANSI/AWWA C606-87.

(1) - On standard

(2) - On a special request

Pressure Rating

Maximum working pressure: 300 psi (12 bar) but depends on the solenoid valve pressure rating, in use.

Temperature Range

Water Max. +150°F (+65°C).

Installation Position

Vertical or horizontal.

Solenoid Valve

Standard

FM Approved models:

2 way, normally closed,

157-01A — Brass body; ½"; 24 V DC; IP 65; 9 Watt; to 290 psi (20 bar)¹

157-02A — Brass body; ½"; 24 V DC; NEMA 1,2,3,3S,4,4X; 10 Watt; to 290 psi (20 bar)²

157-12A — Brass body; ½"; 24 V DC; NEMA 3,3S,4,4X,7,9; 10 Watt; to 290 psi (20 bar)²

157-15A — Brass body; ½"; 24 V DC; EEx dm IIC T4 IP67 Flameproof; 8 Watt; to 290 psi (20 bar)³

157-42A — Brass body; ½"; 24 V DC; NEMA 1,2,3,3S,4,4X; 10 Watt; to 175 psi (12 bar)²

157-52A — Brass body; ½"; 24 V DC; NEMA 1,2,3,3S,4,4X; 10 Watt; to 175 psi (12 bar)²

157-54A — Brass body; ½"; 12-24 V DC; NEMA 1,2,3,3S,4,4X; 2 Watt; to 300 psi (21 bar)²

(1) - Din 43650A connector

(2) - ½" Conduit, 18" leads

(3) - M20x1.5

Optional

Energized to open, energized to close, types in various voltages, frequencies, enclosures, and pressure ratings.

See bulletins F30-10 and F30-12.

Materials

Standard

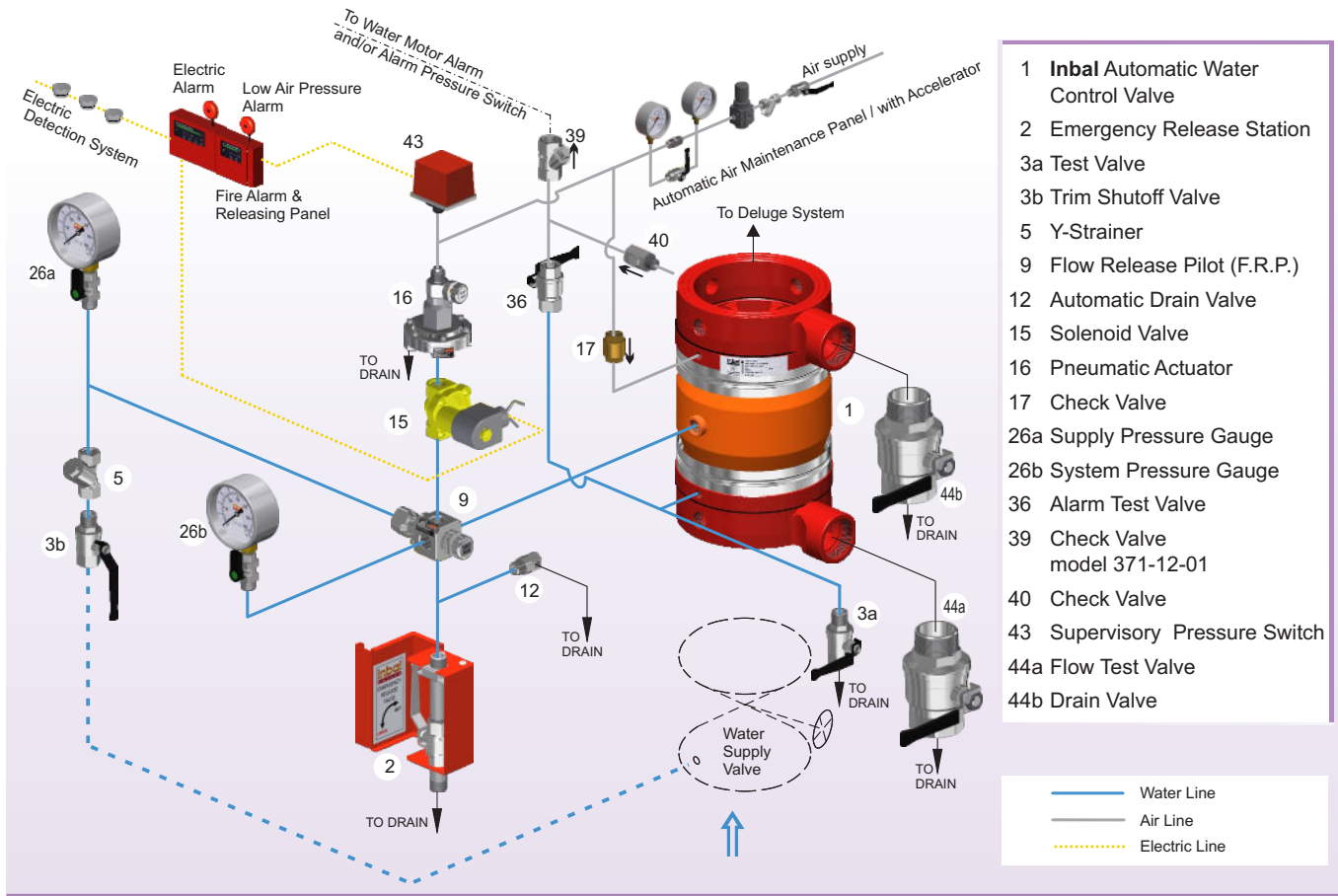
Valve Housing:

Forged Steel (SAE 1021).

Valve Ends and Wafer Flow Test & Drain Ends:

Ductile Iron (ASTM A536 65-45-12).

Schematic Control Diagram – 700DG-04K01



- 1 Inbal Automatic Water Control Valve
 - 2 Emergency Release Station
 - 3a Test Valve
 - 3b Trim Shutoff Valve
 - 5 Y-Strainer
 - 9 Flow Release Pilot (F.R.P.)
 - 12 Automatic Drain Valve
 - 15 Solenoid Valve
 - 16 Pneumatic Actuator
 - 17 Check Valve
 - 26a Supply Pressure Gauge
 - 26b System Pressure Gauge
 - 36 Alarm Test Valve
 - 39 Check Valve model 371-12-01
 - 40 Check Valve
 - 43 Supervisory Pressure Switch
 - 44a Flow Test Valve
 - 44b Drain Valve
- Water Line
— Air Line
- - - Electric Line

Threaded, Flanged, and Grooved Flow Test & Drain Ends:
Carbon Steel (SAE 1020).

Sleeve:
SMR5 Elastomer reinforced with Polyester and Kevlar.

Control Trim:
Brass Nickel Chrome plated, Stainless Steel, and Galvanized Steel.

Optional

- Cast Steel;
- Bronze;
- Nickel Aluminum Bronze;
- Stainless Steel AISI 316;
- Super Austenitic Stainless Steel;
- Super Duplex Stainless Steel;
- Titanium.

Coating

Standard

Powder epoxy coated. Thickness: 0.004" (0.1 mm) external and internal surfaces.

Optional

High built epoxy coated and polyurethane finish. Thickness: 0.01" (0.3 mm).

Halar® coated. Thickness: 0.02" (0.5 mm).

Halar® is a registered trade mark of Amusement USA Inc.

Control Trim

On standard, the control trim is supplied preassembled in sections. If self-assembly is required, all the trim components are supplied in loose form. The Control Trim can be also supplied completely assembled on the Valve body when requested. The complete control trim includes the following components:

- Solenoid Valve, 2 way.
- Resettable Pneumatic Actuator.
- Flow Release Pilot (F.R.P.)
- Supervisory Pressure Switch.
- Y-Strainer with a stainless steel screen.
- Alarm Test Valve – 2 way, quarter turn ball valve.
- Trim Shutoff Valve, Flow Test Valve, and Drain Valve – 2 way quarter turn ball valve.
- Check Valves – spring loaded ball type.
- Check Valve model 371-12-01 - Spring loaded, min opening pressure 40 [psi (2.7 bar)].
- Supply and System Pressure Gauges, with dual scale (psi and bar).
- Pressure Gauge Valves – 3 way, quarter turn ball valves.
- Drain Cup and drain tubes.
- Automatic Drain Valve.
- Emergency Release Station.

Features

- The unique design eliminates the need for a check valve.
- No Moving Mechanical Parts (N.M.M.P.) construction ensures a long life of dependable operation, reducing the cost of maintenance.
- Quick, yet soft opening performance — eliminates water hammer and consequent damages.
- Optional opening and/or closing speed control is available.
- Fast and easy reset by thumb activated knobs.
- Supplied full.
- Can be installed vertically or horizontally.
- Compact design — minimum space for valve and trim.
- Unique principle of operation prevents false operation due to water surges.
- Pressure rating to 300 psi (21 bar), provided a compatible solenoid valve is used.
- Wide selection of solenoid valves to meet various requirements for type of operation, voltage, frequency, protection and enclosure.
- Wide range of sizes for an ideal system design.
- Control trim made of high grade materials as standard.
- Epoxy coating supplied as standard — ensures excellent corrosion resistance.
- Variety of available materials — to ensure corrosion-free service even under severe conditions.
- Additional functions such as pressure control could be added on the same valve body.

Operation

The Control Chamber of the **Inbal** Automatic Water Control Valve is the annular space between the valve Housing and the Sleeve. The valve is held in a closed position as long as inlet pressure is maintained in the Control Chamber.

In the set position the water pressure is applied to the Control Chamber of the **Inbal** Valve and to the Solenoid Valve from the upstream of the Water Supply Valve. The de-energized Solenoid Valve is closed. The sprinkler piping system over the protected area contains air/gas under pressure, which holds the Pneumatic Actuator closed. Consequently, the **Inbal** Valve stays closed.

If only a detecting device activates the Solenoid Valve the **Inbal** Valve stays closed and only an alarm signal is actuated.

If one or more of the automatic sprinklers in the piping system operates, an alarm sounds, but the **Inbal** Valve stays closed.

Simultaneous activation of both the detection device and one or more of the automatic sprinklers in the piping system will open the **Inbal** Valve. These operations release water from the Control Chamber. The **Inbal** Valve opens wide,

introducing a flow of water to the system while activating the system alarm devices. Water will flow from any open sprinkler on the system. The operation of the **Inbal** Preaction Valve and the flow released from the Control Chamber activate the Flow Release Pilot (F.R.P.) to latch in an open position, isolating the Control Chamber from the inlet water supply. The F.R.P. operation prevents the **Inbal** Valve from closing even if the open releasing systems close. The **Inbal** Valve will close only when the Resetting procedure is followed.

The Emergency Release Valve is used for emergency actuation of the **Inbal** Preaction System and for routine testing.

Installation

Refer to the Trim Chart applicable to the specific **Inbal** Double Interlocked Preaction Valve model in use.

1. When the **Inbal** Double Interlocked Preaction Valve is delivered, care-fully unpack and visually check that there has been no damage to the operating components, piping, and fittings.
2. Always flush the pipelines before installing the **Inbal** Valve.
3. Place the **Inbal** Valve in the piping at the outlet of the Water Supply Valve. Verify that the arrow on the valve Housing matches the actual flow direction. Determine which side the system will be accessed from and locate the **Inbal** Valve accordingly.
4. Install the **Inbal** Valve in the pipeline. Use gaskets, bolts, stud bolts, bolt sleeves, and nuts as required by the valve ends.
5. The Trim supplied assembled with a **Inbal** Valve, or assemble the trim if ordered in loose component form. Refer to the applicable Trim Chart.
6. The water pressure supply to the control trim must always be sourced from the inlet of the Water Supply Valve through a ½" pipe.
7. Assemble the Solenoid Valve according to the drawing, the applicable bulletin of the Solenoid Valve, and direction of flow. The Solenoid Valve must be wired in accordance with the requirements of the authorities having jurisdiction and/or NEC, IEC, or GENELEC standards and codes. Wiring should be done by a licensed electrician.
8. Connect the air supply through the **Inbal** Automatic Air Maintenance Panel to the valve trim. The air supply must be regulated and maintained automatically. It is recommended to preset the Automatic air Maintenance Panel to maintain a constant air supply equal to the "minimum recommended sprinkler piping pressure" as shown in Graph (1) in bulletin F32-02. The Air Pressure

Supervisory Switch should be set to activate at a pressure drop of 5 psi (0.35 bar).

9. The air supply must be restricted to ensure that the automatic air supply cannot replace air as fast as it escapes when a sprinkler operates.
10. It is recommended to install an inspector's test valve on the sprinkler piping system. The inspector's test valve is a locked closed ball valve with an outlet end orifice equivalent to the smallest orifice of releasing device provided on the system. The inspector's test valve may be used to verify adequate loss of air pressure when the sprinkler piping system operates.
11. Set the **Inbal** Double Interlocked Preaction Valve by following to the Resetting procedure.
12. Test the **Inbal** Valve, the trim, and the alarms according to the Testing procedure.

Resetting

The **Inbal** Double Interlocked Preaction Valve must be reset and restored to service as soon as possible after automatic, emergency, or manual actuation.

1. Close the Water Supply Valve. The water flow alarms are reset.
2. Close the Trim Shutoff Valve.
3. Close the air supply valve.
4. De-energize the Solenoid Valve by resetting the detection system and the Fire Alarm & Releasing Panel. Verify that the Solenoid Valve is in a closed position and that the Electric Alarm is reset.
5. Open the Flow Test Valve and Drain Valve, allowing all the water to drain.
6. Inspect and replace any sprinklers that have operated, been damaged, or been exposed to fire conditions.
7. Inspect the trim and alarm Y-Strainers. Clean if necessary.
8. Verify that the Emergency Release Valve is in a closed position.
9. Close the inspector's test valve if it was in operation.
10. Open the Trim Shutoff Valve. Push and hold the reset knob on the Flow Release Pilot (F.R.P) and allow water pressure to build up in the trim and in the **Inbal** Valve Control Chamber. Verify that the pressure readings on both pressure gauges are equal.
11. Release the reset knob on the Flow Release Pilot.
12. Slightly open the Water Supply Valve. Allow the air that might be trapped in the section of pipe between the **Inbal** Valve and the Water Supply Valve to escape through the Flow Test Valve.
13. Close the Flow Test Valve.
14. Fully open the Water Supply Valve. Verify that there is no flow from the Drain Valve, downstream of the **Inbal** Valve.
15. Close the Drain Valve.

16. Open the air supply to fill the sprinkler piping system with air/gas. Use the air by-pass valve in the **Inbal** Automatic air Maintenance Panel to accelerate the filling paste. Push and hold the reset knob on the Pneumatic Actuator until the air pressure exceeds the "minimum recommended sprinkler piping pressure" as shown in Graph (1) in bulletin F32-02. Verify that the Pressure Supervisory Switch and Low Air Pressure Alarm are reset.
17. Release the reset knob on the Pneumatic Actuator.

Maintenance, Inspection, & Testing

It is recommended that periodic inspection and tests be conducted by qualified personnel to ensure that the **Inbal** Refrigerated Area Sprinkler System and related equipment are in good operating condition. The inspection and testing activities should be done according to NFPA Standards, the guidelines and regulations of the authorities having jurisdiction, and the following instructions. It is recommended that the **Inbal** Valve be tested, operated, cleaned, and inspected at least on a routine basis.

Inspection

A *weekly* Inspection is recommended:

1. Verify that the Water Supply Valve and the air supply valve are sealed in fully open position.
2. Verify that the required water and air pressures are being applied to the **Inbal** Valve inlet and trim.
3. Verify that the Trim Shutoff Valve, Alarm Test Valve, Emergency Release Valve, Pressure Gauge Valves, Condensate Valve (if in use), Flow Test Valve, and Drain Valve are in set position.
4. The Supply, System, and Air Pressure Gauges should be checked for accuracy. Verify that the proper ratio of air or nitrogen pressure to the water supply pressure is being maintained. Refer to Graph (1) in bulletin F32-02.
5. Visually inspect for disconnected wires, broken or missing parts, or other evidence of impaired protection.

Strainer Cleaning

A *quarterly* Strainer Cleaning is recommended:

1. Close the Trim Shutoff Valve.
2. Remove the covers of the trim and alarm Y-Strainers. Clean if necessary.
3. Open the Trim Shutoff Valve.

Alarm Testing

A *quarterly* Alarm Testing is recommended:

Water Flow Alarm

1. Test the Water Motor Alarm or Alarm Pressure Switch by opening the Alarm Test Valve.
2. Water Motor Alarm should be audible. Pressure Switch should activate. Verify that remote station alarm signals are properly received.
3. Close the Alarm Test Valve. All local alarms should stop

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sounding and pressure switch is reset. All remote alarms should reset.

4. Verify that supply piping to alarm drains properly.

Low Air Pressure Alarm

1. Close the Water Supply Valve.
2. Partially open the inspector's test valve in the sprinkler piping system to reduce the pressure to, but not below, the predetermined alarm level.
3. Verify that the Low Air Pressure Alarm operates properly.
4. Close the inspector's test valve. Verify that normal pneumatic pressure is re-stored and that the Low Air Pressure Alarm and Air Pressure Supervisory Switch are reset.
5. Open the Water Supply Valve.

Preaction Trim Testing

A *semi-annual* Deluge Trim Testing is recommended. Testing of the control trim is conducted with no flow of water to the system.

1. Open the Flow Test Valve to flush away debris or foreign particles, which may have accumulated in the **Inbal** Valve inlet.
2. Close the Flow Test Valve.
3. Close the Water Supply Valve.
4. Energize the Solenoid Valve by manually operating the Fire Alarm & Releasing Panel. Verify that the Electric Alarm operates but the System Pressure Gauge reading has not dropped.
5. De-energize the Solenoid Valve by resetting the Fire Alarm & Releasing Panel.
6. Open the sprinkler system inspector's test valve and let the air/gas pressure in the piping system decrease. The Low Air Pressure Alarm should operate. Verify that the System Pressure Gauge reading has not dropped.
7. At this position, re-energize the Solenoid Valve. The Electric Alarm operates and water should be drained from the deluge trim. Wait until the pressure reading on the System Pressure Gauge drops to zero, which simulates an open position of the **Inbal** Preaction Valve.
8. Reset the valve by performing the instructions in Resetting.

Trip Testing

By performing the Trip Test, the sprinkler piping system will be flooded with water, and water will flow from any open release in the system. The **Inbal** Preaction Valve should be trip tested *annually* with the Water Supply Valve partially open, and *every 3 years* with the Water Supply Valve fully

open. The Trip Testing should be done during warm weather.

1. Open the Flow Test Valve to flush away debris or foreign particles, which may have accumulated in the **Inbal** Valve inlet.
2. Close the Flow Test Valve.
3. Record the water supply pressure and system pneumatic pressure.
4. Trip the **Inbal** Valve to open by either:
 - a) Operating the electric detection system and opening the sprinkler system inspector's test valve.
 - b) Opening the Emergency Release Valve. Opening of the inspector's test valve would be required to verify flow.
5. The **Inbal** Valve should open, filling the sprinkler system with water. Record the elapsed time for the development of a full flow of water from the inspector's test valve.
6. Verify that all the alarms operate properly.
7. Reset the valve by performing the instructions in Resetting.
8. Verify that the water supply pressure and system pneumatic pressure have restored to the level as recorded in (3) above.

Removal

To remove the **Inbal** Preaction Valve:

1. Close all the pressure supply valves:
 - a) Water Supply Valve.
 - b) Trim Shutoff Valve.
 - c) Air supply valve.
2. Disconnect the electric wires from the Solenoid Valve. The electric work should be done by a licensed electrician.
3. Open the Emergency Release Valve to release the water pressure from the **Inbal** Valve Control Chamber.
4. Open the Flow Test Valve and Drain Valve to allow all the water and air to drain.
5. Disconnect the union and remove the trim from the valve.
6. Remove the **Inbal** Valve from the line for inspection.
7. To reinstall, follow the Installation procedure (use new gaskets for flanged or wafer valve).

Inquiries/Orders

The Data Sheet for Inquiries/Orders (bulletin F01-05) should be submitted. ●