

## OPERATION & MAINTENANCE INSTRUCTION MANUAL

### Pre-Action Valve, Double Interlock

#### Electric-pneumatic actuation & Pneumatic-pneumatic actuation

### General Description

The Model 5311 Pre-Action Valve, Double Interlocked, Electric-pneumatic actuation & Pneumatic-pneumatic actuation.

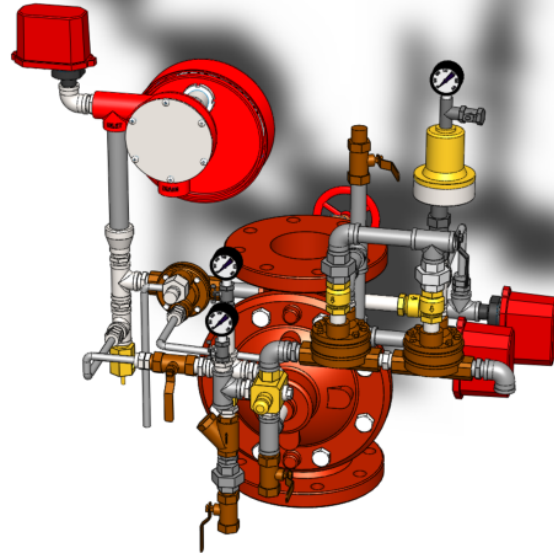
**Pneumatic-pneumatic actuation type:**

The valve will open to fill the sprinkler system with water only after both of the following occurrences. Activation of the release system and relieving of supervisory pressure from the sprinkler system. As soon as the releasing system and the sprinkler piping are reset, the Double Interlocked Pre-Action Valve resetting is merely done by activating the reset knobs. If only the pneumatic release system operates, an alarm will activate but the Deluge Valve will not open. If the sprinkler piping is damaged or a sprinkler is broken or fused but the pneumatic release system has not activated, an alarm will activate without opening the Deluge Valve.

**Electric-pneumatic actuation type.**

The electric is use a solenoid valve to replace the air actuator. Solenoid valve and air actuator in series. The air actuator communicated with the spray pipe or dry pipe line. And Solenoid valve and air actuator connected before and after. The valve will open to fill the sprinkler system with water only after both open of the Solenoid valve and air actuator.

**The Model 5311 Valve can also use for manual operation in case of emergency.**



The Model 5311 Valve is available in size 2" (50mm) to 12" (300mm). The valves have

flanged or grooved inlet and outlet ends and can be used in vertical or horizontal installation.

**TABLE 1-Technical Date**

Rated pressure:	300psi (2067 kPa)
Manufacturer test:	Hydrostatic test: 600psi (4134 kPa) Water seat: 600psi (4134 kPa) Air seat: 100psi (690 kPa)
End Connections:	Flange X Flange Flange X Groove Groove X Groove

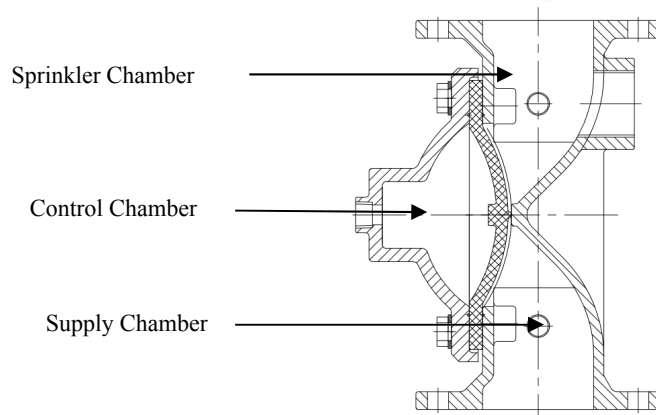
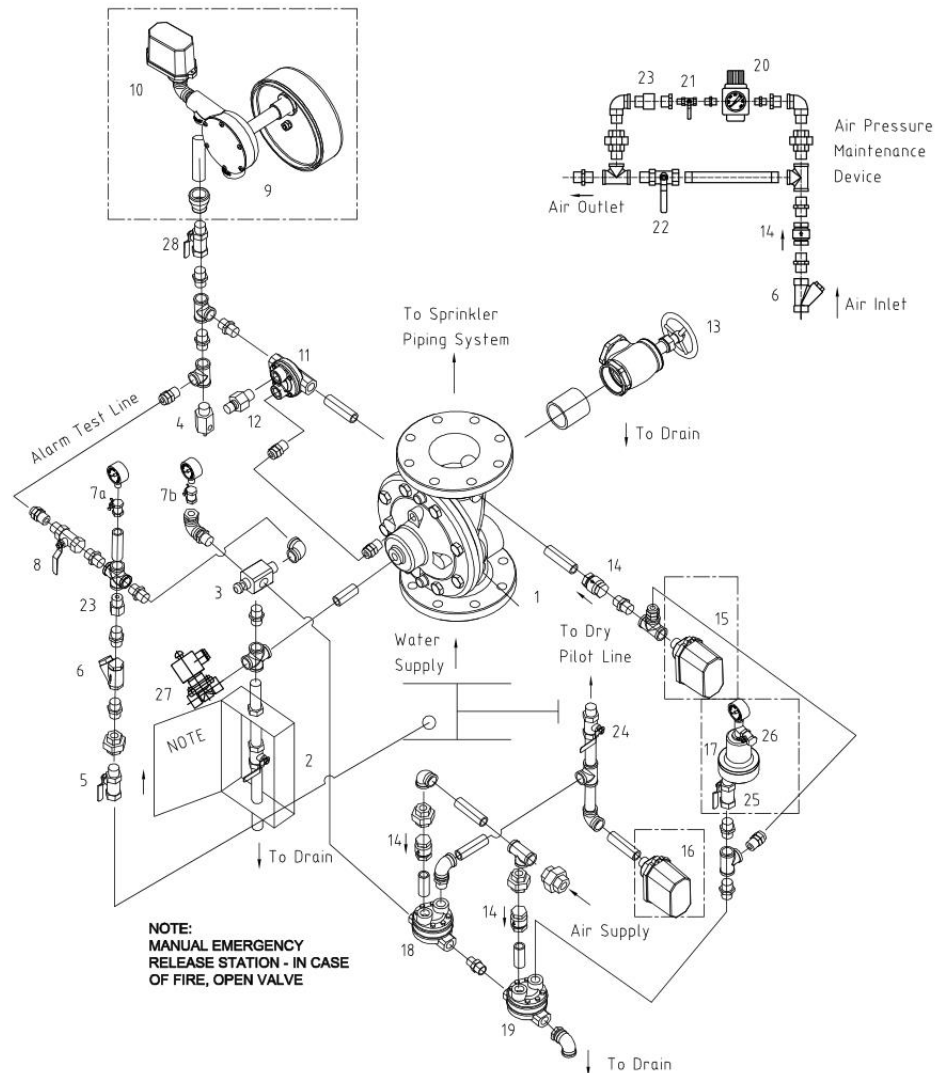
## OPERATION & MAINTENANCE INSTRUCTION MANUAL

### Pre-Action Valve, Double Interlock

#### Electric-pneumatic actuation & Pneumatic-pneumatic actuation

##### Double Air Trim Components

1. Automatic Water Control Valve
2. Emergency Manual Release Station (Normal closed)
3. Water Relay
4. Automatic Drain Valve
5. Trim Valve (Normal open)
6. Y-Strainer
- 7a. Supply Pressure Gauge (Normal open)
- 7b. System Pressure Gauge (Normal open)
8. Alarm Test Valve (Normal closed)
9. Water Motor Alarm (Optional)
10. Pressure Supervisory Switch
11. Hydraulic Actuator
12. Low-Pressure Drain Valve
13. Drain Valve (Normal closed)
14. Check Valve
15. Sprinkler Piping Air Pressure Supervisory Switch (Optional)
16. Pilot Line Air Pressure Supervisory Switch (Optional)
17. Accelerator (Optional)
18. Dry Pilot Pneumatic Actuator
19. Sprinkler Piping Pneumatic Actuator
20. Air Regulator
21. Slow Fill Valve (Normal open)
22. Fast Fill Valve (Normal closed)
23. Restrictor
24. Pilot Line Valve (Normal open)
25. Accelerator Inlet Valve (Normal open)
26. Accelerator Outlet Valve (Normal closed)
27. Solenoid Valve (Optional)
28. Water Motor Alarm Shutoff Valve (Normal open)



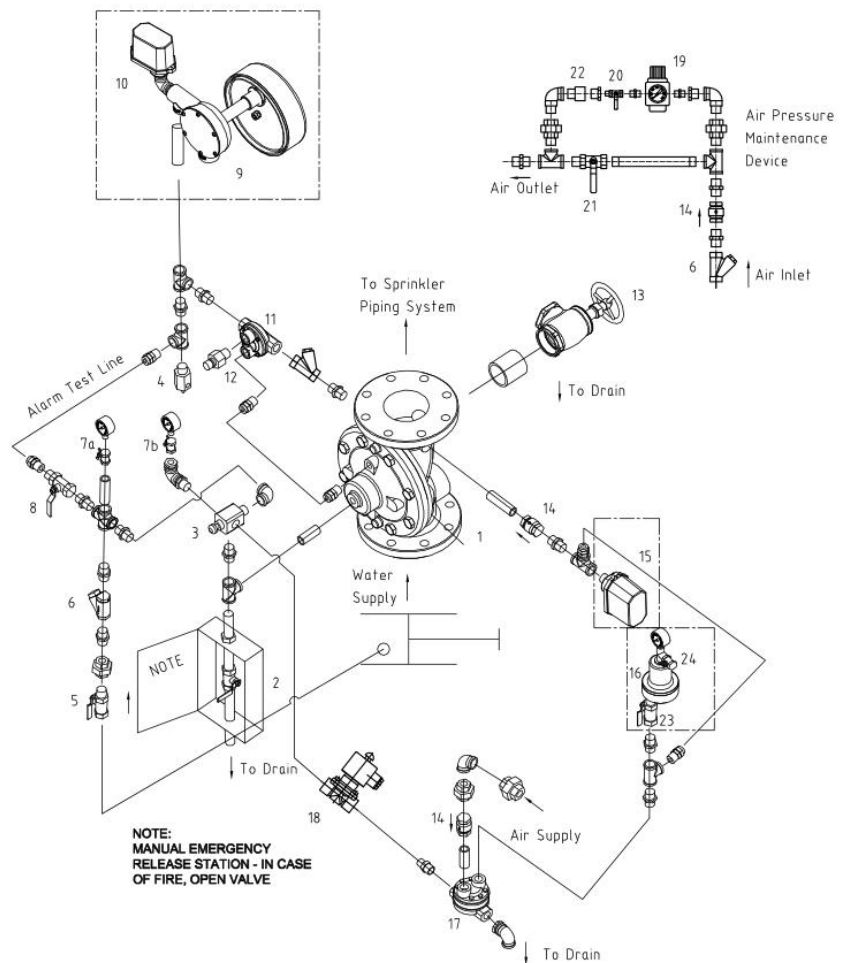
## OPERATION & MAINTENANCE INSTRUCTION MANUAL

### Pre-Action Valve, Double Interlock

#### Electric-pneumatic actuation & Pneumatic-pneumatic actuation

#### Electrically - Air Trim Components

1. Automatic Water Control Valve
2. Emergency Manual Release Station (Normal closed)
3. Water Relay
4. Automatic Drain Valve
5. Trim Valve (Normal open)
6. Y-Strainer
- 7a. Supply Pressure Gauge (Normal open)
- 7b. System Pressure Gauge (Normal open)
8. Alarm Test Valve (Normal closed)
9. Water Motor Alarm (Optional)
10. Pressure Supervisory Switch
11. Hydraulic Actuator
12. Low-Pressure Drain Valve
13. Drain Valve (Normal closed)
14. Check Valve
15. Sprinkler Piping Air Pressure Supervisory Switch (Optional)
16. Accelerator (Optional)
17. Sprinkler Piping Pneumatic Actuator
18. Solenoid Valve
19. Air Regulator
20. Slow Fill Valve (Normal open)
21. Fast Fill Valve (Normal closed)
22. Restrictor
23. Accelerator Inlet Valve (Normal open)
24. Accelerator Outlet Valve (Normal closed)



## OPERATION & MAINTENANCE INSTRUCTION MANUAL

### Pre-Action Valve, Double Interlock

#### Electric-pneumatic actuation & Pneumatic-pneumatic actuation

##### Double Air Trim Components Operation

The Double Air Interlocked Pre-Action Valve is held in a closed position as long as inlet pressure is maintained in the Control Chamber. In the set position, water pressure is applied to the Control Chamber from the Supply Chamber through the (3) Water Relay, The Pneumatic Actuators are held closed by the sprinkler piping supervisory pressure and the air pressure in the pilot release system.

Consequently, the (1) Automatic Water Control Valve stays closed keeping the piping system dry. The sprinkler piping and the pilot line are pressurized with air through the Air Maintenance Device.

When the dry pilot line operates, the pressure in the pneumatic pilot system drops, causing the (18) Dry Pilot Pneumatic Actuator to open and the (16) Pilot Line Air Pressure Supervisory Switch to activate. But the (19) Sprinkler Piping Pneumatic Actuator still closed, so, the pressure of Control Chamber remain, the (1) Control Valve keep closed.

When a sprinkler opens, supervisory pressure in the sprinkler piping is reduced causing the (19) Sprinkler Piping Pneumatic Actuator to open and the (15) Sprinkler Piping Air Pressure Supervisory Switch to activate. But the (1) Control Valve keep closed.

Only after the opening of both pneumatic actuators, the pressure of Control Chamber drops causing the Pre-Action Valve to open. Water will flow to the piping system and the Water Motor Alarm and/or Alarm Pressure Switch will activate. The (3) Water Relay isolate the Control Chamber from the inlet water supply. Consequently, the Automatic Control

Valve is latched in an open position and will not close until the Resetting procedure is followed.

##### Electrically - Air Trim Components Operation

The Electrically - Air Interlocked Pre-Action Valve is held in a closed position as long as inlet pressure is maintained in the Control Chamber. In the set position, water pressure is applied to the Control Chamber from the Supply Chamber through the (3) Water Relay, The Pneumatic Actuators are held closed by the sprinkler piping supervisory pressure and the air pressure in the pilot release system.

Consequently, the (1) Automatic Water Control Valve stays closed keeping the piping system dry. The sprinkler piping and the pilot line are pressurized with air through the Air Maintenance Device.

When the Solenoid Valve electrify, the Solenoid Valve open. But the (17) Sprinkler Piping Pneumatic Actuator still closed, so, the pressure of Control Chamber remain, the (1) Control Valve keep closed.

When a sprinkler opens, supervisory pressure in the sprinkler piping is reduced causing the (17) Sprinkler Piping Pneumatic Actuator to open and the (15) Sprinkler Piping Air Pressure Supervisory Switch to activate. But the (1) Control Valve keep closed.

Only after the opening of both Solenoid Valve and pneumatic actuator, the pressure of Control Chamber drops causing the Pre-Action Valve to open. Water will flow to the piping system and the Water Motor Alarm and/or Alarm Pressure Switch will activate. The (3) Water Relay isolate the Control Chamber from the inlet water supply. Consequently, the Automatic Control Valve is latched in an open



## OPERATION & MAINTENANCE INSTRUCTION MANUAL

### Pre-Action Valve, Double Interlock

#### Electric-pneumatic actuation & Pneumatic-pneumatic actuation

position and will not close until the Resetting procedure is followed.

#### Installation

Refer to the Trim Chart applicable to the specific Double Interlocked Pre-Action Valve model in use.

1. When the Double Interlocked Pre-action Valve is delivered, carefully 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 Valve.
3. Place the 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 Valve accordingly.
4. Install the Valve in the pipeline. Use gaskets, bolts, stud bolts, bolt sleeves, and nuts as required by the valve ends.
5. Complete the trim assembly by connecting the preassembled sections, or assemble the trim if ordered in loose component form. Refer to the applicable Trim Chart and Installation Guide.
6. The water pressure supply connection to the control trim must always be from the inlet of the Water Supply Valve through a 1/2" pipe.
7. Connect the air supply through the Air Maintenance Device. The air supply must be regulated and maintained automatically.
8. Set the air pressure to the required system air pressure. It will be operate before the pressure drops about 5 psi / 34kPa after controlling the flow of air to the orifice is

opened. Air pressure differing from the required system air pressure could reduce system operation response time. 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.

TABLE 2-Air Pressure Settings

Water Pressure		MIN	
psi	kPa	psi	kPa
20-60	138-414	9.5	65
61-100	415-690	12	83
101-140	691-966	15	103
141-175	967-1207	18	125
176-250	1208-1725	21	145
251-300	1726-2070	24	166

9. Set the Double Interlocked Pre-Action Valve by following the Resetting procedure.

#### Resetting

The Double Interlocked Pre-Action System must be reset and restored to service as soon as possible after automatic, emergency, or manual actuation.

#### Double Air Interlocked Pre-Action System

1. Close the Water Supply Valve. The water flow alarms are reset.
2. Close the (5) Trim Valve.
3. Close the (21) Slow Fill Valve and (22) Fast Fill Valve of the Air Maintenance Device.
4. Open the (13) Drain Valve and (26) Accelerator Outlet Valve, allowing all the water and air to drain. Then close them.
5. Inspect and replace any sprinklers that have operated, been damaged, or been exposed to fire conditions.

## OPERATION & MAINTENANCE INSTRUCTION MANUAL

### Pre-Action Valve, Double Interlock

#### Electric-pneumatic actuation & Pneumatic-pneumatic actuation

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>6. Inspect the trim and alarm Y-Strainers. Clean if necessary.</li> <li>7. Verify that the (2) Emergency Manual Release Station is in a closed position.</li> <li>8. Close the (28) Water Motor Alarm Shutoff Valve, and make sure the (8) Alarm Test Valve closed.</li> <li>9. Adjust the (20) Air Regulator of Air Pressure Maintenance Device make air pressure according to table 1. Open (22) Fast Fill Ball Valve until the pressure in the pipe close to the set point, close the (22) fast-fill ball valve and Open the (21)slow-fill ball valve.</li> <li>10. Open the (5) Trim Valve.</li> <li>11. Hold the reset knob on the (3) Water Relay and allow water pressure to build up in the trim and in the Valve Control Chamber. Pull up the (12) Low-Pressure Drain Valve until there is no water leak from outlet. Verify that the pressure readings on both pressure gauges (7a and 7b) are equal.</li> <li>12. Release the reset knob on the (3) Water Relay.</li> <li>13. Open the (28) Water Motor Alarm Shutoff Valve, allow the air that might be trapped in the section of pipe to escape.</li> <li>14. Open the (24) Pilot Line Valve to fill the piping system with air.</li> <li>15. Repeated Step11.</li> <li>16. Slightly open the Water Supply Valve. Check there is no water and air leak from (4) Automatic Drain Valve and all pipes.</li> <li>17. Record water supply and air supply pressure.</li> <li>18. Confirm that all valves are in their normal operating positions.</li> </ol> | <ol style="list-style-type: none"> <li>2. Close the (5) Trim Valve.</li> <li>3. Close the (20) Slow Fill Valve and (21) Fast Fill Valve of the Air Maintenance Device. Close the (24) Pilot Line Valve.</li> <li>4. Open the (13) Drain Valve and (24) Accelerator Outlet Valve, allowing all the water and air to drain. Then close them.</li> <li>5. Inspect and replace any sprinklers that have operated, been damaged, or been exposed to fire conditions.</li> <li>6. Inspect the trim and alarm Y-Strainers. Clean if necessary.</li> <li>7. Verify that the (2) Emergency Manual Release Station is in a closed position.</li> <li>8. Make sure the (8) Alarm Test Valve closed.</li> <li>9. Open the (5) Trim Valve.</li> <li>10. Hold the reset knob on the (3) Water Relay and allow water pressure to build up in the trim and in the Valve Control Chamber. Pull up the (12) Low-Pressure Drain Valve until there is no water leak from outlet.</li> <li>11. Adjust the (20) Air Regulator of Air Pressure Maintenance Device make air pressure according to table 1. Open (22) Fast Fill Ball Valve until the pressure in the pipe close to the set point, close the (22) fast-fill ball valve and Open the (21)slow-fill ball valve.</li> <li>12. When there is no water flowing out of the (17) Sprinkler Piping Pneumatic Actuator, close the solenoid valve.</li> <li>13. Verify that the pressure readings on both pressure gauges (7a and 7b) are equal.</li> <li>14. Release the reset knob on the (3) Water Relay.</li> <li>15. Slightly open the Water Supply Valve. Check there is no water and air leak from (4) Automatic Drain Valve and all pipes.</li> </ol> |
|---|---|
- Electrically - Air Interlocked Pre-Action System**
1. Close the Water Supply Valve. The water flow alarms are reset.





## OPERATION & MAINTENANCE INSTRUCTION MANUAL

### Pre-Action Valve, Double Interlock

#### Electric-pneumatic actuation & Pneumatic-pneumatic actuation

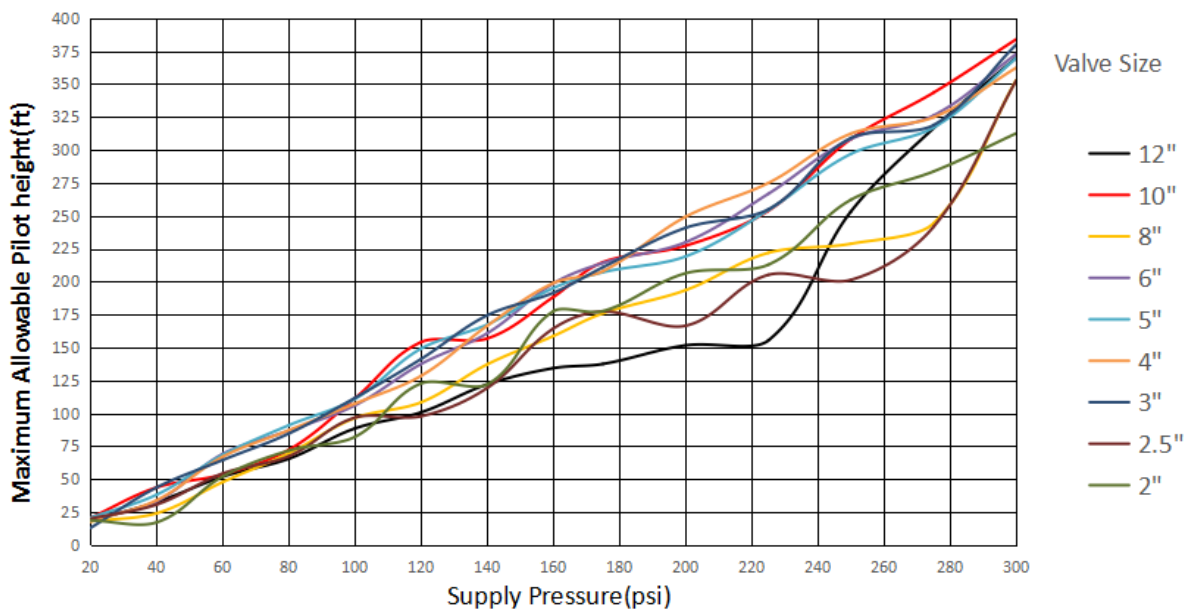
16. Record water supply and air supply pressure.

17. Confirm that all valves are in their normal operating positions.

#### Maximum Allowable Pilot height (ft)

Supply Pressure(psi)	Maximum Allowable Pilot height(ft)								
	12"	10"	8"	6"	5"	4"	3"	2.5"	2"
20	18.4	20.7	8.1	19.3	20.9	17.9	13.1	20.1	18.8
40	32.7	43.8	24.2	33.3	38.3	34.1	43.8	30.8	17.3
60	52	53.6	47.9	69.3	68.5	67.1	64.6	54.4	52.1
80	65.6	72.4	69.7	86.9	91	87.2	84.7	67.5	71.8
100	88.6	111.5	96.5	106.1	111	107.4	111.8	96.8	82.2
120	100.8	154.1	108.4	137.5	149.2	128.5	141.3	97.8	122.7
140	122	156.8	137.2	160.8	167.4	166.5	174.4	119.3	122
160	134.3	188.3	158.7	198.6	195.1	198.9	191.5	164.4	177.5
175	137.5	214.7	175.9	214.1	207.1	207.9	210.9	177.3	177.6
200	151.6	227.2	193.5	229.9	219.1	249.2	240.8	166.5	206.3
225	155.3	253.7	221.8	266.6	254.2	274.8	254.8	205.1	212.8
250	253.2	308.2	228.7	308.2	296.9	312.3	309	201.3	262.1
275	316.4	343.4	244.3	326.1	316.9	324.7	318.8	241.6	283.6
300	369.9	383.9	352.9	372.8	369.6	362.3	379.8	352.6	312.5

NOTE: Graph is based upon 1/2" (15 mm) pilot sprinklers installed on 1/2" (15 mm) schedule 40 galvanized release system piping and a 500 ft. maximum pilot line length.





## OPERATION & MAINTENANCE INSTRUCTION MANUAL

### Pre-Action Valve, Double Interlock

#### Electric-pneumatic actuation & Pneumatic-pneumatic actuation

---

### Maintenance & Inspection

It is recommended that periodic inspections and tests be conducted by qualified personnel to ensure that the Double Interlocked Pre-Action Valve and related equipment are in good operating condition. The inspection and testing activities should be done according to NFPA

Standards, the guidelines and regulation of the authorities having jurisdiction, and the following instructions. It is recommended that the 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 a fully open position.
2. Verify that the required water and air pressures are being applied to the Valve inlet and trim.
3. The Supply, System, and Air Pressure Gauges should be checked for accuracy.
4. Verify that the proper ratio of air or nitrogen pressure to the water supply pressure is being maintained.
5. Visually inspect for broken or missing parts, or other evidence of impaired protection.

### Statement

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