



TECHNICAL DATA

DOUBLE INTERLOCKED PREACTION SYSTEM WITH ELECTRIC/ PNEUMATIC RELEASE

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

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1. DESCRIPTION

(Refer to Figures 1-3.)

Viking Electric/Pneumatic Double Interlocked Preaction Systems utilize a Viking deluge valve controlled by a pneumatic actuator (E.1), normally held closed by supervisory pressure maintained in the automatic sprinkler system, AND a normally closed electric monitored or non-monitored solenoid valve (E.2) controlled by an approved system control panel with compatible detection system. BOTH the electric detection system must activate AND supervisory pressure must be relieved from the sprinkler system before the deluge valve will open to fill the sprinkler system with water. If the electric detection system (alone) operates due to fire, damage, or malfunction, 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 detection system has not activated, an alarm will activate but the deluge valve will NOT open. In fire conditions, operation of both the detection system and a sprinkler is required before the deluge valve will open allowing water to enter the system piping.

Electric/pneumatic double interlocked preaction systems are commonly used as refrigerated area systems. They are also commonly used where flooding of the pipe can have serious consequences, and where it is important to control accidental water discharge due to damaged sprinkler piping. Care should be taken since double interlocked preaction systems may not produce flow from opened sprinklers as quickly as single- or non-interlocked preaction systems. Activation of the detection system alone, or operation of a sprinkler alone, will sound an alarm but will NOT cause the system to fill with water.

2. LISTINGS AND APPROVALS



FM Approved: Viking Electric/Pneumatic Double-Interlocked Preaction Systems are Factory Mutual (FM) Approved as refrigerated area systems when installed with specific components. Refer to current FM Approval Guide. Consult the manufacturer for any component approvals too recent to appear in the FM Approval Guide.

3. SYSTEM OPERATION

(Refer to Figures 1-3.)



WARNING: Cancer and Reproductive Harm-
www.P65Warnings.ca.gov

A. IN THE SET CONDITION

System water supply pressure enters the priming chamber of the deluge valve through the 1/4" (8 mm) priming line which includes a normally open priming valve (B.1), strainer (B.2), restricted orifice (B.3), and check valve (B.4). In the SET condition, water supply pressure is trapped in the priming chamber by check valve (B.4), and BOTH pneumatic actuator (E.1) and normally closed monitored or non-monitored solenoid valve (E.2). The water supply pressure trapped in the priming chamber holds the deluge valve clapper closed, keeping the outlet chamber and system piping dry.

B. IN FIRE CONDITIONS

In a fire condition, when the detection system operates, system control panel energizes solenoid valve (E.2) open. Alarms activate, but the deluge valve (A.1) will NOT open until a sprinkler opens relieving supervisory pressure from the sprinkler system. When a sprinkler opens, supervisory pressure in the sprinkler piping is reduced causing the pneumatic actuator (E.1) to open. After BOTH the electric detection system activates AND supervisory pressure in the sprinkler system have been lost, pressure is released from the priming chamber to open drain cup (B.14) faster than it is supplied through restricted orifice (B.3). The deluge valve (A.1) clapper opens to allow water to flow into the system piping and alarm devices, causing water motor alarm (C.2) and water flow alarms connected to alarm pressure switch (C.1) to activate.

An optional accelerator may be installed to accelerate pressure loss from the sprinkler system to provide earlier alarms and/or allow the system to fill with water faster. An accelerator may be necessary to meet system discharge time requirements.

When the deluge valve (A.1) operates, the sensing end of PORV (B.10) is pressurized, causing the PORV (B.10) to operate. When the PORV (B.10) operates, it continually vents the priming chamber to prevent the deluge valve from resetting even if the open releasing devices close. The deluge valve (A.1) can only be reset after the system has been taken out of service, and the outlet chamber of the deluge valve (A.1) and associated trim piping are depressurized and drained.

C. TROUBLE CONDITIONS

If a sprinkler opens prior to operation of the detection system, or any time supervisory pressure in the sprinkler piping is lost, alarms connected to air supervisory switch will signal a low-air pressure condition but the deluge valve will NOT open.

If the electric detection system (alone) operates due to damage or malfunction, alarms connected to system control panel will activate but the deluge valve will NOT open.

D. MANUAL OPERATION

Any time the handle inside emergency release (B.11) is pulled, pressure is released from the priming chamber; the deluge valve will open. Water will flow into the system piping, and alarm devices. If a sprinkler head opens, water will flow from the system.



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TABLE 1: IMPORTANT SETTINGS

Device	Water Supply Settings	
	Up to 175 PSI (12 bar) Set to Maintain:	175 PSI (12 bar) to 250 PSI (17 bar) Set to Maintain:
Air Compressor On/Off Switch	40 PSI (2.8 bar)	60 PSI (4.1 bar)
Air Maintenance Device	30 PSI (2.1 bar)	50 PSI (3.5 bar)
Release System Pressure Supervisory Switch	25 PSI (1.7 bar) On Pressure Drop	45 PSI (3.1 bar) On Pressure Drop

4. INSTALLATION

Refer to current Viking Technical Data describing individual components of the Viking Electric/Pneumatic Double-Interlocked Preaction System. Technical Data describing the Viking Deluge Valve and other system components are packed with product and in the *Viking Engineering and Design Data* book. Also, refer to applicable installation standards, codes, and Authorities Having Jurisdiction.

A. IMPORTANT SETTINGS

(Also refer to Table 1 above.)

Recommended settings for pneumatic pressure maintained in the pneumatic release system and supervisory pressure maintained in the sprinkler system vary depending on the maximum water supply pressure of the system:

1. Provide a minimum 30 PSI (2.1 bar) pneumatic pressure to the closed sprinkler system and the pneumatic actuator (E.1) for system water pressures of 175 PSI (12 bar) or less. For system water pressures above 175 PSI, up to a maximum of 250 PSI (17 bar), provide a minimum of 50 PSI (3.5 bar) pneumatic pressure to the sprinkler system and pneumatic actuator (F.1).
2. Set air compressor air pressure supervisory switch (F.2) to maintain a constant air supply of 40 PSI (2.8 bar) for system water pressures of 175 PSI (12 bar) or less. For system water pressures above 175 PSI, up to a maximum of 250 PSI (17 bar), set the air compressor air pressure supervisory switch to maintain a constant air supply of 60 PSI (4.1 bar).
3. Set air maintenance device (F.6) to maintain a constant air supply of 30 PSI (2.1 bar) for system water pressures of 175 PSI (12 bar) or less. For system water pressures above 175 PSI, up to a maximum of 250 PSI (17 bar), set the air compressor air pressure supervisory switch (F.2) to maintain a constant air supply of 50 PSI (3.5 bar).
4. Set air pressure supervisory switch (F.2) to activate at 25 PSI (1.7 bar) on pressure drop for system water pressures of 175 PSI (12 bar) or less. For system water pressures above 175 PSI (12 bar), up to a maximum of 250 PSI (17 bar), set the air pressure supervisory switch (F.2) to activate at 45 PSI (3.1 bar) on pressure drop. Air pressure supervisory switch (F.2) should be wired to activate an alarm to signal a low-air pressure condition. Activation of an alarm to signal a high pressure condition may be required. Refer to applicable installation standards and the Authority Having Jurisdiction.
5. Alarm pressure switch (C.1) should activate when pressurized to 4 to 8 PSI (0.3 to 0.6 bar) on pressure rise. The alarm pressure switch (C.1) should be wired to activate the water flow alarm.

B. AIR SUPPLY DESIGN

The air supply compressor should be sized to establish total required air pressure in 30 minutes. The air supply must be regulated, restricted, and maintained automatically. An air maintenance device (F.6) is used to regulate and restrict the flow of supervisory air into the sprinkler system piping. The air supply must be regulated to maintain the supervisory pressure desired in the sprinkler piping. Pressures in excess of the pressure settings recommended in section 4. INSTALLATION, may affect operation of the system. 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.

It is recommended practice to provide an inspector's test connection on the supervised sprinkler piping. The sprinkler system inspector's test connection should terminate in an orifice equal to the smallest sprinkler orifice provided. 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 sprinkler and should be installed at the most hydraulically demanding location of the system. Inspector's test connections may be used to verify that the automatic air supply cannot replace air as fast as it escapes when a sprinkler operates. Refer to section 7. INSPECTIONS AND TESTS.

C. SPEED OF OPERATION

An optional accelerator may be installed to accelerate pressure loss from the sprinkler system to provide earlier alarms and/or allow the system to fill with water faster. An accelerator may be necessary to meet system discharge time requirements.



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5. PLACING THE SYSTEM IN SERVICE

(Refer to Figures 1-3.)

NOTE: REFER TO INSTRUCTIONS PROVIDED IN TECHNICAL DATA DESCRIBING THE VIKING DELUGE VALVE AND OTHER SYSTEM COMPONENTS (SEE SECTION 8).

1. Verify that the system has been properly drained. The system main drain and auxiliary drain valve (B.6) should be open. Verify that the emergency release (B.11) is closed.
2. Close the system main drain.
3. Open the priming valve (B.1).
4. Reset the system control panel.
5. Restore supervisory pressure to sprinkler piping. Establish and maintain 30 PSI (2.1 bar) or 50 PSI (3.5 bar) as required by the pneumatic actuator (E.1). Refer to section 4. INSTALLATION. Verify that the 1/2" valve in the air maintenance device by-pass trim is closed and that both 1/4" valves are open.
6. Reset the system control panel.
7. Open the flow test valve (B.15).
8. Partially open the main water supply control valve
9. When full flow develops from the flow test valve (B.15), close the flow test valve (B.15). Verify that there is no flow from the open auxiliary drain valve (B.6).
10. Close the auxiliary drain valve (B.6).
11. Fully open and secure the main water supply control valve.
12. Verify that the alarm shut-off valve (B.9) is open and that all other valves are in their normal operating position.
13. Depress the plunger of the drip check. No water should flow from the drip check when the plunger is pushed.

6. EMERGENCY INSTRUCTIONS (Refer to Figures 1-3.)

▲ WARNING

Any system maintenance that involves placing a control valve or detection system out of service will impair the fire protection capabilities of that system. Prior to proceeding, appropriate impairment procedures per NFPA 25 shall be followed with the notification of all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected areas.

Failure to follow these instructions could cause improper system operation, resulting in serious personal injury and/or property damage.

To Take the System Out of Service:

After a fire, verify that the fire is OUT and that placing the system out of service has been authorized by the appropriate Authority Having Jurisdiction.

1. Close the water supply valve.
2. Open the system main drain.
3. Silence alarms (optional). To silence electric alarms controlled by the pressure switch and to silence the water motor alarm (C.2), close the alarm shut-off valve (B.9).

NOTE: ELECTRIC ALARMS CONTROLLED BY A PRESSURE SWITCH INSTALLED IN THE 1/2" (15 MM) NPT CONNECTION FOR A NON-INTERRUPTIBLE ALARM PRESSURE SWITCH (C.1) CANNOT BE SHUT OFF UNTIL THE DELUGE VALVE IS RESET OR TAKEN OUT OF SERVICE.

4. Shut off the air supply (optional).
5. Open the auxiliary drain valve (B.6).
6. Close the priming valve (B.1) (optional).

Sprinkler systems that have been subjected to a fire must be returned to service as soon as possible. The entire system must be inspected for damage, and repaired or replaced as necessary.

7. Replace any detectors that have been damaged.
8. Replace any sprinklers that have opened, been damaged, or have been exposed to fire conditions.
9. Perform all maintenance procedures recommended in Technical Data describing individual components of the system that has operated.
10. Return the system to service as soon as possible. Refer to section 5. PLACING THE SYSTEM IN SERVICE.



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7. INSPECTIONS AND TESTS

NOTICE

The owner is responsible for maintaining the fire protection system and devices in proper operating condition.

It is imperative that the system is inspected and tested on a regular basis in accordance with NFPA 25. Refer to INSPECTIONS and TESTS recommended in current Viking Technical Data describing individual components of the Viking Electric/Pneumatic Double-Interlocked Preaction System used. (See section 8 for hyperlinks to Viking Technical Data.)

The frequency of the inspections may vary due to contaminated water supplies, corrosive water supplies, corrosive atmospheres, as well as the condition of the air supply to the system. For minimum maintenance and inspection requirements, refer to NFPA 25. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

WARNING

Any system maintenance that involves placing a control valve or detection system out of service will impair the fire protection capabilities of that system. Prior to proceeding, appropriate impairment procedures per NFPA 25 shall be followed with the notification of all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected areas.

Failure to follow these instructions could cause improper system operation, resulting in serious personal injury and/or property damage.

Low-Air Pressure Alarm Test:

Quarterly testing of low-air alarms is recommended.

To Test Sprinkler System “Low Supervisory Air” Alarm:

1. To prevent operation of the deluge valve and filling the system with water during the test, DO NOT operate the electric detection system during this test. Consider closing the main water supply control valve.
2. Fully open the sprinkler system inspector’s test valve to simulate operation of a sprinkler.
3. Verify that low-air alarms operate within an acceptable time period and continue without interruption.
4. Close the inspector’s test valve.
5. Establish recommended pneumatic supervisory pressure to be maintained. Refer to section 4. INSTALLATION.
6. Open the system control panel and press RESET. Alarms should stop. When testing is complete, return the system to service following steps 1 through 9 below.

When testing is complete, return the system to service following steps 1 through 9 below.

CAUTION

This procedure applies only when done in conjunction with “low air” alarm testing described above.

DESCRIBED ABOVE.

1. Verify that the pressure indicated on the priming pressure water gauge (B.12) indicates that the priming chamber is pressurized with system water supply pressure.
2. Depress the plunger of the drip check. No water should flow from the drip check when the plunger is pushed.

If the main water supply control valve was NOT closed in step 1, proceed to step 8 below.

If the main water supply control valve WAS closed in step 1, proceed with steps 3 through 9 below.

3. Open the flow test valve (B.15) and the auxiliary drain valve (B.6).
4. Partially open the main water supply control valve
5. When full flow develops from the flow test valve (B.15), close the flow test valve (B.15). Verify that there is no flow from the open auxiliary drain valve (B.6).
6. Close the auxiliary drain valve (B.6).
7. Fully open and secure the main water supply control valve.
8. Verify that the alarm shut-off valve (B.9) is open and that all other valves are in their normal operating position.
9. Depress the plunger of drip check. No water should flow from the drip check when the plunger is pushed.

Full-Flow Trip Test:

Performance of a trip test is recommended annually during warm weather. Consider coordinating this test with operation testing of the detectors.



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⚠ CAUTION

Performing a trip test results in operation of the deluge valve. Water will flow into the sprinkler piping. Take necessary precautions to prevent damage.

To trip test the Electric/Pneumatic Double-Interlocked Preaction System:

1. Notify the Authority Having Jurisdiction and those in the area affected by the test.
2. To trip the deluge valve:
 - a. Operate a detector according to the manufacturer's instructions.
 - b. Open the sprinkler system inspector's test valve.
3. The deluge valve should open, filling the sprinkler system with water. Water flow alarms should operate.
4. Verify adequate flow from the sprinkler system inspector's test valve within an acceptable time period.

When trip testing is complete:

5. Perform steps 1 through 10 of section 6. EMERGENCY INSTRUCTIONS to take the system out of service.
6. Perform steps 1 through 13 of section 5. PLACING THE SYSTEM IN SERVICE to return the system to service.
7. Notify the Authority Having Jurisdiction and those in the affected area that testing is complete.

8. ORDERING INSTRUCTIONS

To order a complete Double-Interlocked preaction system with electric/pneumatic release, the following components must be purchased: Deluge valve, Easy Riser check valve, conventional trim, release trim package, and a release control panel.



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VALVE TRIM PACKAGE PART NUMBERS

DESCRIPTION	NOMINAL SIZE	PART NUMBERS	
		Galvanized	Brass
Use with Straight Through Valves	Horizontal Arrangement	1½" / DN40	14635-1 14635-2
		2" / DN50	14635-1 14635-2
		2½" / DN65	14637-1 14637-2
		3" / DN80	14637-1 14637-2
		4" / DN100	14638-1 14638-2
		6" / DN150	14640-1 14640-2
	8" / DN200	14643-1 14643-2	
	Vertical Arrangement	1½" / DN40	14634-1 14634-2
		2" / DN50	14634-1 14634-2
		2½" / DN65	14636-1 14636-2
3" / DN80		14636-1 14636-2	
4" / DN100	14639-1 14639-2		
6" / DN150	14641-1 14641-2		
8" / DN200	14642-1 14642-2		

DELUGE VALVE PART NUMBERS

Straight-Through Valves					
DESCRIPTION	NOMINAL SIZE	PART NUMBERS			
		Painted Red	Halar®		
	Pipe O.D.	Model F-1	Model F-2		
Threaded NPT	NPT 48 mm	1½"	12126	----	
	NPT 60 mm	2"	12059	----	
	NPT 65 mm	2½"	12401	12402Q/B	
	BSP 48 mm	DN40	12682	----	
	BSP 60 mm	DN50	12686	----	
Flange/ Flange	Flange Drilling		Model F-1	Model F-2	
	ANSI	3"	12014	12015Q/B	
	ANSI	4"	11953	11960Q/B	
	ANSI	6"	11955	11962Q/B	
	ANSI	8"	11991	11992Q/B	
	ANSI/Japan	6"	11964	----	
	PN10/16	DN80	12026	12027Q/B	
	PN10/16	DN100	11965	11966Q/B	
	PN10/16	DN150	11956	11963Q/B	
	PN10	DN200	11995	11996Q/B	
PN16	DN200	11999	12000Q/B		
Flange/ Groove	Flange Drilling / Pipe O.D.		Model F-1	Model F-2	
	ANSI / 89 mm	3"	12018	12019Q/B	
	ANSI / 114 mm	4"	11952	11959Q/B	
	ANSI / 168 mm	6"	11954	11961Q/B	
	PN10/16 / 89 mm	DN80	12030	12644Q/B	
	PN10/16 / 114 mm	DN100	11958	12645Q/B	
	PN10/16 / 165 mm	DN150	12640	12641Q/B	
PN10/16 / 168 mm	DN150	11954	11961Q/B		
Groove/ Groove	Pipe O.D.		Model F-1	Model F-2	
	48 mm	1½" / DN40	12125	12127Q/B	
	60 mm	2" / DN50	12057	12058Q/B	
	73 mm	2½" / DN65	12403	12404Q/B	
	76 mm	DN80	12729	12730Q/B	
	89 mm	3" / DN80	12022	12023Q/B	
	114 mm	4" / DN100	11513	11514Q/B	
	165 mm	DN150	11910	11911Q/B	
	168 mm	6" / DN150	11524	11525Q/B	
219 mm	8" / DN200	11018	11118Q/B		



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CHECK VALVE PART NUMBERS

DESCRIPTION		NOMINAL SIZE	PART NUMBER
IN-LINE CHECK VALVE			
Groove / Groove		Model L-1	11054
		1-1/2" / DN40	11059
Threaded NPT		Model K-1	10659
		1-1/2" / DN40	10667
EASY RISER® SWING CHECK VALVE			
Flange/ Flange	Flange Drilling	Model F-1	
		ANSI 3"	08505
		ANSI 4"	08508
		ANSI 6"	08511
		ANSI/Japan DN100	09039
		ANSI/Japan DN150	09385
		ANSI/Japan DN200	14023
		PN10/16 DN80	08796
		PN10/16 DN100	08797
		PN10/16 DN150	08835
		PN10 DN200	08836
		PN16 DN200	12355
	Flange/ Groove	Flange Drilling / Pipe O.D.	Model F-1
		ANSI / 89 mm 3"	08506
		ANSI / 114 mm 4"	08509
		ANSI / 168 mm 6"	08512
		ANSI / 219 mm 8"	08515
		PN10/16 / 89 mm DN80	12648
		PN10/16 / 114 mm DN100	12649
		PN10/16 / 165 mm DN150	12652
		PN10/16 / 168 mm DN150	08512
		PN10 / 219 mm DN200	12651
Groove/ Groove	Pipe O.D.	Model E-1	
		73 mm 2½" / DN65	07929
		Model F-1	
		89 mm 3" / DN80	08507
		114 mm 4" / DN100	08510
		165 mm DN150	12356
		168 mm 6" / DN150	08513
	219 mm 8" / DN200	08516	

RELEASE CONTROL PANEL PART NUMBER

DESCRIPTION	PART NUMBER
VFR-500	26107

RELEASE TRIM PACKAGE PART NUMBERS

DESCRIPTION	PART NUMBERS	
Release Trim	Galvanized	Brass
	12661-1	12661-2
Monitored Solenoid Valve	26785	
Solenoid Valve	11601	
Pneumatic Acuator	H-1	R-1
	06459B	Corrosion-Resistant 09733

CHECK VALVE TRIM PACKAGE PART NUMBERS

DESCRIPTION	NOMINAL SIZE	PART NUMBER
Check Valve Trim	1½" / DN40	12960
	2" / DN50	12960
	2½", 3" / DN65, DN80	13776
	4", 6", 8" / DN100, DN150, DN200	13777

AIR MAINTENANCE DEVICE AND SUPERVISORY SWITCH PART NUMBERS

DESCRIPTION	MODEL	PART NUMBER
AIR PRESSURE MAINTENANCE DEVICE Complete with Trim	D-2	07459
PRESSURE SUPERVISORY SWITCH Adjustable Range 10-175 PSI (0.7-12 bar)	1/2" / DN15	
	Single SPDT	PS40-1A
	Dual SPDT	PS40-2A

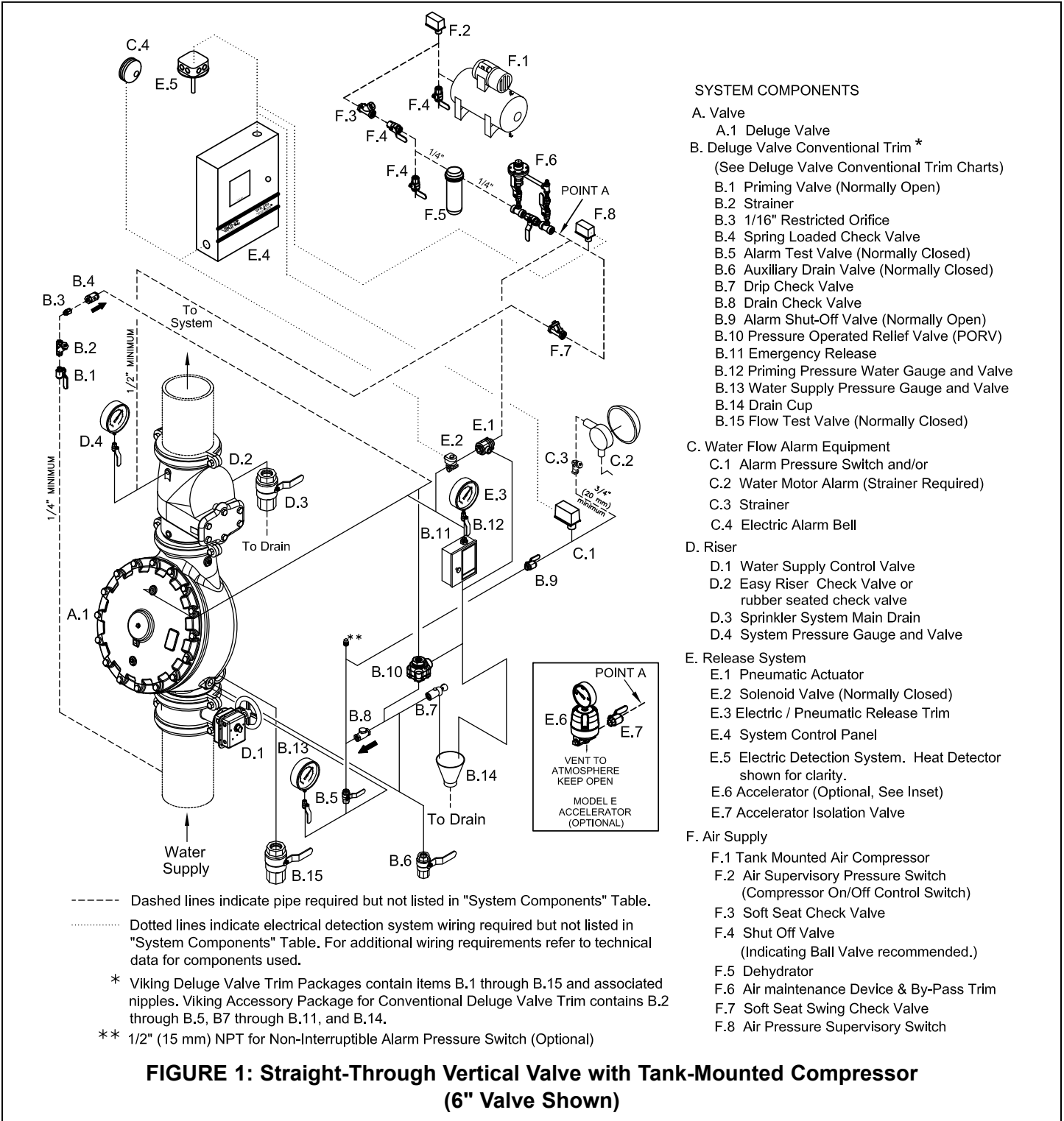


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SYSTEM COMPONENTS

- A. Valve
 - A.1 Deluge Valve
- B. Deluge Valve Conventional Trim *
 - (See Deluge Valve Conventional Trim Charts)
 - B.1 Priming Valve (Normally Open)
 - B.2 Strainer
 - B.3 1/16" Restricted Orifice
 - B.4 Spring Loaded Check Valve
 - B.5 Alarm Test Valve (Normally Closed)
 - B.6 Auxiliary Drain Valve (Normally Closed)
 - B.7 Drip Check Valve
 - B.8 Drain Check Valve
 - B.9 Alarm Shut-Off Valve (Normally Open)
 - B.10 Pressure Operated Relief Valve (PORV)
 - B.11 Emergency Release
 - B.12 Priming Pressure Water Gauge and Valve
 - B.13 Water Supply Pressure Gauge and Valve
 - B.14 Drain Cup
 - B.15 Flow Test Valve (Normally Closed)
- C. Water Flow Alarm Equipment
 - C.1 Alarm Pressure Switch and/or
 - C.2 Water Motor Alarm (Strainer Required)
 - C.3 Strainer
 - C.4 Electric Alarm Bell
- D. Riser
 - D.1 Water Supply Control Valve
 - D.2 Easy Riser Check Valve or rubber seated check valve
 - D.3 Sprinkler System Main Drain
 - D.4 System Pressure Gauge and Valve
- E. Release System
 - E.1 Pneumatic Actuator
 - E.2 Solenoid Valve (Normally Closed)
 - E.3 Electric / Pneumatic Release Trim
 - E.4 System Control Panel
 - E.5 Electric Detection System. Heat Detector shown for clarity.
 - E.6 Accelerator (Optional, See Inset)
 - E.7 Accelerator Isolation Valve
- F. Air Supply
 - F.1 Tank Mounted Air Compressor
 - F.2 Air Supervisory Pressure Switch (Compressor On/Off Control Switch)
 - F.3 Soft Seat Check Valve
 - F.4 Shut Off Valve (Indicating Ball Valve recommended.)
 - F.5 Dehydrator
 - F.6 Air maintenance Device & By-Pass Trim
 - F.7 Soft Seat Swing Check Valve
 - F.8 Air Pressure Supervisory Switch

FIGURE 1: Straight-Through Vertical Valve with Tank-Mounted Compressor (6" Valve Shown)



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