Pre-action Systems

Are: Fixed fire protection systems with CLOSED sprinklers connected to piping pressurized with air or nitrogen with a dependable water supply controlled by a normally closed Deluge Valve activated by a release system.
Pre-action Systems

Are Recommended:
To prevent water damage due to mechanical damage to system piping.
For hazards where fast application of water in fire conditions is important.
SureFire Pre-action Systems

Are: Operate in the same manner as standard pre-action. SureFire Pre-action provides the ability for the system to operate in the absence of power. Standard electric release pre-action systems will not operate without power.
SureFire Pre-action Systems

Are Recommended:
Where “Fail-Safe” pre-action is required, or where the power supply to the control panel cannot be depended upon.
The Release System must activate .....  
-(Detection ) Solenoid valve opens  
-(an alarm will sound) 

In fire conditions,  
-After the release system operates water travels from the Deluge Valve to the open sprinkler.  
-Upon sprinkler opening water flows from sprinkler orifice onto fire.  
Single interlock preaction does not have the water delivery delay that a double interlock preaction system has.
Pre-action System Components

- Deluge Valve
- Deluge Valve trim
- System Control Valve
- Release control panel

Single Interlocked Sure-Fire Pre-action

Sprinklers and Piping

Air Supply

Riser Check Valve

Viking Worldwide Fire Protection
Pre-action System - Components

- Deluge Valve
- Deluge Valve trim
- Double Interlocked Sure-Fire
- Pre-action
- System Control Valve
- Sprinklers and Piping
- Air Supply
- Riser Check Valve
Viking SureFire
Release Trim Module

To pressurized system piping

Normally Open
Solenoid Valve

Normally Closed
Solenoid Valve
Deluge Valves

Deluge valves are held shut with pressurized water placed in the valve’s priming chamber. The priming chamber controls a mechanism that keeps the deluge valve’s clapper closed. The release system controls the water in the deluge valve’s priming chamber. When the release system operates, the priming chamber is relieved of the priming water, allowing deluge valve clapper to open.
Deluge Valves

The priming chamber has to be pressurized before the water control valve can be opened, allowing water pressure against the deluge valve clapper. A connection has to be placed before the water control valve, so the deluge valve can be primed. Once most deluge systems have operated, they have to be manually shut down before they can be put back in service.
Available 2” through 6”

Listed at 250 PSI

Viking Model E-1 Deluge Valve
Deluge Systems

- Bronze clamp ring
- EPDM rubber diaphragm
- EPDM & stainless steel seat rubber
- Bronze seat
- Teflon coated ductile iron clapper
- Ductile iron body
Deluge Systems

- Priming chamber
- Inlet chamber
- Discharge or outlet chamber

Viking

Worldwide Fire Protection
Deluge Systems
Deluge Systems
Deluge Systems
Deluge Systems

[Image of a deluge system diagram]
Deluge Systems
Deluge Valve: Model F-1
Model F-1 Deluge Valve
EZ DELUGE VALVE TRIM

• INSTALLATION & PURPOSE
Install the Deluge Valve above a water supply control valve
Deluge Valve

A flow test valve is connected to the inlet chamber of the deluge valve.

NFPA 25 (1992 ed) recommends “Main Drain Test” to be performed quarterly to determine if there has been a change in the water supply piping or control valves.
Deluge Valve

Priming line
Deluge Valve

Priming line

Check valve

Restricted orifice

Strainer

Connect priming line supply below water supply control valve

Priming valve (normally open)
Deluge Valve Trim

1/16 Restricted orifice

Spring loaded check

1/4" Strainer

1/4" Priming line ball valve
Deluge Valve Trim

1/16” Restricted orifice prevents the priming chamber from refilling at the same rate as the water is being released through the orifice of the releasing device.
Deluge Valve Trim

 Auxiliary drain (normally Closed) Open to drain outlet & system piping after operation

 Trim piping connected to outlet chamber

 Drip check allows moisture to escape from outlet chamber. It seals against notched seat when outlet chamber is pressurized.

 To open drain cup
Deluge Valve Trim

Alarm Connections

½” (15mm) NPT for alarm pressure switch

¾” (20mm) NPT for water motor alarm

Viking drain check valve

Alarm shut off valve (normally open)
Deluge Valve Trim

Alarm test connections & supply pressure connections

Water supply pressure gauge

Alarm test valve (normally closed)
Deluge Valve
Trim

To release system

To open drain cup

Emergency release

Release connections & priming pressure gauge

Priming pressure gauge

Release connections & priming pressure gauge
Deluge Valve EZ Trim
Prime Shut Off Valve (PSOV)

To open drain cup

Prime inlet
Deluge Valve Trim

Drain loop

To releasing device

PSOV

To open drain cup

From releasing device
Viking PSOV (Prime Shut Off Valve) Eliminates the PORV and shuts OFF the water supply to the priming chamber
Deluge Valve and Trim

The trim has been slightly modified to better view operating parts.
Deluge Valve Trim

To Release system

When the hydraulic, electric, or pneumatic detection system has operated and the Viking deluge valve is tripped, the priming shut off valve (PSOV) is activated as shown in the following animation.

WARNING!! Do not use this trim for any automatically resettable detection systems, or for pressure regulating valves!

The trim has been slightly modified to better view operating parts.
The deluge valve will be tripped either:

- Pneumatically (by either pilot sprinklers or fixed temperature devices)
- Hydraulically (by either pilot sprinklers or fixed temperature devices)
- Electrically (by smoke or heat detectors. Etc., that cause a solenoid valve to open.)

The trim has been slightly modified to better view operating parts.
When the valve trips, water pressure from the discharge side of the valve will enter the sensing side of the PSOV forcing the clapper of the PSOV to close against the priming pressure, because of its mechanical advantage.

The trim has been slightly modified to better view operating parts.
Deluge Systems

PSOV Operation
PSOV Operation

Priming the Deluge Valve
Deluge Systems

PSOV Operation

Priming the Deluge Valve
Deluge Systems

PSOV Operation

Priming the Deluge Valve
Deluge Systems

PSOV Operation

Priming the Deluge Valve
PSOV Operation

Deluge valve tripped,
Shutting off priming water
EZ Deluge Trim

- UL Listed and FM Approved

- Stainless Steel Trim & Brass Trim also available
SureFire Release Systems

Deluge valves are held shut by their release system. In a single interlocked SureFire pre-action system, we use one release module.

We will discuss the SureFire release system as it pertains to the deluge valve and it’s trim.
Electric Release

Electric release systems are the most prevalent type of release systems. Electric release offers the most flexibility, as the detection system can be configured in many ways, and the choices in release devices are greater than hydraulic or pneumatic.
Solenoid Valves

Solenoid valves are described by their position when non-powered:

1) Normally Open
   When non-powered the solenoid valve is open

2) Normally Closed
   When non-powered the solenoid valve is closed
Viking SureFire
Release Trim Module

To pressurized system piping

Normally Open Solenoid Valve

Normally Closed Solenoid Valve
Viking SureFire Release Trim Module

24vdc Electric solenoid (normally open)

24vdc Electric solenoid (normally closed)

Release Systems
Viking SureFire release trim module

24vdc Electric solenoid (normally open)

24vdc Electric solenoid (normally closed)

Release Systems
SureFire Single Interlock Preaction
Wiring Schematic

Remote Trouble Signal

Releaseing Circuit
Solenoid One
Release should be Normally Closed

Releaseing Circuit
Solenoid Two
Release should be Normally Open

Alarm Bell

Viking
Worldwide Fire Protection
SureFire Single Interlock Preaction
Wiring Schematic

Detection circuit one
Normally open detectors
maximum loop resistance is 200 ohms

Detection circuit two
Closed pressure depends on water supply pressure
(See Chart)

Detection circuit four (supervisory circuit) closed pressure must be greater than the one from detection two plus 5 psi on pressure loss
SureFire Single Interlock Preaction
Wiring Schematic

Recommended pressure settings

<table>
<thead>
<tr>
<th>Water Supply (psi)</th>
<th>Detection Circuit Two (psi)</th>
<th>Detection Circuit Four (psi)</th>
<th>System Air (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-100</td>
<td>15+</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>100-200</td>
<td>25+</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>200-250</td>
<td>35+</td>
<td>45</td>
<td>50</td>
</tr>
</tbody>
</table>

DIP switches
See Function Table
### SureFire Single Interlock Preaction
### Wiring Schematic

#### Par 3 Release Panel Function Table

<table>
<thead>
<tr>
<th>INPUT CIRCUITS</th>
<th>TYPE</th>
<th>OPEN</th>
<th>COLOR NOTE 3</th>
<th>SHORT</th>
<th>ALARM BELL</th>
<th>REMOTE TROUBLE HORN</th>
<th>RELEASE SOLENOID 1</th>
<th>RELEASE SOLENOID 2</th>
<th>ALARM RELAY</th>
<th>TROUBLE RELAY</th>
<th>ALARM RELAY</th>
<th>SUPERVISORY RELAY</th>
<th>RELEASE 1 RELAY</th>
<th>RELEASE 2 RELAY</th>
<th>ALARM RELAY</th>
<th>TROUBLE RELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Detector Circuit 1</td>
<td>L</td>
<td>T</td>
<td>N</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>T</td>
<td>X</td>
<td>X</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Detector Circuit 2</td>
<td>L, NOTE 1</td>
<td>T</td>
<td>N</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>T</td>
<td>X</td>
<td>X</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Waterflow</td>
<td>L</td>
<td>T</td>
<td>N</td>
<td>A</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>T</td>
<td>X</td>
<td>X</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Supervisory</td>
<td>L</td>
<td>T</td>
<td>N</td>
<td>S</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>T</td>
<td>X</td>
<td>X</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Alarm Activate Switch</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<td>X</td>
<td>X</td>
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</tr>
</tbody>
</table>

**ACTION:**
- L = LATCH
- A = ALARM
- T = TBL
- N = NORMAL
- S = SUPV

**NOTE:**
- Note 2: Further details not provided in the image.
SureFire Single Interlock Preaction
Wiring Schematic

4-Wire Smoke Detector Connections
Viking SureFire
Double Interlocked
Pre-action
SureFire – Double-Interlocked Pre-Action

A second supervisory Switch is required for Double interlocked SureFire
The Release System must activate ..... 
-(an alarm will sound)
-AND,
-Pressure in the sprinkler piping must be reduced-(due to a sprinkler opening in fire conditions) To trip open the Deluge Valve.

In fire conditions,
- After the release system operates and the sprinkler opens, water needs to travel from the Deluge Valve to the open sprinkler. 
There may be a time delay similar to a Dry System.
The Release System must activate ..... -(an alarm will sound) -AND, -Pressure in the sprinkler piping must be reduced-(due to a sprinkler opening in fire conditions)

To trip open the Deluge Valve.
In fire conditions,
- After the release system operates and the sprinkler opens, water needs to travel from the Deluge Valve to the open sprinkler.
There may be a time delay similar to a Dry System.
SUREFIRE release trim is the same for either single or double interlocked pre-action. Double interlocked SureFire requires a second supervisory switch in the air supply line to the riser.

The second supervisory switch operates the normally closed solenoid valve only after the detection circuit has operated. Both the detection and air pressure has to be lost prior to the normally closed solenoid operating.
Viking SureFire
Release Trim Module

To pressurized system piping

Normally Open Solenoid Valve

Normally Closed Solenoid Valve

To pressurized system piping
SureFire Single Interlock Preaction
Wiring Schematic

Remote Trouble Signal

Releasing Circuit
Solenoid One
Release should be Normally Closed

Releasing Circuit
Solenoid Two
Release should be Normally Open

Alarm Bell

PANEL OUTPUTS

Viking
Worldwide Fire Protection
SureFire Double Interlock Preaction
Wiring Schematic

Detection Circuit One
- Normally Open
- Detectors

Detection Circuit Two
- Closed pressure depends on water supply pressure

System Two
- Air Pressure
- Supervisory Switch

System One Detection Circuit Three
- Waterflow Pressure Switch

Detection Circuit Four (Supervisory Circuit)
- Closed pressure must be greater than the one from detection circuit two
SureFire Single Interlock Preaction Wiring Schematic

4-Wire Smoke Detector Connections

B+  A+
To Detection input one
A-  B-
24VR+
RESETTABLE 24VR
24VR-

POWER SUPERVISORY RELAY
VIKING PN 07919
## SureFire Single Interlock Preaction Wiring Schematic

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<th>TROUBLE RELAY</th>
<th>ALARM RELAY</th>
<th>RELAY 1 RELAY</th>
<th>RELEASE 2 RELAY</th>
<th>ALARM RELAY</th>
<th>TROUBLE RELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 DETECTOR CIRCUIT 1</td>
<td>L</td>
<td>T</td>
<td>N</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>T</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>T</td>
</tr>
<tr>
<td>2 DETECTOR CIRCUIT 2</td>
<td>L</td>
<td>T</td>
<td>N</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>T</td>
</tr>
<tr>
<td>3 WATERFLOW</td>
<td>L</td>
<td>T</td>
<td>N</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>T</td>
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<td>X</td>
<td>X</td>
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<td>T</td>
</tr>
<tr>
<td>4 SUPERVISORY</td>
<td>L</td>
<td>T</td>
<td>N</td>
<td>S</td>
<td>X</td>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>5 ALARM ACTIVATE SWITCH</td>
<td>L</td>
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<td>X</td>
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</tbody>
</table>
Remote Trouble Signal

SureFire Single Interlock Preaction Wiring Schematic

Detection Circuit input one or two or workflow alarm switch, input three

Supervisory switches, valve tamper, air pressure Etc. input four

Detection Circuit Input one

Detection circuit input two

Detection circuit input one or two or workflow alarm switch input three

Panel malfunction or fault in field wiring

Zone Relay Module (4XZM)

Relay contacts actuated by
Thank You