

DELUGE VALVE



Deluge Fire Sprinkler Systems and Deluge Valves: Overview and Applications

Deluge Fire Sprinkler System

Definition: A deluge fire sprinkler system is a type of fire protection system characterized by open sprinkler heads and an unpressurized pipe system. It operates by using a deluge valve that releases water when triggered by a smoke or heat detection system.

Functionality:

- **Water Supply:** The system is connected to a water supply through a deluge valve, which remains closed under normal conditions.
- **Activation:** When a fire detection system senses smoke or heat, it triggers the deluge valve to open. This allows water to flood the pipes and be discharged through the open sprinklers or nozzles.
- **Coverage:** Deluge systems are designed to deliver large volumes of water over extensive areas rapidly.

Applications:

- **High-Risk Areas:** Deluge systems are used in environments where rapid and extensive water application is necessary, such as power transformer installations, storage tanks, and conveyor systems.
- **Special Applications:** They are effective in protecting areas with flammable liquids, aircraft hangars, and process areas with combustible materials.



Deluge Valve

Definition: A deluge valve is a quick-release, hydraulically operated diaphragm valve used in deluge fire sprinkler systems to control the flow of water. It ensures the fast application of water over large areas.

Operation:

1. **Normal Condition:** In the "SET" position, the valve maintains water pressure in the top chamber through an external bypass check valve and restriction orifice. This pressure keeps the diaphragm-operated clapper closed, preventing water from entering the system.
2. **Activation:** When fire is detected, the top chamber pressure is vented to the atmosphere. The pressure drop causes the clapper to lift, allowing water to flow into the system piping network and activate alarm devices.

Advantages:

- **Rapid Response:** Deluge valves allow for immediate application of water, quickly addressing fires and cooling affected areas.
- **Effective Cooling:** They help prevent further damage by cooling the area around the fire and reducing the risk of fire spread.
- **Cost-Effective:** Generally less expensive compared to other fire suppression methods.

Disadvantages:

- **Potential Damage:** The application of large volumes of water can damage sensitive electronic equipment and machinery.
- **Cleanup Requirements:** Cleaning up after a deluge system activation can be more extensive and time-consuming compared to powder or gas suppression systems.
- **Water Supply Needs:** Requires a significant amount of water, necessitating a large reservoir for operation.

Summary

- **Deluge Fire Sprinkler System:** Designed for rapid and extensive water application to manage fires in high-risk areas, using a deluge valve activated by fire detection systems.
- **Deluge Valve:** A key component in deluge systems, responsible for controlling water flow through a hydraulic mechanism. It ensures quick response and effective fire suppression.
- **Applications:** Ideal for environments with high fire risks, flammable materials, and areas needing significant cooling or protection.
- **Advantages and Disadvantages:** Deluge systems offer rapid response and effective cooling but can cause damage to equipment and require extensive cleanup.

DRY ALARM VALVE



Dry Alarm Systems and Wet Alarm Valves in Fire Sprinkler Systems

Dry Alarm System with Dry-Piped Sprinkler System

Definition and Function: A dry alarm system is designed for use in dry-piped sprinkler systems, where the pipes are filled with air or nitrogen instead of water. The primary function of the dry alarm valve is to ensure proper equilibrium between the air pressure and the water pressure in the fire extinguishing system. This balance is crucial for the system's effective operation and safety.

Components:

1. **Valve Body:** The main component housing the internal mechanisms that regulate the air and water pressures.
2. **Delay Cell:** A device that introduces a time delay to prevent false alarms and ensure that the system responds only to genuine fire conditions.
3. **Water Motor Alarm Gong:** An audible alarm that activates when water begins to flow through the system, alerting occupants to the presence of a fire.
4. **Pressure Switch:** A device that monitors and maintains the correct pressure balance within the system.

Operation:

- **Air and Water Pressure Balance:** In a dry-piped sprinkler system, the dry alarm valve is located between the compressed air and the water supply. This valve maintains equilibrium and prevents water from flowing into the pipes until a fire is detected.



- **Activation:** When a fire triggers the sprinkler system, the compressed air is expelled, allowing water to enter the pipes and be distributed through the sprinklers. The dry alarm valve ensures that this transition happens smoothly and safely.

Installation and Maintenance:

- **Location:** The dry alarm valve must be installed in a location where freezing is not a risk, to ensure proper functionality.
- **Specialist Installation:** Installation should be carried out by qualified engineers to ensure that the system operates correctly and meets safety standards.
- **Efficiency:** Regular maintenance is required to ensure that the valve operates efficiently and effectively during a fire emergency.

Wet Alarm Valve

Definition and Function: The wet alarm valve is used in wet-piped sprinkler systems, where the pipes are pre-filled with water. Its main function is similar to that of the dry alarm valve, ensuring that the air pressure and water pressure remain balanced within the system.

Components:

- **Valve Body:** Contains the mechanisms that manage the water flow and pressure.
- **Alarm Mechanisms:** Includes alarms and indicators that activate when water flow is detected.

Operation:

- **Pressure Regulation:** The wet alarm valve regulates the water pressure in the system to ensure that it operates correctly and effectively during a fire.
- **Alarm Activation:** When the system detects a fire, the wet alarm valve triggers the alarm mechanisms to alert occupants.

Applications:

- **Fire Safety Systems:** Both dry and wet alarm valves are integral to fire safety systems, ensuring that the sprinkler systems operate effectively and provide adequate protection.

Summary

- **Dry Alarm System:** Utilized in dry-piped sprinkler systems, featuring a dry alarm valve that maintains air and water pressure balance and activates alarms when a fire is detected.
- **Wet Alarm Valve:** Used in wet-piped systems to manage water pressure and activate alarms.
- **Components and Operation:** Both systems include various components such as valve bodies, delay cells, alarm gongs, and pressure switches to ensure proper operation and safety.
- **Installation and Maintenance:** Proper installation and regular maintenance by specialists are crucial for the effective functioning of these valves.



The dry alarm valve's role in maintaining pressure balance and facilitating water flow during a fire emergency is essential for the safety and efficiency of fire protection systems.

HYDRAULIC FIRE HYDRANTS



Fire Hydrant Systems

Definition and Purpose: A fire hydrant system is a crucial safety measure designed to provide a reliable water source for firefighting purposes. It consists of a network of components that deliver water to assist fire authorities in combating fires. Fire hydrants are typically found in buildings and on streets, ensuring that firefighters have quick access to water during emergencies.

Components of a Fire Hydrant System:

- Hydrants:**
 - Wet-Barrel Hydrants:** These have a valve assembly located above ground and are filled with water at all times. They are typically used in areas with mild climates where freezing is not a concern.
 - Dry-Barrel Hydrants:** These have a valve assembly located underground and are designed to prevent water from freezing. When the hydrant is not in use, the barrel is drained, and only the valve remains filled with water.
- Pipes and Network:**
 - Water Supply Pipes:** These pipes deliver water from a source (such as a municipal supply or reservoir) to the fire hydrants.
 - Distribution Network:** A network of pipes that strategically distributes water throughout the building or area to various fire hydrants.
- Valves:**
 - Control Valves:** Used to regulate the flow of water to the hydrants and control pressure levels within the system.
- Connections and Fittings:**
 - Hose Connections:** These fittings allow firefighters to connect hoses to the hydrant for water delivery.
 - Adapters:** Used to ensure compatibility between different types of hoses and hydrants.



5. Flow and Pressure Monitoring:

- **Pressure Gauges:** Measure the water pressure in the system to ensure adequate flow during a fire.

Types of Hydrants:

1. Wet-Barrel Hydrants:

- **Description:** These hydrants have a valve assembly above ground and are always filled with water.
- **Use Case:** Commonly used in regions where temperatures do not drop below freezing, preventing the risk of ice formation inside the hydrant.

2. Dry-Barrel Hydrants:

- **Description:** These hydrants have a valve assembly underground and are drained of water when not in use.
- **Use Case:** Suitable for areas with freezing temperatures to prevent ice formation and potential damage.

Legal and Operational Considerations:

• Water Theft Prevention:

- Water theft from fire hydrants is a concern, particularly if the hydrant is used without proper authorization. To legally use water from a hydrant, businesses or contractors must obtain a permit and meter from the relevant authority (e.g., JEA). Unauthorized use may indicate theft.

Applications and Usage:

• Building Fire Safety:

- In buildings, fire hydrant systems provide firefighters with a reliable water source for extinguishing fires. The system is designed to ensure sufficient pressure and flow to effectively combat fires.

• Emergency Preparedness:

- Regular maintenance and testing of fire hydrant systems are essential to ensure that they are operational and ready for use in emergencies.

Summary:

A fire hydrant system is an integral part of building and community fire safety, comprising various components that work together to provide a reliable source of water for firefighting. The system includes hydrants (wet-barrel and dry-barrel), water supply pipes, valves, and connections, all designed to deliver water efficiently during a fire emergency. Proper maintenance and legal usage are critical to ensuring the system's effectiveness and preventing issues such as water theft.

NRS (NON RISING STEM) VALVE



Non-Rising Stem (NRS) Gate Valves

Definition: NRS gate valves are a type of valve used primarily in fire protection systems for cut-off and zone control. Unlike rising stem valves, the stem in an NRS valve does not move up or down; it only rotates to open or close the valve.

Characteristics:

- **Stem Movement:** The stem remains stationary in the vertical direction but turns to operate the gate.
- **Visibility:** Often used with post indicators for visibility and traceability, especially when installed underground to avoid freezing.

Advantages:

- **Compact Size:** Generally smaller than pressure-reducing control valves.
- **Ease of Maintenance:** Designed for easier maintenance compared to some other valve types.

Disadvantages:

- **Size:** Can be larger than some other types of valves used in firefighting systems.
- **Cost:** Typically more expensive than alternative valve options.

Connection Type:

- **Flanged**

**Working Pressure:**

- 200 psi to 300 psi

Maximum Working Temperature:

- 0.6°C to 52°C

Dimensions:

- 2 ½" to 16"

Material Features:

- **Body:** ASTM A 536 Nodular Cast Iron
- **Cover:** ASTM A 536 Nodular Cast Iron
- **Spindle:** ASTM AISI 420 Stainless Steel
- **Slide:** Covered by EPDM Nodular Cast Iron
- **Gasket:** EPDM
- **O-ring:** EPDM

Application Areas:

- **Fire Fighting Systems:** Specifically designed for use in systems that are not affected by freezing conditions, typically installed underground.

Approvals:

- **UL Listed**
- **ULc Listed**
- **FM Approved**

Summary:

NRS gate valves are utilized in fire protection systems where a non-rising stem design is preferred. They are durable and suited for underground installation with post indicators for operation and visibility. Despite being larger and potentially more costly than some alternatives, their ease of maintenance and compact size offer significant advantages in various applications. The valves are constructed from high-quality materials and approved by relevant safety standards for reliable performance in demanding environments.

OS&Y RISING STEM VALVE



OS&Y Gate Valves

Definition: An OS&Y (Outside Screw and Yoke) gate valve is a type of valve used to control water flow in fire sprinkler systems. It operates by moving a gate up or down, depending on whether the valve is open or closed. The term OS&Y refers to the valve's design, where the stem and yoke are positioned outside the valve body.

Characteristics:

- **Operation:** The valve opens and closes by moving the gate up or down. The stem is visible outside the valve body, allowing for easy visibility of the valve's position.
- **Design:** OS&Y valves are often used with post indicators for better visibility and traceability, especially in systems where the valve needs to be easily accessible.

Advantages:

- **Compact Size:** Generally smaller compared to pressure-reducing and control valves.
- **Economic:** More cost-effective than some other types of valves used in similar applications.
- **Visibility:** The external stem allows for easy monitoring of the valve's position.

Disadvantages:

- **Size:** Not as compact as some other valves, which may be a consideration in tight spaces.
- **Cost:** May be less economical compared to some valve types designed specifically for different applications.

**Connection Type:**

- Threaded
- Flanged
- Grooved

Working Pressure:

- 175 psi to 350 psi

Maximum Working Temperature:

- 0.6°C to 52°C

Dimensions:

- 1" to 16"

Material Features:

- **Body:** ASTM A 536 Nodular Cast Iron
- **Cover:** ASTM A 536 Nodular Cast Iron
- **Spindle:** ASTM AISI 420 Stainless Steel
- **Slide:** Nodular Cast Iron covered with EPDM
- **Gasket:** EPDM
- **O-ring:** EPDM

Application Areas:

- **Fire Fighting Systems:** Suitable for use in various fire protection systems. Commonly used in water tanks and in front of pumps. However, in pump lines, OS&Y gate valves are typically not used.

Approvals:

- UL Listed
- ULc Listed
- FM Approved

Summary:

OS&Y gate valves are essential components in fire protection systems, offering a practical solution for controlling water flow with visible indication of valve status. Their design makes them suitable for both indoor and outdoor use, though they may not be the best choice for all applications, such as pump lines. The valves are constructed from durable materials and are recognized for their reliability through various approvals.

PREACTION SYSTEMS



Pre-Action Sprinkler System

Definition: A pre-action sprinkler system is a type of fire suppression system that integrates additional detection equipment to enhance fire detection and response. This system is designed to prevent accidental discharge of water while still providing an effective response to a fire.

Characteristics:

- **Dimensions:**
 - 1 ½" to 8"
- **Assemble Types:**
 - Flanged x Flanged
 - Flanged x Grooved
 - Grooved x Grooved
- **Configuration:**
 - Vertical
 - Horizontal
- **Working Pressure:**
 - 175 to 250 psi
- **Approvals:**
 - FM (Factory Mutual)
 - UL (Underwriters Laboratories)
 - ULC (Underwriters Laboratories of Canada)

Working Principle:

1. **Detection:**



- The system uses additional detection equipment, such as pilot sprinklers, smoke detectors, heat detectors, or electrical discharging buttons, to identify the presence of a fire.
- 2. **Activation:**
 - Upon detection of a fire, the detection system triggers the release of water into the sprinkler lines. The water moves only when a fire is confirmed, ensuring that the system remains inactive under normal conditions.
- 3. **Prevention of False Alarms:**
 - The pre-action system prevents accidental or unintended water discharge by requiring verification of a fire through the detection equipment. This feature is particularly useful in sensitive areas where accidental water damage could be catastrophic.

Usage Purpose:

- **Preventing Hazards:**
 - The primary goal is to avoid accidental activation of the sprinkler system and the resultant water damage, while still providing reliable fire protection.

Applications:

- **Archives:** Protects valuable documents and records.
- **Computer Rooms:** Safeguards sensitive electronic equipment and data.
- **Libraries:** Preserves books and historical manuscripts.
- **Museums:** Protects art and valuable artifacts.

Summary:

The pre-action sprinkler system offers advanced fire protection by integrating additional detection equipment to ensure that water is only discharged when a fire is confirmed. This system minimizes the risk of accidental discharge and is ideal for protecting valuable or sensitive items in various environments. The system's design includes flexible assembly options, a range of working pressures, and compliance with key industry approvals.

PRESSURE REDUCING VALVE



Pressure Reducing Valve

Definition: A pressure reducing valve (PRV) is used to manage and control the pressure in a system, ensuring that it does not exceed preset limits. It helps in reducing high pressure from sources like fire pumps to a lower, more manageable level. This not only extends the lifespan of system equipment but also conserves water by avoiding unnecessary operations.

Advantages:

- **Increases Equipment Lifespan:** By controlling and reducing excessive pressure, the valve helps in preventing damage to the system's components, thereby extending their operational life.
- **Water Conservation:** Prevents unnecessary water discharge and saves water by avoiding overpressure conditions.
- **Pressure Regulation:** Adjusts and maintains pressure within safe limits as per system requirements, based on hydraulic calculations.

Connection Types:

- Threaded
- Flanged
- Grooved

Pressure Ranges:

- **Input Pressure:**
 - 175 psi – Output Adjustments Pressure: 30-165 psi
 - 300 psi – Output Adjustments Pressure: 30-165 psi

**Maximum Working Temperature:**

- 82°C

Dimensions:

- 1 ½" – 3" (Threaded)
- 1 ½" – 10" (Flanged)
- 1 ½" – 8" (Grooved)

Material Features:

- **Body and Cover:** ASTM A 536 Nodular Cast Iron
- **Valve Inner Parts:** Bronze ASTM B61
- **Pilot Control Valve and System:** Bronze ASTM B62 with Stainless Steel 303 Inner Parts
- **Valve Diaphragm:** Buna-N Neoprene

Application Areas:

- Suitable for use in systems requiring pressure adjustments after hydraulic calculations. Common in systems where high pressure needs to be controlled and regulated, such as in fire protection systems.

Approvals:

- UL Listed
- ULc Listed

Summary:

The pressure reducing valve is essential for maintaining safe and efficient pressure levels within a system. It offers durability and precision in pressure management, making it crucial for applications where high-pressure sources need to be adjusted to prevent damage and ensure proper system operation. Its design accommodates various connection types, pressure ranges, and temperatures, with robust material construction to handle demanding conditions

WATCH SWITCHED BUTTERFLY VALVE



Supervisory Switch Butterfly Valves

Definition: Supervisory switch butterfly valves are used in fire protection systems to control and monitor the flow of water or other fluids in the system. They are designed to be monitored remotely and provide an efficient means for separating zones and controlling system operations.

Advantages:

- **Space Efficiency:** Compared to other types of valves, supervisory switch butterfly valves occupy less area, making them ideal for applications where space is limited.
- **Remote Monitoring:** Equipped with a hand wheel and gear box, these valves can be easily monitored and controlled, offering improved automation and system integration.

Disadvantages:

- **Pressure Loss:** These valves generally incur more pressure loss compared to some other valve types, which might affect system efficiency.

Connection Types:

- Threaded
- Wafer
- Grooved

Working Pressure:

- 175 psi to 300 psi

Maximum Working Temperature:

- 120°C

**Dimensions:**

- **1" to 12"**

Material Features:

- **Body:** ASTM A 536 Nodular Cast Iron
- **Disc:** ASTM 395 (Nickel Covered) Nodular Cast Iron
- **Spindle:** ASTM 583 Tip 416 Stainless Steel
- **Threaded Box:** Cast Iron and Steel
- **Gasket:** EPDM
- **Flywheel:** Cast Iron

Application Areas:

- **Fire Protection Systems:** Suitable for many fire protection applications, these valves are used to control and monitor various parts of the fire protection system.

Approvals:

- **UL Listed**
- **ULc Listed**
- **FM Approved**

Summary:

Supervisory switch butterfly valves are designed for effective zone control and monitoring within fire protection systems. They offer the advantage of compact size and remote operation but may involve higher pressure losses. Their robust construction and material features, along with their approvals, make them suitable for various fire protection applications, both indoors and outdoors.

OTHERS



**CMDA (CONTROL MODE
DENSITY AREA)**



**ESFR (EARLY SUPPRESSION
FAST RESPONSE)**



FIRE EXTINGUISHERS



FIRE HYDRANTS



FIRE PROTECTIVE GLOVES



FLOW METER



FLOW SWITCH



PRESSURE RELIEF VALVE



SPRINKLER TYPES