

The purpose of this Information File (BIF) is to explain the types of sprinkler system, what they are called, how they work and why they have different uses and applications.

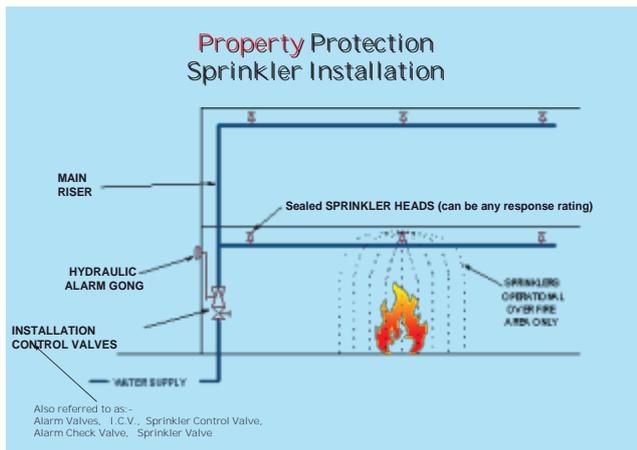
Control Valve Set

The supply of water to a sprinkler installation is controlled by a set of valves. The valve set varies according to the type of installation. There are two principal valves, the main stop valve and the alarm valve.

The *main stop valve* controls water entering the installation. It is a handwheel-operated valve and should be kept locked in its fully open position by a padlocked or riveted strap. It should be located in a position which is readily accessible, preferably near a building's main entrance. Nearby, on an outside wall, should be the sign:



The *alarm valve* is located immediately above the main stop valve. Its function is to open soon after a sprinkler head is activated and water flows in an installation, some water being diverted to drive an alarm motor, which is a water turbine that rotates and causes a clapper to strike a gong and thus raise the alarm.



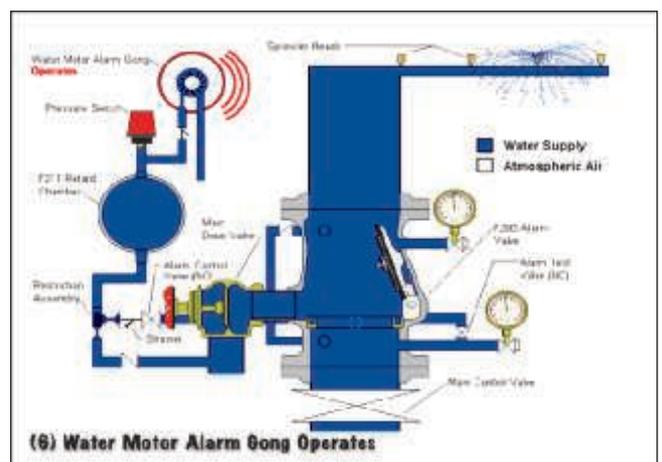
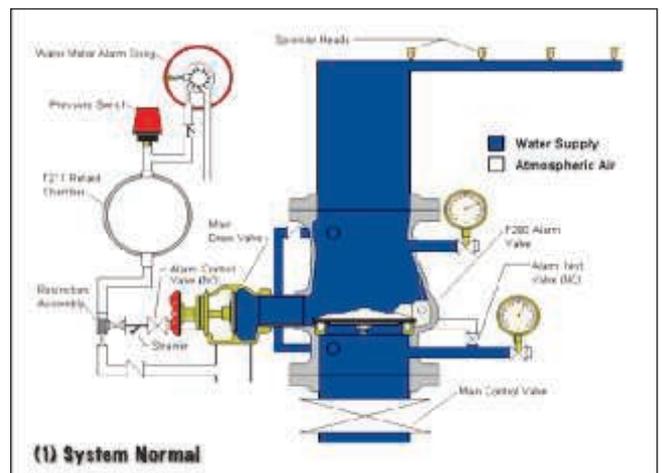
Depending upon the design requirements and the environment in which the system is installed, different configuration of valves will be used. This BIF explains the type of systems and how they are configured and work.

Types of Systems

A wet-pipe system is where all the pipes leading from the water supply, through the various control valves and on to the sprinkler heads, are permanently filled with water under pressure.

Wet type sprinkler systems are the most common type installed. They are used in heated buildings, where there is no possibility of the water freezing ie where the ambient temperature remains above 5°C.

The ambient temperature should not exceed 70°C.

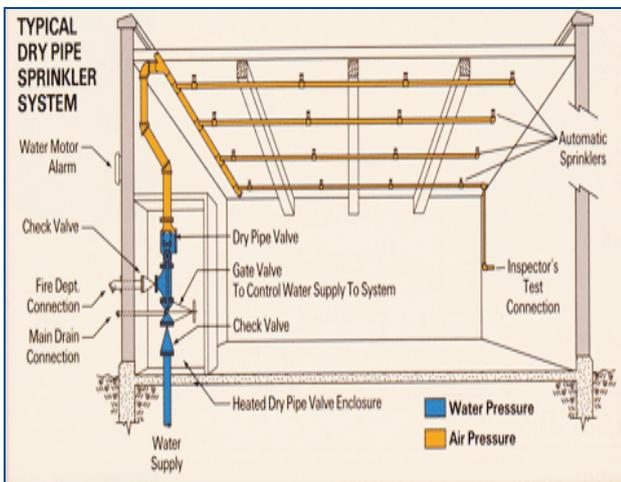


Wet systems are capable of delivering water to the fire as soon as a sprinkler head operates. This is the preferred type of system to install.



Dry pipe sprinkler installations are appropriate for applications either where there is a danger of the water in the pipes freezing or in situations where there may be temperatures above about 70°C.

In a dry-pipe system the pipes on the 'active' side of the installation control valves are charged with air which is under sufficient pressure to prevent the entry of water into the



delivery pipework. Once the first sprinkler head operates the compressed air escapes through the head and water follows.

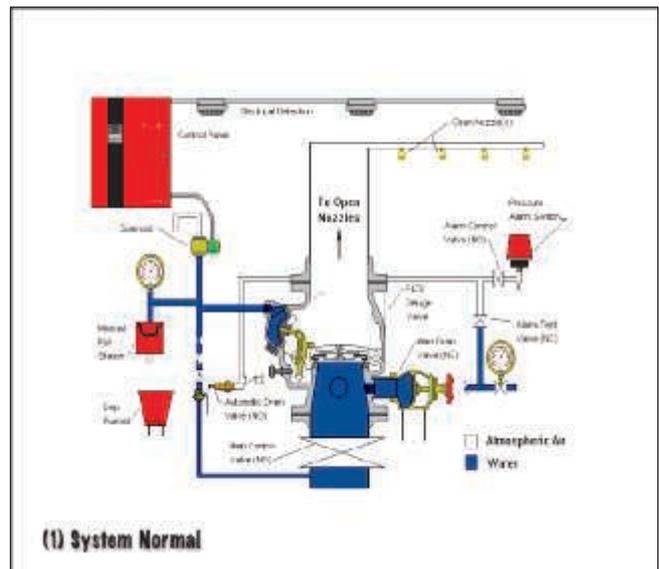
Alternate wet and dry systems are just that. They can operate as either type and the normal configuration is of protecting with a wet-pipe installation in the summer and a dry-pipe installation in winter. These are used in car parks, loading bays and any building where the temperature cannot be guaranteed to stay above freezing. The temperature should not exceed 70°C.

Tail end alternate or tail end dry-pipe systems are essentially wet-pipe installations in which a part of the system, the tail end (in conditions, for example, where it is liable to freeze), is dry or alternate wet and dry. They are commonly used in loading bays and under canopies.

A pre-action sprinkler system is a dry-pipe system linked to an automatic fire detection system which protects the same area. Operation starts when a heat or smoke detector in the detection system activates, (which will usually happen quicker than a sprinkler head). At this point a 'pre-action' valve opens to allow water to flow into the sprinkler pipework before the first sprinkler head operates. Discharge of water will not occur until a sprinkler head operates. This type of system is quite often used in water sensitive areas such as electrical equipment rooms and computer suites.

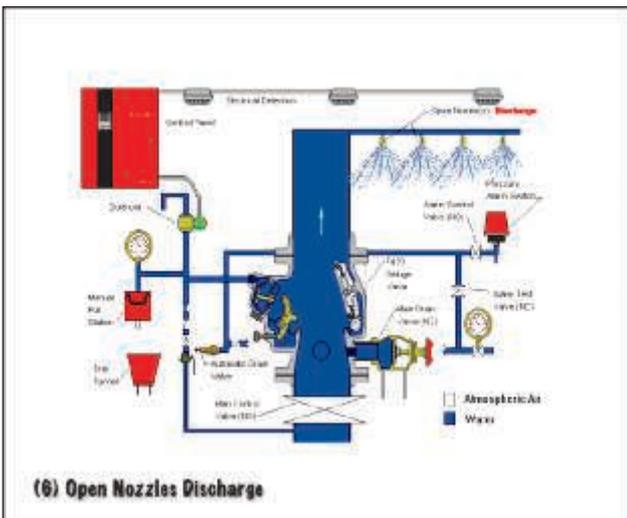
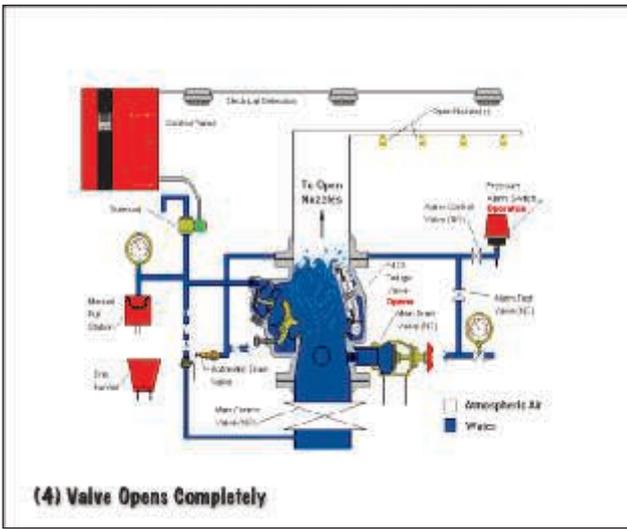
Deluge System

These systems are commonly fitted with open nozzles or projectors and are triggered from air/water detection lines or some kind of detection system.



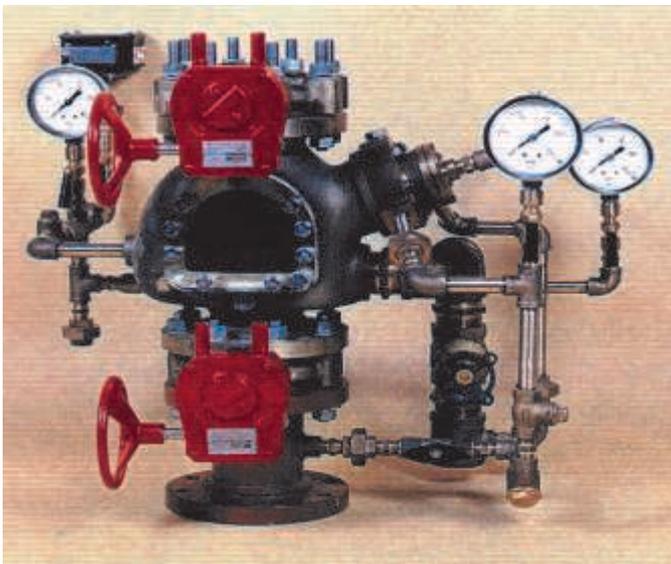
Deluge systems provide water to a network of open nozzles which could be for local application or protection to a specific high risk plant area. Other risks would include such situations as tanker loading bays, flammable gas tanks, oil storage reservoirs, oil lines, power generation plants etc.

There are a variety of sprinkler and nozzles used with deluge type systems. They can be standard



sprinklers, high and low velocity nozzles or directional nozzles.

There are other variations upon the types described above; elaborations upon the basic types are a matter for the sprinkler system designer in consultation with his clients and their insurers, or with the authority having jurisdiction.



What System to Choose?

From the early days of standardisation in the design of sprinkler systems for installation in the United Kingdom, an understanding of the hazards to be protected by a system has been a principal factor influencing system choice and design. The current edition of the *LPC Rules for Automatic Sprinkler Installations*, the industry bible which is based on BS EN 12845, links definitions of hazard classifications to corresponding design requirements. The BS EN is the European Standard on system design and installation, published for the UK by the British Standards Institution; the *LPC Rules*, published by the Fire Protection Association, enjoy the support and endorsement of the insurance industry, specifiers, government departments and installation installers.

Premises which have been assessed and are deemed to have more hazardous conditions would require a system to deliver:

- a higher density of water discharge (in terms of mm depth of water over a given floor area per minute),
- over a longer time period and, possibly,
- over a greater assumed area of operation.

To achieve these objectives the designer would calculate the need to:

- reduce the area protected by each individual sprinkler head,
- specify the use of sprinkler heads with an increased orifice size,
- increase the capacity of stored water supplies and/or the output of the pumps driving the water through the system, and
- increase the pressure/flow requirements of the pipework.

Each of considerations (e) to (g), in that simple example, will have a bearing on other aspects of the system which the designer needs to plan to protect the risk in question. The conditions prevailing in the premises to be protected will influence the designer's choice of type of system.



WET type control valves



DRY type control valves



ALTERNATE type control valve



PREACTION type control valve

Facts about Fire Sprinklers:

- Since 1945 no one in the UK has ever died as a result of a fire in a public building with a working sprinkler system.
- Most fires in sprinkler protected buildings are extinguished by eight or fewer sprinkler heads operating.
- Only the sprinkler heads in the immediate vicinity of the fire actually operate.
- Sprinklered buildings prevent fire fighter deaths.
- Sprinklers do not 'false alarm' they will only operate if there is an actual fire.
- For a very small cost an alarm switch can be built-in to the system to call the fire service automatically should the sprinklers operate
- Maintenance costs for sprinklers are very low and the systems have a very long service life
- Sprinklers save lives - and property - and are the only devices which can detect a fire, sound the alarm, call the fire brigade and extinguish or control the fire.
- Despite preconceptions, sprinklers are not difficult or expensive to install and are not unsightly.
- Sprinkler systems installed in full compliance with third party certification standards will usually attract insurance premium discounts.

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