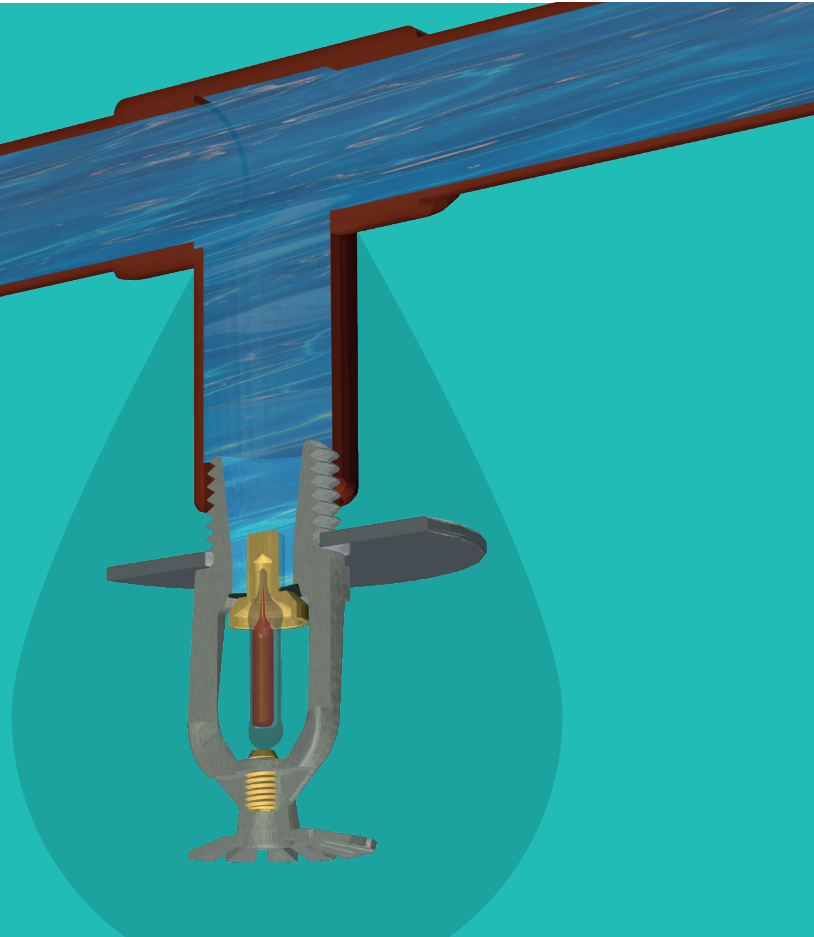


SPRINKLER GUIDANCE



Automatic Sprinkler – A fire suppression or a control device that operates automatically when its heat activated element is heated to its thermal rating or above, allowing water to discharge over a specified area. All sprinkler heads shall have:

- a) A thermal sensing element that responds to heat.
- b) An orifice through which water is released under pressure.
- c) A deflector that forms a spray pattern of water over the fire.

Sprinkler Yoke – That part of the sprinkler which retains the heat responsive element in load bearing contact with the sprinkler head.

Sprinkler System – An integrated system of underground and overhead piping designed in accordance with good fire engineering practice. The system includes a dedicated water supply that caters to one or more systems. The portion of the system above ground is a network of specially sized or hydraulically designed piping installed in a building to which sprinklers are attached in a systematic pattern. Each system has a control valve that includes a device for actuating an alarm when the system is in operation. The system is actuated by heat from a fire and discharges water over the fire area.



Types of sprinkler system

Wet Pipe Systems – Sprinkler systems employing automatic sprinklers attached to a piping network always charged with water and connected to a water supply so that water discharges immediately from sprinklers opened by heat from a fire.

Dry Pipe Systems – Sprinkler systems employing automatic sprinklers attached to a piping network containing air or nitrogen under pressure, the release from which permits the water pressure to open a valve known as dry pipe valve, and then water flows into the piping network and discharges from the opened sprinklers.

Deluge System – Sprinkler systems employing open sprinklers that are attached to a piping network that is connected to a water supply through a valve that is opened by the operation of a detection system installed in the same areas as the sprinklers. When this valve opens, water flows into the piping network and discharges from all sprinklers connected thereto.

Pre-action System – Sprinkler systems employing automatic sprinklers attached to a piping network that contains air that might or might not be under pressure, with a supplemented detection system installed in the same area as the sprinklers. Pre-action system can be combined with either dry or wet pipe system applications.

Anti-freeze System – Wet pipe sprinkler systems employing automatic sprinklers attached to a piping network containing anti-freeze solution and that are connected to a water supply. The anti-freeze solution is discharged, followed by water, immediately upon operation of sprinklers opened by heat from a fire.

GENERAL SPRINKLER CHARACTERISTICS

The following are characteristics of a sprinkler that define its ability to control or extinguish a fire.

- ① **Thermal sensitivity.** A measure of the rapidity with which the thermal element operates as installed in a specific sprinkler or sprinkler assembly. One measure of thermal sensitivity is the response time index (RTI) as measured under standardized test conditions. (a) Sprinkler defined as fast response have a thermal element with an RTI of 50 (meter-seconds)^{1/2} or less. (b) Sprinkler defined as standard response have a thermal element with an RTI of 80 (meter-seconds)^{1/2} or more.
- ② **Temperature Rating**
- ③ **K-factor**
- ④ **Installation orientation**
- ⑤ **Water distribution characteristics** (i.e., application rate, wall wetting)
- ⑥ **Special service conditions**

Types of sprinklers

ACCORDING TO RELEASE MECHANISM

Fusible Element Sprinklers – Opened under the influence of heat by melting of a component.

Glass Bulb Sprinklers – Opened under the influence of heat by the bursting of the glass bulb through pressure resulting from expansion of the fluid enclosed therein.

ACCORDING TO TYPE OF DISCHARGE

Conventional Sprinkler – A sprinkler that has components similar to a standard-spray sprinkler and has a spherical water distribution directed towards the ground over a definite protection area. These sprinklers shall discharge from 40 or more percent of the total water flow initially in an upward direction.

Spray sprinkler – Induces a paraboloid water distribution directed towards the ground over a definite protection area. These sprinklers shall discharge from 80 or more percent of the total water flow in a downward direction.

ACCORDING TO MOUNTING PATTERN

Pendent sprinkler – Sprinkler designed to be installed in such a way that the water stream is directed downward towards the deflector which in turn directs the water downwards toward the protected area. The sprinkler is designed to have the deflector oriented vertically below the pipe to which the sprinkler is connected.

Upright sprinkler – Sprinkler designed to be installed in such a way that the water stream is directed upward against the deflector which in turn redirects the water downwards toward the protected area. The sprinkler is designed to have the deflector oriented vertically above the pipe to which the sprinkler is connected.

Sidewall sprinkler – Sprinkler having special deflector that are designed to discharge most of the water away from the nearby wall in a pattern resembling one quarter of a sphere, with a small portion of the discharge directed at the wall behind the sprinkler.

Recessed sprinkler – Sprinkler in which all or part of the body, other than the shank thread, is mounted within a recessed housing with the plane of the orifice above the plane of the ceiling, or behind the plane of the wall on which the sprinkler is mounted.

Flush sprinkler – Sprinkler in which essentially all of the body, other than the shank thread with the exception of the thermal sensing element, is mounted above the lower plane of the ceiling.

Concealed sprinkler – A recessed sprinkler with a cover plate.

Sprinkler rosette – Plate covering the gap between the shank or body of a sprinkler projecting through a suspended ceiling, and the ceiling.

ACCORDING TO SPECIAL APPLICATION

Extended coverage (EC) sprinkler – A sprinkler where the area of coverage exceeds that given for a standard sprinkler based on the occupancy being protected. A sprinkler which extends the usual maximum area of protection at increased spacing and listed as a EC sprinkler.

Extra-large orifice (ELO) sprinkler – A type of spray sprinkler which discharges at a hemispherical pattern, provide greater flows at lower pressures in comparison to standard or large orifice sprinklers. (Also called CMDA – Control Mode density Application type sprinklers)

Large drop sprinklers – A type of spray sprinkler that is capable of producing characteristic large water droplets and is listed for its capability to provide fire control of specific high-challenge fire hazard. (Also called CMSA – Control Mode Special Application) sprinklers.

Early suppression fast response (ESFR) sprinklers – A type of fast response sprinkler that is listed for its capability to provide fire suppression of specific high-challenge fire hazards. Sprinkler that gives a downward parabolic pattern of water discharge with high momentum and mass flow directly below and adjacent to the sprinkler and a diminishing density with increasing distance from the sprinkler.

Intermediate level or Rack storage sprinkler – A sprinkler that is installed within a storage rack. A sprinkler equipped with integral shields to protect its operating elements from the discharge of the sprinklers installed at higher elevations. The water shield prevents wetting of the thermal sensing element by water from sprinklers at a higher elevation in the rack or at ceiling level.

Cut-Off or open Sprinkler – A sprinkler protecting a door or window between two areas only one of which is protected by the sprinkler.

Window sprinklers – Sprinklers specifically listed to provide appropriate fire rating for heat strengthened or tempered glass windows using closed sprinklers.

ACCORDING TO OCCUPANCIES

Storage sprinkler – A large orifice, closed head sprinkler with either a fast response or a standard response element and designated as 'storage sprinkler. These sprinklers protect storage-type occupancies and/or any other high heat release type fires.

Non-storage sprinklers – A sprinkler which protect non-storage type occupancies and or any other low to moderate heat release type fires such as manufacturing occupancies.

ALARM VALVE

Water Flow Alarm device – A device that is installed on a sprinkler system that detects a water flow when one or more sprinklers operate and provides alarm. It is connected to a fire alarm system to further initiate an alarm condition or is used electrically to initiate a fire pump or local audible or visual alarm.

Alarm Test Valve – A valve through which water may be drawn to test the operation of the water motor fire alarm and/or of any associated electric fire alarm.

Alarm check Valve – A check valve, of the wet, dry or composite type, which is specifically designed to allow a means of alarm notification when waterflows through it.

PIPING

Trunk Mains – A pipe connection to two or more water supply pipes to the installation main control valve set(s).

Supply Pipe – A pipe connecting a water supply to a trunk main or the installation main control valve set(s); or a pipe supplying water to a private reservoir, suction tank or gravity tank.

Main Distribution Pipe (Feed Main) – A pipe feeding a distribution pipe or more distribution pipes.

Distribution Pipe (Cross Main) – Pipes supplying the branch lines, either directly or through riser nipples (Sub-distribution pipe). The piping network of a tree-type sprinkler system that provides water to the branch lines. A pipe feeding either arrange pipe directly or a single sprinkler on a non-terminal range pipe more than 300 mm long.

Range (or Branch) Pipe – A pipe feeding sprinkler directly or via arm pipes of restricted length.

Arm Pipe – A pipe less than 300 mm long, other than the last section of a range pipe, feeding a single sprinkler.

Riser – A vertical pipe feeding a distribution or range pipe.

Drop – A vertical pipe feeding a distribution or range pipe.

Terminal Range Configuration – A pipe array with only one water supply route from a distribution pipe.

Terminal Main Configuration – A pipe array with only one water supply route to each range pipe.

System riser – The above ground horizontal or vertical pipe between the water supply and the mains that contain a control valve and water flow alarm device.

Pipe array – Pipes feeding a group of sprinklers. Pipe arrays can be looped, gridded or branched.

End-centre array – Pipe array with range pipes on both sides of a distribution pipe.

End-side array – Pipe array with range pipes on one side only of a distribution pipe.

Zone – Sub-division of an installation with a specific flow alarm and fitted with a monitored subsidiary stop.

HYDRAULICS OF THE SYSTEM

Hydraulically Designed System – A calculated sprinkler system in which pipe sizes are selected on a pressure loss basis to provide a prescribed water density, in LPM/M², or a prescribed minimum discharge pressure or flow per sprinkler, distributed with a reasonable degree of uniformity over a prescribed area.

Assumed Maximum Area of Operation (Hydraulically Most Favourable Location) – The location in a sprinkler array of an AMAO of specified shape at which the water flow is the maximum for a specific pressure.

Assumed Maximum Area of Operation, Hydraulically Most Unfavourable Location – The location in a sprinkler array of an AMAO of specified shape at which the water supply pressure is the maximum needed to give the specified design density.

Design or Demand Area – The design or demand area is a theoretical area of the sprinkler operation within a protected building in m² representing the worst case area where a fire could burn.

Design Density – The design density is a measurement of how much liters of water per square meter of floor area (lpm/m²) should be applied to the design area. The minimum density of discharge, in mm/min of water, for which a sprinkler installation is designed, determined from the discharge of a specified group of sprinklers, in lpm, divided by the area covered, in m².

LAYOUTS

Standard Sprinkler Layout – A rectilinear lay out with the sprinkler aligned perpendicular to the run of the ranges.

Staggered Sprinkler Layout – An off-set lay out with the sprinklers displaced one half pitch along the range or branch pipe relative to the next range or ranges.

Looped Layout – Sprinkler system in which multiple cross mains are tied together so as to provide more than one path for water to flow to an operating sprinkler and branch lines are not tied together.

Gridded Layout – Sprinkler systems in which parallel cross mains are connected by multiple branch lines. An operating sprinkler will receive water from both ends of its branch line, while the other branch lines help transfer water between cross mains.

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