

How does an automatic fire sprinkler system operate, the different occupancy and hazard classifications, the types of sprinkler systems and sprinkler heads.

Automatic fire sprinkler system

A network of water-filled pipes which starts at a reliable water source and ends with an array of fire sprinkler heads. The sprinkler heads operate as individual heat detectors and actuate to release water over the fire to control or suppress the spread of fire (note: this describes a typical wet pipe sprinkler system).



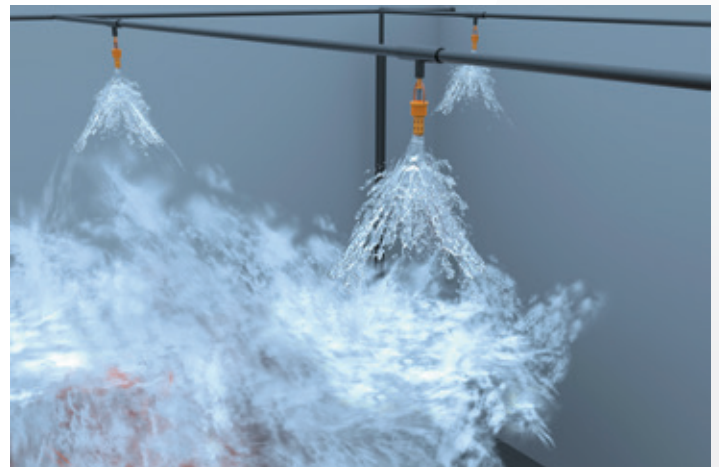
Types of sprinkler systems

Wet system – permanently charged with water. A sprinkler head activates by the heat from the fire and water discharges. This is the most common type of sprinkler system and should not be installed where water in the pipes may freeze.

Dry system – permanently charged with air or inert gas under pressure above the alarm valve (dry) and has water below. This type of system is typically found in freezers where if the pipework was full of water, it would freeze and fracture the pipes.

Pre-action system – combination of a sprinkler system and an independent system of heat or smoke detectors in the same area as the sprinklers. A heat or smoke detector operates prior to the sprinklers, allowing the pre-action valve to open and water to flow into the sprinkler piping before the first sprinkler starts to operate. This system provides an early warning and commencement of the fire suppression much earlier than sprinklers alone.

Deluge system – a system of open sprinklers controlled by a quick-opening valve (deluge valve) which is operated by a system of heat detectors installed in the same area as the open sprinklers. This system would be found in areas where a fire could spread rapidly and it is vital that water envelops the entire area (through the open sprinkler heads) all at once to control the fire.



External sprinklers – a system of sprinkler heads provided along an external wall to protect the building from external exposures such as another building or yard storage.

(Other sprinkler systems include alternate wet and dry, recycling pre-action, and tail-end).

Occupancy and hazard classifications

Light hazard, Ordinary hazard (OH 1, 2 & 3) and High hazard (process risks, high piled storage risks; Category 1, 2, 3 & 4). All relate to the fire load and the water supply needed to control or suppress the spread of fire. For example, a café or restaurant would typically be an Ordinary hazard occupancy compared to a warehouse containing paper products in racks to 6 m high (High hazard) which requires a far greater water supply to control or suppress the spread of fire.

Types of sprinkler heads

Conventional sprinkler – throws some water up to the ceiling and some downwards. The intent is to keep the ceiling cool and intact while controlling the fire below. These can be installed in the upright or pendant (downward facing as in the photo above) position.

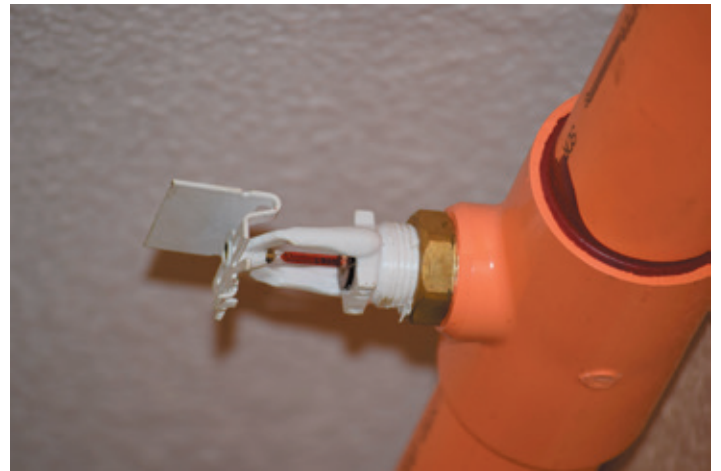
Spray sprinkler – most water goes down to the fire with little or no water thrown to the ceiling.



Flush sprinkler – for aesthetic reasons, all that is exposed is a small round plate (i.e. some 100 mm dia.) flush with the ceiling. Upon detecting heat (at a pre-determined level), the flush plate falls away, a deflector drops down and water discharges in the normal manner.



Sidewall sprinkler – installed along walls and throws some water upon the wall, but mostly outward towards the fire.



Fast response sprinkler – has a high level of thermal sensitivity which enables it to respond at an early stage of fire development.

Early suppression fast response (ESFR) sprinklers – designed exclusively to suppress high-challenge, high-piled storage (i.e. warehouse) fires. Discharges large volumes of water at high speed to suppress a fire before it develops.

(Other sprinkler heads include recessed, dry pendant and dry sidewall, dry upright, extended coverage, large drop, residential, extra-large orifice and enlarged orifice).

Reference: AS 2118.1 Automatic fire sprinkler systems Part 1: General requirements.