

# Fire Sprinkler Maintenance and Operation: How to Protect Your Business

*Commercial fire protection sprinkler systems have been saving lives and reducing property damage for more than a century. New England's textile mills began using fire suppression systems following a series of devastating fires in the mid-1800s. The first automatic sprinkler system was patented in 1872. More than 140 years later, technology has advanced these systems but three basic facts remain — on-site sprinklers reduce fire damage, save lives and prevent injuries for workers and firefighters. However, sprinkler systems must be properly selected for the property they are protecting and correctly installed and maintained to afford optimum protection when they are most needed.*

*The Insurance Institute for Business & Home Safety (IBHS) is committed to helping business owners understand the benefits of fire sprinklers. The following article addresses basic concepts of overhead sprinkler systems used in many small to mid-size commercial facilities with a focus on the most common automatic sprinkler heads and overhead systems; specifically wet, dry and preaction systems. The article does not address more complex fire extinguishing systems, which may be found in larger operations, such as in-rack sprinklers or fixed chemical extinguishing systems such as halon. Nor does it discuss specialty equipment that is needed in particularly vulnerable areas, such as commercial kitchens.*



## HOW COMMERCIAL FIRE PROTECTION SPRINKLER SYSTEMS REALLY OPERATE

While it makes for good drama in the movies, all of the sprinkler heads in a building do not shower the space with water when one head is broken or activated. In fact, the heads are designed to work only when there is enough heat near a specific head to melt its fusible link, which is typically a glass bulb or small piece of metal. The goal is to control and contain a fire until the fire department arrives. This often means many office fires can be controlled by activation of one or two sprinkler heads, while the remainder of the heads will not operate.

Sprinkler heads can be upright, pendent or side wall. Offices and other areas where there are suspended ceilings will have pendent heads. Often concealed pendent heads are installed flush to the ceiling to provide a smooth appearance. When the surrounding temperature approaches the head's rating, the cover plate will drop off. If the temperature continues to climb, the heads will operate upon reaching the activation temperature.



*Pendent sprinkler head with glass bulb.*

## TYPES OF COMMERCIAL SPRINKLER SYSTEMS

### WET SPRINKLER SYSTEM

These are the most common type of sprinkler systems used in small commercial operations such as offices and retail stores. A wet system has water stored within all of the sprinkler pipes right up to the head. When activated, the water is discharged with a specific spray pattern. Modern systems are hydraulically designed based on the available water supply's flow and pressure. If the water supply, which is often the local municipality's public supply, is not strong enough to protect the occupancy or if the building is several stories tall, a fire booster pump may be needed.

### DRY TYPE SYSTEM

These are generally placed in locations where they may encounter freezing temperatures, such as outdoor installations, unconditioned space or large warehouse type freezers. To avoid water freezing within the sprinkler branch line, dry type systems have branch line piping that is pressurized with air or nitrogen. The main riser has a dry-type check valve that holds back water at the main riser. When a sprinkler head operates, it releases the air or nitrogen. This loss of pressure trips the check valve, releasing water into the pipes and out through the sprinkler head.

### PREACTION SYSTEM

This is an alternative for computer rooms or other areas, where sensitive electronics are located and accidental discharge of even a single sprinkler head can cause significant property damage. It is possible to design a variety of levels of protection against sprinkler water accidentally being released by interconnecting heat or smoke detectors and the sprinkler system.

Regardless of the type of system used, all installed sprinkler system materials and equipment, should be UL and/or FM approved. Approved products will include a logo stamped into the apparatus representing the approval organization.

## MAINTENANCE

Maintenance matters – any type of sprinkler system will be useless in a fire if the sprinkler control valves are closed and water is prevented from extinguishing the flames. This is the leading cause of extensive fire damage in buildings with a sprinkler system. Sprinkler control valves should be visually inspected periodically to ensure that they are locked or sealed in the wide open position.

When a sprinkler control valve is shut to conduct repairs or maintenance on the system, it should be done so that only affected areas are shut off and for the shortest possible time period.

## STEPS FOR PROPER MAINTENANCE AND OPERATION

Implement a sprinkler impairment program when a valve needs to be shut off for repair or maintenance. This should include:

- placing a tag on the shut control valve;
- notifying the local fire department and alarm monitoring company;
- notifying the property insurance companies, when required;
- implementing a hot work program (learn more at [http://www.disastersafety.org/disastersafety/commercialhot-work\\_ibhs/](http://www.disastersafety.org/disastersafety/commercialhot-work_ibhs/));
- and avoiding any ignition sources in the area.

An impairment program should be in place for shutting off sprinkler systems and other fire protection systems such as fire pumps, underground fire mains or any other fire protection equipment that is normally open to deliver water all the way through the sprinkler system.

## INSPECTION AND TESTING

Sprinkler systems should be inspected and tested in a schedule and in a manner that meets or exceeds NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems [1]. Some local municipalities require certified sprinkler contractors to conduct inspection and testing, while others allow this to be done by trained in-house staff.

NFPA recommends weekly visual inspections of unsupervised valves and monthly visual inspections of locked or supervised valves. Physical inspections of systems will vary depending upon the type of system involved. For example, physical testing of dry-type and preaction systems is more complicated than wet types and should be conducted by a certified sprinkler contractor, regardless of local ordinances. Frequency of inspections will also vary depending upon the type of equipment.

Fire alarm systems generally are connected to the sprinkler system and will be tested when there is a physical test of the sprinkler system. A flow switch, pressure switch or an alarm check valve located at the sprinkler system's riser will trip the alarm and local water motor gong, if present, when water flows out of a head or an inspector's test connection. Prior to any testing, the alarm monitoring company should be notified so that they do not dispatch the local fire department to the site.

[1] National Fire Protection Agency. "NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems." Quincy, Massachusetts. 2011.

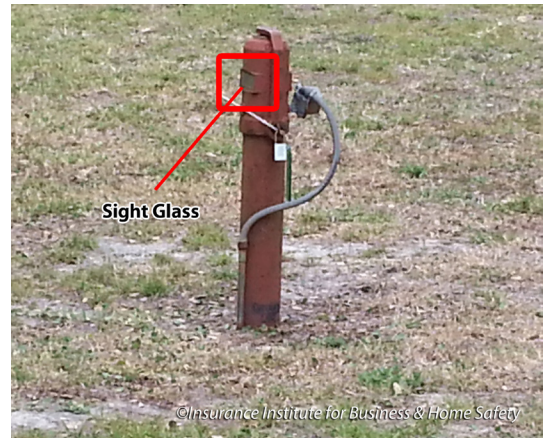


## QUALITY CONTROL QUESTIONS

Even if they do not conduct inspections and testing themselves, facility and maintenance personnel should have a very basic understanding of their systems. If there is an outside company providing fire protection inspection services, staff should take the time to walk with the inspectors and ask questions such as:

- Where are the sprinkler control valves located and what do they control? A map indicating the location of the valves is very helpful and can be developed using an existing evacuation map.
- How can a valve be shut off in an emergency due to a broken head or leak?
- What are the normal pressure readings on the gauges?
- Is the equipment UL and/or FM approved?

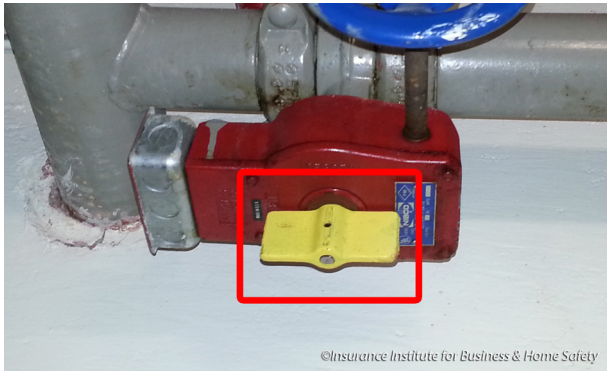
**ARE THERE YARD CONTROL VALVES, SUCH AS POST-INDICATOR VALVES? THESE TOO SHOULD BE VERIFIED TO BE OPEN AND LOCKED.**



*The post indicator valve shown above has a sight glass that includes a target that says "open" or "shut."*

## VISUAL INSPECTION QUESTIONS

**HOW CAN YOU TELL WHEN A SPRINKLER CONTROL VALVE IS OPEN? THIS VARIES WITH TYPE.**



*The butterfly valve above is shown in the open position. When the yellow indicator flag (outlined by the red box) is in line with the pipe, it is open. When it is perpendicular to the pipe, it is closed.*

**WHERE IS THE INCOMING MAIN LINE, AND IF THE BACKFLOW PREVENTER IS ABOVE GROUND, IS IT LOCKED?**



*The lock and chain on the backflow preventer pictured above indicates that it is in a locked position.*



*A backflow preventer with two outside screw and yoke (OS&Y) valves is in the open position since the valve stem is visible (highlighted by red boxes). When an OS&Y valve is shut, the stem is not visible.*

## ENSURING OPTIMAL PROTECTION

Sprinkler systems are an important part of a facility's fire protection system and should not be treated as clothing hooks or ornaments. For example, a coat hanger placed on a sprinkler head can break the fusible link and release a water flow that will continue until the control valve is closed. Similarly, sprinkler heads should never be blocked as this may prevent heat from reaching the head in order to activate the water flow and it can also reduce the water spray pattern of the head.

An uncontrolled fire can quickly grow out of control and cause the total destruction of your commercial building. When properly installed and maintained, a fire sprinkler system can keep a fire from spreading before the fire department arrives. Understanding some of your systems as described in this article can help ensure that your sprinkler systems provides the protection you need to prevent a small fire from becoming a major disaster.



---

IBHS is a non-profit applied research and communications organization dedicated to reducing property losses due to natural and man-made disasters by building stronger, more resilient communities.

**Insurance Institute for Business & Home Safety**  
4775 East Fowler Ave.  
Tampa, FL 33617  
(813) 286-3400  
DisasterSafety.org