

FIRE SUPPRESSION SYSTEMS

Many facilities are equipped with some type of automatic fire suppression system. Most often these systems use water in pipes overhead with heads that activate due to the presence of a nearby heat source. Other systems may use pre-action systems that require heat and alarms to activate before water flows. Still others use extinguishing agents other than water, such as gases or other agents. Often, facilities may employ more than one type of fire suppression system in different areas of a building.

It is important for a facility manager to understand the different types of suppression systems used on a property, how they work and the maintenance requirements of each to reduce the risk of property damage and injury should a fire occur.



TYPES OF FIRE SUPPRESSION SYSTEMS

WET PIPE

The most common type of fire sprinkler system is a wet-pipe system of overhead pipes filled with pressurized water with sprinkler heads that activate when the temperature reaches a certain threshold. This threshold is typically 155 degrees Fahrenheit. The heads activate when a vial of liquid breaks or metal fusing melts, which releases the flow of water.

This system has been reliable for decades, but runs the risk of unintended activation if a sprinkler head is bumped or damaged, as the pressurized water is ready to flow. As such, care should be taken when using these systems in areas with sensitive equipment or documents.



Combination wet pipe and dry pipe (middle blue) fire suppression system.

These systems are also not suitable for areas where the temperature reaches below 40 degrees Fahrenheit, as the water inside may freeze, expand and damage pipes or prevent the system from functioning during an emergency.

DRY PIPE

Another type of system is a dry-pipe system. In this system, the sprinkler pipe is filled with pressurized air or nitrogen. The pressurized air contains the flow of water behind a clapper valve and only opens once a sprinkler head activates and the air is released.

These systems are most often used in areas where pipes are subjected to freezing temperatures, such as attics, vestibules, unheated basements, loading docks or other areas. They are more complicated than typical sprinkler systems, and may be difficult to which to make additions in the future.

PRE-ACTION

In pre-action systems, the overhead pipes are not flooded until a pre-action system triggers the pipes to flood, so it blends some of the aspects of a wet-pipe and dry-pipe system. A pre-action system typically begins with the activation of a smoke detector. After this, the pipes are flooded until heat activates a sprinkler head.

These systems are best used in areas where accidental activation could cause significant damage. As two actions are required to cause the system to activate, accidental damage of a sprinkler head alone does not cause water to flow. Areas such as document storage rooms, server/IT rooms or others are common examples of where a pre-action system may be used.



DELUGE

Deluge systems are similar to pre-action but are designed for all sprinkler heads to activate at the same time. These systems are used in areas of extreme fire risk, often where fire hoses would have difficulty reaching. They are most common in

industrial or manufacturing settings. In a typical configuration, the sprinkler heads are kept open, and the pipe is flooded with water or another agent once the system activates, typically from a smoke or heat detector.

CLEAN AGENT

Another type of system uses clean agents. These systems use a different type of extinguishing medium, which could be either gas or powders. These are commonly found above kitchen fryers or in server/IT rooms or other areas where water may create additional hazards or be ineffective at fighting fires.

Gas-based systems, using halotron or similar gases, are most common in server/IT rooms and work by displacing the oxygen a fire needs to burn. This can protect sensitive electronics or documents, but places those inhabiting the space in danger of asphyxiation should the oxygen in the room become depleted.

Other systems, such as Ansul systems, are typically placed above kitchen fryers and use an extinguishing agent that can suppress grease fires.

Clean agent systems most often have a manual activation switch that employees use to turn on the system quickly to minimize damage. If equipped with a manual activation switch, the switch and the path to the switch must be free of obstructions to allow staff quick access during an emergency.

FIRE SPRINKLER SYSTEM MAINTENANCE

All fire suppression or sprinkler systems require regular inspections, testing and maintenance to continue their effectiveness. These inspections and tests should take place at regular intervals based on manufacturer recommendations and local safety codes. Facility managers should review manufacturer recommendations and confer with the local fire marshal and sprinkler vendors when determining inspection frequency and topics.



Keep sprinkler systems operational with routine inspections, testing and maintenance.

COMMON RISKS

Listed below are many of the most common risks associated with sprinkler or suppression systems and should be included as items in any inspection program.

- **Obstructed fire suppression heads:** Sprinklers require at least 18 inches of clearance below them to cover a room effectively.
 - Items should not be placed next to them in a way that the water flow pattern would be disrupted.
 - Items, such as hangers, holiday decorations and other materials, must not be hung from sprinkler pipes, heads or equipment, whether they disrupt the flow pattern or not.
 - Care must be taken when painting around sprinkler heads. Paint on a sprinkler head may prevent it from activating at the correct temperature or inhibit the valve from opening. Paint may also clog the water deflector, which could negatively affect the spray pattern.
 - In kitchens, accumulated grease and dust can clog nozzles or other equipment over time. These should be cleaned periodically to ensure they will function when needed.
- **Obstructed fire department sprinkler hookups:** Fire department hookups are located outdoors and allow the fire department to attach hoses to direct water into a sprinkler system to help maintain pressure and add more water. These areas require easy access to the fire department or fire truck and should be clearly visible.
 - Hookup covers can be targets for theft. If left open, birds or other pests could take up residence and block the pipe.
- **Valve checks:** Many sprinkler failures occur because control valves were closed that should not have been. Valves with public access are especially subject to this, such as at risers or standpipes between levels. In these locations, consider locking valves to prevent tampering.
 - Other systems are equipped with electronic tamper alarms or other devices to alert individuals of closed valves.
- **Insufficient pressure:** When pipes are not pressurized, the water does not flow properly. Checking on gauges can indicate if leaks or corrosion are occurring and may give notification of additional problems.
- Air compressors for dry-pipe systems should also be properly maintained and checked to ensure that the proper air pressure within the pipe is maintained.



Corroded pipes may not activate a fire suppression system when needed, or activate it unexpectedly.

- **Corrosion or leaks:** Pipes or sprinkler heads can corrode over time and then fail to activate when needed, or may activate when unintended. Inspecting the pipes and sprinkler heads for signs of corrosion or leaks can help identify these problems and address them prior to failure.
 - A supply of additional sprinkler heads and plugging tools should always be on hand to replace damaged or worn out fixtures to prevent or repair leaks.
- **Damaged fire sprinkler heads, nozzles or pipes:** This occurs most often in areas with low ceilings where items or individuals can bump into the fire suppression heads or nozzles. This can direct the flow of water or agent away from where it is most necessary and limit the effectiveness of the system.
 - Tamper-resistant sprinkler heads should be considered for jails and other areas where tampering could be an issue.
 - In certain locations with low ceilings or in storage rooms, consider installing approved guards or covers around the sprinkler heads to prevent accidental damage and activation.
 - Damaged sprinkler heads can be replaced with spares, which should be kept on hand, as well as the wrench used to install them.
- **Freezing:** Water expands when it freezes, so it can lead to pipes bursting in unheated areas. Burst pipes can lead to severe property damage and can disrupt operations and services to the public.
 - Identifying areas where pipes pass through unheated areas and taking steps to avoid freezing, such as heating the pipes, switching to dry pipe systems or other means, can help prevent a burst pipe.
 - Clearly labeling pipes and shut-off valves, and training relevant employees on what to do when a pipe breaks can help minimize damage. See Chapter 41, Winter Preparedness for more about preventing burst pipes.



FIRE SUPPRESSION CHECK LIST

ITEM	YES	NO	ACTION ITEM
Are sprinklers inspected and tested regularly?			
Are means in place to ensure that sprinkler control valves remain open and secure against tampering?			
Are tamper alarms regularly checked to ensure functionality?			
Are air compressors for dry-pipe systems inspected and properly maintained?			
Are employees aware of the types of fire suppression systems in use in their work area or facility?			
Are sprinkler pipes and heads free from leaks and corrosion?			
Are sprinkler heads free of paint, grease or other hindrances that might affect their functionality?			
Are spare sprinkler heads available with the wrench to replace them?			
Is storage kept a least 18 inches below sprinkler heads to allow for clearance?			
Are manual activation switches for clean-agent systems free of obstructions and have a clear path of access?			
Do sprinkler systems have adequate water and/or air pressure (depending on the style of system)?			
Are fire suppression sprinkler systems protected against damage?			
Are all fire sprinkler water pipes protected from freezing in the winter or equipped with dry-pipe systems?			
Are outdoor fire department sprinkler hookups free of obstructions and show no signs of theft or damage?			
Have any special manufacturer requirements for the systems been met?			