



Maintaining Fire Protection Systems

Fire continues to be a major threat to your business and your personal safety. Each year several thousand people are injured or killed by fires and billions of dollars are lost to property damage. In the case of businesses, many of them fail after experiencing a fire.

To minimize and possibly eliminate the effects of a fire, many buildings have engineered fire protection systems to detect, control, and possibly suppress a fire if one should occur. These systems have a proven record of effectiveness, and are generally very reliable. These systems, however, must be maintained and periodically tested to assure they will function properly. This maintenance and testing is the responsibility of the business or building owner and is generally done through a contractor who specializes in fire protection systems.

There are generally a number of fire protection systems in a building. There are fire extinguishers, which are a first-aid fire-fighting device. There are fire alarms, which are designed to warn occupants in case of a fire and summon the fire department. Fire alarms may be manual, automatic or a combination of the two. There are also fire sprinklers, which are designed to control or suppress a fire. Some buildings have standpipes, which are used by the fire department in case of a fire. Finally, some businesses and buildings with special hazards such as restaurants or companies with expensive electronic equipment may have special agent fire protection systems designed specifically to protect those hazards.

Each of these systems is unique and requires special training to inspect, test, and maintain them. Usually, one individual will not have the necessary expertise and credentials to test all systems. Inspecting fire alarms, for example, requires knowledge of electricity and electronics. Fire sprinkler systems, on the other hand, require knowledge of plumbing. Most fire protection companies have the necessary personnel to inspect and test all types of fire-safety systems, but in most cases these are separate services performed by different technicians at different times. It is very rare that one technician will be able to test all of your systems together. Once the technician has completed the inspection, he will provide the business or building owner with documentation of his findings. Business or building owners are required to maintain this documentation and present it to the fire department on request. Generally, if the technician uncovers any problems with the system, it must be repaired. The business or building owner may authorize the technician or his company to make the repairs, or he may use another technician or company to do the work.

The City of Park Ridge requires that fire protection systems be maintained and tested in accordance with National Fire Protection Association standards. These standards are accepted nationwide and are considered minimum requirements. Frequency of testing depends on the type of system. Below is a breakdown of the maintenance that is required to be performed for each system.

FIRE ALARM SYSTEMS

The building's fire alarm system may do one or more of the following:

- Notify occupants in case of a fire.
- Notify the fire department in case of a fire.
- Monitor the premises and detect heat or smoke.
- Monitor the sprinkler system and detect water flow.
- Supervise valves on the sprinkler system and detect tampering.
- Monitor air pressure for dry-sprinkler systems.
- Monitor the fire pump.
- Close fire doors in case of a fire.
- Shutdown HVAC systems in case of a fire.
- Operate smoke control systems.
- Control elevators in case of a fire.
- Monitor special fire suppression systems.

While more frequent tests are recommended, the City of Park Ridge requires an annual test of the fire alarm system. A fire alarm inspection tests each component of the alarm system to ensure it is working properly. Devices not working properly must be repaired or replaced. The main fire alarm panel will be checked to make sure it is operating properly. The battery back-up system will be load tested, and the batteries replaced as needed. Finally, the technician will test the communications link to the fire department or private monitoring company.

Depending on the size of your building, the test may take anywhere from a few hours to a few days. Special lift equipment may be required to test devices in atriums or areas with high ceilings. Tests may be scheduled for the early morning or later in the evening to minimize disruptions to your business.

The technician should provide you with documentation, which shows:

- Date of the test.
- That each device was tested and passed.
- That the batteries were load tested or replaced.
- Any work that was done to bring the system into compliance with applicable standards.
- Any work which must be done to bring the system into compliance with applicable codes.

- A notation stating whether or not the system is in full service.
- An explanation of any discrepancies.

The fire alarm system is connected to other fire protection systems such as sprinkler, hood and duct suppression systems, and standpipe systems. This leads to some confusion because a business or building owner will look over the documentation he receives from the fire alarm technician and see references to the sprinkler system and/or the hood and duct system. The fire alarm technician will inspect and test only the alarm components on these other systems. Other technicians will be necessary to fully check these other systems.

SPRINKLER SYSTEMS

The sprinkler system is designed to suppress or control a fire. Sprinkler systems operate by means of sprinkler heads located throughout the building. The heads are usually in the ceiling or high on the walls, but may be in other locations in certain applications. In the event of a fire, heat from the fire melts a fusible element in the sprinkler head causing the head to open and discharge water. Only heads that are heated hot enough, usually 135 degrees or more, will open and discharge water. In most cases, only one or two heads will operate. The case where every head in the building goes off is a Hollywood myth.

The sprinkler system is generally fairly simple, but nevertheless requires maintenance and testing. While more frequent inspection and testing are recommended, the City of Park Ridge requires only an annual test. Valves for the sprinkler system must be operated and lubricated. Gauges must be checked for damage and accuracy. Heads must be checked to make sure they are not damaged—very often heads are painted which compromises their effectiveness. Hangers are checked to make sure they are properly supporting the piping. The fire department connection will be checked to make sure that it is operating properly and is properly capped. Technicians will also conduct a main drain test and an inspector's test.

The main drain test measures pressure in the system. These pressures must be recorded on the inspection/test documentation. If there is a variation in the pressures from one year, to the next, it is possible that there is a blockage in the water system, which must be evaluated. The inspector test simulates the activation of one sprinkler head and is used to test the flow alarm on the sprinkler system. The technician will time how long it takes for the alarm to activate once water starts flowing. Generally, this is about one minute. This time should also be recorded on the inspection/test documentation.

Generally, valves on the sprinkler system have a monitoring device to ensure that they are not inadvertently closed. The technician will verify that these monitoring devices are working properly. The technician who performs the alarm test also performs these tests of the monitoring devices along with the inspector's test. Unfortunately, there is some overlap in the testing processes.

The sprinkler technician will also make an overall assessment of your system and your building. Sprinkler systems are designed very carefully to protect certain types of hazards. If the operations in a building have changed, it is possible that the sprinkler system may have to be upgraded to protect any new hazards. Generally, the sprinkler system will only have to be modified if the level of hazard has increased. In most cases, the city will not require you to downgrade a sprinkler system if the level of hazard has decreased. The technician will also verify that no major remodeling has occurred that will interfere with the sprinkler systems. Sprinklers are required to be within certain distances to walls and obstructions. Sprinklers are also required to be in every room or combustible space within a building. If walls were added or removed, it is likely that some sprinkler heads will need to be relocated. The technician will also evaluate whether or not the building is adequately heated to protect the sprinklers from freezing.

Sprinkler heads have a service life. Heads must be tested periodically to ensure their effectiveness. Fortunately, with most sprinkler heads, the heads can go fifty years before testing is required, though some heads must be tested more frequently. Testing involves only a sample portion of the heads, not all heads in the facility will require testing. Also, recently, their manufacturers have recalled sprinkler heads. The technician will advise you if a recall programs affect your heads.

The standards require that technicians check the heads from floor level. They are not required to look above drop-in ceilings or in concealed spaces. There are also specialized sprinkler systems, which require special inspections and testing.

Sprinklers in cold areas may have anti-freeze systems. The solutions must be checked before winter to assure they are providing adequate protection. While most sprinkler systems are filled with water all of the time, some sprinkler systems are considered dry. These systems are used in cold areas or in highly sensitive areas where water damage is a major concern. These dry sprinkler systems have special valves and pressurization systems, which require special testing.

Testing the sprinkler system will require flowing a large amount of water. Generally, tests are not scheduled during freezing weather. Most systems are designed to discharge the water outdoors. However, some systems discharge the water indoors. Sewers must be able to handle the water flow. Direct connection of the sprinkler system to the sewer is not permitted.

When the technician has completed his test and inspection of the sprinkler system, he should provide the business or building owner with documentation showing the following:

General

- Date of test.
- The type of sprinkler system.
- Changes to the building since the last inspection.
- Changes to the sprinkler system since the last inspection.
- Whether or not there is adequate heat.
- Whether or not all valves are properly supervised.
- Whether or not all valves are properly identified.
- Whether or not there is a supply of spare sprinkler heads.
- Whether or not there were any changes to the water supply.
- Whether or not the fire department connection is working properly.
- Whether or not the gauges were working properly.
- Whether or not the hydraulic nameplate is present.
- Verification that heads and hangers were checked.
- Verification that valves were operated and lubricated.
- Whether or not any valves or heads were tested.
- Results of the main drain test (residual and static pressure).
- Results of the inspector's test (time).
- Explanation of any discrepancies.

Anti-Freeze Systems

- Date of test.
- Results of solution check.

Dry-Systems

- Date of test.
- Whether or not priming water was present.
- Results of low-pressure alarm test (pressure).
- Results of dry-valve trip test (time).
- Verification that air compressor was checked.
- Verification that dry valve was opened and inspected.
- Explanation of any discrepancies.
- Verification that quick-opening devices were inspected and tested.

SPECIALIZED SPRINKLER SYSTEMS

Specialized sprinkler systems may require special testing in addition to items mentioned above. Please contact the Fire Department for information on these systems.

BACKFLOW PREVENTION

Fire sprinklers are connected to the municipal water supply. The Illinois Plumbing Code requires that fire sprinklers have back-flow protection devices to prevent water from the sprinkler system from mixing with potable water. Backflow devices are also required on lawn sprinklers or other systems that use water for industrial purposes. The plumbing code requires that these devices be inspected and tested every year by a licensed plumber certified to check backflow protection devices. Most sprinkler contractors do not perform this type

of work, but many of them have associations with plumbing companies that do. You may use the contractor your sprinkler company suggests to check your backflow device or you may hire another contractor to do the work. If you have a lawn sprinkling system or another system that requires a backflow device, you may want to hire the same contractor to check all of them.

In short, if you have a sprinkler system, there are three inspections that must be done: the sprinkler system must be inspected by a sprinkler contractor, the backflow device must be checked by a properly certified technician, and the fire alarm must be checked by a fire alarm technician.

STANDPIPES

Standpipes are usually tied into the sprinkler system, but there can be stand alone standpipe systems. Standpipes are required to be flow tested every five years. If you have a dry standpipe, it must be pressure tested every five years. If you have hoses on your standpipe system, they must be tested after five years and every three years thereafter. Generally, either your sprinkler contractor or your fire pump contractor will perform this test.

The documentation should show the following:

- Date of test.
- Results of hydrostatic test (dry pipe system only).
- Results of flow test.
- Results of hose testing.
- Explanations for any discrepancies.

FIRE PUMPS

Fire pumps are used when the municipal water system cannot meet the water flow requirements for a sprinkler system or a standpipe system. Fire pumps may be either electric or diesel driven and are very complicated devices. Fire pumps require weekly and monthly maintenance, which may be performed by specially trained building personnel. A contractor usually does flow testing, which must be performed annually. Usually, a member of the Fire Department should witness the test. The test involves flowing water to measure the pump's capacity as well as starting and stopping the pump several times. If the flow tests show a loss of performance, the technician may dismantle the pump to check its internal components. The technician will also check all components to make sure they are in proper working order.

The maintenance requirements depend on whether the pump has an electric or diesel driver. Diesel drivers, like any diesel engine, require fluid and filter maintenance and checks of the starting system. Electric drivers require exercise of control switches and periodic cleaning of the circuit breakers. All pumps should be inspected to make sure that all valves are operating properly and in the proper position. Gauges must also be checked for damage. Diesel driven pumps should be run for thirty minutes every week. Electric driven pumps should be run for ten minutes every week.

The Fire Department requires that the results of the annual test be documented. The following items must be noted on the documentation:

- Date of test.
- Type of pump, make, and model number.
- Type of flow test (via hose or flow meter).
- Capacity of the pump.
- Pump cut-in/cut-out pressures.
- Type of driver.
- Type of controller, make, model number.
- Results of flow tests (chum, capacity, 150 % of capacity). RPM's during each test phase.
- Amperage/voltage at each test phase (electric driver).
- Pressure readings from each hose (if hose test conducted).
Municipal pressures and net pressures.
- Whether or not all devices were working properly.
- Whether or not all valves are in proper position.
- Explanation of any discrepancies.

All previous pump test records should be maintained on the premises for comparative purposes.

SPECIAL AGENT EXTINGUISHING SYSTEMS

Some hazards such as restaurant cooking areas require special fire protection systems often called suppression systems. The City of Park Ridge requires that these systems be inspected and tested on a semi-annual basis. There are several types of special agent extinguishing systems each with unique testing and inspection requirements. But in general, the following features must be checked:

- Tanks must be visually inspected.
- Tanks must be hydrostatically tested at least every twelve years.
- Tank pressures must be recorded.
- Piping must be visually inspected.
- Nozzles must be inspected and changed or cleaned as necessary.
- Nozzle position must be checked.
- Fusible links must be inspected and changed if necessary.
- A full discharge test is not required, but the system must be tripped to test mechanical and electrical components and shut-offs.
- Manual activation devices must be tested.
- Verify that activation of the system tripped the fire alarm.

Many special agent extinguishing systems are located in the hoods for restaurant ventilation systems. The City of Park Ridge requires that these hoods be cleaned and inspected. Maintenance and cleaning of the hood and ducts is a separate

procedure from checking the extinguishing system and more than likely is done by a different contractor. Many companies that service restaurant extinguishing systems can provide recommendations on contractors who perform hood and duct cleaning.

Since the special agent suppression system is tied into the fire alarm, your alarm contractor will check the alarm contacts in the system. This is another example of redundancy in the testing fire protection systems.

The contractor should check the hazard to make sure that there have been no changes. Special agent systems are designed to protect specific hazards. Nozzles, for example, must be a specific size and in a specific location. Changing the hazard, for example, adding a new cooking appliance in a restaurant, may require modifying the special agent extinguishing system.

Most contractors who service special agent suppression systems will leave a tag on the system. The tag does not provide adequate documentation and does not fulfill the requirements of the city's fire code. After completing his inspection and test, the contractor should give the business or building owner documentation that notes the following:

- Date of test.
- Hydrostatic test date of tanks.
- Date fusible links (if applicable) were changed.
- General condition of the system.
- Any changes to the hazard protected.
- Whether or not all devices work properly.
- Whether or not the fire alarm was tripped during the test.
- Any repairs required to place the system back in service.
- Any discrepancies.
- System and alarm are in full service.

FIRE EXTINGUISHERS

The State of Illinois requires that all fire extinguishes be inspected every year by a licensed contractor. Contractors will check the pressures, inspect the extinguisher for damage, and make sure the extinguisher is properly mounted. Every six years, extinguishers must be discharged, taken apart and internally inspected. A hydrostatic test may also be performed at this time. Contractors will tag the extinguisher with a color-coded tag with their company name and license number. This tag provides adequate documentation. In the event a tag is accidentally torn off, the business or building owner should keep the tag as proof that the extinguisher was checked.

Extinguishers are generally checked on-site, but some fire extinguisher companies have a drop-off service that saves you from paying a travel charge.

The National Fire Protection Association requires all fire protection system testing to be done by qualified individuals. It is not always necessary to hire an outside contractor to maintain, inspect, and test your systems. The City of Park Ridge will accept testing done by properly trained building personnel. The city requires evidence of competence that may be one or more of the following:

- State license.
- Manufacturer's training.
- Nationally recognized certification.
- Other documentation as the city deems appropriate.

All testing documents must be in proper form. Suggested reporting forms can be found in the National Fire Protection Association standards. While some fire protection contractors service more than one type of fire protection system, it is not necessary to use the same company to test all of your systems. You are welcome to select any qualified contractor or individual to do the work. For a list of fire protection contractors and services, you may consult the yellow pages or the Internet-look under or search for "fire protection". Unfortunately, the City of Park Ridge cannot make recommendations. The City can provide you with information as to whether or not the contractor is licensed to do business in the City.

Properly installed and maintained fire protection systems have a proven record of saving lives and protecting property from fire. Insurance companies recognize the effectiveness of these systems and will often discount premiums where these systems exist. Like any other building system, fire protection systems require periodic maintenance. Hopefully, this guide has answered some of your questions concerning the maintenance of your fire protection system. If you have any additional questions, please contact the Park Ridge Fire Prevention Bureau at 847-318-5312.