



Inspection, Testing & Maintenance beyond NFPA 25

Inspection

General installation flaws

A NFPA 25 inspection is not to evaluate whether the system was properly designed and installed, however, an inspection may discover such problems. Depending on the company policy, the inspection report should not include details of the discovery, but best-practice dictates documentation of findings on a separate page that includes a disclaimer of the findings that are not part of a typical ITM program and a warning that the problem discovered could lead to failure of the system.

Incorrectly labeled fire department connections

Fire department connection signs are required by NFPA 13 for sprinklers and NFPA 14 requires signs if the required pump pressure exceeds 150 psi. Signs need to describe where the water goes, especially if it only supplies a portion of the building. The NFPA 13, NFPA 13R, NFPA 14 and the model building, and fire codes require that the fire protection contractor coordinate with the fire department as to the location of the fire department connection. During plan review and field coordination meetings, it is not a bad idea to ask the fire department how they want the sign to read.

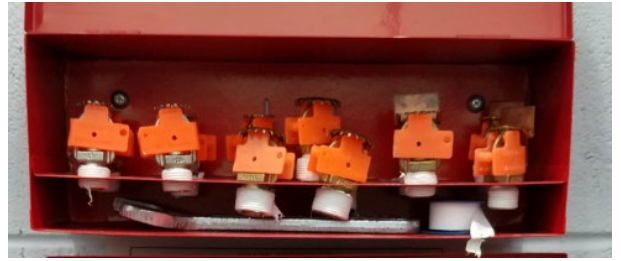
What is a new sprinkler?

There is not a shelf-life for a fire sprinkler. A 10-year-old sprinkler may be installed as “new.” That said, extra-high temperature sprinklers need to be tested every 5 years, quick response sprinklers need to be tested 25 years from initial installation, then 10-year intervals thereafter. Standard sprinklers need to be tested every 50 years, then 10-year intervals thereafter and dry pendent sprinklers need to be tested every 20 years. Obviously, not all sprinklers can be tested, as the test is an operational test. For each type of sprinkler in a sample area, a minimum of 4 sprinklers, or 1% of each type of sprinkler must be tested, unless each type is of the same manufacturer. Determining the age of the systems can be accomplished through discussions with the building owner and / or the local authority having jurisdiction. Most state-required records retention programs mandate the permits for any work be kept for the life of the building.

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Recalled or counterfeit sprinklers

Technicians should be trained on the identification of fire sprinklers. Unfortunately, there are counterfeit and foreign sprinkler sprinklers that have hit the market that are not listed by UL or FM. In addition, some sprinklers currently installed on systems may have been recalled by the manufacturer. It is up to the owner of the system to replace these sprinklers, but they may not be aware of the problem. Notification of the owner of the discovery of a problem with installed sprinklers must be in writing. The NFSA maintains a [product advisory webpage](#) for fire sprinklers and equipment for technicians to review for current information.



Testing

5-year gauge testing

Gauges must be replaced every 5-years or tested every 5-years by comparison with a calibrated gauge. Interestingly, there is no shelf-life for gauges. A 10-year-old gauge may be installed as “new.” In any case, when tested, the gauge should be marked with the date on which the test was conducted. Remember, however, that such marking must last for years. Using a sticker on the back of the gauge may be the best alternative.

City pressures when performing an annual fire pump flow test

Contact the local water purveyor to determine their rules regarding pump testing; many do not allow residuals on the suction side of the pump to drop below 20 psi due to fear of damage to their pipes. Although NFPA does not require the test to stop when supply pressures drop below 20, the inspector may be liable if damages occur. Readings for pressure on the supply side of the pump should be taken on the suction side of the backflow preventor. If the test needs to be stopped at 20 psi, calculations can be made to determine fire pump performance.

Fire pumps with transfer switches

The purpose is to assure that power transfers to the pump and this test is required during the annual 150% capacity test. Once power to the building is cut, the emergency generator must restore power within 10 seconds for a Type 10 Emergency Power Supply System. This can cause a water hammer, depending on the pump pressure and volume parameters when tested. Coordination with the building owner and the presence of a technician from the generator company is highly recommended.



Flow testing

NFPA 25 requires all underground and exposed fire service mains to be flow tested, typically there is no means to conduct this test in a building. This is also the case when it comes to forward flow testing of backflow preventors. Below are a few alternatives to accomplish these tests and meet the requirements of NFPA 25.

- Turn FDC check valve around and flush through FDC connection. This may require removal of the FDC depending on if it has single or dual clappers.
- If there are standpipes in the building, hoses can be attached at an exit level and flowed to a suitable location
- Remove pipe after the backflow and attach a test header.
- Install mechanical tees after backflow to attach hose valves. This could be permanent or, to save the customer some money on the front end, remove and plug mechanical tee. This would require draining of the system each year to install connections to conduct test, which does not save money in the long run.
- If none of these are options, the only thing left is to open every possible connection on the system such as main drains, auxiliary drains, and inspector's test connections and flow as much as possible.

Obstruction investigation

It is important that sprinklers be allowed to flow freely, but obstructions can compromise that goal.

Common obstructions include pipe scale, calcium carbonate deposits, biological growth, and debris, such

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as stones, chips of wood and sticks. They can result from careless installation or repairs. Annex D of NFPA 25 gives a wealth of information regarding the process of an obstruction investigation and how to clear it. While as little as ½ cup of material might require a flush of the piping, not all investigations will require a flush.



Hose Valve Testing

Hose valves are required to be operated annually, but this can be a messy process. An easy solution is to build a hose valve cap with a garden-hose-sized valve installed. When conducting the test, remove the existing hose cap; conduct an inspection of the valve and cap, verifying there is no debris within the valve or in the valve cap; install the cap with the valve, keeping the cap-valve closed. Operate the system valve, opening it all the way and then closing it; then open the cap-valve to empty the accumulated water into a bucket. Finish the job by removing the cap with the valve and replacing it with the original valve cap. Little water has flowed, but the valve has been fully exercised.



Main drains and auxiliary termination points

If the main drain is piped to a slop sink, or the floor drain cannot handle the full flow, count how many turns the drain valve is open when the drain starts to back-up – document both the number of turns and the residual pressure. Subsequent tests can be evaluated using this baseline. Main drain tests can use fire hoses to the outside. In addition, garden hoses can be used to test flow switches, simply connect to a valve, with the correct adaptor. Do not manually move the paddle or use foreign objects (screwdrivers, etc.) to test or prevent activation as these can damage the flow switch. Document every anomaly in the testing procedure and the reasons.

Testing of limited area sprinkler systems

Such systems can be problematic as, typically, there is no drain present, no gauge, no sprinkler cabinet, no alarm device; nor are they required. A common practice is to inspect as much as possible and document carefully the lack of infrastructure to do a complete test. If there is a flow switch, test it.

Testing pressure reducing valves

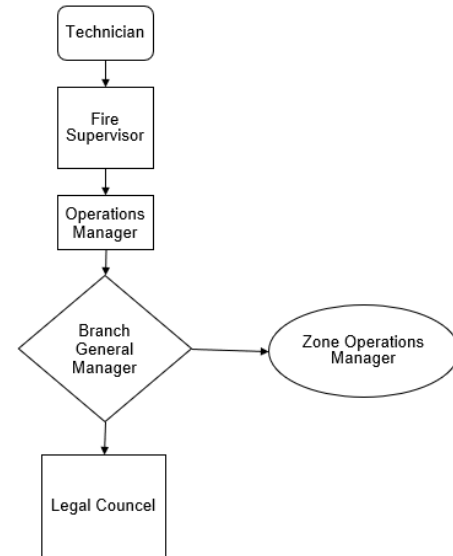
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When there is no means to test the valves in place, there are few choices available. The first is to remove the valve and test each separately on a test bench. One alternative, an in-place testing procedure, can be conducted in a building with multiple standpipes. Using one of the standpipes as an express drain, shut down that standpipe at the standpipe riser valve. Connect a fire hose to the main drain of that standpipe. Run a fire hose from the standpipe to be tested to the standpipe being used as an express drain – flow and document. When one standpipe is complete, switch and repeat the procedure for the 2nd. Another alternative is to simply run a hose line from the valve being tested down the stairs to the outside, or to a window and allow the water to drain down the side of the building.

Maintenance

Are you servicing the correct system?

It is critical for the owner and technician to know which system feeds what. In today’s buildings most sprinkler pipes are buried in the ceiling and is very difficult to trace. It is highly recommended that the technician work with the customer to identify the correct control valve to be shut down. It is also helpful to look at as-built drawings. If you are questioning yourself if it is the right system, it is recommended that you call the company manager and/or facility manager on what next steps should be taken. There are a couple of useful “fool tools” that can be used to help limit opening a live system, such as the Sure-Off tester from Reliable or freezing the water in the piping using carbon dioxide (CO²).



Antifreeze systems

In the last few years, problems have been found with certain antifreeze solutions used in fire protection. NFPA has now established the end of 2022 to replace any unlisted antifreeze with a listed antifreeze solution. Antifreeze can be bulk purchased in 55-gallon drums or totes, but it is easier for technicians to transport and utilize 5-gallon containers. If servicing a system with non-listed antifreeze, contact the owner and suggest a switch-over to a listed antifreeze while on site for other services. Perhaps a discount for such action could be warranted.

Repairs and codes

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The International Building Code (IBC) and International Fire Code (IFC) refers to the International Existing Building Code (IEBC) regarding matters governing the “repair” of existing buildings. Both the IFC and NFPA 1, *Fire Code*, have sections regarding “repair.” Essentially, a repair is the “reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.” Repairing a fire protection system does not involve any alterations or relocation of fire protection systems or components. Repairing a system shall be done in a manner that maintains the level of fire protection as provided prior to the needed repair.

General

Accident involving property loss during inspections

Accidents while performing ITM do happen. Proper notification and documentation will assure insurance coverage when a claim is made. First, check for injuries and take appropriate action if any are found. Second, shut down any systems that are causing the damage in order to limit it. Third, notify the supervisor, the property representative or owner. Fourth, take photos of the damage and the root cause of the damage. Fifth, mitigate the loss by cleaning up the water, or any unwanted material that is causing the damage. Sixth, if a system has been compromised, follow established impairment and return-to-service protocols. An investigation into the event should include taking statements from all parties involved in order to determine the root cause of the problem and develop procedures to prevent such a problem from reoccurring.

Contract language

As mentioned earlier in this report, NFPA 25 is not intended to be a review of the original design or installation. An ITM program may, however, discover changes to the inspected property that may affect sprinkler operation, such as a rearrangement of a tenant space. Depending on the company policy, the inspection report should not include details of the discovery outside the scope of NFPA 25, but best-practice dictates documentation of the findings on a separate page that includes a disclaimer that such findings are not part of a typical ITM program and that a review of the design, as applied to the discovered changes, should be conducted by a fire protection engineer, or other qualified design professional.

Difficult end-users

There are times that the building owner will refuse to fix the impairments and deficiencies the technician might find during an ITM visit. This can be extremely frustrating. Contractors would be well-covered, from

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a liability standpoint, if they developed a form letter that reminds the owner that they are responsible for required ITM tasks, for maintaining the system in correct operating conditions and for correcting any identified impairments or deficiencies.

Field support

When encountering an unusual problem in the field, there are several resources available to determine a solution. If the issue with a specific component, try locating any data sheets on-line. Also contacting the manufacture's website can be a good option, they may have videos or tutorials on how this equipment operates. The next contact should be your supervisor or manager as they may have access to information that is not available in the field or may provide guidance on how to deal with a situation. If there is a question about interpreting the intent of NFPA 25 or other related standards, you can search the NFSA website or submit a question to the [Expert of the Day \(EOD\) program](#), also on the NFSA website. Note that your company must be a member to use this service.

Flooding

Sprinkler systems affected by flooding, such as a system in a flooded basement, is handled on a case-by-case basis. The impact of the flooding, the duration, the exact water quality, how long the components were exposed, etc. are variables when making a call on what to replace, repair, or leave. Without specifics, there are at least four concerns for sprinkler systems that are submerged in a flood:

1. The electric or electronic portions of the system are damaged or are suspected to have unseen or future issues with operating effectively. Replace or consult with the manufacturer for guidance.
2. Sprinklers submerged in water is not a huge concern, however, the water quality and mechanical damage from objects flowing or floating by may be cause for replacement. This may need a special investigation, testing, or cleaning for each individual sprinkler if left in place. Consult with the manufacturer for guidelines.
3. Escutcheons, cover plates, guards, hangers, etc. are probably more susceptible to corrosion and debris that may lodge a cover plate closed or retain water where the pieces contact that increases corrosion. Replace or consult with the manufacturer for guidance.
4. Non-metallic piping, i.e., CPVC that is in contact with the flood waters may have a compatibility issue. Replace or consult with the manufacturer for guidance.

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The NFPA 13 and NFPA 25 standards, or model fire codes do not address the remediation of the effects of the actual flood, however, the flooding and exposure will trigger replacement and repairs through NFPA 25 and the fire codes when corrosion, discoloration, rust, deformation, etc. start to appear on the piping, coupling, sprinklers and other equipment.

Government buildings

When signing a contract for federal and state facilities, ensure the contract delineates exactly what services are to be provided; federal and state facilities are exempt from local requirements and not all of those governmental entities have adopted NFPA 25, If no specific code or standard is mentioned, use NFPA 25 as the basis for the ITM since it is the most widely adopted and utilized. If another standard is mentioned, know the differences between the two.

Lack of AHJ enforcement

Many authorities having jurisdiction only require the annual ITM, as they assume this is the most comprehensive test. Unfortunately, there is no annual requirement that encompasses all inspection, testing, and maintenance protocols. The only answer to that is education. Conducting seminars, for both building owners and authorities having jurisdiction, which covers NFPA 25, and its various requirements can help to alleviate this problem. In addition, posting Table 13.1.1.2 of NFPA 25 in the valve room acts as a reminder to maintenance staff every time they visit that room.

Specialty Sprinkler Systems.

Sprinklers, nozzles and system components installed on NFPA 15 and NFPA 11 systems shall follow the guidance set forth with in NFPA 25 chapters 10 and 11. The components associated with these systems are very different from traditional wet and dry sprinkler system components and may require a higher degree of ITM and testing equipment.