

Purpose and procedures for fire sprinkler system main drain testing

Sprinkler system main drains perform multiple functions

In many cases, fire sprinkler system testing is one of the first maintenance functions to be eliminated when budgets or manpower are reduced. This normally results from lack of awareness that a routine 2-inch main drain test can help ensure an unobstructed water supply to the sprinklers in the event of a fire.

Sprinkler system main drains perform multiple functions; one being to safely drain water from the overhead piping after the system is shut off for scheduled or emergency maintenance. The second is an equally important function. It provides a means to flow sufficient water through the fire sprinkler system's underground water supply piping to detect a significant (or a severe) obstruction to the water supply. Obstructions can take place at any time, generally from a control valve left in a closed or partially open position after testing or maintenance. Even partial valve closures can reduce the water flow to the fire sprinkler system sufficiently to render this fire protection ineffective. As testing confirms an unobstructed water supply only on the date of the test, periodic testing is recommended to help ensure continued fire protection.

Main drain test procedure

The main drain test is conducted in the following manner:



1. Check where the water will be discharging. Sometimes cars must be moved from parking lots or landscaping must be protected. Note that floor drains seldom are capable of handling the volume of water discharged during this testing. A moderate to strong water supply can discharge as much as 500 gallons per minute (gpm) during a main drain test.
2. Notify the alarm receiving company and/or fire department before testing.
3. Open the main drain valve completely.
4. Flow until the pressure has stabilized, record the residual (flowing) pressure indicated by the water supply gauge. (Usually the lower gauge.)

5. After documenting the residual pressure, close the main drain valve slowly.
6. Read and record the static pressure on the same gauge after the main drain has been fully closed.
7. When testing is complete, notify the alarm receiving company and/or fire department that you are finished with testing.

Test results indicating potential water supply problems

A significant pressure differential increase between the static and residual readings from previously documented tests is normally an indication of an obstruction in the water supply line. The normal Static-Residual pressure drop results from pressure lost to friction as the water flows through the supply piping. The same amount of water flowing through the same supply piping should result in very similar pressure differentials at each test. A very slow return to static pressure on the system following the test can also be a sign of an obstruction. Either finding should be investigated immediately to determine the problem. A subsequent test should be conducted after any corrective action to confirm the resolution of the problem.

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Satisfactory drain test results

A satisfactory drain test result is one that is consistent with the pressure differential results of previous tests. In other words; the non-flowing pressure minus the flowing pressure is about the same from test to test. An initial test, where there is no comparison testing, should normally result in less than a 20 to 30 psi differential. Some instances with extremely long, small, old, or a combination of these factors, supply piping, could exceed this figure. And, although an effective tool, the performance of drain tests is not a substitute for a periodic visual inspection of all fire protection control valves on site.

Water systems equipped with backflow preventers

On systems where the sole water supply comes through a backflow preventer and/or a pressure reducing valve, the main drain test should be performed on at least one downstream device on a quarterly basis (every three months).

Performing quarterly testing is important as these valves need to be exercised to ensure proper operation. Backflow preventers were originally designed for domestic use, where water would be flowing through them regularly on a daily basis. When installed on fire protection systems, where there is ordinarily no water flow, they can fail to open in a fire emergency. Quarterly drain testing will help improve the reliability of this equipment.

Resources

NFPA 25, Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems

NFPA 25, Water-Based Fire Protection Handbook, chapter referring to Valves, Valve Components and Trim



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