Coffee Break Training - Fire Protection Series

Inspection Techniques: Forward Full Testing for Water-Based Fire Protection Systems

No. FP-2012-11 March 13, 2012

Learning Objective: *The student shall be able to describe the requirements for forward full testing for water-based fire protection systems.*

National Fire Protection Association (NFPA) 13, *Standard for the Installation of Sprinkler Systems*, and NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, require new and existing water-based fire protection systems that are equipped with a backflow prevention device (e.g., double check or reduced pressure zone backflow device) have the ability to perform a "forward full" flow test.

The 4-inch (102 mm) pipe with the closed butterfly valve (lower left) serves as this sprinkler system's method to conduct a forward full flow test of the backflow prevention device. *Photo courtesy of Tim Mier, Cuyahoga Falls Fire Department, OH.*

The test is intended to verify that the backflow prevention device opens fully under demand conditions. It has to be performed during system acceptance and annually thereafter. In systems where the sole water supply is through a backflow preventer and/or pressure-reducing valves, the main drain test of at least one system downstream of the device must be conducted on a quarterly basis.

The minimum flow rate during the forward full test must equal the sprinkler system demand, including hose stream allowance where applicable. For backflow preventers sized 2 inches (50 mm) and under, the forward flow test may be conducted without measuring flow where the test outlet is able to flow the system demand, such as through the main drain outlet. Where connections do not permit a full flow test, particularly in older existing systems, tests may be completed at the maximum flow rate possible.

Where water rationing is enforced during shortages lasting more than 1 year, an internal inspection of the backflow preventer may be conducted in lieu of conducting the annual forward flow test to ensure the check valves will fully open.

In today's illustration, the total system demand is 297 gallons per minute (gpm) at 53.7 pounds per square inch (psi) (1,124 Lpm at 3.7 bar), so the sprinkler designer included this 4-inch (102 mm) bypass that is plumbed to the fire department connection on the outside of the building. For forward testing, the butterfly valve (lower left) is opened and water is discharged through the fire department connection for measurement. (The fire department connection check valve can be removed to enable this water flow.)

For a more detailed description and several design options, see pages 11 and 12 of the 2010 July/August issue of SQ (formerly *Sprinkler Quarterly*) at: www.nfsa.org/sq/SQjulaug2010.pdf

This Coffee Break Training tip courtesy of Tim Mier, Deputy Fire Marshal, Cuyahoga Falls Fire Department, OH.