



Coffee Break Training - Fire Protection Series

Automatic Sprinklers: Cross-Connection Control in Existing Buildings

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Learning Objective: The student will be able to explain the potential impact of backflow prevention devices on existing fire protection systems.

In recent years, some water purveyors have pursued aggressive retrofit programs requiring the installation of backflow prevention devices on existing fire protection systems. Their goal is to decrease the chances that the often dirty, static water that accumulates in a fire protection system will flow backward and contaminate a potable water supply. This effort is called “cross-connection control.”

While there has been considerable debate between fire protection and water company professionals regarding the likelihood of cross-connection contamination, one thing is clear: The selection and installation of backflow prevention devices on existing sprinkler systems must be done carefully to ensure reliable fire protection system operation.

Some existing fire protection systems, especially hydraulically engineered sprinkler systems, may have been designed with very precise or no safety margins in their operating pressures. This means that any deterioration of the incoming water pressure may have a deleterious effect on the sprinkler discharge pressure and water distribution pattern.

By requiring the installation of some sort of backflow prevention device in an existing system that may have a narrow safety margin, the friction loss characteristics of the backflow prevention device may significantly affect fire protection system performance. Of course, the influence of the cross-connection control device must be evaluated on any **new** fire protection system.

For example, in the backflow prevention device illustrated here, its laboratory-controlled flow test reports indicate that it may reduce water pressure from 2 to 14 pounds per square inch (0.14 to 0.96 bar) between the inlet and outlet pressures. While this may not seem to be a significant pressure drop, if the sprinkler system was not designed with a safety margin, the pressure loss may keep the system from performing properly.

To comply with water company requirements for cross-connection control on existing systems while ensuring that fire protection systems remain operational, the code official should ask for a set of hydraulic calculations that include the backflow prevention device in the water stream. The code official can ask for hydraulic calculations on existing pipe schedule systems if there is concern about the effect of the backflow prevention device.

If the hydraulic calculations reveal that the backflow prevention device has a damaging effect on sprinkler system performance, a fire protection professional should be consulted to recommend appropriate solutions.

For more information, consider enrolling in the National Fire Academy (NFA) course “Water-based Fire Protection System Plans Review” (R0137). Information and applications can be obtained at <http://apps.usfa.fema.gov/nfacourses/catalog/details/10542>. The course is available at the NFA in Emmitsburg, Maryland, or through your state fire service training agency.



This backflow prevention device may affect the performance of an existing sprinkler system.

