



County of Fairfax, Virginia

To protect and enrich the quality of life for the people, neighborhoods and diverse communities of Fairfax County

DATE: September 17, 2009

TO: Building Owners, Condominium Associations & Property Managers

FROM: Fairfax County Office of the Fire Marshal

SUBJECT: Dry Sprinkler Failures

The purpose of this letter is to update building owners, condominium associations, property management companies, and other stakeholders about defective or potentially defective dry sprinklers installed in buildings located in Fairfax County. Most of the installations involved both wet and dry type fire sprinkler systems installed in structures in the county from approximately 1990 to 2002. In particular, the Reliable brand G3 series dry sidewall and dry pendent sprinkler heads have been identified as failing to perform as designed under both actual fire and laboratory test conditions.

Dry Sprinklers: Purpose & Function

Dry sprinklers are installed to provide sprinkler protection in areas subject to freezing such as outdoor balconies, open stairwells, breezeways, private garages under townhouses, unheated storage rooms, loading docks, and walk-in coolers and freezers.

A "dry sprinkler" is a type of sprinkler head assembly designed for use in applications where the sprinklers and/or a portion of the connecting piping may be exposed to freezing temperatures. The basic function of the "dry sprinkler" is to prevent water or condensation from entering the dry pipe portion or "barrel" of the assembly before sprinkler operation. In a wet sprinkler system, they are typically installed in spaces subject to freezing and are supplied through various lengths of dry barrel extensions typically supplied by way of a "T" connection to wet piping in an adjacent heated area. In dry and pre-action sprinkler systems, they are installed where pendent sprinklers are required to protect areas supplied by dry sprinkler piping located in unheated portions of buildings.

Unlike a standard sprinkler head, which has a single point of mechanical operation, the "dry sprinkler" has two points of mechanical operation. The first point of operation is the heat-sensing element located in the sprinkler head which activates when exposed to the heat from a fire. The second point of operation is followed by the immediate release of an internal plug and O-ring seal located at the opposite end of the dry sprinkler assembly allowing water to enter the barrel and flow to and out of the sprinkler head.



Inspection, Testing, and Maintenance

Section 901.6.1 of the 2006 *Virginia Statewide Fire Prevention Code* (SFPC) requires that fire protection systems be inspected, tested, and maintained in accordance with applicable referenced standards. The SFPC references *NFPA 25 - Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. With respect to sprinklers, *NFPA 25* requires the following:

- 5.2.1.1 - Sprinklers shall be inspected from the floor level annually.
- 5.2.1.1.1 - Sprinklers shall not show signs of leakage; shall be free of corrossions, foreign materials, paint, and physical damage; and shall be installed in the proper orientation (*e.g.*, upright, pendent, or sidewall).
- 5.2.1.1.2 - Any sprinkler shall be replaced that has signs of leakage; is painted, other than by the sprinkler manufacturer, corroded, damaged, or loaded; or in the improper orientation.
- 5.2.1.1.6 - Sprinklers that are subject to recall shall be replaced per the manufacturer's requirements.
- 5.3.1.1 - Where required by this section, sample sprinklers shall be submitted to a recognized testing laboratory acceptable to the authority having jurisdiction for field service testing.
- 5.3.1.1.1 - Where sprinklers have been in service for 50 years, they shall be replaced or representative samples from one or more sample areas shall be tested. Test procedures shall be repeated at 10-year intervals.
- 5.3.1.1.1.1 - Sprinklers manufactured prior to 1920 shall be replaced.
- 5.3.1.1.1.5 - Dry sprinklers that have been in service for 10 years shall be replaced, or representative samples shall be tested. They shall be retested at 10-year intervals.
- 5.3.1.2 - A representative sample of sprinklers for testing per 5.3.1.1.1 shall consist of a minimum of not less than four sprinklers or 1 percent of the number of sprinklers per individual sprinkler sample, whichever is greater.
- 5.3.1.3 - Where one sprinkler within a representative sample fails to meet the test requirement, all sprinklers within the area represented by that sample shall be replaced.

Building owners are required to comply with the above listed inspection, testing, and maintenance provisions outlined in *NFPA 25*. With respect to the purpose and scope of this advisory, particular attention should be paid to sections 5.3.1.1 through 5.3.1.3 concerning the replacement and/or testing of aging or defective sprinklers.



Advisory Letters & Notices of Violation

From 2005 to the present, the Office of the Fire Marshal has issued several written notifications to building owners and property management companies concerning defective or potentially defective dry sprinklers installed in buildings located in Fairfax County. Numerous building owners and condominium associations were ordered to have Reliable model G3 or G3A dry sidewall style sprinkler heads tested and/or replaced pursuant to Section 901.6 of the *SFPC*.

In a letter dated July 11, 2005, the Office of the Fire Marshal informed building owners and property management companies of several incidents throughout the region where dry sidewall sprinklers failed to activate under fire conditions. Furthermore, in accordance with Section 901.6 of the *SFPC*, the letter directed building owners and property management companies to test and/or replace dry sidewall sprinklers more than 10 years old.

Seventeen months later, in a letter dated December 20, 2006, the Office of the Fire Marshal advised individual building owners and property management companies that this type of O-ring dry sprinkler had been identified by Underwriters Laboratories (UL) as failing to perform or operate. The letter also reiterated the direction given in the July 11, 2005 letter to test and/or replace dry sidewall sprinklers more than 10 years old.

Both advisory letters included information and procedural instructions about how to comply with the request to test and/or replace these aging or defective dry sprinklers.

In April and July of 2007, "Notices of Violation" (NOV) were issued to various individual building owners and property management companies responsible for buildings equipped with the Reliable model G3 and G3A dry sidewall sprinklers. These buildings were identified in fire marshal records as having this particular brand and model dry sidewall sprinkler installed at the time of construction. Furthermore, the NOV gave specific direction requiring a plan be submitted to the Office of the Fire Marshal within sixty days setting forth a testing and/or replacement schedule.

A History of Failure in Fairfax County

In Fairfax County, there is a documented history where dry sidewall sprinklers have failed to perform on two fronts.

First, between May 2004 and March 2009, there were a total of three building fires in Fairfax County in which a Reliable G3 dry sprinkler failed to operate. Two of these fires each totaled more than \$1 million dollars in fire loss and displaced a large number of people.

Second, extensive laboratory testing of representative samples of the Reliable model G3 dry sidewall sprinklers removed from buildings throughout Fairfax County produced unacceptable rates of failure. More specifically, between August 2006 and April 2007, more than 30 randomly selected dry sidewall sprinklers were selected from four or more building sites in the county where Reliable G3 dry sprinklers were installed more than 10 years ago. These samples were submitted to



Underwriters Laboratory (UL) for evaluation and testing. Extensive research and testing done by UL determined there has been significant deterioration of internal components, which has occurred as early as five years after installation to as late as ten years after installation. As a result of that research and testing, UL no longer certifies sprinkler equipment that incorporates this particular O-ring technology. In particular, the Reliable brand G3 series dry sidewall and dry pendent sprinkler heads have been repeatedly identified as failing to perform as designed.

Actions Required by Building Owners

Building owners and property management companies who have been issued a “Notice of Violation” (NOV) from the Office of the Fire Marshal requiring the testing and/or replacement of Reliable brand G3 series dry sprinklers determined to be defective, and who have submitted to the Office of the Fire Marshal a plan of action and timeline for compliance, must provide periodic written progress reports as to the status of the testing and/or replacement of aging and/or defective dry sprinklers.

Building owners and property management companies who have not complied with the requirements set forth in the NOV, or who have not been served an NOV, shall comply with the following:

1. Submit a plan to the Office of the Fire Marshal setting forth a testing and replacement schedule for all Reliable brand G3 series dry sprinklers installed in all buildings.
2. Written results from the testing of representative samples of dry sprinklers submitted to an acceptable recognized testing laboratory permitted by *NFPA 25* Section 5.3.1.2 shall be submitted to the Office of the Fire Marshal for inspection.
3. Where dry sprinklers are to be replaced, each shall be replaced with a dry sprinkler listed and approved for that particular application.
4. Prior to replacing any dry sprinkler, whether identified as failing to operate/performance or older than ten years, a qualified contractor licensed to work on water-based fire protection systems in the Commonwealth of Virginia shall apply to the Office of the Fire Marshal in person at the address listed below for a permit to modify a sprinkler system. Along with the permit application, the manufacturers' technical specification documentation or "cut sheet" for both the old and replacement dry sprinkler model must be submitted for review and approval by the Engineering Plans Review Branch of the Office of the Fire Marshal. The permit and inspection fee for this process is waived. However, a plan review fee is required and is billed at the applicable hourly rate.

If you are not sure whether or not your building is equipped with the Reliable brand G3 series dry sprinklers, or are not sure how to identify this type of sprinkler equipment, please contact a qualified licensed sprinkler contractor to assist you.



If you have any questions or concerns about this advisory, please contact the Fire Protection Systems Branch at 703-246-4821, Monday through Friday, 8:00 a.m. to 4:30 p.m. Progress reports and test results referenced in this advisory may be faxed to the Fire Protection Systems Branch at 703-246-9173. Questions concerning the permit application process should be directed to the Revenue & Records Branch at 703-246-4803. Technical questions concerning failures of dry sidewall sprinklers should be directed to the Engineering Plans Review Branch at 703-246-4806.

Thank you for your attention to this important fire protection and life safety issue.

Sincerely,

/s/

Deputy Chief Dereck A. Baker
Office of the Fire Marshal
Fairfax County Fire & Rescue Department

