



**Tuesday e-Tech Alert**  
**September 18, 2007**  
**Number 95**

**New Tests Demonstrate CPVC Seismic Performance**

The Lubrizol Company, formerly Noveon, Inc., has released some test information relative to seismic performance of CPVC piping. This is significant since there are frequent questions regarding the earthquake protection needs of such piping. NFPA 13 – *Installation of Sprinkler Systems* has largely sidestepped the issue by making “physical characteristics related to integrity during earthquakes” something that the listing agencies like Underwriters Laboratories are expected to address during their initial product approval. The 2007 edition of NFPA 13 contains this guidance in annex section A.6.3.6.

Lacking any special guidance in its special listing, it can be inferred that CPVC piping is to be treated the same as steel piping with regard to the requirements for flexible fittings, clearances, bracing, and restraint.

The new tests, conducted by the Wiss, Janney, Elstner Associates engineering firm, involved some simple cyclic testing comparing the performance of CPVC to threaded Schedule 40 steel piping. With pipe hangers spaced 6 ft apart on piping pressurized to 175 psi, a “Z-shape” of 1-inch piping was slowly displaced  $\pm 3$  inches using a hydraulic actuator at a rate of only 1 cycle per 25 seconds (0.04 Hz). While a threaded steel joint failed (water spraying with accompanying pressure loss) after 33 cycles, the CPVC joints survived 50 cycles before the test was terminated.

It should be noted that the 2005 version of ASCE 7, which is adopted by the 2006 edition of the International Building Code, makes an important distinction between fire protection systems in Seismic Design Category C and those in higher categories D, E, and F (no protection of sprinkler systems is required in Seismic Categories A or B). For Seismic Category C, systems installed in accordance with NFPA 13 are “deemed to meet the other requirements” of the standard. For systems installed in Seismic Categories D, E and F, however, ASCE 7-05 contains the following requirements in Section 13.6.8.3:

1. The hangers and sway bracing of the fire protection sprinkler systems shall be deemed to meet the requirements of this section if both the following requirements are satisfied:
  - a. The hangers and sway bracing are designed and constructed in accordance with NFPA 13.
  - b. The force and displacement requirements of Sections 13.3.1 and 13.3.2 are satisfied.
2. The fire protection system piping itself shall meet the force and displacement requirements of Sections 13.3.1 and 13.3.2.

3. The design strength of the fire protection sprinkler system piping for seismic loads in combination with other service loads and appropriate environmental effects shall be based on the following material properties:
  - a. For piping and components constructed with ductile materials (e.g. steel, aluminum, or copper), 90 percent of the minimum specified yield strength)
  - b. For threaded connections in components constructed with ductile materials, 70 percent of the minimum specified yield strength.
  - c. For piping and components constructed with nonductile materials (e.g. plastic, cast iron, or ceramics), 10 percent of the material minimum specified tensile strength.

As reported in the May 29, 2007 issue of the NFSA eTechAlert (No. 84), use of the 2007 edition NFPA 13 earthquake protection criteria was accepted as “deemed to meet the requirements (of ASCE 7-05)” in the interim amendments to the 2006 edition of the International Building Code. This includes the way in which the 2007 edition of NFPA 13 addresses the design strength of the piping. As such, all local code authorities should be able to accept the use of the 2007 edition criteria on the basis of equivalency. Since the NFPA 13 approach to listed CPVC piping has not changed, any special earthquake protection needs should be addressed as part of the product listing.

### **Upcoming NFSA “Business Thursday” Seminar – September 20th**

**Topic: Developing Positive Relationships with Fire Officials**  
**Instructor: Doyle Sutton, NFSA Southwest Regional Manager**  
**(Former Nevada State Fire Marshal)**  
**Date: September 20, 2007**

Positive relationships with fire officials are professional relationships based on many factors: professional association, knowledge, training, certification and licensing are just a few of these factors. The foundations of permanent relationships are basic communication, trust, honesty, and ethics and an oath to uphold the ethics of their profession to a higher stand of accountability. Positive relationships require that one regularly act as an advocate for another individual, group, or entity in support of a common goal or ideal. Developing relationships in the fire service does not happen overnight. It takes time, commitment and hard work. This seminar will cover: what is a positive relationship and how to develop a relationship with fire officials in today’s busy work environment, plus review some examples of successful ongoing methods of sustaining those relationships.

Information and registration for this seminar is available at [www.nfsa.org](http://www.nfsa.org) or by calling Dawn Fitzmaurice at 845-878-4200 ext. 133 or email: [dawn@nfsa.org](mailto:dawn@nfsa.org).

### **Upcoming NFSA “Technical Tuesday” Seminar – September 25th**

**Topic: Cloud Ceilings**  
**Instructor: Kenneth E. Isman, P.E., Vice President of Engineering**

**Date: September 25, 2007**

They have been called “Cloud Ceilings”, “Non-continuous Ceilings” and even “Islands in the Sky” by architects. These architectural features can be described as any ceiling that is not continuous across an entire room or space creating multiple objects in between the observer on the floor and the eventual roof of the room or space. As far as fire sprinklers are concerned, the issues are whether to sprinker above or below these features (or both). This seminar will address all of the relevant concerns of matching a sprinkler system to a variety of different architectural features that have the potential to block hot gasses from getting to sprinklers and the potential to block discharge from the sprinklers from getting to the floor below.

Information and registration for this seminar is available at [www.nfsa.org](http://www.nfsa.org) or by calling Dawn Fitzmaurice at 845-878-4200 ext. 133 or email: [dawn@nfsa.org](mailto:dawn@nfsa.org).

### **NFSA Technician Training Classes**

Only the following classes remain in the 2007 NFSA engineering department training schedule:

#### **Two-Week Technician Training Seminar**

*November 5-16*

*Newburgh, NY*

#### **NICET Inspector Certification Review Classes**

*November 6-8*

*Providence, RI*

For more information on any of these classes, contact Nicole Sprague by calling 845-878-4200 ext. 149 or email: [Sprague@nfsa.org](mailto:Sprague@nfsa.org).

### **In-Class Training Seminars**

The NFSA training department also offers in-class training on a variety of subjects at locations across the country. Here are some upcoming seminars:

Sept 19	Sprinkler Protection for Rack Storage////Seattle, WA
Sept 20	Pumps for Fire Protection////Seattle, WA
Sept 18-19	Two-day NFPA 13 Overview & Intro to Plan Review////Carol Stream, IL
Sept 20	Hydraulics for Fire Protection////Carol Stream, IL
Sept 18-19	Two-day NFPA 13 Overview & Intro to Plan Review////Baltimore, MD
Sept 20	Pumps for Fire Protection////Baltimore, MD
Sept 25	Sprinkler Protection for General Storage////Eugene, OR
Sept 26	Sprinkler Protection for General Storage////Eugene, OR
Sept 27	Inspection, Testing & Maintenance////Eugene, OR
Oct 23	Introduction to Sprinkler Systems (1/2 day)(AM)////Woodland, CA
Oct 23	Underground Piping (1/2 day)(PM)////Woodland, CA
Oct 24	Inspection, Testing & Maintenance////Woodland, CA
Oct 25	Basic Seismic Protection (1/2 day)(AM)////Woodland, CA

Oct 25      Advanced Seismic Protection (1/2 day)(PM)///Woodland, CA  
Oct 29-30   Two-day NFPA 13 Overview & Intro to Plan Review///Riverside, CA  
Oct 30-31   Two-day NFPA 13 Overview & Intro to Plan Review///Spokane, WA  
Nov 1       Sprinkler Protection for Special Storage///Spokane, WA  
Nov 1       Hydraulics for Fire Protection///Riverside, CA  
Nov 6-7     Two-day NFPA 13 Overview & Intro to Plan Review///Durango, CO  
Nov 8       Sprinklers for Dwellings///Durango, CO  
Dec 11      Pumps for Fire Protection///Tucson, AZ  
Dec 12      Fire Pump Layout & Sizing (1/2 Day) (A.M.)///Tucson, AZ  
Dec 12      Standpipe Systems (1/2 Day) (P.M.)///Tucson, AZ  
Dec 13      Inspection, Testing & Maintenance///Tucson, AZ

For more information on these seminars, or to register, please visit [www.nfsa.org](http://www.nfsa.org) or call Michael Repko at 845-878-4207.

*NFSA Tuesday eTechAlert is c. 2007 National Fire Sprinkler Association, and is distributed to NFSA members on Tuesdays for which no NFSA Technical Tuesday Online Seminar is scheduled. Statements and conclusions are based on the best judgment of the NFSA Engineering staff, and are not the official position of the NFPA or its technical committees or those of other organizations except as noted. Opinions expressed herein are not intended, and should not be relied upon, to provide professional consultation or services. Please send comments to Russell P. Fleming, P.E. [fleming@nfsa.org](mailto:fleming@nfsa.org).*

***About the National Fire Sprinkler Association***

*Established in 1905, the National Fire Sprinkler Association (NFSA) is the voice of the fire sprinkler industry. NFSA leads the drive to get life-saving and property protecting fire sprinklers into all buildings; provides support and resources for its members – fire sprinkler contractors, manufacturers and suppliers; and educates authorities having jurisdiction on fire protection issues. Headquartered in Patterson, N.Y., NFSA has regional operations offices throughout the country. [www.nfsa.org](http://www.nfsa.org).*