NFPA 25: STANDARD FOR THE INSPECTION, TESTING, AND MAINTENANCE OF WATER BASED FIRE PROTECTION SYSTEMS

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• Provide an overview of the inspection, testing, and maintenance requirements for
  ▪ Automatic sprinkler systems
  ▪ Related systems and equipment such as fire pumps
• Emphasize differences between current editions of NFPA standards and those referenced by TJC
INSPECTION, TESTING, AND MAINTENANCE OF FIRE PROTECTION SYSTEMS
THE OWNER’S RESPONSIBILITY

• The owner is responsible for all inspection, testing, and maintenance procedures
  - BE CAREFUL WITH YOUR CONTRACT LANGUAGE
• The owner may delegate the **authority** for the inspection, testing, and maintenance of the fire protection systems.
• The designated representative must comply with **all** requirements identified for the owner.
QUALIFICATIONS (PER NFPA 72)

• Service personnel shall be qualified
• Qualifications may include:
  ▪ Factory trained and certified for the make/model being serviced
  ▪ National certification approved by AHJ
  ▪ Registered or licensed by AHJ
  ▪ Employed by listed service company
• Provide evidence of qualifications to AHJ
THE OWNER’S RESPONSIBILITY

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  - BE CAREFUL WITH YOUR CONTRACT LANGUAGE

• The owner may delegate the authority for the inspection, testing, and maintenance of the fire protection systems.

• The designated representative must comply with all requirements identified for the owner.
THE OWNER’S RESPONSIBILITY

- Notify proper entities
  - AHJ, fire department, insurance carrier
- Correct deficiencies
- Analyze changes that may impact the system
- Maintain records
  - Available to AHJ upon request
ITM RECORDS

- Retain all records until one year after the next test
- Records must be promptly provided to the AHJ upon request
For hospitals that accreditation for deemed status purposes, documentation of ITM procedures for fire protection systems shall include:

- Name of activity
- Date of activity
- Required frequency
- Name of person performing activity
- NFPA Standard referenced
- Results of the activity

EC 02.03.05 revised effective July 1, 2011
1.1.3 This standard addresses the operating condition of fire protection systems . . .

1.1.3.1 This standard **does not** require the inspector to verify the adequacy of the design of the system.
IMPAIRMENTS

• Where an impairment is to last for more than 10 hours in a 24 hour period **one** of the following must be done:
  - Evacuation of the affected area
  - Fire Watch
  - Temporary water supply
  - Implement an approved fire control program

• Note that NFPA 101 until the 2012 Edition referred to four hours in a 24 hour period
### Table 5.1.1.2

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Reference</th>
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<td>Valve supervision alarm devices</td>
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</table>
TYPICAL INSPECTION
SPRINKLERS ARE INSPECTED FOR:

- Leakage
- Corrosion
- Paint
- Loading
- Orientation
- Empty bulbs
- Clearance below sprinkler (such as storage)
• Standard response sprinklers tested or replaced at 50 years and 10 years thereafter
• Fast-response sprinklers tested or replaced at 20 years and 10 years thereafter
• Dry sprinklers tested or replaced at 10 years and 10 years thereafter
• Sprinklers exposed to harsh environment tested at 5 year intervals
SPRINKLER TESTING

• Test includes 4 sprinklers or 1 percent of sample area whichever is greater
• If one sprinkler fails then all sprinklers in sample are must be replaced
• Tested annually
• The Concentration of solution must be limited to the minimum that is necessary to protect for the lowest anticipated temperature
Traditionally

- Anti-freeze used to protect sprinkler systems installed in small areas where adequate heat is not provided
  - Previous editions of NFPA 13 contained an Annex note indicating that anti-freeze not likely to be economical in excess of 40 gallon capacity of piping system

- Other solutions include:
  - Dry-pipe sprinkler systems
  - Preaction sprinkler systems
  - Heat trace systems
NEW TECHNOLOGIES
FIRE INCIDENTS

- August 18, 2009 – Truckee, CA
- Cooking fire in kitchen of occupied apartment
  - Cooking onions in oil
FIRE INCIDENTS

- Truckee, CA (cont)
- One adult fatality, one adult severely injured, three children with minor injuries
- Fire and explosion resulting in
  - 8 sprinklers in the unit operating
  - Glass was blown 86 ft across the parking lot
  - Bathroom door was separated approx 3 inches from the frame
- 72% antifreeze, 28% water in system.
  - Should have been 50/50
Propylene Glycol

- Heat from fire can generate flammable vapor when mixed with air and exposed to ignition source.
- Vapors can explode if confined. Vapors may travel long distances along ground before igniting/flashing back to vapor source.
- Fine sprays/mist may be combustible at temperatures below normal flash point (211F-228F)
MSDS INFORMATION

• Propylene Glycol
  ▪ Do not handle near heat, sparks, or open flame.
  ▪ Aqueous solutions greater than 22% by weight, if heated sufficiently, will produce flammable vapors.

ENVIROGUARD
LITERATURE REVIEW

• UL Tests
  - Under certain conditions a large-scale ignition is possible from the discharge of a sprinkler system containing solutions of 70% glycerin or 60% propylene glycol in water onto certain ignition sources
  - Dependent on the
    o Characteristics of the fuel source
    o Spray distribution pattern
    o System pressure
    o Type of sprinkler
    o Location of the fire relative to the sprinkler
    o Concentration of the antifreeze solution in the mixture.
  - NOTE: NFPA 13 has permitted 50% glycerin and 60% propylene glycol
• Fire Protection Research Foundation Test Program
  - Concentrations of propylene glycol > 40% by volume and concentrations of glycerin > 50% by volume have the potential to ignite when discharged through automatic sprinklers.
  - Consideration should be given to an appropriate safety factor for concentrations of antifreeze solutions that are permitted by future editions of NFPA 13.
  - The use of solutions of di-ethylene glycol and ethylene glycol in home fire sprinkler systems should also be limited.
NFPA RESPONSE

• Tentative Interim Amendments issued for NFPA 13, NFPA 13R, NFPA 13D
  ▪ Effective date: August 25, 2010
  ▪ Antifreeze not permitted within dwelling units

• Considered to be an initial response
• TIA’s issued for NFPA 13, NFPA 13R, NFPA 13D
  ▪ Effective date: March 21, 2011
  ▪ Premixed antifreeze solutions
    o By manufacturer to ensure proper suspension
  ▪ Permitted concentrations reduced
    o Special provisions for ESFR systems
    o Note still exceed 22% per at least one MSDS
    o NFPA 13D (and NFPA 25) permit higher concentrations for existing
NFPA RESPONSE

• TIA issued for NFPA 25
  ▪ Effective date: March 21, 2011
  ▪ Drain anti-freeze if properties undetermined
  ▪ Permitted concentrations reduced
    o Existing SOLUTIONS permitted at higher concentrations
  ▪ Test details
    o Size of system
    o Drops
Results with k8.0 Sprinkler at Various Heights
Nominal 3.0 MW Ignition Source

Gray region exceeds the calibration of the calorimeter

Figure 5. Comparison of increase in heat release rate based on sprinkler height.
NFPA RESPONSE

• NFPA 13, 13R, and 13D – Potential restriction on all new antifreeze systems unless solution is listed for use in a fire protection system
  ▪ Current submission to UL for a salt water based, with corrosion inhibitor, being evaluated

• Existing systems – Mtg on April 20th
  ▪ Retain existing provisions (from previous TIA)
  ▪ Reduce concentrations further
  ▪ Require risk analysis
  ▪ Prohibit even existing systems
Other options remain possible

- Dry pipe sprinkler systems
- Pre-action sprinkler systems
- Heat-trace
- Insulation
- Risk analysis for non-occupied areas
  - Considered by the NFPA 25 Technical Committee when processing the TIA’s
MAIN DRAIN TEST
FIRE PUMPS
ANNUAL FLOW TEST
HYDRAULIC GRAPH Pressure vs. (Flow)^1.85

Fire Pump rating
500gpm @ 80 psi

Acceptance Test Results
Annual Test Results

(FLOW – GALLONS PER MINUTE (Multiply Scale by ———))
• Inspection
  ▪ Conducted at specified intervals
  ▪ Covers two points in the system (end of one main and sprinkler on one branch line)

• Examination
  ▪ Conducted when certain conditions exist
  ▪ Covers four points in the system (valve, riser, cross main, branch line)
SOURCES OF OBSTRUCTIONS
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• Required for any component that is adjusted, repaired, reconditioned, or replaced
• Main drain test is required if any system control valve or other upstream valve was operated
• It is not intended that a design review be conducted
• Classifies how critical the deficient condition is
  ▪ Is it an impairment?
  ▪ How critical is the deficiency?