INSPECTION, TESTING AND MAINTENANCE FOR THE SPRINKLER INDUSTRY

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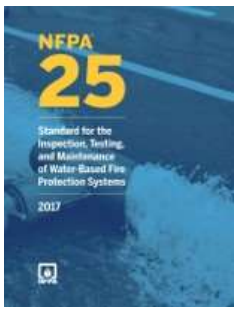
PROGRAM DESCRIPTION

This interactive seminar will provide an introduction to the various types of water- based fire protection systems as well as an in-depth exploration of the codes, standards and other documents that are used during the inspection and testing process. The seminar is designed for individuals interested in obtaining certification as an inspection and testing technician for water-based fire protection systems.



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LEARNING OBJECTIVES

1. Explain the terminology as used in NFPA standards
2. Discuss the Scope of NFPA 25
3. Explain Inspection terminology
4. Describe the requirements in NFPA 25
5. Identity the responsibilities of the inspector, tester, contractor, owner, and AHJ

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SYSTEMS CHAPTERS

- Chapters 1-4
- Chapters 5 – 13
  - Summary Table
  - Inspection
  - Testing
  - Maintenance
  - Component Replacement Action

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MODULE 1
SCOPE AND DEFINITIONS

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CHAPTER 1

- Scope
- Purpose
- Application

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SCOPE

- Minimum Requirements
- Periodic Inspection, Testing and Maintenance
- Assumes the system has been properly installed
- Not intended for addressing design deficiencies

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SCOPE

- Coordination with NFPA 72 Testing Requirements
- Types of Systems
- Design Evaluation
- Corrective Action
- NFPA 13D

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COORDINATION WITH NFPA 72

- The inspection, testing, and maintenance required by this standard and *NFPA 72* shall be coordinated so that the system operates as intended.
- All inspections, testing, and maintenance required by *NFPA 72* shall conform to *NFPA 72,* and all inspections, testing, and maintenance required by this standard shall conform to this standard.

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TYPES OF SYSTEMS

- The types of systems addressed by this standard include, but are not limited to, sprinkler, standpipe and hose, fixed water spray, private fire hydrants, water mist, and foam water.
- Water supplies that are part of these systems, such as private fire service mains and appurtenances, fire pumps and water storage tanks, and valves that control system flow, are also included in this standard.

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DESIGN EVALUATION

- This standard addresses the operating condition of fire protection systems as well as impairment handling and reporting, and also applies to fire protection systems that have been properly installed in accordance with generally accepted practice.
- This standard does not require the inspector to verify the adequacy of the design of the system.

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CORRECTIVE ACTION

- Corrective action needed to ensure that a system operates in a satisfactory manner shall be in accordance with the appropriate installation standard.

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NFPA 13D SYSTEMS

- Unless required by Chapter 16, this standard shall not apply to sprinkler systems designed, installed, and maintained in accordance with NFPA 13D.

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PURPOSE

- Provide a reasonable degree of protection to life and property through minimum inspection, testing and maintenance methods for water-based fire protection systems.
- In those cases where it is determined that an existing situation involves a distinct hazard to life or property, the authority having jurisdiction shall be permitted to require inspection, testing, and maintenance methods in excess of those required by the standard.

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APPLICATION

- Other ITM programs permitted
- Equivalent level of system integrity and performance
- AHJ approval required

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NFPA 25 DEFINITIONS

- Official Definitions
  - Approved
  - Authority Having Jurisdiction
  - Listed
  - Shall / Should
  - Standard

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NFPA 25 DEFINITIONS

- General Definitions
  - Inspection
  - Testing
  - Maintenance
  - Deficiency
  - Impairment

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INSPECTION

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NOT AN INSPECTION

- An evaluation of the adequacy of the system to control or extinguish a fire in the protected occupancy.
- An evaluation of the adequacy of the water supply (water tanks and fire pumps) with regard to the necessary waterflow and pressure needed to meet the system demand as designed.

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NOT AN INSPECTION

- An evaluation of the hazards present in the building in relation to the minimum design for protection.
- A determination as to whether the system was designed and installed in accordance with the applicable installation standard.
- An evaluation of the extent of protection in accordance with the original applicable installation standard.

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NOT AN INSPECTION

- Reviewing or commenting on the design criteria for the system in relation to the commodity or hazard.
- Reviewing or commenting on the installation plans regarding pipe sizing or sprinkler type, orifice size, or temperature rating.

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NOT AN INSPECTION

- Evaluating and commenting on whether the storage commodities and/or arrangements are different from those anticipated when the system was designed and installed.
- Researching the installation contract files to determine whether special requirements were required by the AHJ.

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NOT AND INSPECTION

- Performing a water supply analysis to determine whether the water supply is sufficient for system demand.

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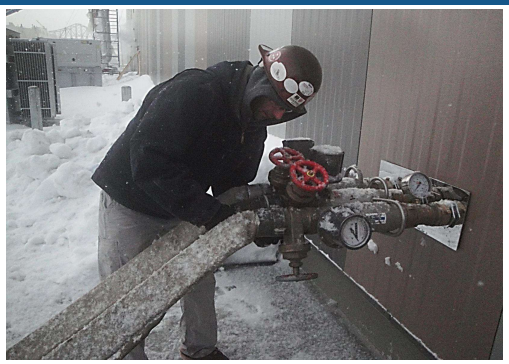
WHAT IS TESTING?



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TESTING

- **Testing.** A procedure used to determine the operational status of a component or system by conducting periodic physical checks, such as waterflow tests, fire pump tests, alarm, tests, and trip tests of dry pipe, deluge, or preaction valve

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OTHER DEFINITIONS

- **Test**. The operation of a device to verify that it is functioning correctly or the measurement of a system characteristic to determine if it meets requirements.

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WHAT IS MAINTENANCE?

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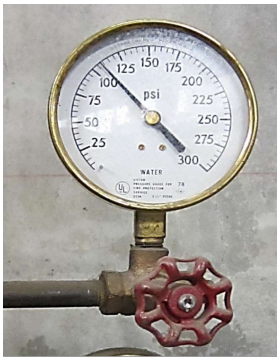
WHAT IS A DEFICIENCY?



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DEFICIENCY

- **Deficiency.** For the purposes of inspection, testing, and maintenance of water-based fire protection systems, a condition that will or has the potential to adversely impact the performance of a system or portion thereof but does not rise to the level of an impairment.

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NONCRITICAL OR CRITICAL DEFICIENCY

- **Noncritical Deficiency.** A deficiency that does not have a material effect on the ability of the fire protection system or unit to function in a fire event, but correction is needed to meet the requirements of this standard or for the proper inspection, testing, and maintenance of the system or unit.

- **Critical Deficiency.** A deficiency that, if not corrected, can have a material effect on the ability of the fire protection system or unit to function as intended in a fire event.

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NONCRITICAL OR CRITICAL DEFICIENCY

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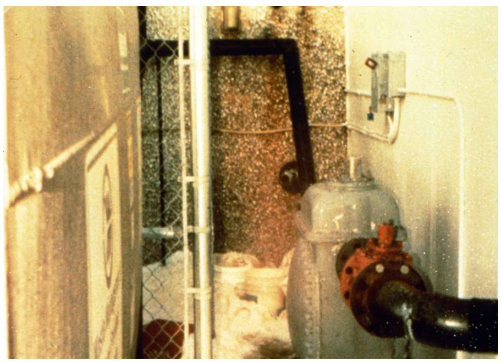
NONCRITICAL OR CRITICAL



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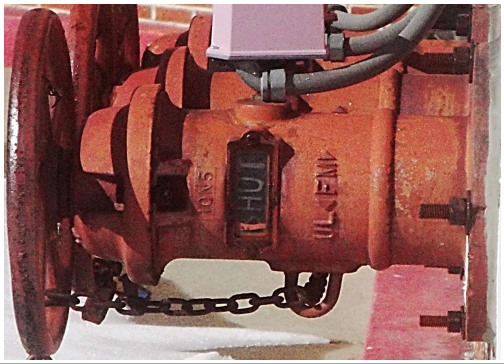
IMPAIRMENT?



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IMPAIRMENT

- **Impairment.** A condition where a fire protection system or unit or portion thereof is out of order, and the condition can result in the fire protection system or unit not functioning in a fire event.

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EMERGENCY IMPAIRMENT

- A condition where a water-based fire protection system or portion thereof is out of order due to an unplanned occurrence, or the impairment is found while performing inspection testing or maintenance activities.

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PREPLANNED IMPAIRMENT

- A condition where a waterbased fire protection system or a portion thereof is out of service due to work planned in advance, such as revisions to the water supply or sprinkler system piping.

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SPRINKLER SYSTEM

- A system that consists of an integrated network of piping designed in accordance with fire protection engineering standards that includes a water supply source, a water control valve, a waterflow alarm, and a drain... [NFPA 13]

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OTHER DEFINITIONS

- **Adjust**. To maintain or regulate, within prescribed limits, by setting the operating characteristics to specified parameters.
- **Clean**. To remove dirt, scale and debris.

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OTHER DEFINITIONS

- **Rebuild**. To restore working condition by replacement or repair of worn or damaged parts.
- **Remove**. To physically take away or eliminate.

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OTHER DEFINITIONS

- **Repair**. Restore to sound working condition or to fix damage.
- **Replace**. To remove a component and install a new or equivalent component.

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FREQUENCY DEFINITIONS

- **Weekly** - once per calendar week.
- **Monthly** - once per calendar month.
- **Quarterly** - four times per year with a minimum of 2 months, maximum of 4 months.

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FREQUENCY DEFINITIONS

- **Semiannual** - twice per year with a minimum of 4 months, maximum of 8 months.
- **Annual** - Once per year with a minimum of 9 months, maximum 15 months.

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FREQUENCY DEFINITIONS

- **3 years** – Once every 36 months, with a minimum of 30 months and a maximum of 40 months.
- **5 years** – Once every 60 months with a minimum of 54 months and a maximum of 66 months.

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VALVE STATUS - DEFINITIONS

- **Valve Status Test.** Flowing water to verify valves for a portion of the system are not closed
- **Valve Status Test Connection**. A point in the system where water is discharged for purposes of performing a valve status test

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MODULE 2
OWNERS RESPONSIBILITIES

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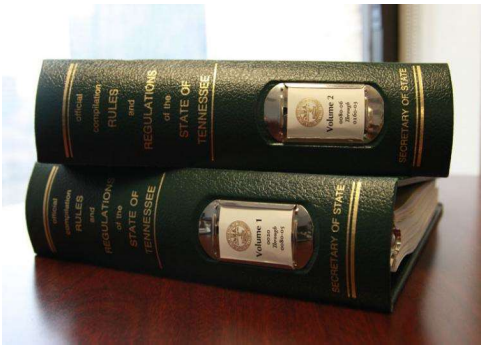
WHO IS RESPONSIBLE?



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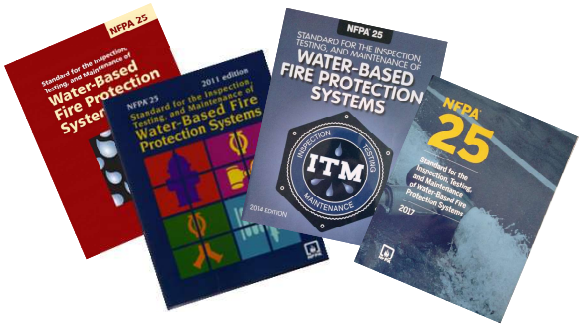
WHO IS RESPONSIBLE?



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INSPECTION, TESTING & MAINTENANCE

- What is your job?
- What is your role?

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INSPECTION, TESTING AND MAINTENANCE

- Owners or Designated Representative is responsible for properly maintained a water-based fire protection system.

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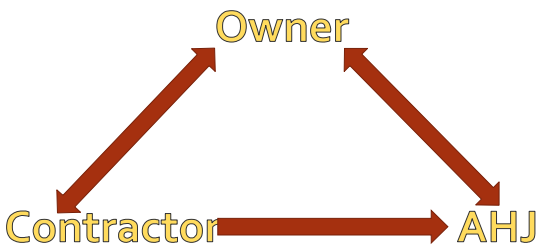
WHO IS RESPONSIBLE?



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CHAPTER 4 – GENERAL REQUIREMENTS

- Responsibility of Owner or Designated Rep.
- Impairments
- Corrective Actions
- Records
- Inspection
- Testing
- Maintenance

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OWNER OR DESIGNATED REP.

- System Inspection, Testing and Maintenance
- Buildings
- Accessibility
- Notifications
- Corrections and Repairs
- Changes
  - Occupancy, Use, Process, Materials

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FREEZE PROTECTION

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ACCESSIBILITY

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ACCESSIBILITY

Courtesy of OxTools

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NOTIFICATIONS

- Stakeholders
  - Authority Having Jurisdiction
  - Fire Department
  - Alarm-Receiving Facility
- Purpose of Shutdown
- Return to Service

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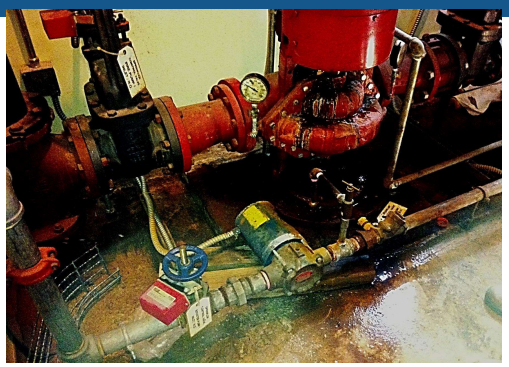
CORRECTIONS AND REPAIRS



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CHANGES

The property owner or designated representative shall not make changes in the occupancy, the use or process, or the materials used or stored in the building without evaluation of the fire protection system(s) for its capability to protect the new occupancy, use, or materials.

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CHANGE EVALUATION

(1) Occupancy changes

(2) Process or material changes

(3) Building revisions

(4) Removal of heating

(5) Changes to the storage method, arrangement, height or commodities

(6) Changes in water supplies

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CHANGES IN OCCUPANCY

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CHANGES IN PROCESS

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CHANGES IN STORAGE COMMODITIES

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CHANGES IN STORAGE METHOD

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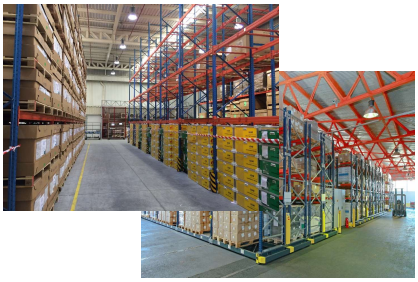
CHANGES IN STORAGE METHOD



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CHANGES IN HEIGHT

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BUILDING REVISIONS

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BUILDING REVISIONS

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BUILDING REVISIONS

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BUILDING REVISIONS

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ANNEX E

FIRE SPRINKLER SYSTEM HAZARD EVALUATION

Changes in building occupancy, use, or process, or material used or stored, create the need for evaluation of the installed fire protection systems. This form is intended to identify and evaluate such changes and should be completed only by an individual properly qualified in the area of system design.

Owner:_____ Owner's Address:_____

Property Being Evaluated:_____

Property Address:_____

Date of Work:_____

(All responses refer to the current hazard evaluation performed on this date.)

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VALVE LOCATION

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INFORMATION SIGN(S)

4.1.9.1 A permanently marked metal or rigid plastic information sign shall be placed at the system control riser supplying an antifreeze loop, dry system, preaction system, or auxiliary system control valve.

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ANTIFREEZE INFORMATION SIGN

- Must show concentration & volume
- Posted on anti-freeze system main valve

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IMPAIRMENTS

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RECORDS

- Inspections, Tests, Maintenance
- Made available to AHJ upon request
- Maintained by Property Owner
- Stored Electronically
- Original Acceptance Test Records
- ITM Records

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RECORDS

1. Procedure Performed
2. Organization
3. Required Frequency
4. Results and Date
5. Qualified Contractor Contact Information

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RECORDS

Owner's Section

A. Is the building occupied? ❑ Yes ❑ No
B. Has the occupancy and hazard of contents remained the same since the last inspection? ❑ Yes ❑ No
C. Are all fire protection systems in service? ❑ Yes ❑ No
D. Has the system remained in service without modification since the last inspection? ❑ Yes ❑ No
E. Was the system free of actuation of devices or alarms since the last inspection? ❑ Yes ❑ No

Explain any "no" answers:

Owner or Designated Representative (print) Signature and Date

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WATER SUPPLY STATUS

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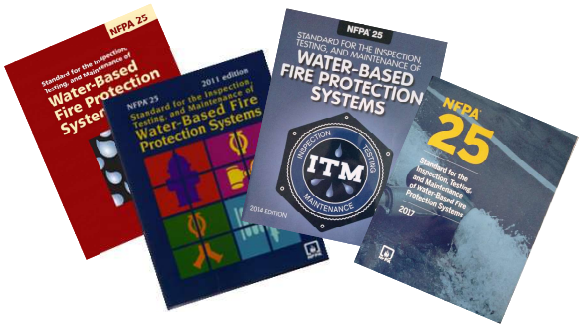
INSPECTION AND TESTING



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AUTOMATED INSPECTION

- Automated inspections permitted as long as they meet the intent of a visual inspection
- Use of cameras, transducers, temperature sensors, etc.

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AUTOMATED TESTING

- Automated testing equipment must "produce the same action" required by NFPA 25
- Automated testing devices must be listed for the purpose of the test being conducted
  - Including flowing water *past* flow switch
- Must be supervised
- Flow witnessed 1 out of every 3 years

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PERFORMANCE-BASED COMPLIANCE PROGRAMS

- Alternative performance based means are allowed if approved by the AHJ
  - Clearly Identifiable Goals
  - Equals compliance with the standard
  - Reviewed every 3 years
  - Records available to AHJ

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MODULE 3
INSPECTION

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SPRINKLER SYSTEMS

- NFPA 25 – Chapter 5 – Inspection
  - Sprinklers
  - Piping and Fittings
  - Hangers and Seismic Bracing
  - Waterflow Alarm and Supervisory Devices
  - Hydraulic Design Information Sign
  - Heat Tape
  - Information Sign
  - General information sign

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SPRINKLERS

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SPRINKLER CHARACTERISTICS

- Thermal sensitivity – RTI
- Temperature rating
- Orifice size
- Installation orientation
- Water distribution characteristics
- Special service conditions

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THERMAL SENSITIVITY

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TEMPERATURE RATING

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ORIFICE SIZE

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INSTALLATION ORIENTATION

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SPRINKLER IDENTIFICATION

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CORROSION RESISTANT

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PAINTING / ORNAMENTAL

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PROTECTIVE COVERINGS

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ESCUTCHEONS AND COVER PLATES

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GUARDS

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GUARDS

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CLEARANCE REQUIREMENTS

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STOCK OF SPARE SPRINKLERS

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ABOVEGROUND PIPE & TUBE

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FITTINGS

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SEISMIC BRACING

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SEISMIC BRACING

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HANGERS

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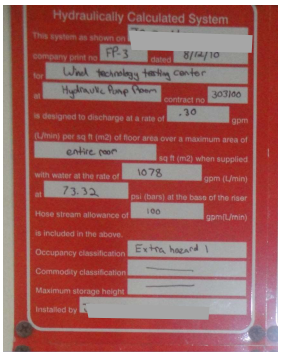
HYDRAULIC NAMEPLATE



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GENERAL INFORMATION SIGN

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STANDPIPE AND HOSE SYSTEMS

- NFPA 25 - Chapter 6 – Inspection
  - Valves – Chapter 13
  - Gauges
  - Hydraulic Design Information Sign
  - Components - NFPA 1962

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STANDPIPE SYSTEM TYPES

- Automatic
- Manual
- Semiautomatic

- Wet
- Dry

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STANDPIPE SYSTEM CLASS

- Class I
- Class II
- Class III

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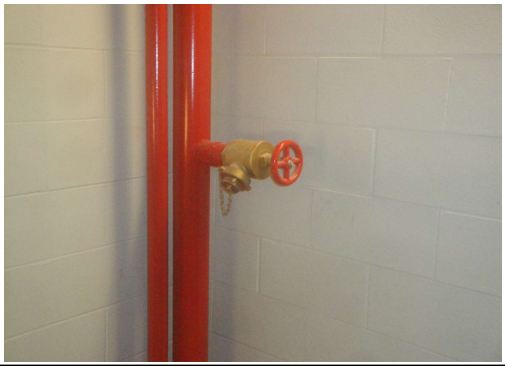
CLASS I STANDPIPE



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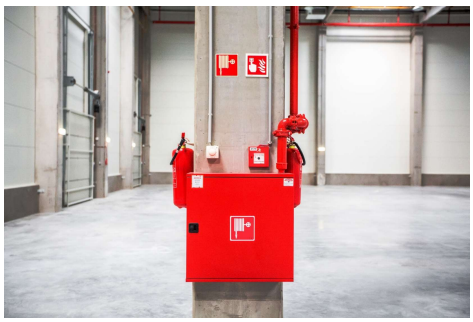
CLASS II STANDPIPE



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CLASS III STANDPIPE & HOSE

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HOSE CONNECTIONS

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HOSE, HOSE STORAGE & NOZZLE

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STANDPIPE

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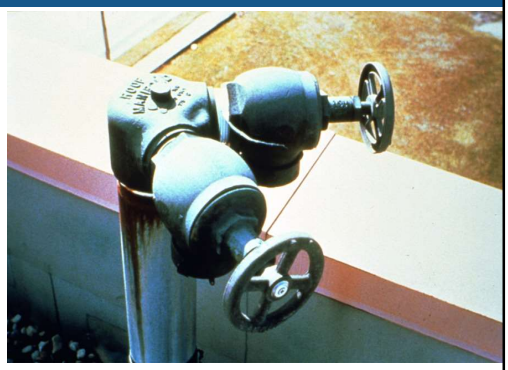
ROOF OUTLETS



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PRIVATE FIRE SERVICE MAINS

- NFPA 25 - Chapter 7 – Inspection
  - Exposed Piping
  - Underground Piping
  - Mainline Strainers
  - Dry Barrel and Wall Hydrants
  - Wet Barrel Hydrants
  - Monitor Nozzles
  - Hose Houses

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ABOVEGROUND (EXPOSED)

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PRIVATE FIRE SERVICE MAINS

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DRY BARREL HYDRANTS

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DRY BARREL HYDRANTS

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WET BARREL HYDRANTS

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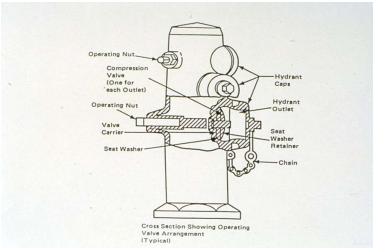
WET BARREL HYDRANTS



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MONITOR NOZZLES

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HOSE HOUSE

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HYDRANTS

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CHAPTER 8 – FIRE PUMPS

- Pump House Condition
- Pump System Condition
- Electrical System Condition
- Diesel Engine System Condition

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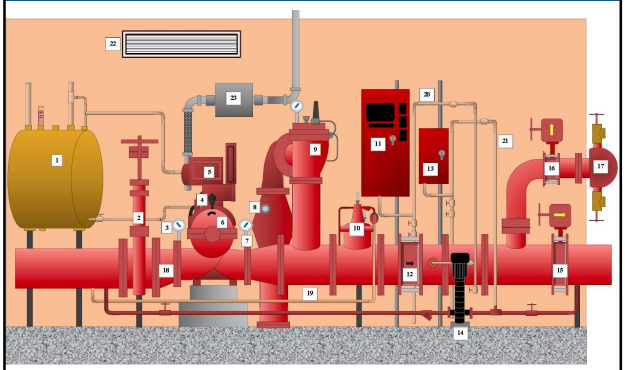
FIRE PUMPS



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PUMP HOUSE CONDITION

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PUMP SYSTEM CONDITION

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HORIZONTAL SPLIT CASE PUMP

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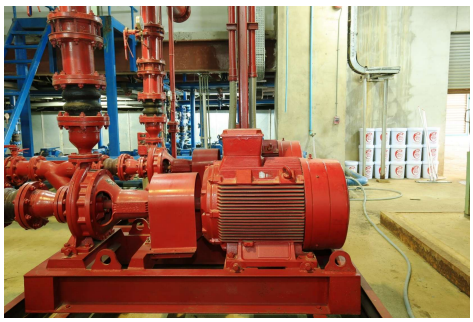
END SUCTION PUMP



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VERTICAL IN-LINE PUMP

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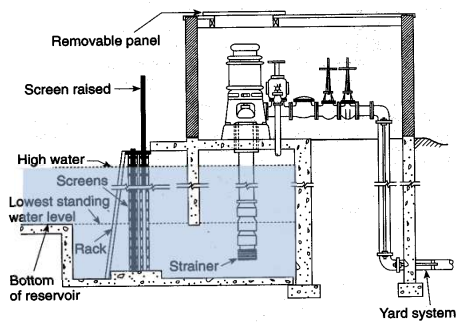
VERTICAL SHAFT TURBINE PUMP



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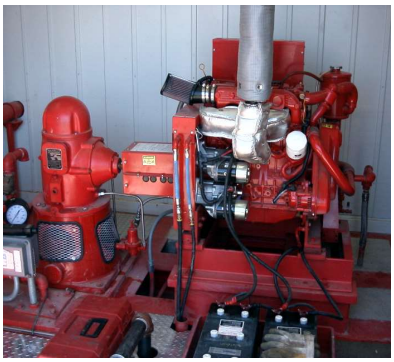
RIGHT ANGLE GEAR DRIVE



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JOCKEY PUMP

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GAUGES

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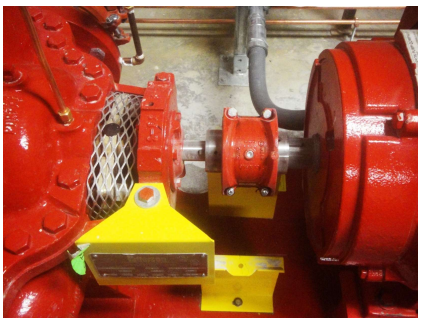
FLEXIBLE COUPLING



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PUMP SIGNAGE

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ECCENTRIC REDUCER

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CIRCULATION RELIEF VALVE

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AIR RELEASE VALVE

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DIESEL ENGINE CONDITIONS

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FUEL TANKS

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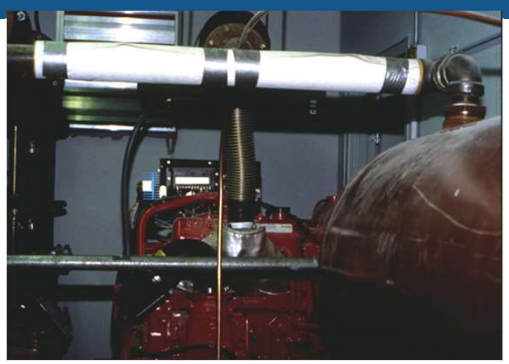
ENGINE EXHAUST



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ENGINE EXHAUST

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DIESEL PUMP CONTROLLER

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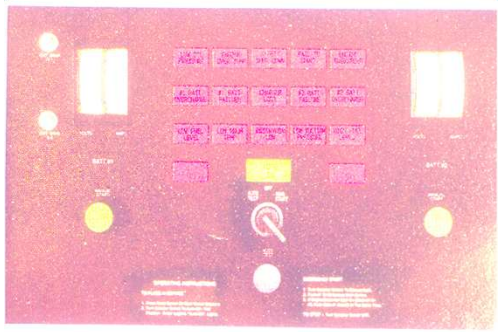
CONTROLLERS



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ELECTRIC SYSTEM CONDITIONS

NFSA

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ELECTRIC PUMP CONTROLLER

NFSA

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ELECTRIC PUMP CONTROLLER

NFSA

152

ELECTRIC PUMP CONTROLLER

NFSA

153

TRANSFER SWITCH

NFSA

154

CHAPTER 9 – WATER STORAGE TANKS

- Water Level
- Air Pressure
- Heating System
- Water Temperature
- Exterior Inspection
- Interior Inspection
- Tests During Interior Inspection

NFSA

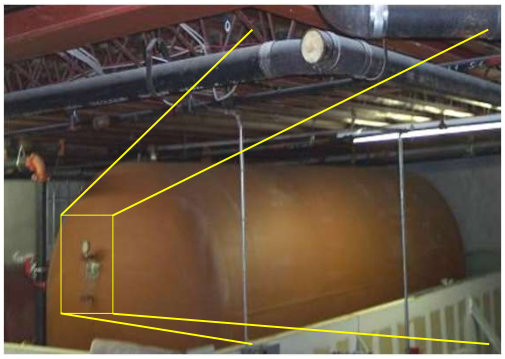
155

WATER LEVEL

NFSA

156

WATER LEVEL & PRESSURE



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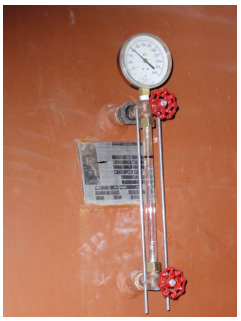
WATER LEVEL AND PRESSURE



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EXTERIOR CONDITIONS

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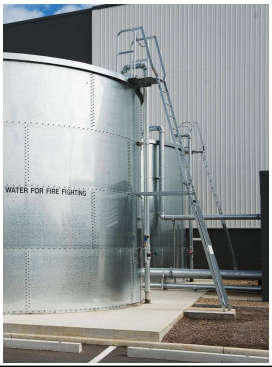
CATWALKS AND LADDERS



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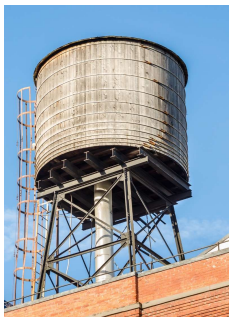
HOOPS AND GRILLAGE



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HEATING SYSTEMS

- Tanks with supervised low temperature alarms connected to constantly attended location
  Weekly

- Tanks without supervised low temperature alarms connected to constantly attended
  Daily

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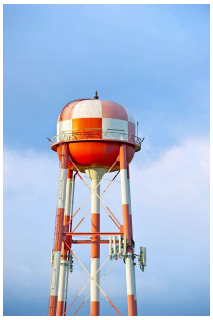
162

PAINTED AND COATED SURFACES



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SUPPORT STRUCTURE

NFSA

164

SURROUNDING AREA

NFSA

165

INTERIOR CONDITIONS

NFSA

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CHAPTER 10 – WATER SPRAY SYSTEMS

NFSA

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CHAPTER 11 – FOAM-WATER SPRINKLER SYSTEMS

NFSA

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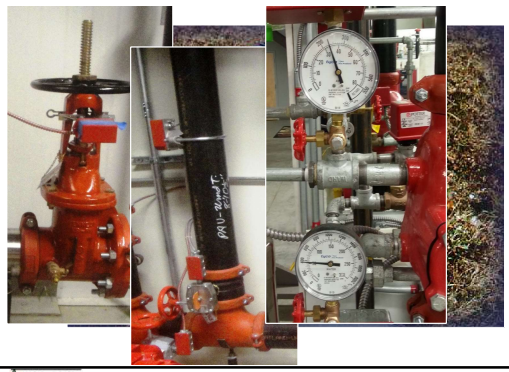
CHAPTER 12 – WATER MIST SYSTEMS

NFSA

169

CHAPTER 13 – COMMON COMPONENTS & VALVES



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GENERAL PROVISIONS

NFSA

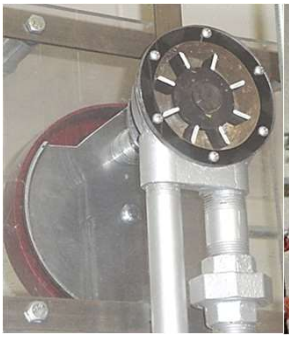
171

MAIN DRAIN TEST

NFSA

172

WATERFLOW ALARM DEVICES



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ALARM DEVICES

NFSA

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GAUGES

NFSA

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VALVE SUPERVISION

NFSA

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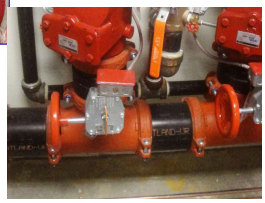
CONTROL VALVES



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OS&Y CONTROL VALVES



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FLOOR CONTROL VALVES

NFSA

179

POST INDICATOR VALVES

NFSA

180

VALVES IN PITS

NFSA

181

SYSTEM VALVES

- Alarm Valves
- Check Valves
- Preaction & Deluge Valves
- Dry Pipe Valves / QODs

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WET PIPE SPRINKLER SYSTEM

NFSA

183

CHECK VALVES

NFSA

184

PREACTION SPRINKLER SYSTEM

NFSA

185

DELUGE SPRINKLER SYSTEM

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186

DRY PIPE SPRINKLER SYSTEMS

NFSA

187

SIGNAGE

NFSA

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SIGNAGE

NFSA

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SIGNAGE

NFSA

190

PRVS AND RELIEF VALVES

- Sprinkler Systems
- Hose Connection PRVs
- Hose Rack Assembly PRVs
- Master PRVs

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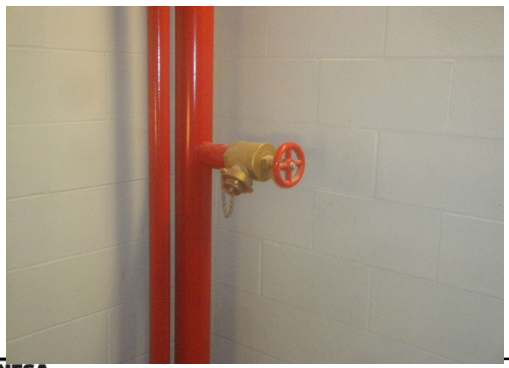
191

HOSE VALVES



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FIRE PUMP PRESSURE RELIEF VALVE

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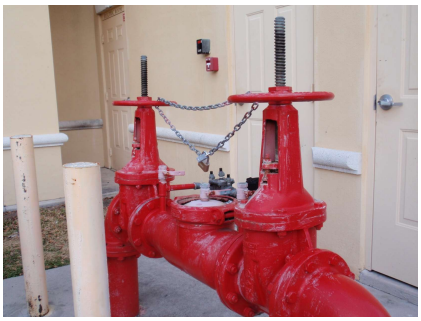
193

BACKFLOW PREVENTION ASSEMBLIES



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BACKFLOW PREVENTERS

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195

RPZ BACKFLOW PREVENTERS

NFSA

196

FIRE DEPARTMENT CONNECTION

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197

FIRE DEPARTMENT CONNECTION

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198

ACTIVITY

What are you looking at?

Identify the Problem
Cite the Section of NFPA 25
Determine the Classification of the Problem

NFSA

199

1- STORAGE

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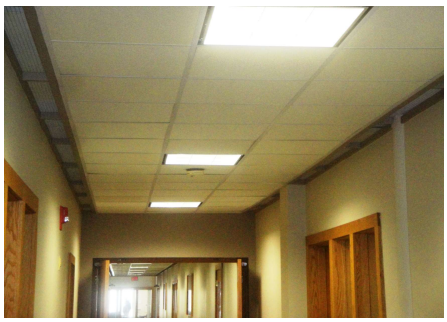
200

2 – NO SPRINKLERS IN CORRIDOR



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201

3 - SPRINKLER

NFSA

202

6 – PAINT ON ARM AND DEFLECTOR

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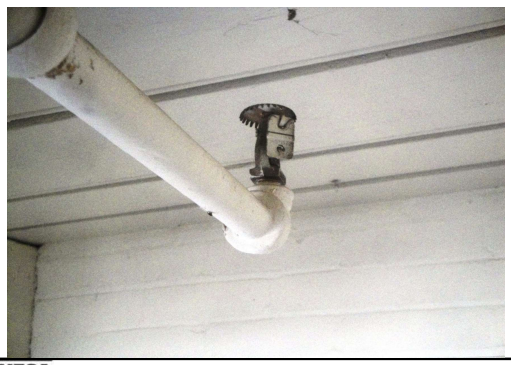
7 – PAINT ON LINK



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8 – LOADED SPRINKLER

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205

9 – LOADED SPRINKLER

NFSA

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10 – DAMAGED SPRINKLER

NFSA

207

11 – DAMAGED CONCEALER PLATE

NFSA

208

12– MISSING ESCUTCHEON

NFSA

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13– DANGLING ESCUTCHEON

NFSA

210

14– SPRINKLER CABINET

NFSA

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15– SPRINKLER ORIENTATION

NFSA

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16– SPRINKLER ORIENTATION

NFSA

213

18- CEILING

NFSA

214

20 – SPRINKLER

NFSA

215

21– SPRINKLER (NO FLUID)

NFSA

216

23– SPRINKLER ??

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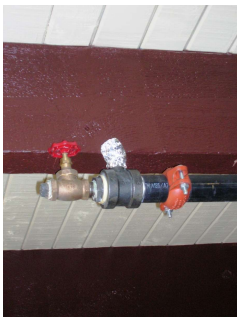
24– COVERED SPRINKLER



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26 – SUPERVISED VALVE

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219

29 – FDC

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31 – FDC

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221

48 – MAIN DRAIN

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222

49 – HYDRANT

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MODULE 4
TESTING

224

SPRINKLER SYSTEMS

- NFPA 25 – Chapter 5 – Testing
  - Sprinklers
  - Waterflow Alarm Devices
  - Antifreeze Systems

NFSA

225

TESTING SPRINKLERS

- 50 years of Service
- Sprinklers Manufactured Prior to 1920
- Sprinklers with Fast Response Elements
- Extra high Temperature Solder Type
- 75 years of Service
- Dry Sprinklers
- Sprinklers in Harsh Environments

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REPRESENTATIVE SAMPLE

- Minimum of 4 sprinklers
- 1% of the number of sprinklers per type
- Results
- Modifications

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ALARM DEVICES

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ALARM DEVICES

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229

SUPERVISORY SIGNALS

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230

INSPECTORS TEST CONNECTION

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231

ANTIFREEZE SYSTEMS

- Annual Testing
- Use & Type
- Limitations
- Concentrations
- Grandfathering Existing Systems (2022)

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TEST LOCATIONS

Courtesy of Green Mountain Sprinkler

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233

ANTIFREEZE TESTING

NFSA

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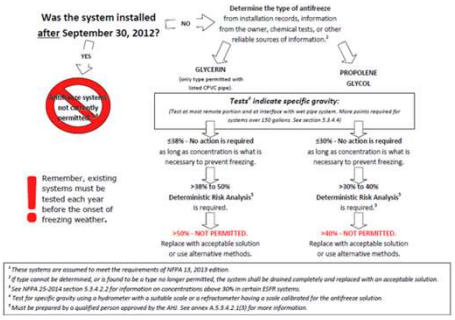
ANTIFREEZE GUIDE



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235

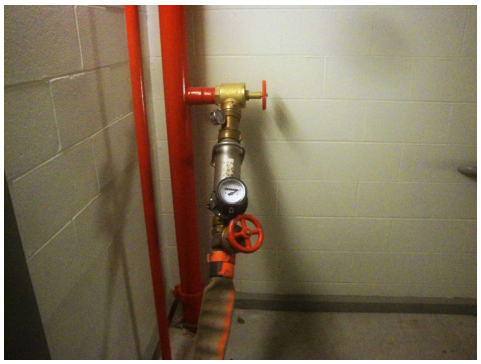
STANDPIPE SYSTEMS

- NFPA 25 - Chapter 6 – Testing
  - Flow Tests
  - Hydrostatic Tests
  - Alarm Devices

NFSA

236

STANDPIPE TEST



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STANDPIPE TEST

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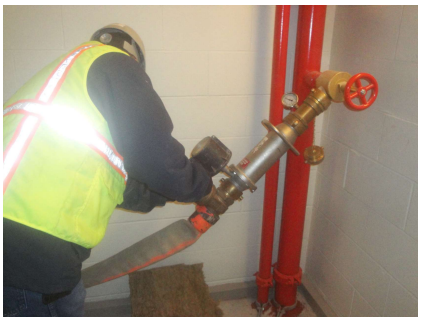
STANDPIPE TEST



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239

STANDPIPE TEST

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240

HYDROSTATIC TEST

- Pressures
- 2 hours
- Every 5 years
- Manual and Semi-Automatic Dry Systems

NFSA

241

PRIVATE FIRE SERVICE MAINS

- NFPA 25 - Chapter 7 – Testing
  - Flow Test
  - Hydrants

NFSA

242

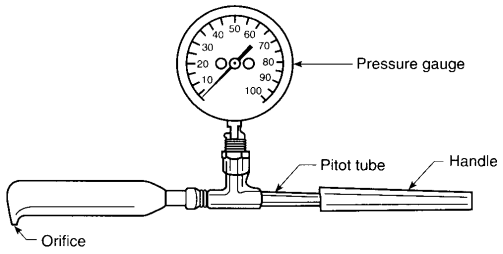
NFPA 291

- Layout of Test
- Equipment
- Test Procedure
- Pitot Readings
- Determination of Discharge

NFSA

243

PITOT TUBE



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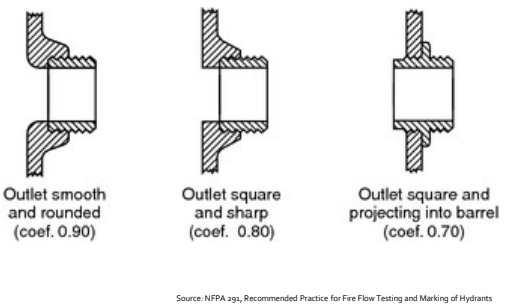
HYDRANT COEFFICIENT



Source: NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants

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DETERMINING THE DISCHARGE

- $Q = 29.84cd^2\sqrt{p}$

Q = Total Flow
c = Hydrant Coefficient
d = Diameter of Opening
p = Pitot Pressure (psi)

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PLOTTING DISCHARGE CURVE

- $Q = 29.84cd^2\sqrt{p}$
- Q = 29.84(0.9)(2.5) 25
- Q = 29.84(0.9)(6.25)(5)
- Q = 840 gpm

- Static Pressure 65 psi
- Residual Pressure 40 psi

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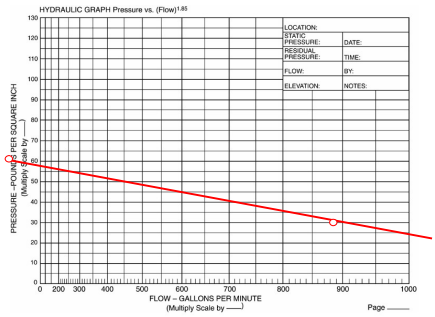
FLOW CHART



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SUBSEQUENT TEST

- $Q = 29.84cd^2\sqrt{p}$
- Q = 29.84(0.9)(2.5) 23
- Q = 29.84(0.9)(6.25)(4.8)
- Q = 805 gpm

- Static Pressure 60 psi
- Residual Pressure 30 psi

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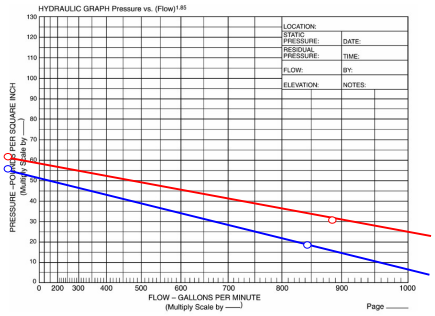
FLOW CHART



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250

TESTING

- 8.3.2 No Flow/churn
- Main pressure relief permitted to weep
- Circulation relief shall discharge a small amount of water
- Pump installation prior to 1993 edition of NFPA 20 may discharge larger amounts of water

NFSA

251

TESTING

- No Flow/churn
  - Monthly for electric
    - 10 minutes
    - 4 exceptions
      - Beyond pumping capacity
      - Limited-service controllers
      - Vertical turbine
      - Taking suction from tanks or of material value
        - NO BYPASS
  - Allows the motor winding to cool down

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- Weekly Diesel
- 30 Minutes
  - Allows engine temperature to come up
  - Uses fuel
  - Exercises engine components

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OBSERVATIONS WITH PUMP RUNNING

- 8.3.2.9
  - Starting pressure

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OBSERVATIONS WITH PUMP RUNNING

- 8.3.2.9
  - Suction and Discharge readings

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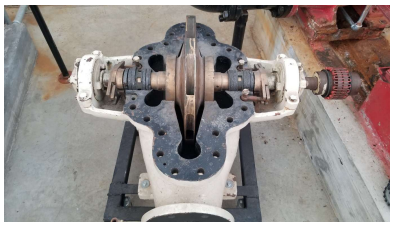
255

OBSERVATIONS WITH PUMP RUNNING

- 8.3.2.9
  - Packing glands
    - Adjust if necessary



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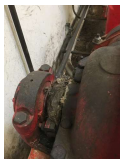
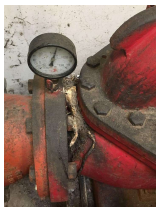
OBSERVATIONS WITH PUMP RUNNING

- 8.3.2.9
  - Packing box, bearings, pump casing overheating
  - Unusual noises/vibrations





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OBSERVATIONS WITH PUMP RUNNING

- 8.3.2.9
  - Verify circulation relief valve is operating

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OBSERVATIONS WITH PUMP RUNNING

- Electrical system operation
  - Record time for motor to reach full speed
  - Record time for controller on first step
  - Record time runs after starting
- Diesel engine procedure
  - Time for engine to crank
  - Time for engine to reach running speed
  - Observe engine oil pressure, speed, oil temperature
  - Record abnormalities
  - Heat exchanger

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TESTING

- 8.3.3 Annual Flow Test
  - No Flow/churn
  - 100%/rated
  - 150%/max
- Variable speed
  - Churn,25%,50%,75%,100%,125%,150%
- Flow maximum possible if water supply not available at 150%

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HOSE STREAMS

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FLOW METER

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CLOSED LOOP METERING

NFSA

263

MIND THE WATER

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PUMP ROOM ENVIRONMENT

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265

FUEL TANKS

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266

WATER STORAGE TANKS

- NFPA 25 - Chapter 9 – Testing
  - Tank Heating System
  - Low Water Temperature
  - High Temperature Limit Switches
  - Water Level Alarms
  - Level Indicators
  - Pressure Gauges

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WATER STORAGE TANKS

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VALVES

- NFPA 25 - Chapter 13 – Testing
  - Main Drains
  - Water Flow Alarms
  - Preaction & Deluge Systems
  - Dry Pipe Systems & QODs
  - Pressure Reducing Valves
  - Backflow Prevention Assemblies

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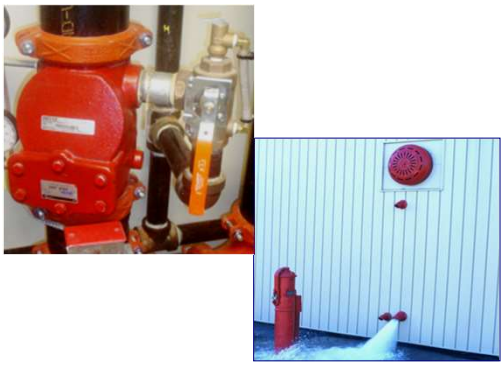
MAIN DRAIN TEST



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ALARM DEVICES

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INSPECTORS TEST CONNECTION

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272

ALARM DEVICES

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ALARM INITIATION

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SIGNAL VERIFICATION

- The signal sounded where it was supposed to
- *Alarms Received*
- *Correct Signal*

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DRY PIPE SYSTEM

- Partial Trip Test
- Full Trip Test
- Priming Water
- Low Air Pressure Alarm
- QODs

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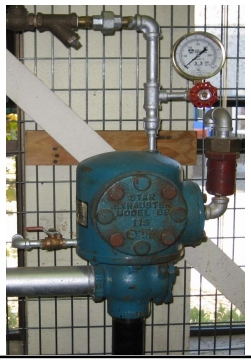
QODS



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PREACTION & DELUGE SYSTEMS

- Priming Water
- Low Air Pressure Alarms
- Full Flow

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PRESSURE REDUCING/RELIEF VALVES

- Sprinkler Systems
- Circulation Relief
- Pressure Relief Valves
- Hose Connections
- Hose Racks

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BACKFLOW PREVENTERS

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280

DOUBLE DETECTOR CHECK VALVE

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281

REDUCED PRESSURE ZONE

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282

FORWARD FLOW TEST

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MODULE 5
OBSTRUCTIONS AND IMPAIRMENTS

284

CHAPTER 14

- Internal Piping Condition
- Obstruction Investigation and Prevention
- Ice Obstruction

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285

ASSESSMENT OF INTERNAL CONDITION

- Every 5 years
  - Or Established by Risk Analysis
- Check for Foreign Organic or Inorganic Material

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ASSESSMENT OF INTERNAL CONDITION

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287

ASSESSMENT OF INTERNAL CONDITION

- Non-metallic Pipe
- Dry and Preaction Systems
- Cross Mains

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288

MULTIPLE WET PIPE SYSTEMS

- Alternate systems
- Materials found require all systems inspected internally
- What is a system?

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289

SUFFICIENT CAUSE

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290

OBSTRUCTION INVESTIGATION

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291

OBSTRUCTION SOURCES

- Pipe Scale
- Careless Installation or Repair
- Raw Water Sources
- Biological Growth
- Calcium Carbonate Deposits
- Corrosion

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CORROSION

- General
- Pitting
- Galvanic
- Crevice
- Selective Leaching
- Erosion
- Environmental Cracking
- Intergranular
- Microbiologically Influenced (MIC)

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ANNEX D

- Investigating Procedures
- Obstruction Prevention Program
- Flushing Procedures

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15 TRIGGERS

1. Defective Intake for fire pumps taking suction from open bodies of water
2. Discharge of obstructive material
3. Foreign materials in fire pumps, dry valve or check valves
4. Foreign materials discharged during drain test or plugging inspectors test connection

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15 TRIGGERS

5. Unknown materials heard in the system piping.
6. Plugged Sprinklers
7. Plugged piping in sprinkler systems dismantled during building alterations
8. Failure to flush yard piping

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15 TRIGGERS

9. Record of a broken public main in the vicinity
10. Frequent false tripping of dry valves
11. System returned to service after extended shutdown (greater than 1 yr.)
12. System contains sodium silicate or highly corrosive fluxes in copper lines.

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15 TRIGGERS

13. System has been supplied with raw water via the fire department connection

14. Pinhole Leaks

15. A 50 percent increase in the time it takes water to travel to the inspectors test connection from the time the valve trips during a full flow trip test of a dry pipe sprinkler system when compared to the original system acceptance test

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REPEAT INVESTIGATIONS

- Based on conditions
- Correction of conditions

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299

METHODS & ALTERNATIVES

- 4 Points of Investigation
- Non-Destructive Methods
- Flushing if necessary

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300

OBSTRUCTION INVESTIGATION

- If an obstruction investigation indicates the presence of sufficient material to obstruct piping or sprinklers, a complete flushing program shall be conducted
  - Must be done by qualified personnel
- If the condition has not been corrected, or if it is such that it could result in obstruction despite prior flushing
  - Must be reinspected at the 4 points every 5 years

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OBSTRUCTION INVESTIGATION

- Special rules for dry and preaction system piping that protects or passes through freezers or cold storage rooms
  - Piping shall be inspected internally every year where it enters the refrigerated area
  - Non destructive methods are allowed
  - If any blockage exists, additional piping shall be inspected to insure all blockage is removed

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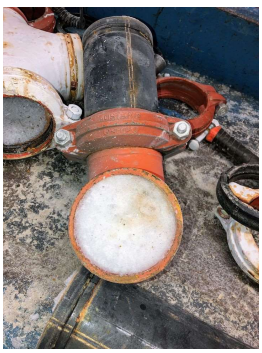
ICE OBSTRUCTION



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CHAPTER 15 - IMPAIRMENTS

- Impairment Coordinator
- Tag Impairment System
- Impaired Equipment
- Preplanned Impairments
- Emergency Impairments
- Restoring System to Service

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IMPAIRMENT COORDINATOR

- Property Owner
- Designated Representative

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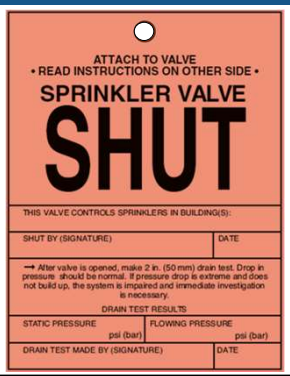
IMPAIRMENTS

Tag Impairment System



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IMPAIRMENT TAG

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IMPAIRED EQUIPMENT

- Sprinkler Systems
- Standpipe Systems
- Fire Hose Systems
- Underground Fire Service Mains
- Fire Pumps
- Water Storage Tanks
- Water Spray Systems / Foam-Water Systems
- Control Valves

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PREPLANNED IMPAIRMENT

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PREPLANNED IMPAIRMENT

- Extent and Duration
- Determination of Increased Risk
- Stakeholders Notified
- Tag Impairment System Implemented
- Tools and Materials Provided

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DETERMINATION OF INCREASED RISK

- Duration of System Impairment
- Greater than 10 hours in 24 hour period?
  - Evacuation of Building
  - Establish an approved fire watch
  - Establish a temporary water supply
  - Eliminate potential ignition sources

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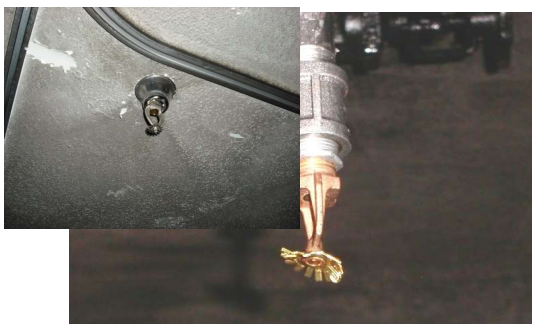
EMERGENCY IMPAIRMENT



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RESTORING SYSTEM TO SERVICE

- Verification of Operation
  - Inspection and Testing
- Stakeholders Informed
  - Supervisors
  - AHJs
  - Property Owner or Designated Representative
- Impairment Tags Removed

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THANK YOU

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Questions?

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