Seminar Title: Fire Sprinkler Installation in One- and Two-Family Dwellings - Multipurpose Residential

Seminar Description: This course is intended to provide training in multipurpose residential sprinkler systems for participants seeking licensure as a Multipurpose residential fire sprinkler contractor (F-5) or Multipurpose residential fire sprinkler journeyperson (F-6) in the State of Connecticut.

This course will give installers the skills and knowledge to competently install multipurpose residential fire sprinkler systems in one- and two-family dwellings. This class is based upon the two major installation standards for these residential sprinkler systems: NFPA 13D, Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes, 2016 Edition and Section P2904 of the International Residential Code, 2018 edition which is titled Dwelling Unit Fire Sprinkler Systems. Edition years may be adjusted based upon the licensing agency having jurisdiction.

Sprinkler system installation in one- and two-family dwellings differs considerably from the techniques and concepts of a “commercial” type sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems and NFPA 13R, Standard for The Installation of Sprinkler Systems in Low-Rise Residential Occupancies and this class will give participants a thorough understanding of the specific requirements for installing residential fire sprinkler systems in one- and two-family dwellings.

As residential fire sprinkler systems become more widely recognized and adopted by communities, it becomes more important than ever to understand the requirements of proper design and installation. More than the commercial market, the residential environment is subject on the job changes and less engineering oversight and as a result the residential sprinkler system installer must have a thorough understanding of all aspects of residential sprinkler systems. A solid understanding of the requirements of the installation standards and how they are applied is the key to a successful installation. This class will guide the participant through the requirements of NFPA 13D as well as the alternate approaches, such as IRC P2904.

The curriculum consists of five basic modules with various sub-sections. Successful completion of this curriculum will ensure that the participant gains a comprehensive understanding of the following topics: Residential fire problem, principles of combustion, rules governing installation, components and acceptable materials, residential fire sprinklers, spacing and location of residential sprinklers, obstruction rules, water supplies, backflow prevention, installation techniques of copper tube, PEX tubing and CPVC piping, and acceptance testing and maintenance. The concentration will be on multipurpose residential fire sprinkler systems

Learning Outcomes:

At the conclusion of this seminar the participant will be able to:
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1. Understand the residential fire problem and the life safety benefits of a residential fire sprinkler system

2. Discuss the scope and application of sprinkler standards for one and two family dwellings and townhomes.

3. Identify the requirements for residential fire sprinkler system installation in accordance with NFPA 13D and IRC P2904 with a concentration on multipurpose piping systems.

4. Apply the installation requirements and calculation procedures to various residential layouts.

5. Develop an approach for coordinating installation inspection & testing.

6. Identify and understand installation tools and methods for the applicable materials

Five Modules:

Module 1: Introduction to Dwelling Fire Sprinkler Systems:

Upon completion, the participant will understand the following concepts:

1-01 Introduction to curriculum
   • What to expect in class
   • Responsibilities of student
   • Required resources

1-02 Residential Fire Problem
   • NIST living room and Fire Power videos
   • America Burning
   • Residential fire statistics

1-03 Principles of Combustion

1-04 Rules Governing Installation
   • Codes
   • Installation Standards
   • Local Amendments
   • Device listing requirements

1-05 Scope of Sprinkler Standards
   • Overview of Installation Standards
     o NFPA 13, NFPA 13R, NFPA 13D and IRC P2904
1-06 Residential Sprinklers

- History and Development
- Types (pendent, recessed, concealed, upright, residential and sidewall) of sprinklers
- Walk through of Residential Sprinkler Data Sheets

Module 2: NFPA 13D Walk Thorough

Upon completion, the participant will understand the following concepts:

2-01 History and Development of NFPA 13

2-02 Layout of NFPA 13D
   - Table of contents and chapter review

2-03 Scope and Purpose
   - Life Safety is primary purpose
   - Cost conscious
   - Fire is controlled long enough for occupants to escape

2-04 Definition Review (Chapter 3)
   - Review definitions specific to NFPA 13D

2-05 Types of Systems
   - Stand-Alone Systems
   - Multi-purpose Systems
     - Specific requirements
   - Passive Purge Systems
   - Wet and Dry Systems

2-06 Components
   - Sprinklers
     - Types (residential, quick response, dry-type, etc.)
     - Temperature ratings
   - Aboveground pipe
     - Metallic (steel, copper)
       - Joining methods
     - Nonmetallic
       - CPVC
     - PEX
   - Underground pipe
     - Review plumbing requirements
2-07 Water Supply Requirements
   • Duration Requirements (7 or 10 minutes)
   • Acceptable Types
     o City Water System
     o Tanks
     o Pump and Tanks
     o Pressure Tanks
     o Wells
   • Water Supply requirements specific to multi-purpose systems
   • Common Supply Pipes (Domestic and Fire Sprinkler)
     o Domestic Demand
     o Water Treatment systems
   • Backflow Prevention
     o Types of acceptable backflow prevention

2-08 Installation Rules (General Rules)
   • Control Valves, Gauges and Drains
   • Pipe Support and Hangers
   • Sprinklers
     o Types and location
     o Temperature ratings
       ▪ Heat sources
   • Alarms

2-09 Sprinkler Location and Spacing
   • Location of Sprinklers
     o Where sprinklers are required
     o Areas where sprinklers may be omitted
       ▪ Data of locations of deadly fires (used to determine where sprinklers may be omitted)
   • Spacing of sprinklers
     o Coverage Areas
       ▪ How to determine coverage areas
   • Deflector Distance (distance below ceilings)
     o Pendent and Upright Sprinklers
     o Sidewall Sprinklers

2-10 Obstructions Rules
   • Obstructions to Pendent sprinklers
     o Obstruction exercises
   • Obstructions to Sidewall Sprinklers
     o Obstruction exercises
• Shadow Area allowances

2-11 Distance from Heat Sources

2-12 Freeze Protection
• Insulation Techniques
• Dry Type Sprinklers (connected to wet pipe systems)
  o Minimum exposed barrel length
• Antifreeze (Note - not applicable to multi-purpose Systems)
• Dry and Pre-Action Systems (Note - not applicable to multi-purpose Systems)

2-13 Layout Exercises
• Students to take residential floor plans (real life examples) and layout sprinklers per the requirements of NFPA 13D
  o This will indicate an understanding of:
    ▪ Spacing requirements
    ▪ Location requirements
    ▪ Obstruction rules

Module 3: NFPA 13D Alternatives (IRC P2904)

Upon completion, the participant will understand the following concepts:

3-01 P2904 walk through (Concentrating on differences with NFPA 13D)

3-02 Required Sprinkler Locations

3-03 Components
• Sprinklers
  o Types (residential, Quick Response, dry-type
  o Temperature ratings
• Aboveground pipe
  o Copper
  o CPVC
  o PEX
  o PE-RT

• Underground pipe
  o Review plumbing requirements

3-04 Protection from Freezing

3-05 Obstruction Rules
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3-06  Sloped Ceilings

3-07  Layout Exercises
  •  Students to take residential floor plans (real life examples) and layout sprinklers per
    the requirements of P2904
    o  This will indicate an understanding of:
      ▪  Spacing requirements
      ▪  Location requirements
      ▪  Obstruction rules
    o  Compare to NFPA 13D Layout

Module 4: Pipe Sizing Methods (Both 13D and P2904)

Upon completion, the participant will understand the following concepts:

4-01  Number of Design Sprinklers
  •  Based upon Ceiling Configuration

4-02  Design discharge and flow requirements
  •  Review Sprinkler data sheets

4-03  Minimum Pipe Sizes

4-04  General Pipe Sizing Method
  •  Walk through of this method
    o  Exercise - General Pipe Sizing Method

4-05  Prescriptive Pipe Sizing Method
  •  Walk through of this method
    o  Exercise - Prescriptive Pipe Sizing Method

4-06  NFPA 13 Hydraulic Calculation Method
  •  Overview of this method

Module 5: System Acceptance Testing and Inspections and Maintenance

Upon completion, the participant will understand the following concepts:

5-01  Role of Installer and Authority having Jurisdiction
5-02  Rough-in Inspection (pre-concealment inspection)
  •  Sprinkler location and position
  •  Obstruction evaluation
  •  Sprinkler separation and distance from heat source
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• Piping size and type
• Hangers and support

5-03 Required Testing
• Hydrostatic Tests
  o Required pressure
  o Use of sprinklers versus plugs during test
• Pump tests (If applicable)
• Waterflow detector Alarm Test (if applicable)

5-04 Inspection, Testing, and Maintenance.
• Role of the Installing Contractor
  o Provide owner with instructions
• Role of the owner/occupant
• Recommended Inspection Procedures on change of ownership of property

Additional Requirements:

The participant shall meet the installer requirements of the listed residential piping materials:

**CPVC:** Online or classroom installation training by the manufacturer of the listed CPVC piping must be completed, and training card/certificate awarded.

**PEX:** Classroom installation training by the manufacturer of the listed PEX piping must be included in this class and training card/certificate awarded.

**Copper:** Proficiency in copper tube installation techniques must be demonstrated in a manner acceptable to the licensing agency having jurisdiction.