

# Chesterfield Fire and EMS

Fire and Life Safety Division

## FIRE SPRINKLER SYSTEM - 13D

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### FIRE SPRINKLER SYSTEM

### **NFPA –13D (2007 Edition) - ONE AND TWO FAMILY DWELLINGS**

Project Name: \_\_\_\_\_

Project Address: \_\_\_\_\_

Building Permit #: \_\_\_\_\_ Date: \_\_\_\_\_

Code Edition: \_\_\_\_\_

All supporting documentation showing items listed below are required for review. The checklist is based on the 2007 Edition of NFPA 13D and 2009 Edition of the International Residential Code

#### **General (All submissions shall include the following):**

- A minimum of two copies of shop drawings, calculations and submittal data shall be provided with the permit application permitting evaluation of the system code compliance, prior to installation. The permit application shall clearly designate the system as being required or installed as an elective system at the discretion of the owner.
- Provide the name and address of project or location where system will be installed; include associated building permit number with project.
- Provide the name, address, and telephone/fax numbers for the designer of the system.
- The submitted plans are to be uniform in size and drawn to a recognized scale. NFPA 13D – Section 4.8 and A 4.8.
- The submitted plans and calculations shall clearly indicate the design standard(s) and edition used to prepare the submission.
- The submitted plans shall include a schematic drawing of the fire protection underground showing the point of entry of the fire protection underground into building, the size and length of pipe, the point of connection to county main and the location of the referenced water flow test. The schematic drawing shall also include the location and type of all valves, meters, and back-flow prevention devices to be installed. NFPA 13D – Section 4.8 and A4.8.

- If a self-contained water supply tank and pump are provided, the submitted plans shall indicate the location of the water supply tank and pump, the tank capacity and duration of the water supply tank, the method of refilling the water supply tank (Note: A permanent connection to refill the tank is not required.), the rating of the pump (gpm and psi), the power supply for the pump and if provided, the location and type of emergency power supply for the pump. The method of provide a minimum temperature of 40 degrees F for the room or enclosure where the water supply tank and pump are located shall be indicated.
- The submitted plans shall clearly show a floor plan of each story, indicating the location of all walls, partitions, and sky lights, cooking appliances (stove), fire places, ceiling fans; and the intended use of each area, room, or void space. NFPA 13D – Section 4.8 and A 4.8.
- The submitted plans shall include full height cross-section elevation detail(s) indicating construction, of roof/ceiling and structural members; slopes, curved or irregular ceiling configuration and obstructions in accordance with NFPA 13D – Section 4.8, A 4.8 and 8.2.5.
- The submitted plans shall clearly indicate the type and location of all control valves, drain valves, test connections, related equipment and piping. NFPA 13D 4.8 and A 4.8.
- The submitted plans shall clearly indicate the make, model, manufacturer, temperature rating, orifice size, hydraulic K-factor, area of coverage for extended coverage sprinklers (spacing requirements) and quantity of each type of sprinkler to be installed. NFPA 13D – Section 4.8 and A 4.8.
- The submitted plans shall clearly indicate the location of all special sprinklers, such as extended coverage, sidewall and intermediate/high temperature sprinklers. NFPA 13D – Section 4.8 and A 4.8.
- The submitted plans shall clearly indicate all pipe types and wall thickness, the type of fittings and joints, and the type of hangers, the hanger spacing requirements per the pipe manufacturer, the location of hangers, sleeves, braces, and methods to support sprinkler components. NFPA 13D – Section 4.8 and A 4.8.
- The submitted plans shall clearly indicate the nominal pipe size and cutting lengths of the pipe (center to center), including riser nipples, drop nipples, and arm-overs. NFPA 13D – Section 4.8 and A 4.8.
- The submitted plans shall clearly indicate the method of maintaining a minimum temperature of 40° F for sprinkler system piping installed in unconditioned spaces. NFPA 13D – Sections 4.8, A 4.8, 8.3.1 and Figure A8.3.1. Special note: The tenting method of insulating the sprinkler pipes located in unconditioned spaces requires properly secured, minimum R-30 unfaced batt insulation..

- Hydraulically designed systems:
  1. Hydraulically designed sprinkler systems shall be calculated in accordance with NFPA 13 or in accordance with NFPA 13D – Section 8.4.4 – Straight-run systems, Section 8.4.7 – Grid-type systems and Section 8.4.8 – Looped-type systems or the International Residential Code.
    - a. Where the sprinkler system is supplied through the domestic water meter, a copy of the Chesterfield County Department of Utilities Water Meter Sizing Form shall be provided with the submission.
    - b. Where the sprinkler system is supplied through a separate fire line connection 2” or smaller in diameter, the Chesterfield County Department of Utilities Specification FIR-1 shall be used.
    - c. Hydraulic calculations shall be provided for a single sprinkler flow and multiple sprinkler flow; with a maximum of 2 sprinklers flowing in accordance with NFPA 13D – Section 8.1.2
  2. A hydraulic data nameplate shall be provided with the following minimum information. NFPA 13 – Section 22.1.3
    - a. The minimum rate of water application (density).
    - b. The location and size of the design area or spacing of sprinkler heads based on the manufacturer’s listing.
  3. Hydraulic reference points shall be indicated on the plan corresponding with the hydraulic calculation sheets. NFPA 13 – Section 22.3.5.5.
  4. The submittal shall include a copy of the Chesterfield County Department of Utilities water flow test results, dated within six months of the plan submission date.
  
- Graph sheet. A graphic representation of the hydraulic demand shall be plotted on graph paper ( $Q^{1.85}$ ) or computer generated hydraulic program based upon NFPA 13 – Section 22.3.5.3 and shall show the following information:
  1. Chesterfield County Department of Utilities flow data.
  2. Total sprinkler system hydraulic demand.
  
- When a separate control valve for a sprinkler system that is supplied by the domestic water system is installed, the sprinkler system control valve shall be supervised in accordance with NFPA 13D – Section 7.1.2.

**Manufacturers Data Sheet:**

All submissions shall include the appropriate Manufacturers Data Sheets for the following:

- Pipe
- Fittings (Threaded, Grooved, Etc.)
- Valves (O.S. & Y., Butterfly, Etc.) (Indicating valves required)
- Hangers/Rod/Fasteners/Clamps
- Fire Department Connections (If Supplied)
- Sprinkler Heads/Spray Nozzles
- Inspectors Test Connections/Drain Assemblies
- Riser Manifolds

- Backflow Preventers/RPZ's/Detector Check Valves
- Valve Supervisory Switches
- Water flow Detection Devices (If Provided)
- Fire Pumps/Accessories
- Relief Valves

**Special Notes**

- Antifreeze systems shall be the least desirable system type of choice. If all other alternative type systems are unworkable the design, installation and charging of antifreeze systems shall comply with the following criteria:
  1. A placard shall be placed on the antifreeze system main valve that indicates the manufacture type and brand of antifreeze solution, the concentration by volume used, and the volume of the antifreeze solution used in the system.
  2. Antifreeze solutions shall be limited to the minimum concentration necessary for the temperature conditions but shall not exceed the premixed antifreeze solution for glycerine (chemically pure or United States Pharmacopoeia 96.5%) at a maximum concentration of 48% by volume or propylene glycol at a maximum concentration of 38% by volume.
  3. Premixed antifreeze solutions of propylene glycol exceeding 40% concentration by volume shall be permitted for use with ESFR sprinklers where the ESFR sprinklers are listed for such use in a specific application.
  4. Premixed antifreeze solutions other than those described above that are listed by an independent nationally recognized testing laboratory for use in sprinkler systems shall be permitted to be used. Documentation of the listing and use limitation shall be submitted with the plans.
  5. All premixed antifreeze solutions shall be provided with a certificate from the manufacturer indicating the type of antifreeze, concentration by volume, and freeze point. A copy of the manufacturer's certification shall be submitted with the plans.
  6. A premix antifreeze solution with a freeze point below the expected minimum, not exceeding the above maximums, shall be provided.
  7. If an antifreeze solution is to be used with listed CPVC sprinkler piping and fittings, only glycerine shall be used. The use of diethylene, ethylene, or propylene glycols is prohibited.
  8. The use of antifreeze solutions shall be permitted within the dwelling unit portions of sprinkler systems, designed in accordance with NFPA 13D, only when the maximum antifreeze solution outlined in Item 2 is not exceeded. If the temperature condition to prevent freezing can not be met at the maximum solution concentration specified in Item 2 a different type of sprinkler system shall be used in lieu of an antifreeze system (i.e. – running all pipe when the heated area, insulation, dry pipe system or pre-action system where permitted by the applicable building and fire codes).
  9. The submitted plan shall indicate the provision of an antifreeze test ports at the lowest and highest elevations of the antifreeze system. Antifreeze systems with a

capacity of 150 gallons or greater shall have additional test ports provided at 100-gallon capacity points in the system piping.

- An approved reduced pressure principle backflow prevention device (RPZ-listed assembly), including approved indicating control valves, shall be provided at the point of connection of the wet pipe sprinkler system supplying the anti-freeze sprinkler system. An approved, listed reduced pressure backflow prevention device is required on all antifreeze systems. NFPA 13D – Section 8.3.3.3.2.2 and Figure 8.3.3.3.2.1
- An approved, listed expansion chamber shall be provided for all anti-freeze systems in accordance with NFPA 13D – Section 8.3.3.3.2.3
- In addition to standard hydraulic calculations, antifreeze systems with a solution capacity greater than 40 gallons shall also be calculated using the Darcy-Weisbach formula. A copy of the annotated Moody diagram shall be included for all NFPA 13D antifreeze sprinkler systems with a capacity of 40 gallons or more. NFPA 13 – Section 22.4.2.1.3