


July 1, 2010	<b>SANTA ROSA FIRE DEPARTMENT</b> <b>FIRE PREVENTION BUREAU STANDARD</b>
	<b>RESIDENTIAL FIRE SPRINKLERS</b> <b>NFPA 13D</b>

**PURPOSE**

This standard outlines the general requirements for the installation and maintenance of Residential (NFPA 13D) Fire Sprinkler Systems. Information contained herein applies to typical instances and may not address all circumstances.

**CODE REFERENCES**

2007 California Building Code (CBC)  
2007 California Fire Code (CFC) Chapter  
NFPA 13D, 2002 edition

**PERMIT(S) REQUIRED**

A Fire Sprinkler System Installation permit is required.  
Categories and fee amounts are found at:  
<http://ci.santa-rosa.ca.us/doclib/Documents/IB%20018.pdf>

**REQUIRED INSPECTIONS**

- 1) Underground – NFPA 13D, an inspection of all underground, flush and backfill.
- 2) Overhead Hydrostatic Inspection – NFPA 13D, System shall be pressurized at 200 psi for two hours. Gauge shall be marked upon pressurization.
- 3) Fire Sprinkler Final - NFPA 13D, a main drain, inspector test and final walkthrough of sprinkler coverage shall be performed.

Inspections shall be scheduled a minimum of 48 hours in advance. Directions for scheduling are found at:  
<http://ci.santa-rosa.ca.us/news/Pages/AutomatedFireInspectionRequestSystem.aspx>

**PERMIT INFORMATION**

All residential fire sprinkler systems within the jurisdiction of the Santa Rosa Fire Department shall meet all the applicable sections of the Santa Rosa City Code, NFPA 13, 2002 edition and NFPA 13D, 2002 edition as amended by the Supplemental Standard for NFPA-13D

Fire sprinklers shall be required for all of the following:

1. All new residential structures;
2. Additions to existing buildings that increase the square feet based upon the following percentages;

Existing Square Footage	% Increase Triggering Sprinklers
0-1000	200% (or total > 2000 ft <sup>2</sup> )
1001-4000	100%
> 4000	50%

3. Any combination of alterations, or repairs to existing structures, affecting more than 50% of the existing floor area;
4. Additions to existing structures 200 square feet or more. (See Hydraulic Calculation Requirements)

Working plans shall be submitted for approval to the Santa Rosa Fire Department before any equipment involving seven (7) or more sprinklers is installed. A completed Permit and Plan Review Application Form and fee shall be submitted along with not less than three (3) sets of plans and calculations as required. A Santa Rosa Business Tax Certificate, current appropriate contractor's license and proof of worker's compensation insurance shall be provided or shall be on file at the time of application.

Any deviation from plans as submitted during the installation requires Fire Department approval. Plans shall include the information specified below and failure to provide all of the required information may result in the plans being rejected. Rejected plans will be returned with a Plan Review Correction Form. Review the form and make the required additions/ changes which shall be clouded for identification. Provide a legend to describe the addition or change. Allow ten (10) working days for review of submitted plans.

Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor and shall show the following data:

- Location of all walls
- Location of partitions
- Location and size of concealed spaces, attics, closets and bathrooms
- Any small enclosures in which no sprinklers are to be installed
- Size of city water main in street and pressure.
- Make, manufacturer, type, temperature rating and nominal orifice size of sprinklers
- Temperature rating and location of high-temperature sprinklers
- Number of sprinklers on each riser, per floor
- Kind and location of alarm devices
- Type of pipe and fittings
- Type of protection for nonmetallic pipe
- Nominal pipe size with lengths
- Underground pipe size, material, and point of connection to city main;
- The type of valves and meters;

For hydraulically designed systems the following data shall be provided:

- Hydraulic calculations
- The hydraulic design area

- Hydraulic reference points corresponding with comparable reference points on the hydraulic calculation sheets
- The total quantity of water and the pressure required noted at a common reference point for each system
- The setting for pressure-reducing valves
- Information about backflow preventers (manufacturer, size, type)

Hydraulic calculation forms shall be provided for all calculations. These forms shall include a Summary Sheet with the following information:

- Date
- Location
- Name of owner and occupant
- Building number or other identification
- Name and address of contractor or designer
- Description of hazard protected
- System design requirements
  1. Design area of water application, square feet
  2. Minimum rate of water application (density), gpm/sq ft
  3. Area per sprinkler, square feet

Detailed work sheets or computer printout sheets shall contain the following information:

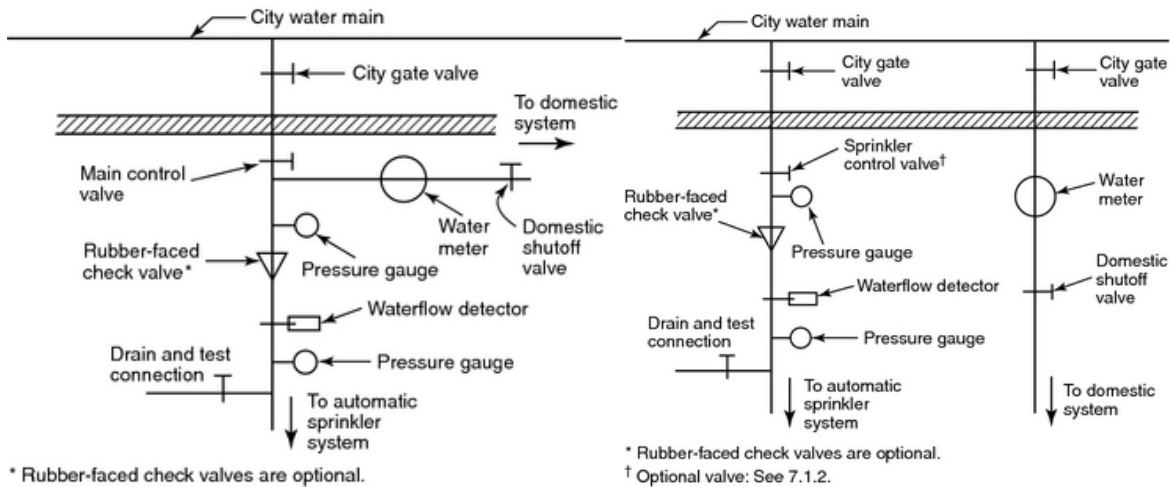
- Sheet number
- Sprinkler description and discharge constant (K factor)
- Hydraulic reference points
- Flow in gpm
- Pipe size
- Pipe lengths, center-to-center of fittings
- Equivalent pipe lengths for fittings and devices
- Friction loss in psi per ft of pipe
- Total friction loss between reference points

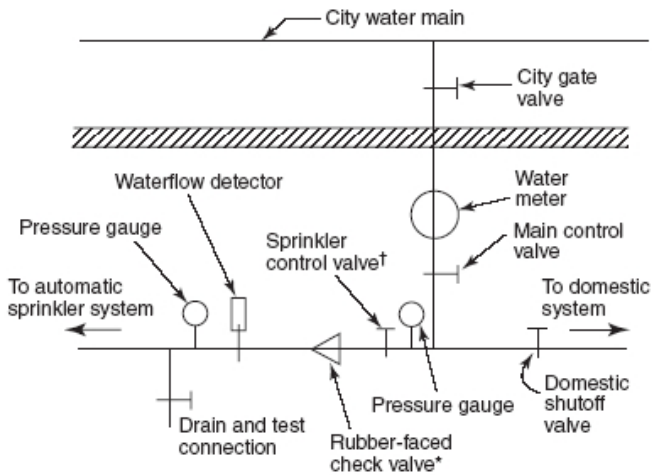
- Elevation head in psi at each reference point
- Required pressure in psi at each reference point
- Velocity pressure and normal pressure if included in calculations
- Combined K-factor calculations for sprinklers on drops, armovers, or sprigs where calculations do not begin at sprinkler

**DESIGN**

One and two family dwellings fire sprinkler systems shall be per NFPA 13D, 2002 edition as amended by Sonoma County Fire Agencies. Garages are required to have fire sprinkler protection.

- NFPA 13D 6.2 - Water Supply Sources.- The following water supply sources shall be considered to be acceptable by this standard:
  - A connection to a reliable waterworks system with or without an automatically operated pump. Preferred and acceptable water supply arrangements are shown below:





\* Rubber-faced check valves are optional.

† Optional valve: See 7.1.2.

- NFPA 13D 7.1.1 and 7.1.2 - A single control valve arranged to shut off both the domestic system and the sprinkler system installed unless a separate shutoff valve for the sprinkler system is installed as follows:
  - The sprinkler system piping shall not have a separate control valve installed unless supervised by one of the following methods:
    - Central station, proprietary, or remote station alarm service
    - Local alarm service that causes the sounding of an audible signal at a constantly attended location
    - Valves that are locked open
- NFPA 13D 7.1.1.1 (\*) - Sprinkler system has a single soft seated check valve installed on the system side of the control valve. Unless approved by the fire department, no additional check valves or pressure reducing valves shall be installed on the sprinkler system. If backflow devices are required by the water purveyor, the device shall be installed before the domestic connection and be reflected in the hydraulic calculations.
- NFPA 13D 7.3.1 - Where a dry system is installed, a pressure gauge shall be installed to indicate system air pressure.
- NFPA 13D 7.3.2 - Where a pressure tank is used for the water supply, a pressure gauge shall be installed to indicate tank pressure.

**TYPE and SPACING**

- NFPA 13D A.5.1.1.1 (\*) - At least 2 spare residential sprinklers of each type, temperature rating and orifice size used in the system, and a wrench to replace said sprinklers, kept in an approved cabinet on the premises.

- NFPA 13D 5.2.2.2 (\*) - Listed and approved devices and materials being used. CPVC fire sprinkler pipe may be used. All materials shall be installed per their listing requirements. CPVC piping is acceptable for use in a garage when it is installed in the following manner;
  - The piping is installed above a smooth flat horizontal ceiling.
  - The entire ceiling and all the walls are covered with a minimum of 1/2 inch plywood or 3/8 inch gypsum board.
- NFPA 13D A.6.2.1(\*) - The piping from the municipal main to the water meter is a minimum of 1-1/2 inch diameter unless approved hydraulic calculations support a different pipe size. The underground supply, including lateral size, meter size and pipe run to the base of the riser shall be shown on the plans submitted for a sprinkler permit
- NFPA 13D 7.5.1 - Listed residential sprinklers shall be used unless another type is permitted
- NFPA 13D 7.5.5.3 – Skylights shall be protected with intermediate temperature rated sprinkler heads.
- NFPA 13D 7.6 -Local water flow alarm provided on all sprinkler systems. Alarm incorporates a delay mechanism to account for pressure fluctuations and small water flows.
- NFPA 13D 8.1.3 - Spacing between sprinklers does not exceed 12 ft., sprinklers are not greater than 6 ft. from a wall, and sprinklers are not within 8 ft. of each other unless listing allows it.
- NFPA 13D 8.1.3 (\*) Sprinklers in the garage are spaced at a maximum of 130 square feet per each sprinkler head.
- NFPA 13D 8.4.3.1.1 (\*) - Pressure of 50 PSI at the point of connection to the city water system. The pipe shall be sized accordingly or operate at the pressure available. A 10% reserve shall be provided to account for seasonal pressure fluctuations.
- NFPA 13D 8.6.4 and 8.6.5 (\*) - Garages and small enclosures containing heat producing devices (i.e. furnaces, hot water heater, etc.) may be standard type with intermediate temperature rating within the vicinity of the hazard.
- NFPA 25 4.1.2 - No pipe covered or concealed prior to hydrostatic test inspection. Any covered and concealed piping shall be made visible for inspection.
- RESIDENTIAL METER SIZING – City Water Standard 863 & 865. For one and two family dwellings, ensure the meter size and the lateral (corporation stop to meter box) is of sufficient size to supply a residential fire sprinkler system. Generally, 1-1/2 inch is sufficient for one and two family dwellings.

### **HYDRAULIC CALCULATION**

- Calculation areas on the plans.
- Calculations for the two most hydraulically demanding heads within a compartment, include a 10% safety margin
- Hydraulic reference points on the plans.
- Water meter size on the plan (generally 1 inch), including the appropriate pressure drop in the calculations.

- Water flow data and the source of information on the plan.

### **LOCATIONS**

- NFPA 13D 8.6 -. Sprinklers are in all areas as shown on the approved set of plans.
- NFPA 13D 8.6.1 - Sprinklers in all areas of the structure including:
  - Attached garage (\*)
  - Attic Spaces (as described below\*)
  - Crawl Spaces (as described below\*)
  - Closets (as described below\*)
  - Under combustible balconies (\*)
- NFPA 13D 8.6.4(\*): Full sprinkler coverage provided in attached garages. Attached carports shall be protected by coverage along the separation wall between the dwelling unit and carport
- NFPA 13D 8.6.5 (\*) - Sprinklers throughout attics and crawl spaces that are to be used, or have the potential to be used for storage. If only a heat-producing device is installed in an attic or crawl space, sprinklers shall be installed in the vicinity of the hazard. In such condition, a listed metallic pipe shall be used in the vicinity of the hazard.
- NFPA 13D 8.6.5 - Sprinklers may be omitted from attics which are not intended for living purposes or storage provided that coverage is installed above the attic access and above any furnace or air handling units. Any attic areas or under-floor areas used or intended to be used for storage shall be provided with full coverage using sprinklers installed in accordance with their listing. The number of sprinklers to be calculated in these areas shall be the two most remote sprinklers.

### **SIGNAGE**

- NFPA 13D 6.3 & 7.8 - Signs provided for the system:
  - A permanent plate labeled “INSPECTORS TEST/MAIN DRAIN” securely affixed at the inspectors’ test/main drain.
  - At the system control valve, a permanent plate which reads “WARNING; THE WATER SYSTEM FOR THIS HOME SUPPLIES A SPRINKLER SYSTEM THAT DEPENDS ON CERTAIN FLOWS AND PRESSURES TO FIGHT A FIRE. DEVICES THAT RESTRICT THE FLOW OR PRESSURE SUCH AS PRESSURE REDUCERS AND WATER SOFTNERS SHALL NOT BE ADDED TO THE SYSTEM WITHOUT A REVIEW OF THE SYSTEM BY A FIRE PROTECTION SPECIALIST. LEAVE VALVE IN THE FULLY OPEN POSITION AT ALL TIMES”
  - Hydraulic calculation plate provided and permanently attached to the riser, which indicates the system demand and pressure.
- Title 24 CFC 510.1 - Alarms installed adjacent to the system riser and include a sign that reads “FIRE ALARM – CALL 911” or equivalent language

### **PIPING**

- NFPA 13D 7.4.1 - Listed pipe is supported in accordance with any listing limitations.

- NFPA 13D 7.4.2 Pipe that is not listed, and listed pipe with listing limitations that do not include piping support requirements, shall be supported from structural members using support methods comparable to those required by applicable local plumbing codes.
- NFPA 13D 7.4.3 Piping laid on open joists or rafters shall be supported in a manner that prevents lateral movement.
- NFPA 13D 7.4.4 Sprinkler piping shall be supported in a manner that prevents the movement of piping upon sprinkler operation.
- NFPA 13D 7.7 - Pipes in attics are adequately insulated
- NFPA 13D 8.3.3 - Antifreeze system is installed in accordance with the approved set of plans.

### **SPRINKLERS**

- NFPA 13D 7.5.6 - Sprinkler heads are not painted or covered or blocked.
- Proper type and temperature sprinklers are used.
- NFPA 13D 7.5.7 - Escutcheon plates are installed and pendent/upright deflectors are within 1 in. to 4 in. from the ceiling, sidewalls are within 4 in. to 6 in. from the ceiling or all are per their listing.
- NFPA 13D 8.2.1.3 - Pendent and upright deflectors in closets can be installed within 12 in. of the ceiling.
- NFPA 13D 8.6.8 - Sprinkler protection for covered porches and balconies, adjacent to kitchens and other covered areas that could accommodate the use of portable cooking equipment.

### **TESTING**

- NFPA 13D 4.3.1 and 4.3.2 - Hydrostatic pressure test in accordance with NFPA 13 performed. All piping and attached appurtenances subjected to system working pressure hydrostatically tested. Piping hydrostatically tested at 200 psi. The system maintained at pressure without loss for two hours.
- NFPA 13D 4.4.1 - System is leak tested at normal operating pressure when an FDC is not provided. External alarm operational.
- System control valve for both the sprinkler and domestic systems is on and operable.
- Operate the drain valve on the system side of the control valve.

**An (\*) indicates a standard adopted by Sonoma County Fire Authorities for enforcement within those jurisdictions.**

### **SUPPLEMENTAL STANDARD FOR NFPA-13D, THE INSTALLATION OF SPRINKLER SYSTEMS IN ONE AND TWO FAMILY DWELLINGS AND MANUFACTURED HOMES 1999 EDITION**

**THE PROVISIONS FOUND IN THIS DOCUMENT SHALL EITHER AMEND, ADD OR DELETE THOSE SECTIONS OF NFPA-13D (1999 EDITION) AS IDENTIFIED BELOW. (Italicized print represents amendments & asterisk represents additions)**



**\*1-2.1** This standard may be limited in its scope by requirements specific to a project or development. Users are *strongly* encouraged to consult with the authority having jurisdiction (AHJ) for local conditions or mitigating measures.

**A-1-5.1:** *At least 2 spare residential sprinklers of each type, temperature rating and orifice size used in the system and a wrench to replace said sprinklers shall be kept in an approved cabinet on the premises. In addition, for other types of sprinklers used in the system, at least one spare sprinkler shall be provided for each type & temperature rating.*

**\*1-5.2.1** The installer may be required to produce certification of training from manufacturers or distributors for the installation of the respective system components.

**1-5.4** *A piping inspection shall be completed prior to installation of drywall or insulation. It shall include a pressure test isolating the system from the domestic water and tested for leakage at 200 PSI for a period of two hours.*

## **2-1** Exception Deleted

**\*A-2.2.1** The piping from the municipal main to the water meter should be 1-1/2 pipe unless different pipe sizing can be supported by approved hydraulic calculations.

## **2-3 (e)** Refer to section 3-7

**3-1.1** *Each system shall have an indicating ball style brass control valve at the base of the riser that controls both the sprinkler system and domestic water. The valve shall be installed a minimum 6" above grade and easily accessible. A separate shut-off valve for the domestic water may be installed on the system side of the control valve. Other than a water meter shut-off valve, no other system control valves are permitted including valves on a backflow device.*

**\*3-1.1.1** Each sprinkler system shall have a single soft seated check valve installed on the system side of the control valve. Unless approved by the fire department, no additional check valves or pressure reducing valves shall be installed on the sprinkler system. If backflow devices are required by the water purveyor, the device shall be installed before the domestic connection and be reflected in the hydraulic calculations.

**3-2** *A pressure gauge shall be installed on the system side of the check valve and on the supply side for systems supplied by pumps.*

**3-6** *A local water flow alarm shall be provided on all sprinkler systems. Alarms shall be installed adjacent to the system riser and include a sign that reads "FIRE ALARM – CALL 911" or equivalent language acceptable to the AHJ. Alarms shall also incorporate a delay mechanism to account for pressure fluctuations and small water flows.*

**\*3-7** The following signs shall be provided for the system:

**(a)** A permanent plate labeled "INSPECTORS TEST/MAIN DRAIN" is securely affixed at the inspectors' test/main drain.

**(b)** At the system control valve, a permanent plate which reads "WARNING; THE WATER SYSTEM FOR THIS HOME SUPPLIES A SPRINKLER SYSTEM THAT DEPENDS ON CERTAIN FLOWS AND PRESSURES TO FIGHT A FIRE. DEVICES THAT RESTRICT THE FLOW OR PRESSURE SUCH AS PRESSURE REDUCERS AND WATER SOFTENERS SHALL NOT BE ADDED TO THE SYSTEM WITHOUT A REVIEW OF THE SYSTEM BY A FIRE PROTECTION SPECIALIST. LEAVE VALVE IN THE FULLY OPEN POSITION AT ALL TIMES"

**\*4-4.2 (l)** *The pipe shall be sized so the system shall operate at a pressure of 50 PSI at the point of connection to the city water system or at that pressure available if less including a 10% reserve to account for seasonal pressure*

*fluctuations.*

**4-6** Sprinklers shall be installed in all areas.

*Exception No. 3: Full sprinklers coverage shall be provided in attached garages. Attached carports shall be protected by coverage along the separation wall between the dwelling unit and **3-6** A local water flow alarm shall be provided on all sprinkler systems. Alarms shall be installed adjacent to the system riser and include a sign that reads "FIRE ALARM – CALL 911" or equivalent language acceptable to the AHJ. Alarms shall also incorporate a delay mechanism to account for pressure fluctuations and small water flows.*

**\*4-4.2 (I)** *The pipe shall be sized so the system shall operate at a pressure of 50 PSI at the point of connection to the city water system or at that pressure available if less including a 10% reserve to account for seasonal pressure fluctuations*

**4-6** Sprinklers shall be installed in all areas.

*Exception No. 3: Full sprinklers coverage shall be provided in attached garages. Attached carports shall be protected by coverage along the separation wall between the dwelling unit and carport*

*Exception No. 4: Sprinklers may be omitted from attics which are not intended for living purposes or storage provided that coverage is installed above the attic access and above any furnace or air handling units. Any attic areas or under-floor areas used or intended to be used for storage shall be provided with full coverage using sprinklers installed in accordance with their listing.*

**Exception:** No. 5 is deleted.

**CHAPTER 5, LIMITED AREA DWELLINGS** is deleted in its entirety.