



# SANTA CLARA COUNTY FIRE DEPARTMENT

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<b>STANDARD DETAILS &amp; SPECIFICATIONS</b>	Spec No	SP-6
	Review Date	_____
	Revis. Date.	03.24.23
	Eff. Date.	05.25.23
	Approved By	
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SUBJECT: Fire Sprinkler System in One- and Two-Family Dwellings		

## SCOPE

This standard applies to the installation of a fire sprinkler system in one- and two-family dwellings, whether required by the California Fire Code, California Residential Code, local ordinance, or as an approved Alternate Method of Compliance thereto.

## AUTHORITY

2022 California Fire Code (CFC), California Code of Regulations, Title 24, Part 9.

2022 California Residential Code (CRC), California Code of Regulations, Title 24, Part 2.5. 2022 California Plumbing Code (CPC), California Code of Regulations, Title 24, Part 5. 2022 NFPA 13D, with CFC Amendments.

## DEFINITIONS

**Alternate Method of Compliance:** An approved method of compliance that, in the opinion of the Fire Department, meets the intent of the California Fire Code.

**Fire Area:** The aggregate floor area enclosed and bounded by fire walls, fire barriers, exterior walls or horizontal assemblies of a building. Areas of the building not provided with surrounding walls shall be included in the fire area if such areas are included within the horizontal projection of the roof or floor next above.

**NFPA 13D:** National Fire Protection Association Standard 13D, *Standard for the installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*. Including all California Fire Code amendments, thereto.

**Multipurpose Piping Sprinkler System:** A piping system intended to serve both domestic needs in excess of a single fixture and fire protection needs from one common piping system throughout the dwelling unit(s).





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## REQUIREMENTS

### I. General

- A. Design and installation of a fire sprinkler system in one- and two-family dwellings shall be in accordance with the California adopted edition of NFPA 13D, or section R313 of the California Residential Code (CRC) and as otherwise specified by this Standard.

### II. Design Criteria

#### A. Water Supply

1. The water supply to the fire sprinkler system shall be from the same source as the domestic supply, unless otherwise approved by the Fire Code Authority. [CFC § 903.3.]
2. Any system proposed for installation as a multipurpose piping system, per NFPA 13D definition, shall be subject to joint approval of the building official and the fire department. Acceptance of such systems will be considered on a case-by-case basis for dwelling units no larger than 1,200 square feet.
3. Where a single water source connection serves sprinklers in more than one dwelling or structure, piping shall be configured as Fig. 1 or Fig. 2 below. Any other configuration shall be by special consideration based on project specific conditions.

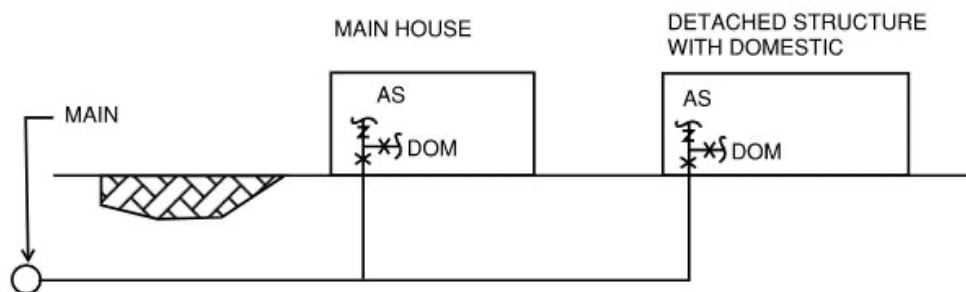


Figure 1





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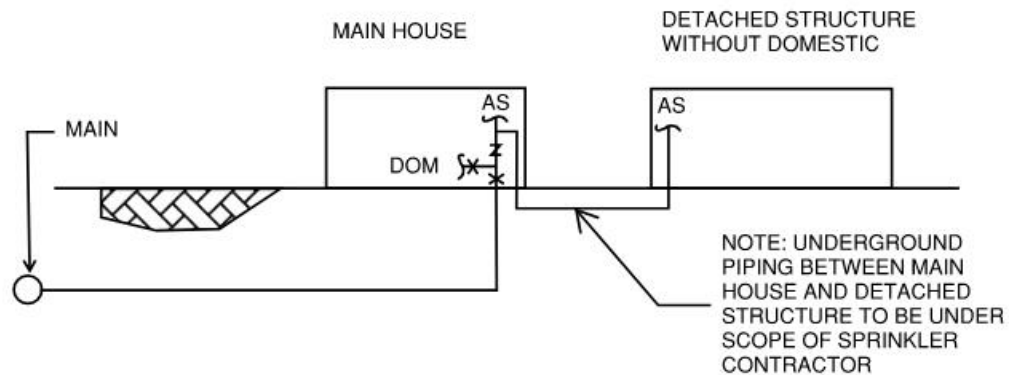


Figure 2

- Individual water storage systems (tank or tanks) supplying fire sprinklers shall be combined with domestic water storage, and sized for the aggregate required volume (flow rate times duration) of both demands. When individual tank systems are used due to lack of compliant fire flow, per CFC Appendix B, tanks shall be sized for not less than 30 minutes of fire sprinkler water supply. Where fire flow is met via compliant fire hydrants, sprinkler supply duration shall be per NFPA 13D.
- Minimum domestic water storage shall be in accordance with Environmental Health Department requirements. For installations in unincorporated Santa Clara County, see Standard Detail CFMO-W5 for tank requirements.
- Where a pump or pumps supply system pressure, a complete set of manufacturer's data including, horsepower, voltage, and flow/pressure curve shall be included with the plan submittal. Both the domestic and fire sprinkler systems shall be supplied by a common pump system to ensure reliability. Where a pump is required because the water utility has insufficient pressure, the utility shall be consulted as to specific requirements necessary for cross-contamination control (e.g., break tank, backflow prevention device, etc.).
- Where a water supply serves both the domestic and fire sprinkler system, 5 gpm shall be added to the sprinkler system demand (*per system, regardless of number of dwelling units*), at the point where the systems are connected, to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler [NFPA 13D, 6.2.4, CFC amendment].





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8. Water meters, serving residential fire sprinkler systems, shall be capable of supplying the maximum calculated fire sprinkler demand, including 5 gpm domestic demand. The plan submittal shall include water meter hydraulic data sufficient to validate that the continuous flow capacity is sufficient to supply the combined demand.
9. Back-flow prevention devices may be required by the local water purveyor, or Plumbing Code Authority. If such devices are installed, the system demand calculations shall account for pressure loss from the proposed device. Manufacturer's data sheets for the device shall be included with the plan submittal [NFPA 13D, 10.4.9.2].
10. Whole house water treatment or filtration systems, installed to condition domestic water supply, shall be installed downstream of the domestic water isolation valve, such that fire sprinkler water does not pass through the treatment system. Where a tank supply and pump are installed, water treatment may occur within the tank.
11. Underground supply piping shall be thoroughly flushed until clear of sediment and debris prior to connection to the sprinkler system piping.

## B. Above Ground Piping

1. All sprinkler system piping shall be installed in accordance with the manufacturer's listing requirements, including methods of joining, supporting, insulating, and protection from damage [NFPA 13D, 5.2.3.1].
2. All metallic piping installed in the system shall be approved for use in potable water systems, (e.g., copper, galvanized steel, stainless, etc.), unless building department approved backflow prevention is installed. [CPC §602.2, 603, 612.3.8, CRC R313.3.1.1]. All exterior, above-ground (supply, riser, etc.) piping shall be metallic pipe approved for installation in potable water systems.
3. Where engineered wood joists are used in the building construction, support of piping from such construction shall be in accordance with the joist manufacturer's published guidelines. The manufacturer's details shall be replicated on system design drawings.
4. Insulation installed above concealed sprinklers shall be installed such that it does not adversely affect the operation of the sprinkler by blocking the airflow opening around a concealed sprinkler. See linked document for more information: [https://osfm.fire.ca.gov/media/8414/ib13007\\_resfirespklsenergyregs.pdf](https://osfm.fire.ca.gov/media/8414/ib13007_resfirespklsenergyregs.pdf)





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5. Where spray polyurethane foam is used for building insulation, installation practices shall be followed to prevent damage to nonmetallic system piping. See linked document for more information:  
[https://osfm.fire.ca.gov/media/8422/ib\\_spraypolyurethanefoamapplication\\_5-27-2014.pdf](https://osfm.fire.ca.gov/media/8422/ib_spraypolyurethanefoamapplication_5-27-2014.pdf)
6. When nonmetallic piping is installed exposed in attics, insulation shall be provided on the attic side of the piping sufficient to maintain pipe temperature below the manufacturer's specified maximum temperature.

## C. Design Sprinklers

1. For buildings up to 10,000 square feet in fire area, the number of design sprinklers shall be in accordance with NFPA Standard 13D or the California Residential Code.
2. For buildings exceeding 10,000 square feet in fire area, the number of design sprinklers shall include four (4) sprinklers in the most hydraulically demanding area, which may include more than one compartment.

## D. Locations of Sprinklers

1. Fire sprinklers shall be installed in all locations specified by NFPA 13D and the California Fire Code, or the California Residential Code, and as follows:
  - a. Fire sprinklers shall be installed in all attached garages, carports, basements and areas accessible for storage or other habitable use.
  - b. Fire sprinklers shall be installed to protect all open, exterior, covered living areas (patio, covered deck, outside kitchen, etc.) having habitable space above.
  - c. Attics, crawl spaces and normally unoccupied, concealed spaces containing fuel-fired equipment, shall have a pilot sprinkler installed above the equipment.
  - d. Unconditioned garages are assumed to have a maximum ceiling temperature between 101°F and 150°F; therefore, provide intermediate temperature heads at garage [NFPA 13D 7.5.6.2].





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## E. Alarms

1. An interior and exterior audible water flow alarm shall be provided. The interior bell/horn shall be audible throughout all sleeping rooms. The exterior alarm bell/horn shall be located on the street side of the house, or in an approved location that will be audible from the street or access driveway. A sign shall be provided at the exterior alarm to indicate sprinkler water flow. All alarm devices shall be installed in accordance with the manufacturer's listing and installation instructions.
2. For sprinkler systems in structures with Early Warning Alarm Systems (EWAS), installation of the exterior fire bell and interior horns shall be coordinated with the EWAS installer.
3. A minimum of one interior horn shall be installed in attached ADU's.

## F. Valves

1. Control Valve: Valves controlling the water supply to residential fire sprinkler systems shall be installed in accordance with NFPA 13D. The main control valve shall be distinguishable, readily accessible, and located adjacent to and on the exterior of the structure (Figure 3). The main supply control valve shall be distinguishable from the domestic valve by means of a permanently attached tag and be of a contrasting color (i.e., red handle for main system, versus black handle for the domestic supply).
2. Test Valve: The sprinkler test connection shall have an orifice with K-factor equal to the smallest K-factor sprinkler installed in the system. A combination test/drain valve may be used if meeting the criteria for both.
3. Drain Valve: Each sprinkler system riser shall be equipped with a minimum ½" drain valve. The valve shall be piped to the building exterior, or to a drain capable of discharging full system flow for a minimum of 90 seconds. A combination test/drain valve may be used if meeting the criteria for both.
4. Main Shut Off Valve: The main shutoff valve shall include a sign or valve tag stating the following: "Warning, the water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by the Fire Code Authority. Do not remove this sign."  
[CRC R313.3.7]





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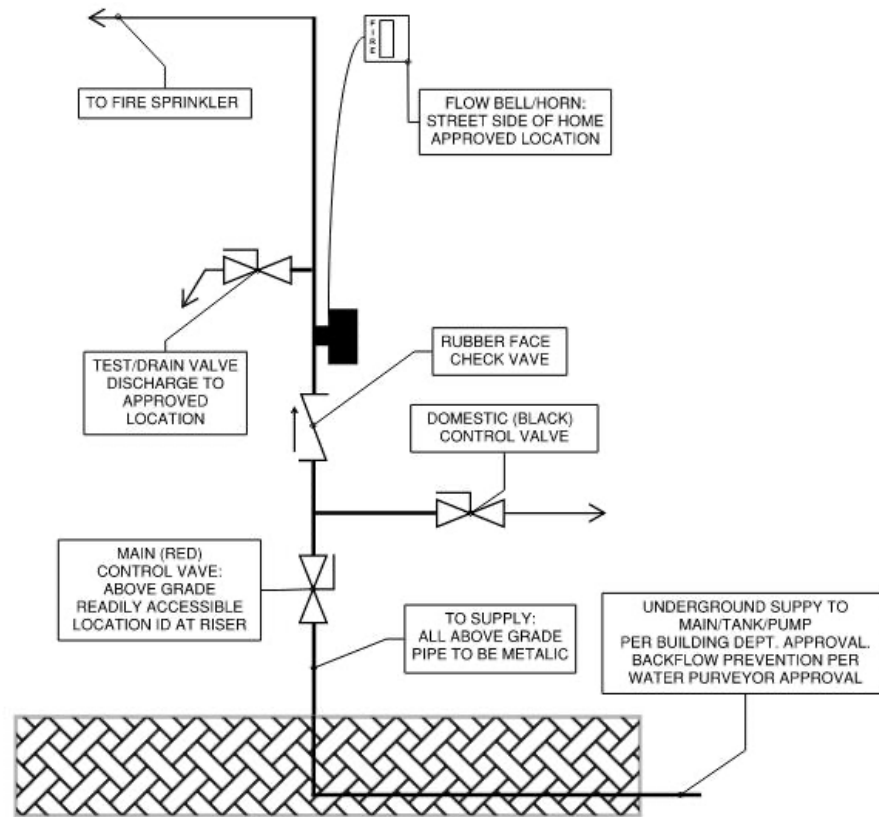


Figure 3

### III. Owner's Documentation

- A. Upon completion and final acceptance of the system by the Fire Code Authority, the installing contractor shall provide the property owner or the property owner's authorized representative with the following:
  1. As-built drawings and calculations for the installed sprinkler system.
  2. Information regarding the necessary system inspection, testing, and maintenance as described in NFPA 13D.
  3. The manufacturer's installation, care, and maintenance instructions for the installed sprinkler system components.
  4. Name, address, and phone number of the installing contractor of the fire sprinkler system.





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5. Name, address, and phone number of a fire sprinkler system service company if different than the installing contractor.

## IV. Permit Submittal, Approval, and Inspection

### A. Permit Submittals

1. All permit submittals shall include the following information:
  - a. Three (3) sets of plans and hydraulic calculations meeting the requirements of this standard. Hydraulic calculations shall prove the water supply is capable of meeting the sprinkler demand with a minimum 10% safety factor (i.e., the available supply pressure, at demand flow, shall not be less than 1.10 times the system demand pressure).
  - b. Submittal documents shall include the following information, at a minimum:
    - i. A completed [Permit Application](#) and payment of fees at time of submittal.
    - ii. An approved building site plan clearly identifying location of the water supply connection, water meter, backflow prevention and tank/pump.
    - iii. Material and diameter of domestic supply piping between system riser and supply connection, including water meter size and location.
    - iv. Current water flow data, obtained within one year prior to permit application.
    - v. System design drawings (see “Plan Submittal Checklist”).
    - vi. Manufacturer, model, temperature, K-factor for each sprinkler type used.
    - vii. Material, diameter & routing of all above ground piping.
    - viii. Hanger type and spacing requirement per the pipe manufacturer.
    - ix. Riser detail, including supply & domestic water valve configuration.
    - x. Complete hydraulic calculations.
    - xi. Manufacturer’s product data sheets for all system and supply components.







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- c. Water supply documentation shall include:
  - i. For systems supplied by a public utility, the water supply test data shall be on water purveyor's letterhead or certified by licensed engineer or qualified C-16 contractor.
  - ii. Flow test report shall include static pressure, residual pressure and flow observed at available residual pressure. Flow test data shall be current, within one year of sprinkler permit submittal.
  - iii. For private tank systems, submit pump manufacturer's data sheet(s) showing hydraulic data or provide validation of tank, pump and house elevations for gravity fed systems. The system calculations shall account for all relative elevations.

## B. Permit Approval

1. Upon review approval, one (1) copy of the approved plans and supplemental documents will be retained for the project record. The balance of submitted plans will be stamped and returned to the applicant with remaining documents and the installation permit.
2. The installation permit entitles the applicant to one (1) hydrostatic/overhead piping inspection and one (1) final system inspection. Additional fees may be assessed and shall be paid prior to any inspections beyond two.
3. The installer is responsible to pre-test and verify proper installation of the system prior to scheduling a field inspection. Additional fees may be charged for repeat inspections, due to incomplete or negligent installation.

## V. Inspection Requirements

- A. The stamped, approved plans and installation permit shall remain on site until the job is complete and a final approval is issued.
- B. A hydrostatic pressure test shall be performed and witnessed by the Fire Code Authority. The system shall be pressurized two (2) hours prior to the scheduled inspection time and documented by a photo with time and date stamp. All piping shall remain exposed, for visual inspection and hydrostatic testing [NFPA 13D § 11.2.1 SCCFD amendment].





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- C. The hydrostatic test pressure shall not be less than 50 psi over maximum anticipated working pressure and shall be maintained, without loss, for 2 hours. The system will be reviewed for evidence of leakage during visual inspection of the piping system.
- D. Final inspection shall include a functional test of the water flow switch, operation of the exterior and interior audible alarm and visual inspection of interior sprinklers, control valves, water meter, pump test and tank refill function (if applicable) [NFPA 13D § 11.2.3.1 SCCFD amendment].
- E. Failure to comply with the Inspection Requirements may result in the inspection being canceled, and charge of a re-inspection fee. Inspections required beyond the two (2) included in the permit fee are billed separately. All inspections shall be scheduled at least 48 hours in advance by calling the Fire Prevention Office at 408-341-4420 and providing project permit number for reference.

## VI. Plan Submittal Checklist

- A. The following list is provided to assist the applicant in preparation of a complete sprinkler permit submittal. Failure to provide the required information will delay the plan review process.
  - 1. Project site plan, from approved building permit documents, showing house/tank on parcel, site elevations, underground supply pipe size, routing, meter/backflow location, and point of connection to the water supply source.
  - 2. Sprinkler piping plans, drawn to scale, showing all fire sprinkler locations and room descriptions. Plans shall clearly identify areas with no sprinklers, and exceptions allowing the omission. Include elevation details to show sprinklers installed in areas with sloped ceilings, soffits, and other architectural features to clarify proper coverage. Building sections shall be provided to show ceiling/piping elevations, vertical piping and unique ceiling configurations.
  - 3. Indicate the type of piping being used in all areas; include diameter and length (system piping, riser piping and underground piping).
  - 4. Clearly identify all sloped or unique ceiling elements, including soffits, ceiling pockets, exposed beams, etc. For sloped ceilings, identify the pitch of the slope (i.e. Slope – 4:12).
  - 5. Note all ceiling mounted obstructions that may affect sprinkler discharge such as ceiling fans and lighting fixtures.





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6. Indicate on the plans all heat producing zones (fireplace, range, woodstove, furnace, etc.).
7. Specify the manufacturer of each sprinkler model, orifice size, K-factor, and temperature rating. Provide a sprinkler legend to clearly identify location and number of each type of sprinkler used in the system.
8. Provide hanger details showing all components and methods of attachment to building structure.
9. Provide a system riser detail showing all valves, drains and system components.
10. Show proposed location of the exterior bell/horn.
11. Indicate all hydraulic reference points on the plans.
12. Provide a building cross section showing sprinkler system components and building construction to clarify installation features.
13. Provide all necessary information and details so a comprehensive plan review may be performed.

