



**SAN BERNARDINO COUNTY FIRE DEPARTMENT
COMMUNITY SAFETY DIVISION**

620 South 'E' Street
San Bernardino, CA 92415-0179
(909) 386-8400

Standard Number

F-3

Revision Date:
3-22-16

FIRE PREVENTION STANDARD

FIRE SPRINKLER SYSTEMS IN MULTI-FAMILY DWELLINGS

AUTHORITY

Sections 102.9, 103 and 104.1 of the 2013 California Fire Code provides that the fire code official of the San Bernardino County Fire Department shall have the authority to adopt policies, procedures, rules, and regulations in order to clarify the application of the Fire Code and to specify requirements not specifically provided for by the Fire Code. For further requirements on this subject, see section 508 of the 2013 California Fire Code. This standard may be modified with the approval of the Fire Code Official.

PURPOSE

The purpose of this standard is to provide minimum requirements for the design and installation of fire sprinkler systems in multifamily dwellings, in order to aid in the detection and control of fires and thus provide improved protection against injury, life loss, and property damage.

SCOPE

This standard, in conjunction with the latest edition of NFPA 13R, shall apply to the design and installation of, and the modification to, all fire sprinkler systems in multi-family dwellings within buildings up to and including four (4) stories, or sixty (60) feet, in height. This standard and its interpretation is not intended to be applied or enforced where there is any conflict with NFPA 13 or the California Fire Code.

DISCLAIMER

These standards may change without notice. Whenever applicable statutes, regulations and standards are updated and adopted, the latest shall apply. Please contact the Community Safety Division at (909) 386-8400 to determine if these standards have changed.

These requirements do not exempt any individual from complying with other applicable state, county, or city codes and standards.

SUBMITTALS

The following shall be submitted to the Fire Department for approval and permit prior to performing any work on any fire sprinkler system:

- 1) A completed San Bernardino County Fire Department permit application
- 2) A minimum of three (3) sets of detailed plans describing the work to be done. (For information on what must be included on plans, see sections below in this Standard and the SBCFD Plan Submittal Checklist.)



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- 3) A minimum of one (1) set of hydraulic calculations for all design areas
- 4) Manufacturer's specification sheets (cut sheets) for all proposed materials and equipment.
- 5) A water flow test report from the water purveyor dated within one (1) year of submittal.
- 6) When required, at least one (1) set of approved drawings showing private underground water supply lines, labeled "FOR REFERENCE" (*NOTE: This can also be a concurrent submittal*)
- 7) Any other important details and information as required by this Standard.
- 8) Payment of all appropriate fees

GENERAL

All automatic fire sprinkler systems for multifamily residential projects shall be designed to the requirements of the latest edition of NFPA 13R and other recognized standards as they apply to the hazard being protected. No deviations from these recognized standards will be made without approval from the fire code official.

UNDERGROUND PIPING SYSTEMS

- 1) Underground sprinkler piping serving fire protection systems ONLY shall be installed in accordance with SBCFD Standard W-2 and current editions of NFPA 13 and 24. Underground piping that serves both fire sprinkler systems and domestic water demand shall meet the requirements of applicable codes for domestic water plumbing.
- 2) Underground domestic water supply services that also serve sprinkler systems, either from the public water system or from a private supply source, shall meet the requirements of NFPA 13R and this Standard, as well as all applicable requirements of the local water company. It is the contractor's or owner's responsibility to contact the local water purveyor prior to design of the system to find out any specific requirements.
- 3) Post Indicator Valves (PIVs) and Fire Department Connections (FDCs) serving fire sprinkler systems shall be installed in accordance with SBCFD Standard F-4 and current editions of NFPA 13 and 24.

SYSTEM RISERS

- 1) System risers shall be located exposed inside the building, or protected inside walls, or in an approved cabinet or enclosure, and in a location acceptable to the fire code official. All risers shall be located in a common area, and accessible without entering a dwelling unit.



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- 2) Risers enclosed (protected) in a wall, cabinet, or other enclosure shall have a minimum twelve inch (12") wide by thirty six inch (36") high access door, unless otherwise approved by the Fire Code Official. (See **DIAGRAM F-3.1**) When required by the fire code official, the location of the riser shall be identified with a sign permanently affixed with minimum ¼" letters on a contrasting background.
- 3) Risers inside a common room (exposed) shall be co-located with the Fire Alarm Control Panel inside a minimum 4' X 4' room accessible by means of an exterior door way or opening for access a minimum of thirty six inches (36") in width and eighty inches (80") in height for access Signage for the room shall be in accordance with 'Signage' section of this standard. Fire Dept Knox Box shall be installed outside of this door (See **DIAGRAM F-3.2**).

DRAINS AND VALVES

- 1) All drains and test valves shall be piped to the exterior of the building. Outlets of test valves and drains shall discharge preferably into landscaped areas, such as planters or basins, but in no case shall the installation allow water to flow into the public street or storm drain system.
 - a) As an alternate to exterior outlets, test valves and drains may have outlets that discharge into interior floor drains connected to the sewer system, or another suitable location approved by the fire code official. Floor drains are to be adequately sized for the flow and pressure of the water being drained from the system.
 - b) Such outlets for systems with anti-freeze solutions shall not be allowed to drain onto the site. All anti-freeze systems shall have drain and test valve connections that allow for the safe collection of anti-freeze solutions.
- 2) Each sprinkler system shall have a Test Valve installed in an approved location.

SYSTEM MONITORING AND ALARMS

- 1) All valves controlling the fire sprinkler system(s), including any above ground detector check valves, Post Indicator Valves, and sectional control valves shall be monitored for tamper by an approved supervising station alarm system meeting the requirements of NFPA 72 and SBCFD Standard F-5. This system shall be installed and in operation prior to any approval to occupy the building.
- 2) Each system shall be provided a separate local water-flow alarm bell, installed at the exterior of the protected building closest to the sprinkler riser. Water-flow alarm bells shall be a minimum of six (6) inches in size and bear a weather resistant sign stating "WHEN BELL



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RINGS CALL FIRE DEPT” in minimum three quarters inch ($\frac{3}{4}$ ”) letters on a contrasting background.

- 3) Other local alarm devices may be provided with the approval of the fire code official. See SBBCFD Standard F-5 for fire alarm interior water-flow notification requirements.

OTHER SYSTEM COMPONENTS

- 1) In living areas within dwelling units, only approved listed residential or quick response sprinkler heads shall be used, per the listing of the manufacturer.
- 2) In storage areas, attics, and attached or detached garages, approved residential or quick response sprinkler heads may be used, with a minimum intermediate temperature rating.
- 3) All CPVC plastic pipe used shall meet the requirements of the manufacturers listing, particularly for applications when pipe is exposed.
- 4) An approved rubber-faced check valve shall be installed on systems that have a common fire protection and domestic supply, on the system side of the tee that feeds the sprinkler riser. For systems on which a separate backflow device is required on the riser, an additional check valve is not required.
- 5) A pressure relief valve (PRV), minimum of a one quarter inch ($\frac{1}{4}$ ”), and set at 175 p.s.i shall be provided on the system side of the main riser check valve, when check valves are installed and the maximum system pressure exceeds 125 psi.
- 6) All system components shall be rated for the maximum working pressure, but not less than 175 p.s.i.
- 7) Piping shall be supported from structural members using methods approved by the pipe manufacturer and NFPA 13R. Devices such as “J-hooks” or plumbers tape are prohibited. Hangers shall not be attached to the structure by nails or any fastener which requires impact to fasten it to the structure. All hangers used on CPVC pipe shall be approved by the Fire Code Official.
- 8) The installation of a reduced pressure (RP) device or backflow device on sprinkler system risers shall be allowed when required by the water purveyor or by the Plumbing Code for well or tank fed private systems. When such RP or backflow devices are required, they shall be secured in an open position and an appropriate allowance shall be made for all such devices in the hydraulic calculations.
- 9) A Test Valve shall be installed on all new systems in a location approved by the fire code official. The orifice shall be equal to the hydraulically calculated most remote sprinkler head.



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SYSTEM DESIGN

- 1) The design density of the sprinkler system shall be as permitted in NFPA 13R, based on the area being protected.
- 2) Sprinklers shall be installed in all areas required by NFPA 13R.
- 3) Systems shall be supplied using a water meter of sufficient size to meet the hydraulically calculated demand and the manufacturer's listing for sprinkler heads used. In no case shall the meter be less than three quarters inch (3/4") unless approved by the fire code official. Hydraulic calculations shall demonstrate the appropriate pressure loss through water meters, using the manufacturer's specification or NFPA 13R.
- 4) Sprinkler systems shall be designed to provide the demand of the four (4) most hydraulically remote sprinkler heads, or as required per NFPA13R or the manufacturer's listing.
- 5) Systems fed by water supplies with very low inlet pressure (less than 40 p.s.i.) may utilize an approved automatic residential domestic shut-off valve, in order to eliminate the 10 GPM or greater domestic allowances in the demand, as required by NFPA 13R and this Standard. Such automatic valves shall be listed for such use with fire sprinklers and be installed per the manufacture's specifications (See **DIAGRAM F-3.3**).

HYDRAULIC CALCULATIONS

- 1) All hydraulic calculations shall be designed for the system demand not to exceed 90% of the available water supply, or at least ten (10) p.s.i. below the available water supply, whichever is greater.
- 2) Hydraulic calculations shall be designed using data either from official flow tests performed by the water purveyor, or performed by a licensed contractor and witnessed by the San Bernardino County Fire Department fire code official. All water flow tests used in design of sprinkler systems shall be less than one (1) year old.
- 3) All hydraulic calculations for new systems that are served by a combination fire protection and domestic connection shall have included in the demand a minimum of ten (10) gallons per minute (GPM) allowance for domestic use.

TESTING AND MAINTENANCE

- 1) All sprinkler systems shall be tested in accordance with the proper CCR Title 19 and NFPA 25 standards. All tests reports for "Five-year certifications" shall be submitted to the appropriate office of Community Safety at the Fire Department and in an approved format.



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INSPECTIONS

All sprinkler systems are required to be inspected visibly by the fire code official prior to final approval. The C-16 contractor of record shall contact the appropriate SBCFD office at least forty-eight (48) hours prior to requesting an inspection, and shall notify the SBCFD office a minimum of twenty four (24) hours for any cancellation of inspections.

The following inspections shall be required for all fire sprinkler systems in multi-family dwellings:

1) **"OVERHEAD ROUGH INSPECTION"**:

- a) All piping and components are required to be in place and shall be exposed and visible, including fire department connection, sprinkler heads, valves, gauges, and flow switches. If insulation is to be used for freeze protection, this shall be in place and fastened, and with the approval of the inspector, is permitted to cover the necessary exposed pipe.
- b) All seismic bracing, hangers and other restraints shall be in place and installed per the approved plans.

2) **"OVERHEAD HYDRO INSPECTION"**:

- a) The system piping and all components shall be pressurized with water for a minimum of two (2) hours at two hundred (200) PSI, or at fifty (50) PSI above the static pressure, whichever is greater. There shall be no visible pressure drop on the gauge during the hydrostatic test. All areas shall be exposed to check for leaks.

3) **"FINAL INSPECTION"**:

- a) A thorough flush of the underground supply piping shall be completed prior connecting to the riser, witnessed by the Fire Department inspector (See SBCFD Standard W-2.)
- b) Water motor gong bell or electric water-flow alarm bell and flow switch shall be functional, and all identification signs, system hydraulic data plates shall be installed. Spare head box, including additional sprinklers and sprinkler head wrench, shall be installed.
- c) All sprinkler heads and escutcheons shall be in place. All sprinkler heads shall be free of protective caps, paint, texturing, or any other obstruction. Protective guards shall be installed on all heads in garages and storage areas, if required.
- d) A flow test shall be performed using the Test Valve. If electrically operated, the water-flow alarm bell shall be connected an energized source, and must ring in no more than sixty (60) seconds after opening the test valve.



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- e) When required by the Fire Code Official, the installing contractor shall complete a 'Contractors Material and Test Certificate for Aboveground Piping', in accordance with NFPA 13R, and submit it to the Fire Code Official at the time of sprinkler final inspection.

PROTECTION AGAINST FREEZING

- 1) All piping for new systems in areas subject to freezing temperatures and not maintained above 40°F shall be protected against freezing in accordance with the current edition of NFPA 13R.
- 2) The need for freeze protection shall be as determined by the fire code official and based on the California Energy Commission "Climate Zones" and Part 6 of CCR Title 24, the California Energy Code. Systems located in Climate Zone 14 as defined by the California Energy Commission may be protected solely by the use of insulation. Systems located in Climate Zone 16 shall not be protected solely by the use of insulation. Detailed maps of Climate Zones may be found on the Internet at <http://www.energy.ca.gov>.
- 3) Insulation may be used as freeze protection for piping if the building or spaces containing piping can be maintained at a minimum of 40 degrees F at all times. The use of batt or blown-in insulation for freeze protection may be approved by the fire code official and installed per current edition of NFPA 13R.
- 4) Foam pipe wrap, by itself, is not an approved method of freeze protection.
- 5) All antifreeze solutions shall be a listed factory premixed solution and approved in accordance with NFPA 13R and the California Fire Code, which allows only propylene glycol solutions of no more than 40% or glycerin solutions of no more than 50% by volume.
- 6) A metal placard shall be placed on all systems using antifreeze solutions at the main riser as well as the test valve. The placard shall contain the necessary information permanently stamped or engraved as shown in **DIAGRAM F-3.4**.

SIGNAGE

- 1) All signs for drains and test valves required on sprinkler systems shall be made of metal, no less than 10-gauge thickness, colored red and engraved with permanent white letters.
- 2) Hydraulic calculation plates required on risers shall be made of metal, unpainted, and the information permanently stamped or engraved, and attached to the riser with a metal "U-bolt" or chain.
- 3) All doors or other building materials enclosing or concealing sprinkler risers shall have a durable metal sign with a minimum of three inch (3") red block letters on a contrasting



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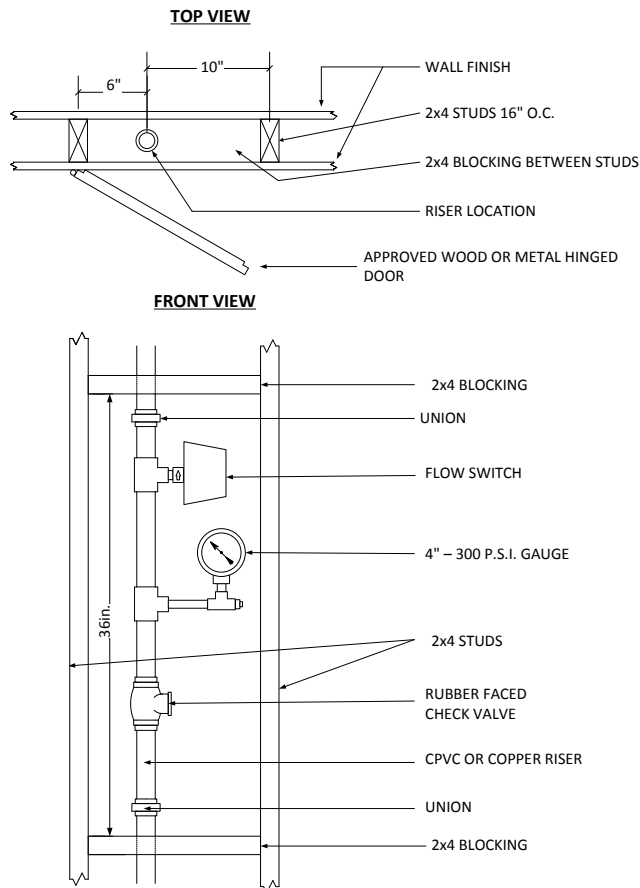
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background stating "FIRE RISER INSIDE." per **DIAGRAM F-3.5**. Signs shall be installed at five feet (5') above finished floor on the outside of fire sprinkler riser access doors.

SPECIAL SITUATIONS

Spray applied or wrapped polyurethane foam insulation that comes into contact with non-metallic fire sprinkler piping, whether such is required for freeze protection or not, shall be listed for such use with pipe and applied according to the manufacturer's recommendations. Information about any polyurethane foam insulation shall be made available to the fire code official upon request.

DIAGRAM F-3.1: RISER ACCESS PANEL DETAIL





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DIAGRAM F-3.2: ACCESS TO SPRINKLER RISERS

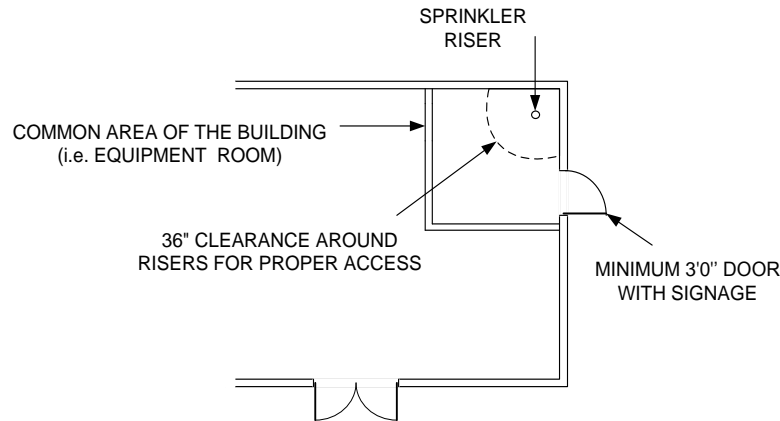
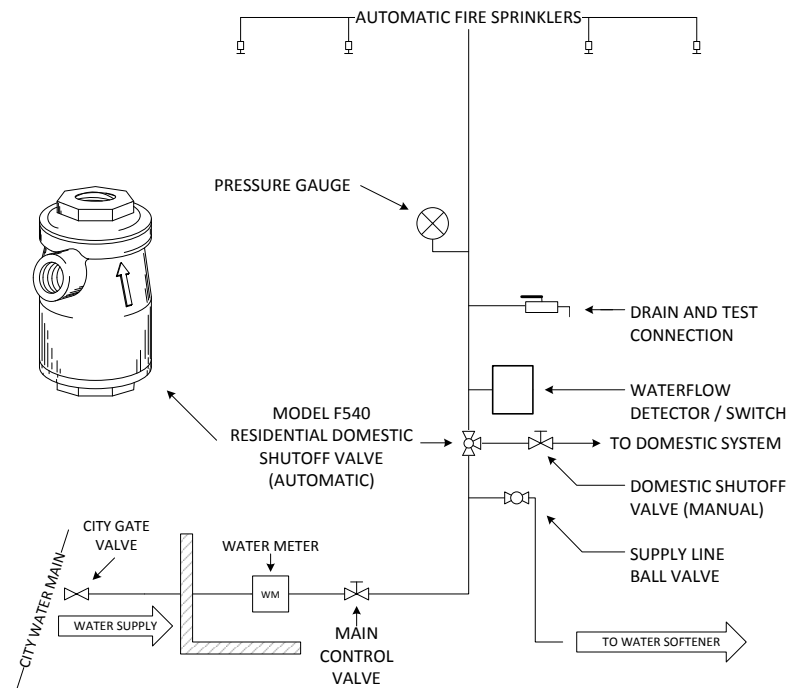


DIAGRAM F-3.3: DOMESTIC WATER SHUTOFF





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DIAGRAM F-3.4: SAMPLE PLACARD FOR ANTIFREEZE SYSTEMS

ANTI-FREEZE SYSTEM

The fire sprinkler system in this building contains an anti-freeze solution for protection against freezing.

Type of anti-freeze:

Manufacturer:

Trade name & brand:

Solution concentration: %

System volume: gallons

Protected to: degrees (°F/°C)

Location:

Date tested:

DIAGRAM F-3.5: FIRE RISER SIGN

