



SAN BERNARDINO COUNTY FIRE PROTECTION DISTRICT COMMUNITY SAFETY DIVISION

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

Standard Number

F - 2

Revision Date:
July 1, 2023

FIRE PREVENTION STANDARD

FIRE SPRINKLER SYSTEMS IN ONE AND TWO-FAMILY DWELLINGS

AUTHORITY

Sections 102.9, 103 and 104.1 of the 2022 California Fire Code (CFC) and Sections 4 and 8 of Ordinance FPD 23-01 of the San Bernardino County Fire Protection District Fire Code (Fire Code) state that the Fire Code Official of the San Bernardino County Fire Protection District (SBCFPD) shall have the authority to adopt policies, procedures, rules, and regulations in order to clarify the application of the Fire Code and to determine requirements not specifically provided for by the Fire Code. For further requirements on this subject, see section 903 of the 2022 California Fire Code and the currently adopted edition of NFPA 13D as amended. 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 fire sprinkler systems in one and two-family residential dwellings, in order to aid in the detection and control of fires and thus provide improved protection against injury and loss of life.

SCOPE

This Standard, in conjunction with the currently adopted edition of NFPA 13D (or CRC R313) shall apply to the design and installation of, as well as the modification to, all fire sprinkler systems in one and two-family dwellings and manufactured homes. This Standard shall take precedent where there is any conflict with NFPA13D, CRC313 and 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

- 1) Submit an application and all required documentation online through the county EZOP website, <https://wp.sbcounty.gov/ezop/>.

NOTE: If the project is in the City of Fontana, please contact (909) 428-8890 for submittal information.

- 2) All pages of plans shall have a three-inch (3) by three-inch (3) box labeled "FOR FIRE DEPARTMENT USE ONLY" located in the bottom right corner of every page for approval stamp.



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- 3) The following shall be submitted to the Fire Department for approval and permit prior to performing work on any fire sprinkler system:
 - a) 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 SBCFPD Plan Submittal Checklist.)
 - b) Hydraulic calculations for all design areas. If not included, applicant shall conduct a bucket test to verify system performance.
 - c) Manufacturer's specifications sheets (cut sheets) for all proposed materials and equipment.
 - d) A water flow test report from the water purveyor dated within six (6) months of submittal. As an alternative to a water flow test, information shall be submitted as listed in option #1 or #2 below.
 - I. A water pressure test, performed by the licensed C-16 contractor of record, may be submitted using the current SBCFPD "ONE OR TWO FAMILY RESIDENTIAL WATER PRESSURE TEST" form. The static pressure shall be taken from the base of the riser and documented on this form. Per NFPA 13D a static pressure may only be used if the public or private water main serving the project is 4" or larger. The C-16 contractor is responsible for the accuracy of water pressure and supply mains. All information on this form will be verified in the field by the SBCFPD.
 - II. A signed official letter from the water purveyor stating that a water flow test cannot be provided. A field water flow test (AKA 'Bucket Test') will be required to be performed by the contractor at the time of 'Rough/Hydro' inspection. NOTE: Additional fees will apply.
 - e) Any other important details and information as required by this Standard.
 - f) Payment of all appropriate fees.

DEFINITIONS

SELF-CONTAINED AUTOMATIC RESIDENTIAL SPRINKLER SYSTEM - An approved fire sprinkler system, that conforms to NFPA 13D and this Fire Prevention Standard and is supplied by a water source independent from a municipal water distribution system.

GENERAL

1. All automatic fire sprinkler systems for one- and two-family residential dwelling projects shall be designed to the requirements of this standard, the currently adopted edition of NFPA 13D and the California Residential Code (CRC) section R313. No deviations from these recognized Standards will be made without approval from the Fire Code Official.



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SYSTEM COMPONENTS

- 1) In living areas within the dwelling unit, only approved listed residential or quick response sprinkler heads shall be used, per the listing of the manufacturer and NFPA 13D (or CRC R313).
- 2) All CPVC plastic pipe used shall meet the requirements of the manufacturers listing, particularly for applications when pipe is exposed.
- 3) All system components shall be rated for the maximum working pressure, but not less than 175 psi.
- 4) A minimum of ¼" relief valve, set at 130 psi shall be provided on the system side of the riser when the static pressure exceeds 100 psi.
- 5) Piping shall be supported from structural members using methods approved by the pipe manufacturer and NFPA 13D (or CRC R313). 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.
- 6) Sprinkler risers shall be located in an attached garage whenever possible. All system risers shall be located inside a wall, cabinet, or other enclosure, with a minimum twelve inch (12") wide by twenty-four inch (24") high access panel. **(See DIAGRAM F-2.1)** When approved by the Fire Code Official, panels may be of a smaller size; but shall be sufficient to allow all valves, gauges and other components of the riser to be readily accessible. The location of the riser shall be labeled on the access panel, with red letters on a white background, stating "FIRE SPRINKLER RISER INSIDE."
- 7) The installation of a 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 backflow devices are required, they shall be secured in an open position with valve handles removed, and an appropriate allowance shall be made for all such devices in the hydraulic calculations.
- 8) Where waterflow detection devices are installed, these devices, including the associated alarm circuits, shall be flow tested through the approved inspector's test valve (ITV) and shall result in an audible alarm on the premises. The orifice of the ITV shall be equal to the hydraulically calculated most remote sprinkler head.
- 9) When installed, water flow alarm bells shall be a minimum of six (6) inches in size and bear a weather resistant sign stating, "WHEN BELL RINGS CALL FIRE DEPT" in minimum three-quarter inch (3/4") letters on a contrasting background.

WATER SUPPLY

- 1) Water supplies shall meet the requirements of NFPA 13D or CRC section R313.

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- 2) Water supplies to one- and two-family residential fire sprinkler systems shall be by a single domestic water supply service (or water meter) for each separately owned dwelling unit, with separate connections to domestic and sprinkler system, unless a combination domestic and fire sprinkler system (multipurpose system) is installed per NFPA 13D or CRC R313.
- 3) Local water companies may have other requirements for separate water meters or devices on water supplies. It is the applicant's responsibility to contact the local water purveyor prior to design of the system to find out these and any other specific requirements.
- 4) In areas not served by a water purveyor, or where the public water supply is insufficient, a private well, tank, or approved Self-Contained Automatic Fire Sprinkler System may be used to provide adequate protection. (See "PRIVATE WELL, TANK, AND OTHER STORED WATER SUPPLY SOURCES" section below.)

SYSTEM DESIGN

- 1) Residential sprinkler heads shall be designed for a coverage area in accordance with the manufacturers listing. Sprinklers other than residential sprinklers shall provide coverage as specified in NFPA 13D.
- 2) The water meter shall be of sufficient size to meet the hydraulically calculated system demand or as approved by the Fire Code Official. Hydraulic calculations shall demonstrate the appropriate pressure loss through water meters, using the manufacturer's specification, NFPA 13D or CRC R313. Information on friction loss and flow rates through water meters shall be submitted for review when required by the Fire Code Official.
- 3) Sprinkler systems shall be designed to provide the demand of the two (2) most hydraulically remote sprinkler heads, per the manufacturer's listings and specifications. Hydraulic calculations shall be provided for each separate remote area or design area that uses a different piping configuration, different sprinkler head or different spacing.
- 4) Systems fed by water supplies with very low inlet pressure (less than forty (40) psi) may utilize an approved Automatic Domestic Water Shut-Off Valve, in order to eliminate the five (5) GPM domestic allowances in the demand, as required by this Standard or by other connected systems, such as water softeners. Such automatic valves shall be listed for such use with fire sprinklers and be installed per the manufacture's specifications. **(See DIAGRAM F-2.2)**
- 5) Sprinklers are required in attached garages per CRC R313 and NFPA 13D as referenced and amended by the 2022 California Fire Code.
- 6) Sprinkler heads shall be located over all fuel-fired appliances per the requirements of the CRC R313.



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HYDRAULIC CALCULATIONS

- 1) Hydraulic calculations shall be provided to the Fire Code Official demonstrating an adequate supply, from the water main (source), to the most hydraulically calculated remote sprinkler(s).
- 2) Hydraulic calculations shall be designed using data either from official water flow tests performed by the water purveyor or using a water pressure test performed by a licensed contractor and documented on the appropriate form (See 'SUBMITTALS' section above.) All water flow tests and water pressure tests used in the design of sprinkler systems shall be dated no more than six (6) months prior to the time of plan submittal.
- 3) Hydraulic calculations shall take into account pressure losses from elevation and friction. For systems designed from flow test information, all elevation losses from the water supply main to the most remote area sprinkler head(s) shall be calculated. For systems designed using water pressure test reports per this Standard, elevation losses need only be calculated from the base of the riser to the most remote sprinkler heads.
- 4) All hydraulic calculations shall be designed for the system demand not to exceed ninety percent (90%) of the available water supply pressure.
- 5) Hydraulic calculations for new systems shall have included in the demand a minimum of five (5) gallons per minute (GPM) allowance for domestic use, unless the fire sprinkler system has a dedicated meter installed or uses an approved automatic residential domestic shut-off valve.
- 6) For multiple dwelling units (ADU's) on one meter, a minimum of five (5) gallons per minute (GPM) per unit shall be included in the demand.

HOUSING TRACTS

- 1) Prior to the start of a new phase of tract construction, the licensed sprinkler contractor shall submit plans, together with a current water flow test dated within six (6) months, and hydraulic calculations based on the current water flow test. A separate application and set of system plans shall be required for each floor plan type. After approval of each plan, a permit will be issued for each system on each individual lot. New plans and water flow test reports are required to be submitted for review for each new phase of building construction, even if the floor plan or piping plan has not changed.
- 2) Each separate remote area or design area that uses a different piping configuration, different sprinkler head, different spacing, or different water supply information shall have a separate set of hydraulic calculations. Where acceptable to the fire code official, 'worst case scenario' calculations shall be submitted showing maximum hydraulic losses to a number of lots/systems for a given plan type.



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OWNER BUILDER INSTALLED SYSTEMS

- 1) Any system that is to be installed by an owner builder must conform to the requirements of the California Business and Professions Code section 7026 et. seq., and all applicable adopted codes as well as this Standard.
- 2) The owner builder shall provide proof of sprinkler installation training given by the system manufacturer. This documentation shall be submitted along with the application for a permit to install the system.
- 3) Owner builder installed systems shall not exceed two (2) sprinkler systems per applicant, per year.

MANUFACTURED HOUSING AND MOBILE HOMES

- 1) Plans for the sprinkler system, approved by California Department of Housing and Community Development (HCD) shall be submitted to the SBCFPD by property owner or installing contractor. The applicant shall also submit a site plan showing water meter size and location, water main size and location, connection to the home and the backflow device if required. Manufactured homes that are supplied by a pump or on a self-contained system shall submit pump and tank cut sheets for approval.
- 2) The sprinkler system shall undergo a hydrostatic pressure test at a minimum of 50 psi but not more than 100 psi for 1 hour. The test shall be witnessed by the SBCFPD fire inspector.

PROTECTION FROM FREEZING

- 1) Sprinkler systems installed in areas subject to freezing temperatures and not maintained above 40°F shall be protected from freezing in accordance with the requirements of NFPA 13D, CRC R313 and this standard.
- 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. Generally, systems located in Climate Zone 14 as defined by the California Energy Commission shall be permitted to be protected solely by the use of insulation; systems located in Climate Zone 16 shall be freeze protected by a means other than the use of insulation. Detailed maps of Climate Zones may be found on the Internet at: <https://www.energy.ca.gov/>
- 3) Heat tape and foam pipe wraps are not acceptable methods of freeze protection.
- 4) Passive purge systems may be allowed in conjunction with insulation installed per NFPA 13D requirements for freeze protection. Passive purge system shall be of looped type and provide water to the master bath toilet.

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- 5) Insulation may be used as freeze protection for piping if the building or spaces containing piping can be maintained at a minimum of 40°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 the current edition of NFPA 13D (or CRC R313). It shall be the responsibility of the sprinkler installer to ensure building insulation is in compliance with NFPA 13D.
- 6) All antifreeze solutions shall be a listed factory premixed solution and approved in accordance with NFPA 13D (or CRC R313) and the California Fire Code. When required,
 - a) Sprinkler systems that contain antifreeze for freeze protection shall also have an expansion tank installed to prevent loss of solution.
 - b) When required by the local water purveyor, a reduced pressure (RP) detection device or backflow assembly shall be installed on antifreeze systems.
- 7) A permanent sign shall be placed on all systems using antifreeze solutions at or near the main riser. The sign shall contain the necessary information permanently and clearly written as shown in **DIAGRAM F-2.3**.

PRIVATE WELL, TANK, AND OTHER STORED WATER SUPPLY SOURCES

- 1) In areas where the public domestic water supply is inadequate to meet sprinkler system demands, approved private water supply sources may be installed in accordance with NFPA 13D, as well as other applicable requirements of this Standard. All system components and equipment shall be listed and be installed per the manufacturer's specifications.
- 2) Where a well, pump, tank or combination thereof is the source of supply for a fire protection system, the configuration for the system shall be per NFPA 13D, as referenced and revised by chapter 80 of the 2022 California Fire Code.
- 3) Self-Contained Automatic Residential Sprinkler Systems shall be installed in accordance with NFPA 13D, as referenced and amended by the 2022 California Fire Code. Such systems may use a pump with an approved dedicated power supply (240 VAC) or compressed gas pressurization. Self-Contained systems shall be inspected and tested using a method approved by the Fire Code Official, using the manufacturer's recommendations.
- 4) Private stored water supply tanks shall be approved by the Fire Code Official and shall be sized sufficiently in accordance with NFPA 13D. An automatic means of refilling tanks shall be provided.
- 5) Pumps used on residential sprinkler systems shall be secured from movement and protected from freezing or other damage using a method approved by the Fire Code Official, I.E. dog house.



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INSPECTIONS

- 1) All sprinkler systems are required to be inspected by the Fire Code Official prior to final approval. The sprinkler contractor of record shall contact the appropriate SBCFPD office at least forty-eight (48) hours prior to requesting the inspection and shall notify the SBCFPD office a minimum of twenty-four (24) hours for any cancellation of inspections. Inspections may be scheduled by sending an email to inspections@sbcfire.org
- 2) A hard copy of the stamped plans and required job card(s) shall be onsite at the time of inspection.
- 3) The following inspections shall be required for all fire sprinkler systems in one and two-family residential dwellings:
 - a) "OVERHEAD ROUGH INSPECTION":
 - I. All piping and components, including plugs in place of sprinkler heads, hangers, valves, gauges, and flow switches, are required to be in place and shall be exposed for visible inspection. 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.
 - II. Effective January 1, 2024, fire sprinkler systems installed with CPVC shall use plugs in place of sprinkler heads.
 - b) "OVERHEAD HYDRO INSPECTION":
 - I. The system shall be pressurized with water at a pressure comparable to static or 50 psi above the pump rated pressure, during the duration of the inspection. There shall be no visible pressure drop on the gauge during the hydrostatic test. All piping shall be exposed to check for leaks. Testing shall comply with the requirements of NFPA 13D (or CRC R313). Plugs shall be used for all overhead hydro testing on CPVC systems.
 - c) "FINAL INSPECTION":
 - I. The underground supply system shall be flushed before it can be connected to the overhead piping.
 - II. All sprinkler heads shall be uncovered, with escutcheons or trim rings in place. For concealed heads, the cover plates shall be off. Protective guards shall be installed on all heads in the garage and storage areas, if required.
 - III. Where waterflow detection devices are installed, a flow test shall be performed using the Inspectors Test Valve (ITV). Such test shall result in an audible alarm on the premises.
 - IV. Master bathroom toilet shall be installed to verify connection to system for all passive purge systems.

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- V. All painting, staining and texturing of walls and ceilings shall be completed.
- VI. All plugs used during hydro static testing shall be replaced with sprinkler heads.

SPECIAL SITUATIONS

- 1) For systems where it may be difficult to verify the design by means of hydraulic calculations, such as those that are fed by a water pump, or where visual inspection of the overhead or underground piping is otherwise not possible, the Fire Code Official may allow an onsite field water flow test ("bucket test") inspection in lieu of such hydraulic calculations or visual inspections. The test shall include the two most remote sprinkler heads flowing water into an approved container(s), using an approved method to measure the observed flow and compare it to the listed flow and pressure of the sprinkler head. Bucket tests may be performed in combination with the overhead rough inspection or prior to the final inspection (an additional fee will apply).
- 2) 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 fire sprinkler 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.

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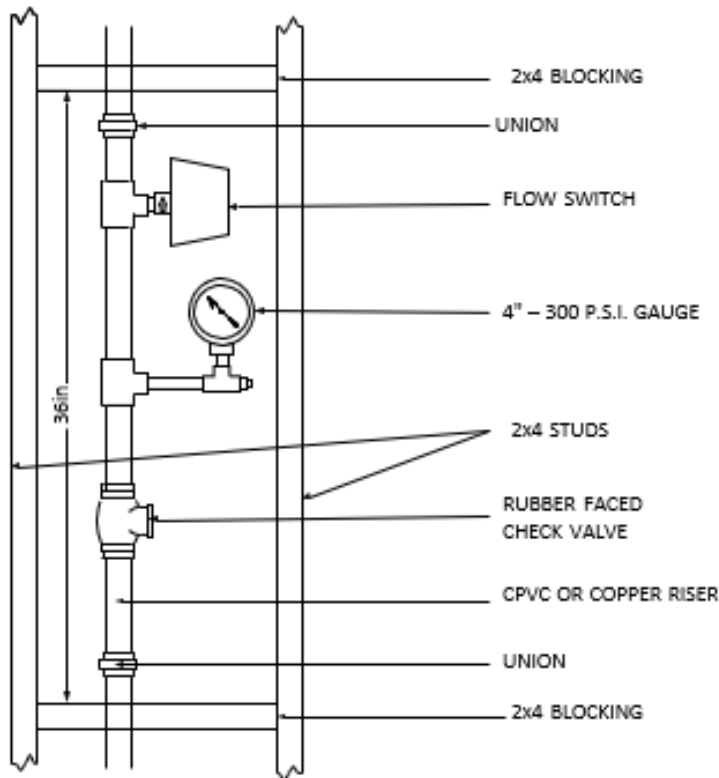
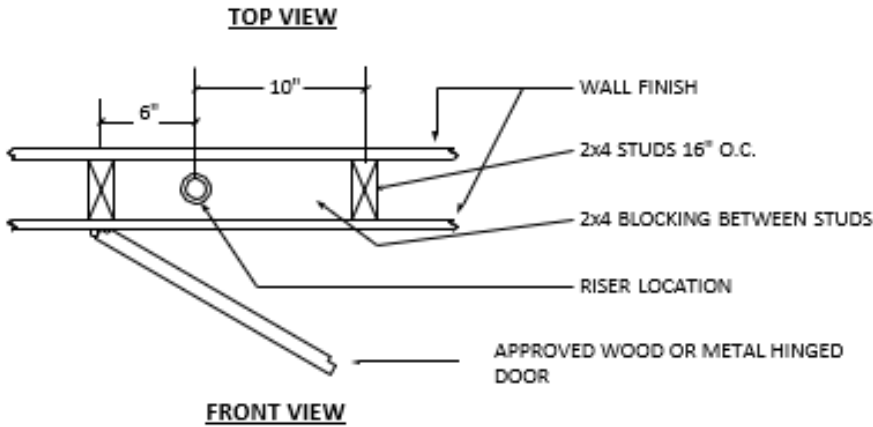


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DIAGRAM F-2.1: RISER ACCESS PANEL DETAILS





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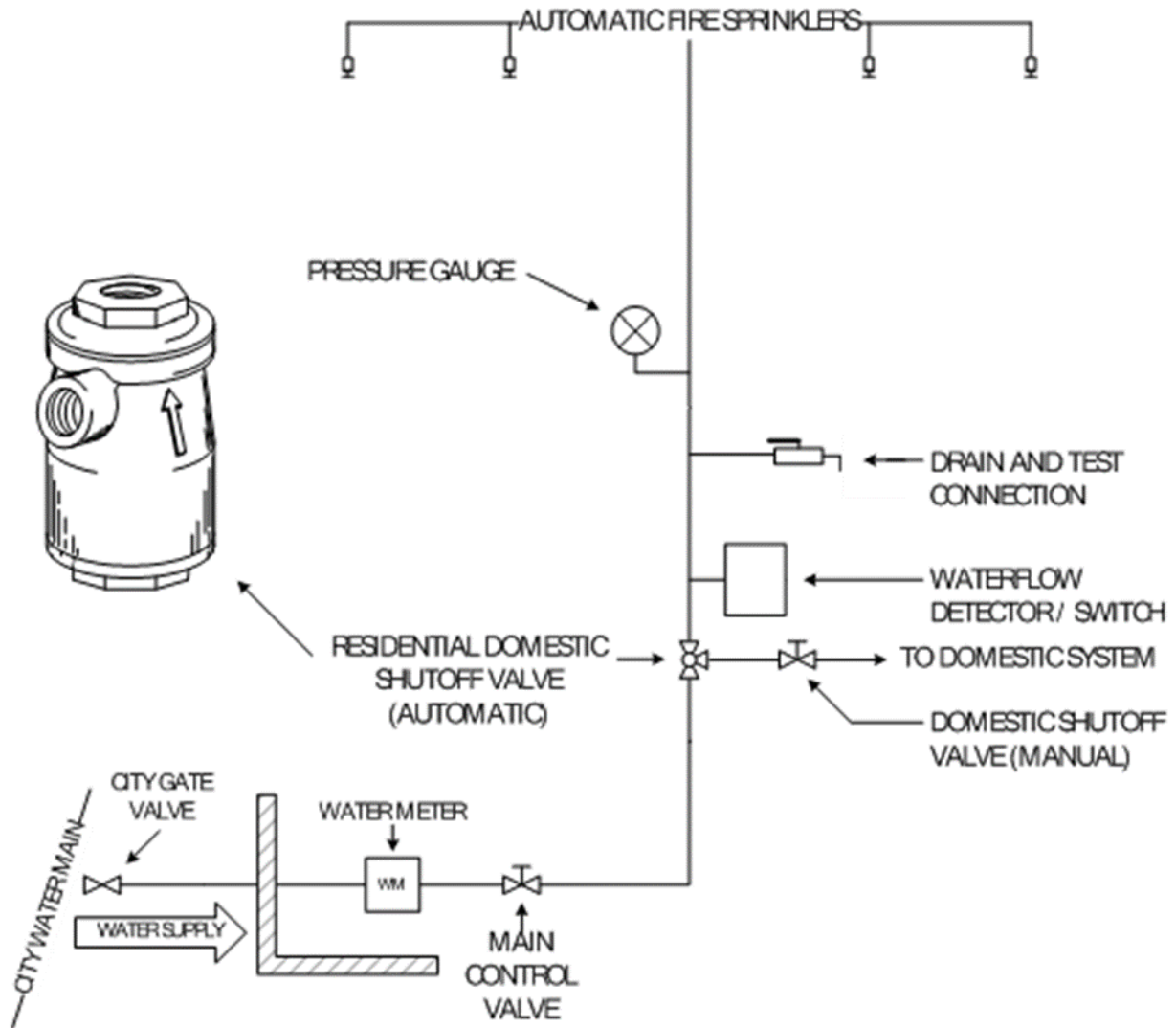
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DIAGRAM F-2.2: RESIDENTIAL AUTOMATIC DOMESTIC SHUTOFF VALVE





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DIAGRAM F-2.3: 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: