



OFFICE OF THE FIRE MARSHAL

FIRE PREVENTION STANDARD

**FIRE PROTECTION SYSTEMS
INSTALLATION OF RESIDENTIAL SPRINKLERS**

SCOPE: This standard applies to the design and installation of automatic fire sprinkler systems in one and two-family dwellings and manufactured homes. This standard shall be used in conjunction with NFPA 13D-2013, Installation of Sprinkler Systems in One and Two-Family Dwellings and, California Building Code 2013, California Fire Code 2013 and local amendments, and other applicable codes.

1. RESPONSIBILITY

- A. All individuals and companies who intend to engage in the installation or alteration of fire sprinkler systems are subject to the requirements of this standard.
- B. Installer: The sprinkler system can be installed by an individual who holds a state of California C-16 (sprinklers) license or, by owner-builder of an owner-occupied, single-family dwelling.
- C. Designer: Plans shall be designed by a C-16 licensed contractor or by a Registered Professional Engineer (Civil, Mechanical, or Fire Protection), licensed by the State of California (Board of Professional Engineers). All copies of the plans shall be stamped and signed by the licensed individuals.
- D. C-16 contractors may only design systems that the firm has a contract to install.

2. PLANS SUBMITTAL PROCEDURE

- A. Please call the Fire Prevention Counter at (626) 744-6885 to obtain the appropriate fees. Fire Prevention Counter hours are Monday through Thursday, 8:00 a.m. to 5:00 p.m. Friday, 8:00 a.m. to 12:00 p.m..
- B. Submit a minimum of three sets of plans, hydraulic calculations, Fire Prevention Bureau transmittal form, and a check/money order for the appropriate fees to the City of Pasadena Permit Center located at 175 N. Garfield Ave. Pasadena CA 91101.
- C. The Fire Department has instituted the use of a “**Case Number**” for tracking all projects submitted for review. To provide faster customer service, please refer to your

Case Number when contacting this Department. Your Case Number will also be listed on the Fire Department approved plans.

D. One copy of the Fire Department stamped plans shall be maintained on the job site.

E. All modifications/changes to existing systems require a plan check and inspection by the Fire Department.

F. Plan Check fees include the original plan check and one re-check. Please ensure that all corrections are made prior to re-submission to avoid additional fees.

G. Excessive field changes may require re-submittal of plans along with additional plan check fees.

3. SCHEDULING INSPECTIONS

A. It is the responsibility of the installing contractor/owner to be on the job site during the inspection with approved plans. Failure to do so will result in the cancellation of the inspection. Cancelled inspections will be counted as one inspection.

B. Inspection requests can only be taken from the installing contractor/owner.

C. Call (626) 744-4668, 72 hours prior to inspection for scheduling an inspection. The inspection request line is open Monday through Friday between 8:00 a.m. and 3:00 p.m.

D. Inspection times are approximate and may vary because of delays at previous inspections or emergency response by Fire Department personnel. Please allow time on either side of the inspection time for the inspector to arrive.

4. PLANS

A. Submittal Information

1) To speed up the plan check process and to avoid the possibility of returning the plans for corrections, please use the following checklist, prior to submittal, to insure that the appropriate information is included on the working sprinkler drawings.

a) Name of owner and/or occupant

b) Location of project, including street, number, and city.

c) Name of sprinkler installer, address, phone number, type of license and license number.

d) Total number of square feet.

e) Point of compass.

f) All plans must be to scale or dimension.

g) The scale shall be no smaller than one inch=1 foot.

h) Plot plan showing tank, pump, structures, underground pipe size and type, point of supply connections, depth of bury, type and size of any valves or meters.

- i) Piping plan showing tank, pump, and structure elevations as they relate to each other.
- j) Full height cross-section showing building construction types, vaulted, and beamed ceiling locations.
- k) Riser detail showing system split, pressure gage, check valve, main control valve, relief valve (where applicable), main drain, and domestic shut-off valve.
- l) Water tank details including size and type of construction (where applicable).
- m) Indicate the manufacturer, model, type, and pump curve of the booster pump (where applicable).
- n) Detailed calculations.
- o) Sprinkler head spacing.
- p) Show clearly all unsprinklered areas.
- q) Indicate manufacturer, style, model, orifice size, and “K” factor of each sprinkler used.
- r) The main drain shall be a minimum ½ inch.
- s) Type of pipe.
- t) Hanger detail.
- u) Indicate type of fitting used.
- v) Size of each pipe.
- w) The main control valve shall be located above grade and readily accessible.
- x) Use of each room.
- y) Location of heat sources.

2) Water flow information:

Contact the Pasadena Water Department at (626) 744 – 4409 to maintain a flow report within 6 months of the submittal date and shall include:

- Flow location
- Static pressure, PSI
- Residual pressure, PSI
- Flow, GPM
- Date
- Time
- Test conducted by or information supplied by _____.

- 3) The following information shall be contained in the hydraulic calculations.
 - a) Calculations must conform to manufacturer's specifications.
 - b) "K" factors for all sprinklers.
 - c) "C" values for the type of pipe used.
 - d) A pump curve or city supply curve, where the total demand point is clearly plotted.

- 3) The attached notes shall be completed and placed verbatim on the working sprinkler plans.
 - a) This residential sprinkler system shall be designed and installed as per NFPA 13D, and Pasadena Fire Department regulations.
 - b) Only listed and approved devices shall be installed in this system (Except tanks). Should sprinklers or devices be requested to be installed in a manner that is not in accordance with the manufacturer's specifications, wet stamp of a registered professional engineer certifying compliance with the design criteria as set forth in NFPA 13D shall be placed on plans.
 - c) Only new listed residential sprinklers shall be employed in the installation of this sprinkler system.
 - d) A minimum of three spare fire sprinklers of each type, temperature rating and orifice size, along with a sprinkler wrench, shall be located in a spare head cabinet at the system riser or other approved location. If less than three heads of a particular type are used, only one spare head shall be provided.
 - e) All piping shall be provided with hangers and shall be supported per code and manufacturer's specifications.
 - f) All piping shall be hung from structure members.
 - g) All CPVC piping shall be installed by persons who have been certified by the manufacturer for installation of CPVC piping, if applicable.
 - h) All primers and glues shall be listed and approved for use with CPVC piping in systems using CPVC pipe, if applicable.
 - i) All valves shall have a permanently affixed sign indicating its function.
 - j) Underground mains and lead-in connections shall be flushed before connection is made to sprinkler piping.
 - k) A 10% reduction in the available water pressure shall be included in all calculations.
 - l) Water pump shall activate automatically upon system demand and be self-priming and UL listed for electrical safety.
 - m) This residential sprinkler system shall be tested and inspected at both rough and final inspection, prior to occupancy being granted. Call one working day in advance to schedule all inspections.

B. Water Supply

- 1) All sprinkler systems shall have a single supply main serving both the automatic sprinkler system and the domestic system.
- 2) An additional 5 GPM shall be added to the sprinkler system demand to determine the size of common piping and the size of the total water supply requirements.

Exception: Domestic design demand shall not be required to be added

where provision is made to prevent flow into the domestic water system upon operation of a sprinkler.

3) Where system piping or pumps are located in areas subject to freezing, steps shall be taken to protect system integrity; this may include, but is not limited to, heating and/or installation of insulation.

C. Automatic Booster Pump

1) When the domestic water supply is deficient or a water tank is being used to supply the automatic sprinkler system, an automatic booster pump may be required to maintain the required pressure at the minimum gallons per minute.

2) The pump must be automatically activated upon system demand.

3) The pump must be of self-priming type.

4) The pump must be listed or approved for electrical safety by a recognized testing laboratory.

5) When a pump is used, provisions shall be made to protect the pump from exposure to freezing and/or brush fires.

D. Water Storage Tanks

1) Each tank shall have a connection to a supply source to refill the tank automatically.

E. System Components

1) Valves and drains.

a) Each system shall have a main control valve located on the system side of the water meter or pump. The main control valve shall be of the indicating type such as an O.S. & Y. or ball valve.

b) The valve shall control both the domestic water system and the automatic sprinkler system. The main control valve shall be readily accessible and above grade. A separate shut-off valve for the domestic shall be provided.

c) A double check valve shall be installed on system side of riser per the Pasadena Water Department requirement.

d) All valves shall have an all-weather sign affixed to them, which indicate their purpose.

e) For systems with normal operating pressure in excess of 100 psi, a listed pressure relief valve shall be installed on the riser.

2) Sprinklers

a) Only new residential sprinklers that are manufactured after July 12, 2004 shall be installed. Sprinklers manufactured prior to July 12, 2004 can be used as replacement sprinklers on existing systems.

b) Attached garages and foyer entry shall be sprinkled.

c) Sprinklers are required in attic area if it is used for storage.

d) When sprinklers are required in attics, the coverage per sprinkler shall not exceed 130 square feet.

e) In areas where ambient temperature exceeds the specifications of the listed residential sprinklers (i.e., attics, utility rooms and water heater closets), approved intermediate

temperature commercial quick response automatic sprinklers shall be used. The orifice size shall be the same as the residential heads used.

- f) Sprinkler heads in the attic under or near the peak of a roof or ceiling shall have deflectors located not more than 3 feet vertically down from the peak.
- g) All heads in the attic area lower than 7 feet AFF shall be installed using head cages.
- h) FAU catwalks are not intended for storage and shall not exceed 4 feet in width.

3) Pressure Gage

A listed pressure gage shall be installed and maintained on the sprinkler system riser. The pressure gage shall be installed on the system side of the check valve.

4) Piping

- a. When copper tubing is soldered, 95/5 solder shall be used.
- b. Approved plastic pipe may be used when installed in accordance with the manufacturers listing where installed in attics. Adequate insulation shall be provided on the attic side of the piping to avoid exposure of the piping to temperatures in excess of its rated temperature.

F. System Design

1) Hydraulic Calculations

- a) Design of sprinkler system shall include provisions for a reduction in the available water pressure of 10 %
- b) Single and two family residences 10,000 sq. ft. or greater shall be designed per NFPA 13R with the most remote 4 heads flowing, and shall be provided with a fire department connection in an approved location.
- c) Garages less than 750 sq. ft. or with no more than (6) sprinkler heads shall be designed per NFPA 13D with a two – head Calculation.
- d) Garage greater than 750 sq. ft. or with more than (6) sprinkler heads shall be designed per NFPA 13 for an Ordinary Hazard Group 1 Occupancy.
- e) Tandem system is NOT allowed by this department.

Definition: A sprinkler system in a detached building which is Supplied from the overhead fire sprinkler system piping of another Building or has its supply piping running through the other building.

- f) Due to the sloped ceiling within the residence, modify the calculations As required to meet the manufacturer's criteria for sloped ceilings. See the sprinkler head manufacturers data sheet, and U.L. Listing.
- g) As the ceiling has a slope of greater than 2:12, provide a residential sprinkler head specifically listed for sloped ceilings.

- h) The ceiling construction has beams, coffers, or other conditions which causes the sprinkler deflector to exceed 4" from the ceiling. Modify the sprinkler protection to meet the requirements of NFPA 13D

5. TESTING PROCEDURE

- A. The sprinkler system shall be field tested and inspected at the rough plumbing stage (i.e. exposed pipe and fitting stage) by the Pasadena Fire Department. All systems shall be hydrostatically tested (not pneumatic) for leakage at the normal system operating pressure at the stage.
- B. A functional test (bucket test) shall be conducted at the rough stage from the hydraulically most demanding heads, when the overhead system is connected to the underground and the water meter is in place. The system shall meet the required flow.
- C. All system shall have an underground flush completed at time of hydrostatic test prior to connecting the underground to the overhead piping.
- D. The sprinkler system and all of the related components shall be tested and inspected by the Pasadena Fire Department at the final inspection stage, prior to occupancy being granted.