City of Visalia Building Department

315 East Acequia Ave., Visalia, CA 93291 Tel: (559) 713-4444 Fax: (559) 713-4816

RESIDENTIAL FIRE SPRINKLERS

PURPOSE

The purpose of this standard is to provide clarification, instruction and regulation to help in the plan submittal, plan check, inspection and the installation of residential fire sprinklers.

SCOPE

This standard is for the design and installation of fire sprinkler systems in one and two family dwellings and pre-manufactured homes and is pursuant to the following California Codes and State regulations: 2010 California Fire Code (Sec. 903), 2010 California Residential Code (Sec. R313), 2010 NFPA 13 (Sec. 8.4.3), 2010 NFPA 13D, 2010 California Plumbing Code (Sec. 603.4.16), 2010 California Electrical Code Art. 760, 2010 NFPA 72 Chap. 11, California Health & Safety Code 13114.7, and manufacturer specifications.

RESPONSIBILITY

- All individuals and companies who propose to engage in the design, installation, or alteration of fire sprinkler systems are subject to the requirements of this standard.
- Installer: The sprinkler system (CPVC, PEX or Copper) shall be installed by an individual who holds the required licenses.
    - Stand-alone system C-16 (Fire Protection Contractor).
    - Multi-purpose system C-36 (Plumbing Contractor) and C-16

      Exception: 13D sprinkler systems designed and installed in accordance With owner-builder provisions of the California Business and Professions Code, Section 7026.12.

- Designer: Plans shall be designed by a C-16 licensed contractor or be 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 designer. License numbers for both the designer and the installer, of the fire sprinkler system, shall be listed on all copies of plans.

PLANS SUBMITTAL PROCEDURE

- Plans for the fire sprinkler system shall be submitted to and plan checked by the City of Visalia Building Department. (315 E. Acequia)
- Plans for fire sprinkler systems and the plans for the dwelling shall be submitted at the same time but as separate packages. Both sets of plans will be under the same permit number. Deferred submittals will not be permitted for fire sprinkler systems.
- Submit a minimum of 3 sets of plans, hydraulic calculations, manufacturer cut sheets and listing information.
- Plans will be checked and if approved will be stamped. The applicant will be contacted to pick up the approved plans along with the permit. The Building Department will retain one set.
- Excessive field changes may require re-submittal of as-built plans along with additional plan review fees.

PLAN SUBMITTAL INFORMATION

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

- Name of owner.
- Address of dwelling in which the sprinkler system is to be installed.
- Name of designer of the sprinkler system, phone number, type of license and license number.
- Name/company of the installer, for the sprinkler system, phone number, type of license and license number.
- Total number of square feet of the new dwelling including the garage. Also the square footage of any detached garage.
- Number of floors.
- Point of compass. (north arrow)
- All plans must be to scale and shall not be smaller than 1/8 inch = 1 foot.
- Plot/site plan with the following information:
    - Point of connection to public water system.
    - Service point of entry to dwelling.
    - Size and type of all pipe and fittings, with length of each segment and actual inside diameter used for hydraulic calculations.
    - Location and arrangement of all devices such as meter and backflow.
    - Size of the meter.
    - On combined laterals serving fire sprinklers and domestic water, location of fire service take-off, master shut off valve.
    - Size and location of public water main at point of connection.
    - Flow test/pressure data used for hydraulic calculations.

- Full height cross-sectional views of the dwelling that shows the construction types, vaulted and beamed ceiling locations.
- Floor plan with the following information:
    - Building dimensions.
    - Dimensions for rooms, compartments and garage(s).
    - Identify each room and/or compartment. {e.g. closet, pantry, kitchen, living room, garage(s), storage, mechanical room, etc.}
    - Show clearly all un-sprinklered areas..
    - Show all areas that have sloped/vaulted ceilings. List the actual slope. (1:12, 2:12, 3:12, etc.)
    - List the ceiling height of all rooms if there is more than one ceiling height inside the dwelling.
    - Location, width and depth of all soffits.
    - Location and depth of exposed beams at ceilings. List the size of beams. (including false beams)
    - Location, depth, and height above floor of all arches.
    - Location of all light fixtures. List the type on the plan. (recessed, pendant, boxed flush mount etc.)
    - Location of all ceiling fans. Show diameter of fan.
    - Location of all heat producing appliances. (e.g. stoves, ovens, furnaces, fireplace, etc.)
- Fire sprinkler piping plan, (which can be included on the floor plan), with the following information:
    - Point of connection to the service pipe.
    - Dimensioned location and spacing criteria for all sprinklers.
    - List the total number of each type of sprinkler head to be installed.
    - Size and type of all pipe and fittings, with length of each segment and actual inside diameter used for hydraulic calculations.
    - Location and type of all hangers and means of support. Provide a detail that shows the method of connection to the roof/ceiling/floor framing members. (engineered trusses & joist, wood joist, rafters, beams etc.)
    - Location and arrangement of valves and devices such as drain/test, pressure relief valve, alarm connection (if installed), appliance bypass on multipurpose systems etc.
    - Reference nodes matching hydraulic calculations. (Node analysis data)
- Water flow information:
    - Flow location.
    - Static pressure, psi.
    - Residual pressure, psi.
    - Flow, gpm.

- Material data sheets for all devices in connection with the fire sprinkler system:
    - Each type of fire sprinkler head to be installed which list the manufacturer, identification number, style, model, orifice size, response type, temperature rating and K-factor.
    - Pipe and fittings. (required to be listed)
    - Hangers as the means of support for type of piping to be installed. (required to be listed)
    - Water supply components and connected devices which may restrict the water flow. (e.g. the water meter, backflow preventers, pressure-reducing valves, water softeners, water filters, etc.)

HYDRAULIC CALCULATIONS

A hydraulic calculation package will be submitted with each submittal for the installation of residential fire sprinkler systems. The calculation will determine if there is enough pressure at the water supply to deliver the required volume of water to the hydraulically most remote area.

The accumulation of pressure losses that will occur when the required volume of water flows through the system can be determined by the following steps:

- Identify the pressure needed to flow the required volume at the hydraulically most demanding sprinkler.
- Total the pressure losses from the friction and elevation changes between the water supply and the most demanding sprinkler.
- Deduct the pressure losses from the supply pressure, and compare the result with the required pressure.

If the calculation result exceeds the required pressure, it confirms that supply pressure will provide the design flow rate. If is not sufficient, designers have several options for increasing the available pressure.

- Reducing sprinkler spacing.
- Use of a more efficient pipe layout.
- Increase pipe diameters.
- Increase the water supply pressure.

The following information shall be contained in the hydraulic calculations:

- Calculations must conform to manufacturer specifications.
- “K” factors for all sprinklers.
- “C” factors for the type of piping to be used.

SYSTEM DESIGN

Prescriptive method of calculation

- California Residential Code Sec. R313.3.6.2 – R313.3.6.2.2
- NFPA 13D Sec. 8.4.10.1 – 8.4.10.2

OR

- Computer-based calculations. (example: UPONOR)

INSPECTIONS

- All inspections of the fire sprinkler system shall be made by a building inspector under the authority of the building official.
- Request for inspections shall be made on the automated phone system (713-4452). The inspection request line number and instructions is printed at the top of the permit card. Do not call the inspector for an inspection request.
- Request for inspections shall be made on the day prior, (up to mid-night), to the day of the inspection.
- Inspection times are slated for AM or PM. You may call the building department, (713-4444), on the day of the inspection to check who your inspector will be and to get the phone number of the inspector, to schedule a time to meet.
- The installer of the fire sprinkler system is recommended to be on the jobsite at the time of each inspection and/or testing of the system.
- One copy of the approved stamped plans shall be on the job site at the time of the inspection. The building inspector will not do any inspections on the fire sprinkler system without the approved set of plans and a permit card.
- The Complete Frame Inspection will not be approved until plans for the suppression system have been submitted and approved by the City and inspection made on the system.
- Inspection and/or test of the fire sprinkler piping, installation, hangars, etc., (Item # 49 on permit card), may be scheduled at the same time as the complete frame inspection, (Item # 17), of the dwelling.
- Final inspection for the suppression system, (Item # 102), may be scheduled at the same time as the final inspection, (Item # 106), for the dwelling.
- One set of plans for the fire sprinkler system shall remain within the home owner's package. This will be verified at the final inspection for the dwelling.

TESTING

• Fire sprinkler systems with a fire department connection (FDC). Not required for 13D systems.	2 hour test @ 200 psi
• Stand-alone fire sprinkler systems, (fire sprinkler systems independent of the domestic water system), and without a FDC.	2 hour test @ 100 psi.
• Multi-purpose fire sprinkler systems, (fire sprinkler systems inter-connected with the domestic water system), and without a FDC.	15 min. test @ line pressure

NOTES

The following notes shall be placed verbatim on the plans for the fire sprinkler system.

- Only new listed residential sprinklers manufactured after July 12, 2002 shall be installed.
- Only lead free sprinkler heads, valves and fittings shall be installed in multi-purpose fire sprinkler systems. (AB 1953)

OTHER REQUIREMENTS

In lieu of a waterflow alarm required by NFPA 13D Sec. 7.6 smoke detectors will be permitted as a substitute when installed as per NFPA 72 Standards.

- Sprinkler waterflow alarm-initiating devices. (NFPA 72 Sec. 5.10)
    - Initiation of the alarm signal shall occur within 90 seconds of waterflow at the alarm-initiating device when flow occurs that is equal to or greater than that from a single sprinkler of the smallest orifice size installed in the system.
    - Movement of water due to waste, surges, or variable pressure shall not initiate an alarm signal.
- Smoke detectors. (NFPA 72 Chap. 29)
    - All devices, combinations of devices, and equipment to be installed shall conform to Chapter 29. (Single and Multiple-Station Alarms and Household Fire Alarm Systems) Sec. 29.1.1
    - Specific location requirements. Sections 29.8.3-29.8.3.4
        - Shall not be installed within 36 inch horizontal path from a door to a kitchen or a bathroom containing a shower or tub.
        - Shall not be installed within a 36 inch horizontal path from the supply registers of a forced air heating or cooling system and shall be installed outside of the direct airflow from those registers.
        - Shall not be installed within 36 inch horizontal path from the tip of the blade of a ceiling-suspended paddle fan.
        - Flat ceilings. Shall not be located closer than 4 inches from the adjoining wall surface.
        - Peaked ceilings. Shall be located within 36 inch horizontally of the peak, but not closer than 4 inches vertically to the peak.
        - Sloped ceilings. Detectors mounted on a sloped ceiling having a rise greater than 1 foot in 8 feet horizontally shall be located within 36 inches of the high side of the ceiling surface and not further than 12 inches from the adjoining ceiling surface.
        - Wall mounting. Shall be located not closer than 4 inches from the adjoining ceiling surface and not further than 12 inches from the adjoining ceiling surface.
    - Wiring and Equipment. {NFPA 72 Sec. 29.8.5 & NEC Art. 760 (Fire Alarm Systems)}
        - An individual branch circuit shall be required for the supply of the power source. This branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.