



# EL DORADO COUNTY REGIONAL FIRE PROTECTION STANDARD

## Installation of Residential Fire Sprinkler Systems STANDARD #C-002 EFFECTIVE 03-19-2009

### PURPOSE:

To ensure that sprinkler plans submitted for review contain items necessary for approval prior to installation of systems in accordance with the latest approved edition of NFPA 13D, *Standard for the Installation of Sprinkler Systems in One and Two-Family Homes* (NFPA 13D).

### 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 the latest version of NFPA 13D, *Installation of Sprinkler Systems in One and Two-Family Dwellings and Manufactured Homes*, California Building Code 2007, California Fire Code 2007, local amendments, and other applicable national and manufacturer standards.

### AUTHORITY:

The latest approved edition of NFPA 13D and the California Fire Code, 2007 Edition, as adopted and amended by the Local Fire District

## 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 fire sprinkler system shall be installed by an individual who holds a State of California C-16 Contractor's License (for fire sprinklers) or, by an owner-builder of an owner-occupied, single-family dwelling.
- C. Designer: Plans shall be designed by a State of California 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. A C-16 Licensed Contractor shall only design systems that the firm has a contract to install.

## 2. PLANS SUBMITTAL PROCEDURE

- A. Submit for plan review at your local Fire Department/ Authority Having Jurisdiction (AHJ). A minimum of two sets of plans, hydraulic calculations, cut sheets, and the appropriate fees shall be submitted when the plans are turned in for review.
- B. Plans will be checked and if approved, will be stamped, signed and dated. The Fire District will retain one set.
- C. One copy of the Fire District stamped plans (Job Set) shall be maintained on the job site during inspection.
- D. All modifications/changes to existing systems may require a plan check and inspection by the Fire District.
- E. Field changes may require re-submittal of plans along with additional plan check fees.

### **3. SCHEDULING INSPECTIONS**

- A. The fee that is paid at the time of plan submittal will provide two inspections to complete the project (one at rough-in) static pressure test and one final inspection). Projects that exceed this limit may require additional fees that shall be paid prior to scheduling an inspection.
- B. It is the responsibility of the installing contractor/owner to be on the job site during the inspection with approved plans (Job Set). Failure to do so will result in the cancellation of the inspection. Cancelled inspections will be counted as one inspection and may require additional inspection fees.
- C. Inspection requests can only be taken from the installing contractor/owner.
- D. Contact the Fire District Inspector at least two business days prior to inspection for scheduling an inspection. Earlier inspections may be possible.
- E. Inspection times are approximate and may vary because of delays at previous inspections or emergency response by Fire District personnel. Please allow time on either side of the inspection time for the inspector to arrive.

### **4. GENERAL REQUIREMENTS**

- A. Additional Requirements to NFPA 13D
  - 1) Automatic sprinkler systems installed in one and two-family dwellings shall be installed throughout in accordance with NFPA 13D. Additional requirements for NFPA 13D sprinkler systems shall include:

- a) Automatic fire sprinkler protection shall be designed as follows (See also item 2 below):
  - Less than 2500 sq. ft. 2 Head Calculation
  - 2500 sq. ft. to 3500 sq. ft. 3 Head Calculation
  - Larger than 3500 sq ft 4 Head Calculation
- b) Automatic fire sprinkler protection shall extend to attached garages and basements. Fire sprinkler protection may extend to accessory structures within 20 feet of the main structure and may also be required to extend to other structures that are located further than 150 feet from fire apparatus access. See CFC Section 503.1.1
- c) Pilot sprinkler heads shall be installed in attic spaces that are more than 30 inches in depth. Pilot heads shall be installed over HVAC units, furnaces, hot water heaters, crawl access holes and areas used for storage (including storage areas in the garages). All pilot heads shall conform to the freeze protection requirements of the local AHJ.
- d) Fire sprinkler coverage may be required under open garage doors as required by the AHJ. All exposed piping shall conform to c) above and shall be protected from damage.
- e) Automatic fire sprinklers shall be provided under stairways.
- f) The main drain shall be a minimum ½ inch diameter.
- g) There shall be no control valve on the sprinkler side of the water supply. The main water control valve shall turn off both the domestic water as well as the fire sprinklers.
- h) Where required by the AHJ, the pressure reducing valve shall be removed from the main water supply and installed on the domestic water supply side only. This shall ensure an unrestricted water flow to the fire sprinklers.

#### B. Plan 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 address and Assessor's Parcel Number (APN).

- c) Name of sprinkler installer, address, phone number, type of license and license number.
- d) Total number of square feet to be covered by fire sprinklers.
- e) Point of compass.
- f) All plans must be to scale or dimension. The scale shall be no smaller than 1/8 inch=1 foot.
- g) 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.
- h) Piping plan showing tank, pump, and structure elevations as they relate to each other.
- i) Full height cross-section showing building construction types, vaulted, and beamed ceiling locations.
- j) Water tank details including size and type of construction (where applicable).
- k) Detailed hydraulic calculations (See item 2 below).
- l) Sprinkler head spacing.
- m) Show clearly all unsprinklered areas.
- n) Indicate manufacturer, style, model, orifice size, and “K” factor of each sprinkler used.
- o) Indicate the type and size of pipe.
- p) Hanger details.
- q) Indicate type of fitting used.
- r) Use of each room.
- s) Location of heat sources areas.
- t) Water flow information including:
  - Flow location

- Static pressure, psi
- Residual pressure, psi
- Flow, gpm
- Date
- Time
- Test conducted by or information supplied by\_\_\_\_\_.

2) 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.
- e) A 10% reduction in the available water pressure shall be included in all calculations.

3) The following notes shall be completed and placed verbatim on the working sprinkler plans:

- a) This residential sprinkler system shall be designed and installed in accordance with the latest edition of NFPA 13D and the Fire Department standards.
- b) Only listed and approved devices shall be installed in this system.
- c) Only new listed residential sprinklers shall be employed in the installation of this sprinkler system.
- d) A minimum of two 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.

- h) All primers and glues shall be listed and approved for use with CPVC piping in systems using CPVC pipe.
- i) Underground mains and lead-in connections shall be flushed before connection is made to sprinkler piping.
- j) A 10% reduction in the available water pressure shall be included in all calculations.
- k) This residential sprinkler system shall be tested and inspected at both rough and final inspection, prior to occupancy being granted. Call two working days in advance to schedule all inspections.
- l) A flow test of the installed system may be required by the AHJ to ensure that the proper flows are achieved.

#### C. 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 10 gpm minimum 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 the provision is made to prevent flow into the domestic water system upon operation of a sprinkler.

- 3) Where there is a large water flow due to irrigation or other outside water demands, and additional 5 gallons of water may be calculated to the system design as required by the AHJ
- 4) 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.
- 5) Any system prone to freezing (3000 feet and greater) may require an anti-freeze system per the AHJ.

#### D. 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 water pump shall activate automatically upon system demand and be self-priming and UL listed for electrical safety.
- 3) When a pump is used, provisions shall be made to protect the pump from exposure to freezing and/or damage.

#### E. Water Storage Tanks

- 1) If the sprinkler system is not being supplied by a public water service of sufficient flow and pressure, a water tank shall be installed that conforms to the Residential Water Supply without a Purveyor Standard (D003).

#### F. 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 a ¼ turn ball valve.
- b) The valve shall control both the domestic water system and the automatic sprinkler system.
- c) An approved rubber faced check valve shall be located on the system side of the main control valve.
- 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, 2002 shall be installed. Sprinklers manufactured prior to July 12, 2002 can be used as replacement sprinklers on existing systems.
- b) Pilot sprinkler heads shall be installed in attic spaces that are more than 30 inches in depth. Pilot heads shall be installed over HVAC units, furnaces, hot water heaters, crawl access holes and areas used for storage.

- c) 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.
  - d) Fire Sprinklers may be required for covered porches or decks that have fireplaces or cooking areas.
- 3) Pressure Gauge
- a) 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.
- 5) Interior Audible Device
- a) Upon activation of the fire sprinkler system, an interior sounder shall sound an alarm inside the building, capable of being heard in all sleeping rooms, and in accordance with NFPA 72.
- 6) The system shall have an audible/ visual device or bell that is mounted at an approved location. The device shall be activated from the riser flow switch and shall sound at approximately 45 seconds after fire sprinkler head activation.
- 7) The audible/visual device or bell shall be identified with a sign that reads “Call 911 When Ringing”. Size and location shall be approved by the Fire Department.
- 8) A fire sprinkler system may require monitoring by the AHJ if the structure is deemed remote or sparsely occupied (i.e. seasonal use...).

#### G. System Design

- 1) Systems shall be designed and calculated in accordance with NFPA 13-D Chapter 8 “Systems Design.”



## **5. TESTING PROCEDURE**

- A. Indicate the manufacturer, model, type, and pump curve of the booster pump (where applicable).
- B. The sprinkler system shall be field tested and inspected at the rough plumbing stage (i.e. exposed pipe and fitting stage) by the AHJ. All systems shall be hydrostatically tested (not pneumatic) for leakage at 150 lbs. for not less than a 30 minute time period.
- C. The sprinkler system and all of the related components (i.e. flow switch, audible interior alarm, exterior bell or horn/ strobe device...) shall be tested and inspected by the AHJ at the final inspection stage, prior to occupancy being granted.
- D. A flow test of the installed system may be required by the AHJ to ensure that the proper flows are achieved.
- E. Contact the AHJ at least two business days prior to inspection for scheduling an inspection. Earlier inspections may be possible.

## **6. MANUFACTURED HOMES AND MULTI-UNIT MANUFACTURED HOUSING WITH TWO DWELLING UNITS**

- A. The Department of Housing and Community Development is responsible for plan approval, in-plant inspection, testing and installation of fire sprinkler systems installed in new manufactured housing units and multi-unit manufactured housing with two dwelling units for sale in California. Prior to shipment of a home containing a fire sprinkler system, the factory is required to affix a "Fire Sprinkler System Information and Installer Certification" label inside the unit that provides detailed information for the on-site installer and homeowner use. The label is required to be affixed on an inside wall or door of the water heater compartment.
- B. The installation of a fire sprinkler system in an existing manufactured home or multi-unit manufactured home with two dwelling units requires prior design approval from the Department of Housing and Community Development and inspection approval of the installation prior to the installer covering the piping material with finished wall or ceiling materials. Only the occupant homeowner or a fire protection contractor holding a valid C-16 license may install a fire sprinkler system in an existing manufactured home or multiunit manufactured home with two dwelling units.
- C. The Fire Department is responsible for the final plan check for fire flow and to ensure the above requirements are met.