C I T Y O F S E L M A

F I R E D E P A R T M E N T

Informational Bulletin Regarding
Residential Fire Sprinkler Systems for One and Two Family Homes:
Frequently Asked Questions

ADMINISTRATIVE PROVISIONS:

1. **Q**: *When does the requirement for the installation of residential fire sprinklers take effect?*
   A: The requirement commences January 1, 2011 with the effective date of the 2010 California Codes. All permits obtained for one and two family approved standard plan homes obtained on or after this date shall include the installation of residential fire sprinklers. The effective date for custom homes will be the date of house plan submission to the Building Department. The standards for this installation are the 2010 edition of NFPA 13D or Section R313.3 of the 2010 edition of the California Residential Code.

2. **Q**: *Will Fire Department be inspecting residential sprinkler system installations?*
   A: Inspections of the installations will be initially conducted by the Fire Department; however, inspections of tract home fire sprinklers may transition in the future to Building Department inspectors subject to further discussion between the two departments.

3. **Q**: *Can a Plumbing Contractor with C-36 license install residential fire sprinklers?*
   A: No. As required by the State of California Business and Professions Code and the Contractors State Licensing Board (CSLB) only a C-16 Fire Protection Contractor may install fire sprinklers. There currently are a limited number of plumbing contractors in California who possess both the C-36 and C-16 license.

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4. **Q**: *Who may design residential fire sprinkler systems?*
   A: A C-16 Fire Protection Contractor may design, submit plans, and obtain installation permits only for those systems that are installed under their license. Residential fire sprinkler system plans prepared by a California licensed mechanical or fire protection professional engineer (PE) may be used for installation purposes by any C-16 contractor.

5. **Q**: *Which City department will review the plans for residential fire sprinkles?*
   A: For "stand-alone" systems (fire sprinklers supplied by a separate interior system piping from the domestic cold water system), the Fire Department will review the plans. Stand alone systems will require a deferred submittal directly to the Fire Department. For "multi-purpose" systems (fire sprinklers and domestic cold water fixtures on the same piping system) a joint plan review will be conducted by the Fire and Building Departments.

6. **Q**: *I have numerous "standard plans" on file with the Development Department, how should I proceed with updating these plans to reflect the new requirements?*
   A: The Building Department recently issued a bulletin informing developers of the effective date of the 2010 California Building Code Standards. All standard plans must be approved for the 2010 Code revisions prior to January 1, 2011 in order to obtain permits on or after this date. Developers are encouraged to submit fire sprinkler plans as early as possible before the end of the year due to the anticipated volume of plan reviews.

7. **Q**: *How will the permit issuance for residential sprinkler systems be handled?*
   A: The C-16 contractor installing the systems will obtain a permit for each house from the Fire Department for stand-alone systems. Details on the permits for multi-purpose piping systems have yet to be determined.

WATER SUPPLY ISSUES

8. **Q:** *Do I need a separate water service to supply residential fire sprinklers?*
   A: No. The design standard allows use of a standard domestic water service to supply both fire sprinklers and domestic water using a common metered service.

9. **Q:** *Is the standard tract home one inch service adequate to provide water for both domestic use and residential fire sprinklers?*
   A: In many cases yes, however:
   - If the one inch domestic service is done in polyethylene (PE) tubing, as has been past practice, it will be more challenging for the fire sprinkler design professional due to the interior diameter of PE tubing.

- A typical residential sprinkler system design will have a demand of approximately 31 gallons per minute, which includes a required simultaneous 5 gpm domestic demand.
- Demand may be higher for house designs with sloped ceilings exceeding 4 in 12, beamed or coffered ceiling, or where sprinkler head spacing in excess of 16' X 16' is chosen by the design professional.

10. **Q**: *We have several tracts where the utilities have been installed and we are waiting for the market to turnaround before proceeding with construction of new homes. Will we have to change the water services?*

    A: No. However, as noted in the answer to question #9, the fire sprinkler design professional will need to be creative in their design which may include larger pipe in the house, additional looping of lines, use of reduced spacing sprinklers with lower water demand, and, for some house designs, a booster pump may be needed.

11. **Q:** *Is a UL/FM listed fire pump required for home fire sprinklers as is required* for *commercial installations?*

    A: No. However, State amendments to the installation requirements include a provision that when a booster pump is needed, it must serve both domestic water and fire sprinkler piping in order to enhance reliability of the pump. The size of pump needed will be determined by the fire sprinkler design professional based on system demand. It is anticipated a pump in the range of 40 gpm at 30 psi will be needed. For multi-purpose systems, the maximum pressure rating for plumbing fixtures must be taken into consideration in choosing a pump. The pump shall be approved for use in potable water systems in California and have brass or stainless steel operating components for reliability.

12. **Q:** *Are there any other special conditions regarding the City water service that the fire sprinkler design professional should be aware of?*

    A: Yes. The design professional needs to consider the following factors:
    - The hydraulic calculation for standard plan homes needs to be based on a far side service connection.
    - The nominal inside diameter of SDR-9 CTS 3408 PE tubing is:
      1 inch = .863"
      1-1/2 inch = 1.245"
      2 inch = 1.629"
    - For purposes of determining friction losses: the Badger Recordall Model 55 is the current water meter specified by the Water Division for 1" inch services. 1-1/2 inch and 2 inch services use the Neptune T-10 water meter.

- The following equivalent feet friction loss must be included for the corp stop and angle meter stop devices on the service.
  1 inch = 10.6 feet
  1-1/2 inch = 13.8 feet
  2 inch = 15.1 feet

13. **Q:** *Is there a requirement for a special backflow prevention device for residential fire sprinklers.*
A: No for one and two story houses. Yes for three story houses. A backflow device is required whenever residential plumbing fixtures or fire sprinklers are located above the second floor. Note that the friction loss from a double check or reduced pressure backflow device will place severe design constraints in supplying adequate water pressure for 3rd floor residential sprinklers and plumbing fixtures without a booster pump.

REQUIREMENTS WITHIN THE HOUSE

14. **Q:** *I have heard that there is a prescriptive design standard that may be used in lieu of hydraulic calculations for home fire sprinklers?*
A: Yes. Both NFPA 13D and the California Residential Code allow use of a prescriptive pipe sizing method in lieu of hydraulic calculations. However, be advised that these prescriptive methods are conservative and with 40 psi for available water pressure for design purposes may not be feasible. In general, a hydraulic calculation results in smaller pipe sizing than prescriptive methods.

15. *Am I required to have a separate piping system for sprinklers and domestic water or can a system be designed with common piping?*
A: A multi-purpose piping design is allowed using the cold water distribution system. The hydraulic calculation and piping design to assure adequate delivery of water to the sprinkler head at the minimum flow and pressure must be carefully done by the design professional. The pipe or tube and fire sprinkler fittings for multi-purpose systems must be listed for residential fire sprinklers in accordance with UL 1821.

16. **Q:** *What type of pipe or tube is required for residential sprinklers?*
A: The water distribution pipe or tube must be UL listed for fire sprinklers for both multi-purpose and stand-alone systems. The dominate material used until recently for single and duplex homes has been CPVC (Chlorinated Polyvinyl Chloride) in stand-alone piping systems. Three major distributors of PEX tubing (Uponor, REHAU, and Zurn) have received UL 1821 listings for their tubing and fire sprinkler head fittings for use in multi-purpose systems only.

17. **Q:** *Are there special requirements for hanging residential sprinkler pipe or tube?*
A: Yes. In general, pipe or tube must be supported in accordance with the manufacture's listing or NFPA 13D as applicable. Sprinkler pipe or tube must be supported in a manner that prevents movement of the sprinkler head. For PEX tubing, the fire sprinkler head adaptor attaches to the ceiling framing members. For CPVC, there are specific hanger distance requirements for the pipe and from the sprinkler tee fitting per the manufacturer's installation guidelines. Copper pipe hanging is governed by NFPA 13D.

18. **Q:** *Is there an issue with pipe freezing or being subjected to high summer temperatures in the attic?*
A: Yes. All attic piping needs to be covered with insulation. Pipe or tube diameters may be as small as ¾" and could freeze even in our relatively mild winters. Manufactures also required that PEX and CPVC be protected from the excessively high attic temperature that we experience in the valley.

19. **Q:** *What areas of the house must have fire sprinklers?*
A: In general, most living space within the house must be provided with fire sprinklers. A state amendment requires that sprinklers be installed in attached garages using residential sprinklers. The following areas do not require fire sprinklers: unfinished attics, open porches and patios, small closets without mechanical equipment, and bathrooms under 55 square feet. Where mechanical equipment is installed in attics, a single fire sprinkler is required to be installed over the unit.

20. **Q:** *Is there a requirement for a "pilot" sprinkler head in the attic for use in detecting attic fires?*
A: No. However, many new homes are designed with fuel fired mechanical equipment installed in the attic. A fire sprinkler head must be installed over such units within 12 inches of the roof deck. Because of attic temperatures, a commercial type quick response fire sprinkler with a minimum 200F temperature rating must be used. When using non-metallic CPVC or PEX to supply this sprinkler, the pipe must be protected with a 15 minute thermal barrier. Copper or internally galvanized steel approved for potable water may be used in this application and does not require the thermal barrier.

21. **Q:** *Are there fire sprinkler system design issues that need special attention on these existing standard house plans and on future plan submissions?*
A: Yes. Your fire sprinkler system design professional needs to address issues such as ceiling fan and light fixture locations, distance of fire sprinklers from heat

sources (fire places, HVAC registers, kitchen stoves, etc), and beamed or coffered ceilings. As changing of light fixtures is a common homeowner improvement, fire sprinklers need to be located a minimum of 36" from the centerline of ceiling electrical junction boxes. Under stair storage closets are often missed in fire sprinkler design

22. **Q:** *Are the types of fire sprinklers used in house the same as in commercial systems?*
A: They are similar. Residential fire sprinklers are somewhat smaller, have a different discharge pattern, require less water to operate effectively, and are tested to a different UL Standard. The minimum flow and pressure for the most commonly used residential sprinkler is 13gpm at 7 psi. As with commercial applications, residential fire sprinkles are available in semi-recessed or concealed configurations. Note that concealed sprinklers cannot be used in garages or areas with temperature in excess of 100F because the concealed plate will eventually fall off. A semi-recessed or pendent, 175F rated residential sprinkler is needed in these areas.

23. **Q:** *Is there a 200 psi pressure test required for residential sprinkler systems as is required for commercial fire sprinkler systems?*
A: No. Both multi-purpose and stand-alone systems may be hydrostatically tested at normal system operating pressure as required for domestic plumbing.

24. **Q:** *Is a separate shut-off valve permitted for the residential sprinkler system?*
A: No. The intent of installation the standards is that fire sprinklers cannot be shut-off independent of the domestic water supply to the home. For stand-alone fire sprinkler systems, a shut off valve is installed before the split between sprinklers and domestic, and an additional valve is installed for the domestic lateral. This allows working on plumbing fixtures while still retaining fire sprinkler protection. For multi-purpose piping systems there is no way to shut off fire sprinklers independent of the domestic water plumbing.

25. **Q:** *Is an interior or exterior alarm bell required for residential sprinkler systems?*
A: No. We are not proposing a local amendment to require an alarm bell. While 93% of California fire jurisdictions that currently have local residential fire sprinkler ordinances require an outside alarm bell, this requirement was not included in the State adoption of residential fire sprinklers. One reason for this is that the future of residential fire sprinkler installation will most likely be multi-purpose piping systems where water use from domestic fixtures may activate any water flow switch installed. There are listed water flow switches available now that will only activate upon flow in excess of 11 gpm (most residential fire sprinklers flow a minimum of 13 gpm), but this technology is relatively new and

it's long term reliability is unknown. Those developers installing residential sprinklers on separate piping systems within the house should not hesitate to provide a local outside bell and the ability to connect to an alarm company. While the required smoke detectors will sound an interior alarm before fire sprinklers activate, an outside bell can warn a passerby of an interior fire when the home owner is away.

26. **Q:** *Is a residential fire sprinkler system required to be monitored by an alarm company?*

    A: No. There is no requirement for connection to an alarm company. Such connection is a desirable option when a stand-alone residential sprinkler system is installed. As discussed in question #26, use of a special water flow switch would be necessary on a multi-purpose piping system.

27. **Q:** *Is the installation of a water softener affected by the new residential fire sprinkler requirement?*

    A: For a multi-purpose piping system, a water softener device has a significant effect on available water pressure and use of such devices may be precluded. For stand-alone piping systems, the fire sprinkler piping will be connected ahead of the water softener and will have no effect on fire sprinkler operation.

28. **Q:** *Am I required to provide spare fire sprinklers for each house?*

    A: Yes. A spare sprinkler kit that contains one of each type of sprinkler used in the house and associated special wrench(es) is required to be installed in the laundry room or laundry closet.

29. **Q:** *Are there any additional requirements I should be aware of?*

A: Yes. A homeowner information sheet shall be permanently installed adjacent to the spare sprinkler head kit. The information on the instruction shall be approved by the Fire Department. An example an acceptable information sheet is available from our office.

If you have any additional questions please contact either the fire department at 559-891-2211 or the building department at 559-891-2200.