

RESIDENTIAL FIRE SPRINKLER SYSTEMS

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Fady's Bio

- Work History:
 - JAS Pacific, Building & Safety Firm—current—5 years:
 - President
 - City of Long Beach, Building Department—5 years:
 - Director of Building
 - California Building Standards Commission—8 years:
 - Vice Chairman
 - County of Los Angeles, Building and Safety—30 years:
 - Assistant Building Official
 - Chief Plumbing and Mechanical Engineer
- Education and Certification
 - BS & MS Mechanical Engineering
 - Licensed Mechanical Engineer
 - Certified Building Official
 - Certified Instructor

CRC R313

- Automatic Fire Sprinklers shall be installed in Townhouses and SFD & duplexes
 - Exception: additions & alterations to existing without sprinklers
- Applies to “Stand-alone” and “Multipurpose”
- Only “wet” systems (*13D-Dry system*)
- No anti-freeze (*13D-Anti-freeze-Propylene Glycol-problems; max 40%*)

SPRINKLER SYSTEM TYPES-1

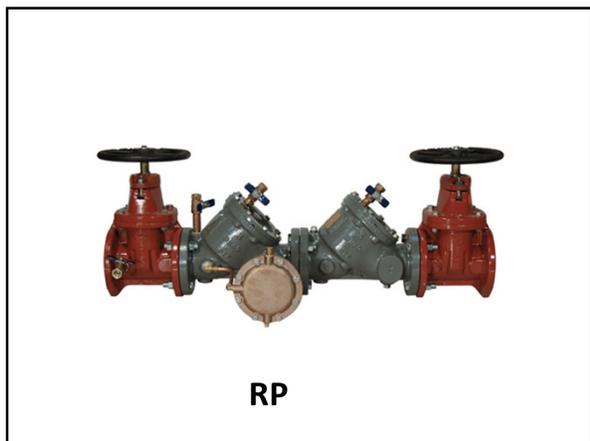
- NFPA 13
 - Closed systems (check valve-alarm-FD Connection)
 - Anti-freeze
 - Dry systems
- Typically, backflow protection is required
 - DC or RP (depending on the type of hazard)
 - Detectors – DC or RP

TYPES OF HAZARD

- Contamination-High Hazard
- Pollution-Low Hazard

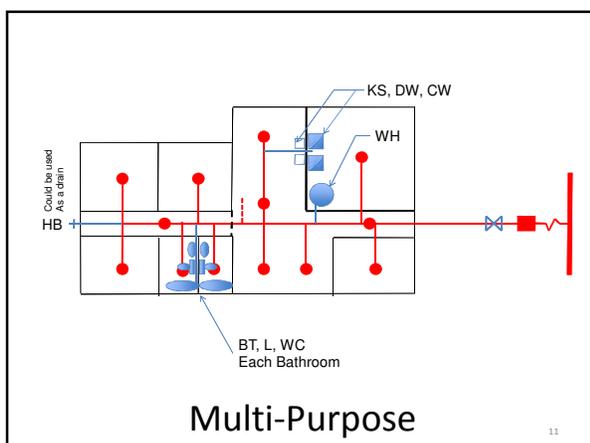
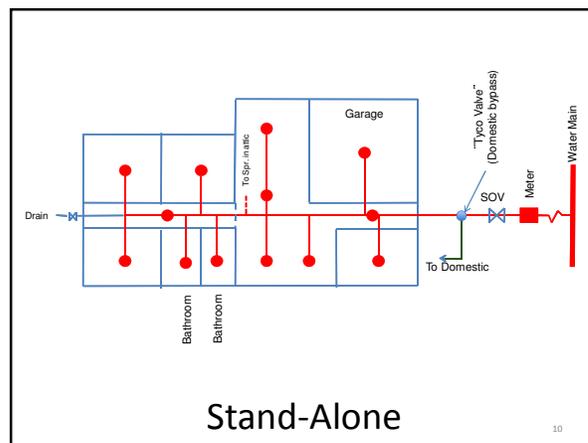


DC



SPRINKLER SYSTEM TYPES-2

- NFPA 13D
 - Stand-Alone vs. Multi-purpose



BACKFLOW PROTECTION

- Public Water System vs. potable water within the building
 - UPC
 - CPC
 - NFPA 13
 - NFPA 13D
 - Task Force

Preface

This document is Part 1 of a 3-part series regarding issues related to the adoption of regulations in preparation for a statewide residential fire sprinkler requirement for new construction scheduled for implementation January 1, 2011. This part is known as the **Residential Fire Sprinkler/Water Purveyor Task Force**.

On October 9, 2008, the Office of the State Fire Marshal convened representatives from various disciplines related to water supply and how it relates to residential fire sprinklers. The purpose of the Residential Fire Sprinkler/Water Purveyor Task Force was to provide information and suggested recommendations to the State Fire Marshal on all water supply issues related to residential fire sprinkler systems and to recommend strategies for solutions.

Our key stakeholders include members of the California Fire Service, Building Industry, Building Officials, Water Purveyors, American Water Works Association, Public Health Officials, State agencies, National Fire Protection Association, National Fire Sprinkler Association and the California League of Cities.

It is recommended that the reader review Health & Safety Code 116279 - 116820, American Waterworks Association Manual 14 & 31, and Residential Fire Sprinkler Manual NFPA 130.

DC:WHS - Original Residential Fire Manual 11

CONNECTION CONFIGURATION SUB-GROUP

INTRODUCTION

A water supply connection, whether provided by a quasi-governmental agency, public utility, or private supply source, supplies water for public and private uses and must always consider health, safety and economics. Configuration of connections is provided to supply adequate pressure and flow as economically and reliably as possible.

PHASE I RECOMMENDATIONS

1. Recommendations a configuration with the following characteristics:
 - a. Single lateral feed from main; branching from the domestic supply to the meter. Least cost, simplest design, provides greatest flexibility.
 - b. Service sized based upon sprinkler demand and/or domestic (including irrigation) demand - worst case, without concern for simultaneous demand. Issues of designing to minimize simultaneous demand by requiring private domestic shutoff valve complicated household design but it is an option open to the individual agency. 1-inch meters are generally acceptable if based on these criteria.
 - c. Service sized as per agency policy. Shutoff ability is required by the water purveyors for a variety of reasons. Agencies should use best practice to worst shutoff policies to include potential loss of fire sprinkler protection and take appropriate measures to limit potential liability associated with discontinuing fire protection service. (Consider alternate design and possible hold harmless clause as part of Phase II discussion.)
 - d. Metering per purveyor/agency policy (and commonly by guiding practices or statutes) with exception from fire rating for residential application.
 - e. Include maximum flexibility in the service configuration, which allows agencies to use existing policies, procedures and time-tested material resulting in appropriate cost for long-term reliability.
 - f. Continue the water industry standard that facility costs are 100 percent captured in the fees directly associated with installation, maintenance, reading, and replacement of the meters.

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2. Recommendations for type/listing of meter; meter size/arrangement; meter versus no meter.
 - a. Social: Not applicable - the configuration has no impact positive or negative on society.
 - b. Technological: Current technology is available. Selection of particular meter and configuration to be in keeping with agency's policies and engineering requirements based on demand flows.
 - c. Economical: Configuration is a water purveyor decision based on cost and technical factors. Standby charges based on local rate structure developed on a case-by-case basis. Meter type and size directly impact the cost of maintenance and replacement of the meters but can be minimized through design considerations and design criteria (i.e. rating meters, separate connections, and backflow devices).
 - d. Environmental: Potential positive impact; reduces impacts of fires on the community.
 - e. Political: Variable in that size of service and meter will affect cost and that can raise questions like what is driving the meter size, for what benefit, and at what cost? Who should pay? Water purveyors charge the beneficiary, i.e., the customer. Sizing of the meter is based on maximum flow rate, which can be either the aggregate of domestic and fire sprinkler flow or one or the other, whichever is larger. Since cost, benefit, and configuration are all a function of independent agencies, political implications are intrinsically present.
3. Recommendations for rural versus municipal supply.
 - a. Social: No specific differences in terms of configuration.
 - b. Technological: Current technology is available though water supply capability may be quite different. Municipal is likely more reliable in terms of supply owing to larger base of resources to operate and maintain the system.
 - c. Economical: No difference in configuration, but supply facilities may be affected, i.e., onsite storage tank or large well flowing to the sprinkler flow if additive.
 - d. Environmental: Feasibility of configuration supports minimizing use of materials in construction.

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4. Recommendations for backflow protection.
 - a. Social: Optional backflow does not provide 100 percent guarantee of backflow protection, however, protection is in keeping with current level of overall protection.
 - b. Technological: Current backflow prevention technology is available. The main unknown is the issue of contamination of domestic water (both the specific home and public system from state water in the sprinkler piping system). Solutions are available (if it is a problem), but not well studied. A key point is the number of opportunities for contamination will increase significantly if the requirement for sprinklers is ubiquitous. At present, no specific problems are obvious and some purveyors require residential backflow prevention as a result of water quality concerns.
 - c. Economical: Backflow prevention is a cost and requires annual maintenance and inspection. Typically, homeowner would pay for installation and maintenance and agency would inspect for a fee. Configuration alternatives would affect cost depending on size, type and location of the backflow prevention device.
 - d. Environmental: Minimize use of materials in construction.
 - e. Political: By providing both Best Management Practices and local flexibility, political support is maintained. Recommend further study by industry (perhaps Water Research Foundation, Denver, Colorado).
5. Recycled water - not considered a necessary concern at this time as it is unlikely that this would be a cost-effective or even safe separation of recycled water for residential even if an adjacent supply were available in that a dual system would be required (in terms of both meter and purveyor) and the issue of homeowner-performed plumbing and cross connections would be a concern (nearly impossible to prevent or inspect).
6. Recommendations for water supply criteria - pressure/flow/duration.
 - a. Social: Ensuring a coordinated approach to purveyor supply, configuration, and cost with other regulatory agencies (State and fire agencies) for an adequate water supply is in the best interest of the citizens.
 - b. Technological: Current technology is available. Water purveyors can ensure adequate flow and pressure by design. Duration is normally not an issue for an urban water purveyor as the distribution storage and pumping is driven by larger domestic demands of numerous customers and fire flows from hydrants.

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ISSUES OF CONCERN

- Pipe/tubing material
 - Iron, Copper, CPVC, PEX (listed for sprinklers)
 - Flushing requirements (Section 609.9 CPC for all)
 - Flushing requirements CPVC (Section 604.1 CPC)
 - Flushing requirements PEX (Section 604.1.2 CPC)

609.9 Disinfection of Potable Water System. New or repaired potable water systems shall be disinfected prior to use whenever required by the Authority Having Jurisdiction. The method to be followed shall be that prescribed by the Health Authority or, in case no method is prescribed by it, the following:

609.9.1 The pipe system shall be flushed with clean, potable water until only potable water appears at the points of outlet.

609.9.2 The system or parts thereof shall be filled with a water-chlorine solution containing not less than fifty (50) parts per million of chlorine, and the system or part thereof shall be valved-off and allowed to stand for twenty-four (24) hours; or, the system or part thereof shall be filled with a water-chlorine solution containing not less than two-hundred (200) parts per million of chlorine and allowed to stand for three (3) hours.

609.9.3 Following the allowed standing time, the system shall be flushed with clean, potable water until the chlorine residual in the water coming from the system does not exceed the chlorine residual in the flushing water.

609.9.4 The procedure shall be repeated if it is shown by bacteriological examination made by an approved agency that contamination persists in the system.

604.1.1 Local Authority to Approve CPVC Pipe Within Residential Buildings Under Specified Conditions [HCD1 & HCD2] The local responsible building official of any city, county, or city and county, shall authorize by permit the use of CPVC for hot and cold water distribution systems within the interior of residential buildings provided all of the following conditions are satisfied:

(a) **Permit Conditions.** Any building permit issued pursuant to Section 604.1.1 shall be conditioned on compliance with the mitigation measures set forth in this section.

(b) **Approved Materials.** Only CPVC plumbing material listed as an approved material and installed in accordance with this code may be used.

(c) **Installation and Use.** Any installation and use of CPVC plumbing material pursuant to this section shall comply with all applicable requirements of this code and Section 1.2.2 of Appendix 1 of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO IS 20-2005.

(d) **Certification of Compliance.** Prior to issuing a building permit pursuant to Section 604.1.1, the building official shall require as part of the permitting process that the contractor, or the appropriate plumbing subcontractors, provide written certification: (1) that he or she will comply with the flushing procedures and worker safety measures set forth in Section 1.2.2 of Appendix 1 of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO IS 20-2005; and (2) that he or she will comply with the flushing procedures and worker safety measures set forth in Section 1.2.2 of Appendix 1 of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO IS 20-2005.

(e) **Worker Safety.** Any contractor applying for a building permit that includes the use of CPVC plumbing materials authorized pursuant to this section shall include in the permit application a signed written certification stating that:

- (1) They are aware of the health and safety hazards associated with CPVC plumbing installations;
 - (2) They have included in their Injury and Illness Prevention Plan the hazards associated with CPVC plumbing pipe installations; and
 - (3) The worker safety training elements of their Injury and Illness Prevention Plan meet the Department of Industrial Relation's guidelines.
- (f) **Findings of Compliance.** The building official shall not give final permit approval of any CPVC plumbing materials installed pursuant to Section 604.1.1 unless he or she finds that the material has been installed in compliance with the requirements of this code and that the installer has complied with the requirements in Section 1.2.2 of Appendix 1 of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO IS 20-2005.
- (g) **Penalties.** Any contractor or subcontractor found to have failed to comply with the ventilation, glove or flushing requirements of Section 1.2.2 of Appendix 1 of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO IS 20-2005 shall be subject to the penalties in Health and Safety Code, Division 13, Part 1.5, Chapter 6 (Section 17995 et seq.). In addition, if during the course of any building inspection the building official finds that the ventilation and glove requirements of Section 1.2.2 of Appendix 1 of this code, Special Requirements for CPVC Installation within Residential Buildings, "are being violated, such building officials shall cite the contractor or subcontractor for that violation."

IS-20-2006

1.2 Special Requirements for CPVC Installation within Residential Structures. [HCD 1] In addition to the other requirements in the California Plumbing Code and this Appendix for the installation of CPVC Solvent Cemented Hot and Cold Water Distribution Systems, all installations of CPVC pipe within residential structures shall meet the following:

1.2.1 Flushing Procedures. All installations of CPVC pipe within residential structures shall be flushed twice over a period of at least one (1) week. The pipe system shall be first flushed for at least 10 minutes and then filled and allowed to stand for no less than 1 week, after which all the branches of the pipe system must be flushed long enough to fully empty the contained volume. At the time of fill, each fixture shall have a removable tag applied stating:

"This new plumbing system was first filled on (date) by (name). The California Department of Housing and Community Development requires that the system be flushed after standing at least one week after the fill date specified above. If the system is used earlier than one week after the fill date, the water must be allowed to run for at least two minutes prior to use for human consumption. This tag may not be removed prior to flushing, except by the homeowner."

604.1.2 PEX. All installations of PEX pipe where it is the initial plumbing piping installed in new construction shall be flushed twice over a period of at least one week. The pipe system shall be first flushed for at least 10 minutes and then filled and allowed to stand for no less than 1 week, after which all the branches of the pipe system must be flushed long enough to fully empty the contained volume. This provision shall not apply to the installation of PEX pipe where it replaces an existing pipe system of any material.

(1) At the time of fill, each fixture shall have a removable tag applied stating:

(a) "This new plumbing system was first filled and flushed on (date) by (name). The State of California requires that the system be flushed after standing at least one week after the fill date specified above. If this system is used earlier than one week after the fill date, the water must be allowed to run for at least two minutes prior to use for human consumption. This tag may not be removed prior to the completion of the required second flushing, except by the building owner or occupant."

(2) Prior to issuing a building permit to install PEX pipe, the building official shall require as part of the permitting process that the contractor, or the appropriate plumbing subcontractors, provide written certification that he or she will comply with the flushing procedures set forth in the Code.

(3) The building official shall not give final permit approval of any PEX plumbing installation unless he or she finds that the material has been installed in compliance with the requirements of the Code, including the requirements to flush and tag the systems.

(4) Any contractor or subcontractor found to have failed to comply with the PEX flushing requirements shall be subject to the penalties in Health and Safety Code, Division 13, Part 1.5, Chapter 6 (Section 17995, et seq.).

ISSUES OF CONCERN

- Sprinkler heads and California Lead Law



California State Fire Marshal
Information Bulletin 11-05

Issued: August 24, 2011

Lead Free Residential Fire Sprinkler Heads

The purpose of this information bulletin is to advise local code enforcement agencies and interested parties of information pertaining to the use of low lead components within residential plumbing systems.

The requirement for low lead components is by legislative action specifically 2006 Assembly Bill 1489, Chapter 853, which states that the bill, commencing on January 1, 2007, revised the prohibition to apply to any pipe or plumbing fitting, or fixture intended to convey or dispense water for human consumption. Health and Safety Code, Section 116875. (a) reads "No person shall use any pipe, pipe or plumbing fitting or fixture, solder, or flux that is not lead free in the installation or repair of any public water system or any plumbing in a facility providing water for human consumption." The intent of the referenced section of the Health and Safety Code is to address plumbing components used for human consumption. Health and Safety Code, Section 25214.4.3 lists the listing and evaluation requirements to those items subject to Health and Safety Code, Section 116875. Furthermore, Section 116875 provides direction for items that are not subject to its requirements, which includes several solder, leaded brass connectors for nonpotable services such as irrigation and industrial, and water distribution main gate valves that are two inches in diameter and above. Pipes, pipe or plumbing fittings, or fixtures that are used in manufacturing, industrial processing, for irrigation purposes, and any other use where the water is not intended for human consumption through drinking or cooking are not subject to Section 116875.

Based on the information provided in the Health and Safety Code and information contained in the original published guidance from the author of AB 1489, the Department of Toxic Substances and Control and CAL FIRE - Office of the State Fire Marshal notice that provisions of the Health and Safety Code 25214.4.3 is not intended to require residential fire sprinkler heads to be tested and evaluated, and the product is excluded from the requirements of Health and Safety Code, Section 116875.

Inquires concerning lead in plumbing may be directed to the Department of Toxic Substances Control. For more information please visit: <http://www.dtsc.ca.gov/Lead/Lead%20in%20Plumbing/Pages/default.aspx>

For more information please visit our website: <http://www.calfire.ca.gov>

ISSUES OF CONCERN

602.0 Unlawful Connections.

602.1 No installation of potable water supply piping or part thereof shall be made in such a manner that it will be possible for used, unclean, polluted, or contaminated water, mixtures, or substances to enter any portion of such piping from any tank, receptor, equipment, or plumbing fixture by reason of back-siphonage, suction, or any other cause, either during normal use and operation thereof, or when any such tank, receptor, equipment, or plumbing fixture is flooded or subject to pressure exceeding the operating pressure in the hot or cold water piping.

ISSUES OF CONCERN

- Dead end?
 - Connect to a frequently used fixture (WC) close to end of line



Technical Services: Tel: (800) 381-9312 / Fax: (800) 791-5500



Model RSV-1 Residential Domestic Shutoff Valve 1 Inch (DN25) For Dual Purpose Residential Water Supply

General Description

The Rapid Response™, Model RSV-1 Residential Domestic Shutoff Valves are intended for use in dual-purpose residential water supply piping that serves both domestic and NFPA 13D residential fire protection sprinkler system needs.

When a fire sprinkler operates, the RSV-1 Valve will automatically shut off water flow to the domestic system and divert the available water supply to the fire sprinkler system. Consequently, when the RSV-1 is utilized, the system designer need not add the domestic flow demand to the fire sprinkler system flow demand.

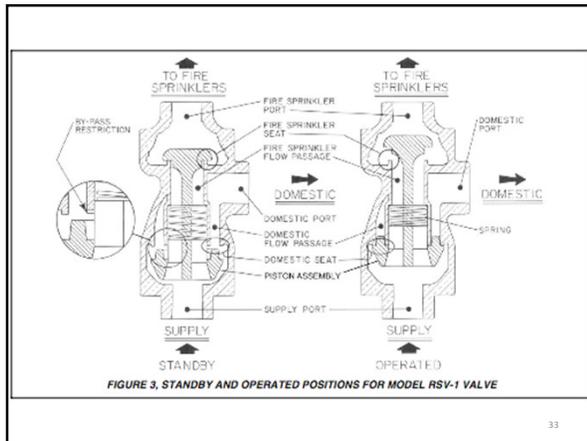
WARNING

The Model RSV-1 Residential Domestic Shutoff Valves described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

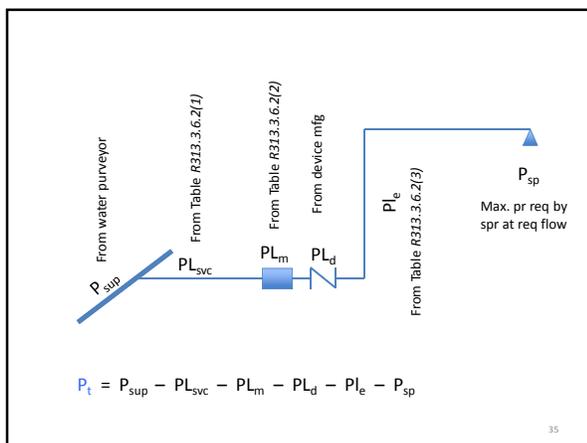


Technical 32



Other Issues

- Do we have a choice?
- Two heads maximum CRC/NFPA 13D
- Calculations:
 - Tables (same in both)-includes supply from water main, meter losses, etc
 - Hydraulic calcs
 - Computer program (HASS)



- CRC/13D Prescriptive Method, Cont'd:
 2. Calculate available pressure (P_t):

$$P_t = P_{sup} - PL_{svc} - PL_m - PL_d - PL_e - P_{sp}$$

- P_t = Pressure used in applying Tables (to offset for friction loss)
- P_{sup} = Pressure available from water supply source
- PL_{svc} = Pressure loss in water service pipe (from main to meter)
- PL_m = Pressure loss in meter
- PL_d = Pressure loss from other devices (e. g. regulator)
- PL_e = Pressure loss due to elevation
- P_{sp} = Maximum pressure required by a sprinkler

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QUESTIONS?

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