

**California State Fire Marshal's**  
Residential Fire Sprinkler – Training and Education  
Task Force (Phase III)

Presents  
An Awareness Level Course  
on the  
2010 California Residential Code (CRC)  
(Title-24, Part 2.5)



**Instructors:**

- **Kevin Reinertson, Division Chief**  
CAL FIRE Office of the State Fire Marshal
- **Bruce Lecair, Western Regional Manager**  
National Automatic Sprinkler Assn. (NFSA)
- **Steve Hart, Consultant**  
National Automatic Sprinkler IP-Fund

**Awareness Level Course (Handouts)  
On The  
2010 California Residential Code (CRC)  
(Title-24, Part 2.5)**

**Table of Contents**

Cover Page .....	
Table of Contents .....	Page i
PowerPoint Presentation .....	Pages 1-20.1
Title-24, Part 2.5 (Building Planning) .....	Pages 21-23
Title-24, Part 2.5 (Automatic Fire Sprinkler Systems .....	Pages 24-36
Title-24, Part 2.5 (Care Facilities in a Group R3.1) .....	Pages 37-38
Title-24, Part 2.5 (Amendments to NFPA-13D and 13-R ..	Pages 39-40
CRC Matrix Adoption Tables .....	Pages 41-45
CSFM Information Bulletin (Residential Fire Sprinklers) ...	Pages 46-47
Phase III Terminology Sub-Committee .....	Pages 48-51
Phase I, II, & III (Laws & Regulations) .....	Pages 52-56
Phase III Working Plans (Recommendations) .....	Pages 57-58
Residential Fire Sprinkler Training Programs .....	Pages 59-67
CSFM Website (Products/Components) .....	Pages 67-71
Tyco Cut sheet (Residential Domestic Shutoff Valve) .....	Pages 72-77
HCD Information Bulletin (Manufactured Homes) .....	Pages 78-80
HCD Frequently Asked Questions (Fire Sprinklers) .....	Pages 81-83
BSC Building Standards Bulletin (PEX Piping) .....	Page 84-85
Fire Service Setter (Domestic Lockout Wing) .....	Page 86

## Preparing for the California Residential Code!

Residential Fire Sprinkler Criteria for One and Two-family Dwellings and Townhouses

2010 California Residential Code (Title 24, Part 2.5)

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## Preparing for the CRC! Introduction

- Kevin Reinertson, Division Chief, Code Development and Analysis Division, Office of the State Fire Marshal
- Steve Hart, Consultant National Automatic Sprinkler - IP Fund
- Bruce Lecair - West Regional Manager, NFSA

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## Course Outline

- 1 Develop awareness of the 2010 California Residential Code and the 2010 NFPA 13D (1 and 2 Family Dwellings and Manufactured Homes) and the amendments and/or modifications
- 2 Develop an awareness of the State of California Provisions as defined in the 2010 California Residential Code, Title 24, Part 2.5, and specifically Section R313.
  - Sections R313 - R325.5.1
- 3 Develop an awareness of the CSFM Residential Fire Sprinkler Task Force Phase I, II, III Recommendations and Final Report. Develop an awareness of the State of California Mandate.
- 4 Develop an awareness of the term, "Best Management Practices" as it relates to the various stakeholders and the Residential Fire Sprinkler Task Force Process
- 5 Develop an awareness of the various stakeholder considerations, training resources and technical terms

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## Introduction

- Orientation and Administration
  - Student Manual and Handouts
- Scope and Purpose
- Overview of the CSFM's Residential Fire Sprinkler Task Force
  - Phase I (Water Supply) Final Report and Recommendations
    - PPT Presentation - Water Purveyors
  - Phase II (Installation) Final Report and Recommendations
    - PPT Presentation - Installation
  - Phase III (Training and Education) Final Report and Recommendations

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## California Residential Code (Title 24, Part 2.5)

- California Building Standards Codes
  - 2007 CBC (based on 2006 IBC),  
CFC (based on 2006 IFC)
  - 2010 CBC (based on 2009 IBC)  
CFC (based on 2009 IFC)

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## California Residential Code (Title 24, Part 2.5)

- California Residential Code (CRC)
  - ICC-IRC, 2000 ed, 2003 ed, 2006 ed, & 2009 ed
  - 2010 CRC based on 2009 IRC
  - State Housing Law (Title 25)
- California Residential Code, Section R313
  - 2009 ed. IRC Section P2904 - Table P2904.3.6.2(9)
  - 2010 ed. CRC Section R 313.3
  - NFPA 13D 2010 ed

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## California Residential Code (Title 24, Part 2.5)

- Defining New Buildings and Dwellings, Remodel, Renovations, Alterations (pg.24)
- Attached garages/carports (pg.22-23)
  - (NFPA 13D, Section 8.6.4) (pg.39)
- Property Setbacks (pg.21)
- Opening Protection (pg.22)
- Residential Care Facilities (pg.37)
  - R325.5.1

7

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## California Residential Code (Title 24, Part 2.5)

- Matrix Adoption Table
  - Handout (Pg.41-45)
- NFPA 13D amendments
  - Handout (Pg.39)
- NFPA 13R amendments
  - Handout (Pg.40)

8

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## Factory-Built and Manufactured Housing

- Factory-Built Housing
  - Factory-Built Housing - a residential building, dwelling unit, individual dwelling room or combination of rooms thereof, or building components, assembly, or system manufactured in such a manner that all concealed parts or processes of manufacturing cannot be inspected before installation. Factory-Built Housing is constructed in accordance with the Title 24, California Building Standards Code. Health and Safety Code Section 19967 and 19971.
- Manufactured Housing
  - Manufactured Homes (includes mobilehomes) are "single-family dwellings" transportable in one or more sections constructed to a federally preemptive standard. Health and Safety Code Section 18007.
  - Multifamily Manufactured Homes are one or two family dwellings transportable in one or more sections built to Department regulations designed to contain no more than two dwelling units. Health and Safety Code Section 18008.7.

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## Manufactured Housing

- National Manufactured Home Construction and Safety Standards (June 15, 1976)
  - Permits and Conditions (HUD Federal Preemption)
- State Housing Code (September 1, 1958)
  - Permits and Conditions
    - (HUD Federal Preemption)
    - Factory
  - Local Enforcing Agency/AHJ's (limited by state exemption)
- Relationship between Title 24, Part 2.5 and Title 25

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## Manufactured Housing

- General Manufactured Housing Contractor
  - (C-47)
  - On Sales Lots and/or Field (Fire Protection Contractor (C-16))
- Acceptance, Test and Approval (in-factory vs. on-site)
  - Manufactured Facility
    - In-plant Inspections/3<sup>rd</sup> party inspectors
    - Quality Control
    - Uniformity
  - Field Site
    - Enforcing Agency/AHJ's

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## Manufactured Housing

- Manufactured Housing Continued
  - Title 25, Chapter 3, Article 1 (Section 4002(1) Definitions)
  - **And** Article 2.5 (Sections 4300, 4302, 4306, 4310, 4312, 4314, 4316, 4318, 4320, 4322 and 4324)

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### Roles of the Stakeholders

- Why do we need to “Circle the Wagons?”
- Who do we involve?
- What are their roles as pertaining to the CRC?
- When do we need to involve them?
- How do you manage their needs?

13

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### Roles of the Stakeholders

- Phase I Task Force Recommendation
  - Use the Best Practices Philosophy when applicable for making recommendations and suggestions for specific applications that are appropriate for the conditions within a specific region of California.
- Defining Best Management Practices (BMP)
  - Refers to those practices that have produced outstanding results in another situation and that could be adapted for our situation.

14

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### Roles of the Stakeholders

- BMP based on discipline
  - Building Department
  - Fire Department
  - Water Purveyor
  - Public Health Department
  - Fire Protection Contractor
  - Developer
  - Homebuilder

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### Roles of the Stakeholders

- Water Purveyors
  - Service Connection (Single Vs. Dual Metering)
    - State Fire Marshal Information Bulletin (pg.46-47)
  - Meter Sizing (flow/pressure/configuration)
  - Back-flow/Cross Connection
  - Rural Vs. Municipal Water Supply
    - Self Contained Water Supply Systems
  - Pressure Regulators

19

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### Roles of the Stakeholders

- Potable Water Vs. Reclaimed Water (Purple)
- Fees/Charges
  - Standby Fees, Connection Fees
- Passive Purge
- Domestic Valve
  - Handout (pg.72-77)

20

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### Roles of the Stakeholders

- Health Departments
  - Federal/State Clean Water Act
  - Water Quality
- Contractors and Developers
  - Map Act (Preliminary Map/Final Map)

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## Roles of the Stakeholders

- Fire Protection Contractors/Sprinkler System Designers
  - CSLB Regulations (B & P Code, Sec. 7026.12)
  - Licensed Contractor's Exemption from the Provisions of the Engineers Act (B & P Code, Section 6737.4)
- Homeowners
  - Owner/Builder (B & P Code, Sec. 7026.12)
  - System Maintenance (voluntary/recommendations)
  - Resale – Building permit – License inspections

22

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## Terminology

- Communication is the number one cause of miscommunication
  - Identified as a Potential Recommendation for study in the Phase III IRC Task Force
    - \*Identify common terminology used by stakeholders in the water purveyor and fire industry for use in all aspects of NFPA 13D Residential Fire Sprinkler System construction and design.
    - Phase III Final Report; Appendix E, Terminology (pg.48-51)

23

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## Statutory Authority (Statutes and Regulations)

- Health and Safety Code (Important Sections)
 

■ 116270-116275	■ 13146.5
■ 116875	■ 13198.5
■ 116880	■ 17921.B
■ 116880-116820	■ 17958.7
■ 13105.5	■ 18941.5
■ 13114.5-13114.7	■ 18949.2
■ 13144-13146	■ 19850
■ 13146.3	■ 25214.4

24

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## Statutory Authority (Statutes and Regulations)

- Government Code (Important Sections)
  - 11125-11125.9
  - 11340-11340.1
  - 11340.5
  - 11359
  - 54950-54963
  - 66013
  - 66014

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## Statutory Authority (Statutes and Regulations)

- Business and Professions Code (Important Sections)
  - 6737.3
  - 7008
  - 7026.2 - 7026.3
  - 7026.11 - 7026.12
  - 7058 -7059
  - 7065
  - 7068

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## Statutory Authority (Statutes and Regulations)

- Contractors State License Board (CSLB)
  - Section 832.47

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## Statutory Authority (Statutes and Regulations)

- State Water Board
  - Title 22

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## Statutory Authority (Statutes and Regulations)

- State Housing Law
  - Title 25
    - Chapter 3, Article 1 Section 4002(1) - Definitions
    - Article 2.5 Sections 4300, 4302, 4306, 4308, 4310, 4312, 4314, 4316, 4318, 4320, 4322, 4324

29

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## Statutory Authority (Statutes and Regulations)

- California Public Utilities Commission
  - General Order No. 103

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## Statutory Authority (Statutes and Regulations)

- State Public Safety
  - Title 19, Section 901(c)

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## Statutory Authority (Statutes and Regulations)

General Questions and Answers: (pg.52-56)

1. Where is it written that public commissions, boards and councils and other public agencies must conduct their business/actions in an open forum/hearing?
  - Answer: Ralph M. Brown Act
  - (Government Code Section 54950-54963)
2. Where does it require that a state body (*Agency, Board, Advisory Committee, etc.*) must provide notice at least 10-days prior to a public meetings in which action shall be taken? Answer: Bagley-Keene Open Meeting Act
  - (Government Code Section 11125-11125.9)

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## Statutory Authority (Statutes and Regulations)

3. Are there any regulations which define criteria by which a water purveyor can discontinue the water service to a customer for non-payment? (Note: *This regulation only applies to water purveyors who fall under the authority and jurisdiction of the CA Public Utilities Commission – PUC.*)
  - Answer: General Order No. 103:
  - (CA Public Utility Commission – Water Branch, Section 1-6.a thru f)
4. Where can I find the statutory authority for the California Safe Drinking Water Act, and what does it say?
  - Answer: California Safe Drinking Water Act:
  - (Health and Safety Code, Section 116270-116275)

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## Statutory Authority (Statutes and Regulations)

5. Where does it define the requirements for Backflow/Cross-Connection devices on a water service?
- **Answer:** Backflow/Cross-Connection
  - (Health and Safety Code, Section 116800-116820 )
6. Is there any state law which governs the implementation of backflow/cross-connection equipment and/or device(s) when connecting a residential fire sprinkler system to the domestic water supply service?
- **Answer:** Backflow Prevention and Cross-Connection Control
  - (Health and Safety Code, Section 13114.5 and 13114.7)

34

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## Statutory Authority (Statutes and Regulations)

7. What is the statutory authority for a local agency to impose fees and charges for a water service connection?
- **Answer:** Service Connection Fees/Charges:
  - (Government Code Section 66013)
8. Where is the statutory criteria found for a local agency (Planning, Building and/or Fire) for establishing fees and charges associated with processing and inspecting projects?
- **Answer:** Building/Fire Agencies:
  - (Government Code Section 66014)

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## Statutory Authority (Statutes and Regulations)

9. If the Building Department wanted to do the review and inspections of residential fire sprinkler systems and the Fire Department objected; "Do we, the Fire Department have the authority to keep this task?"
- **Answer:** The city, county, or city and county shall delegate.
  - (Health & Safety Code, Section 13145-13146)

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## Statutory Authority (Statutes and Regulations)

10. By code we cannot require five year services on residential fire sprinkler systems. Can this be accomplished by local ordinance?

- **Answer:** NO
- (CA SFM Website: Question taken from Frequently Asked Questions Concerning NFPA-25, 2006 California Edition [Page #7]: Can local fire authorities adopt testing and maintenance requirements that are more restrictive than the service requirements in the California Code of Regulations, Title-19? Answer: No . )
- (Health & Safety Code, Section 13198.5, 17958.7, 18941.5)

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## Statutory Authority (Statutes and Regulations)

11. Can a Fire Protection Contractor (C-16) design the system that he or she is to install?

- **Answer:** YES
- (B&P Code – Contractors License Law 6737.3)

12. What does Section R313 of the 2010 California Residential Code say as relates to the design and installation of a residential fire sprinkler systems?

- **Answer:** See Section R313.1.1
- (R313.1.1 Design and installation. Automatic residential fire sprinkler systems for townhouses shall be designed and installed in accordance with R313.3 or NFPA 13D)

38

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## Statutory Authority (Statutes and Regulations)

13. Is it the intent of Section R313 to allow residential fire protection systems to be installed by a Fire Protection Contractor (C-16) and/or a Plumbing Contractor (C-36)?

- **Note:** Section R313.3.3.1 General states "Where installed, residential fire sprinkler systems, or portions thereof, shall be in accordance with NFPA-13D or Section R313, which shall be considered equivalent to NFPA-13D." So, does all of this mean if you are a C-16 you design and install in accordance with NFPA-13D and if you are a C-36 you design and install in accordance with R313?
- **Answer:** Only Fire Protection Contractors (C-16's, General Manufactured Housing Contractors (C-47's) and Owner-Occupied Owner-Builders may install a fire protection system.
- (B&P Code – Contractors License Law, Sections 7026.2, (a), 7026.3, 7026.11, 7026.12)
  - (B&P Code 7008, 7058, and 7059)
  - (832.47, Class C-47 – General Manufactured Housing Contractor)

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## Statutory Authority (Statutes and Regulations)

14. Why doesn't the State of California do like many other states and mandate that all fire sprinkler designs will be done by or supervised and certified by a minimum NICET – Level III Automatic Sprinkler Layout Technician?

- **Answer:** In California, the State of California licenses Professional Engineers (BPE&LS) for design of systems and Contractors (CSLB) for design and installation of fire protection systems. A quick check of the licensing requirements and/or application forms for both the Board of Professional Engineers & Land Surveyors (BPE&LS) and the Contractors State License Board (CSLB) are silent when it comes to NICET criteria necessary to be licensed as an engineer and/or contractor.

- **Note:** Many states have this requirement in order to even get a Fire Protection Contractor license.

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## Statutory Authority (Statutes and Regulations)

15. How does the State handle training and education for contractors, installers, plan checkers, inspectors, and the consumer?

- a) **Contractor/Installers:**
  - **Answer:** Necessary degree of knowledge
  - (B&P Code – Contractors License Law Section 7065, 7068)
- b) **Plans Examiner/Inspectors (Fire):**
  - **Answer:** SFM shall establish fire prevention training for delivery on a regional basis.
  - (Health & Safety Code, Section 13105.5)
- c) **Plans Examiner/Inspectors (Building):**
  - **Ca Building Standards Law Health and Safety Code 18949.25-31**
- d) **Consumer:**
  - **Answers:**(Health & Safety Code, Section 13144)

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## Statutory Authority (Statutes and Regulations)

16. In a multi-purpose system, will the traces of lead in the sprinkler heads be a problem with the domestic water?

- **Answers:** Sprinklers and other components must be "lead free" (meaning not more than 0.2 percent and not more than a weighted average of 0.25 percent when used with respect to the wetted surfaces of pipes and pipe fittings, plumbing fittings and fixtures. Manufacturer's Data Sheets (Cut-sheets) now list compliance for California and Vermont.
- (Health & Safety Code, Section 116875)
- (Health & Safety Code, Section 25214.4.3)

17. What are the requirements for protecting attached garages in accordance with the 2010 California Residential Code?

- **Answer** R302.6, R302.5, R309.6

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## Statutory Authority (Statutes and Regulations)

18. What is the criteria which defines an "Underground Regulation" and is used for the premise by which State Agencies are required to follow strict criteria for the adoption of Building Standards?

- **Answer:** Regulations SHALL be adopted by the Building Standards Commission or Office of Administrative Law.
  - (Government Code, Section 11340-11340.1) (Government Code, Section 11340.5)
  - (Government Code, Section 11335)

19. Do Building Departments (and Fire Departments) need to maintain an official copy of the construction plans (including fire sprinkler drawings and calculations) for a single- or multiple dwelling for the life of the building?

- **Answer:** No.
  - (Health & Safety Code, Section 19850)

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## Training Resources

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| ■ <b>American Fire Sprinkler Association</b> <ul style="list-style-type: none"><li>■ Marlene Garrett, Director of Education Services,<ul style="list-style-type: none"><li>■ Ph: (214) 349-5965</li></ul></li><li>■ California Contact:<ul style="list-style-type: none"><li>■ Lorelei Ostrander, Training Coordinator<ul style="list-style-type: none"><li>■ Ph: (925) 249-9705</li></ul></li><li>■ lorelei@cafsa.org</li></ul></li></ul> | ■ <b>National Fire Sprinkler Association</b> <ul style="list-style-type: none"><li>■ Bob Trieber, Director of Training<ul style="list-style-type: none"><li>■ NFSA Training, contact Mike Repko<ul style="list-style-type: none"><li>■ Ph: (845) 878-4207</li></ul></li></ul></li><li>■ Bruce Lecair, NFSA West Regional Manager<ul style="list-style-type: none"><li>■ Ph: (951) 277-3517</li><li>■ lecair@nfsa.org</li></ul></li></ul> |
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## Training Resources

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|---|---|
| ■ <b>National Fire Protection Association</b> <ul style="list-style-type: none"><li>■ Ray Bizal, Regional Manager<ul style="list-style-type: none"><li>■ Ph: (562) 497-1706</li><li>■ E-mail: rbizal@nfpa.org</li></ul></li></ul> | ■ <b>International Code Council</b> <ul style="list-style-type: none"><li>■ Kevin Scott, Senior Regional Manager<ul style="list-style-type: none"><li>■ Ph: (661) 302-2277</li><li>■ E-mail: KScott@iccsafe.org</li></ul></li></ul> |
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## Training Resources

- Sprinkler Fitters of California (SFAC)
  - Sprinkler Fitters Local 483 (San Francisco Bay Area)
    - Phone: (510) 782-9483
  - Sprinkler Fitters Local 709 (Los Angeles Area)
    - John Holmes, Training Director; Ph: (310) 698-9909
    - Johnh@sprinklerfitters709.org

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## Training Resources

- Society of Fire Protection Engineers (SFPE)
  - Northern California-Nevada Chapter
    - Website: <http://www.ncnsfpe.org>
  - Los Angeles Chapter
    - Website: <http://www.sfpe.org/chapters/southerncalifornia.aspx>
  - San Diego Chapter
    - Website: <http://www.sfpe.org/Chapters/sandiego.aspx>

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## Training Venues/Hosts (Stakeholders)

- Building Officials/Departments
  - CALBO Website: ([www.calbo.org](http://www.calbo.org))
    - CalBO Training Institute (CTI)
    - Five 1-week CTI's scheduled per year
      - Other Local ICC Chapters
      - International Code Council: ([www.iccsafe.org](http://www.iccsafe.org))

48

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## Training Venues/Hosts (Stakeholders)

- Fire Officials/Departments
  - Association of Contract Counties
  - California Fire Chiefs Assoc. ([www.calchiefs.org](http://www.calchiefs.org))
  - Fire Prevention Officers
    - Northern Section
    - Southern Section
    - [www.firepreventionofficers.org](http://www.firepreventionofficers.org)
  - California Fire Prevention Institute (CFPI)
    - Buellton, Ca. (March)
- Fire District Association of California ([www.fdac.org](http://www.fdac.org))
- League of California Cities
  - Dorothy Johnson, Fire Department Contact, Ph: (916) 658-8214

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## Training Venues/Hosts (Stakeholders)

- Water Purveyors
  - American Water Works Association (AWWA)
    - California – Nevada Section Address
    - 10574 Acacia St., Suite D6
    - Rancho Cucamonga, CA 91730
    - Phone: (909) 481-7200
    - Fax: (909) 481-4688
  - Section Office Hours
    - Monday-Friday
    - 8:00 AM to 4:30 PM
  - General Questions
    - (909) 481-7200
    - [info@ca-nv-awwa.org](mailto:info@ca-nv-awwa.org)
  - Executive Director
    - Elizabeth Kang
    - (909) 481-7200
    - [ekang@ca-nv-awwa.org](mailto:ekang@ca-nv-awwa.org)
    - Oversees the strategic vision of the organization, secretary of the governing board
  - Website, [www.awwa.org](http://www.awwa.org)
    - seminar schedule, <http://www.awwa.org/ebusmain/meetings/eventcalendar.aspx>

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## Training Venues/Hosts (Stakeholders)

- Home Builders, Contractors and Developers
  - California Building Industry Association
    - Website: [www.cbia.org](http://www.cbia.org)
      - HBA of Northern California
      - HBA of Kern County
      - BIA of Fresno/Madera Counties
    - HBA of the Central Coast
    - HBA of Tulare and Kings Counties
    - BIA of the Delta
    - BIA of the Central California
    - North State BIA
    - BIA of San Diego
    - BIA of Southern California

51

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## Training Venues/Hosts (Stakeholders)

- Fire Protection Contractors/Sprinkler System Designers
  - American Fire Sprinkler Association
    - Website: [www.firesprinkler.org](http://www.firesprinkler.org)
    - Website: [www.clse.org](http://www.clse.org) (Center for Life Safety Education)
    - Greater Bay Area Chapter: Ph: (925) 249-9705
    - Sacramento Valley Chapter: Ph: (916) 973-4434
    - San Diego Chapter: Ph: (858) 973-2930

52

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## Training Venues/Hosts (Stakeholders)

- National Fire Sprinkler Association
  - Website: [www.nfsa.org](http://www.nfsa.org)
  - Phone Number (845) 878-4200
    - San Francisco Chapter
      - Phone Number: (951) 277-3517
    - Los Angeles Chapter
      - Phone Number: (951) 277-3517
    - West Regional Manager Bruce Lecair
      - Phone Number: (951) 277-3517
      - [lecair@nfsa.org](mailto:lecair@nfsa.org)
    - West Area Director Jack Thacker
      - Phone Number: (714) 993-9500

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## Training Venues/Hosts (Stakeholders)

- Homeowners/Real Estate Agencies/Insurance Agencies
  - Homeowners
    - Maintenance Awareness
  - Real Estate Agencies
    - Life Safety (Built-in Fire Protection)
  - Insurance Agencies
    - Insurance Credits (5-15%)

54

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## Antifreeze Mitigation

- Dry pipe systems and pre-action systems in accordance with NFPA 13D, Section 8.3.4
  - Listed standard dry pendant or dry sidewall sprinklers extended from pipe in heated areas into unheated areas not intended for living purposes
  - Propylene Glycol-Water Mixture (2-8.1(a))
  - Glycerine Mixture
    - CPVC piping
  - Trace wire/Thermo-Tape

55

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## Appendix

### List of Manufacturers - Storage Tanks

- 1) Advanced Technology, Inc.  
Website: [www.advancedfiretechnology.com](http://www.advancedfiretechnology.com)
- 2) D-System, Inc.  
Website: [www.thedsystem.com](http://www.thedsystem.com)
- 3) Fire Water Systems, Inc.  
Website: [www.firewatersysteminc.com](http://www.firewatersysteminc.com)
- 4) Life-Line Series (Raimondo Consultants, Inc.)  
Website: [www.raimondofire.com](http://www.raimondofire.com)
- 5) S-P-D, Inc.  
Website: [www.spd.com](http://www.spd.com)
- 6) Talco Industries, Inc.  
Website: [www.talcofire.com](http://www.talcofire.com)

56

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## Appendix

- SFM Website (Products and Components)** (pg. 67-71)  
Website: <http://osfm.fire.ca.gov/code/development/residentialsprinklerandcacodes.php>
- Dual Meter: SFM Website (Information Bulletin; 02/18/10)** (pg. 46-46)  
Website: <http://osfm.fire.ca.gov/informationbulletin/pdf/2010/resautosprinklersbulletin.pdf>
- HCD Information Bulletin 2001-04 (Manufactured Housing)** (pg. 78-80)  
Website: [http://www.hcd.ca.gov/codes/mhp/IB.2001\\_04.pdf](http://www.hcd.ca.gov/codes/mhp/IB.2001_04.pdf)
- HCD Questions/Answers (Manufactured Housing)** (pg. 81-83)  
Website: <http://www.hcd.ca.gov/codes/mhp/sprinkler.html>
- BSC Building Standard Bulletin 09-03 (PEX Pipe)** (pg. 84)  
Website: [http://www.documents.dgs.ca.gov/bssc/cd\\_qustns/documents/2009/BSC\\_09-03.pdf](http://www.documents.dgs.ca.gov/bssc/cd_qustns/documents/2009/BSC_09-03.pdf)

57

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## Appendix

### Plastic Pipe: (pg.68)

- BlazeMaster Fire Sprinkler Systems [www.blazemaster.com](http://www.blazemaster.com)  
Phone: (216) 447-5000 [Cleveland, OH]
- Harvel Plastics, Inc. [www.harvel.com](http://www.harvel.com)  
Phone: (610) 252-7355 [Easton, PA]
- IPEX, Inc. [www.ipexinc.com](http://www.ipexinc.com)  
Phone: (416) 445-3400 [Don Mills, ON M3B 2S9 Canada]
- Rehau, Inc. [www.na.rehau.com/fireprotection](http://www.na.rehau.com/fireprotection)  
Phone: (703) 777-5255 [Leesburg, WV]
- Spears Manufacturing Co. [www.spearsmfg.com](http://www.spearsmfg.com)  
Phone: (818) 364-1611 [Sylmar, CA]
- Tyco Fire Products [www.tyco-fire.com](http://www.tyco-fire.com)  
Phone: (215) 362-0700 [Lansdale, PA]

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## Questions???

Thank-you!

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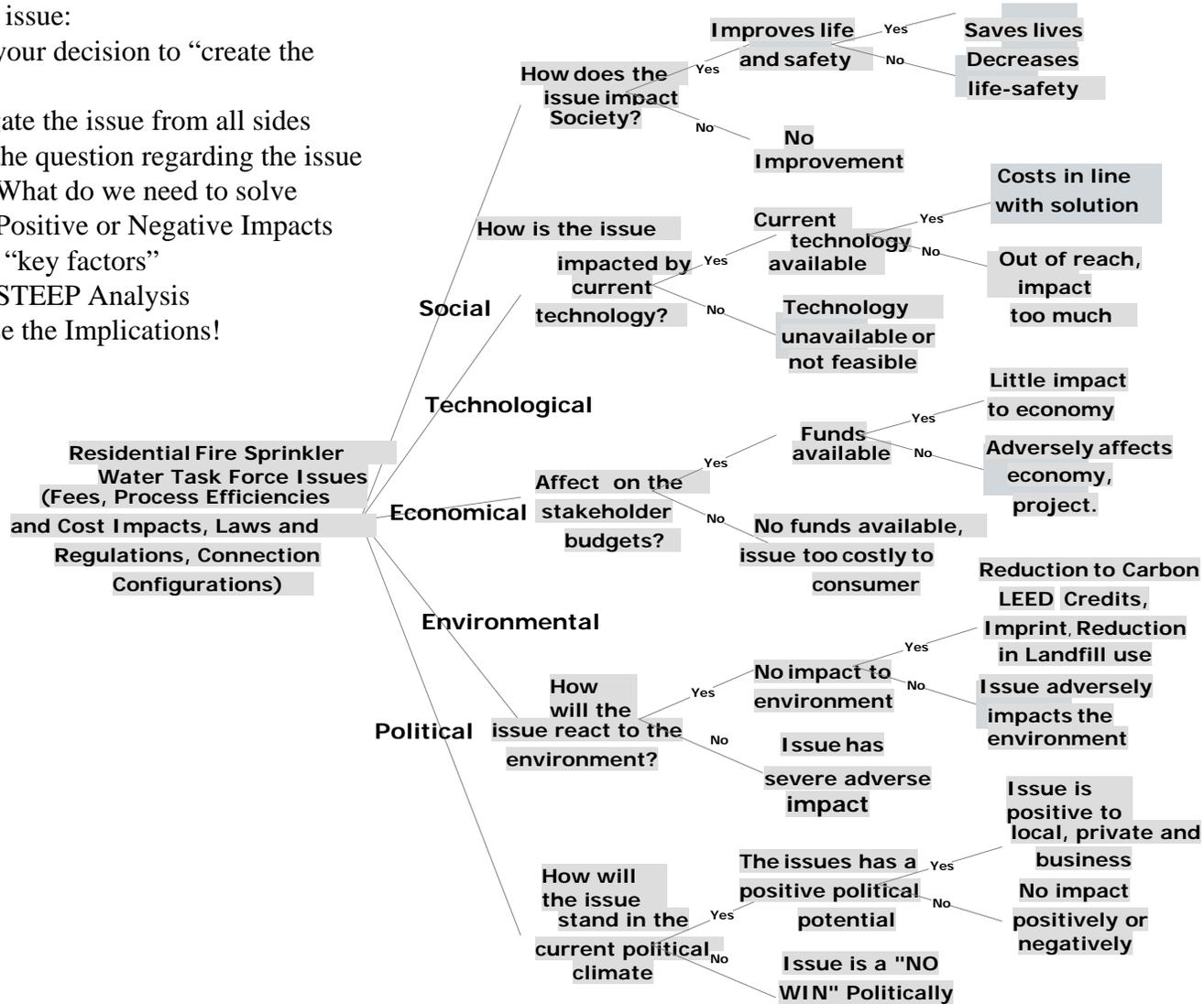
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# STEEP Decision Model

For each issue:

- Isolate your decision to “create the issue”
- Investigate the issue from all sides
- Refine the question regarding the issue
  - What do we need to solve
  - Positive or Negative Impacts
- Look at “key factors”
  - STEEP Analysis
- Rehearse the Implications!



**CHAPTER 3  
BUILDING PLANNING**

**(302.1 CBC)**

**R301.1 Application.** Buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.

*Existing buildings housing existing protective social care homes or facilities established prior to 1972 (see Section 3413 of the California Building Code).*

**R302.1 Exterior walls.** Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); *or for dwellings and accessory buildings equipped throughout with an automatic residential fire sprinkler system installed in accordance with Section 313 shall comply with Table R302.1(2).*

**Exceptions:**

1. Walls, projections, openings, or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

**TABLE R302.1(1)  
EXTERIOR WALLS – DWELLINGS AND ACCESSORY BUILDINGS  
WITHOUT AUTOMATIC RESIDENTIAL FIRE SPRINKLER PROTECTION**

Exterior Wall Element		Minimum Fire-Resistance Rating	Minimum Fire Separation Distance
Walls	(Fire-resistance rated)	1 hour-tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	<5 feet
	(Not fire-resistance rated)	0 hours	≥5 feet
Projections	(Fire-resistance rated)	1 hour on the underside	≥ 2 feet to 5 feet
	(Not fire-resistance rated)	0	5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% Maximum of Wall Area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section <del>R317.3</del> R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

**TABLE R302.1(2)  
EXTERIOR WALLS – DWELLINGS AND ACCESSORY BUILDINGS  
WITH AUTOMATIC RESIDENTIAL FIRE SPRINKLER PROTECTION**

<u>Exterior Wall Element</u>		<u>Minimum Fire-Resistance Rating</u>	<u>Minimum Fire Separation Distance</u>
<u>Walls</u>	<u>(Fire-resistance rated)</u>	<u>1 hour-tested in accordance with ASTM E 119 or UL 263 with exposure from both sides</u>	<u>&lt;3 feet</u>
	<u>(Not fire-resistance rated)</u>	<u>0 hours</u>	<u>≥3 feet</u>
<u>Projections</u>	<u>(Fire-resistance rated)</u>	<u>1 hour on the underside</u>	<u>≥ 2 feet to 3 feet</u>

	<i>(Not fire-resistance rated)</i>	<i>0</i>	<i>3 feet</i>
<i>Openings in walls</i>	<i>Not allowed</i>	<i>N/A</i>	<i>&lt; 3 feet</i>
	<i>Unlimited</i>	<i>0 hours</i>	<i>3 feet</i>
<i>Penetrations</i>	<i>All</i>	<i>Comply with Section R302.4</i>	<i>&lt; 3 feet</i>
		<i>None required</i>	<i>3 feet</i>

For SI: 1 foot = 304.8 mm.

*N/A = Not Applicable*

**R302.2 Townhouses.** Each townhouse shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

**Exception:** A common 1-hour fire-resistance-rated wall is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. Electrical installations shall be installed in accordance with ~~Chapters 33 through 42~~ *the California Electrical Code*. Penetrations of electrical outlet boxes shall be in accordance with Section R302.

**(406.1.4 item 1 CBC)**

**R302.5.1 Opening protection.** Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 13/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 13/8 inches (35 mm) thick, or 20-minute fire-rated doors. *Doors shall be self-closing and self-latching.*

**Exception:** *Where the residence and the private garage are protected by an automatic residential fire sprinkler system in accordance with Sections R309.6 and R313, other door openings between the private garage and the residence need only be self-closing and self-latching. This exception shall not apply to rooms used for sleeping purposes.*

**(406.1.4 item 3 CBC)**

**R302.6 Dwelling/garage and/or carport fire separation.** The garage *and/or carport* shall be separated as required by Table R302.6. Openings in garage walls shall comply with Section R302.5. This provision does not apply to garage walls that are perpendicular to the adjacent dwelling unit wall. *A separation is not required between the dwelling and carport, provided the carport is entirely open on two or more sides and there are not enclosed areas above.*

**TABLE R302.6  
DWELLING/GARAGE AND/OR CARPORT SEPARATION**

<b>SEPARATION</b>	<b>MATERIAL</b>
From the residence and attics	Not less than 1/2-inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the <i>garage or carport</i>	Not less than 5/8-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	Not less than 1/2-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than 1/2-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

**(803.1.2 CBC)**

**R302.9.4 Alternate test method.** As an alternate to having a flame-spread classification of not greater than 200 and a smoke developed index of not greater than 450 when tested in accordance with ASTM E 84, wall and ceiling finishes, other than textiles, shall be permitted to be tested in accordance with NFPA 286. Materials tested in accordance with NFPA 286 shall meet the following criteria:

During the 40 kW exposure, the interior finish shall comply with Item 1. During the 160 kW exposure, the interior finish shall comply with Item 2. During the entire test, the interior finish shall comply with Item 3 *and 4*.

1. During the 40kW exposure, flames shall not spread to the ceiling.
2. During the 160 kW exposure, the interior finish shall comply with the following:
  - 2.1. Flame shall not spread to the outer extremity of the sample on any wall or ceiling.
  - 2.2. Flashover, as defined in NFPA 286, shall not occur.
3. The total smoke released throughout the NFPA 286 test shall not exceed 1,000 m2.

4. The peak rate of heat release throughout the NFPA 286 test shall not exceed 800 kW.

**(803.10 CBC)**

**R302.9.5 Stability.** Interior finish materials regulated by this chapter shall be applied or otherwise fastened in such a manner that such materials will not readily become detached where subjected to room temperatures of 200°F (93°C) for not less than 30 minutes.

**R302.13 Combustible insulation clearance.** Combustible insulation shall be separated a minimum of 3 inches (76 mm) from recessed luminaires, fan motors and other heat-producing devices.

**Exception:** Where heat-producing devices are listed for lesser clearances, combustible insulation complying with the listing requirements shall be separated in accordance with the conditions stipulated in the listing.

Recessed luminaires installed in the building ~~thermal~~ envelope shall meet or exceed the minimum requirements of ~~Section N1102.4.3~~ specified in the California Energy Code for recessed luminaires installed in insulated ceilings.

**R309.6 Fire Sprinklers.** Carports with habitable space above and attached garages shall be protected by residential fire sprinklers in accordance with this Section. Residential fire sprinklers shall be connected to, and installed in accordance with, a fire sprinkler system that complies with Section R313 or NFPA 13D. Fire sprinklers shall be residential sprinklers or quick-response sprinklers, designed to provide a minimum density of 0.05 gpm/ft<sup>2</sup> (2.04 mm/min) over the area of the garage and/or carport, but not to exceed two sprinklers for hydraulic calculation purposes. Garage doors shall not be considered obstructions with respect to sprinkler placement.

**Exception:** An automatic residential fire sprinkler system shall not be required when additions or alterations are made to existing carports and/or garages that do not have an automatic residential fire sprinkler system installed in accordance with this Section.

**(1026.4 CBC)**

**R310.1.4 Operational constraints.** Emergency escape and rescue openings shall be maintained free of any obstructions other than those allowed by this section and shall be operational from the inside of the room without the use of keys, tools or special knowledge.

**(1026.4 CBC)**

**R310.4 Bars, grilles, covers and screens.** Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Sections R310.1.1 to R310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening. The release mechanism shall be maintained operable at all times.

**(1026.4 CBC)**

Such bars, grills, grates or any similar devices shall be equipped with an approved exterior release device for use by the fire department only when required by the authority having jurisdiction.

Where security bars (burglar bars) are installed on emergency egress and rescue windows or doors, on or after July 1, 2000, such devices shall comply with California Building Standards Code, Part 12, Chapter 12-3 and other applicable provisions of this Code.

~~**R310.5 Emergency escape windows under decks and porches.** Emergency escape windows are allowed to be installed under decks and porches provided the location of the deck allows the emergency escape window to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court.~~

**R311.4 Vertical egress.** Egress from habitable levels including habitable attics and basements not provided with an egress door in accordance with Section R311.2 shall be by ~~a~~ one or more ramps in accordance with Section R311.8 or ~~a~~ one or more stairways in accordance with Section R311.7 or both. For habitable levels or basements located more than one story above or more than one story below an egress door, the maximum travel distance from any occupied point to a stairway or ramp that provides egress from such habitable level or basement, shall not exceed 50 feet (15 240 mm).

**(1013.3 CBC)**

**R312.2 Height.** Required guards at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than ~~36 inches (914 mm)~~ 42 inches (1067 mm) high measured vertically above the adjacent walking surface, adjacent fixed seating or the line connecting the leading edges of the treads.

**Exceptions:**

1. Guards on the open sides of stairs shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
2. Where the top of the guard also serves as a handrail on the open sides of stairs, the top of the guard shall not be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

**SECTION R313  
AUTOMATIC FIRE SPRINKLER SYSTEMS**

**R313.1 Townhouse automatic fire sprinkler systems.** An automatic residential fire sprinkler system shall be installed in townhouses.

**Exception:** An automatic residential fire sprinkler system shall not be required when additions or alterations are made to existing townhouses that do not have an automatic residential fire sprinkler system installed.

**R313.1.1 Design and installation.** Automatic residential fire sprinkler systems for townhouses shall be designed and installed in accordance with Section ~~P2904-R313.3~~ or NFPA 13D.

**R313.2 One- and two-family dwellings automatic fire sprinkler systems.** ~~Effective January 1, 2011, a~~An automatic residential fire sprinkler system shall be installed in one- and two- family dwellings.

**Exception:** An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential sprinkler system.

**R313.2.1 Design and installation.** Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section ~~P2904-R313.3~~ or NFPA 13D.

**(Provisions of Section P2904 of the IRC relocated here with modification)**

**SECTION ~~P2904~~ R313.3  
DWELLING UNIT FIRE SPRINKLER SYSTEMS**

~~P2904.1~~**R313.3.1 General.** Where installed, residential fire sprinkler systems, or portions thereof, shall be in accordance with NFPA 13D or Section ~~P2904.4-R313.3~~, which shall be considered equivalent to NFPA 13D. Section ~~P2904.4-R313.3~~ shall apply to stand-alone and multipurpose wet-pipe sprinkler systems that do not include the use of antifreeze. A multipurpose fire sprinkler system shall supply domestic water to both fire sprinklers and plumbing fixtures. A stand-alone sprinkler system shall be separate and independent from the water distribution system. A backflow flow preventer shall not be required to separate a stand-alone sprinkler system from the water distribution system.

~~P2904.1.1~~ **R313.3.1.1 Required sprinkler locations.** Sprinklers shall be installed to protect all areas of a dwelling unit.

**Exceptions:**

1. Attics, crawl spaces and normally unoccupied concealed spaces that do not contain fuel-fired appliances do not require sprinklers. In attics, crawl spaces and normally unoccupied concealed spaces that contain fuel-fired equipment, a sprinkler shall be installed above the equipment; however, sprinklers shall not be required in the remainder of the space.
2. Clothes closets, linen closets and pantries not exceeding 24 square feet (2.2 m<sup>2</sup>) in area, with the smallest dimension not greater than 3 feet (915 mm) and having wall and ceiling surfaces of gypsum board.
3. Bathrooms not more than 55 square feet (5.1m<sup>2</sup>) in area.
4. ~~Detached~~ Garages; carports *with no habitable space above*; *open attached* ~~exterior~~ porches; unheated entry areas, such as mud rooms, that are adjacent to an exterior door; and similar areas.

~~P2904.2~~ **R313.3.2 Sprinklers.** Sprinklers shall be new listed residential sprinklers and shall be installed in accordance with the sprinkler manufacturer's installation instructions.

~~P2904.2.1~~ **R313.3.2.1 Temperature rating and separation from heat sources.** Except as provided for in Section ~~P2904.2.2~~ **R313.3.2.2**, sprinklers shall have a temperature rating of not less than 135°F (57°C) and not more than 170°F (77°C). Sprinklers shall be separated from heat sources as required by the sprinkler manufacturer's installation instructions.

~~P2904.2.2~~ **R313.3.2.2 Intermediate temperature sprinklers.** Sprinklers shall have an intermediate temperature rating not less than 175°F (79°C) and not more than 225°F (107°C) where installed in the following locations:

1. Directly under skylights, where the sprinkler is exposed to direct sunlight.
2. In attics.
3. In concealed spaces located directly beneath a roof.
4. Within the distance to a heat source as specified in Table ~~P2904.2.2~~ R313.3.2.2.

~~P2904.2.3~~ R313.3.2.3 **Freezing areas.** Piping shall be protected from freezing as required by ~~Section P2603.6~~ the California Plumbing Code. Where sprinklers are required in areas that are subject to freezing, dry-sidewall or dry-pendent sprinklers extending from a nonfreezing area into a freezing area shall be installed. *Where fire sprinkler piping cannot be adequately protected against freezing, the system shall be designed and installed in accordance with NFPA 13D.*

~~P2904.2.4~~ R313.3.2.4 **Sprinkler coverage.** Sprinkler coverage requirements and sprinkler obstruction requirements shall be in accordance with Sections ~~P2904.2.4.1~~ R313.3.2.4.1 and ~~P2904.2.4.2~~ R313.3.2.4.2.

~~P2904.2.4.1~~ R313.3.2.4.1 **Coverage area limit.** The area of coverage of a single sprinkler shall not exceed 400 square feet (37 m<sup>2</sup>) and shall be based on the sprinkler listing and the sprinkler manufacturer's installation instructions.

~~P2904.2.4.2~~ R313.3.2.4.2 **Obstructions to coverage.** Sprinkler discharge shall not be blocked by obstructions unless additional sprinklers are installed to protect the obstructed area. Sprinkler separation from obstructions shall comply with the minimum distances specified in the sprinkler manufacturer's instructions, *and/or the provisions of NFPA 13D.*

~~P2904.2.4.2.1~~ R313.3.2.4.2.1 **Additional requirements for pendent sprinklers.** Pendent sprinklers within 3 feet (915 mm) of the center of a ceiling fan, surface-mounted ceiling luminaire or similar object shall be considered to be obstructed, and additional sprinklers shall be installed.

~~P2904.2.4.2.2~~ R313.3.2.4.2.2 **Additional requirements for sidewall sprinklers.** Sidewall sprinklers within 5 feet (1524mm) of the center of a ceiling fan, surface-mounted ceiling luminaire or similar object shall be considered to be obstructed, and additional sprinklers shall be installed.

~~P2904.2.5~~ R313.3.2.5 **Sprinkler installation on systems assembled with solvent cement.** The solvent cementing of threaded adapter fittings shall be completed and threaded adapters for sprinklers shall be verified as being clear of excess cement prior to the installation of sprinklers on systems assembled with solvent cement.

~~P2904.2.6~~ R313.3.2.6 **Sprinkler modifications prohibited.** Painting, caulking or modifying of sprinklers shall be prohibited. Sprinklers that have been painted, caulked, modified or damaged shall be replaced with new sprinklers.

~~P2904.3~~ R313.3.3 **Sprinkler piping system.** Sprinkler piping shall be supported in accordance with the requirements for cold water distribution piping. Sprinkler piping shall comply with all requirements for cold water distribution piping. For multipurpose piping systems, the sprinkler piping shall connect to and be a part of the cold water distribution piping system.

~~P2904.3.1~~ R313.3.3.1 **Nonmetallic pipe and tubing.** Nonmetallic pipe and tubing, such as CPVC and PEX, shall be listed for use in residential fire sprinkler systems.

~~P2904.3.1.1~~ R313.3.3.1.1 **Nonmetallic pipe protection.** Nonmetallic pipe and tubing systems shall be protected from exposure to the living space by a layer of not less than 3/8 inch (9.5 mm) thick gypsum wallboard, 1/2 inch thick plywood (13 mm), or other material having a 15 minute fire rating.

**Exceptions:**

1. Pipe protection shall not be required in areas that do not require protection with sprinklers as specified in Section ~~P2904.1.1~~ R313.3.1.1.
2. Pipe protection shall not be required where exposed piping is permitted by the pipe listing.

~~P2904.3.2~~ R313.3.3.2 **Shutoff valves prohibited.** With the exception of shutoff valves for the entire water distribution system, valves shall not be installed in any location where the valve would isolate piping serving one or more sprinklers.

~~P2904.3.3~~ R313.3.3.3 **Single dwelling limit.** Piping beyond the service valve located at the beginning of the water distribution system shall not serve more than one dwelling

**TABLE ~~P2904.2.2~~ R313.3.2.2  
LOCATIONS WHERE INTERMEDIATE TEMPERATURE SPRINKLERS ARE REQUIRED**

HEAT SOURCE	RANGE OF DISTANCE FROM HEAT SOURCE WITHIN WHICH INTERMEDIATE TEMPERATURE SPRINKLERS ARE REQUIRED <sup>a,b</sup> (inches)
Fireplace, side of open or recessed fireplace	12 to 36
Fireplace, front of recessed fireplace	36 to 60
Coal and wood burning stove	12 to 42
Kitchen range top	9 to 18
Oven	9 to 18
Vent connector or chimney connector	9 to 18
Heating duct, not insulated	9 to 18
Hot water pipe, not insulated	6 to 12
Side of ceiling or wall warm air register	12 to 24
Front of wall mounted warm air register	18 to 36
Water heater, furnace or boiler	3 to 6
Luminaire up to 250 watts	3 to 6
Luminaire 250 watts up to 499 watts	6 to 12

- a. Sprinklers shall not be located at distances less than the minimum table distance unless the sprinkler listing allows a lesser distance.
- b. Distances shall be measured in a straight line from the nearest edge of the heat source to the nearest edge of the sprinkler.

**~~P2904.3.4~~ R313.3.3.4 Drain.** A means to drain the sprinkler system shall be provided on the system side of the water distribution shutoff valve.

**~~P2904.4~~ R313.3.4 Determining system design flow.** The flow for sizing the sprinkler piping system shall be based on the flow rating of each sprinkler in accordance with Section ~~P2904.4.1~~ R313.3.4.1 and the calculation in accordance with Section ~~P2904.4.2~~ R313.3.4.2.

**~~P2904.4.1~~ R313.3.4.1 Determining required flow rate for each sprinkler.** The minimum required flow for each sprinkler shall be determined using the sprinkler manufacturer's published data for the specific sprinkler model based on all of the following:

1. The area of coverage
2. The ceiling configuration
3. The temperature rating
4. Any additional conditions specified by the sprinkler manufacturer.

**~~P2904.4.2~~ R313.3.4.2 System design flow rate.** The design flow rate for the system shall be based on the following:

1. The design flow rate for a room having only one sprinkler shall be the flow rate required for that sprinkler, as determined by Section ~~P2904.4.1~~ R313.3.4.1.
2. The design flow rate for a room having two or more sprinklers shall be determined by identifying the sprinkler in that room with the highest required flow rate, based on Section ~~P2904.4.1~~ R313.3.4.1, and multiplying that flow rate by 2.
3. Where the sprinkler manufacturer specifies different criteria for ceiling configurations that are not smooth, flat and horizontal, the required flow rate for that room shall comply with the sprinkler manufacturer's instructions.
4. The design flow rate for the sprinkler system shall be the flow required by the room with the largest flow rate, based on Items 1, 2 and 3.
5. For the purpose of this section, it shall be permissible to reduce the design flow rate for a room by subdividing the space into two or more rooms, where each room is evaluated separately with respect to the required design flow rate. Each room shall be bounded by walls and a ceiling. Openings in walls shall have a lintel not less than 8 inches (203 mm) in depth and each lintel shall form a solid barrier between the ceiling and the top of the opening.

**~~P2904.5~~ R313.3.5 Water supply.** The water supply shall provide not less than the required design flow rate for sprinklers in accordance with Section ~~P2904.4.2~~ R313.3.4.2 at a pressure not less than that used to comply with Section ~~P2904.6~~ R313.3.6. *Where a water supply serves both domestic and fire sprinkler systems, 5 gpm (19 L/min) shall be added to the sprinkler system*

*demand at the point where the systems are connected, to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler.*

**~~P2904.5.1~~ R313.3.5.1 Water supply from individual sources.** Where a dwelling unit water supply is from a tank system, a private well system, *a pump*, or a combination of these, the available water supply shall be based on the minimum pressure control setting for the pump.

**~~P2904.5.2~~ R313.3.5.2 Required capacity.** The water supply shall have the capacity to provide the required design flow rate for sprinklers for a period of time as follows:

1. 7 minutes for dwelling units one story in height and less than 2,000 square feet (186 m<sup>2</sup>) in area. *For the purpose of determining the area of the dwelling unit, the area of attached garages and attached open carports, porches, balconies, and patios shall not be included.*
2. 10 minutes for dwelling units two or more stories in height or equal to or greater than 2,000 square feet (186 m<sup>2</sup>) in area. *For the purpose of determining the area of the dwelling unit, the area of attached garages and attached open carports, porches, balconies, and patios shall not be included.*

Where a well system, a water supply tank system, *a pump*, or a combination thereof, is used, *the water supply shall serve both domestic and fire sprinkler systems.* Any combination of well capacity and tank storage shall be permitted to meet the capacity requirement.

**~~P2904.6~~ R313.3.6 Pipe sizing.** The piping to sprinklers shall be sized for the flow required by Section ~~P2904.4.2~~ R313.3.4.2. The flow required to supply the plumbing fixtures shall not be required to be added to the sprinkler design flow.

**~~P2904.6.1~~ R313.3.6.1 Method of sizing pipe.** Piping supplying sprinklers shall be sized using the prescriptive method in Section ~~P2904.6.2~~ R313.3.6.2 or by hydraulic calculation in accordance with NFPA 13D. The minimum pipe size from the water supply source to any sprinkler shall be 3/4 inch (19 mm) nominal. Threaded adapter fittings at the point where sprinklers are attached to the piping shall be a minimum of 1/2 inch (13 mm) nominal.

**~~P2904.6.2~~ R313.3.6.2 Prescriptive pipe sizing method.** Pipe shall be sized by determining the available pressure to offset friction loss in piping and identifying a piping material, diameter and length using the equation in Section ~~P2904.4.6.2.1~~ R313.3.6.2.1 and the procedure in Section ~~P2904.6.2.2~~ R313.3.6.2.2.

**~~P2904.6.2.1~~ R313.3.6.2.1 Available pressure equation.** The pressure available to offset friction loss in the interior piping system (Pt) shall be determined in accordance with the Equation 29-1.

$$P_t = P_{sup} - P_{Lsvc} - P_{Lm} - P_{Ld} - P_{Le} - P_{sp} \text{ (Equation 29-1)}$$

Where:

P<sub>t</sub> = Pressure used in applying Tables ~~P2904.6.2(4)~~ R313.3.6.2(4) through ~~P2904.6.2(9)~~ R313.3.6.2(9).

P<sub>sup</sub> = Pressure available from the water supply source.

P<sub>Lsvc</sub> = Pressure loss in the water-service pipe.

P<sub>Lm</sub> = Pressure loss in the water meter.

P<sub>Ld</sub> = Pressure loss from devices other than the water meter.

P<sub>Le</sub> = Pressure loss associated with changes in elevation.

P<sub>sp</sub> = Maximum pressure required by a sprinkler

**~~P2904.6.2.2~~ R313.3.6.2.2 Calculation procedure.** Determination of the required size for water distribution piping shall be in accordance with the following procedure:

#### Step 1 - Determine P<sub>sup</sub>

Obtain the static supply pressure that will be available from the water main from the water purveyor, or for an individual source, the available supply pressure shall be in accordance with Section ~~P2904.5.1~~ R313.3.5.1.

## Step 2 – Determine PL<sub>svc</sub>

Use Table ~~P2904.6.2(1)~~-R313.3.6.2(1) to determine the pressure loss in the water service pipe based on the selected size of the water service.

## Step 3 – Determine PL<sub>m</sub>

Use Table ~~P2904.6.2(2)~~-R313.3.6.2(2) to determine the pressure loss from the water meter, based on the selected water meter size.

## Step 4 – Determine PL<sub>d</sub>

Determine the pressure loss from devices other than the water meter installed in the piping system supplying sprinklers, such as pressure-reducing valves, backflow preventers, water softeners or water filters. Device pressure losses shall be based on the device manufacturer's specifications. The flow rate used to determine pressure loss shall be the rate from Section ~~P2904.4.2~~-R313.3.4.2, except that 5 gpm (0.3 L/S) shall be added where the device is installed in a water-service pipe that supplies more than one dwelling. As alternative to deducting pressure loss for a device, an automatic bypass valve shall be installed to divert flow around the device when a sprinkler activates.

## Step 5 – Determine PL<sub>e</sub>

Use Table ~~P2904.6.2(3)~~-R313.3.6.2(3) to determine the pressure loss associated with changes in elevation. The elevation used in applying the table shall be the difference between the elevation where the water source pressure was measured and the elevation of the highest sprinkler.

## Step 6 – Determine P<sub>sp</sub>

Determine the maximum pressure required by any individual sprinkler based on the flow rate from Section ~~P2904.4.1~~-R313.3.4.1. The required pressure is provided in the sprinkler manufacturer's published data for the specific sprinkler model based on the selected flow rate.

## Step 7 – Calculate P<sub>t</sub>

Using Equation 29-1, calculate the pressure available to offset friction loss in water-distribution piping between the service valve and the sprinklers.

## Step 8 – Determine the maximum allowable pipe length

Use Tables ~~P2904.6.2(4)~~-R313.3.6.2(4) through ~~P2904.6.2(9)~~-R313.3.6.2(9) to select a material and size for water distribution piping. The piping material and size shall be acceptable if the developed length of pipe between the service valve and the most remote sprinkler does not exceed the maximum allowable length specified by the applicable table. Interpolation of P<sub>t</sub> between the tabular values shall be permitted.

The maximum allowable length of piping in Tables ~~P2904.6.2(4)~~-R313.3.6.2(4) through ~~P2904.6.2(9)~~-R313.3.6.2(9) incorporates an adjustment for pipe fittings, and no additional consideration of friction losses associated with pipe fittings shall be required.

~~P2904.7~~-R313.3.7 **Instructions and signs.** An owner's manual for the fire sprinkler system shall be provided to the owner. A sign or valve tag shall be installed at the main shutoff valve to the water distribution system stating the following: "Warning, the water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign."

~~P2904.8~~R313.3.8 **Inspections.** The water distribution system shall be inspected in accordance with Sections ~~P2904.8.1~~-R313.3.8.1 and ~~P2904.8.2~~-R313.3.8.2.

~~P2904.8.1~~-R313.3.8.1 **Preconcealment Inspection.** The following items shall be verified prior to the concealment of any sprinkler system piping:

1. Sprinklers are installed in all areas as required by Section ~~P2904.1.1~~-R313.3.1.1.

2. Where sprinkler water spray patterns are obstructed by construction features, luminaires or ceiling fans, additional sprinklers are installed as required by Section ~~P2904.2.4.2~~ R313.3.2.4.2.
3. Sprinklers are the correct temperature rating and are installed at or beyond the required separation distances from heat sources as required by Sections ~~P2904.2.1~~ R313.3.2.1 and ~~P2904.2.2~~ R313.3.2.2.
4. The pipe size equals or exceeds the size used in applying Tables ~~R313.3.6.2(4)~~ through ~~P2904.6.2(9)~~ R313.3.6.2(9) or, if the piping system was hydraulically calculated in accordance with Section ~~P2904.6.1~~ R313.3.6.1, the size used in the hydraulic calculation.
5. The pipe length does not exceed the length permitted by Tables ~~P2904.6.2(4)~~ R313.3.6.2(4) through ~~P2904.6.2(9)~~ R313.3.6.2(9) or, if the piping system was hydraulically calculated in accordance with Section R313.3.6.1, pipe lengths and fittings do not exceed those used in the hydraulic calculation.
6. Nonmetallic piping that conveys water to sprinklers is listed for use with fire sprinklers.
7. Piping is supported in accordance with the pipe manufacturer's and sprinkler manufacturer's installation instructions.
8. The piping system is tested in accordance with ~~Section P-2503.7~~ the California Plumbing Code.

**~~P2904.8.2~~ R313.3.8.2 Final Inspection.** The following items shall be verified upon completion of the system:

1. Sprinkler are not painted, damaged or otherwise hindered from operation.
2. Where a pump is required to provide water to the system, the pump starts automatically upon system water demand.
3. Pressure-reducing valves, water softeners, water filters or other impairments to water flow that were not part of the original design have not been installed.
4. The sign or valve tag required by Section ~~P2904.7~~ R313.3.7 is installed and the owner's manual for the system is present.

**TABLE ~~P2904.6.2(1)~~ R313.3.6.2(1)  
WATER SERVICE PRESSURE LOSS (PL<sub>Lsvc</sub>)<sup>a,b</sup>**

FLOW RATE <sub>c</sub> (gpm)	3/4 INCH WATER SERVICE PRESSURE LOSS (psi)				1 INCH WATER SERVICE PRESSURE LOSS (psi)				1 1/4 INCH WATER SERVICE PRESSURE LOSS (psi)			
	Length of water service pipe (feet)				Length of water service pipe (feet)				Length of water service pipe (feet)			
	40 or less	41 to 75	76 to 100	101 to 150	40 or less	41 to 75	76 to 100	101 to 150	40 or less	41 to 75	76 to 100	101 to 150
8	5.1	8.7	11.8	17.4	1.5	2.5	3.4	5.1	0.6	1.0	1.3	1.9
10	7.7	13.1	17.8	26.3	2.3	3.8	5.2	7.7	0.8	1.4	2.0	2.9
12	10.8	18.4	24.9	NP	3.2	5.4	7.3	10.7	1.2	2.0	2.7	4.0
14	14.4	24.5	NP	NP	4.2	7.1	9.6	14.3	1.6	2.7	3.6	5.4
16	18.4	NP	NP	NP	5.4	9.1	12.4	18.3	2.0	3.4	4.7	6.9
18	22.9	NP	NP	NP	6.7	11.4	15.4	22.7	2.5	4.3	5.8	8.6
20	27.8	NP	NP	NP	8.1	13.8	18.7	27.6	3.1	5.2	7.0	10.4
22	NP	NP	NP	NP	9.7	16.5	22.3	NP	3.7	6.2	8.4	12.4
24	NP	NP	NP	NP	11.4	19.3	26.2	NP	4.3	7.3	9.9	14.6
26	NP	NP	NP	NP	13.2	22.4	NP	NP	5.0	8.5	11.4	16.9
28	NP	NP	NP	NP	15.1	25.7	NP	NP	5.7	9.7	13.1	19.4
30	NP	NP	NP	NP	17.2	NP	NP	NP	6.5	11.0	14.9	22.0
32	NP	NP	NP	NP	19.4	NP	NP	NP	7.3	12.4	16.8	24.8
34	NP	NP	NP	NP	21.7	NP	NP	NP	8.2	13.9	18.8	NP
36	NP	NP	NP	NP	24.1	NP	NP	NP	9.1	15.4	20.9	NP

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 0.063 L/s, 1 pound per square inch = 6.895 kPa.

NP - Not permitted. Pressure loss exceeds reasonable limits.

- a. Values are applicable for underground piping materials listed in ~~Table P2905.4~~ the California Plumbing Code and are based on an SDR of 11 and a Hazen Williams C Factor of 150.
- b. Values include the following length allowances for fittings: 25% length increase for actual lengths up to 100 feet and 15% length increase for actual lengths over 100 feet.
- c. Flow rate from Section ~~P2904.4.2~~ R313.3.4.2. Add 5 gpm to the flow rate required by Section ~~P2904.4.2~~ R313.3.4.2 where the water-service pipe supplies more than one dwelling.

**TABLE ~~P2904.6.2(2)~~ R313.3.6.2(2)**

**MINIMUM WATER METER PRESSURE LOSS (PL<sub>m</sub>)<sup>a</sup>**

<b>FLOW RATE (gallons per minute, gpm)<sup>b</sup></b>	<b>5/8 INCH METER PRESSURE LOSS (pounds per square inch, psi)</b>	<b>3/4 INCH METER PRESSURE LOSS (pounds per square inch, psi)</b>	<b>1 INCH METER PRESSURE LOSS (pounds per square inch, psi)</b>
8	2	1	1
10	3	1	1
12	4	1	1
14	5	2	1
16	7	3	1
18	9	4	1
20	11	4	2
22	NP	5	2
24	NP	5	2
26	NP	6	2
28	NP	6	2
30	NP	7	2
32	NP	7	3
34	NP	8	3
36	NP	8	3

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.063 L/s.

NP - Not permitted unless the actual water meter pressure loss is known.

a. Table ~~P2904.6.2(2)~~ R313.3.6.2(2) establishes conservative values for water meter pressure loss or installations where the water meter loss is unknown. Where the actual water meter pressure loss is known, P<sub>m</sub> shall be the actual loss.

b. Flow rate from Section ~~P2904.4.2~~ R313.3.4.2. Add 5 gpm to the flow rate required by Section ~~P2904.4.2~~ R313.3.4.2 where the water-service pipe supplies more than one dwelling.

**TABLE ~~P2904.6.2(3)~~ R313.3.6.2(3)**

**ELEVATION LOSS (PL<sub>e</sub>)**

<b>ELEVATION (feet)</b>	<b>PRESSURE LOSS (psi)</b>
5	2.2
10	4.4
15	6.5
20	8.7
25	10.9
30	13
35	15.2
40	17.4

For SI: 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa.

**TABLE P2904.6.2(4) R313.3.6.2(4)**  
**ALLOWABLE PIPE LENGTH FOR 3/4 INCH TYPE M COPPER WATER TUBING**

SPRINKLER FLOW RATE <sup>a</sup> (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE - Pt						(psi)			
		15	20	25	30	35	40	45	50	55	60
		Allowable length of pipe from service valve to farthest sprinkler (feet)									
8	3/4	217	289	361	434	506	578	650	723	795	867
9	3/4	174	232	291	349	407	465	523	581	639	697
10	3/4	143	191	239	287	335	383	430	478	526	574
11	3/4	120	160	200	241	281	321	361	401	441	481
12	3/4	102	137	171	205	239	273	307	341	375	410
13	3/4	88	118	147	177	206	235	265	294	324	353
14	3/4	77	103	128	154	180	205	231	257	282	308
15	3/4	68	90	113	136	158	181	203	226	248	271
16	3/4	60	80	100	120	140	160	180	200	220	241
17	3/4	54	72	90	108	125	143	161	179	197	215
18	3/4	48	64	81	97	113	129	145	161	177	193
19	3/4	44	58	73	88	102	117	131	146	160	175
20	3/4	40	53	66	80	93	106	119	133	146	159
21	3/4	36	48	61	73	85	97	109	121	133	145
22	3/4	33	44	56	67	78	89	100	111	122	133
23	3/4	31	41	51	61	72	82	92	102	113	123
24	3/4	28	38	47	57	66	76	85	95	104	114
25	3/4	26	35	44	53	61	70	79	88	97	105
26	3/4	24	33	41	49	57	65	73	82	90	98
27	3/4	23	30	38	46	53	61	69	76	84	91
28	3/4	21	28	36	43	50	57	64	71	78	85
29	3/4	20	27	33	40	47	53	60	67	73	80
30	3/4	19	25	31	38	44	50	56	63	69	75
31	3/4	18	24	29	35	41	47	53	59	65	71
32	3/4	17	22	28	33	39	44	50	56	61	67
33	3/4	16	21	26	32	37	42	47	53	58	63
34	3/4	NP	20	25	30	35	40	45	50	55	60
35	3/4	NP	19	24	28	33	38	42	47	52	57
36	3/4	NP	18	22	27	31	36	40	45	49	54
37	3/4	NP	17	21	26	30	34	38	43	47	51
38	3/4	NP	16	20	24	28	32	36	40	45	49
39	3/4	NP	15	19	23	27	31	35	39	42	46
40	3/4	NP	NP	18	22	26	29	33	37	40	44

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.963 L/s.

NP - Not permitted

a. Flow rate from Section P2904.4.2 R313.3.4.2.

**TABLE P2904.6.2(5)-R313.3.6.2(5)**  
**ALLOWABLE PIPE LENGTH FOR 1 INCH TYPE M COPPER WATER TUBING**

SPRINKLER FLOW RATE <sup>a</sup> (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE - P <sub>t</sub> (psi)									
		15	20	25	30	35	40	45	50	55	60
		Allowable length of pipe from service valve to farthest sprinkler (feet)									
8	1	806	1075	1343	1612	1881	2149	2418	2687	2955	3224
9	1	648	864	1080	1296	1512	1728	1945	2161	2377	2593
10	1	533	711	889	1067	1245	1422	1600	1778	1956	2134
11	1	447	586	745	894	1043	1192	1341	1491	1640	1789
12	1	381	508	634	761	888	1015	1142	1269	1396	1523
13	1	328	438	547	657	766	875	985	1094	1204	1313
14	1	286	382	477	572	668	763	859	954	1049	1145
15	1	252	336	420	504	588	672	756	840	924	1008
16	1	224	298	373	447	522	596	671	745	820	894
17	1	200	266	333	400	466	533	600	666	733	799
18	1	180	240	300	360	420	479	539	599	659	719
19	1	163	217	271	325	380	434	488	542	597	651
20	1	148	197	247	296	345	395	444	493	543	592
21	1	135	180	225	270	315	360	406	451	496	541
22	1	124	165	207	248	289	331	372	413	455	496
23	1	114	152	190	228	267	305	343	381	419	457
24	1	106	141	176	211	246	282	317	352	387	422
25	1	98	131	163	196	228	261	294	326	359	392
26	1	91	121	152	182	212	243	273	304	334	364
27	1	85	113	142	170	198	226	255	283	311	340
28	1	79	106	132	159	185	212	238	265	291	318
29	1	74	99	124	149	174	198	223	248	273	298
30	1	70	93	116	140	163	186	210	233	256	280
31	1	66	88	110	132	153	175	197	219	241	263
32	1	62	83	103	124	145	165	186	207	227	248
33	1	59	78	98	117	137	156	176	195	215	234
34	1	55	74	92	111	129	148	166	185	203	222
35	1	53	70	88	105	123	140	158	175	193	210
36	1	50	66	83	100	116	133	150	166	183	199
37	1	47	63	79	95	111	126	142	158	174	190
38	1	45	60	75	90	105	120	135	150	165	181
39	1	43	57	72	86	100	115	129	143	158	172
40	1	41	55	68	82	96	109	123	137	150	164

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.963 L/s.

a. Flow rate from Section P2904.4.2-R313.3.4.2.

**TABLE ~~P2904.6.2(6)~~ R313.3.6.2(6)**  
**ALLOWABLE PIPE LENGTH FOR 3/4 INCH CPVC PIPE**

SPRINKLER FLOW RATE <sup>a</sup> (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE - P <sub>t</sub> (psi)									
		15	20	25	30	35	40	45	50	55	60
		Allowable length of pipe from service valve to farthest sprinkler (feet)									
8	3/4	348	465	581	697	813	929	1045	1161	1278	1394
9	3/4	280	374	467	560	654	747	841	934	1027	1121
10	3/4	231	307	384	461	538	615	692	769	845	922
11	3/4	193	258	322	387	451	515	580	644	709	773
12	3/4	165	219	274	329	384	439	494	549	603	658
13	3/4	142	189	237	284	331	378	426	473	520	568
14	3/4	124	165	206	247	289	330	371	412	454	495
15	3/4	109	145	182	218	254	290	327	363	399	436
16	3/4	97	129	161	193	226	258	290	322	354	387
17	3/4	86	115	144	173	202	230	259	288	317	346
18	3/4	78	104	130	155	181	207	233	259	285	311
19	3/4	70	94	117	141	164	188	211	234	258	281
20	3/4	64	85	107	128	149	171	192	213	235	256
21	3/4	58	78	97	117	136	156	175	195	214	234
22	3/4	54	71	89	107	125	143	161	179	197	214
23	3/4	49	66	82	99	115	132	148	165	181	198
24	3/4	46	61	76	91	107	122	137	152	167	183
25	3/4	42	56	71	85	99	113	127	141	155	169
26	3/4	39	52	66	79	92	105	118	131	144	157
27	3/4	37	49	61	73	86	98	110	122	135	147
28	3/4	34	46	57	69	80	92	103	114	126	137
29	3/4	32	43	54	64	75	86	96	107	118	129
30	3/4	30	40	50	60	70	81	91	101	111	121
31	3/4	28	38	47	57	66	76	85	95	104	114
32	3/4	27	36	45	54	63	71	80	89	98	107
33	3/4	25	34	42	51	59	68	76	84	93	101
34	3/4	24	32	40	48	56	64	72	80	88	96
35	3/4	23	30	38	45	53	61	68	76	83	91
36	3/4	22	29	36	43	50	57	65	72	79	86
37	3/4	20	27	34	41	48	55	61	68	75	82
38	3/4	20	26	33	39	46	52	59	65	72	78
39	3/4	19	25	31	37	43	50	56	62	68	74
40	3/4	18	24	30	35	41	47	53	59	65	71

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.963 L/s.

a. Flow rate from Section ~~P2904.4.2~~ R313.3.4.2.

**TABLE P2904.6.2(7)-R313.3.6.2(7)**  
**ALLOWABLE PIPE LENGTH FOR 1 INCH CPVC PIPE**

SPRINKLER FLOW RATE <sup>a</sup> (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE - P <sub>t</sub> (psi)									
		15	20	25	30	35	40	45	50	55	60
		Allowable length of pipe from service valve to farthest sprinkler (feet)									
8	1	1049	1398	1748	2098	2447	2797	3146	3496	3845	4195
9	1	843	1125	1406	1687	1968	2249	2530	2811	3093	3374
10	1	694	925	1157	1388	1619	1851	2082	2314	2545	2776
11	1	582	776	970	1164	1358	1552	1746	1940	2133	2327
12	1	495	660	826	991	1156	1321	1486	1651	1816	1981
13	1	427	570	712	854	997	1139	1281	1424	1566	1709
14	1	372	497	621	745	869	993	1117	1241	1366	1490
15	1	328	437	546	656	765	874	983	1093	1202	1311
16	1	291	388	485	582	679	776	873	970	1067	1164
17	1	260	347	433	520	607	693	780	867	954	1040
18	1	234	312	390	468	546	624	702	780	858	936
19	1	212	282	353	423	494	565	635	706	776	847
20	1	193	257	321	385	449	513	578	642	706	770
21	1	176	235	293	352	410	469	528	586	645	704
22	1	161	215	269	323	377	430	484	538	592	646
23	1	149	198	248	297	347	396	446	496	545	595
24	1	137	183	229	275	321	366	412	458	504	550
25	1	127	170	212	255	297	340	382	425	467	510
26	1	118	158	197	237	276	316	355	395	434	474
27	1	111	147	184	221	258	295	332	368	405	442
28	1	103	138	172	207	241	275	310	344	379	413
29	1	97	129	161	194	226	258	290	323	355	387
30	1	91	121	152	182	212	242	273	303	333	364
31	1	86	114	143	171	200	228	257	285	314	342
32	1	81	108	134	161	188	215	242	269	296	323
33	1	76	102	127	152	178	203	229	254	280	305
34	1	72	96	120	144	168	192	216	240	265	289
35	1	68	91	114	137	160	182	205	228	251	273
36	1	65	87	108	130	151	173	195	216	238	260
37	1	62	82	103	123	144	165	185	206	226	247
38	1	59	78	98	117	137	157	176	196	215	235
39	1	56	75	93	112	131	149	168	187	205	224
40	1	53	71	89	107	125	142	160	178	196	214

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.963 L/s.

a. Flow rate from Section P2904.4.2-R313.3.4.2.

**TABLE P2904.6.2(8) R313.3.6.2(8)**  
**ALLOWABLE PIPE LENGTH FOR 3/4 INCH PEX TUBING**

SPRINKLER FLOW RATE <sup>a</sup> (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE - P <sub>t</sub> (psi)									
		15	20	25	30	35	40	45	50	55	60
		Allowable length of pipe from service valve to farthest sprinkler (feet)									
8	3/4	93	123	154	185	216	247	278	309	339	370
9	3/4	74	99	124	149	174	199	223	248	273	298
10	3/4	61	82	102	123	143	163	184	204	225	245
11	3/4	51	68	86	103	120	137	154	171	188	205
12	3/4	44	58	73	87	102	117	131	146	160	175
13	3/4	38	50	63	75	88	101	113	126	138	151
14	3/4	33	44	55	66	77	88	99	110	121	132
15	3/4	29	39	48	58	68	77	87	96	106	116
16	3/4	26	34	43	51	60	68	77	86	94	103
17	3/4	23	31	38	46	54	61	69	77	84	92
18	3/4	21	28	34	41	48	55	62	69	76	83
19	3/4	19	25	31	37	44	50	56	62	69	75
20	3/4	17	23	28	34	40	45	51	57	62	68
21	3/4	16	21	26	31	36	41	47	52	57	62
22	3/4	NP	19	24	28	33	38	43	47	52	57
23	3/4	NP	17	22	26	31	35	39	44	48	52
24	3/4	NP	16	20	24	28	32	36	40	44	49
25	3/4	NP	NP	19	22	26	30	34	37	41	45
26	3/4	NP	NP	17	21	24	28	31	35	38	42
27	3/4	NP	NP	16	20	23	26	29	33	36	39
28	3/4	NP	NP	15	18	21	24	27	30	33	36
29	3/4	NP	NP	NP	17	20	23	26	28	31	34
30	3/4	NP	NP	NP	16	19	21	24	27	29	32
31	3/4	NP	NP	NP	15	18	20	23	25	28	30
32	3/4	NP	NP	NP	NP	17	19	21	24	26	28
33	3/4	NP	NP	NP	NP	16	18	20	22	25	27
34	3/4	NP	NP	NP	NP	NP	17	19	21	23	25
35	3/4	NP	NP	NP	NP	NP	16	18	20	22	24
36	3/4	NP	NP	NP	NP	NP	15	17	19	21	23
37	3/4	NP	NP	NP	NP	NP	NP	16	18	20	22
38	3/4	NP	NP	NP	NP	NP	NP	16	17	19	21
39	3/4	NP	NP	NP	NP	NP	NP	NP	16	18	20
40	3/4	NP	NP	NP	NP	NP	NP	NP	16	17	19

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.963 L/s.

NP - Not permitted.

a. Flow rate from Section P2904.4.2 R313.3.4.2.

**TABLE P2904.6.2(9) R313.3.6.2(9)**  
**ALLOWABLE PIPE LENGTH FOR 1 INCH PEX TUBING**

SPRINKLER FLOW RATE <sup>a</sup> (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE - P <sub>t</sub> (psi)									
		15	20	25	30	35	40	45	50	55	60
		Allowable length of pipe from service valve to farthest sprinkler (feet)									
8	1	314	418	523	628	732	837	941	1046	1151	1255
9	1	252	336	421	505	589	673	757	841	925	1009
10	1	208	277	346	415	485	554	623	692	761	831
11	1	174	232	290	348	406	464	522	580	638	696
12	1	148	198	247	296	346	395	445	494	543	593
13	1	128	170	213	256	298	341	383	426	469	511
14	1	111	149	186	223	260	297	334	371	409	446
15	1	98	131	163	196	229	262	294	327	360	392
16	1	87	116	145	174	203	232	261	290	319	348
17	1	78	104	130	156	182	208	233	259	285	311
18	1	70	93	117	140	163	187	210	233	257	280
19	1	63	84	106	127	148	169	190	211	232	253
20	1	58	77	96	115	134	154	173	192	211	230
21	1	53	70	88	105	123	140	158	175	193	211
22	1	48	64	80	97	113	129	145	161	177	193
23	1	44	59	74	89	104	119	133	148	163	178
24	1	41	55	69	82	96	110	123	137	151	164
25	1	38	51	64	76	89	102	114	127	140	152
26	1	35	47	59	71	83	95	106	118	130	142
27	1	33	44	55	66	77	88	99	110	121	132
28	1	31	41	52	62	72	82	93	103	113	124
29	1	29	39	48	58	68	77	87	97	106	116
30	1	27	36	45	54	63	73	82	91	100	109
31	1	26	34	43	51	60	68	77	85	94	102
32	1	24	32	40	48	56	64	72	80	89	97
33	1	23	30	38	46	53	61	68	76	84	91
34	1	22	29	36	43	50	58	65	72	79	86
35	1	20	27	34	41	48	55	61	68	75	82
36	1	19	26	32	39	45	52	58	65	71	78
37	1	18	25	31	37	43	49	55	62	68	74
38	1	18	23	29	35	41	47	53	59	64	70
39	1	17	22	28	33	39	45	50	56	61	67
40	1	16	21	27	32	37	43	48	53	59	64

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.963 L/s.

a. Flow rate from Section P2904.4.2 R313.3.4.2.

**(425 CBC)**

**SECTION R325**

**SPECIAL PROVISIONS FOR LICENSED 24-HOUR CARE FACILITIES IN A GROUP R-3.1**

**R325.1 Scope.** *The provisions of this section shall apply to 24-hour care facilities in a Group R-3.1 occupancy licensed by a governmental agency.*

**R325.2 General.** *The provisions in this section shall apply in addition to general requirements in this code.*

**R325.2.1 Restraint shall not be practiced in a Group R-3.1 occupancy.**

**Exception:** *Occupancies which meet all the requirements for a Group I-3 occupancy.*

**R325.2.2 Pursuant to Health and Safety Code Section 13133, regulations of the state fire marshal pertaining to Occupancies classified as Residential Facilities (RF) and Residential-care Facilities for the Elderly (RCFE) shall apply uniformly throughout the state and no city, county, city and county, including a charter city or charter county, or fire protection district shall adopt or enforce any ordinance or local rule or regulation relating to fire and panic safety which is inconsistent with these regulations. A city, county, city and county, including a charter city or charter county may pursuant to Health and Safety Code Section 13143.5, or a fire protection district may pursuant to Health and Safety Code Section 13869.7, adopt standards more stringent than those adopted by the state fire marshal that are reasonably necessary to accommodate local climate, geological, or topographical conditions relating to roof coverings for Residential-care Facilities for the Elderly.**

**Exception:** *Local regulations relating to roof coverings in facilities licensed as a Residential Care Facility for the Elderly (RCFE) per Health and Safety Code Section 13133.*

**R325.3 Building Height and Area Provisions.**

**R325.3.1 Limitations six or less clients.** *Group R-3.1 occupancies where clients are housed above the first story, having more than two stories in height or having more than 3,000 square feet (279 m<sup>2</sup>) of floor area above the first story shall not be of less than one-hour fire-resistance-rated construction throughout.*

*In Group R-3.1 occupancies housing a bedridden client, the client sleeping room shall not be located above or below the first story.*

**Exception:** *Clients who become bedridden as a result of a temporary illness as defined in Health and Safety Code Sections 1566.45, 1568.0832, and 1569.72. A temporary illness is an illness, which persists for 14 days or less. A bedridden client may be retained in excess of the 14 days upon approval by the Department of Social Services and may continue to be housed on any story in a Group R-3.1 occupancy classified as a licensed residential facility.*

*Every licensee admitting or retaining a bedridden resident shall, within 48 hours of the resident's admission or retention in the facility, notify the local fire authority with jurisdiction of the estimated length of time the resident will retain his or her bedridden status in the facility.*

**R325.4 Interior Finish Provisions.**

**R325.4.1 Interior wall and ceiling finish.** *Group R-3.1 occupancies housing a bedridden client shall comply with Interior Wall and Ceiling Finish requirements specified for Group I-2 occupancies in Table 803.5 of the California Building Code.*

**R325.5 Fire Protection System Provisions.**

**R325.5.1 Automatic sprinkler systems in Group R-3.1 occupancies.** *An automatic sprinkler system shall be installed where required in Section 313.*

**Exceptions:**

- 1. Existing Group R-3 occupancies converted to Group R-3.1 occupancies not housing bedridden clients, not housing nonambulatory clients above the first floor, and not housing clients above the second floor.*
- 2. Existing Group R-3 occupancies converted to Group R-3.1 occupancies housing only one bedridden client and complying with Section R325.6.3.3.*
- 3. Pursuant to Health and Safety Code Section 13113 existing occupancies housing ambulatory children only, none of whom are mentally ill or mentally retarded, and the buildings or portions thereof in which such children are housed are not more than two stories in height, and buildings or portions thereof housing such children have an automatic fire alarm system activated by approved smoke detectors.*

4. Pursuant to Health and Safety Code Section 13143.6 existing occupancies licensed for protective social care which house ambulatory clients only, none of whom is a child (under the age of 18 years), or who is elderly (65 years of age or over).

**(907.2.10.1.5 CBC/CFC)**

**R325.5.2 Smoke alarms in Groups R-3.1 occupancies.** Smoke alarms shall be installed where required in Section 314. In addition to the provisions set forth in Section R314 the following shall apply:

1. Smoke alarms shall be provided throughout the habitable areas of the dwelling unit except kitchens.
2. Facilities housing a bedridden client:

- 2.1. Smoke alarms shall receive their primary power from the building wiring when such wiring is served from a commercial source and shall be equipped with a battery backup.
- 2.2. Smoke alarms shall be electrically interconnected so as to cause all smoke alarms to sound a distinctive alarm signal upon actuation of any single smoke alarm. Such alarm signal shall be audible throughout the facility at a minimal level of 15 db above ambient noise level. These devices need not be interconnected to any other fire alarm device, have a control panel, or be electrically supervised or provided with emergency power.

**(907.5.2.1.3 CBC/CFC)**

**R325.5.2.1 Audible alarm signal.** The audible signal shall be the standard fire alarm evacuation signal, ANSI S3.41 Audible Emergency Evacuation Signal, “three pulse temporal pattern,” as described in NFPA 72.

**R325.5.2.2 Hearing impaired.** See Section 907.9.1 of the California Building Code.

**(907.5.2.3 CBC/CFC)**

**R325.5.2.3 Visible alarms.** Visible alarm notification appliances shall be provided in accordance with Sections 907.5.2.3.1 through 907.5.2.3.5 of the California Building Codes.

**Exceptions:**

1. Visible alarm notification appliances are not required in alterations, except where an existing fire alarm system is upgraded or replaced, or a new fire alarm system is installed.
2. Visible alarm notification appliances shall not be required in enclosed exit stairways, exterior exit stairs, and exterior exit ramps.
3. Visible alarm notification appliances shall not be required in elevator cars.

**(907.5.2.3.5 CBC/CFC)**

**R325.5.2.4 Group R-3.1 Protective social care facilities which house persons who are hearing impaired, shall be provided with notification appliances for the hearing impaired installed in accordance with NFPA 72 and which shall be activated upon initiation of the fire alarm system or the smoke alarms.**

**Exception:** The use of the existing evacuation signaling scheme shall be permitted where approved by the enforcing agency.



National Fire Protection Association  
 1 Batterymarch Park  
 Quincy, MA 02169

Standard reference number	Title	Referenced in code section number
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Standard for the Installation of Sprinkler Systems in One-and Two-Family Dwellings and Manufactured Homes as amended\*.....*R313.1.1, R313.2.1, R313.3.1, R313.3.2, R313.3.2.3.1, R313.3.2.4.2, R313.3.6.1*

**NFPA 13D, Amended Sections as follows:**

**6.2\* Water Supply Sources.** *When the requirements of 6.2.2 are met,* the following water supply sources shall be considered to be acceptable by this standard:

- (1) A connection to a reliable waterworks system with or without an automatically operated pump
- (2) An elevated tank
- (3) A pressure tank designed to American Society of Mechanical Engineers (ASME) standards for a pressure vessel with a reliable pressure source
- (4) A stored water source with an automatically operated pump
- (5) A well with a pump of sufficient capacity and pressure to meet the sprinkler system demand. The stored water requirement of 6.1.2 or 6.1.3 shall be permitted to be a combination of the water in the well (including the refill rate) plus the water in the holding tank if such tank can supply the sprinkler system.

13D—0710

**6.2.2** Where a well, pump, and tank or combination thereof is the source of supply for a fire sprinkler system, ~~but is not a portion of the domestic water system~~ the water supply shall serve both domestic and fire sprinkler systems, and the following shall be met:

- (1) A test connection shall be provided downstream of the pump that creates a flow of water equal to the smallest sprinkler on the system. The connection shall return water to the tank.
- ~~(2) Pump motors using ac power shall be connected to a 240 V normal circuit.~~
- ~~(3)~~ (2) Any disconnecting means for the pump shall be approved.
- ~~(4)~~ (3) A method for refilling the tank shall be piped to the tank.
- ~~(5)~~ (4) A method of seeing the water level in the tank shall be provided without having to open the tank.
- ~~(6)~~ (5) The pump shall not be permitted to sit directly on the floor.

**6.2.2.1** Where a fire sprinkler system is supplied by a stored water source with an automatically operated means of pressurizing the system other than an electric pump, the water supply may serve the sprinkler system only.

**6.2.4** Where a water supply serves both domestic and fire sprinkler systems, 5 gpm (19 L/min) shall be added to the sprinkler system demand at the point where the systems are connected, to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler.

**8.6.4\*** Sprinklers shall not be required in detached garages, open attached porches, carports with no habitable space above, and similar structures.



National Fire Protection Association  
 1 Batterymarch Park  
 Quincy, MA 02169

Standard reference number	Title	Referenced in code section number
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<u>13R—10</u>	<u><i>Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height as amended*</i></u> .....R326.8	
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**NFPA 13R, Amended Sections as follows:**

**Revise Section 2.2 and add publications as follows:**

**2.2 NFPA Publications.**

NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 2006 California edition.

**Add Section 6.3.5 as follows:**

**6.3.5 Instructions.**

The installing contractor shall provide the property owner or the property owner's authorized representative with the following:  
(1) All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed

(2) NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems 2006 California Edition and Title 19, California Code of Regulations, Chapter 5.

(3) Once the system is accepted by the authority having jurisdiction a label as prescribed by Title 19, California Code of Regulations, Chapter 5, shall be affixed to each system riser.

**CALIFORNIA RESIDENTIAL CODE – MATRIX ADOPTION TABLE**

**CHAPTER 1  
SCOPE AND ADMINISTRATION**

Adopting Agency	BSC	SFM	HCD			DSA		OSHPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SL C
			1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																			
Adopt Entire Chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below		X																	
Chapter / Section																			
<u>Division I</u>																			
<u>1.1 – 1.12</u>		X																	
<u>1.11 – 1.11.10</u>		X																	
<u>Division II</u>																			
<u>104.2 – 104.4</u>		X																	
<u>104.9 – 109.1</u>		X																	
<u>105.1</u>		X																	
<u>105.2.1 – 105.2.2</u>		X																	
<u>105.3 – 105.3.1</u>		X																	
<u>105.4</u>		X																	
<u>105.6</u>		X																	
<u>105.7</u>		X																	
<u>106 – 106.5</u>		X																	
<u>107 – 107.4</u>		X																	
<u>109.1</u>		X																	
<u>109.1.4 – 109.1.6</u>		X																	
<u>109.3.8 – 109.3.10</u>		X																	
<u>109.2 – 109.4</u>		X																	
<u>110 – 110.5</u>		X																	
<u>111 – 111.3</u>		X																	
<u>113 – 113.2</u>		X																	
<u>114 – 114.3</u>		X																	

**CHAPTER 2  
DEFINITIONS**

Adopting Agency	BSC	SFM	HCD			DSA		OSHPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SL C
			1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																			
Adopt Entire Chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below		X																	
Chapter / Section																			
<u>R201 – R201.4</u>		X																	
<u>ACCESSORY STRUCTURE</u>		X																	
<u>ADDITION</u>		X																	
<u>AGED HOME OR INSTITUTION</u>		X																	
<u>ALTERATION</u>		X																	
<u>APPROVED</u>		X																	
<u>APPROVED AGENCY</u>		X																	
<u>APPROVED LISTING</u>		X																	





**CHAPTER 3  
BUILDING PLANNING**

Adopting Agency	BSC	SFM	HCD			DSA		OSHDPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SL C
			1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																			
Adopt Entire Chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below		<u>X</u>																	
Chapter / Section																			
<u>R302.1 through R302.13</u>		<u>X</u>																	
<u>R303.6 through R306.1</u>		<u>X</u>																	
<u>R308.3 through R308.4</u>		<u>X</u>																	
<u>R309.5</u>		<u>X</u>																	
<u>R310 through R310.4</u>		<u>X</u>																	
<u>R311 through R311.8.3.3</u>		<u>X</u>																	
<u>R312 through R312.4</u>		<u>X</u>																	
<u>R313 through R313.3.8.2</u>		<u>X</u>																	
<u>R314 through R314.6.3</u>		<u>X</u>																	
<u>R316.3 through R316.4</u>		<u>X</u>																	
<u>R316.5.8 through R316.5.11</u>		<u>X</u>																	
<u>R319</u>		<u>X</u>																	
<u>R325 through R325.9</u>		<u>X</u>																	
<u>R326 through R326.8</u>		<u>X</u>																	
<u>R327 through R327.10.2</u>		<u>X</u>																	
<u>R328 through R328.4</u>		<u>X</u>																	

**CHAPTER 8  
ROOF-CEILING CONSTRUCTION**

Adopting Agency	BSC	SFM	HCD			DSA		OSHDPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SL C
			1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																			
Adopt Entire Chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below		<u>X</u>																	
Chapter / Section																			
<u>R802.1.3 through R802.1.3.8</u>		<u>X</u>																	

**CHAPTER 9  
ROOF ASSEMBLIES**

Adopting Agency	BSC	SFM	HCD			DSA		OSHDPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SL C
			1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																			
Adopt Entire Chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below		<u>X</u>																	
Chapter / Section																			

R901.1		X															
R902 through R902.2		X															
R904 through R904.4		X															

**CHAPTER 10  
CHIMNEYS AND FIREPLACES**

Adopting Agency	BSC	SFM	HCD			DSA		OSHDPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SL C
			1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																			
Adopt Entire Chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below		X																	
Chapter / Section																			
R1003.9.1		X																	

**CHAPTER 44  
REFERENCED STANDARDS**

Adopting Agency	BSC	SFM	HCD			DSA		OSHDPD				CSA	DHS	AGR	DWR	CEC	CA	SL	SL C
			1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																			
Adopt Entire Chapter as amended (amended sections listed below)		X																	
Adopt only those sections that are listed below																			
Chapter / Section																			
ANSI		X																	
ASTM		X																	
ICC		X																	
NFPA		X																	
SFM		X																	
UBC		X																	



## **California State Fire Marshal Information Bulletin**

### **Residential Automatic Fire Sprinklers in One- and Two-Family Dwellings and Townhouses**

Issued: 2/18/10

This Information Bulletin is to clarify which provisions have been adopted and/or amended by the SFM regarding residential automatic fire sprinkler systems in one- and two-family dwellings and townhouses for statewide application. The adoption of residential automatic fire sprinkler systems was approved by the Building Standards Commission (BSC) on January 12, 2010 (with an effective date of January 1, 2011); and since that time, the SFM has received inquiries primarily in regards to the following issues:

- a.) The use of a domestic shutoff valves; and
- b.) The need for an acceptable water supply source

The SFM has adopted through the BSC the 2009 International Residential Code (IRC) by reference for inclusion into 2010 California Residential Code (CRC) as part of the California Building Standards Code (Title 24, CCR, Part 2.5). This adoption includes provisions for the installation of automatic fire sprinkler systems for new one- and two-family dwellings and townhouses by one of several methods, that include but are not limited to provisions contained in 2010 CRC, Section R313.3 (derived from Section P2904 of the 2009 IRC) or the National Fire Protection Associations (NFPA-13D, 2010 edition) Standard for the Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes.

The adoption of these provisions and/or standards allows for the installation of a domestic shutoff valve with a single water supply source/metering. The SFM has not adopted a standard or code that would "require" a second (dual) water supply source/metering (domestic demand and fire protection demand). Furthermore, the "preferred method" in accordance with NFPA-13D (2010 edition) is a single meter with domestic shut off as described in the NFPA 13D Annex A Explanatory Material for section 6.2. However, it must be emphasized that the size of and/or the requirement for a second water supply source/metering is subject to the acceptance of the local water purvey, city or county or city and county or the local fire authority having jurisdiction.



## California State Fire Marshal Information Bulletin

### Residential Automatic Fire Sprinklers in One- and Two-Family Dwellings and Townhouses

Issued: 2/18/10

**Note:** *The design of the Domestic Shutoff Valve is such that if there is a fire sprinkler operation/activation during domestic usage, the Valve will automatically shut off flow to the domestic system and divert the available water supply to the fire sprinkler system, thereby eliminating the lower flow into the sprinkler system that might otherwise be caused by possible significant domestic water usage. The use of a domestic valve can eliminate the need to combine the domestic and sprinkler demand (gallons per minute) when performing the hydraulic design calculation, thus enhancing the water meter/pipe sizing in many cases.*

The SFM convened a group of Subject Matter Experts to address the residential fire sprinkler/water supply issues. Between October 9, 2008 and March 30, 2009 this group developed the SFM Residential Fire Sprinkler/Water Purveyor Task Force (Phase I) Final Report with recommendations for “best practices” which was issued in June 2009. This report is available for review and downloading (PDF) at:

<http://osfm.fire.ca.gov/pdf/firemarshal/taskforcefinalreport.pdf>

Additionally, a copy of the SFM Residential Fire Sprinkler Installation Task Force (Phase II) Final Report with recommendations for “best practices” was issued in June 2009 and is available for review and downloading (PDF) at:

<http://osfm.fire.ca.gov/pdf/firemarshal/taskforcephast2finalreport.pdf>

A third report, the SFM Residential Fire Sprinkler Training and Education Task Force (Phase III) Final Report with recommendations is being finalized and will be available soon for review and downloading (PDF)

For more information please visit our website <http://osfm.fire.ca.gov>

## Office of the State Fire Marshal

### Phase III Terminology Subcommittee

Purpose: In order to enhance and create better communication and understanding among all stakeholders involved in the Residential Fire Sprinkler community, a list of common terminology used by the various industries has been created. This documented is created to eliminate confusion and to develop common terminology between stakeholders.

Scope: Common terminology used by members of the Fire Service, Fire Sprinkler Industry and the Water Industry.

- I. Fire Sprinkler Industry
  - a. CPVC pipe
    - i. Chlorinated Polyvinyl Chloride (CPVC)
      1. A thermoplastic pipe produced by chlorination of polyvinyl chloride (PVC) resin. Uses include hot and cold water pipe and industrial liquid handling.
  - b. Exterior Bell
    - i. A device that alerts occupants when the water flow switch is activated.
  - c. Fire Sprinkler System
    - i. A fire sprinkler system ;is an active fire;; protection measure, consisting of a water supply, providing adequate pressure and flow rate to a water distribution piping system, onto which fire sprinklers are connected. Although historically only used in factories and large commercial buildings, home and small building systems are now available at a cost-effective price.
  - d. Flashover
    - i. The temperature at which the heat in an area or region is heated enough to ignite; all flammable materials simultaneously
  - e. Flow Switch
    - i. Allow sensing switch device located on a fire sprinkler riser having a housing provided with a fluid flow passage through defined by an inlet and an outlet separated by a valve seat controlled by a movable valve member that is operated by the pressure differential between the inlet and the outlet. The device contains an electrical switch construction operatively associated with the valve member and having the switch contacts actuated by the pressure differential. The switch contacts of the switch construction are disposed in the fluid flow 'passage so as to be exposed to fluid flow there through and have a part thereof carried by the valve member.
  - f. Gauge
    - i. A device located on the riser that notes the static (non-flowing water pressure) and residual (flowing water pressure) and allows for a visual indication that the fire sprinkler system is pressurized.
  - g. LEED
    - i. Leadership in Energy and Environmental Design, allows credit for
      1. Carbon credit
      2. Carbon Reduction
      3. Contractors operating Green
  - h. Residential Domestic Shut-off Valve

August 13, 2009

- i. Makes water available on demand to the domestic system, and acts as a check valve for the fire protection system. When the sprinkler system operates in the home, the supply to the domestic system is automatically shut off and makes the maximum use of the available water supply to control the fire. 1" domestic shut-off valves are used in piping systems that supply water to both the domestic service and the fire sprinkler designed per NFPA 13D in one and two family dwellings or mobile homes.
- i. Residential Fire Sprinkler System
  - i. Residential sprinkler systems fall under a residential classification separate from the commercial classifications (NFPA 13). A commercial sprinkler system is designed to protect the structure and the occupants from a fire. Most residential sprinkler systems are primarily designed to suppress a fire in such a way to allow for the safe escape of the building occupants. While these systems will often also protect the structure-;from major fire damage, this is a secondary consideration. In residential structures sprinklers are often omitted from closets, bathrooms, balconies, garages and attics because a fire in these areas would not usually impact: the occupant's escape route : .
- j. Riser
  - i. A vertical pipe and component assembly that is the connection, of the domestic water supply to the fire sprinkler sys.tern.- The riser typically cosists of:
    1. Flow switch
    2. Gauge
    3. Test valve
    4. Sprinkler pipe
- k. Sprinkler Head
  - i. A sprinkler head will spray water into the roam if sufficient heat reaches the bulb and causes it to shatter. `Sprinkler heads operate individually. Each closed-head:sprinkler is, held closed by either a heat-sensitive glass bulb or a two-part metal ink. held' together with fusible alloy. The glass bulb or link applies pressure ,to .a pipe cap, which acts as. a plug-and prevents water from flowing until the ambient temperature around the sprinkler reaches the design activation temperature of the individual sprinkler head. Because each sprinkler activates independently when the predetermined heat level is reached, the number of sprinklers that operate is limited to only those near the fire, thereby maximizing the available water pressure over the point of fire origin. A sprinkler activation will do less':damage than a fire department hose stream.
- l. Test Valve'
  - i. A device used to test the water flow through sprinkler systems which is usually constructed of forged brass with a 3-way ball valve (Off-Test-Drain).

#### Basic Water Supply terminology for general use

- Water Service- connection to a public water supply including the connection to a pubic water main, the lateral pipe from the main the curb or property line, the meter and a shutoff valve before or after the meter. Services are provided in standardize sizes, depending on the need for capacity and the supplying agencies' practice. Common sizes for single family residential development are 5/8- inch, 3/8 inch 1- inch and 1 1/2- inch.

August 13, 2009

- Property pipe- private, onsite plumbing connecting to the public water supply downstream of the meter. Owned, maintained and operated by the property owner.
- Water Main- pipe, usually located in the street, which distributes public water supply. Typically the water main provides domestic, private fire and public fire supply, although some jurisdictions may have separate facilities for public fire supply. Water mains are sized to provide water efficiently at a given pressure range, with loops and multiple directions of supply where possible. Mains typically range in size from 6-inches to 20-inches in diameter. Smaller main may be used to serve limited areas or single customers. Larger mains, usually used for transmission from one area to another, may provide service directly if most efficient and acceptable to overall transmission operations.
- Lateral- part of a water service; pipe connecting main to meter (if present) and then to the private service.
- Tap- the connection (noun, or to connect (verb) to. a water::main. "Taps" for services are typically made by inserting a valve into the wall of the main. This tapping valve is then connected to a service Lateral (pipe) to provide water to a property.
- Water meter- instrument for measuring volume flow of water. Typically mechanical; typically in units of one hundred cubic feet (748 gallons:),. The water meter box is casually where the line between the public water system and the property owner's private plumbing begins.
- Public fire supply-Supply of water to public fire hydrants. Required fire supply is usually set by the fire department of jurisdiction and in accordance with applicable code. Flow may be required in excess of capacity of a single hydrant; and may be from the three closest hydrants for example. Typically, required public fire flow ranges from 1000 gallons per minute for a residential area to 9000 gallons per minute for a high hazard industrial area.
- Private fire supply- fire flow dedicated to fire suppression on private property.
- Detector check- check valve assembly; mechanical valve assembly in a fire service allowing oneway flow and indicating status of flow specifically for a non-metered fire service.
- Fire Service- a type of water service dedicated singularly to fire suppression on private property. Fire Services may range from 2 to 12- inches in diameter and flow from a few hundred gallons per Minute to several thousand gallons.per minute.
- Domestic service- water service to private property for domestic- as opposed to fire suppression purposes.
- Water pressure- Measure of energy of water, related both to elevation and the velocity of the water. Pressure is measured in pounds pressure per square inch of area (psi). Water pressure varies depending on many factors and can range up to 30 psi, sometimes more, each day.
- Static pressure-the highest pressure experienced at a given location (elevation)- experienced in a no-flow situation (i.e. velocity in the water system is zero).
- Residual pressure- water;pressure at a particular location (elevation) under flowing conditions. Relatively lowest design pressure.

August 13, 2009

- Normal operating pressure- the range of pressure variation experienced at a specific location under over the course of an extended time period. Water utilities design to operate over a range of pressure to accommodate daily and seasonal variation in use, efficiently. Normal operating pressure varies significantly based upon the elevation changes in a system and a size and configuration of the piping. It is usually above about 30 psi and less than 150 psi but may be over 200 psi in some areas. Normal operating pressure is exclusive of fire flow conditions. A typical minimum residual not fire flow pressure target is 40 psi where practical but this varies.
- Fire Flow pressure condition- Water Utilities design facilities to provide a base flow of domestic water supply and a supply to the fire hydrant(s) as require by the local fire jurisdiction while maintain a minimum pressure to the fire hydrant (usually 20 psi at the hydrant).
- Pressure or Elevation agreement or notification- a notice to property owner that the water utility can not supply water to the property at a normal pressure (typically less than 30- 40 psi) and that the property owner will be required to provide on-site facilities (hydro pneumatic pump) as needed. This notice or agreement is typically provided to the developer at the time the property is developed or service is requested and is frequently recorded against the deed to the property as notice to future property owners. Some water purveyors also notify the fire agency as a courtesy.
- Operating Storage- a volume of water stored in tanks, or reservoirs to be available to respond instantaneously to a fluctuation in demand including changes in domestic use that occurs of the course of a day. The volume of operating storage de,pends.o.n. the availability or fluctuation in supply and is sized to maintain normal operating pressure within an acceptable range.
- Fire demand storage or emergency storage- storage volume above and beyond the operating storage to provide for added fire flow requirements. May be represented in terms of a fire flow for a given period of time. (E.g. 2 hours of fire flow at 1,500 gpm = 0.18 million gallons (MG)). Tanks larger than about 1.0 MG typically have a large volume of emergency storage available.
- Back flow prevention- method of protecting domestic water supply from potential contamination- including loss of,chlorine residual from cross connection with a non-protected source of supply (including some fire suppression systems) by allowing only one-way flow of water toward the user.
- Cross connection- the potential for contamination of domestic water supply due to connection to non-potable system.
- Volumetric charges- charges:for water service based on the amount of water used as measured by meter. Promotes concept of water conservation.
- Base charges- water-services charges based on the set cost of doing business, whether any water is used or not. -Frequently a set amount per billing period covering such costs as billing and collecting fees and basic staff and certain facility operating and maintenance costs not related to commodity volumetric charges.
- Stand-by charge- set, fee for service sometime used in place of a base charge- to cover cost of operating and maintaiolng water supply facilities in anticipation of future need.

gpm - gallons per minute- common-measure rate of flowing water  
 psi - pounds per square inch- common measure of water pressure  
 MG- million gallons- measure of water storage

August 13, 2009

**CSFM's Residential Fire Sprinkler**  
**Task Force - Phase I, II, III**  
**(Laws & Regulations Sub-Committees)**

**[Slide #1]**

**General Questions and Answers:**

1. Where is it written that public commissions, boards and councils and other public agencies must conduct their business/actions in an open forum/hearing?

**Answer:** **Ralph M. Brown Act**  
*(Government Code Section 54950-54963)*

2. Where does it require that a state body (Agency, Board, Advisory Committee, etc.) must provide notice at least 10-days prior to a public meetings in which action shall be taken?

**Answer:** **Bagley-Keene Open Meeting Act**  
*(Government Code Section 11125-11125.9)*

**[Slide #2]**

3. Are there any regulations which define criteria by which a water purveyor can discontinue the water service to a customer for non-payment? (**Note:** *This regulation only applies to water purveyors who fall under the authority and jurisdiction of the CA Public Utilities Commission – PUC.*)

**Answer:** **General Order No. 103:**  
*(CA Public Utility Commission – Water Branch, Section I-6.a thru f)*

4. Where can I find the statutory authority for the California Safe Drinking Water Act, and what does it say?

**Answer:** **California Safe Drinking Water Act:**  
*(Health and Safety Code, Section 116270-116275)*

**[Slide #3]**

5. Where does it define the requirements for Backflow/Cross-Connection devices on a water service?

**Answer:** Backflow/Cross-Connection:  
(*Health and Safety Code, Section 116800-116820*)

6. Is there any state law which governs the implementation of backflow/cross-connection equipment and/or device(s) when connecting a residential fire sprinkler system to the domestic water supply service?

**Answer:** Backflow Prevention and Cross-Connection Control:  
(*Health and Safety Code, Section 13114.5 and 13114.7*)

**[Slide #4]**

7. What is the statutory authority for a local agency to impose fees and charges for a water service connection?

**Answer:** Service Connection Fees/Charges:  
(*Government Code Section 66013*)

8. Where is the statutory criteria found for a local agency (Planning, Building and/or Fire) for establishing fees and charges associated with processing and inspecting projects?

**Answer:** Building/Fire Agencies:  
(*Government Code Section 66014*)

**[Slide #5]**

**General Questions and Answers:**

9. If the Building Department wanted to do the review and inspections of residential fire sprinkler systems and the Fire Department objected; “Do we, the Fire Department have the authority to keep this task?”

**Answer:** The city, county, or city and county shall delegate.  
(*Health & Safety Code, Section 13145-13146.5*)

10. By code we cannot require five year services on residential fire sprinkler systems. Can this be accomplished by local ordinance?

**Answer:** NO

*(CA SEM Website: Question taken from Frequently Asked Questions Concerning NFPA-25, 2006 California Edition [Page #7]: Can local fire authorities adopt testing and maintenance requirements that are more restrictive than the service requirements in the California Code of Regulations, Title-19? Answer: No .)*

*(Health & Safety Code, Section 13198.5, 17958.7, 18941.5)*

**[Slide #6]**

11. Can a Fire Protection Contractor (C-16) design the system that he or she is to install?

**Answer:** YES

*(B&P Code – Contractors License Law)*

12. What does Section 2904 of the 2009 International Residential Code say as relates to the design and installation of a residential fire sprinkler system and is it being proposed for adoption by the Building Standards Commission?

**Answer:** See Section R313.1.1

*(R313.1.1 Design and installation. Automatic residential fire sprinkler systems for townhouses shall be designed and installed in accordance with Section ~~P2904~~R313.3 or NFPA 13D.)*

**[Slide #7]**

13. Why doesn't the State of California do like many other states and mandate that all fire sprinkler designs will be done by or supervised and certified by a minimum NICET – Level III Automatic Sprinkler Layout Technician?

*(Comment: Many states have this requirement in order to even get a Fire Protection Contractor license.)*

**Answer:** In California, the state licenses Professional Engineers (BPE&LS) for design of systems and Contractors (CSLB) for design and installation of fire protection systems. A quick check of the licensing requirements and/or application forms for both the Board of Professional Engineers & Land Surveyors (BPE&LS) and the Contractors State License Board (CSLB) are silent when it comes to NICET criteria necessary to be licensed as an engineer and/or contractor.

**[Slide #8]**

**14. We have copies of the 2009 IRC, Chapter 29. Is it the intent of Section P2904 to allow residential fire protection systems to be installed by a Fire Protection Contractor (C-16) and/or a Plumbing Contractor (C-36)?**

*(Note: Section P2904.1 General states “Where installed, residential fire sprinkler systems, or portions thereof, shall be in accordance with NFPA-13D or Section P2904, which shall be considered equivalent to NFPA-13D.” So, does all of this mean if you are a C-16 you design and install in accordance with NFPA-13D and if you are a C-36 you design and install in accordance with P2904? )*

**Answer: Only Fire Protection Contractors (C-16’s, General Manufactured Housing Contractors (C-47’s) and Owner-Occupied Owner-Builders may install a fire protection system.**

*(B&P Code – Contractors License Law, Sections 7026.2. (a), 7026.3, 7026.11, 7026.12)  
(B&P Code 7008, 7058, and 7059)  
(832.47. Class C-47 – General Manufactured Housing Contractor)*

**[Slide #9]**

**15. How does the State handle training and education for contractors, installers, plan checkers, inspectors, and the consumer?**

**a) Contractor/Installers:**

**Answer: Necessary degree of knowledge**  
*(B&P Code – Contractors License Law Section 7065, 7068)*

**b) Plan Checkers/Inspectors (Fire):**

**Answer: SFM shall establish fire prevention training for delivery on a regional basis.**  
*(Health & Safety Code, Section 13105.5)*

**c) Consumer:**

**Answers:**  
*(Health & Safety Code, Section 13144)*

**[Slide #10]**

**16. In a multi-purpose system, will the traces of lead in the sprinkler heads be a problem with the domestic water?**

**Answers:** Sprinklers and other components must be “lead free” (meaning not more than 0.2 percent. Manufacturer’s Data Sheets (Cutsheets) now list compliance for California and Vermont.

*(Health & Safety Code, Section 116875)*

*(Health & Safety Code, Section 25214.4.3)*

**17. Is there a distance a detached garage has to be away from a sprinklered home before it’s not required to be sprinklered?**

**Answers:** Yes – 3-feet

*(2010 CRC, Section and Table R302.6)*

*(2007 CBC, Section 310.1)*

*(2007 CBC, Section 312.1)*

*(2007 CBC, Section 406.1.2)*

*(2007 CBC, Section 704.3)*

*(2007 CBC, Section 704.5)*

**[Slide #11]**

**18. What is the criteria which defines an “Underground Regulation” and is used for the premise by which State Agencies are required to follow strict criteria for the adoption of Building Standards?**

**Answer:** Regulations SHALL be adopted by the Building Standards Commission or Office of Administrative Law.

*(Government Code, Section 11340-11340.1)*

*(Government Code, Section 11340.5)*

*(Government Code, Section 1135)*

**19. Do Building Departments (and Fire Departments) need to maintain an official copy of the construction plans (including fire sprinkler drawings and calculations) for a single- or multiple dwelling for the life of the building?**

**Answer:** No.

*(Health & Safety Code, Section 19850)*

## **Working Plans Proposal (Recommendation)**

It must be clearly noted that “Working Plans” are required in the 2010 NFPA-13 (Section 22.1 – Page 13-217 thru 13-218), which defines forty-six (46) separate items to be shown on the drawings.

Likewise, the 2010 NFPA-13R (Section 8-1 – Page 13R-19), which defines twenty-five (25) items to be shown on the drawings.

However, the 2010 NFPA-13D does not require “Working Plans”, as has been the case since the first edition back in 1975.

Today, in California, the majority of local enforcing agencies (900 +/- Fire Agencies, 58 +/- County Building Departments, and 478 +/- Incorporated/Charter Cities) require working plans/drawings to be prepared and submitted with the supportive calculations to reflect the materials used, layout of the piping, and reflecting the proper coverage for the fire sprinkler installations, and to compare the hydraulic calculations to what is being proposed. Each agency is defining the criteria to be shown. Every Fire Protection Contractor (C-16) must research what that individual enforcing agency will be requiring in order to submit an application for approval.

The purpose for this recommendation is for the uniformity of what working drawings/plans would be for residential fire sprinkler systems, installed in accordance with NFPA-13D and/or the California Residential Code and would help to clarify and to give guidance to those agencies and individuals who may not currently know what is required. It should also be noted that by doing so may in-fact reduce the use of local guidelines and/or submittal criteria which often have provisions which could be considered as “underground regulations”.

### **Working Plans Proposal:**

- Plans & Calculations
- Name of Owner, Builder or Responsible Party.
- Location, including street address and vicinity map.
- For production homes, Include lot or parcel number, plan ID or model name.
- Point of compass.
- Number of, manufacturer, Sprinkler Identification Number (SIN), response type, temperature rating and K-factor of all sprinklers.
- Underground/site piping plan including all of the following that apply:
  - Point of connection to public water system.
  - Service point of entry to dwelling.

- Alternative water supply components such as well, pump, gravity or pressure tank.
- 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.
- On combined laterals serving fire sprinklers and domestic water, location of fire service take-off, master shut off valve, and point of added domestic flow allowance.
- Size/location of public water main at point of connection.
- Flow test/pressure data used for hydraulic calculations, including location of test, elevation relative to finished floor at service point of entry and source of information.
- Reference nodes matching hydraulic calculations.
- Building system piping plan including all of the following that apply:
  - Point of connection to service pipe.
  - Dimensioned location and spacing criteria for all sprinklers.
  - 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.
  - Location and arrangement of valves and devices such as drain/test, pressure relief valve, alarm connection, appliance bypass on MP systems, etc.
  - Full height building section.
  - Reference nodes matching hydraulic calculations.
- Means of freeze protection, as required.
- Name, address and license number of designer or installing design/build contractor (C-16 – Fire Protection)
- Material Data Sheets:
  - Fire sprinklers
  - Pipe and fittings
  - Hangers, means of support
  - Water supply components and connected devices such as water meter, backflow, etc.

## APPENDIX F

### Training and Educational Programs

#### National Fire Sprinkler Association (NFSA):

Onsite and Online Seminars are approved in several states for ICC building and fire official continuing education units (CEU's) and also for contractors and personnel needing National Institute for Certification for Engineering Technologies (NICET) training credits. NFSA seminars and programs are also good for NFPA recertification credits for fire inspectors and certified fire protection specialists (where required). The following are programs offered for Residential Fire Sprinkler training:

#### **NFSA Onsite Training and Education Seminars:**

##### **NFPA 13, 13-D, 13-R update 2007:**

This one day seminar describes the major changes that have occurred in the 2007 editions of NFPA 13, 13-D and 13-R. The class is designed to enhance and further develop the rules and requirements for proper installation of the fire sprinkler systems. Experience level – ALL LEVELS

##### **Plan Review Procedures and Policies:**

This one day seminar is intended to educate the student on how to conduct a plan review of a sprinkler system. The class covers the methodology and systematic approach to plan review procedures. The attendee will learn how to evaluate and analyze a fire sprinkler plan for compliance with NFPA 13. Each attendee receives copies of various sprinkler plan review check sheets that are used in compliance with NFPA 13, 13-D, 13-R. Experience level – INTERMEDIATE.

##### **Residential Sprinklers - Homes to High-Rise:**

This one day seminar provides participants with an overview of the residential fire problem in the United States. The seminar addresses the causes and effects of that problem in the past, present and the future. The seminar explains the history of the residential sprinkler and how it was designed to specifically address the life-safety considerations in residential fires. Attendees are given an overview of the basic differences among residential designs and installations applied in accordance with NFPA 13, 13-D, 13-R. Experience level – BASIC to INTERMEDIATE.

## **APPENDIX F**

### **Sprinklers for Dwellings:**

This one day seminar analyzes the basic requirements used in designing, installing and accepting sprinkler systems in one and two family dwellings and manufactured housing. The program addresses the basic responsibilities of the designer, installer, authority having jurisdiction (AHJ), and owner for proper installation of these systems. The program discusses the issues behind developing a life safety type sprinkler system to specifically address the problems associated with residential deaths in the United States. Experience level – BASIC

### **NFPA 13, 13-D, 13-R, 2007/2010:**

The ½ day seminar details the latest and most significant changes to NFPA Standards 13, 13-R, 13-D, 2007/2010 as compared to the 1999 edition of NFPA 13, 13-R, 13-D.

### **CPVC Piping Installation Requirements and Procedures:**

The ½ day seminar will cover the NFPA 13 requirements and industry recommendations. The student will learn about hanging requirements, expansion loops, solvent cementing methods, fire stopping assembly requirements, anti-freeze systems and other installation requirements specified in NFPA 13 and by the manufacturers of CPVC fire protection piping. CPVC compatibility issues will also be covered in this seminar. This seminar is intended for entry level and intermediate students and any person involved in installation, approval or inspection of a CPVC fire piping system. Experience level – BASIC to INTERMEDIATE.

## **NFSA Academy Classes**

### **Bathrooms and Closets – To sprinkler or not to sprinkler?:**

Sprinklers can be required or omitted from spaces such as bathrooms and closets. NFPA 13, 13D and 13R all contain different requirements for these spaces, along with sections of the building code that will dictate if these spaces need to be protected by sprinklers. These small rooms cannot be ignored, tune in to review how the requirements for bathrooms and closets all piece together. Experience level – BASIC to ADVANCED

### **CPVC Issues:**

With the large quantity of CPVC pipe being used throughout the country and with the increased need for plastic pipe installation because of future residential sprinkler usage, issues regarding CPVC pipe arise. This presentation will discuss how the industry has taken a proactive step, involving contractors, suppliers and manufacturers and other stakeholders to address the issues. Experience level – BEGINNER.

## **APPENDIX F**

### **Basics of Residential Sprinkler Systems:**

NFPA standards offer various options for use of residential sprinklers in accordance with NFPA 13, 13D, and 13R. This seminar will provide a basic introduction covering residential sprinkler capabilities, layout and hydraulics. Experience level – BEGINNER TO INTERMEDIATE.

### **CPVC Piping Compatibility and Use:**

Although introduced as a special listed product, the CPVC piping system has become the industry standard for residential and similar applications. Some specific rules relating to CPVC pipe and fittings are now found within the NFPA standards. Special precautions must be taken with regard to hanging, testing, and other aspects of use. There are also newer concerns of compatibility with other products found in sprinkler systems that require attention to prevent system failures. The focus of this seminar will be on identifying and avoiding these compatibility problems. Experience level – INTERMEDIATE.

### **Residential NFPA 13-D Calculations:**

Options for calculating NFPA 13D, 13R and 13 systems using residential sprinklers, including a discussion of the new minimum flow rates that become effective July 12, 2002. Experience level – INTERMEDIATE.

### **NFSA On-line Classes**

#### **NFPA-13, -13R -13D UPDATE:**

This one-half day seminar describes the changes in the NFPA Standards for the contractor and authority having jurisdiction for the proper installation of fire sprinkler systems. This is a Basic level class.

Overview – Provides the attendees with the understanding of changes made to the NFPA-13, -13R and -13D Standards.

#### **2002 RESIDENTIAL SPRINKLERS HOMES TO HIGH-RISE SEMINAR:**

This one-day seminar provides the attendee with the knowledge and a detailed description of the residential fire problem in America in the past, present and the future. The application of the residential design and installation is applied in accordance with NFPA-13, NFPA 13R and NFPA13D. This is a basic level class.

Overview – Provides the attendees with the understanding of the residential sprinkler and its characteristics that provide life safety in residential dwelling units.

#### **Fire Team USA:**

Through the Assistance to Firefighter Grant (AFG) program, the department awards grants to firefighters, emergency response personnel and first

## APPENDIX F

responders throughout the country to enhance response capabilities and to more effectively protect public health and safety with respect to fire and other hazards. The grants provide resources for local fire departments and emergency medical services programs to purchase or receive training, conduct first responder health and safety programs, and fire prevention initiatives such as Fire Team USA. Fire Team USA will use the grant funds for delivery of Fire Team USA, a workshop series that brings together public policy-makers, fire chiefs, building officials, water purveyors, and fire marshals to learn about fire sprinklers and how they can be an effective strategic planning tool and resource for their community.

The Fire Team USA workshop is a tremendous opportunity for communities interested in improving overall public fire safety. The workshop not only addresses public fire safety issues and common concerns, but introduces very fundamental, broad-scope philosophies that can help the public policy-maker fully understand the economic benefits afforded the fire sprinkler-protected community.

### **Residential Fire Sprinklers; “A Step-by-Step Approach for Communities”:**

The latest information developed by NFSA and the International Association of Fire Chiefs for community leaders who wish to pass fire sprinkler legislation or adopt a national code that includes fire sprinklers and includes community success stories, specific steps and how-to advise.

Included in the program is the “Look up for Safety; Where you live...” CD and resource package that will help you share the facts about residential fire sprinklers in a meaningful way. Filled with multi-media options, this resource package will be used time and time again as a companion piece to the “Residential Fire Sprinklers; “A Step-by-Step Approach for Communities (second ed.),” which is also included as a PDF file. Brought to you by a partnership between the National Fire Sprinkler Association and the International Association of Fire Chiefs, Look up for Safety and Residential Fire Sprinklers, A Step-by-Step Approach for Communities is created to help leaders improve community fire protection.

### **Contact Information:**

For more information regarding NFSA Training Programs  
Bruce Lecair, Western Regional Manager  
National Fire Sprinkler Association  
25417 Hyacinth Street Corona, Ca. 92883  
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Home/Office: (951) 277-3517  
Fax: (951) 277-3199  
E-mail: [lecair@nfsa.org](mailto:lecair@nfsa.org)  
Website: [www.nfsa.org](http://www.nfsa.org)

## APPENDIX F

### American Fire Sprinkler Association (AFSA):

#### **System Layout School for Residential 1 and 2 Family Dwellings:**

This five day class provides basic training in the layout and Calculation of a residential fire sprinkler system. The class includes discussion on stand alone, multi-purpose and flow-through system types. The topics covered during class are: how to determine water supply, material selection, the requirements of NFPA 13D and the International Residential Code (IRC). The course will include fire sprinkler system layout and hydraulic calculation exercises.

The class is geared toward those with limited experience who need assistance with design and those wanting to refresh their experience. Upon completion of the class, the student should understand basic residential layout and how to apply NFPA 13D and P2904 of the IRC (R313.3 CRC).

#### **AFSA Residential Fire Sprinkler System Installation Guide:**

The American Fire Sprinkler Association Fire Sprinkler Fitter Correspondence Training Program entitled, *“Residential Fire Sprinkler System Installation”* is a new correspondence course, which is available in a Spanish language version, teaches installers the techniques for residential fire sprinkler installation according to the 2007 edition of NFPA 13D, *Standard for the Installation of Sprinkler Systems in One-and-Two Family Dwellings and Manufactured Homes*.

#### **Review of Residential Fire Sprinkler Systems for One- and Two-Family Dwellings, Part 1 – CLSE 501:**

This two-part program describes the review process of fire sprinkler systems for one- and two-family dwellings, designed in accordance with the NFPA 13D standard. Part 1 is a prerequisite Part 2, and describes the history of the NFPA 13D standard, and how it differs from NFPA 13 and NFPA 13R. It discussed the exceptions allowed by NFPA 13D in certain circumstances, and covers water supply requirements and how they are determined and evaluated. Other topics covered include: Residential sprinkler spacing and location; Residential sprinkler coverage areas, temperature ratings, and obstruction to discharge; Applicable to piping and fittings; Multipurpose and Stand-alone piping systems; and Concepts and considerations used in residential system hydraulic calculations.

#### **Review of Residential Fire Sprinkler Systems for One- and Two-Family Dwellings, Part 2 – CLSE 502:**

Part 2 requires the completion of Part 1. This program leads the student through the detailed step-by-step process of reviewing a fire sprinkler system plan designed for protection of a single-family home. Supplemental

## APPENDIX F

documents, available to the student as downloadable pdf files, provide a copy of the plan to be reviewed, as well as supporting data sheets, hydraulic calculations, and a simple plan review checklist.

### **Contact Information:**

For more information regarding NFSA Training Programs  
Janet Knowles, Vice President  
American Fire Sprinkler Association  
12750 Merit Drive, Suite 350, Dallas, TX 75251  
Office: (469) 385-7638 – Ext. 117  
Fax: (214) 343-8898  
E-mail: [jknowles@clse.org](mailto:jknowles@clse.org)  
Website: [www.firesprinkler.org](http://www.firesprinkler.org) and [www.clse.org](http://www.clse.org)

### **National Fire Protection Association (NFPA) Classes**

#### **Sprinkler Systems Plans Review (NFPA-13 –2007 editions):**

Provides hands-on experience Simplify your plans review process. Learn to read plans and specifications, and meet submittal requirements for new sprinkler systems or for modifications to existing systems. A good working knowledge of NFPA 13 and NFPA 72 is highly recommended for this seminar. Upon completion you should be able to:

- Recognize code requirements for submittal of complete plans and calculations
- Evaluate sprinkler plans considering classification of occupancy, commodity classification, and system area limitations
- Analyze critical elements of hydraulic calculations, including remote area adjustments and sprinkler flow determination
- Apply basic sprinkler system requirements such as classification of occupancy, commodity classification, and system area limitations
- Perform a comprehensive sprinkler system plans review
- Explain basic conventions of blueprint reading, including scales, drawing identification, and symbology.

#### **Installation of Sprinkler Systems (NFPA 13–2007 edition):**

Properly installed sprinkler systems reduce both damage and loss of life in building fires by up to 67 percent. This three-day seminar will effectively illustrate the concepts and requirements for automatic sprinkler systems and how they apply to specific hazards.

Upon completion you should be able to:

- Define the organization of NFPA 13 and its general requirements
- Ascertain the hazard classification for an occupancy

## APPENDIX F

- Identify and discuss the requirements for various sprinkler system components
- Recognize the different types of sprinkler systems and be familiar with their operation
- Establish installation requirements for the various types of sprinklers
- Apply the requirements for system hanging and seismic bracing
- Appraise various system design requirements including:  
Occupancy hazard fire control, protection of storage occupancies, and protection of special hazards
- Determine the requirements for system design and installation deliverables including: plans and calculations, water supply data, and system acceptance certification

### **Contact Information:**

For more information regarding NFSA Training Programs  
Raymond B. Bizal, P.E., Western Regional Manager  
National Fire Protection Association  
6285 E Spring Street, #363, Long Beach, CA 90808-4000  
Office: (562) 497-1706  
Fax: (562) 497-1716  
E-mail: [rbizal@nfpa.org](mailto:rbizal@nfpa.org)  
Website: [www.nfpa.org](http://www.nfpa.org)

## **APPENDIX F**

### **International Code Council (ICC) Classes**

#### **2009 IRC Fire Sprinkler Requirements**

One Day Seminar

This seminar provides participants with the understanding of the 2009 International Residential Code fire sprinkler regulations for design, installation and inspection. This seminar will cover 2009 IRC Fire Sprinkler System requirements for one-two family dwelling and townhomes; placement and selection of fire sprinklers; proper water supply requirements; design, plan review and inspection of fire sprinkler systems for one-two family dwelling and townhomes. Engineering

#### **Dwelling Fire Sprinkler Requirements**

40 Hour Seminar

This seminar will prepare qualified individuals to install residential sprinklers in one- and two-family homes and townhouses. This seminar will cover requirements in the international Residential Code and NFPA 13D Standard for the Installation of Sprinklers in Detached One and Two Family Dwellings, including placement and selection of fire sprinklers; proper water supply requirements; system design and calculation methods; simple tree and looped piping systems; for both combination and standalone systems; plan review and inspection.

#### **2009 Fire Sprinkler Plan Review**

One Day Seminar

This seminar covers plan review of fire sprinkler systems in commercial and industrial uses. This seminar will cover requirements in the international Fire Code, International Building Code, NFPA 13 and NFPA 13R.

#### **Contact Information:**

Kevin H. Scott, Senior Regional Manager  
International Code Council  
2513 Moffitt Way  
Bakersfield , CA 93309  
(888) 422-7233 x7273  
(661) 472-2100 cell  
(661) 834-7477 fax  
[www.iccsafe.org](http://www.iccsafe.org)

## **Residential Fire Sprinklers – Products/Components** **(Listing and Websites)**

### **Residential Fire Sprinklers:**

Globe Fire Sprinkler Corp. [www.globesprinkler.com](http://www.globesprinkler.com)  
Phone: (989) 846-4583 [Standish, MI]  
Phone: (562) 943-4181 [LaMirada, CA]

The Reliable Automatic Sprinkler Company, Inc. [www.reliablesprinkler.com](http://www.reliablesprinkler.com)  
Phone: (800) 431-1588 [Elmsford, NY]  
Phone: (800) 352-4365 [Brea, CA]

Senju America, Inc. [www.senjuamerica@msn.com](mailto:www.senjuamerica@msn.com)  
Phone: (516) 829-5488 [Great Neck, NY]  
Phone: (408) 792-3830 [San Jose, CA]

Tyco Fire Products [www.tyco-fire.com](http://www.tyco-fire.com)  
Phone: (215) 362-0700 [Lansdale, PA]  
Phone: (714) 993-6111 [Brea, CA]

Victaulic Company [www.victaulic.com](http://www.victaulic.com)  
Phone: (610) 559-3300 [Easton, PA]  
Phone: (610) 559-3380 [Redlands, CA]

The Viking Corporation [www.vikinggroupinc.com](http://www.vikinggroupinc.com)  
Phone: (269) 945-9501 [Hastings, MI]  
Phone: (714) 992-5276 [Fullerton, CA]  
Phone: (510) 429-7297 [Hayward, CA]  
Phone: (916) 923-1080 [Sacramento, CA]

### **Residential (13D) Water Storage Tanks/Pumps:**

Advanced Fire Technology, Inc. [www.advancedfiretechnology.com](http://www.advancedfiretechnology.com)  
Phone: (314) 351-5005 [St. Louis, MO]

D System Inc. [www.thedsystem.com](http://www.thedsystem.com)  
Phone: (717) 235-6800 [New Freedom, PA]

Firewater Systems, Inc. [www.firewatersystemsinc.com](http://www.firewatersystemsinc.com)  
Phone: (717) 234-3473 [Harrisburg, PA]

Raimondo Consultants, Inc. [www.raimondofiresystems.com](http://www.raimondofiresystems.com)  
Phone: (781) 279-4344 [Stoneham, MA]

S-P-D Incorporated [www.spdinc.com](http://www.spdinc.com)  
Phone: (866) 664-7902 [Schaumburg, IL]

Talco Industries, Inc. [www.talcofire.com](http://www.talcofire.com)  
Phone: (503) 653-8055 [Milwaukie, OR]

### **Plastic Pipe:**

BlazeMaster Fire Sprinkler Systems [www.blazemaster.com](http://www.blazemaster.com)  
Phone: (216) 447-5000 [Cleveland, OH]

Harvel Plastics, Inc. [www.harvel.com](http://www.harvel.com)  
Phone: (610) 252-7355 [Easton, PA]

IPEX, Inc. [www.ipexinc.com](http://www.ipexinc.com)  
Phone: (416) 445-3400 [Don Mills, ON M3B 2S9 Canada]

Rehau, Inc. [www.na.rehau.com/fireprotection](http://www.na.rehau.com/fireprotection)  
Phone: (703) 777-5255 [Leesburg, WV]

Spears Manufacturing Co. [www.spearsmfg.com](http://www.spearsmfg.com)  
Phone: (818) 364-1611 [Sylmar, CA]

Tyco Fire Products [www.tyco-fire.com](http://www.tyco-fire.com)  
Phone: (215) 362-0700 [Lansdale, PA]

Uponor Wirsbo [www.wirsbo.com/aquasafe](http://www.wirsbo.com/aquasafe)  
Phone: (952) 891-2000 [Apple Valley, MN]

### **Backflow:**

Ames Fire & Waterworks [www.amesfirewater.com](http://www.amesfirewater.com)  
Phone: (916) 928-0123 [Sacramento, CA]

Apollo Valves [www.conbraco.com](http://www.conbraco.com)  
Phone: (704) 841-6000 [Matthews, NC]

CB Marketing, Inc. [www.backflow.com](http://www.backflow.com)  
Phone: (708) 202-0033 [Alsip, IL]

CLA-VAL Canada [www.cla-val.ca](http://www.cla-val.ca)  
Phone: (949) 722-4800 [Costa Mesa, CA]  
Phone: (951) 687-9145 [Riverside, CA]

Conbraco Industries., Inc./Apollo Valves [www.conbraco.com](http://www.conbraco.com)  
Phone: (704) 841-6000 [Mathews, NC]

Febco [www.FEBCOonline.com](http://www.FEBCOonline.com)  
Phone: (559) 441-5301 [Fresno, CA]

Watts Regulator Company [www.watts.com](http://www.watts.com)  
Phone: (978) 688-1811 [North Andover, MA]

Wilkins A Zurn Company [www.zurn.com](http://www.zurn.com)  
Phone: (805) 238-7100 [Paso Robles, CA]

### **Switches & Waterflow Detectors:**

Barksdale Control Products [www.barksdale.com](http://www.barksdale.com)  
Phone: (800) 835-1060 [Los Angeles, CA]

Globe Fire Sprinkler Corp. [www.globesprinkler.com](http://www.globesprinkler.com)  
Phone: (989) 846-4583 [Standish, MI]

Irvine Fire Protection & Safety Equipment, Inc. [www.irvine@eticomm.net](http://www.irvine@eticomm.net)  
Phone: (856) 629-6123 [Williamstown, NJ]

Keltron Corporation [www.keltroncorp.com](http://www.keltroncorp.com)  
Phone: (781) 894-8710 [Waltham, MA]

Potter Electric Signal Company [www.pottersignal.com](http://www.pottersignal.com)  
Phone: (314) 878-4321 [St. Louis, MO]

Safe Fire Detection, Inc. [www.safefiredetection.com](http://www.safefiredetection.com)  
Phone: (704) 821-7920 [Monroe, NC]

System Sensor [www.systemsensor.com](http://www.systemsensor.com)  
Phone: (630) 377-6580 [St. Charles, IL]

United Electric Controls Company [www.ueonline.com](http://www.ueonline.com)  
Phone: (617) 926-1000 [Watertown, MA]

Gamewell-FCI [www.gamewell-fci.com](http://www.gamewell-fci.com)  
Phone: (203) 484-7118 [Northford, CT]

### **Suppliers (California):**

Action Fire Fab & Supply, Inc. [amy@actionfirefab.com](mailto:amy@actionfirefab.com)  
Phone: (209) 836-6460 [Tracy, CA]

ARGCO [www.argco.com](http://www.argco.com)  
Phone: (760) 727-1644 [Hayward, CA]

Brown Company, The [craigb@brownco.encoffice.com](mailto:craigb@brownco.encoffice.com)  
Phone: (510) 886-5260

Ferguson Fire & Fabrication  
Phone: (714) 284-0180 [Anaheim, CA]  
Phone: (626) 964-8569 [City of Industry, CA]  
Phone: (951) 272-8803 [Corona, CA]  
Phone: (619) 596-8857 [El Cajon, CA]  
Phone: (916) 858-2606 [Rancho Cordova, CA]  
Phone: (951) 274-9701 [Riverside, CA]  
Phone: (408) 885-9040 [San Jose, CA]  
Phone: (510) 483-1694 [San Leandro, CA]  
Phone: (760) 740-9926 [San Marcos, CA]  
Phone: (209) 234-8245 [Stockton, CA]  
Phone: (323) 586-9430 [Vernon, CA]  
Phone: (530) 662-1777 [Woodland, CA]

Fire & Pump Service Group [www.fireandpumpservice.com](http://www.fireandpumpservice.com)  
Phone: (310) 223-3960 [Carson, CA]

Fire Protection Products, Inc. [www.fppi.com](http://www.fppi.com)  
Phone: (760) 931-1168 [Carlsbad, CA]

FireMaster

Phone: (619) 569-3888

Groeniger Company [www.groeniger.com](http://www.groeniger.com)

Phone: (510) 786-3333 [Hayward, CA]

HD Supply – Fire Protection [www.fireprotection.hdsupply.com](http://www.fireprotection.hdsupply.com)

Phone: (559) 441-7171 [Fresno, VA]

Phone: (562) 690-8800 [LaHabra, CA]

Phone: (916) 565-0466 [Sacramento, CA]

Phone: (415) 431-8722 [San Francisco, CA]

Phone: (510) 441-1650 [Union City, CA]

Starfire, Inc. [www.starfireusa.com](http://www.starfireusa.com)

Phone: (714) 632-8713 [Anaheim, CA]

State Pipe & Supply [www.statepipe.com](http://www.statepipe.com)

Phone: (562) 695-5555 [Santa Fe Springs, CA]

T. Christy Enterprises [www.tchristy.com](http://www.tchristy.com)

Phone: (714) 507-3300 [Anaheim, CA]

Viking SupplyNet [www.vikjingsupplynet.com](http://www.vikjingsupplynet.com)

Phone: (714) 992-5276 [Fullerton, CA]

Phone: (510) 429-7297 [Hayward, CA]

Phone: (916) 923-1080 [Sacramento, CA]

### **Fire Sprinkler Associations:**

**American Fire Sprinkler Association** (AFSA) [www.firesprinkler.org](http://www.firesprinkler.org)

- **California Chapters:**

- [Greater Bay Area Chapter](#) - (925) 249-9705

Chairman: Charlie Quickert - (510) 490-7873

- [Sacramento Valley Chapter](#) - (916) 973-4434

Chairman: Joel Myers - (916) 381-4101

- [San Diego Chapter](#) - (858) 751-2930

Chairman: Kenneth J. Stuart - (619) 562-6247

- [Southern California Chapter](#) - (949) 378-1333

Chairman: J. Moyer - (951) 735-5560

**National Fire Sprinkler Association** (NFSA) [www.nfsa.org](http://www.nfsa.org)

- **California Chapters:**

- [San Francisco Bay Area Chapter](#)

Chairman: Charlie Martin – (800) 870-7377

- [Los Angeles Chapter](#)

Chairman: Don Becka – (562) 945-7404

**Note:** NFSA Regional Manager Bruce Lecair is a full-time employee of the NFSA and is active with both Chapters.

His contact information is:

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[lecair@nfsa.org](mailto:lecair@nfsa.org)

**Domestic Valves:**

Tyco Fire Products [www.tyco-fire.com](http://www.tyco-fire.com)

Phone: (215) 362-0700 [Lansdale, PA]

Phone: (714) 993-6111 [Brea, CA]

Data Sheet: [http://www.tyco-fireproducts.com/TD\\_TFP/TFP/TFP980\\_05\\_2007.pdf](http://www.tyco-fireproducts.com/TD_TFP/TFP/TFP980_05_2007.pdf)

**Riser Manifold:**

Tyco Fire Products [www.tyco-fire.com](http://www.tyco-fire.com)

Phone: (215) 362-0700 [Lansdale, PA]

Phone: (714) 993-6111 [Brea, CA]

Data Sheet: [http://www.tyco-fireproducts.com/TD\\_TFP/TFP/TFP960\\_04\\_2006.pdf](http://www.tyco-fireproducts.com/TD_TFP/TFP/TFP960_04_2006.pdf)

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

### General Description

The Rapid Response<sup>™</sup>, 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.

Use of the Model RSV-1 Residential Domestic Shutoff Valve should be considered when either the water supply cannot adequately provide for both the domestic design demand and fire sprinkler flow demand, or it is desirable to increase the effectiveness of the fire sprinkler system by automatically shutting off domestic flow.

The RSV-1 maximizes the effective use of an existing water supply and, therefore, in areas with limited water supplies, it may eliminate the need to add costly pumps, pressurized reservoirs, or electrically operated domestic shutoff valves. The RSV-1 has a built-in check valve in the fire sprinkler system outlet that eliminates the need for a separate check valve. Also, the RSV-1 automatically resets, thereby eliminating the need for valve disassembly after a fire sprinkler system test or operation.

The Model RSV-1 Residential Domestic Shutoff Valve is a redesignation of the Gem Model F540 and Star Model S370 Residential Domestic Shutoff Valves.

#### 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 Data

#### Approvals

The 1 inch (DN25) Model RSV-1 Residential Domestic Shutoff Valve is UL and ULC Listed and is suitable for use in water supply arrangements for residential fire sprinkler systems designed per NFPA 13D.

#### Maximum Pressure

175 psi (12,1 bar)

#### Pressure Loss

Figure 4

#### Assembly

The Body, Top Cover, and Bottom Cover are bronze. The Piston, Differential Ring, and Sleeve are glass reinforced Polyphenylene Oxide. The Upper Cap is brass. The O-rings are Buna-N, while the Upper and Lower Seals are EPDM. The Spring, Upper Cap Screws, and Piston Screws are stainless steel.

#### Weight

11 lbs. (5 kg)

#### Patents

U.S.A. 5,236,002

## Design Criteria

The RSV-1 must be installed vertically with the Water Supply Port at the bottom, the Fire Sprinkler Port at the top, and the Domestic Port at the side. The typical arrangement is shown in Figure 1.

Local regulations concerning public water supplies may require a backflow prevention device. The design of the RSV-1 anticipates that the backflow prevention device will be located in the water supply upstream of the RSV-1 as shown in Figure 1. Should the local regulations require the backflow prevention device to be located in the fire sprinkler line downstream of the RSV-1, a by-pass per Figure 2 must be installed.

### NOTES

A check valve is not to be installed between the RSV-1 and the fire sprinklers unless a by-pass per Figure 2 is installed. Absence of the by-pass may result in defeating the automatic resetting capability of the RSV-1.

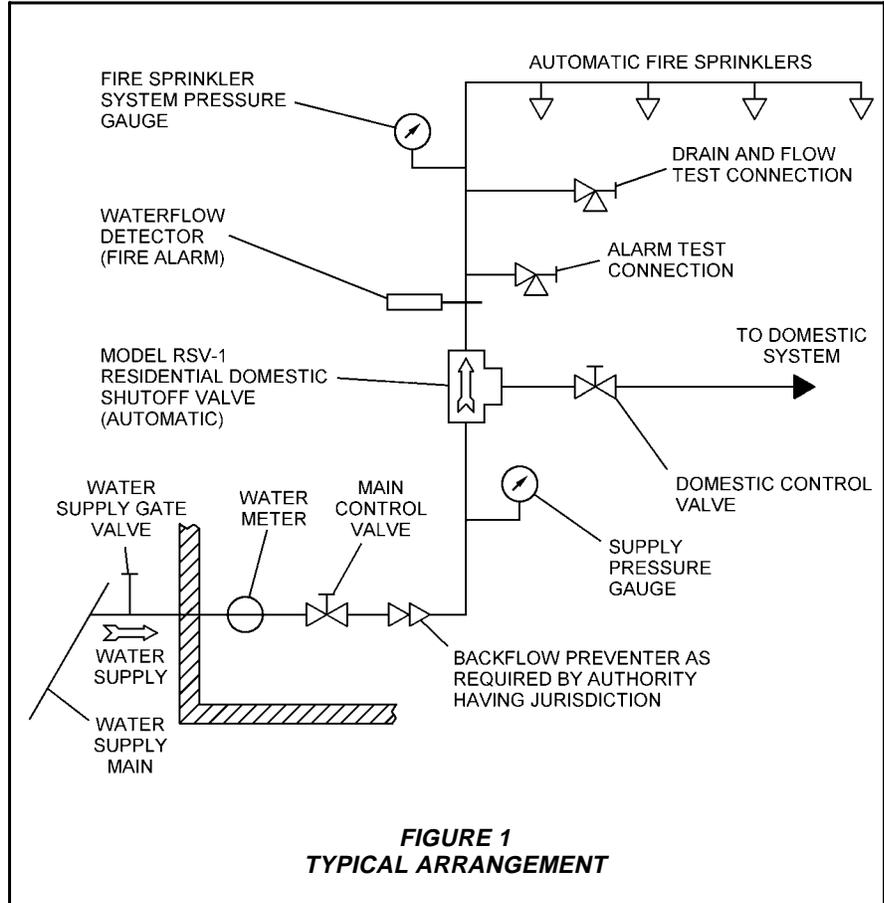
Installation of the by-pass defeats the ability of the RSV-1 to perform as a check valve.

**Minimum Water Supply Requirements.** In order for the 1 Inch (DN25) RSV-1 Valve to automatically operate, once a fire sprinkler operates, the fire sprinkler system from the water main to the most hydraulically remote sprinkler must be designed to provide a minimum single sprinkler flow of 12.5 GPM (47,3 LPM), when the supply pressure at the main is at its minimum expected value.

### NOTES

The minimum single sprinkler flow rate of 12.5 GPM (47,3 LPM), required for use with the RSV-1 Valve, does not take precedence over any more hydraulically demanding single sprinkler flow rate specified for the residential sprinklers being utilized.

It is not necessary to take into account the trickle flow through the RSV-1 Valve By-Pass Restriction, into the domestic system, when performing hydraulic design calculations for the fire sprinkler system.



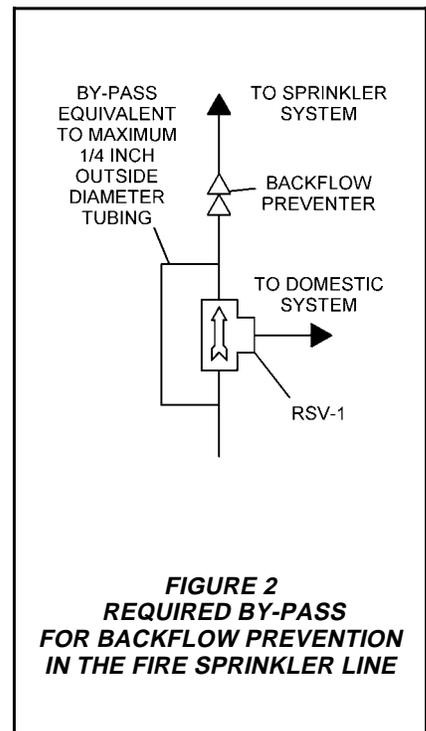
**FIGURE 1  
TYPICAL ARRANGEMENT**

## Operating Principles

The design of the RSV-1 Valve is such that if there is a fire sprinkler operation during domestic usage, the RSV-1 Valve will automatically shut off flow to the domestic system and divert the available water supply to the fire sprinkler system, thereby eliminating the lower flow into the sprinkler system that might otherwise be caused by possible significant domestic water usage.

When the RSV-1 Valve is in the normal standby position as shown in Figure 3, the Piston, assisted by the Spring, is in the down position. With the Piston in the down position, the Fire Sprinkler Seat permits the RSV-1 to perform as a conventional check valve. Also, with the Piston in the down position, water is available on demand through the Domestic Flow Passage and out the Domestic Port.

Upon operation and a minimum design water flow (i.e., 12.5 gpm) to the automatic residential fire sprinkler system, the Piston moves upward. With the Piston in the up position, any water



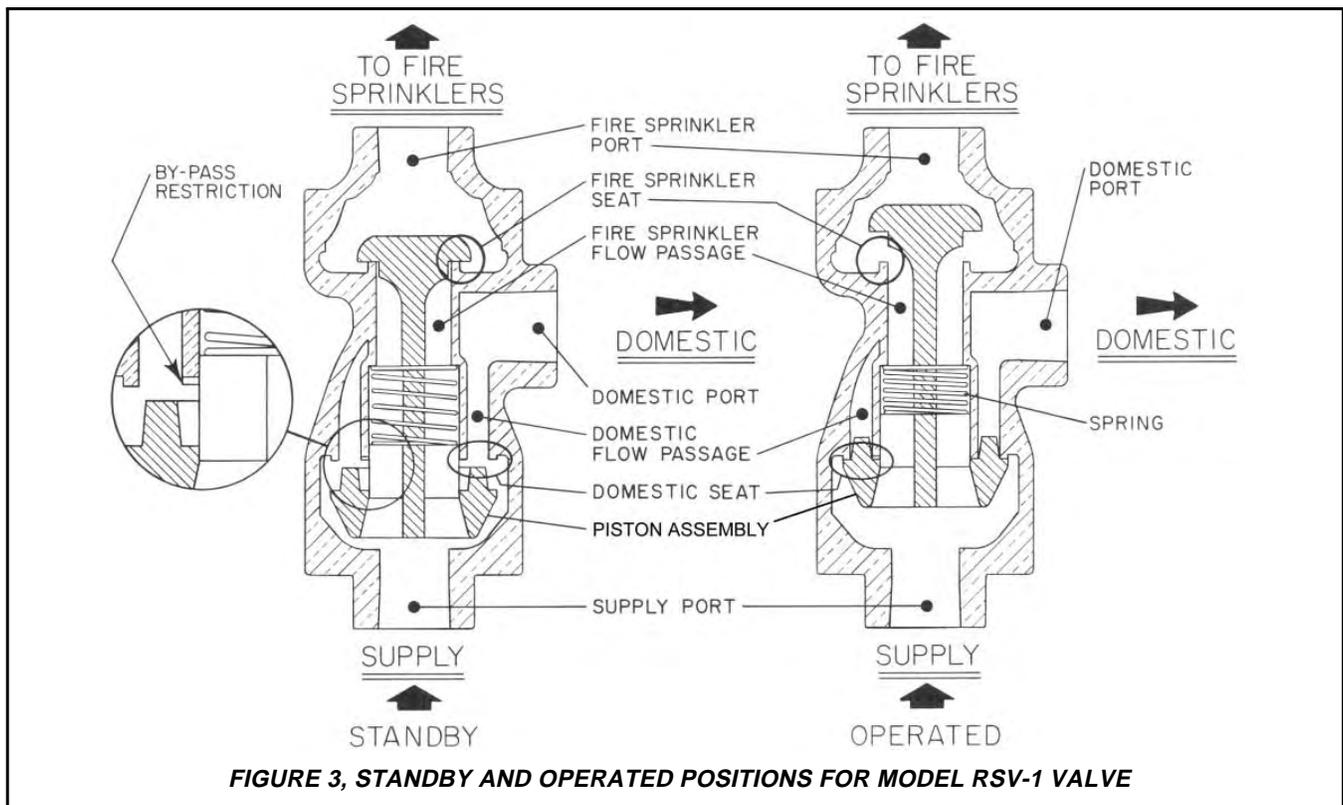
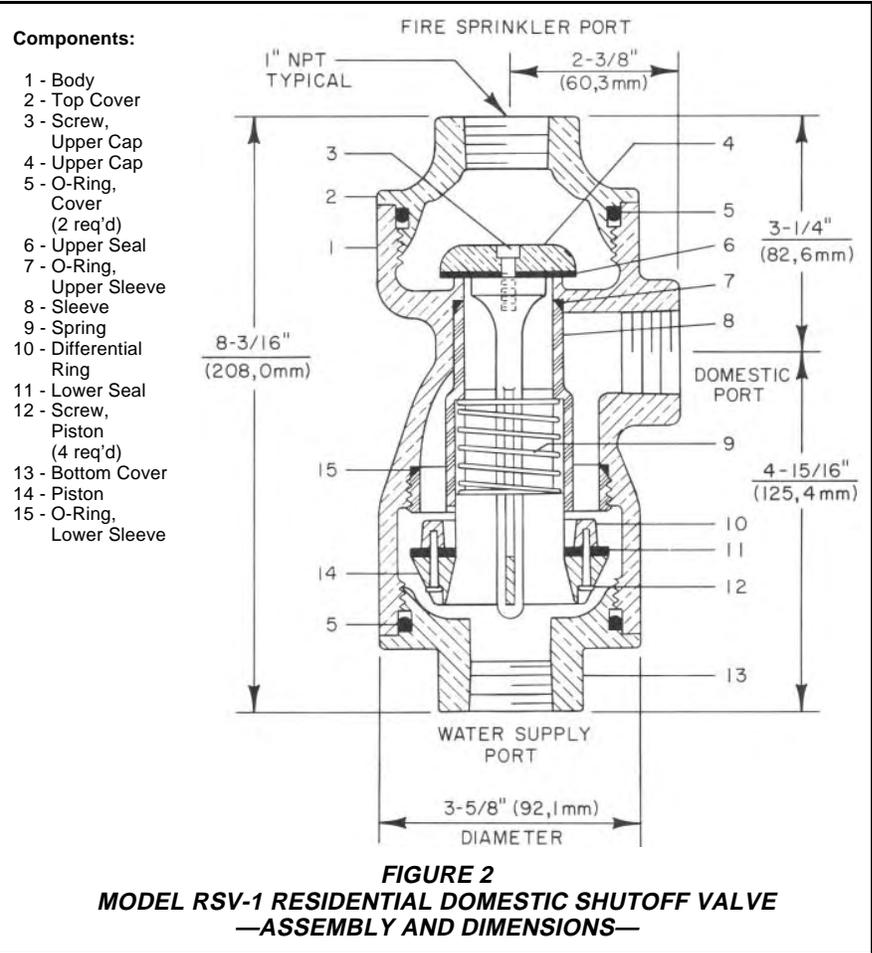
**FIGURE 2  
REQUIRED BY-PASS  
FOR BACKFLOW PREVENTION  
IN THE FIRE SPRINKLER LINE**

flow to the Domestic Flow Port is diverted to the Fire Flow Port.

The contours of the Piston have been specifically configured to minimize its upward movement except under the level of sustained fire sprinkler system flow resulting from operation of one or more fire sprinklers. However, because most fire sprinkler systems contain air pockets, the Piston will tend to move momentarily upward if there is a surge in supply pressure. The momentary opening and reclosing of the Piston at the Fire Sprinkler Seat will trap a portion of the pressure increase within the fire sprinkler system. The trapping of pressure increases within the fire sprinkler system will help to reduce the possibility of a subsequent surge in the supply pressure from causing the waterflow detector to signal a false alarm (unless a by-pass is installed per Figure 2).

As indicated above, domestic system usage may reduce the pressure available to the fire sprinkler system. However, when utilizing the RSV-1 Valve, it is not necessary to take into account the complex hydraulic modeling of the domestic system that would otherwise be required to determine the minimum possible residual (flowing) pressure that would be available to the fire sprinkler system.

For operation of the RSV-1 Valve, it is



only necessary to design the fire sprinkler system, from the water supply main to the most hydraulically remote sprinkler. The domestic flow need not be considered. As long as the single sprinkler flow is equal to or greater than 12.5 GPM when the supply pressure at the main is at its minimum expected value, the RSV-1 will automatically shutoff the domestic flow.

#### NOTES

After the Piston has moved to the full up position, only a small amount of water is permitted to trickle through the By-Pass Restriction to the Domestic Port (Ref. Figure 3). The trickle flow through the By-Pass Restriction permits automatic resetting of the RSV-1 Valve, without draining of the fire sprinkler system, after a sprinkler operation or test. When the Manual Domestic Shutoff Valve is closed, the By-Pass Restriction allows the Supply and Domestic Port pressures to equalize and the Piston Assembly to move back down to the standby position. The maximum flow rate through the By-Pass Restriction, when the RSV-1 Valve is in the operated position is less than 1/4 GPM (0,9 LPM) for a typical residual (flowing) pressure of 40 psi (2,8 bar) at the inlet. Consequently, it is not necessary to take into account the trickle flow through the RSV-1 Valve By-Pass Restriction, into the domestic system, when performing hydraulic design calculations for the fire sprinkler system.

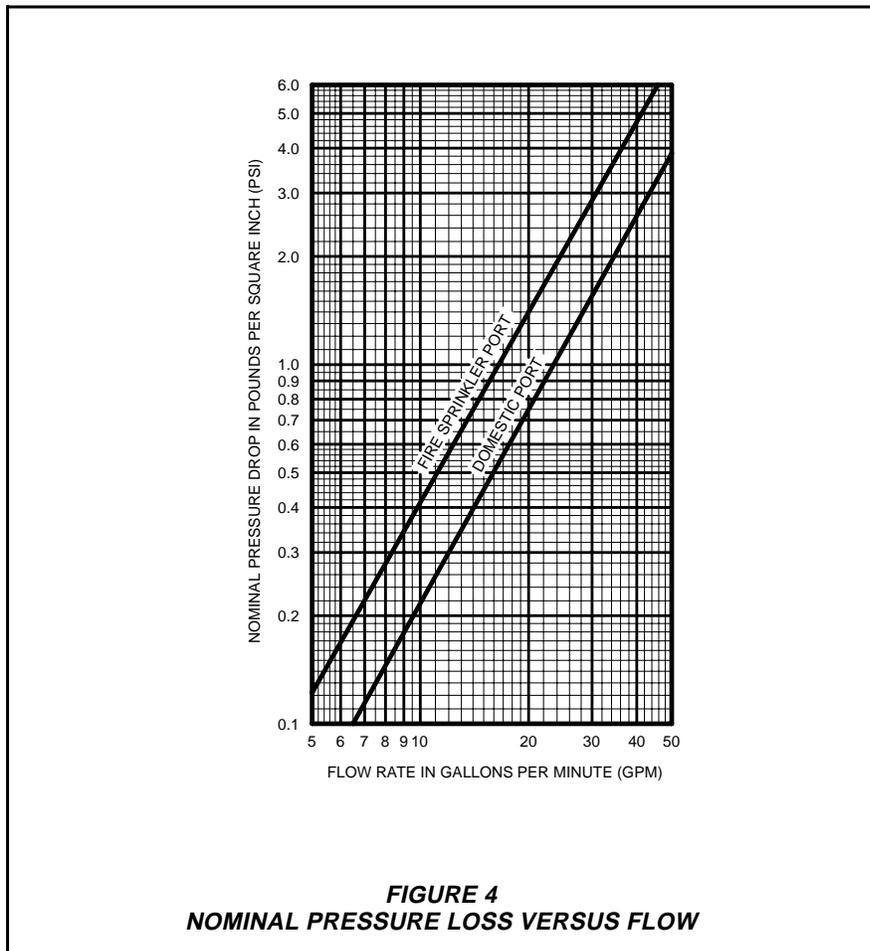
## Installation

#### NOTE

A fire sprinkler water supply connection to a public water supply is usually subject to local regulations concerning metering and backflow prevention requirements. Consult with the local water authorities concerning local requirements which may apply to the arrangement of these components in the fire sprinkler system water supply.

Figure 1 illustrates a typical arrangement using the Model RSV-1 Residential Domestic Shutoff Valve. The arrangement may need to be modified to meet the requirements of the authority having jurisdiction; however, the Model RSV-1 Residential Domestic Shutoff Valve must be installed in accordance with the following criteria:

**Step 1.** The RSV-1 Valve is to be installed vertically with the Supply Port at the bottom, the Fire Sprinkler Port at the top, and the Domestic Port at the side. It is recommended that a suitable clamp be installed along the water



**FIGURE 4**  
**NOMINAL PRESSURE LOSS VERSUS FLOW**

supply riser piping, to provide support for the weight of the RSV-1 Valve.

#### NOTE

The maximum water supply service line is to be 1 inch (DN25).

**Step 2.** The water supply to the RSV-1 Valve must be free of contaminants and particles of a size greater than 1/8 inch (3,2 mm).

**Step 3.** The RSV-1 is to be installed so that the arrows cast on the Body point in the direction of flow.

**Step 4.** A Domestic Control Valve is to be located between the RSV-1 Valve and the domestic system. The inlet to the Domestic Control Valve is to be located within 12 inches of the Domestic Port of the RSV-1 Valve.

**Step 5.** The Drain and Flow Test Connection (Ref. Figure 1) is recommended to be minimum 1/2 inch (DN15) for systems per NFPA 13D.

**Step 6.** An Alarm Test Connection with a test orifice equal to or less than the smallest K-factor sprinkler in the system is to be located downstream of the Waterflow Detector.

**Step 7.** Apply pipe thread sealant sparingly only to the male pipe threads which are to be assembled to the three ports of the RSV-1 Valve. The use of a Teflon\* based pipe thread sealant is recommended.

## Valve Setting Procedure

Steps 1 through 9 are to be performed when initially filling the fire sprinkler and domestic system piping with water or after a fire sprinkler operation (Ref. Figure 1).

**Step 1.** Close the Main Control Valve.

**Step 2.** Close the Domestic Control Valve, and all water outlets in the domestic piping system.

**Step 3.** Close all drain valves in addition to the Drain and Flow Test Connection in the fire sprinkler system, and replace all operated sprinklers as necessary.

**Step 4.** Partially open the Main Control Valve until the sound of flowing water just begins, and then leave the Main Control Valve in the partially open position.

**Step 5.** After the fire sprinkler system pressure gauge indicates approximately the same pressure as the supply pressure gauge, fully open the Main Control Valve.

**Step 6.** Open the highest elevation outlet on the domestic system.

**Step 7.** Partially open the Domestic Control Valve until the sound of flowing water begins. Allow the domestic piping to slowly fill with water.

**Step 8.** Close the highest elevation water outlet on the domestic system when un-aerated water begins to flow.

**Step 9.** Completely open the Domestic Control Valve, and then check that the domestic system is properly pressurized by verifying that at least three water outlets in the domestic system can flow full at the same time.

If the water outlets flow full, the RSV-1 Valve is set and ready for service and the water outlets on the domestic system may be closed.

If the water outlets do not flow full, reclose the Domestic Control Valve, wait a minimum of ten seconds, and ensure that there is no flow from the fire sprinkler system piping. Reopen the Domestic Control Valve and then recheck that the water outlets are flowing full.

## Care and Maintenance

The following inspection procedure must be performed as indicated, in addition to any specific requirements of the NFPA, and any impairment must be immediately corrected.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any authority having jurisdiction. The installing contractor or product manufacturer should be contacted relative to any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

### NOTES

*No attempt is to be made to repair any RSV-1 valve component in the field.*

*The operational test and flow test procedures will result in operation of the associated alarms, as well as an interruption of the domestic water supply service. Consequently, notification must be given to the owner and the fire department, central station, or other signal station to which the alarms are connected, and notification must be given to the building occupants.*

*Before closing a fire protection system control valve for inspection or maintenance work on the fire protection system that it controls, permission to shut down the effected fire protection system must first be obtained from the proper authorities and all personnel who may be affected by this action must be notified.*

*After placing a fire protection system in service, notify the proper authorities and advise those responsible for monitoring proprietary and/or central station alarms.*

### Operation Test Procedure

**Step 1.** Fully open two or three water outlets in the domestic piping system.

**Step 2.** Open the Alarm Test Connection of the fire sprinkler system, to simulate a sprinkler operation.

**Step 3.** Verify that the alarms are operating and that the flow from the do-

mestic water outlets has decreased to no more than a trickle.

**Step 4.** Reset the RSV-1 Valve in accordance with the Valve Setting Procedure.

### Flow Test Procedure

**Step 1.** While there is no water flowing in the domestic system, completely open the Drain and Flow Test Connection.

**Step 2.** While water is flowing, record the pressure reading on the fire sprinkler system pressure gauge and then compare this reading to previous readings. If there is a significant decrease in pressure since the last time the pressure reading was taken which is not due to a normally expected drop in the water supply pressure, there may be an impairment that should be immediately identified and corrected.

**Step 3.** Close the Drain and Flow Test Connection to allow the RSV-1 Valve to automatically reset. Automatic resetting will occur within ten seconds.

**Step 4.** After waiting ten seconds, completely open at least three water outlets in the domestic system and allow them to simultaneously flow.

If the water outlets flow full, the RSV-1 Valve is set and ready for service and the water outlets on the domestic system may be closed.

If the water outlets do not flow full, close the Domestic Control Valve and verify that there is no flow from the fire sprinkler system piping (such as at the Inspector's Test Connection). Wait a minimum of ten seconds. Reopen the Domestic Control Valve and then recheck that the domestic system water outlets are flowing full.

## Limited Warranty

Products manufactured by Tyco Fire & Building Products (TFBP) are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by TFBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by TFBP to be defective shall be either repaired or replaced, at TFBP's sole option. TFBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFBP was informed about the possibility of such damages, and in no event shall TFBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materials or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

## Ordering Information

### Valves with NPT Connections:

Specify: 1 Inch NPT (DN25) Model RSV-1 Residential Domestic Shutoff Valve, P/N 52-540-1-001.

### Valves with ISO Connections:

Specify: ISO Rc1 (DN25) Model RSV-1 Residential Domestic Shutoff Valve, P/N 52-540-1-011.

**DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT**  
**DIVISION OF CODES AND STANDARDS**  
1800 THIRD STREET, SUITE 260, P.O. BOX 1407  
SACRAMENTO, CALIFORNIA 95812-1407  
(916) 445-9471 FAX (916) 327-4712  
From TDD Phones 1 (800) 735-2929



March 6, 2001

**INFORMATION BULLETIN 2001-04 (MH)**

**TO:**           **Manufactured Home Manufacturers**  
                  **Manufactured Home Dealers**  
                  **Manufactured Home Salespersons**  
                  **Department-Approved Third-Party Agencies (MH)**  
                  **Manufactured Housing Interested Parties**  
                  **City and County Building Officials**  
                  **Mobilehome Park Owners**  
                  **Division Staff**

**SUBJECT: NEW REGULATIONS FOR THE DESIGN AND INSTALLATION OF FIRE SPRINKLER SYSTEMS IN MANUFACTURED HOMES AND MULTI-UNIT MANUFACTURED HOUSING WITH TWO DWELLING UNITS**

On January 17, 2001, new Department of Housing and Community Development regulations were approved by the Office of Administrative Law, and filed by the Secretary of State establishing preemptive requirements for the design and installation of fire sprinkler systems for new and used manufactured homes and multi-unit manufactured housing containing two dwelling units<sup>1</sup>.

Manufactured homes and multi-unit manufactured homes are currently constructed and installed under preemptive state and federal construction standards. These standards, however, do not address the installation of fire sprinkler systems. The lack of uniform standards subjects the construction of manufactured homes and multi-unit manufactured homes to various city and county rules and ordinances and with differing degrees of enforcement. These differences interfere with a key component of a manufactured home's affordability: use of a standardized factory-built procedure.

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<sup>1</sup> "Multi-unit manufactured housing with two dwelling units" is defined in Health and Safety Code Section 18008.7(a). These fire sprinkler regulations do not apply to multi-unit manufactured homes containing more than two dwelling units.

The new regulations will provide preemptive state requirements for the plan approval, inspection, testing and installation of fire sprinkler systems, but do not, by themselves, mandate the installation of fire sprinklers in manufactured homes or multi-unit manufactured homes with two dwelling units.

These new regulations will become operative for all manufactured home units designed for fire sprinkler systems that are offered for sale, rent or lease in California entering production on and after May 17, 2001.

### **Application And Scope:**

The new regulations establish comprehensive requirements for the installation of fire sprinkler systems in manufactured homes and in multi-unit manufactured housing with two dwelling units and apply only when either fire sprinkler systems are required by the local government or authority having jurisdiction over any fire sprinkler system installation in any residential unit that could be built on the same site, or where the purchaser, dealer or owner elects to install a fire sprinkler system in a new or existing manufactured home or multi-unit manufactured home with two dwelling units located in California.

The regulations preempt all other local requirements that establish standards for the design and installation of a fire sprinkler system in a manufactured home and in the dwelling unit(s) of a multi-unit manufactured home with two dwelling units.

It will be unlawful for any person to sell, offer for sale, rent or lease a manufactured home or multi-unit manufactured home containing two dwelling units if the fire sprinkler system will not operate properly due to inadequate water pressure at the site of installation.

The new regulations establish specific standards for types of materials, installation instructions, construction methods and workmanship, information labels and testing requirements.

### **Standards, Plan Review And Inspection Procedures For New Homes:**

The regulations adopt, with amendments, the NFPA 13D "Standard for the Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes", 1999 Edition, as published by the National Fire Protection Association (NFPA).

While manufacturers of manufactured housing units obtain design and inspection approval of the of manufactured homes constructed under the Federal (HUD) regulations, through oversight by HUD-approved third-party agencies (IPIAs and DAPIAs), the design and inspection approval of fire sprinkler systems installed in new manufactured homes for sale in California will be in accordance with state law and regulations and through Department-approved Design Approval Agencies (DAAs) and Quality Assurance Agencies (QAAs) Design Approval Agencies.

Department-approved DAAs and QAAs are authorized to provide plan review and in-plant inspection approval 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.

A fire sprinkler system installed in a factory is required to be tested at 100 psi hydrostatic pressure for 2 hours at the manufacturing facility and for an additional 1 hour hydrostatic test at the home installation site.

**Fire Sprinkler Systems Installations Added To Existing Homes:**

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, and Department inspection approval of the installation prior to the installer covering the piping material within 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 multi-unit manufactured home with two dwelling units.

In order for a fire sprinkler system to operate properly, a minimum of 15 pounds of water pressure per square inch is required at the home water supply connection.

The new regulations are contained within Title 25, California Code of Regulations (25CCR) Chapter 3, commencing with Section 4300, and will be available either through Barclay's Law Publishers, at 1-800-888-3600, or through the Internet at <http://www.oal.ca.gov/>. Anyone having questions concerning the manufactured housing fire sprinkler regulations may contact Richard Weinert, Manufactured Housing Program Manager, at (916) 327-2838.

Sincerely,

Norman Sorensen  
Deputy Director

## Frequently Asked Questions for Fire Sprinkler Systems in Manufactured Homes

### **Why was there a need for State regulation?**

Manufactured homes generally cost less than other types of homes. The method of construction is the reason for the lower cost. Manufacturers construct homes on an assembly line under a federal building code, known as the “Housing and Urban Development –Code,” or “HUD-Code.” The HUD-code provides uniformity that allows builders to use assembly line construction, which then lowers the cost of building a home.

The HUD-code does not include rules for Fire Sprinkler Systems (FSS). This lack of rules caused a problem because numerous California communities require FSS in single-family dwellings. Because these community FSS requirements are not all the same, the cost of HUD-code homes in these communities may increase due to a lack of uniform rules.

This lack of uniform rules also caused delays in the manufacturing process due to the necessity to custom design and install FSS based on individual community rules which slowed the assembly-line process and increased the cost of homes. Thus the State adopted regulations governing FSS installation to help preserve affordability while concurrently protecting life and property.

### **How did California adopting rules solve this problem?**

The California Department of Housing and Community Development adopted rules for the design and installation of FSS in manufactured Homes. The rules apply uniformly throughout California, whenever a community requires FSS or a buyer wants FSS. Thus, an individual community’s rules are preempted and the uniform assembly-line construction of manufactured homes is maintained.

### **Do the rules apply only during the construction of a home?**

No. The rules also apply to the design and installation of FSS in any existing manufactured home located in California that is required to have FSS installed or that is voluntarily retro fitted with a FSS.

### **Can only a builder or manufacturer install FSS?**

No. Following State rules and regulations, either a homeowner or a fire protection contractor can install FSS in a manufactured home.

### **Do FSS rules contain technical requirements?**

Yes. State regulations include technical requirements. They are specified in the California Code of Regulations, Title 25, § 4302 (1).

### **Do FSS rules require a review of plans?**

Yes. An HCD-approved Design Approval Agency must review and approve plans for FSS to ensure the system meets technical requirements. The Design Approval Agency also ensures the installation will not harm a home's structural, plumbing, mechanical, or electrical systems.

### **Do FSS rules require an inspection of installed FSS?**

Yes. An HCD-approved Quality Assurance Agency inspector or HCD inspector must inspect and approve the completed installation of the system. The inspector ensures the installed system follows the approved plans and no harm to the home has occurred during installation.

### **Why are plans reviewed and installation inspection of FSS required?**

California communities that mandate the installation of FSS, homeowners that choose to install FSS, and fire fighters responding to a fire need to know that the installed FSS will perform as required and designed. Plan review and FSS inspection provides this assurance.

### **Does FSS installation require any follow-up paperwork or certifications?**

Yes. Installers must complete a "Fire Sprinkler System Information and Installer Certification" label. This label then is attached to the inside wall or door of the home's water heater enclosure. This label notes all design specifications and water supply requirements of the FSS.

### **Why do the rules require a certification label?**

Upon sale or movement of a manufactured home, a homeowner may require new design and water supply requirements for the FSS. The label and the information it contains provide water supply requirements for each homeowner.

### **Who maintains the installed FSS?**

The homeowner maintains the installed system and should inspect the sprinklers on a regular basis, replacing any damaged sprinkler. The homeowner also must replace a sprinkler if it operates. The new sprinkler must match the original sprinkler.

### **May a person change the installed FSS?**

Yes, a homeowner or a fire protection contractor may alter an installed system. However, before an alteration may be performed, an HCD-approved Design Approval Agency must review and approve the plans and an HCD-approved Quality Assurance Agency inspector or HCD inspector must inspect and approve the completed alteration(s).

## **What types of changes are considered an alteration of an installed FSS?**

The following activities are considered alterations of installed FSS

- Alteration to provide greater protection against property damage.
- Replacement of parts of the system with sprinklers or materials that differ from the original.
- Extension of the system to provide coverage to additional area or areas.
- Movement of a location of system riser, sprinkler or piping.
- Removal of a part or all of the FSS.

## **How do I obtain further assistance or a permit to install a FSS?**

A person may contact the nearest HCD Area Office for further assistance or to obtain and complete an Application for Permit (HCD 415). The HCD 415 may also be obtained on the Internet at: <http://www.hcd.ca.gov/codes/mhp/hcd415.pdf>

Northern Area Field Operations  
9342 Tech Center Dr., Suite 550  
Sacramento, Ca. 95826  
(916) 255-2501

Southern Area Field Operations  
3737 Main Street, Suite 400  
Riverside, Ca. 92501  
(951) 782-4420

# BUILDING STANDARDS BULLETIN 10-01

**DATE:** August 18, 2010

**TO:** INTERESTED PARTIES

**SUBJECT:** STATE PEX EXCLUSION REMOVED from the California Plumbing Code (CPC) EFFECTIVE AUGUST 18, 2010

This information bulletin is being issued to highlight an action taken by the California Building Standards Commission (commission) on August 16, 2010, concerning cross-linked polyethylene flexible plastic pipe, commonly referred to as “PEX.” The action taken removed the state’s amendment that excluded the use PEX for water piping systems from the 2007 California Plumbing Code (California Code of Regulations, Title 24, Part 5), and to amend the 2010 California Plumbing Code (California Code of Regulations, Title 24, Part 5). The regulations include mitigation measures identified in the Commission’s Second Revised Draft Environmental Impact Report (SRDEIR) and additional conditions and restrictions on the use of PEX. The Commission’s action allows the statewide use of PEX in hospitals, clinics, schools, residences and commercial structures. **The effective date of this action is August 18, 2010 for the 2007 CPC and January 1, 2011 for the 2010 CPC.** You can view the SRDEIR on the Commission’s website: <http://www.documents.dgs.ca.gov/bsc/pex/2010/Final-EIR/SR-FINAL-EIR-PEX-08-09-10.pdf>

## **Background**

In January 2009, the Commission adopted “PEX regulations” that allowed the statewide use of PEX Tubing by removing the CPC’s exclusion of PEX. The PEX regulations have been the subject of litigation. During the litigation, the court ordered that the PEX regulations must be “vacate[d] and set aside ...” pending the Commission’s preparation and certification of the SRDEIR. The Commission complied with the court’s order by repealing the previous action taken by the Commission in January 2009. The repeal became effective on July 1, 2010.

The Commission prepared and certified the SRDEIR which supports the adoption of PEX regulations and constitutes full compliance with the California Environmental Quality Act (CEQA). The California Building Standards Commission adopted and approved new PEX regulations and amended other regulations that allow the statewide use of PEX Tubing. The parties involved have reached a tentative settlement agreement that reflects the mitigation measures identified in the SRDEIR and additional conditions and restrictions on

the use of PEX that address concerns raised after the release of the SRDEIR. The Commission action implements the terms of the settlement agreement.

**Availability**

The documents reflecting the changes are available on the Commission's website at <http://www.bsc.ca.gov/pex.htm> . Publication of the changes to the California Plumbing Code will be available from the publisher at [www.iapmo.org](http://www.iapmo.org), depository libraries around the state, and bookstores carrying technical publications.

In addition to the above, California Building Standards Law requires that each local jurisdiction, including charter cities, obtain and maintain with all revisions on a current basis, at least one copy of the building standards and other regulations relating to buildings published in Titles 8, 19, 20, 24 and 25 of the California Code of Regulations. The law mandates that these codes are to be maintained in the office of the building official responsible for administration and enforcement of California Building Standards Law.

The law allows local jurisdictions to make modifications to Title 24 for reasons of local conditions, namely climate, topography, and/or geology. This provision may have an impact on the use of PEX in any particular local jurisdiction.



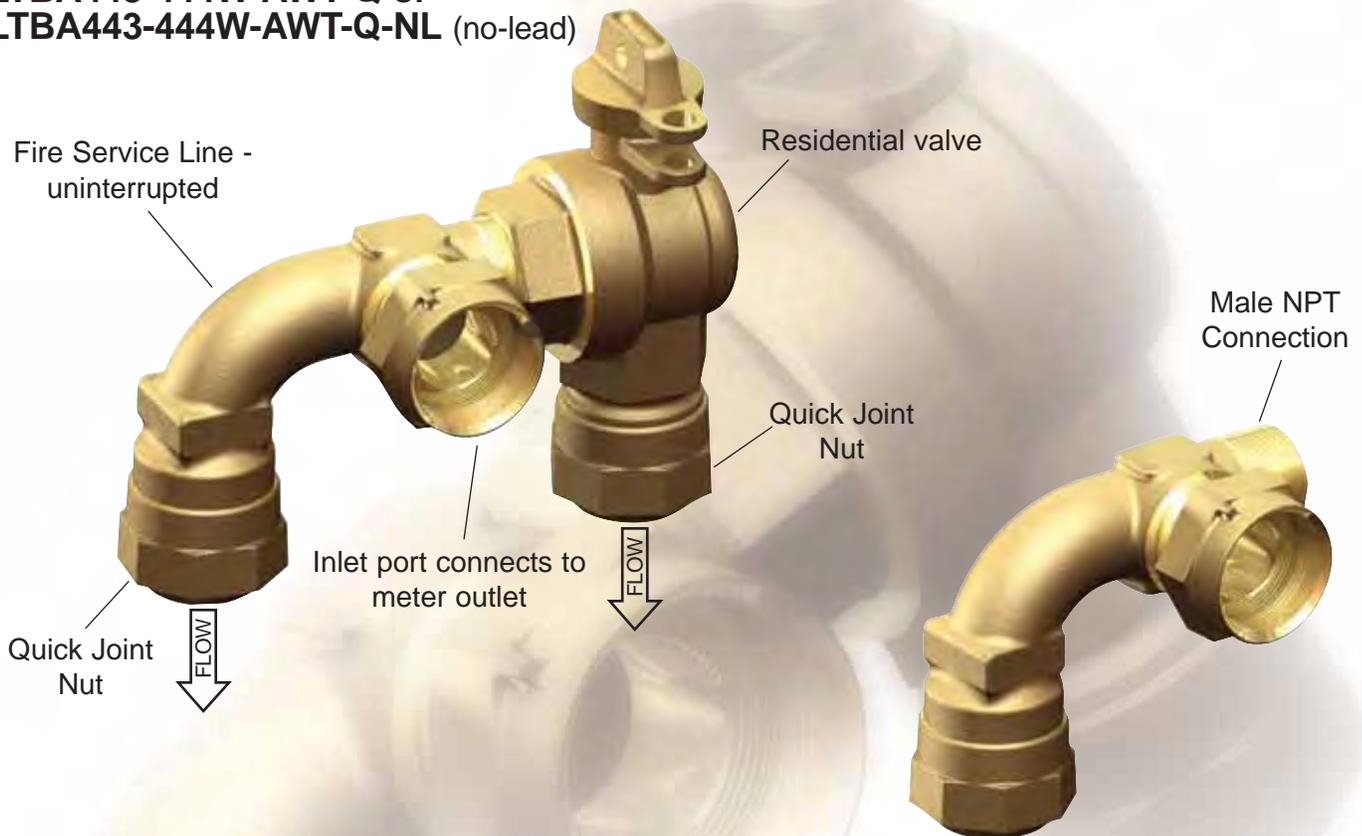
# FIRE SERVICE SETTER

Product Release

12/2009

**Meter water usage for fire service and residential service with just one setting.**

**LTBA443-444W-AWT-Q or  
LTBA443-444W-AWT-Q-NL (no-lead)**



**LT483-444W-Q or  
LT483-444W-Q-NL (no-lead)**  
(Tee only, less residential valve)

- Provides uninterrupted water flow from meter to sprinkler connection
- Separate service line to residence
- 1" full port provides excellent flow characteristics
- Fire Service Setter can be ordered less the residential valve, offering a 1" male NPT connection for other types of valves or fittings (LT483-444W-Q or LT483-444W-Q-NL)
- Available in C83600 (85-5-5-5) or C89833 (no-lead) copper alloys
- Made in the USA

Contact The Ford Meter Box Company or your local Ford distributor for information on optional inlet and outlet connections or optional valve assemblies.