



## **RFDS 5.00 FIRE SPRINKLER SYSTEMS**

### **5.1; SCOPE:**

This standard covers the permitting, installation and maintenance of fire sprinkler systems in the City of Redmond.

All fire sprinkler systems in Redmond shall meet the criteria as set forth in these standards:

- A. The authority having jurisdiction for all new system installations or existing system modifications, upgrades, equipment replacement, or repair work done within the City of Redmond shall be the Redmond Fire Marshal or his designee (referred to in this document as the Fire Code Official). The Fire Code Official shall be responsible for the interpretation and application of standards to actual design and installation situations.
- B. The 2013 edition of NFPA 13 and 2013 edition of NFPA 13D shall be used unless specifically noted otherwise. The current Redmond-adopted building and fire codes shall be used. See Redmond Municipal Code 15.06.
- C. NFPA 13R systems shall not be used to protect buildings that require fire sprinkler protection per the International Building Code, International Fire Code, the City of Redmond Municipal Code or any other adopted codes. At the discretion of the Fire Code Official, NFPA 13R systems may be required as mitigation.

### **5.2; PERMITS REQUIRED:**

A permit shall be obtained from the Redmond Fire Department for the following work related to fire sprinkler systems:

- A. Installation of a new fire sprinkler system.
- B. Modification of an existing fire sprinkler system.

Note: Combination Fire Sprinkler/Standpipe systems need both a Fire Sprinkler and a Standpipe Permit.



## **5.2.1 Permit Types**

There are two types of sprinkler system permits within the City of Redmond:

- A. Standard Sprinkler Permit: Shall be obtained for installation of new or modifications to existing systems when the modifications include one or more of the following:
  - a. More than 25 heads
  - b. Pipe greater than 1 ½” in diameter
  - c. A change in the design area
  - d. A change in the flow or pressure of the system.
- B. Quick Start Sprinkler Permit: Shall be obtained for the installation or relocation of 25 fire sprinkler heads or less when all the following apply:
  - a. No pipe over 1½” is altered or installed.
  - b. There is no effect on, or degradation to, the hydraulically most remote area. This must be verified in writing. A letter, stamped by the designer shall be submitted that specifically states that there will be no degradation of the existing hydraulic calculations. This letter shall be attached to the Quick Start application.

A Quick Start Permit may be obtained by the contractor over the counter through the Redmond Development Center at Redmond City Hall or on line at [redmond.gov/prevention](http://redmond.gov/prevention). By either method, submittal of one set of reference plans is required.

## **5.2.2; EXCEPTIONS TO THE PERMITTING PROCESS:**

### **5.2.2.1 Emergency Repair Work**

“Emergency Repair Work” is defined as the minimum work necessary to return a damaged or impaired system to a satisfactory and fully functional status.

Emergency repair work may proceed without a permit provided all of the following conditions apply:



- A. The system is repaired to its original configuration.
- B. A permit application is submitted by the end of the second working day after the work is completed.

If the repair meets the criteria for a standard permit, then an inspection shall be required subsequent to the issuance of the permit.

If the repair meets the requirements for a Quick Start Permit, then no permit will be issued. However, a letter from the contractor defining the repairs shall be submitted to the Redmond Fire Department for placement in the occupancy file.

### **5.2.2.2 Recalled or Changed Out Sprinkler Heads**

When the system alteration consists solely of changing out sprinkler heads (i.e., standard response to quick response heads or replacement of recalled heads), the following applies:

- A. A Quick Start permit is acceptable for any number of heads replaced as long as a letter is provided from the sprinkler designer stating that there is no degradation of the sprinkler system's hydraulic calculations due to any change in the K factor of the replacement heads or that the K factor has not changed. A reference set of plans is required showing the area where the heads are being changed out.
- B. The fees associated with the number of recalled sprinkler heads to be changed out will be calculated by dividing the number of heads changed out by 50 and rounding up to the nearest whole number. This number will be used as the device count for purposes of calculating the permit fee.
- C. A Final Fire inspection is required.
- D. Any replacement with heads that degrade the hydraulic calculations of the system will require plans and new calculations to be provided under the normal permit procedures and fees. Any additional piping or other modifications to the system will be permitted under the normal permit procedures and fees.
- E. Head replacement affecting more than 25 heads shall be hydrostatically tested in accordance with NFPA 13 and Redmond Fire Department Standards 5.3.5.3.



### **5.2.3; Permit Requirements**

- A. The installation contractor shall obtain the permit and the permit shall be valid only for the contractor identified on the permit application.
- B. A minimum of one permit is required for each building of a multi-building project. A permit is only valid for the work and the contractor designated by the permit. The permit is not transferable.
- C. All permits shall have the required documents on site after issuance of permit until final inspection.
- D. A City of Redmond business license shall be required for both the designer and installer (if separate companies). To obtain a license, contact the City of Redmond Development Services Center.
- E. New fire sprinkler systems shall not be installed nor shall modifications be made to existing systems until:
  - a. A complete application has been submitted.
  - b. Plans have been reviewed and approved.
  - c. A permit has been issued and the approved plans have been reviewed by the designer for changes which may have been required as part of the review.
  - d. A set of stamped, accepted plans and the permit inspection card must be on site for reference by the installer and fire code official.

### **5.2.4; Penalties**

Failure to obtain a permit prior to installation or modification of any portion of a fire sprinkler system will result in the following penalties as described in the City of Redmond Code Enforcement Regulations:

- A. First Offense:
  - a. Stop work order will be posted.
  - b. Permit Fee will be doubled.
  - c. The contractor will be given written notice for failure to comply.
- B. Second Offense:
  - a. Stop work order will be posted.
  - b. Permit fee will be multiplied by five times.
  - c. The contractor will be given written notice for failure to comply.



- c. Third Offense:
- a. Stop work order will be posted.
  - b. Permit fee will be multiplied by five times.
  - c. Code enforcement action can be initiated which may require the contractor to appear before the hearing examiner who may impose further penalties and/or suspend or revoke the City of Redmond business license.

## **5.3; NFPA 13 SYSTEM COMMERCIAL AND MULTI-FAMILY SYSTEMS**

### **5.3.1; Where Required**

The 2013 version of NFPA 13 shall govern the installation of sprinkler systems in buildings other than one and two family dwellings with the following changes:

An approved fire sprinkler system shall be required in the following commercial structures:

- A. In any structure where the gross area, as defined in the International Building Code, is 3,000 square feet or more.
- B. In any structure where the calculated fire-flow demand exceeds available flow.
- C. In buildings with an A-2 occupancy where one or more of the following exists:
  - An occupant load greater than 100.
  - An A-2 fire area is located on a floor other than the level of exit discharge.
- D. All nightclubs, defined as follows:

An A-2 Occupancy use under the 2006 International Building Code in which the aggregate area of concentrated use of unfixed chairs and standing space that is specifically designated and primarily used for dancing or viewing performers exceeds three hundred 350 feet, excluding adjacent lobby areas. "Nightclub" does not include theaters with fixed seating, banquet halls, or lodge halls.



- E. In any building with an assembly occupancy where the total occupant load of the building is over 200.
- F. Existing commercial buildings, where one of the following applies:
  - Additions resulting in a gross area greater than 5,000 square feet.
  - Sprinklers may be required in buildings that undergo a change of use or occupancy, refer to IFC Section 102.3.
- G. Non-conforming structures shall comply with Redmond Municipal Code 15.06.024.
- H. For the purposes of this section, the following definition shall apply:  
Gross Area. The gross area means the total area of all floors, measured from the exterior face, outside dimensions or exterior column line of a building, including basements, cellars, and balconies, but not including unexcavated areas. Where walls and columns are omitted in the construction of a building, such as an open shed or marquee, the exterior wall of the open side or sides, for the purpose of calculating gross area, will be the edge of the roof, including gutters.

**5.3.2; Designer Qualifications**

- A. All fire sprinkler systems shall be designed and installed in a professional manner.
- B. Contractors must be licensed in the State of Washington for the type of work to be performed. (U = Underground; Level 1 = 13D; Level 2 = 13R&13D; Level 3 = 13, 13R, 13D & Underground)

**5.3.3; Plans**

- A. All plans and calculations shall be stamped with a valid Washington State certificate seal identifying the appropriate level of competency.
- B. An approved set of plans shall be on site from issuance of permit until completion of final inspection for both Standard and Quick Start permits.
- C. If the designer is other than the installation contractor, the designer shall be identified on the plans and the professional relationship between the contractor and designer shall be described. The



designer's written authorization shall be attached to the plans for any field changes requiring re-submittal of plans.

- D. Plans shall include a slope legend indicating rise and run for all ceiling 2" in 12" or greater.
- E. All plans shall be submitted electronically following the current permit application and process.

### **5.3.4; Design Requirements**

The 2013 version of NFPA 13 shall govern the installation of sprinkler systems in buildings other than one and two family dwellings with the following additions, deletions or changes.

#### **5.3.4.1; General Design Requirements**

- A. The following regulations from the RMC 15.06.16 constitute general requirements for fire sprinkler systems in the City of Redmond:
  - a. All approved fire sprinkler systems shall meet the requirements of the Redmond Fire Department Standards, Redmond Fire Code, and the applicable NFPA Standards.
  - b. All systems shall have an adequate water supply, system of piping, and sprinkler heads designed to discharge water on a fire at an appropriate time and in an effective manner.
  - c. All underground sprinkler supply piping shall be included on civil drawings and shall be approved by the water supplier and the Redmond Fire Department.
  - d. An area separation wall or fire wall, or occupancy separation or fire barrier wall, or a distance of 10 feet or less shall not constitute a separation between two structures on the same property.
- B. When a building is required to be equipped with fire sprinklers, they shall be provided throughout the structure. Fixed automatic extinguishing systems (i.e.: Carbon Dioxide, FM 200, Halon) are not acceptable in lieu of fire sprinkler protection.
- C. Antifreeze systems are prohibited.



- D. Rooms or areas where wet pipe systems, or any sprinkler supplies, are installed shall be maintained at a minimum of 40 degrees F.

*Exception: When allowed by the fire code official, heat tracing may be used. The heat tracing shall be listed for sprinkler piping and shall be installed and tested in accordance with the manufacturer's specifications. All heat tracing circuits shall be supervised by the building fire alarm system for power supply and temperature. A Special Inspection shall be required by a manufacturer's representative to verify that the heat trace is installed per the manufacturers specifications and listing.*

#### **5.3.4.2; Hydraulic Calculations**

- A. Available flow information shall be obtained from the Redmond Water Utilities Division.
- B. All new systems shall be hydraulically calculated.
- C. All additions to existing systems shall be hydraulically calculated.
- D. Hydraulic calculations shall include a 10% or 10 psi safety factor, whichever is greater. Exception: For existing structures when allowed by the Fire Code Official.
- E. Hydraulic calculations shall include all underground piping from the public water supply main.
- F. When the addition or modification involves only "arm-over" or "drop" type installation, and will not degrade the performance of the system, no new calculations are required. A letter from the designer attesting to this shall be submitted with the permit. The letter shall also bear the contractor's competency stamp, signature and existing system design criteria.

#### **5.3.4.3; Valves**

##### **5.3.4.3.1 Control Valves**

- A. Multi-story buildings that exceed 10,000 (gross) square feet shall have at least one control valve, drain, and water flow switch for each floor.



*Exception: R-1 and R-2 townhouse style buildings up to and including 6 units.*

- B. Control valves shall be located in approved locations. They shall not be more than six feet above finished floor to the top of the valve.
- C. Above ground backflow prevention valves shall have supervised tamper switches.
- D. If a valve is installed in the connection between an alarm-initiating device intended to signal activation of a fire suppression system and the fire suppression system, the valve shall be supervised in accordance with NFPA 72, Chapter 17. Sealing or locking such a valve in the open position or removing the handle from the valve does not meet the intent of the supervision requirement as detailed in NFPA 72.
- E. Both interior and exterior control valves shall be marked.

#### **5.3.4.3.2; Indicating Control Valves (PIV'S & WIV'S)**

All NFPA 13 fire sprinkler systems shall have an exterior, post indicator valve installed. Indicating control valves shall be installed in a location approved by the fire code official at least 40 feet from any building as shown on the approved civil plans.

*Exception: When approved by the fire code official, control valves may be located closer to structures. If a wall indicating valve is proposed, the construction on each side of the valve shall be one hour with no openings or glass. This construction shall extend 10 feet to either side and to the roof and top of the wall above.*

- A. Exterior control valves shall be locked open with a non-case hardened lock or approved rotary shackle lock. The person (or agency) that cuts this lock will be responsible for replacing it.
- B. PIVs shall be installed so the top of the device is 36" to 44" above grade. The area within a 4' radius of these items shall be clear of obstructions, have a compacted surface of crushed rock minimum and have a slope of 5% or less. Where there is an immediate drop of 6" or greater beyond the clear radius or where the slope away from the circle is greater than one foot drop in three feet or where in the



opinion of the Fire Code Official there may exist a hazard to a firefighter using these items, an approved protective guardrail shall be installed.

- C. Above ground exterior control valves shall be located adjacent to the fire department connection for the system served and protected from vehicular damage. See the Redmond Utility Division, Standard Specification and Details book.

*Exception: When approved by the fire code official, exterior control valves may be located away from fire department connections.*

#### **5.3.4.3.2; Fire Department Connections (FDCs)**

- A. All NFPA 13 fire sprinkler and standpipe systems shall have a fire department connection (FDC). FDCs shall be located and installed in conformance with RFDS 4.0 in a location approved by the Fire Code Official as shown on the approved civil plans.
- B. Signage for FDCs shall be in accordance with RFDS 4.0.
- C. The FDCs shall be located at least 40 feet from any building and within 40 feet of a hydrant.

*Exception: When approved by the Fire Code Official, wall mounted FDCs may be used. If a wall mounted FDC is allowed, a second FDC shall be installed on the opposing side of the building adjacent to the approved fire department access and within 40 feet of a hydrant.*

#### **5.3.4.4; Underground (Exterior)**

- A. A State of Washington Level U or Level 3 license is required to perform underground work.
- B. No inspection of underground piping shall be requested without a valid Underground Material and Test Certificate documenting the installation is clear and proper per NFPA 13, Chapter 10.10.1.
- C. Commercial underground supplies are inspected by Redmond Public Works.



- D. A State of Washington Department of Health approved back flow prevention is required on all systems. Submittals shall indicate the specific device to be used and the location of backflow device in the riser room. A certified backflow assembly tester shall test this assembly. After this test is complete and prior to the request for final system acceptance, the completed backflow assembly test form shall be submitted prior to by email or fax to:

Kathy Caldwell, Lead Water Quality Technician, Redmond  
Water Utility  
[kcaldwell@redmond.gov](mailto:kcaldwell@redmond.gov)  
Fax (425)556-4222

- E. All NFPA 13 fire sprinkler systems serving commercial or multi-family structures shall be fed by a minimum of 6" ductile iron underground, unless hydraulic calculations by a sprinkler designer prove a different size is acceptable to the fire code official. The FDC line and the underground supply line shall be the same size and shall not be less than the size of the system riser. Where applicable, an allowance for interior hose streams from standpipes shall be included.

#### **5.3.4.5; Fire Sprinkler Riser Rooms**

- A. Risers shall be located in a separate room from the general occupancy. The main fire sprinkler riser, its appurtenances and the building's fire alarm panel shall be located in this room. A 3-foot clearance in front of the entire width of the fire sprinkler equipment and 1-foot clearance on the remaining 3 sides shall be provided.
- B. The location of the fire sprinkler riser room shall be determined during the site plan approval process and be identified on the architectural drawing. The riser room shall have direct exterior access with minimum dimensions of 8 feet by 10 feet unless otherwise approved by the Fire Code Official.
- C. Phone and electrical equipment may be allowed in the fire sprinkler riser room, provided it does not interfere with the operation of, or access to, the fire alarm panel and fire sprinkler system components.
- D. Interior drains in riser rooms, and at remote riser locations shall be sized to accept the flow from the system drain when fully opened.



Exterior drains shall be directed and/or protected so as not to disrupt landscaping, etc. from the system drain when fully open. Plans shall be made for drainage from testing volumes.

- E. Riser rooms shall be locked at all times and openable with the building master key secured in the Knox box. See RFDS 2.0 Access and Addressing Standard for additional details.
- F. All riser rooms shall be provided with zone maps showing what areas of the building are covered by the system(s) installed. These maps shall be accurate as to the building layout, the location of all sprinkler zones, standpipe outlets, control valves, and water-flow alarm devices and remote drains. All maps shall be legible and easily understood. They shall be laminated and permanently attached to the wall in the riser room. When the system is modified, it is the responsibility of the installing contractor to update the maps.
- G. Storage is prohibited in fire sprinkler riser rooms. Signs stating "NO STORAGE" (4" letters) shall be provided on at least one wall.
- H. All fire sprinkler riser rooms shall have signs on the door stating: "Fire Sprinkler and Fire Alarm Control" (as applicable). Letters shall be a minimum of 2" in height and shall contrast with their background.
- I. All sprinkler system flows shall be monitored in accordance with NFPA 72 Chapter 17. Flows shall be detected by paddle type flow switches (wet systems only) or pressure switches (dry systems only). These devices shall detect a flow from one sprinkler, and trigger a local alarm within 90 seconds of opening the inspector's test valve. Additionally, a signal shall be received at the central station monitoring company within this same amount of time (refer to RFD Fire Alarm Standard for specific requirements).
- J. Location of interior and exterior alarm sounding devices shall be per the RFD Fire Alarm Standard.

### **5.3.4.6; Special Design Requirements**

- A. When attached to a fire sprinkled building, overhangs shall be protected as follows:
  - a. In all "M", "S" and "H" Occupancies (as defined in the International Building Code) canopies and overhangs that



exceed 4 feet in width shall be provided with fire sprinklers regardless of construction type.

- b. Canopies or attached walkway covers greater than 4 feet and that are associated with occupancies where combustibles are stored, handled or used under such canopies or attached walkway covers shall be provided with fire sprinklers regardless of construction type. This includes coverings over vehicle parking and movement areas.
- B. All parking garages shall be equipped with quick response fire sprinklers.

*An exception may be applied for an 'open' parking garage to use other than quick response heads at discretion of the Fire Code Official.*

- C. All dry systems, regardless of size, shall provide a continuous stream of water to the inspector's test within 60 seconds of the opening of the inspector's test valve. A test connection shall be provided for pre-action systems using supervisory air. The connection used to control the level of priming water shall be considered adequate to the test operation of the alarms monitoring the supervisory air pressure.

### **5.3.5; ACCEPTANCE TESTING & INSPECTIONS**

#### **5.3.5.1 Responsibilities**

- A. In the City of Redmond, the responsibility for inspection of fire sprinkler systems are as follows:
  - a. Commercial and multi-family underground from city mains to the floor flange in the riser room: Public Works.
  - b. Commercial and multi-family from floor flange to overhead systems: Redmond Fire Department.
- B. The contractor shall be responsible for ensuring that all test water is safely disposed of and does not create a safety hazard or damage property. The contractor shall provide and oversee the operation of all equipment and be responsible for damages.
- C. The installing contractor shall pretest all systems prior to requesting an inspection.



- D. The installing contractor shall perform all pretests and acceptance tests (i.e. flush, purity, hydrostatic, & flow) at their expense and with their own or rented equipment.
- E. Existing systems (all types): If code violations are noted in existing systems during inspection, correction may be required immediately or prior to final inspection. These violations include, but are not limited to: incorrect hangers, earthquake bracing, sprinkler spacing, design criteria, etc.

### **5.3.5.2; Underground**

- A. Underground mains, including lead-in connections and FDC lines, shall be flushed per NFPA 24 prior to connection to the overhead of any 13 or 13R systems. The contractor shall provide a copy of the “Underground Material and Test Certificate” to the fire code official prior to final inspection.
- B. Backflow assembly testing is required in accordance with City of Redmond Public Works Standards.

### **5.3.5.3; Overhead**

Overhead sprinklers shall be installed per approved plans and NFPA 13.

#### **A. Cover Inspection**

- a. Hydrostatic Test - Redmond inspectors shall witness a hydrostatic test on all new systems or work involving more than 25 fire sprinklers being added or relocated per NFPA 13.
  - 1. System will be pressurized at 200 psi for two hours. No leaks or drops in pressure shall be observed during the hydrostatic test.
  - 2. Dry pipe systems shall be air tested for 24 hours at 40 psi in accordance with NFPA 13.

*Exception: Modifications that cannot be isolated, such as relocated drops, shall not require testing in excess of system working pressure.*

- b. Coverage Inspection\_– Verifies that the system is installed per NFPA 13 and as designed on approved plans. Items to be inspected include:



1. Appropriate bracing and hangers.
2. Correct head placement per plans and NFPA 13.
3. Correct fire stopping in rated assemblies.

**B. Final Inspection**

- a. Verify proper head placement, protection in place, with no obstructions.
- b. Verify no painted heads and trim rings are installed.
- c. Collect all required paperwork (Contractors Materials and Test Certificate for above and below ground piping)
- d. Verify proper mounting of spare head box with heads, wrench, and calculation plate
- e. Test all fire alarm devices located on sprinkler system, if any.
- f. Other tests as required by NFPA 13, Chapter 24.

**5.3.6; MAINTENANCE**

**5.3.6.1; General**

- A. All NFPA 13 fire sprinkler systems shall be maintained, inspected, and tested at least annually using a Redmond Fire Department approved confidence test form and the procedures from NFPA 25.
- B. Contracts for the maintenance and emergency repair of all NFPA 13 systems in the building(s) must be in place prior to the final acceptance of any system. These contracts shall specifically state that emergency repair response initiated by either the owner, fire department personnel, or fire dispatch will be provided 24 hours a day, 7 days per week.

**5.3.6.2; Backflow devices**

All backflow devices installed on fire sprinkler supply lines shall be inspected for proper operation annually. A certified backflow assembly tester shall test this assembly. After this test is complete, the completed backflow assembly test form shall be submitted by email or fax to:

Kathy Caldwell, Lead Water Quality Technician, Redmond Water Utility Division  
[kcaldwell@redmond.gov](mailto:kcaldwell@redmond.gov)  
Fax: (425)556-4222



## **5.4; NFPA 13D SINGLE AND TWO-FAMILY RESIDENTIAL SPRINKLER SYSTEMS**

As of April 13, 2007 all new one and two-family dwellings shall have sprinklers installed. The 2013 version of NFPA 13D shall govern these installations.

### **5.4.1; Where Required**

#### A. Residential – One and Two-Family dwellings:

- a. An approved automatic fire sprinkler system shall be installed in new one and two family dwellings and townhouses as described in the International Residential Code in accordance with Section 903.3.1 of the International Fire Code 2015 Edition.

*Exception: This subsection (1)(A) does not require the installation of an approved fire sprinkler system in any mobile home or manufactured home. This exception is limited to this subsection (1)(A) and nothing herein exempts a mobile home or manufactured home from any other requirement to install an approved automatic fire sprinkler system under any other section or subsection of this code or of any international code adopted by the City.*

- b. An approved automatic fire sprinkler system shall be installed when additions or improvements are made to existing one and two family dwellings, where one or more of the following conditions apply:
  1. Required fire flow exceeds available fire flow per RFDS 3.0.  
Note: Maximum available fire flow in residential areas is 1500 gpm. This limits the maximum house size without sprinklers to a gross area of 3600 square feet. (IFC Table B105.1)
  2. Access grade (on or off site) is greater than 10% (RFDS 2.1.1.5).
  3. Access roadway width is less than 14 feet or longer than 150 feet (RFDS 2.1.1.6).



4. Distance to nearest hydrant is greater than 300 feet (RMC 15.06.013 Amendment 30).
5. The total construction cost on all building permits within a three year period exceeds the King County assessed value of the structure at the beginning of the three year period (RMC 15.06.024).
6. 100% or greater increase in gross square footage (RMC 15.06.024).
7. A non-conforming structure has been destroyed, damaged or has incurred a loss equal to or greater than 60 percent of its King County assessed value (RMC 15.06.024).
8. The one or two family dwelling is greater than 6000 square feet regardless of available fire flow (RMC 15.06.016 (2)(b)).

Exception: If sufficient fire flow exists, additions of up to 500 square feet to detached one or two family dwelling units greater than 6000 square feet are permitted as a one-time only exemption.

Note: Buildings separated by 10 feet or less shall be considered as one building for the purposes of evaluating section (B) above (RFDS 3.1.1.0).

### **5.4.2; Design Requirements**

All systems in the City of Redmond will meet the following requirements:

#### **5.4.2.1; General**

- A. Systems shall be installed as NFPA 13D Multipurpose Piping Sprinkler systems.

Except: When approved by the Fire Code Official

- B. Multipurpose Piping Sprinkler systems shall not be installed on dedicated or non-domestic/fire sprinkler water meters.
- C. Anti-freeze systems are not allowed.
- D. Water supplies for residential sprinkler systems shall be from the public main.



Except: Tanks and pumps may be used when approved by the Fire Code Official

**5.4.2.2; Special Design Requirements**

- A. Arm-over extensions shall not exceed 4 feet.
- B. Tree systems shall have a domestic connection at the end of each branch line.
- C. One domestic appliance shall be connected to the system on each floor.
- D. A single control valve shall be arranged to shut off both the domestic system and the sprinkler system.
- E. A drain shall be installed on the system side of the domestic shut-off to allow maintenance of the system.
- F. A minimum of one head shall be installed on the garage side of the door leading into the residence from an attached garage.
- G. A copy of the maintenance instructions required in 2013 NFPA 13D, Chapter 12 shall be included and approved with the submittal.
- H. If the system has a fire compartment with a slope greater than 8:12 (8 units of rise per 12 units of run), and more than two heads, a separate calculation shall be done to prove the design is able to flow all heads in the fire compartment containing the slope. The heads used in this area shall be listed for a maximum slope of at least 8:12. All other design approaches for fire compartments with a slope greater than 8:12 shall be proposed to, and approved by, the Fire Code Official prior to installation.
- I. If mixed head spacing is used, a separate calculation shall be done to prove the design is able to flow all heads.
- J. A cabinet containing a minimum of two spare heads of each type and a sprinkler wrench shall be provided.
- K. The design criteria below shall be permanently affixed to the riser in an approved manner.



System	Head Type/model	Coverage Area	K-Factor	Static P.S.I.	Required Min P.S.I.	Required Min Flow	Actual P.S.I.	Actual Flow
One head								
Two heads								
Pressure Reducing Valve	Yes		No		Min. P.S.I. Required System side of P.R.V.			

**5.4.2.3; Underground (Exterior)**

- A. Pipe size shall be a minimum of 1” inside diameter, I.D.
- B. Pipe type shall be copper or high molecular polyethylene, (or alternate material as approved by the fire code official).
- C. Meters shall be installed per the Redmond Water Utility Division Standards and are inspected in the trench by City of Redmond plumbing inspectors.
- D. The supply line shall have a flush test witnessed by the Fire Prevention Division, prior to connection to above ground piping.
- E. Pipe installed under the slab of a building shall be sleeved for its entire length and requires the approval of the fire code official prior to its installation.
- F. Supply lines shall be buried in the ground or installed above ground as above ground pipe.
- G. No inspection of underground shall be requested without a valid underground material and test certificate documenting the installation is clear and proper.

**5.4.3; ACCEPTANCE TEST & INSPECTIONS**

- A. The contractor shall be responsible for ensuring that all test water is safely disposed and does not create a safety hazard or damage property. The contractor shall provide, and oversee the operation of all equipment and be responsible for damages.



- B. The installing contractor shall pretest all systems prior to requesting an inspection. The contractor should allow for a minimum of 48 hours (2 working days) for the request to be filled. Redmond Fire Prevention will confirm an appointment with the contractor prior to arriving on site.
- C. The installing contractor shall perform all pretests and acceptance tests (i.e. flush, hydrostatic, & flow) at their expense and with their own or rented equipment.
- D. Existing systems (all types): If code violations are noted in existing systems during inspection, the contractor may be required to correct the condition immediately and prior to final inspection. These violations include, but are not limited to; incorrect hangers, earthquake bracing, sprinkler spacing, design criteria, etc.
- E. Redmond Fire Department 13D Sprinkler System Acceptance Test Process. Acceptance testing for single and two-family residence sprinkler systems (NFPA 13D) are inspected and approved in two site inspections:
  1. **COVER INSPECTION:** This inspection confirms that the system was installed per the approved plans, meets the requirements of 13D and operates as designed. The system must pass this inspection prior to covering walls and ceilings. There are six components to the cover inspection:
    - a. Underground Flush - The flush must be witnessed by the inspector and performed prior to the water supply being connected to the sprinkler system.
      - i. Connect a hose to the water supply line at the point it connects to the sprinkler system.
      - ii. Connect a porous bag to the end of the hose (burlap).
      - iii. Flow water and inspect bag for debris. If debris is evident, continue to flush until system is clean.
    - b. Hydrostatic Test
      - i. Hydro test shall be witnessed by the inspector.
      - ii. Pressurize the system for a minimum of two hours.



- iii. For CPVC, pressurize system to 200 psi or 50 psi above static.
- iv. For PEX, pressurize systems per manufacturer's listing.
- c. Head Placement and Piping
  - i. Sprinkler coverage is adequate based on designed head spacing, sprinkler head specifications, NFPA 13D and RFD Standards.
  - ii. System connected to fixtures as required (multi-purpose systems).
  - iii. System is installed with required trim (valves, gauges, PRVs, etc.) and gauges.
- d. Flow Test - A functional flow test of the system verifies that proper flow and pressure is present in the system's most hydraulically demanding area. The procedure and specific requirements for this system are as follows:
  - i. Locate and replace the two most hydraulically demanding heads in the system with test assemblies identified on the approved plans. The test assemblies shall consist of:
    - Sprinkler pipe (same interior diameter as system pipe).
    - In-line gauge (accurate and readable to within one PSI and in good working order).
    - In-line valve.
    - Test head (same make and model as installed heads with the fusible element and deflector removed).
  - ii. Place a pipe over the orifice of each test head. Direct each discharge into its own container.
  - iii. Record the static pressure prior to flow. Flow the two heads for 30 seconds and record the residual pressure during flow.



- iv. Measure the volume of water in each container individually and multiply X 2 to determine gpm. Record the result.
    - Note: Measurement container must be calibrated and clearly marked to within ½ gallon.
  - v. Verify that the test flow rates and pressures conform to the manufacturer's specifications for the designed head spacing(s).
  - vi. A separate bucket test is required for each of the head spacings.
- e. Tenting – All sprinkler pipe and connections to domestic plumbing must be protected from freezing temperatures in attic spaces.
- f. Hangers/Bracing/Nail Plating – All sprinkler pipe is braced, hung and protected from nail penetration per code.

## **2. FINAL INSPECTION**

- a. Test fire alarm devices connected to sprinkler system, if any.
- b. Verify proper head placement, head protection in place (if required) and no obstructions to water distribution.
- c. Verify proper installation
  - i. All sprinkler trim is installed
  - ii. No painted heads
  - iii. Protective plastic caps removed
- d. Collect all required paperwork (contractor's materials and test certificate for above and below ground piping).
- e. Verify all required signage in place
  - i. Warning signs
- f. Verify proper mounting of spare head box
  - i. Minimum two spare heads of each type
  - ii. Sprinkler head wrench
  - iii. Calculation plate



## **5.4.4; MAINTENANCE**

### **5.4.4.1; Maintenance requirements:**

NFPA 13D systems shall be maintained in accordance with the instructions provided to the owner from the installing company per 2013 NFPA 13D, Chapter 12.

### **5.4.4.2; Backflow devices**

All backflow devices installed on fire sprinkler supply lines shall be inspected for proper operation annually. A certified backflow assembly tester shall test this assembly. After this test is complete, the completed backflow assembly test form shall be submitted by email or fax to:

Kathy Caldwell, Lead Water Quality Technician, Redmond Water  
Utility Division

[kcaldwell@redmond.gov](mailto:kcaldwell@redmond.gov)

Fax: (425)556-4222