RFDS 5.00 FIRE SPRINKLER SYSTEMS

5.1; SCOPE:

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

1. The authority having jurisdiction for all new system installation or existing system modification, upgrade, equipment replacement, or repair work done within the City of Redmond shall be the Redmond Fire Marshal or his designees. The Fire Marshal shall be responsible for the interpretation and application of standards to actual design and installation situations.
2. The 2007 edition of NFPA 13 and 13D shall be used when referenced unless specifically noted otherwise. The current, Redmond-adopted, building and fire codes shall be used. See Redmond Municipal Code 15.06.

5.2; PERMIT REQUIRED:

1. 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. Modifications of an existing fire sprinkler system.

   The installation contractor shall obtain the permit and the permit shall be valid only for the contractor identified on the permit application. The Redmond Fire Department issues permits through the Redmond Development Services Center.
2. A City of Redmond business license shall be required; this can be obtained from the Redmond City Clerk's office. This includes the designer as well as the installer (if separate companies).
3. New fire sprinkler systems shall **not** be installed nor shall modifications be made to existing systems until a complete application has been submitted, plans have been reviewed and approved, 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. A set of stamped, accepted plans and the permit inspection card must be on site for reference by the installer and fire inspector.
4. A minimum of one permit is required for each building of a multi-building project. A permit is only valid for the work and by the contractor designated by the permit. The permit is not transferable.
5. 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: Stop work order will be posted, permit Fee will be doubled, contractor given written notice for failure to comply.
    b. Second Offense: Stop work order posted, permit fee will be multiplied by 5 times, contractor given written notice for failure to comply.
    c. Third Offense: Stop work order posted, permit fee will be multiplied by 5 times, code enforcement action 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.

6. Standard Permit: A standard fire sprinkler system permit shall be obtained for new or modified systems with:
    a. Over 25 heads, or
    b. Pipe greater than 1 ½" in diameter, or
    c. A change in the design area, or
    d. A change in the flow or pressure of the system.

    At least three (3) complete sets of plans, three complete sets of manufacturer's specification sheets for all equipment being installed, and a completed permit application form must be submitted in person to the Redmond Development Services Center, 15670 NE 85th Street. Half the estimated permit fee will be due and payable at this time. Accurate, approved underground civil drawings shall be submitted with the overhead design. (Redmond Water Utility Division and the Redmond Fire Department approvals are required.)
7. Quick Start Permit: A Quick Start Permit may be obtained over the counter (or on line at redmond.gov/prevention) by the contractor for the installation or relocation of 25 fire sprinkler heads or less when the following applies:
    a. No pipe over 1½" is altered or installed.
    b. There is no effect on, or degradation of, 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.

    Quick Start permits require submittal of one set of reference plans.
8. Emergency Repair Work: "Emergency Repair Work" is defined as that minimum work necessary to return a damaged or impaired system to satisfactory and fully functional status. Emergency repair work may proceed without a permit provided the system is repaired to its original configuration, and a permit application is submitted by the end of the second working day after the work is completed.
    a. If the repair meets the criteria for a standard permit, then an inspection shall be required subsequent to the issuance of the permit.
    b. If the repair meets the criteria for a Quick Start Permit then no permit will be issued if, a letter from the contractor defining the repairs is submitted to the Redmond Fire Department for placement in the occupancy file.
9. Replacement of recalled sprinkler heads requires notification of the Fire Prevention Division. See "Sprinkler Head Change Out Permit Procedures" document at: http://www.redmond.gov/insidecityhall/fire/prevention/documentsandforms.asp

5.3; SYSTEM DESIGN:

All fire sprinkler systems shall be designed and installed in a professional manner. 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)

5.3.1; Plans

1. All plans shall be on a minimum of 11” x 17” and maximum of 24” x 36” paper using a minimum of $^{1}/_{8}$” and a maximum of ¼” scale (architectural only), unless approved otherwise, in advance, by the Fire Marshal.
2. All plans and calculations shall be stamped with a valid Washington State certificate seal identifying the appropriate level of competency.
3. 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.
4. Plans shall include a slope legend indicating rise and run for all ceilings 2” in 12” or greater. Add note stating “No Sloped Ceilings” if applicable.

5.3.1.2; Underground (Exterior)

1. A State of Washington “U” level or level 3 license is required to perform underground work.
2. No inspection of underground shall be requested without a valid underground material and test certificate documenting the installation is clear and proper.
3. Commercial underground supplies are inspected by Redmond Water Utility Division. Dedicated fire meters supplying one or two family residences are inspected in the trench by Redmond plumbing inspectors, and shall have a flush witnessed by a Fire Department representative.
4. Department of Health approved back flow prevention is required on all systems. Submittals shall indicate whether this will be installed in the building, or outside in a vault. A certified backflow assembly tester shall test this assembly. After this test is complete, the completed backflow assembly test form shall be submitted to the Lead Water Quality Technician of the Redmond Water Utility Division prior to the request for final system acceptance.
5. Residential fire sprinkler systems designed per NFPA 13 or 13R shall have a minimum of 4” ductile iron underground, unless a smaller supply line is justified and approved by the Fire Marshal.
6. All NFPA 13 fire sprinkler systems 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 Marshal. 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.
7. Fire Department Connections and Post Indicator Valves shall be installed so that the top of the device is 36" to 44" above finish 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 cross 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 Marshal there may exist a hazard to a firefighter using these items, an approved protective guardrail shall be installed.

5.3.1.3; General Design

1. Antifreeze systems are prohibited.
2. 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 Marshal 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 may be required by a manufacturers representative to verify that the heat trace is installed per the manufacturers specifications and listing.

5.3.1.4; Hydraulic Calculations

1. Available flow information shall be obtained from the Redmond Water Utilities Division.
2. Hydraulic calculations shall include a 10% or 10 p.s.i. safety factor, whichever is greater..
3. Hydraulic calculations shall include all underground from the public water supply main.
4. All new systems shall be hydraulically calculated. All additions to existing systems shall be hydraulically calculated.
5. 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.

5.3.2; NFPA 13D Systems

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

5.3.2.1; Special Design Requirements

1. For underground supplies the following shall apply:
   a. Pipe size shall be a minimum of 1";
   b. Pipe type shall be copper or high molecular polyethylene, (or alternate material as approved by the Fire Marshal)
   c. Meters shall be installed per the Redmond Water Utility Division Standards; and
   d. A backflow prevention device shall be installed per Redmond Plumbing Code.
   e. The supply line shall have a flush test witnessed by the Fire Prevention Division, prior to connection to aboveground piping.
   f. Pipe installed under the slab of a building shall be sleeved for its entire length and requires the approval of the Fire Marshal prior to its installation.
   g. Supply lines shall be buried in the ground or installed above ground as aboveground pipe.
2. A copy of the maintenance instructions required in Section 4.2.1 shall be included and approved with the submittal.
3. Antifreeze Systems are not allowed.

4. Systems shall be hydrostatically tested for leakage at 200 psig or 50 psig above static pressure for a minimum of 2 hours weather or not a FDC is provided, unless prohibited by manufacturers' listing.
5. Local water flow alarms shall be provided on all sprinkler systems. This alarm shall be a minimum 6" red electric bell or electric horn, mounted on the exterior of the home
6. The riser shall be in an accessible location, adjacent to the furnace and/or water heater and shall be protected from damage and freezing.
7. A minimum of one head shall be installed on the garage side of the door leading into the residence from an attached garage.
8. The design criteria shall be permanently affixed to the riser in an approved manner.

Company name Address Phone	Head type	Base of Riser (psi)	Head Flow (gpm)	Drain Test (psi)
	K-Factor:	Minimum required:	Minimum required:	Minimum Flowing:
	Design area:	Actual: Date:	Actual: Date:	Minimum Non-flowing:

9. 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 Marshal prior to installation.

5.3.3; NFPA 13R Systems:

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.

5.3.4 NFPA 13 Systems

The 2002 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

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.

5.3.4.2; Special Design Requirements

1. 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.

2. 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 Marshal.

5.3.4.3; POST INDICATOR VALVES (PIV'S & WIV'S))

All NFPA 13 systems shall have an exterior, post indicator valve.
The following applies to these control valves:

1. Installed in a location approved by the Fire Marshal.
2. At least 40 feet from any building (generally this location is in the same planter island as a fire hydrant).

Exception: When approved by the Fire Marshal, 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 wall above.

3. 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.
4. 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 Marshal, exterior control valves may be located away from fire department connections

5.3.4.5; FIRE DEPARTMENT CONNECTIONS (FDC'S)

All NFPA 13 systems and standpipe systems shall have a fire department connection (FDC). FDC's shall be:

1. Installed in a location approved by the Fire Marshal (generally this location is in the same planter island as a fire hydrant).
2. Located at least 40 feet from any building.

Exception: When approved by the Fire Marshal, FDC's may be located closer to structures. If a wall FDC 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 wall above.

3. Be marked and be visible and accessible from the Fire Department access road:
   a. FDC's and PIV's for wet/combination systems shall be painted red. The address of the building served shall be painted in nominal 3" letters of contrasting color.
   b. Complexes and special designed systems shall have the address and any fire pump pressure criteria, etched in 18 gauge (min.) metal and permanently attached (u-bolts) to the FDC and PIV.
4. FDC's shall be a Siamese connection in accordance with the following conditions:

a. Each inlet shall have its own clapper valve.
b. Minimum size 4" x 2 ½ x 2 ½
c. Additional inlets or a 5" Storz adapter may be required on systems with large water demands or for unique sites.

5. FDC caps and their fasteners shall be frangible metal or an approved alternate.
6. FDC's shall be protected from vehicular damage. See the Redmond Utility Division, Standard Specification and Details book.

5.3.4.6; Fire Sprinkler Riser Rooms

1. 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.
2. 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.
3. Phone and electrical equipment may be allowed in the fire sprinkler riser room, provided it does not interfere with the operation of the fire alarm panel or access to the fire sprinkler system components.
4. 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.
5. Riser room shall be locked at all times and open-able with the building master key secured in the Knox box.
6. 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. 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.
   Exception: Buildings with no more than one sprinkler zone per floor.
7. Storage is prohibited in fire sprinkler riser rooms. Signs stating "**NO STORAGE**" (4" letters) shall be provided on at least one wall.
8. 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.
9. All sprinkler system 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).
10. Location of interior and exterior alarm sounding devices shall be as per RFD Fire Alarm Standard.

5.3.4.7; Control Valves

1. 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.
2. Control valves shall be located in approved locations. They shall not be more than 6-feet above finished floor to the top of the valve.
3. Above ground backflow prevention devices shall have supervised tamper switches.
4. 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 5. 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. (2002 NFPA 72- 6.8.5.9.2)
5. Pipe that connects any pressure operated alarm or supervisory device to the fire sprinkler system shall be galvanized, brass, copper or other corrosion resistant material acceptable under NFPA 13.
6. Both interior and exterior control valves shall be marked.

5.4; INSPECTION

5.4.1; General

1. In the City of Redmond, the responsibilities for inspection of fire sprinkler systems are as follows:
   a. Commercial underground from city mains to the floor flange in the riser room: Public Works, inspections can be requested by calling (425) 556-2435.
   b. Commercial from floor flange to over head systems and 13D residential underground and overhead piping: Redmond Fire Department, inspections can be requested by calling (425) 556-2232.
2. 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 the site.
3. 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.
4. Existing systems (all types): If code violations are noted in existing systems during inspection, they shall be corrected immediately and prior to final inspection. These violations include, but are not limited to; incorrect hangers, earthquake bracing, sprinkler spacing, design criteria, etc.

5.4.2; Underground

1. 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.
2. Underground mains, including lead in connections and FDC lines, shall be flushed as per NFPA 24 prior to connection to the overhead of any NFPA 13D; 13R or 13

systems. The contractor shall provide a copy of the "**Underground Material and Test Certificate**" to the fire inspector prior to final inspection.

3. Backflow assembly testing is required in accordance with City of Redmond Public Works Standards. The contractor shall provide all of the necessary hardware, gauges, etc for this test. The contractor shall also make provisions for proper disposal of the water flow generated by the test.

5.4.3 NFPA 13D Systems

1st Inspection:

1. Witness hydrostatic test at 200 psig (or 50 psig above working pressure, which ever is higher) for 2 hours on all above ground pipe, unless prohibited by manufacturers' listing. No leaks or drops in pressure shall be observed during this time.
2. Witness underground flush and bag test. No connection to above ground pipe shall be done prior to this witnessed test.
3. Witness a functional flow test proving the system design.
4. Witness that insulation is installed.
5. Inspect hangars and bracing

2nd Inspection:

1. Verify proper head placement with no obstructions.
2. Verify no painted heads
3. Collect all required paperwork (Contractors materials and Test Certificate for above and below ground piping)
4. Verify proper mounting of spare head box with heads and calculation plate
5. Test and time flow switch activation and interconnection of exterior bell.

5.4.4 NFPA 13R Systems

13R systems are not allowed in the City of Redmond.

5.4.5 NFPA 13 Systems

5.4.5.1; Overhead

General:

1 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 test the operation of the alarms monitoring the supervisory air pressure.

1st Inspection

1. Witness hydrostatic test on all new systems or work involving more than 20 fire sprinklers being added or relocated per NFPA 13, 200 psig for two hours. No leaks or drops in pressure shall be observed during the hydrostatic test. Additionally dry

pipe systems shall be air tested for 24 hours at 40 psig 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.

2. Inspect all bracing and hangars.
3. Verify head placement is correct per plans.

2nd Inspection:

1. Verify proper head placement with no obstructions.
2. Verify no painted heads
3. Collect all required paperwork (Contractors materials and Test Certificate for above and below ground piping)
4. Verify proper mounting of spare head box with heads and calculation plate
5. Test all fire alarm devices located on sprinkler system
6. Other tests as required by NFPA 13 chapter 16.

5.5; MAINTENANCE

5.5.1: 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 to the Lead Water Quality Technician of the Redmond Water Utility Division.

5.5.2: NFPA 13 D system maintenance

NFPA 13D systems shall be maintained in accordance with the instructions provided to the owner from the installing company per 2002 NFPA 13D, Section 4.2.

5.5.3 NFPA 13 and 13R systems:

1. 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.
2. 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 the owner, fire department personnel, or fire dispatch will be provided 24 hours a day, 7 days per week.