RESIDENTIAL FIRE SPRINKLER DEVELOPMENT STANDARDS

Pages 1 through 7

NFPA 13-D - Modified

Always submit plans and await the return of the plans before installing. Always ask the general contractor for a copy of the Fire Review Document that is part of the approved building plan set before bidding a project to be certain that all items have been covered.

Full size plans are to be submitted with either 1/8” or ¼” common scale.
WSP/STATE FIRE MARSHAL CURRENT LICENSE AND STAMP REQUIRED ON BOTH SHEETS

Two (2) sets of plans are required. One for the file, one approved set for the site. Approved plans must always be on site for each inspection, no exceptions.

Access, fire flow and square footage may cause the sprinkler requirements to be altered. Submit plans in person to:

City of Mercer Island
Development Services Group
9611 SE 36th Street
MERCER ISLAND, WA 98040

Please call (206) 275-7605, on the automated menu first select planning, building and permits and then select inspections building permits and codes. Ask the Permit Coordinator for the current single family residential sprinkler plans review, inspection and permit fee.

These design standards have been adopted by the Mercer Island Fire Department and have been established for the design and installation of sprinkler systems for one- and two-family dwellings, zero lot line townhomes and manufactured homes.

Plan review and site inspection may change the original design and sprinkler head locations of the submitted plans.

Systems shall be installed as per applicable UL, NFPA and City of Mercer Island special requirements.

Some residential structures are so large that they severely exceed the fire code requirement for fire flow water supply and/or access requirements. In these cases an NFPA 13 commercial fire sprinkler system may be required.
WATER SUPPLY

The water supply line for all residential fire sprinklers will be 2” (minimum). Materials are to be acceptable under the Plumbing Code. A minimum 1 ½” meter is required and a 2” meter may be required. The City of Mercer Island requires a direct tap (2”) to the water main. Exceptions must be filed with the Building Official in writing stating the reason the owner is requesting the alternate.

☐ Using a smaller “stub out” then connecting the 2” supply for sprinkler service is not allowed and would compromise the performance flow test of the sprinkler system.

Pump and Tank. Under certain conditions the construction of a water line to serve certain locations may be impractical. The Fire Code official must approve this alternative. Tanks and pumps are allowed, provided that they meet the following criteria:

Tank size: Minimum 500 gallons, with means for filling the tank and visualizing the tank level.

Back up power: An emergency generator capable of operating the fire pump is required to be installed in accordance with UL 2100 and the Fire and Electrical Codes.

The fire pump and tank shall be one of the following or a like equivalent:

“American Fire Technology”, www.advancedfiretechnology.com; 888-498-5200
“The D System” www.thedsystem.com; 800-786-7133
General Air Products “RFP System” www.generalairproducts.com; 800-345-8207
Raimondo Consultants, Inc. www.raimondofiresystems.com; 781-279-4344

All parts of the assembly must be listed.

BACK FLOW PREVENTER REQUIRED BY CITY ENGINEERS OFFICE UNLESS THE SYSTEM IS A COMBINATION OR “FLOW THROUGH” SYSTEM. Must conform as follows:

- May not be installed in crawl spaces, under stairs or other similar areas of difficult access. The riser and controls shall be installed in a room that is rapidly accessible with no special effort or knowledge, through a “man door”.
- Must be in a heated area, with a drain (in the floor) and a floor that is not subject to water damage. Note the backflow preventer may be installed in the garage on the “warm” wall in a protective (insulated) cabinet see below.
- Must be installed with at least 4” clearance from wall or other obstructions for testing and service access. The maximum height is 5 ft AFF.
- If riser and backflow are installed in a garage, the device shall be installed on a warm wall in an approved cabinet to protect from freezing. Test ports to be facing away from the wall, with room for a standard 2 ½ gallon pail to be used for backflow testing.
- WATER FRONT HOMES: In addition to the regular in line backflow prevention assembly at the sprinkler riser, a Reduced Pressure Backflow Assembly (RPBA) installation shall be required and installed 12 inches above grade behind the water mater for all new and demo rebuild single family, lakefront projects. The RPBA shall be inspected at time of installation and at building
final. (A Hot Box to protect the RPBA assembly is optional). Regular sprinkler riser backflow also required.

- **ANTI-FREEZE SYSTEMS.** Anti-freeze systems are allowed with the following configurations,
  - a Reduced Pressure Backflow Assembly for premises isolation is required at the meter; and
  - a RPBA for in-premises protection from the antifreeze system replaces the regular DCVA at the base of the riser.

- A maintenance agreement signed by the owner, to properly maintain the backflow devices and remix the anti-freeze solution annually per manufacturer’s requirements is required as part of the plan set.

- The sprinkler riser back-flow prevention device must be tested as a condition of occupancy. Call the inspection request line for testing (206) 275-7730

**PIPING.**
All UNDERGROUND piping shall be listed and installed in accordance with its UL or Factory Mutual listing and approved by the International Plumbing Code. All aboveground sprinkler materials must be UL Listed and approved by NFPA. All materials used on CPVC piping or on sprinkler threads must be listed for use on that material.

**Pipe Protection.** CPVC pipe shall ONLY be installed under smooth, flat horizontal ceilings constructed of approved materials. CPVC pipe shall not be used for concealed space coverage. *Exception: When approved sprinkler heads are used to provide concealed space protection.*

**GARAGE SPRINKLERS REQUIRED.**

- **a)** Attached garages shall be provided with fire sprinklers. Dry sidewall sprinklers shall protect the entire “warm wall”. Extended coverage heads are preferred and may be required. ECQR dry sidewalls shall be properly supplied by correct sized sprinkler lines. The in the event of a car fire City of Mercer Island expects that all heads will operate.

- **b)** An FDC (1 ½” female swivel with cap and chain) must be installed when there is occupied space above the garage/s. The FDC shall be installed on an exterior front wall, be in plain sight and shall point toward the arriving fire apparatus. The exterior (8” Potter) bell shall be located above the FDC. *Exception: If no more than four sprinklers are installed and the domestic supply can meet the sprinkler demand, an FDC is not required.*

- **c)** ADU’s. Accessory dwelling units or other sleeping rooms in detached garages shall be protected with fire sprinklers when one of the following occurs: the access is difficult or the fire flow is deficient.

**CRAWL SPACE SPRINKLERS:**

Crawl spaces that can be used for storage or other uses must be protected with fire sprinklers. If the crawl space is provided with a hard floor and man door, fire sprinkler protection is required. If the crawl space is used for mechanical equipment it is considered “occupied” and must be sprinklered. The use of exposed plastic pipe under other than 2x10 or 2x12 on 16” center solid beam construction is prohibited. The use of sidewall sprinkler heads must be under a smooth flat covered ceiling.

**DECKS**

Covered decks (part of the roof line) with open flame devices must be protected with approved fire sprinklers listed for the application. As an example, using the Reliable DH56 Dry Sidewall, coverage specifications can be obtained for 10-feet out and 28 feet width coverage.
ATTIC SPRINKLERS
Attics in homes under 10,000 sq ft are not normally protected with fire sprinklers unless there is a requirement for such due to severe restriction or no access at all to the site.

FUEL FIRED EQUIPMENT IN ATTIC:
If the attic is used for mechanical devices a sprinkler head may be required to protect the heating units. The sprinkler must be approved metallic pipe and well braced and protected from freezing.

SPRINKLER PIPE AND CEILING COVER:
If plastic sprinkler pipe is used, light weight engineered (pre-fabricated wood “I” joists) floor joists must be covered with gypsum board if exposed plastic pipe is chosen for the fire sprinklers in that compartment. Exposed plastic pipe for sprinklers is allowed if solid wood floor joists are used, either 2x10 or 2x12 on 16” centers.

WATER SUPPLY LINE.
1) The minimum combination domestic/fire supply line and meter for a two-head design system is 2” I.D. of approved material. NFPA 13 systems will require a minimum 4” supply line, unless the sprinkler contractor can demonstrate that a smaller line will provide the design flow requirements.

2) The backflow preventer shall be no smaller than 1 ½”. A minimum 1 ½” riser to each floor is required. EXCEPTION: A DCVA is not required for “flow through” systems.

3) Dual RPBA’s are required for anti-freeze systems, one at the base of riser and one at the meter.

4) The supply lines shall be flushed for a period of time to ensure that debris that would clog sprinklers is removed. The contractor shall call for an inspection by the site-utilities inspector.

5) There shall be NO valve (unless it is an approved indicating valve that can be locked in the open position or electrically monitored) between the meter and the back flow preventer on the fire sprinkler supply line.

6) It is highly recommended that if irrigation supply is tapped before the fire sprinkler system an automatic shut off valve is required to prevent reduction of supply to the sprinklers when irrigation is operating.

SPRINKLER COVERAGE ADDITIONS FOR MERCER ISLAND.

BATHROOMS
All bathrooms are to be sprinklered regardless of size. IFC 901.4.3

EXIT STAIRS
Intermediate landing on combustible egress stairs will require sprinkler protection.

Storage space or rooms regardless of size or use under combustible egress stairs shall be protected with fire sprinklers. Storage rooms with outside access only where flammable liquids are stored.

COVERED DECKS
Covered decks (under the roof line of the attic) with gas plumbed for open flame cooking units shall be protected with dry sidewall heads. We suggest you consider the Reliable DH 56 Dry head or equivalent be installed due to its ability to cover the occupied wall area. Up to 28’ width by 10’ throw.
ACCESSORY DWELLING UNITS
In areas with poor fire flow or difficult access, occupied accessory buildings shall be provide with approved fire sprinklers.

ALARMS
Water flow alarm is required. Some areas may require UL Listed dialer monitoring. All alarm requirements will be completed before the final acceptance test. See the individual FIRE REVIEW document that accompanies the approved building plan set for each project.

TESTING
Hydraulic pressure test. A 200-psi test is required for systems with an FDC. This test shall be conducted in accordance with NFPA 13. Sprinkler contractor must remain in attendance for safety reasons when this test is underway. Fire Inspector to witness the test.

a) A 175-psi hydraulic pressure test is required for systems without an FDC; this test is to be run for 1 hour with the sprinkler contractor in attendance at all times. Fire inspector to witness the test.

b) Pressure test for flow through and for crossed-linked polyethylene shall be per NFPA 13D. Flow test. A flow test with a marked container of ½ gallon increments (no more than 4 gallons) is required. The sprinkler contractor shall install an inline pressure gauge downstream at the next in line head from the remote heads for the testing inspector to view. Please see the gauge specifications below. Fire inspector must witness the test.

IMPORTANT TESTING INFORMATION
TEST PRESSURE GAUGE REQUIREMENT
A pressure gauge shall be installed at the test location. The gauge shall have a graduation interval of 1 or 2-PSI increments. We recommend that the gauge be a 160 psi model. The gauge face shall be no less than 4” diameter.

Final inspection. The final inspection will show the system in service. All alarms are required to be in service. The alarm company will be present if the system is monitored OR if the alarm system is a low voltage type with special keypad reset. Fire inspector must witness the test.

NOTE: The contractor will submit an NFPA 13 Contractor’s Test and Materials sheet to the fire inspector upon completion of the project.

The sprinkler representative AND low voltage alarm company representative (if applicable) shall be present for all final tests. CALL (206) 275-7730 and leave your permit information, the Building Official or inspector will then call you back for an appointment. 48-hour lead-time required.

RISER and CONTROLS.
Control valves inside the house shall be either electrically monitored or locked in the open position. Removal of the DCVA (backflow preventer) valve handles in the “open” position is also acceptable. No valves are allowed on the sprinkler supply side between the meter and the required backflow preventer.

- The riser shall be located in a fully accessible room with a standard hinged door access.
- You may not install the riser and backflow controls in crawl space, under stairs or near the overhead garage door.
- Garage riser locations must be placed in an insulated cabinet to protect against freezing.
TEST/DRAIN PLUMBING REQUIREMENTS.
The drainpipe and size shall conform to NFPA requirements. Drains must be plumbed to the exterior of the building. Hose bibs are not allowed.

Test line shall be plumbed and routed to the outside and shall not cause landscape damage or soil erosion. If a low point is created on the test line an auxiliary drain shall be installed and labeled.

OPERATION AND MAINTENANCE.
The fire sprinkler system shall be maintained in service and in good working order by the owner for the life of the building.

The installer shall provide operation, maintenance and testing information to the owner.

WATER FLOW ALARM REQUIRED (no exceptions).

The sprinkler system shall have installed a means of notification of a water flow event.

INTERIOR: You may connect the water flow switch to the sounder side of the line voltage smoke alarms. Firex smoke detectors use part # 0498 and Kidde with relay/power supply module SM120X are currently approved for this purpose.

If you cannot interface the water flow switch to smoke alarms then a separate horn, bell or siren is required to be located centrally on each level including the basement or lowest level of the structure for occupant water flow notification.

EXTERIOR: An exterior grade 8” Potter bell or equivalent shall be installed. This shall be above the FDC if one is present. An exterior grade siren (105 db @ 10 FEET) is also allowed.

UL DIALER MONITORING: When the structure is located in an area of difficult access or is excessively large with deficient fire flow available, the sprinklers shall send an automatic signal of water flow via an approved UL listed automatic dialer.

The final tests are necessary for the issuance of the certificate of occupancy. The plan review and final tests by the Building Official’s Office do not exclusively constitute permission to occupy. Oversights and improper installations shall be the responsibility of the sprinkler contractor and owner to correct. Building Official plan review shall not be construed as completely binding; field changes may be required upon inspection. The Building Official shall determine from field inspection the fitness of the system and changes to be made.

Contractors Test and Materials Form is required on completion of the project.

FIRE CODE REFERENCE:
INTERNATIONAL FIRE CODE  901.4.3 Additional fire protection systems.

“In occupancies of a hazardous nature, where special hazards exist in addition to the normal hazards of the occupancy, or where the fire code official determines that access for fire apparatus is unduly difficult, the fire code official shall have the authority to require additional safeguards. Such safeguards include, but shall not be limited to, the following: automatic fire detection systems, fire alarm systems, automatic fire-extinguishing systems, standpipe systems, or portable or fixed extinguishers. Fire protection equipment required under this section shall be installed in accordance with this code and the applicable referenced standards.”