

**Residential Sprinkler  
Plan Submittal Requirements  
Prescriptive Path  
Section 2904 International Residential Code.**

1. Detailed floor plan of all habitable levels including basement. Drawings must show exact dimensions of entire structure and all rooms including closets.
2. Section 2904.1.1 IRC: Exact location and type of sprinkler head (pendant, upright or sidewall) must be clearly indicated.
3. 2904.2 IRC: Manufacture specifications, coverage area, temperature rating & minimum flow requirements (manufacture cut sheets) for each type of sprinkler used must be submitted.
4. Table 2904.2.2: Locations where intermediate temperature sprinkler are required.
5. 2904.2.4.1 Coverage area limit: The area of coverage of a single sprinkler shall not exceed 400 square feet (37m<sup>2</sup>) and shall be based on the sprinkler listing and the and the manufacture installation instructions. 2904.2.4.2 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.
6. 2904.3: Sprinkler Piping Systems. Type of system must be clearly indicated ( stand alone or multipurpose) piping shall comply with all applicable requirements for cold water distribution piping.
7. Size and type of pipe used must be clearly depicted on floor plan, exact location and length must be depicted.
8. Riser diagram from water source (private or municipal) to the highest elevation must be submitted, length, size and type of pipe, all fittings, meter, (if applicable) shutoff valves & water softeners must be depicted.
9. Nonmetallic pipe such as CPVC and PEX must be listed for use in residential sprinkler systems. Nonmetallic pipe must be protected by a material having a minimum 15 minute fire rating.
10. 2904.3.2 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.
11. 2904.3.3: P2904.3.3 Single dwelling limit. Piping beyond the service valve located at the beginning of the water distribution system shall not serve more than one dwelling.
12. 2904.4.1 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:
  - The area of coverage.
  - The ceiling configuration.
  - The temperature rating
  - Any additional conditions specified by the sprinkler manufacturer.

- 13. 2904.4.2 System design flow rate.** The design flow rate for the system shall be based on the following
- 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.
  - 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, and multiplying that flow rate by 2.
  - 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.
  - 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.
  - 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. 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.

- 14. 2904.5 Water supply.** The water supply shall provide not less than the required design flow rate for sprinklers in accordance with Section P2904.4.2 at a pressure not less than that used to comply with Section P2904.6.
- 2904.5.1 Water supply from individual sources.** Where a *dwelling unit* water supply is from a tank system, a private well system or a combination of these, the available water supply shall be based on the minimum pressure control setting for the pump.

- 15. 2904.5.2 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:
- 7 minutes for *dwelling units* one story in height and less than 2,000 square feet (186 m<sup>2</sup>) in area.
  - 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.

Where a well system, a water supply tank system or a combination thereof is used, any combination of well capacity and tank storage shall be permitted to meet the capacity requirement.

- 16. 2904.6 Pipe sizing.** The piping to sprinklers shall be sized for the flow required by Section P2904.4.2. The flow required to supply the plumbing fixtures shall not be required to be added to the sprinkler design flow.

**2904.6.1 Method of sizing pipe.** Piping supplying sprinklers shall be sized using the prescriptive method in Section 2904.6.2 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 sprinkler shall be 1/2 inch (13mm) nominal.

17. **2904.6.2.1 Available pressure equation.** The pressure available to offset friction loss in the interior piping system ( $P_t$ ) 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:

- $P_t$  = Pressure used in applying Tables P2904.6.2(4) through P2904.6.2(9).
- $P_{sup}$  = Pressure available from the water supply source.
- $P_{Lsvc}$  = Pressure loss in the water-service pipe.
- $P_{Lm}$  = Pressure loss in the water meter.
- $P_{Ld}$  = Pressure loss from devices other than the water meter.
- $P_{Le}$  = Pressure loss associated with changes in elevation.
- $P_{sp}$  = Maximum pressure required by a sprinkler.

**Step 1—Determine  $P_{sup}$**

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.

**Step 2—Determine  $P_{Lsvc}$**

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

**Step 3—Determine  $P_{Lm}$**

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

**Step 4—Determine  $P_{Ld}$**

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, 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  $P_{Le}$**

Use Table P2904.6.2(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  $P_{sp}$**

Determine the maximum pressure required by any individual sprinkler based on the flow rate from Section P2904.4.1. 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  $P_t$**

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) through P2904.6.2(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  $P_t$  between the tabular values shall be permitted.

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

18. **2904.7 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."

For more information please visit

***Residential Sprinkler System Design Made Easy*** there you will find all the tables from the IRC necessary to do flow calculations, there are also work sheets to do all required calculations that are printable and can be used as part of you submittals.

## **Residential Sprinkler Plan Submittal Requirements**

### **NFPA-13D**

**The layout, calculations, and installation of systems installed in accordance with this standard shall only be performed by people knowledgeable and trained in such systems.**

- **Submittals must include detailed drawings, riser diagram, flow calculations, manufacture specifications and recommended installation instructions for all materials and methods used.**
- **All plans and submittals must be signed by the person responsible for the system design.**
- **All plans and submittals must be stamped by a licensed design professional, a NICET or documentation must be provided that the person responsible for the design has been trained and is qualified using NFPA 13D**