Fire Protection Water Supplies

Purpose
This policy provides guidance and outlines the State Fire Marshal Division’s (SFMD) requirements for water supplies for fire sprinkler systems. These requirements apply to newly installed sprinkler systems; they are not intended to be applied retroactively to existing systems.

Types of water supplies
Fire sprinkler systems shall be connected to at least one automatic, approved, and reliable water supply. The following are considered reliable water supplies [NFPA 13 (2016) – Section 24.2.1]:

- Municipal or private waterworks systems (including wells).
- Water storage tanks (underground, at grade level, or elevated).
- Pressure tanks.
- Lakes, rivers, ponds, or reservoirs.

Water supplies shall be capable of providing the required flow and pressure for the design area in accordance with NFPA 13. In some cases, a fire pump may be necessary. Swimming pools, ponds, or fire department connections alone are not considered reliable water supplies.

Valve requirements
Listed double-check backflow assemblies are required by the State Plumbing Code for all new fire sprinkler systems. If an existing valve assembly is disassembled and/or moved, a new listed double-check assembly may be required along with an analysis of the impact on the existing system. A reduced pressure zone-type (RPZ) backflow device is required when:

- Additives (e.g. antifreeze) are introduced to the system.
- Non-potable water may be introduced to the system via the fire department connection.

Municipal waterworks system mains
When a combined fire/domestic water main is proposed to serve the building, the SFMD will accept one of the following options:

- The size of the domestic connection be no more than one-fourth (1/4) the size of the main (e.g. two-inch domestic on an eight-inch main).
- Hydraulic calculations demonstrate that both fire flows and domestic water demands can be satisfied,
- If neither of the above options work or where there is a large enough water supply to meet the fire protection demand but not both fire protection and domestic, a normally open electronic solenoid valve that closes domestic supply upon sprinkler system water flow is acceptable.
Water flow tests
Flow test data shall be less than three years old or a new flow test shall be performed. In areas with a weak municipal water supply, the Minnesota State Fire Code (MSFC) allows the local fire code official to modify the outside hose allowance when an adequate alternate water supply is available. A waiver from the local fire code official must be included in the submittal.

Where an existing fire pump is to be used in a water supply, a copy of that pump test from the previous year shall be submitted. The system design shall be based on the actual pump test results, adjusted for any outside hose allowance. Existing fire pumps showing substantial deterioration from their rated flow and pressure shall be subject to corrective measures.

Water supply graphs submitted with sprinkler plans and calculations must plot the actual water supply beyond the system demand curve. Projected water supplies beyond the water supply are not acceptable. For example a 900 gpm sprinkler and hose stream demand is not acceptable when the water supply test produced 787 gpm (see graph below).

Water storage tanks
Pressure, storage, and gravity tanks shall be sized for the greatest sprinkler system demand and time duration according to the overall occupancy classification. Hose allowances need not be included if the stored water supplies sprinkler systems only. Water storage tank configurations shall be acceptable to the authority having jurisdiction (AHJ). Where tanks have automatic refill features, the refill rate can be used to reduce the tank size – see example below:

<table>
<thead>
<tr>
<th>Description</th>
<th>Sprinkler Demand</th>
<th>Duration</th>
<th>Refill Rate</th>
<th>Tank Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank w/o auto refill</td>
<td>150 gpm</td>
<td>60 minutes</td>
<td>0</td>
<td>9,000 gallons</td>
</tr>
<tr>
<td>Tank with auto refill</td>
<td>150 gpm</td>
<td>60 minutes</td>
<td>25 gpm</td>
<td>7,500 gallons</td>
</tr>
</tbody>
</table>

Questions?
Contact the SFMD 651-201-7221 or by email at fire.code@state.mn.us

Revised December 2020 (replaces FP-02 dated July 10, 2007)