



## **HYDRAULIC CALCULATION FORMS AND WATER SUPPLY INFORMATION**

**Hydraulic calculations shall be prepared on form sheets that include a summary sheet, detailed work sheets, and a graph sheet. (See NFPA 13 for copies of typical forms) The following information shall be included:**

### **General.**

- 1) Location and elevation of static and residual test gauge with relation to the riser reference point
- 2) Flow location
- 3) Static pressure, psi
- 4) Residual pressure, psi
- 5) Flow, gpm
- 6) Date
- 7) Time
- 8) Name of person who conducted the test or supplied the information
- 9) Other sources of water supply, with pressure or elevation

**Water Supply Treatment Information.** Provide documentation that the water supplies and environmental conditions shall be evaluated for the existence of microbes and conditions that contribute to microbiologically influenced corrosion (MIC). Where conditions are found that contribute to MIC, the owner(s) shall notify the sprinkler system developed to treat the system using one of the following methods:

- 1) Install a water pipe that will not be affected by the MIC microbes.
- 2) Treat all water that enters the system using an approved biocide.
- 3) Implement an approved plan for monitoring the interior conditions of the pipe at established time intervals and locations.
- 4) Install corrosion monitoring station and monitor at established intervals.

The following information shall be included with the plans when water supply treatment is provided:

- 1) Type of condition that requires treatment
- 2) Type of treatment needed to address the problem
- 3) Details of treatment plan

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**Summary Sheet.** The summary sheet shall contain the following information, where applicable:

- 1) Project name and date
- 2) Location (including street address)
- 3) Name of owner and occupant
- 4) Building number or other identification (when applicable)
- 5) Drawing Number
- 6) Remote area number
- 7) Remote area location
- 8) Description of hazard to justify the Occupancy or commodity classification
- 9) System design requirements, as follows:
  - a. Design area of water application, ft.<sup>2</sup>
  - b. Minimum rate of water application (density), gpm per sq.ft. Where sprinklers are listed with minimum water application in gpm or pressure in psi, and/or other limitations such as apply to extended coverage or other listed special sprinklers, the minimum rate of water application and/or other limitations shall be indicated on the plans and calculations.
  - c. Area per sprinkler, ft.<sup>2</sup>
- 10) Total water requirements as calculated including allowance for inside hose, outside hydrants, water curtain and exposure sprinklers, and allowance for in-rack sprinklers, gpm
- 11) Type of system and, if dry or preaction, the volume of the system in gallons, gpm
- 12) Water supply information, including the following:
  - a. Date
  - b. Flow location
  - c. Source
  - d. elevation relative to finished floor
- 13) Name and address of installing contractor
- 14) Name and address of designer
- 15) Name of approving agency
- 16) Authority having jurisdiction
- 17) Notes that include items such as peaking information for calculations performed by a computer program and any other pertinent information.

**Graph Sheet.** A graphic representation of the complete hydraulic calculation shall be plotted on semi-logarithmic graph paper ( $Q^{1.85}$ ) and shall include the following:

- 1) Water supply curve
- 2) Sprinkler system demand
- 3) Hose demand (where applicable)
- 4) In-rack sprinkler demand (where applicable)
- 5) Additional pressures supplied by a fire pump or other source (when applicable)

**Supply Analysis.** Information summarized from the graph sheet shall include the following:

- 1) Node tag at source
- 2) Static pressure in psi available at the source
- 3) Residual pressure in psi available at the source
- 4) Total flow in gpm available at the source
- 5) Available pressure in psi at the source when the total calculated demand is flowing
- 6) Total calculated demand in gpm at the source
- 7) Required pressure in psi when flowing the total calculated demand

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**Node Analysis.** Organized information regarding the node tags given to each hydraulic reference point on the system as indicated on the shop drawings shall include the following information:

- 1) Node tag for each specific point on the system used in the hydraulic calculations
- 2) Elevation in feet at each node tag
- 3) K-factor of flowing nodes (such as sprinklers)
- 4) Hose allowance in gpm requirements for the node tag
- 5) Pressure in psi at the node
- 6) Discharge in gpm calculated at the node
- 7) Notes that indicate any special requirements for the node

**Detailed Work Sheets.** Detailed work sheets or computer printout sheets shall contain the following information:

- 1) Street number
- 2) Hydraulic reference points used in each step
- 3) Sprinkler description and discharge constant (K) for the flowing reference point
- 4) Flow in gpm for the flowing reference point (when applicable)
- 5) Velocity (limited to 20 ft/sec per SJFD Ordinance)
- 6) Total flow in gpm through each step
- 7) Nominal pipe size in inches
- 8) Actual internal diameter of pipe in inches
- 9) Quantity and length in feet of each type of fitting and device
- 10) Pipe lengths in feet, center-to-center of fittings
- 11) Equivalent pipe lengths in feet of fittings and devices for the step
- 12) Total equivalent length in feet of pipes and fittings for the step
- 13) C-factor used in each step
- 14) Sum of the pressures from the previous step (starting pressure at the beginning)
- 15) Elevation head in psi between reference points
- 16) Total friction loss in psi between reference points
- 17) Required pressure in psi at each reference point
- 18) Notes and other information shall include the following:
  - a. Velocity pressure and normal pressure if included in calculations
  - b. In-rack sprinkler demand balanced to ceiling demand
  - c. Notes to indicate starting points, reference to other sheets, or to clarify data shown
  - d. Diagram to accompany gridded system calculations to indicate flow quantities and direction for lines with sprinklers operating in the remote area
  - e. Combined K-factor calculations for sprinklers on drops, armovers, or sprigs where calculations do not begin at sprinkler
  - f. The pressure loss in psi assigned the backflow device when included on a system

## **DOCUMENT REVISIONS**

This document is subject to revisions. For general information and to verify that you have the most current document, please call (408) 535-7750, and request the current version.