Coffee Break Training - Fire Protection Series

Access and Water Supplies: Fire Flow Formulas: Part 4: Introduction to the Insurance Services Office Needed Fire Flow Formula

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Learning Objective: *The student will be able to recite the Insurance Services Office (ISO) Needed Fire Flow (NFF) formula.*

The ISO "Guide for Determination of Needed Fire Flow" has been a recommended practice for calculating fire flow for many years. It is more complicated than the Iowa State University or National Fire Academy (NFA) methods but usually is employed when the fire department is establishing minimum flows for new construction rather than for emergency operations. It also is an important consideration in a jurisdiction's overall fire defense rating for insurance rates.

The distant elevated water tank above this roofline has been sized to meet the Insurance Services Office Needed Fire Flow formula for this project.

The ISO developed its NFF through historical review and analysis of large-loss fires. During the study, ISO reviewed the average fire flow that was delivered and evaluated other important factors such as construction type, occupancy, building area and exposures.

As a result of its analysis, ISO created the following NFF formula:

$$NFF_i = (C_i)\ (O_i)\ [1 + (X + P)]$$

Where:

NFF_i = Needed Fire Flow in gallons or liters per minute (gpm or Lpm)
C_i = "construction factor," including "effective area"
O_i = occupancy factor
$X + P$ = exposures and communication (openings) factor

Regardless of the variables inserted in the formula, the minimum required fire flow is 500 gpm (1,892 Lpm), and the maximum required fire flow is based on construction details as follows:

Construction Type	Max Fire Flow (gpm)	Max Fire Flow (Lpm)
Wood frame and joisted masonry	8,000	30,283
Noncombustible	6,000	22,712
Masonry noncombustible	6,000	22,712
Modified fire resistive	6,000	22,712
Fire resistive	6,000	22,712
Single-story building of any construction type	6,000	22,712

Subsequent Coffee Break Training items will explain how to select the variables for the NFF formula. For more information on fire flow, you can take the NFA online class "Testing and Evaluation of Water Supplies for Fire Protection" (Q0218) at http://1.usa.gov/12JypCa.