



Coffee Break Training - Fire Protection Series

Automatic Sprinklers: Sprinkler System Design: Pipe Schedule or Hydraulic?

No. FP-2014-30 July 29, 2014

Learning Objective: The student will be able to explain the difference between a pipe schedule and hydraulically designed sprinkler system.

For many of the early years of automatic fire suppression, fire sprinkler systems were designed using the pipe schedule method. Since the 1980s, however, almost all systems have been designed using hydraulic calculations. In fact, National Fire Protection Association 13, *Standard for the Installation of Sprinkler Systems* now prohibits the pipe schedule method except under very limited circumstances.

What's the major difference between a pipe schedule and hydraulically designed sprinkler system?

In a pipe schedule design, the sprinkler system designer had to know the hazard classification of the building or contents to be protected, the amount and duration of the water supply, and the specific placement or spacing of automatic sprinklers. Then, the designer used a table or "schedule" to select the pipe size needed to supply the sprinklers on the branch lines. The following table is an extract of one example for light-hazard occupancies.



The hydraulic nameplates mounted above the alarm check valves on these wet pipe sprinkler systems are a clear suggestion that these systems are hydraulically designed. (See Coffee Break Training FP-2012-16.)

Light-Hazard Pipe Schedule (Extract)

Pipe Dia. (inches)	Steel		Pipe Dia. (inches)	Copper	
	Diameter (mm)	Sprinklers		Diameter (mm)	Sprinklers
1	25.4	2	1	25.4	2
1 1/4	31.8	3	1 1/4	31.8	3
3	76.2	60	3	76.2	65

From the schedule, a 3-inch (76.2-millimeter) copper tube could supply 65 sprinklers, compared to 60 for steel. This is due to the fact that there is less friction loss in copper, and the copper tube's inside diameter is larger than steel's for the same nominal dimension, providing more carrying capacity.

A hydraulically designed sprinkler system, on the other hand, uses mathematical analysis of the water-carrying capacity of the pipe network to ensure that adequate water is distributed on the fire to control or suppress it. The complex mathematical calculations are usually done with proprietary computer software.

In subsequent Coffee Break Training items, we will explore hydraulically designed systems in greater detail.

For more information, consider enrolling in the National Fire Academy (NFA) course "Water-based Fire Protection System Plans Review" (R0137). Information and applications can be obtained at <http://apps.usfa.fema.gov/nfacourses/catalog/details/10542>. The course is available at NFA in Emmitsburg, Maryland, or through your state fire service training agency.



Eligible for Continuing Education Units (CEUs)
at www.usfa.fema.gov/nfaonline

For archived downloads, go to:

www.usfa.fema.gov/nfa/coffee-break/