Coffee Break Training - Fire Protection Series

Automatic Sprinklers: Sprinkler System Design: The Hydraulic Remote Area (Part 7)

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Learning Objective: *The student will be able to describe the hydraulic remote area.*

The hydraulic remote area is that portion of the system where — due to the design, components, materials and system size — it is the most **hydraulically** challenging to deliver water at the required density. The goal of hydraulic design in a sprinkler system is to provide adequate water density over the area of application while overcoming the water pressure losses due to friction and elevation.

In tall buildings, such as these high-rises, the hydraulic remote area is often at the highest area of the building.

What does that mean in practice, and why is it called "remote"?

In practice, the sprinkler designer intends to lay out the system for maximum efficiency in terms of water distribution and pipe size. Depending upon the system layout (tree, grid, looped or a variation thereof), the hydraulic remote area is the area of application **hydraulically farthest** from the source of sprinkler supply where it enters the building. This is normally called the "base of the riser."

In a dead-end or tree layout, the hydraulic remote area is almost always at the highest, most physically remote location from the base of the riser. In the high-rise buildings illustrated here, the hydraulic remote area probably occurs on the top floor because that is where it is most challenging to deliver the water. This assumption is based on a single riser supplying the automatic sprinkler system throughout the building.

However, when the sprinkler system is designed using a gridded or looped layout, the location of the hydraulic remote area may be more difficult to assess. Since gridded and looped systems employ multiple or parallel cross mains, the direction and efficiency of water flow is quite different from a tree or dead-end layout, which has the single-direction flow running through ever-decreasing pipe sizes.

In looped systems (where multiple cross mains are tied together for water to flow along more than one path to an operating sprinkler and branch lines are **not** tied together), the hydraulic remote area most often is halfway around the loop, assuming that all of the pipe is the same size and the loop is symmetrical.

In gridded systems (where parallel cross mains are connected by multiple branch lines, resulting in an operating sprinkler getting water from both ends of its branch line), the location of the hydraulic remote area is more difficult to determine. When a sprinkler designer submits plans, the submittal should be accompanied by at least two additional sets of calculations to show that the most hydraulically demanding area has been identified correctly. Because of the sophistication of the calculations, this is normally accomplished with computer programs.

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 the NFA in Emmitsburg, Maryland, or through your state fire service training agency.