



Coffee Break Training - Fire Protection Series

Automatic Sprinklers: Sprinkler System Design: Area of Application (Part 4)

No. FP-2014-33 August 19, 2014

Learning Objective: The student will be able to describe the area of application as it pertains to hydraulic sprinkler design.

Last week, we explained **density** in hydraulically calculated sprinkler system design. We also introduced the shorthand descriptor, such as 0.10/1,500 or 0.21/2,200 gallons per minute (gpm)/square feet (ft²) (4.1/139 or 8.3/204 millimeters/minute/square meters (mm/min/m²)), where density is the value to the left of the forward slash (/).

The other value, to the right of the forward slash, is the **area of application**. For design purposes, this is the area where it is assumed that all sprinklers will operate simultaneously to control a fire. So, for design purposes, the area of application cited above is 1,500 or 2,200 ft² (139 or 204 m²) respectively.

In its simplest explanation, this shorthand means that if every sprinkler in the area of application were operating simultaneously, each sprinkler would deliver 0.10 or 0.21 gpm (4.1 or 8.3 mm/min) over every square foot (m²) in the area of application. By multiplying the density by the area of application, we obtain a rough estimate of how much water would be flowing:



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Estimated Total Flow

Density/Area American Standard Units gpm/ft ²	Estimated Total Flow in Area of Application	Density/Area SI Units mm/min/m ²	Estimated Total Flow in Area of Application
0.10/1,500	0.1 x 1,500 = 150 gpm	4.1/139	4.1 x 139 = 569.9 mm/min
0.21/2,200	0.21 x 2,200 = 462 gpm	8.3/204	8.3 x 204 = 1,693.2 mm/min

Note: These are very simplistic estimates, provided solely as a comparative illustration of the relationship of density and area to flow. Actual values will differ depending upon the design, components, materials and size of the sprinkler system.

In many systems, the hydraulic remote area and area of application are the same. The hydraulic remote area is that portion of the system where — due to the design, components, materials and system size — it is **hydraulically** the most challenging to deliver water at the required density.

In a tree-layout sprinkler system, for example, the hydraulic remote area likely will be the area most physically distant from the sprinkler riser. In a gridded or looped design, the remote area may be anywhere along the system network.

Some buildings and facilities may have more than one hydraulic remote area. It is incumbent on the sprinkler designer to verify the size and placement of the hydraulic remote area on the plans. We will explain that circumstance in the next Coffee Break Training.

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.



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

For archived downloads, go to:
www.usfa.fema.gov/nfa/coffee-break/