Coffee Break Training - Fire Protection Series

Automatic Sprinklers: Sprinkler System Design: Multiple Areas of Application (Part 5)

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Learning Objective: *The student will be able to describe circumstances where a building or facility may have multiple areas of application.*

Many buildings, especially those that have a single hazard classification, often have a single required design density and area of application. However, there may be circumstances where a single sprinkler system must be designed to protect a variety of hazards. Consequently, that single system may have multiple design densities and/or areas of application.

The building in this photograph is a good example. It consists of an underground parking garage, open-plan office space, private offices, science laboratories, and accessory storage uses.

A building like this—with multiple stories and varied hazardous operations—may have more than one sprinkler design area of application.

Minimum design density and application area requirements are found in National Fire Protection Association (NFPA) 13, *Standard for the Installation of Sprinkler Systems*. The property owner, insurer, code official or sprinkler designer can specify an increase in the design density if he or she desires. The density selection should be made with sound engineering judgment. The following table provides examples of the density and area application minimums recommended by the hazard classifications of NFPA 13.

Use and Density/Area of Application Minimums From NFPA 13

Occupancy Use	Occupancy Hazard Classification	Minimum Density/Area American Standard Units gpm/ft²		Minimum Density/Area SI Units mm/min/m²	
Parking Garage	Ordinary Hazard, Group 1	0.15	1,500	6.1	139
Open-Plan Office	Light Hazard	0.10	1,500	4.1	139
Private Offices	Light Hazard	0.10	1,500	4.1	139
Science Labs	Ordinary Hazard, Group 2	0.20	1,500	8.1	139
Accessory Storage	Ordinary Hazard, Group 1	0.15	1,500	6.1	139

It is conceivable that this building might be protected by a single sprinkler system designed to deliver densities ranging from 0.10 to 0.20 gallons per minute/square foot (4.1 to 8.1 millimeters/minute/square meters) over the different hazardous locations. It would be customary to see three sets of hydraulic calculations submitted with the plans, one for each of the three different hazard classes.

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.