



Coffee Break Training - Fire Protection Series

Automatic Sprinklers: Water Spray Distribution Patterns

No. FP-2012-40 October 2, 2012

Learning Objective: The student shall be able to explain the difference in water spray distribution patterns between listed residential and control mode automatic sprinklers.

Firefighters who suppress fires with hand-held nozzles might expect that automatic sprinklers are expected to do the same: discharge water directly onto the flames to extinguish the fire. Except for special early suppression fast response (ESFR) sprinklers, that is not the case. Most sprinklers are designed to alter the overall fire environment by lowering temperatures and controlling flame spread by wetting combustible materials to prevent their ignition. A key difference between residential and commercial type sprinklers is the water distribution pattern.

Sprinklers intended for property protection must meet the performance standards established in Underwriters Laboratories (UL) Standard 199, "Automatic Sprinklers for Fire Protection Service." Their discharge pattern is designed for fire control or suppression by wetting adjacent combustibles to keep the fire from spreading. The UL standard requires that the cone-shaped spray pattern, 18 inches (457 millimeter (mm)) below the deflector, has a diameter of at least 4 feet (1,219 mm), and 4 feet (1,219 mm) below the deflector has a diameter of at least 8 feet (2,438 mm).

Residential sprinklers are tested to UL Standard 1626, "Residential Sprinklers for Fire Protection Service." Residential sprinklers are intended to control fire growth and prevent flashover in the space where fire starts. When they operate, residential sprinklers are designed to distribute water in a flat pattern to wet the upper 28 inches (711 mm) of the walls and the entire ceiling of the space where the fire occurs. This wetting action is intended to prevent flashover from the high temperatures that accumulate near the ceiling.

One effect of the difference in water distribution pattern is the importance of sprinkler spacing. The spacing rules established by the sprinkler listing, or the National Fire Protection Association (NFPA) standards (13, 13R, and 13D), are intended to assure adequate coverage by the water distribution.

See Coffee Break Training 2007-4 for additional information on the differences between residential and property protection sprinklers.



This control mode sprinkler is discharging a desirable pattern to control a fire by wetting nearby combustible materials.

