



Coffee Break Training - Fire Protection Series

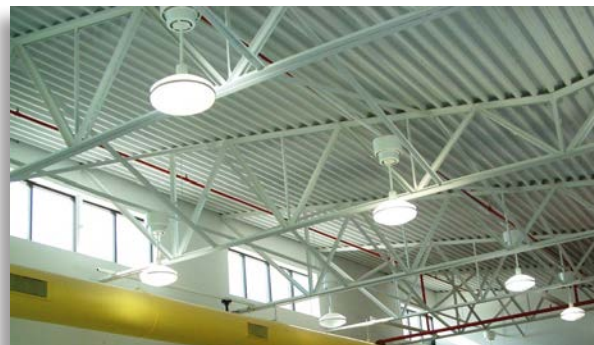
Automatic Sprinklers: Sprinkler System Design: Tree (Dead-End), Looped or Gridded? (Part 6)

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Learning Objective: The student will be able to describe the differences among tree (dead-end), looped or gridded sprinkler system layouts.

Sprinkler system designers plan their layouts to achieve both economic and hydraulic efficiency while assuring the hazard is adequately protected. They select pipe sizes for risers, mains and branch lines based on a combination of factors including such things as material size and weight, water carrying capacity, flow characteristics, and material and installation costs.

Each part of the pipe network has a definition provided by National Fire Protection Association (NFPA)13, *Standard for the Installation of Sprinkler Systems*:



The red-painted branch lines in this gymnasium sprinkler system are part of a gridded system where parallel branch lines are connected between parallel cross mains.

Sprinkler System Design Elements¹

Component	Definition
Branch Lines	The pipes supplying sprinklers, either directly or through sprigs, drops, return bends, or arm-overs.
Cross Mains	The pipes supplying the branch lines, either directly or through risers.
Feed Mains	The pipes supplying cross mains, either directly or through risers.
Risers	The vertical supply pipes in a sprinkler system.
System Riser	The aboveground horizontal or vertical pipe between the water supply and the mains (cross or feed) that contains a control valve (either directly or within its supply pipe), pressure gauge, drain, and a waterflow alarm device.

The pipe network can be laid out in one of several ways, the most common being:

Common Sprinkler System Layouts

Layout	Definition
Tree or Dead-End	A sprinkler system in which feed mains, cross mains and branch lines are supplied by and extend from a single system riser in a pattern in which pipe diameters get progressively smaller and branch lines are not tied together.
Gridded ¹	A sprinkler system in which parallel cross mains are connected by multiple branch lines, causing an operating sprinkler to receive water from both ends of its branch line while other branch lines help transfer water between cross mains.
Looped ¹	A sprinkler system in which multiple cross mains are tied together so as to provide more than one path for water to flow to an operating sprinkler and branch lines are not tied together.

For an illustration, see NFPA 13, Annex A.

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.

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