



## Coffee Break Training - Fire Protection Series

### Automatic Sprinklers: Bonding and Grounding to Sprinkler Systems

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**Learning Objective:** The student shall be able to identify the difference between bonding and grounding with water-based fire protection systems.

Fire inspectors occasionally find heavy gauge cables like the ones illustrated attached to standpipes or automatic sprinkler systems. They should take a few extra minutes to verify the purpose of these conductors before approving the fire protection system installation. An error can have catastrophic consequences.

These cables might be used for either electrical “bonding” or “grounding.” Bonding is permitted, but grounding is not.

Bonding is the process of connecting the metal in the sprinkler piping to the metal in the building (like structural steel) and provides that metal with a path to ground stray electric currents. Bonding is a safety requirement for all metal. People would be electrocuted if a stray current happened to be in the pipe and a person touched the pipe if it was without a bond to ground.

Under normal conditions, there is no current in a bonded system. Bonding of all metal systems in a building is required by National Fire Protection Association (NFPA) 70, *National Electrical Code*<sup>®</sup>. Most fittings in sprinkler systems are metal-to-metal couplings and are listed as bonding devices. A metal pipe sprinkler system that has metal underground is usually bonded automatically. Also, metal hangers that attach metal sprinkler pipes to metal structural members can also provide sufficient connection to meet the bonding requirement. For plastic pipe sprinkler systems, a simple bonding strap may be necessary near the riser to bond the metal sprinkler piping to the other metal in the building and the ground.

Grounding, on the other hand, is the use of pipe to complete an electrical circuit so that a building’s electrical system works. If an electrical system were grounded through the sprinkler system, it would mean that a current would run through the sprinkler pipe every time electricity was used in the building. Both NFPA 13, *Standard for the Installation of Sprinkler Systems*, and NFPA 24, *Standard for the Installation of Private Water Service Mains and Their Appurtenances*, prohibit the use of a sprinkler system for grounding the electrical system.

Occasionally, telephone and information technology equipment gets grounded to branch lines. Lightning rods have been grounded to standpipe risers in highrise or lowrise buildings, and heavy duty power equipment has been attached to branch lines, cross mains, or risers. None of these connections is permitted.

If you are in doubt as to whether the conductors have been connected as “bonding” or “grounding” devices, check with a qualified electrical inspector or engineer to resolve any discrepancies that might lead to tragic consequences.



This sprinkler riser is appropriately bonded to the metal building in which it is located.



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