

The bonding jumper(s) shall be sized in accordance with 250.102(D). The bonding jumper shall not be required to be larger than the largest ungrounded feeder or branch-circuit conductor supplying the building or structure.

Δ **(B) Other Metal Piping.** If installed in or attached to a building or structure, a metal piping system(s), including gas piping, that is likely to become energized shall be bonded to any of the following:

- (1) Equipment grounding conductor for the circuit that is likely to energize the piping system
- (2) Service equipment enclosure
- (3) Grounded conductor at the service
- (4) Grounding electrode conductor, if of sufficient size
- (5) One or more grounding electrodes used, if the grounding electrode conductor or bonding jumper to the grounding electrode is of sufficient size

The bonding conductor(s) or jumper(s) shall be sized in accordance with Table 250.122, and equipment grounding conductors shall be sized in accordance with Table 250.122 using the rating of the circuit that is likely to energize the piping system(s). The points of attachment of the bonding jumper(s) shall be accessible.

Informational Note No. 1: Bonding all piping and metal air ducts within the premises will provide additional safety.

Informational Note No. 2: See NFPA 54, *National Fuel Gas Code*, and NFPA 780, *Standard for the Installation of Lightning Protection Systems*, for information on gas piping systems.

Where the phrase “likely to become energized” is used in the NEC, it means that the failure of electrical insulation on a conductor can cause normally non-current-carrying metal parts to become energized. Where mechanical and electrical connections are within equipment, a failure of electrical insulation can result in the connected piping system(s) becoming energized. For example, an insulation failure in an electrical circuit of a gas range could energize the metal gas piping.

The use of an additional bonding jumper is not necessary to comply with 250.104(B), because the equipment grounding connection to the non-current-carrying metal parts of the appliance also provides a bonding connection to the metal piping attached to the appliance. Section 250.104(B) requires the gas piping system to be bonded. It does not make the gas piping part of the grounding electrode system. Therefore, this requirement does not conflict with 250.52(B)(1), which prohibits the use of metal underground gas piping as a grounding electrode. To prevent the underground gas piping from inadvertently becoming a grounding electrode, gas utilities usually provide an isolating fitting. Gas utility companies also often provide cathodic protection of their underground metal piping system.

(C) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame, is not intentionally

grounded or bonded, and is likely to become energized shall be bonded to any of the following:

- (1) Service equipment enclosure
- (2) Grounded conductor at the service
- (3) Disconnecting means for buildings or structures supplied by a feeder or branch circuit
- (4) Grounding electrode conductor, if not smaller than a conductor sized in accordance with Table 250.102(C)(1)
- (5) One or more grounding electrodes used, if the grounding electrode conductor or bonding jumper to the grounding electrode is not smaller than a conductor sized in accordance with Table 250.102(C)(1)

The bonding conductor(s) or jumper(s) shall be sized in accordance with Table 250.102(C)(1), except that it shall not be required to be larger than 3/0 AWG copper or 250 kcmil aluminum or copper-clad aluminum, and installed in accordance with 250.64(A), (B), and (E). The points of attachment of the bonding jumper(s) shall be accessible unless installed in compliance with 250.68(A), Exception No. 2.

(D) Separately Derived Systems. Metal water piping systems and structural metal that is interconnected to form a building frame shall be bonded to separately derived systems in accordance with 250.104(D)(1) through (D)(3).

(1) Metal Water Piping System(s). The grounded conductor of each separately derived system shall be bonded to the nearest accessible point of the metal water piping system(s) in the area served by each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with Table 250.102(C)(1) based on the largest ungrounded conductor of the separately derived system except that it shall not be required to be larger than 3/0 AWG copper or 250 kcmil aluminum or copper-clad aluminum.

Exception No. 1: A separate bonding jumper to the metal water piping system shall not be required if the metal water piping system is used as the grounding electrode or grounding electrode conductor for the separately derived system and the connection to the water piping system is in the area served by the separately derived system.

Exception No. 2: A separate bonding jumper to the metal water piping system shall not be required if the metal in-ground support structure is used as a grounding electrode or the metal frame of a building or structure is used as the grounding electrode conductor for a separately derived system and is bonded to the metal water piping system in the area served by the separately derived system.

(2) Structural Metal. If exposed structural metal that is interconnected to form the building frame exists in the area served by the