Bulletin 10-14-8
Equipotential Bonding of non-electrical equipment
Rules 10-700, 10-702, 10-706 and 10-708

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Supersedes Bulletin 10-14-7

Scope

(1) Equipotential bonding of interior metal gas piping (includes natural gas & propane piping)
(2) Corrugated stainless steel tubing (CSST)
(3) Equipotential bonding of metal wastewater piping

(1) Equipotential bonding of interior metal gas piping (includes natural gas & propane piping)

Rule 10-700 c) requires that interior metal gas piping in a building supplied with electric power to be made equipotential to non-current carrying conductive parts of electrical equipment.

Background

Questions have arisen regarding what needs to be bonded, what are acceptable bonding methods, and who is responsible for installing the bond conductor.

In addition to the requirements of the Ontario Electrical Safety Code (OESC), the bonding of interior metal gas piping and gas tubing is required by the Technical Standards & Safety Authority (TSSA).

The requirement in Rule 10-700 c) to provide equipotential bonding to a metal gas piping system is not intended to apply to metal gas tubing.

Bonding metal gas tubing by conventional means can create a hazardous situation where the tubing can be punctured by or by arcing between improperly secured bonding means during faults or lightning strikes.

The Ontario Gas Utilization Code, 6.14.6 of the B149.1 - 15 does not permit the underground gas piping to “be used for an electrical ground (i.e. grounding electrode). Grounding electrode(s) must be installed as per Rule 10-102 for electrical system grounding.

Where electrical wiring is present in the areas in which gas piping is installed, there is a possibility that the gas pipe, appliance or may become energized. Gas appliances, such as fireplaces and furnaces, may have electrical wiring installed right in the unit and in close proximity to the gas piping.

The intent of bonding interior metal gas piping is to minimize hazards such as:
- incidental contacts between metal gas piping and energized electrical circuits,
- accumulation of static charges, and
- stray currents and potential differences between various sections of piping and electrical equipment.

Equipotential bonding is required in buildings with metal gas piping installed at the time of construction. Bonding is also required for short sections of metal gas piping that is newly installed for fireplaces, pool heaters and other gas appliances on existing buildings. This bonding requirement applies to both natural gas and propane gas installations.

Direction

Where gas piping is installed, either the electrical contractor or the contractor installing the interior gas piping system, is permitted to bond the gas piping, as required by Rule 10-700. For example:
- Installation or replacement of gas appliances,
- Installation or modification of a gas piping system.
The building owner is responsible to ensure that the gas piping system is bonded in accordance with the OESC and as required by TSSA, where there is a replacement or upgrade of an electrical service or grounding within a building containing a gas piping system not bonded to ground, as required by Rule 10-700.

Where work is performed under Ontario Regulation 212/01 (Gaseous Fuels), it should be executed by a person competent and qualified to perform such work, as required by TSSA. See OESC Bulletin 2-3-* for Inspection requirements.

Rule 10-706 1) requires an equipotential bonding conductor to be a minimum of No. 6 AWG copper or a No. 4 AWG aluminum conductor, with approved clamps suitable for the conductor size and type when run as open wiring. When run as concealed wiring and mechanically protected Rule 10-706 2) permits the use of No. 10 AWG copper or No. 8 AWG aluminum.

A connection to electrical equipment with an equipotential bonding conductor will meet the requirement of rule 10-700. (See Diagrams B1, B2 and B3)

A direct conductive connection to electrical equipment with gas piping will also meet the requirement of this rule. (See Diagram B4)

**Note**

Care should be taken not to have aluminum bonding conductors in contact with copper piping.

![Diagram B1 – Bonding at the hot water tank](image)

Traditionally, the requirements of this rule have been satisfied by bonding the black iron pipe after the gas meter, to the nearest bonded continuous metallic cold water pipe. The contractor responsible for gas pipe bonding is to ensure that the water piping systems are electrically continuous and connected to the system grounding conductor.
Given the common use of non-metallic water piping systems, it is important to verify that cold water piping is electrically continuous and is connected to the electrical system equipment in order to use the connection shown above.

**Diagram B2**

A connection to non-current conductive carrying parts of electrical equipment with an equipotential bonding conductor.

The corrugated stainless steel tubing in yellow is not to be used as a bonding means for the gas piping.

**Diagram B3**

A connection to non-current carrying conductive parts of electrical equipment with an equipotential bonding conductor.

CSST is **not** pipe and is not to be used as a bonding means.
A direct conductive connection of gas piping to gas fired equipment that is also supplied by an electrical circuit with a bonding conductor will make the gas piping equipotential to electrical equipment.

(2) Corrugated Stainless Steel Tubing (CSST)

The OESC does not include requirements for bonding Corrugated Stainless Steel Tubing (CSST), (Photo B1). If bonding is necessary, the location of bonding connections and connection method should be according to the manufacturer's directions and shall meet the requirement of the TSSA.

Photo B1 – Typical Corrugated Stainless Steel Tubing
(3) Equipotential bonding of metal wastewater piping

Rule 10-700 b) requires that continuous metal wastewater piping of a building supplied with electric power to be made equipotential to non-current carrying conductive parts of electrical equipment.

The section of the metal wastewater piping that shall be bonded is the section that is in contact with the earth. For the purposes of the Rule, that will be considered a continuous system. Once there is an insulating section, or an insulating type coupling, the portion beyond need not be bonded to the electrical ground and will not be considered part of the continuous drain system.

The routing and use of the drain is more important than the length. The major concern in the Rule is voltage differences. A length of drain, which is continuous from where it contacts a remote ground, is of more concern than a length which is isolated at some point and then continues for some distance. The latter has no ground reference and can transfer no potential, the former can.