



Corrugated Stainless Steel Tubing (CSST) Bonding

International Fuel Gas Code 310.1.1

CSST gas piping systems must be bonded to the electrical service grounding electrode system at the point where the gas service enters the building. The bonding jumper must connect to a metallic pipe or fitting between the point of delivery and the first downstream CSST fitting. The bonding jumper must not be smaller than 6 AWG copper wire or equivalent.

- Attach clamp downstream of gas meter at nearest point indoors or outdoors
- Location must be between Gas Meter and First CSST fitting
- Attach UL467 listed clamp to Black Iron Pipe
- If there is no Black Iron Pipe then attach to the first CSST fitting

Figure 1: Bonding Clamp Attachment to Pipe

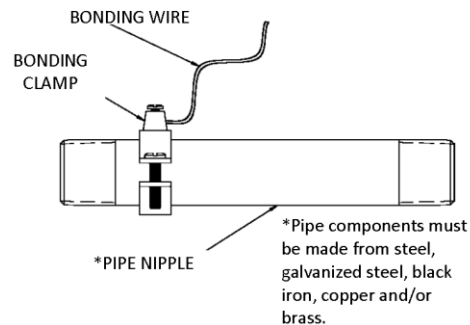
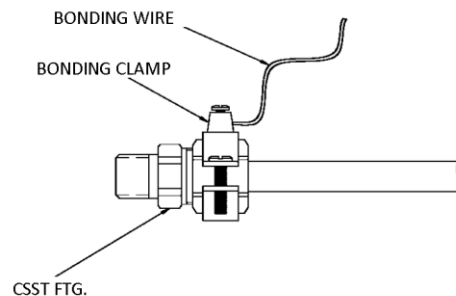


Figure 2: Bonding Clamp on CSST Fitting



- Use a 6 AWG copper wire not longer than 75' from the clamp to the:
 - Grounding Electrode or
 - Grounding Electrode conductor or
 - Grounded Conductor Terminal Bar in the service panel or
 - Electrical Service Equipment Enclosure
- Do not bury connections in the floors or walls
- Do not attach clamps directly to CSST tubing
- Do not attach to an independent or non-bonded ground rod
- Avoid contact or parallel runs of CSST with metal components such as conduits, recessed lights, ductwork, or furnace/fireplace/appliance flues

Direct Bonding of Standard (Yellow) CSST

Direct bonding is required for gas piping systems incorporating standard (yellow) or uncoated CSST whether or not the connected gas equipment is electrically powered. This requirement is provided as part of the manufacturer's instruction for single-family and multi-family buildings and required by the 2009 and later editions of the National Fuel Gas Code, the International Fuel Gas Code and the Uniform Plumbing Code. A person knowledgeable in electrical system design, the local electrical code and these requirements should specify the bonding for commercial applications.

Standard CSST installed inside or attached to a building or structure shall be electrically continuous and direct-bonded to the electrical ground system of the premises in which it is installed. The gas piping system shall be considered to be direct-bonded when installed in accordance with the following:

The bonding conductor is permanently and directly connected to the electrical service equipment enclosure, the grounded conductor at the electrical service, the grounding electrode conductor, or to one or more of the grounding electrodes used. When an additional grounding electrode(s) is used for the gas service, it shall be bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding system. For single and multi-family structures a single bond connection shall be made on an accessible rigid piping component or CSST fitting located downstream of the utility gas meter or second-stage LP regulator. The bonding clamp attachment point may be at any location within the gas piping system. However, the shortest practical bonding wire length will improve the effectiveness of the direct-bond. The corrugated stainless steel tubing portion of the gas piping system shall not be used as the point of attachment of the bonding clamp under any circumstances. (Fig. 1, 2)

The bonding conductor shall be no smaller than a 6 AWG copper wire or equivalent. The bonding conductor shall be installed and protected in accordance with the *National Electrical Code, NFPA 70, (NEC)* and *Canadian Electrical Code CSA-C22.1 (CEC)*. Bonding/grounding clamps shall be installed in accordance with its listing per UL 467 and shall make metal-to-metal contact with a rigid pipe component or CSST fitting. This direct-bond is in addition to any other bonding requirements as specified by local codes for ground fault protection.

The 2015 edition of the National Fuel Gas Code, International Fuel Gas Code, and Uniform Plumbing Code limits the length of the bonding conductor to 75-ft. When there are no local code requirements for the length of this conductor refer to the manufactures instructions or the NEC / CEC for guidance regarding the permissible length of the bonding conductor.

Figure 1: Bonding Clamp Attachment to Pipe

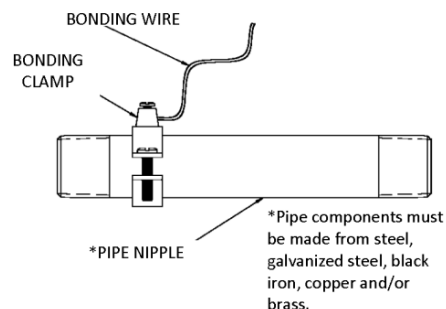
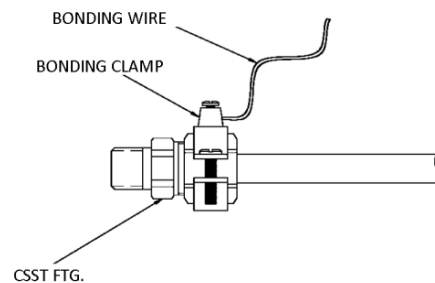


Figure 2: Bonding Clamp on CSST Fitting



Manufactures of black jacketed CSST products which have been tested and listed to ICC-ES LC 1024, "CSST Utilizing a Protective Jacket", may not require or include in their instructions the additional direct-bonding step that is required with standard (yellow) CSST products. However local codes may be more restrictive and may differ from manufacturer's requirements. Local codes take precedence and must be adhered to.