

# **Parflex**<sup>®</sup>

Flexible Gas Piping System

## Design and Installation Guide

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# Caution!

This design manual provides basic guidelines to follow in the design, installation, testing, repairing or use ("Application") of fuel gas piping systems using Parker Parflex™ corrugated stainless steel tubing, systems and related accessories ("CSST"). The Application procedures must comply with local building codes. When local codes do not exist, Application must comply with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 (USA) or Installation Codes Canadian CGA B149.1 and B149.2. Please see the entire Parflex System Design and Installation Guide for complete instructions.


Care must be taken to ensure that proper engineering practices and procedures are followed in the Application of the gas piping system. All Parker CSST must be installed by trained and qualified installers. Only components specified and sold by Parker as part of the Parflex system are to be used. All installed CSST must be tested and pass inspection by local authority having jurisdiction before being placed into service.

This Design and Installation Guide has been prepared in accordance with:


- The American National Standard, Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing, ANSI LC1.
- CGA Laboratory Requirement—Flexible Gas Tubing for Natural and Propane Gas Piping Systems, No. LAB-009, CGA 6.26.





## WARNING

 **WARNING:** Failure or improper Application of CSST used to convey fuel gas such as natural gas or propane in building structures can cause death, personal injury and property damage. Possible consequences of failure or improper Application of these Products include but are not limited to:

- Holes and leaks in the CSST caused by electrical arcing between the tubing and an adjacent metal object such as a furnace duct, caused by lightning.
- Holes and leaks in the CSST caused by puncture by nails, drills, or other sharp objects.
- Holes and leaks in the CSST caused by kinking.
- Leaks in the fittings or other accessories
- Fires or explosion or burning of the conveyed gas, or asphyxiation from the conveyed gas, resulting from holes and leaks.

 **ASPHYXIATION HAZARD:** Natural gas, propane or other fuel gas that has leaked from CSST can cause asphyxiation.

 **EXPLOSION HAZARD:** Natural gas, propane or other fuel gas that has leaked from CSST can become explosive.

 **FIRE HAZARD:** Natural gas, propane or other fuel gas that has leaked from CSST is flammable

Only a Qualified Installer can install or repair the CSST. Additionally, because the Qualified Installer is usually not an electrician but electrical code requirements apply to gas piping in buildings, a state certified electrician must assure that all required electrical bonding and grounding of metal systems in the building (including the gas piping system) has been completed and is functional. Failure to install and maintain required bonding and grounding of metal systems including gas piping systems in buildings can cause electrical arcing (sparks) and fires from leaking gas. NFPA 70 National Electrical Code and NFPA 54 National Fuel Gas Code require grounding and bonding for above ground gas piping systems that may become electrically energized, such as by direct or indirect lightning strikes. Before any Application of CSST, it is important that you read and follow the instructions below and the Design and Installation Guide provided by the manufacturer. Visit [www.parflexsystem.com](http://www.parflexsystem.com) for a complete of the Design and Installation Guide and additional information.

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**Section 4.0 Installation Practices**

**4.10 Minimum Electrical Bonding and Grounding**

Lightning is a known highly destructive force. In the event of high energy from a lightning strike (which can be a direct strike or an indirect strike to nearby objects), CSST can momentarily be at a much higher or lower electrical potential than adjacent metal systems in the building such as heating ducts, copper pipes and wire and telecommunication wires. If this occurs, an electric spark may arc between the CSST and adjacent metal systems. This arcing can melt holes and cause leaks in the CSST.

According to the National Fuel Gas Code NFPA 54/ANSI Z223, “each above ground portion of a gas piping system which is likely to become energized shall be electrically continuous and bonded to a designed, permanent, low-impedance effective ground fault current path.” Parker requires that every above ground portion of the Parflex CSST System is electrically bonded and grounded in accordance with NFPA 70 (NEC® Section 250).

A permanent electrical connection to the earth must be made by bonding the CSST to the grounding system through the use of a bonding clamp and wire in accordance with the National Electric Code, Section 250 (NFPA 70). This bonding point must be in as close proximity to the electrical panel as possible; close proximity of the bonding point to the gas meter is also desirable if possible. The wire gauge for bonding must be sized, at a minimum, for the full amperage available through the electrical service (per NEC®) and no smaller than a 6 AWG copper wire. Bonding clamps used on the The Parflex System must be attached to a Parflex brass fitting (Figure 1), a steel manifold (Figure 2) or to a rigid pipe component connected to a Parflex fitting. The CSST portion of the gas piping system must not be used for the bonding attachment (Figure 3). CSST also must not be used as a grounding electrode or as the grounding path for appliance or electrical systems. The latest edition of the National Electric Code (NEC®) should be consulted for additional requirements and specific techniques for equipotential bonding and grounding.

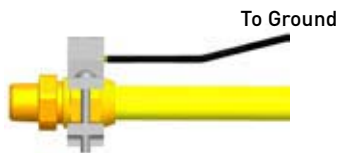


Figure 1: Proper bond attachment on fitting

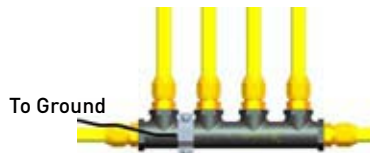


Figure 2: Proper bond attachment on manifold

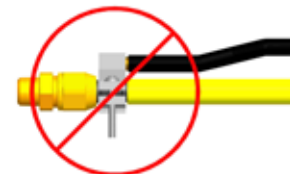


Figure 3: Unacceptable bond attachment on CSST

CSST must be routed as far as possible from all conductive materials in the building such as metal ducts, metal water pipes and electrical wires and cables. See Figure 4

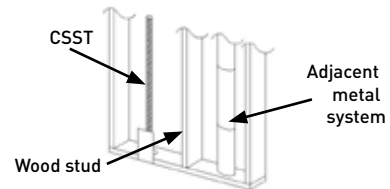


Figure 4: Routing CSST as far as possible from adjacent metal systems. Bonding and Grounding of adjacent metal is recommended.

**4.11 Additional Recommended Equipotential Bonding**

Equipotential bonding consists of making a low impedance electrical connection between the CSST and any adjacent metal structures to create a uniform electrical potential. Adjacent metal systems can include but are not limited to appliances, metal vents, flues, electrical wires and metal pipes. Bonding and grounding of all electrically conductive metal systems and metallic structural material is recommended.

In order to further increase protection of an entire building structure from potential lightning damage, the installer and user should consider the installation of a lightning protection system pursuant to NFPA 780 or other recognized standard, particularly those in geographical areas prone to lightning strikes.