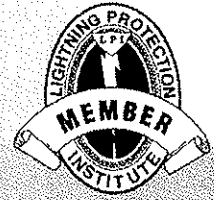


LPI TECH LETTER



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Bonding of Gas Lines

The purpose of this Tech Letter is to address an issue that surfaces out in the field on lightning protection installations and system inspections, and in the office through questions from fire professionals, utility workers, contractors and sometimes engineers. An unfounded belief continues to exist with regard to bonding connections for gas lines. There is an incorrect school of thought that gas line bonds should be removed to prevent lightning being directed to the gas line or prevent use of the gas system as an avenue for grounding. For clarification on this issue, we can find supporting documentation in the safety standards.

Interpreting the Safety Standards & Codes

The National Fire Protection Association (NFPA 780) Safety Standard and the National Electrical Code (NEC), both require the inter-connection of all metallic piping

systems inside a structure to stop potential differences which create arcing between differently derived (grounded) systems. The connection (bonding) must be made on the "customer" side of the meter to assure there is no negative effect on any cathodic protection used on transmission lines. When a connection is on the building side of the isolation fitting, compliance with the safety standards and codes is enforced. It is dangerous to remove such a bond, because of the side-flash potential between the systems within a structure.

In addition to the danger, a utility company has no right to remove a customer-owned bonding connection. Any utility company or local "authority" who removes such a bond is creating a hazard, and is initiating a procedure that does not comply with NFPA 780 (which is not necessarily adopted by all local authorities) and NEC (which is generally adopted by all "authorities having jurisdiction").

It is proven that the lightning protection system provides a superior ground path as compared to an isolated gas transmission system. In the reverse circumstance, where

lightning attaches to a gas transmission system, jumps the isolation fitting and approaches the interior of the building, the lightning protection bond would serve to protect against infiltration. It is important to note that this is not only a code violation from an electrical standpoint, but is also acknowledged in the gas codes. In part 192 of the Minimum Federal Safety Standards, "Transportation of Natural or Other Gas by Pipeline" in Section 192.467 titled External Corrosion Control: Electrical Isolation (under paragraph f), we find the following statement:

"Where a pipeline is located in close proximity to electrical transmission tower footings, ground cables or counterpoise, or in other areas where fault currents of unusual risk of lightning may be anticipated, it must be provided with protection against damage due to fault currents or lightning, and protective measures must also be taken at insulating devices."

For further information, members can refer to this exact wording at the following web address:

http://www.tsi.dot.gov/divisions/pipeline/amdts_mas_docs/192mas.pdf

Resolving the Issue With the Customer

So, why must gas lines always be connected? In a nutshell, bonding provides a common potential for all items within the structure to avoid side-flashing from the lightning protection system to anything associated with the gas inside. To reiterate, the gas utility may provide a system of cathodic protection to protect their underground lines. This protection would be defeated by a grounding system, therefore, the lightning protection contractor implements the connection on the customer side of the meter, NOT on the utility side. In the event that there are various points of entry for the gas to the structure, only one connection is generally needed between systems within the first 12 ft. above grade – as long as everything is continuous. Multiple isolated gas line entrances to a structure may require a connection to each separate line. Gas lines that extend up on the roof, particularly those found on a commercial construction site should be bonded at the top and bottom of their elevations.

If utility officials object to the gas bonding, remove it, or require that you remove the bond, it is important for the lightning protection specialist to get this request in writing so that responsibility for creating this safety hazard rests squarely on them. The gas company and/or official making the

request should provide the lightning protection specialist with documentation, explaining their desire to violate National Safety Standards

and cause the structure to be improperly protected from lightning. Without the required bond, the structure could be at risk.

Where to Find Reference in the Safety Standards

- **LPI-175 2004 Edition** – Common Grounding/Water Pipe – Paragraph 107/pg.31
- **NFPA 780 2004 Edition** – Interconnections with piping systems are covered in Section 4.14-Common Grounding:
 - 4.14.1 General. All grounding media in or on a structure shall be interconnected to provide common ground potential.
 - 4.14.1.1 This interconnection shall include lightning protection, electric service, telephone, and antenna system grounds, as well as underground metallic piping systems.
 - 4.14.1.2 Underground metallic piping systems shall include water service, well casings located within 7.6m (25 ft.) of the structure, gas piping, underground conduits, underground liquefied petroleum gas piping systems, and so on.
 - 4.14.1.3 Interconnection to a gas line shall be made on the customer's side of the meter.
 - 4.14.1.4 main size lightning conductors shall be used for interconnecting these grounding systems to the lightning protection system.
- **UL96A** – Common Grounds - Paragraph 8.4.1
- **NEC (NFPA 70) 2005 Edition** – Section 250.104 Bonding of Piping Systems and Exposed Structural Steel, and Section 250.106 Lightning Protection Systems.

Note: It is important to reference that the Lightning Protection Safety Standard, NFPA 780 is not in conflict with information found in NFPA 54 (the National Fuel Gas Code). Confirmation with regard to the NFPA 780 and NFPA 54 requirements for gas line bonding can be obtained from NFPA directly, by contacting the NFPA Standards Administration at 617-770-3000.