Position Statement

Protection of Corrugated Stainless Steel Tubing (CSST) from Lightning Strikes

Submitted by the IAFC Fire & Life Safety Section

The International Association of Fire Chiefs (IAFC) adopts the position the International Fuel Gas Code and other fuel gas code references should be updated to recognize the LC1027 standard when Corrugated Stainless Steel Tubing (CSST) gas piping is used in new construction.

Problem Statement

Domestic fuel gas installations using Corrugated Stainless Steel Tubing (CSST) in accordance with the provisions of the ICC International Fuel Gas Code and NFPA National Fuel Gas Code (NFPA 54) and NFPA Liquefied Petroleum Gas Code (NFPA 58) have led to an increased incidence of fires in dwellings due to leaks and ignitions caused by lightning strikes. Efforts to reduce the likelihood of leaks by introducing bonding requirements in 2009 have not significantly reduced the occurrence of fires involving products that meet the current product standards governing CSST performance.

Background Information

The installation and use of Corrugated Stainless Steel Tubing (CSST) in fuel gas installations (beyond appliance connections alone) became permissible in many jurisdictions across the United States beginning in the mid-1990s. Since that time, the use of this material has proliferated due to greatly reduced installation costs. An estimated five (5) million homes may have been constructed using this fuel gas product over that period.

Since the use of CSST became widespread, jurisdictions in lightning-prone areas have witnessed a significant increase in the incidence of fires involving CSST following lightning events. Although the precise number of these incidents is difficult to estimate, anecdotal evidence collected by fire officials at the state and local levels suggest the use of CSST for fuel gas installations in areas with high incidence of lightning strikes may increase the likelihood of fires by 10 times compared with other dwellings not equipped with CSST.

Current code requirements reference listing requirements for CSST that do not adequately address protection from lightning. During lighting strikes involving CSST-equipped dwellings, stray current follows the shortest available ground path to reach earth. In many instances, this results in the CSST becoming energized. In instances where the CSST is located in close proximity to piped services, electrical conductors, or HVAC ducts, arcing can occur. When this arcing occurs near bends or flexed points in the

CSST tubing, leaks can develop, resulting in ignition of the escaping fuel gas. When this occurs, multiple points of origin may appear evident.

Efforts to Address the Problem

The National Association of State Fire Marshals (NASFM) has spearheaded efforts to raise awareness of this problem in affected jurisdictions and share information about the problem across the United States. The Lightning Protection Institute recently joined their efforts and endorsed measures to introduce requirements beyond the bonding provisions introduced beginning in 2009.

These measures include the introduction of new product standards for CSST intended for use in new construction. This standard LC1027, established by the ICC-ES, a subsidiary of the International Code Council, has already been developed, but is not yet recognized by the model codes or product testing agencies. The introduction of such a standard would not affect existing installations already prone to these fires.

Efforts to educate homeowners, insurers, fuel gas suppliers, and other regulators of the problems associated with CSST in lightning-prone areas have had limited effect, as demonstrated by the low uptake and compliance with the previously introduced bonding requirements.

Remedies Sought

Reducing the incidence and consequences of fires involving CSST requires separate remedies for new and existing construction due to the limited reach of retrospective regulations in domestic dwellings. Nevertheless, the Fire and Life Safety Section strongly urges the IAFC and its members to support the adoption of the following recommended changes in legislation:

1. New construction: Propose the adoption of changes to Section 403.5.4 of the International Fuel Gas Code, Section 5.6.3.4 of NFPA 54- 2015 edition, and Section 5.11.1.2 of NFPA 58-2017 edition, requiring CSST in all new installations, including new installations in existing buildings, to comply with LC 1027.

2. Existing construction: Propose new real property transfer regulations in each state that would require homeowners to disclose the installation and hazards of CSST that does not meet LC 1027 in homes located in areas with a ground flash density greater than 4 flashes/km^2/yr as recorded by the National Lightning Detection Network.

Technical Supporting Publications

Fire Protection Research Foundation, Validation of Installation Methods for CSST Gas Piping to Mitigate Lightning Related Damage, Phase 1, Final Report, Prepared by: SEFTIM, ©April 2011 Fire Protection Research Foundation.

SAE ARP5412B Aerospace Recomm4ended Practice, 'Aircraft Lighting Environment and Related Test Waveforms'

National Association of State Fire Marshals (NASFM) 'Comparison of protective-jacketed CSST Listing Tests'

Reference:

1. National Fire Protection Association, NFPA 54 (2015 edition) National Fuel Gas Code
2. International Code Council, International Fuel Gas Code
3. National Fire Protection Association, NFPA 58 (2017 edition) Liquefied Petroleum Gas Code

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