CSST
Corrugated Stainless Steel Tubing & Lightning Protection
Overview

- What is CSST?
- Composition
- History
- Manufacturers
- Lawsuit
- Standards & Requirements
- Damages/Hazzards
- Recent Events
- Future
What is CSST

- A flexible stainless steel piping material used for natural gas & propane installations.
- Utilized in commercial & residential construction.
- Sizes range from 3/8” up to 2” diameter.
- Bendable and easy to install.
Typical Installation

- Entry a larger pipe (CSST or black iron)
- Runs to manifold
- Distributed to each point of use. One pipe for every application
Figure 2  Clamp Attached to Rigid Pipe
Composition

- Usually yellow jacketed.
- Thin, stainless steel, wall tubing.
  - .008” thick on most products
History

- Introduced to US in the early 1980’s from Japan.
- During all the standards development, no testing for lightning resistance or reaction within buildings.
- Biggest selling point is labor savings for Contractors.
- Estimates at over 55 million linear feet sold per year.
<table>
<thead>
<tr>
<th>Manufacturers</th>
<th>Trade Name</th>
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<tbody>
<tr>
<td>Ward Manufacturing</td>
<td>Wardflex</td>
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<tr>
<td>115 Gulick Street</td>
<td>Tracpipe, Counter-strike</td>
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<tr>
<td>Blossburg, PA 16912</td>
<td>Gastite</td>
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<td>[<a href="http://www.wardmfg.com/">http://www.wardmfg.com/</a>]</td>
<td>Parflex</td>
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<td>Omegaflex</td>
<td>Proflex CSST</td>
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<tr>
<td>260 North Elm Street</td>
<td>Diamondback Flexible Gas Pipe</td>
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<tr>
<td>Westfield, MA 01085</td>
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<tr>
<td>[<a href="http://www.tracpipe.com/">http://www.tracpipe.com/</a>]</td>
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<td>Gastite</td>
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<tr>
<td>603 Hendee Street</td>
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<tr>
<td>Springfield, MA 01139</td>
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<td>[<a href="http://www.gastite.com/">http://www.gastite.com/</a>]</td>
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<td>Parker Hannifin Corporation</td>
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<td>Parflex Division</td>
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<tr>
<td>1300 North Freedom Street</td>
<td></td>
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<tr>
<td>Ravenna, OH 44266</td>
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<td>[<a href="http://www.parker.com/parflexsystem/">http://www.parker.com/parflexsystem/</a>]</td>
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<tr>
<td>Tru-Flex Metal Hose</td>
<td></td>
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<tr>
<td>PO Box 85</td>
<td></td>
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<tr>
<td>Howell, MI 48844</td>
<td></td>
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<tr>
<td>[<a href="http://www.tru-flex.com/">http://www.tru-flex.com/</a>]</td>
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<tr>
<td>Metal-Fab Inc.</td>
<td></td>
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<tr>
<td>3025 May Avenue</td>
<td></td>
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<tr>
<td>Wichita, KS 67201</td>
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<td>[<a href="http://www.mtlfab.com/">http://www.mtlfab.com/</a>]</td>
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Most people aware of the settlement and associated program?
At time, national standards very vague on how to ground. Court settlement bonding requirements exceeded the codes.
National Standards, Codes & Manufacturer’s Requirements

- **NFPA 780-2008**
  - Section 4.14 Common Grounding

- **NEC: 250.104(b) Other Metal Piping**
  - “Where installed in or attached to a building or structure, a metal piping system(s), including gas piping, that is likely to become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or the one or more grounding electrodes used.”
    
    » **Not mandatory requirement to bond CSST directly to grounding system**

- **NEC 110.3(B) Installation & Use**
  - “Listed or labeled equipment shall be used in accordance with any instructions included in the listing or labeling.”
    
    » **Pretty Vague**
National Standards, Codes & Manufacturer’s Requirements

- NFPA 54/ANSI Z223.1 2009 Edition
  - Section 7.13
    - “7.13.1 Pipe & Tubing other than CSST”
    - “7.13.2 CSST. CSST gas piping systems shall be bonded to the electrical service grounding electrode system at the point where the gas service enters the building. The bonding jumper shall not be smaller than 6 AWG copper wire or equivalent.”
    - “7.13.4 Lightning Protection Systems. Where a lightning protection system is installed, the bonding of the gas piping shall be in accordance with NFPA 780, Standard for Lightning Protection Systems.”

- Manufacturers’ Technical Bulletin
  All Manufactures of CSST have a technical bulletin that mirrors NFPA 54 for bonding.
What to look for!
Damages & Hazzards
CSST blown out of black iron
CSST run beneath peak in attic space
CSST above master Bedroom
Another view of A.T. at peak
Melted 3/8 Copper Air Terminal
Recent Events

- **Massachusetts**
  - Nov. 26, 2008 Board of State Examiner of Plumbers & Gas Fitters Temporarily rescind approval of all CSST products in State.
  - Feb 4, 2009 Board reinstates previously approved CSST in MA. Citing evidence provided in form of results from testing at Lightning Technologies.

- **New York State**
  - July 24, 2008 Building Code Council emergency adoption of new bonding requirements for CSST.

- **IN, VA, MN & GA** code changes for bonding of CSST.
Moving Forward

- **Scope of work**
  - Plumbing installer to subcontract grounding work to electrical?

- **LSA proposal to NFPA Research Foundation**
  - Try and find arc sensitivity value.

- **Lightning Technologies**
  - Tested Tracpipe
    - Test Data requested by the LSA twice…no response

- **As an industry – We should exceed what all the current Codes & Standards require.**
  - USE THE SETTLEMENT SCHEMATIC AS OUR GUIDELINE FOR BONDING TOP & BOTTOM!!
Credits

- Torbin, Robert, “CSST: Direct Bonding Required For All Brands”, Dec 2008
- Circuit Court of Clark County, AR, Case No. CIV-2004-211 “Stipulation and Settlement Agreement.”
- Bonded Lightning Protection, Argyle, TX “Grounding and Bonding requirements of TPV as specified in Settlement Agreement”
- Carmody, Mike, “Concerns about CSST Gas Lines – “Grounded in Reality?”
- FAQ Titeflex.com
- Goodsen, Mark, Hergenrether, Mark, “Investigating the Causal Link between Lightning Strikes, CSST and Fires”
Credits

- IAMPO, Uniform Mechanical Code 2006
- IAMPO, Uniform Plumbing Code 2003
- Product Alert – Ground and Bond, Parflex Flexible gas Piping System, Parker Hannifan Corp.
- Wardflex Technical Bulletin
Photo Credits

- Bonded Lightning Protection, Argyle, TX
- Charles Ackerman, East Coast Lightning Equipment, Winsted, CT
- Donan Engineering Co., Louisville, KY
- WE Energies, “Corrugated Stainless Steel Tubing Policy Requirements
- David McAfee, PE, SFPE, Fire Protection Engineering
- “Lightning Safety Recommendations for Gas Piping Systems”, Omegaflex,
- Robert Cooper, Associated Lightning Rod Company, Millerton, N.Y.
- Wardflex Website, www.wardflex.com
- Tracpipe Website, www.tracpipe.com