Case Study LNG #5

Vacuum Insulated Pipe (VIP) for LNG Fueling Stations

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Highlights:

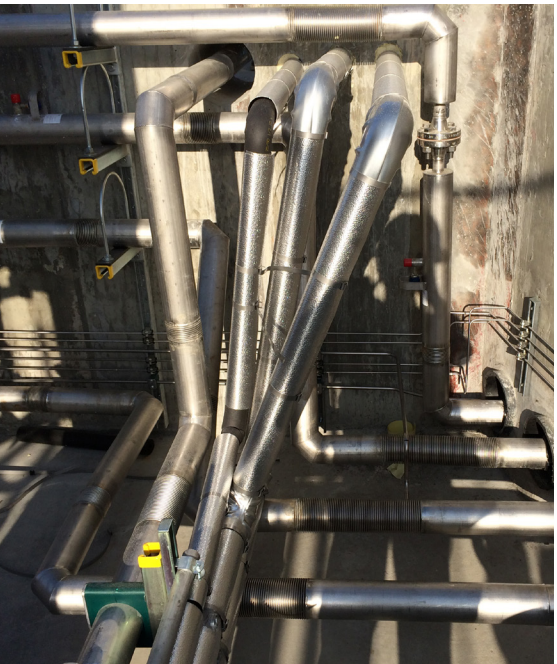
Location — 20 Fueling Stations across the US

Scope of Project:

- Factory built & tested VIP skids
- Installed on LNG fueling stations designed to fill up to 150 trucks per day

Customer Quote:

"The VIP bolted right up and the fit was right on the money. I was impressed with the knowledge of the Chart team and the quality and accuracy of the installation."



Application:

VIP for LNG use on multiple fueling stations that was easy to install, economical to maintain, and could be easily replicated on future stations.

Project Background:

Major Energy Company wanted to design and build a select number of LNG fueling stations across the US. In order to mitigate risk and ensure profitability for the venture, they needed a way to distribute and dispense LNG in the most reliable and cost-effective manner possible, which could be easily replicated at new fueling station sites as needed. The piping system would need the lowest maintenance solution available in the industry.

Solution:

The energy company contracted Chart Inc. to design, manufacture and commission 20 LNG fueling stations, the first of which opened in May 2014 in California. The stations are built in a phased approach based on the success of the first few locations, with each station designed to fill up to 150 trucks per day.

As part of applying its 50+ years of experience toward ensuring a safe, dependable and profitable configuration, Chart recommended using vacuum insulated pipe (VIP) instead of mechanically insulated pipe (MIP) to distribute LNG from the onsite storage vessel to the LNG dispensers.

Chart VIP has a higher purchase price than MIP, but it offers several advantages that will greatly reduce long-term costs for the station owner. Those include a double-wall design that decreases heat leakage by 90% and acts as a secondary barrier for safety, while preserving the maximum amount of energy per volume of LNG to ensure superior MPG performance for end-users. The typical VIP installation also offers a functional life up to 10 times longer than that of MIP.

System Configuration:

- 200 ft of 2" ID VIP
- Connecting manifolds
- VIP skids installation and onsite testing includes in the start-up and commissioning support of the total LNG fueling station(s)

Significant Accomplishments:

- Low heat leak and low pressure drop
- Reduced transport costs, ease of installation and ease of service
- Full system includes design for efficient recovery & reuse of vented LNG
- Minimal vibration between the pumps and distribution system
- Maximum temperature expansion and contraction compensation