

Tank Level Measurement with Multi-Point Thermocouple

Case A080201

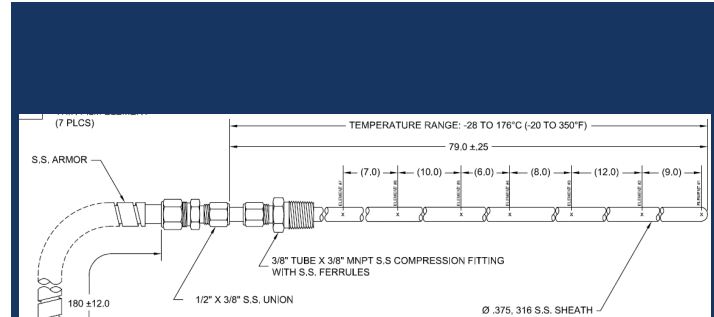
Application

Multi-point temperature sensors have long been used for profiling the temperature across a medium. They have been installed in petrochemical storage tanks to determine tank level and to profile the vertical temperature gradient as to accurately determine the specific gravity and in turn, total liquid volume.

A chemical manufacturer wanted to measure the level of a highly corrosive and dangerous fluid in a tank by monitoring the temperature at several points over the 20 foot depth. A multi-point thermocouple with a couple exclusive features to deal with the hazards was chosen as the solution.

Challenge

The proprietary chemical was processed in a large tank of 20 foot depth. Temperature measurement was required every foot for a total of 20 points. All had to be contained inside a 1/2" diameter tube made of Hastelloy. The only location available to install the probe was through a small port in the side of the tank near the top. As is sometimes the case, the details for instrument installation are not considered during the vessel design and that leads to some creative ways to adapt to what's there!



Multi-Point Thermocouple

Solution

Working closely with the customer design and instrumentation engineers we conceived of the above design. A large radius 90 degree bend at the top would allow the probe to be installed through the side port in the tank and sealed with a compression fitting. A port was added to the 1/2" tube for a pressure monitoring gauge that would indicate a change in pressure inside the tube should it ever fail. Next to it was another fitting where a knife valve was installed that was activated to seal off the tube if the pressure gauge should ever indicate a failure.

All materials and fittings were specified in Hastelloy with material certifications and positive material identification (PMI) required. X-ray inspection of the probe verified the thermocouple locations and non-destructive inspection of the welded tip section insured a leak free installation.